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# **2014 COMPETITIVENESS REPORT**

A Resilient Economy



LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG Ministère de l'Économie

Observatoire de la compétitivité

# **2014 COMPETITIVENESS REPORT**

A Resilient Economy

The "Perspectives de Politique Économique" series includes reports, studies, research results or summaries of conferences commanded by or carried out by employees of the Ministry of the Economy or by experts of associated institutions.

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# 2014 Competitiveness Report

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# Preface

Luxembourg's real GDP is expected to grow more rapidly than that of the euro area. However the more pessimistic outlook of the euro area, which is absorbing most of our exports, will eventually weigh on the economic growth of our country. Furthermore, the euro area is constrained to reform in a rather difficult context, namely the citizens' disaffection with the European project and a near stagnation of activity. It is hoped that the new European Commission will tackle a coordinated recovery of the economy by granting the Member States the necessary flexibility to develop the public investment in infrastructure, research, education or protection of the environment. Hopefully the change of head of the Executive in Brussels puts an end to austerity policies and neo-liberal reforms imposed by financial markets.



This should not prevent Luxembourg from positioning itself favourably in the international competition. According to the results of the national competitiveness scoreboard, a tool for analysing structural competitiveness, Luxembourg takes 6th place among the 28 EU Member States. This result is one to be proud of. After ten years of good and reliable service, it seems reasonable to scrutinize the scoreboard for possible improvements and to review the relevance, quality and scope of statistics. A review has become indispensable. The scoreboard is thus currently being examined by the social partners in the Economic and Social Council. I do expect a more solid and more reliable scoreboard, consistent with other indicators such as the ones of the future *"PlBienêtre"* ("GDProsperity"). Many indicators entered the sphere of European politics with the Europe 2020 strategy and the macroeconomic imbalances procedure, which makes it necessary for them to also enter the sphere of Luxembourg's politics.

The *Observatoire* follows dozens of international benchmarks featuring Luxembourg. These benchmarks supply useful information to economic agents and help understand why certain countries perform better than others. These benchmarks have also to be useful to the government by pointing where is the rub, as is the case for the ranking "Doing business" of the World Bank. Rather than simply accepting the description of problems, their roots need to be properly examined in order to be able to fix them. In the 2014 edition of the Competitiveness Report, the Observatoire de la compétitivité has dedicated a chapter to the analysis of the impact of new priority sectors the government wishes to actively develop. This is part of a sustained effort to regenerate the economic fabric in a targeted way. Globalisation and the digitalisation of all production processes foreshadow a "third industrial revolution", as Jeremy Rifkin would put it. The traditional approach of gathering activities into the three categories of agriculture, industry and services is outdated as it leads to a statistical illusion. The decrease of the share of employment in the traditional industrial sector is partly due to the fact that industrial companies subcontract specialised services providers for activities such as transport, cleaning and security. The outsourcing of services and the change of technological links between industry and services are reflected in complex intrasectoral interactions. The traditional distinction between services and industry is thus no longer appropriate, making it difficult to grasp the importance of the industrial sector through conventional macroeconomic or sectoral analyses. A new approach is therefore necessary in order to gain an overview of production and taking into account synergies between industrial activities and services. The Ministry of the Economy ensures an optimised management of these synergies as they determine the competitiveness of the country.

The Observatoire de la compétitivité has always insisted on the importance of the social dimension of its activity and the studies it undertakes or heads. For some years now, the Observatoire has organised a public conference in partnership with the Luxembourg Income Study (LIS). During the "summer school", open to doctoral students and researchers, a speaker traditionally talks to a larger public about current issues related to inequality. This year Branko Milanovic addressed a public of lay people with the topic "Income inequality from a global perspective?".

In conclusion, the Competitiveness Report is an interesting and enriching reading, which feeds and prepares the debate on competitiveness which is soon to take place in the Chamber of Deputies.

#### Francine Closener

Secretary of State for Economic Affairs

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# 1 The Observatoire de la compétitivité

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# 1.1 The *Observatoire de la compétitivité*: Role and missions

The role of the *Observatoire de la compétitivité* is to assist the Government and the social partners in providing guidelines and formulating policies that promote and/or are suited to the concept of long-term competitiveness, which is the source of growth and well-being.

As such, it is a tool for documenting, observing and analysing evolution in the country's competitive position. It is a monitoring unit, responsible for leading a constructive debate between the social partners.

The main tasks of the Observatoire de la compétitivité are as follows:

- Collect, analyse and compare existing data on the national, regional and international levels that relate to economic competitiveness;
- Accurately target the dissemination of selected and processed information, which is useful for strategic decision-making;
- Undertake or commission studies and research on competitiveness, its factors, etc.;
- Contribute to the works and to the analyses of international organizations dealing with competitiveness (EU Council, OECD, etc.);
- Coordinate the work and the drafting of the Luxembourg's National Reform Programme (NRP) within the framework of the European Strategy for Growth and Jobs (Lisbon strategy and Europe 2020 strategy).

# 1.2 From the Lisbon strategy to the Europe 2020 strategy

Within the Government, the Minister of the Economy is responsible for coordinating the implementation of the European strategy for growth and jobs on the national level. The *Observatoire de la compétitivité* was commissioned in the autumn of 2005 to prepare the National Plan for Innovation and Full employment<sup>1</sup>, which was submitted to the European Commission within the framework of the Lisbon strategy. In order to optimize government coordination, to ensure consultation procedures and to guarantee assimilation of reforms nationally, an ad hoc structure was set up at the inter-ministerial level in 2005, whose structure is coordinated by the *Observatoire de la compétitivité*. This network brings together Lisbon strategy coordinators within each of the relevant ministerial departments and administrations concerned. The Government then submitted annual implementation reports to the Commission, until the Lisbon strategy expired in 2010.

At the end of 2009, the European Commission began the works to define a new strategy for the next decade: the Europe 2020 strategy<sup>2</sup>. Based on European Commission proposals, the June 2010 European Council decided upon the development of this new strategy, the governance of which will take place at three integrated levels:

- A level of macroeconomic monitoring to focus on macroeconomic and structural policies;
- A thematic coordination level, covering the five major European objectives and their national implementation;
- A simultaneous monitoring level, taking place within the framework of the Stability and Growth Pact (SGP).

In November 2010 each Member State had to submit to the European Commission a first draft of the National Reform Programme (NRP), developed in the framework of the Europe 2020 strategy. In November 2010 Luxembourg submitted its interim NRP draft to the Commission, and the Government finally decided on the finalized NRP for Luxembourg in April 2011, which was then submitted to the European Commission, along with the SGP. The fourth update of Luxembourg's finalized NRP was sent to the European Commission in April 2014, along with the SGP 2014-2018<sup>3</sup>. Based on the NRP and the SGP, the Council issued in July 2014 country-specific recommendations for Luxembourg, for consideration during the national discussions to be conducted about the 2015 draft budget.

- <sup>1</sup> For additional details: http://www.odc.public.lu/ publications/pnr/index.html
- <sup>2</sup> For additional details: http://ec.europa.eu/eu2020/ index\_fr.htm
- <sup>3</sup> For additional details: http://www.mf.public.lu

# 1.3 Agency for standardization and the knowledge economy (ANEC)

Through the creation of the economic interest group ANEC in 2012, the government wanted to promote and support advocacy, awareness, training and monitoring in the field of standardization in order to support the competitiveness of companies in Luxembourg while developing a centre of excellence in research, development and innovation.

Research projects are carried out among others by the *Observatoire de la compétitivité* in collaboration with STATEC.

For 2014, the work program plans to deepen the activities undertaken to fulfil the foremost mission of ANEC, which consists in valuing STATEC's available statistical data through applied research. The work to be performed by ANEC in 2014 remains structured around the three pillars of applied research, namely growth and productivity; innovation and performance; entrepreneurship and profitability<sup>4</sup>. 2014 research projects will especially bring substance to the 2nd and 3rd thematic pillars, which are mainly involved in projects using "company"-level data. Preparation and publication of the special *Cahier économique* dedicated to the dynamics and competitiveness of companies in Luxembourg will help to enhance the visibility and specialisation of the EIG team in those themes.

# 1.4 Events and publications in 2013-2014

The Observatoire de la compétitivité aims to inform both the economic players and the general public on competitiveness issues. To achieve this, multiple communication channels are used, such as organising public events (seminars, conferences, etc.) and publishing analytical documents relating to competitiveness. All information concerning events organized by the Observatoire de la compétitivité and its publications can be downloaded.

For additional details: http://www.statistiques. public.lu/en/actors/statec/ organisation/epr/index.html

# 1.4.1 Seminars and conferences

The communication strategy of the *Observatoire de la compétitivité* is consistent with its "competitiveness monitoring" mission and is in particular useful for initiating public debate on the major axis that define the competitiveness of the Luxembourg economy and the Europe 2020 strategy. The organization of public events is a part of this mission.

# Les Journées de l'Économie 2014<sup>5</sup>

In February, the Ministry of the Economy, Chamber of Commerce and Fedil, in collaboration with PwC organised the 2014 edition of "*Les Journées de l'Économie*", entitled #ReinventingLuxembourg. A few months after the early legislative elections the "*Journées de l'Économie* 2014" were held in an economic and political context marked by the new governmental economic programme. The first half-day dealt with the economic programme of the new government and the targets set in terms of economic development for Luxembourg. Economists and economic actors have reflected on the challenges met by the country and drivers for sustainable growth. During the second half-day discussions focused on promoting Luxembourg abroad and on the key factors of attractiveness of the country.

## Conference "Income inequality from a global perspective"<sup>6</sup>

In July 2014, the *Observatoire de la compétitivité* and the *Fondation Alphonse Weicker*, in collaboration with the LIS Cross-National Data Center in Luxembourg, organised the conference "Income inequality from a global perspective" given by Branko Milanovic (Visiting Presidential Professor - City University of New York / LIS Center Senior Scholar). Branko Milanovic is the author of numerous articles on methodology and empirical analysis of global income distribution and the effects of globalisation.

- <sup>5</sup> For additional details: http://www.odc.public.lu/ actualites/2014/02/Journees\_ economie\_2014/index.html
- For additional details: http://www.odc.public.lu/ actualites/2014/07/ Conference\_LIS/index.html

# 1.4.2 Perspectives de Politique Économique

Through the publication "Perspectives de Politique Économique", the Observatoire de la compétitivité disseminates the findings of studies and/or commissioned research from academics or consultants, as well as papers written by members of the Observatoire de la compétitivité. This publication is also intended to publicize the reports of lectures, seminars or conferences that the Ministry of the Economy organizes on issues of economic policy. Finally, its goal is also to clarify the possible policy options, to assess the effectiveness of certain measures, and so to foster the public debate on economic policy<sup>7</sup>.

# 1.4.3 The Observatoire de la compétitivité website

The Observatoire de la compétitivité has a website that gathers all the information and publications regarding the competitiveness of the national economy: http://www.odc.public.lu. In particular this site provides information on Luxembourg's competitiveness in foreign publications. It acts as a communication platform for all those involved in the implementation of the Europe 2020 strategy in Luxembourg and enables to make the Competitiveness Scoreboard data available. The website announces upcoming events and publications. Documents relating to conferences and seminars, as well as the publications, can be downloaded for free from this site. The number of visits to the site has grown significantly in recent years.



All editions of "Perspectives de Politique Économique" can be downloaded from the website: http://www.odc.public.lu/ publications/perspectives/ index.html.

# 1.5 An overview of the 2014 Competitiveness Report

**Chapter 2** presents the performance of Luxembourg according to major international composite indicators (IMD, WEF, etc.) and also looks at various rankings less known to the general public.

**Chapter 3** analyses, on a yearly basis, the evolution of the competitiveness of Luxembourg in comparison with EU Member States according to the national Competitiveness Scoreboard indicators established in2004. The calculation of a composite indicator of competitiveness based on this national scoreboard allows us to understand the relative competitive position of Luxembourg over the years.

**Chapter 4** aims at providing an overview of the European Semester, presenting the priorities and objectives of the structural thematic coordination of the Europe 2020 strategy and making an intermediate appraisal of Luxembourg's position for the indicators in the EU macro-economic surveillance scoreboard, before the publication of the new edition at the end of 2014 by the European Commission.

**Chapter 5** is intended to provide an initial inventory of the five priority sectors whose development is actively promoted by the Ministry of the Economy: ICT, logistics, biotechnology, eco-technologies and space technologies.

**Chapter 6** presents a brief overview of the automatic wage indexation mechanism in Luxembourg as well as an insight into its operating system. It also includes a synthesis of a number of recent studies on the topic of automatic wage indexation. Finally, this chapter provides a summary of the recent study "Wage formation and automatic indexation: comparative analysis of four European countries" commissioned by the *Observatoire de la compétitivité* to the University of Luxembourg.

**Chapter 7** aims to provide an estimation of the impact of a VAT increase on consumer prices and inflation. It also includes simulations aimed at measuring the impact of VAT increase on price levels in Luxembourg in the context of cross-border price comparisons "Étude 4 Frontières" (Study 4 Borders) carried out by the Observatoire de la formation des prix.

**Chapter 8** covers the main results of analyses undertaken on enterprise dynamics in Luxembourg: productivity, non-price competitiveness, business demography, entrepreneurship, job creation, innovation and R&D, sustainable development, etc.

**Chapter 9** finally summarises the conference organised by the *Observatoire de la compétitivité* and the *Fondation Alphonse Weicker*, in collaboration with the LIS Cross-National Data Center in Luxembourg, "Income inequality from a global perspective" by Branko Milanovic. Branko Milanovic is the author of numerous articles on methodology and empirical analysis of global income distribution and the effects of globalisation.

# 2 Benchmarks and comparative competitiveness analysis

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# 2.1 Introduction

In an era of international comparisons it has become easy to compare how territories have managed to define and ensure their growth potential. This debate is repeatedly rekindled with the publication of the international benchmarks and country rankings. The concept of territorial competitiveness results directly from this ever-changing world. Composite indicators allow us to make a comparison of best international practices and to regroup copious information in one single numerical value<sup>1</sup>, thus aggregating a variety of characteristics and giving an approximate overall image to a complex topic. Therefore, these benchmarks supply useful information to economic agents, and are also helpful in better understanding why certain countries perform better than others.



Since September 2008 "crisis rankings" have taken over, grouping together those countries hit most by the fragility of public finance. However the action of countering deficits and managing public debt may well be important to governments but should not be the one and only purpose of economic policy. Current account imbalances in some countries are reminders of the importance of the "cost competitiveness" concept. The debt level does not decrease significantly unless growth resumes. Supply-side policies and structural issues remain essential in the long term in order to sustainably increase growth and employment, in a world economy that is increasingly globalised and integrated.

This chapter aims to provide a descriptive overview of a series of benchmarks published since the last edition of the Report in autumn 2013<sup>2</sup>.

- For more information on composite indicators, see the European Commission's Joint Research Centre website: http://composite-indicators. jrc.ec.europa.eu/
- A list of more benchmarks may also be found on the website of the Observatoire de la compétitivité: http://www.odc.public.lu/ indicateurs/benchmarks\_internationaux/index.html

# 2.2 Luxembourg's rankings

In the debate about the determinant factors of regional competitiveness, the best-known benchmarks and rankings published annually are those of the World Economic Forum (WEF), the International Institute for Management Development (IMD), the Heritage Foundation and the European Commission. In addition to these four classifications, there are a multitude of other reports, some of which we will look at in this chapter.

# 2.2.1 WEF, IMD, Heritage Foundation and European Commission

#### a. Growth Competitiveness Index

Early September 2014 the World Economic Forum (WEF) published the new 2014-2015 edition of its comparative study regarding the competitiveness of countries around the world. The objective of this study, called "Global Competitiveness Report", is to assess the world economies' potential to achieve sustainable growth in both the medium and long term. In this study competitiveness is defined as "the set of institutions, policies and factors that determine the level of productivity of a country."

The study measures the competitiveness level of 144 countries worldwide based on a hundred indicators on a scale from 1 (the least competitive) to 7 (the most competitive). These indicators are spread among three fundamental growth and competitiveness "pillars": the basic requirements of competitiveness (through the subcategories: institutions, infrastructure, macroeconomic environment, health and primary education), efficiency enhancers (through the subcategories: higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size) and innovation and sophistication factors (through the subcategories: business sophistication and innovation). The study takes into account that all countries are not at the same level of development, and thus that the relative importance of the various factors of competitiveness is dependent on initial conditions. A composite index called "Growth Competitiveness Index" (GCI) is calculated in order to rank countries using a combination of statistical data and survey results, including the annual survey of business leaders, carried out in collaboration with its network of partner institutes.

In this new 2014-2015 edition, the global ranking is led by Switzerland (5.70), followed by Singapore (5.65) and the United States (5.54). According to the WEF, Luxembourg figures among those countries within the ultimate phase of development (to whom determiners of innovation and sophistication are the most important).

With a score of 5.17/7, Luxembourg comes 19th in the global classification, gaining 3 positions on the previous annual classification (22nd). Germany comes 5th (5.49), the Netherlands 8th (5.45), Belgium 18th (5.18) and France 23rd (5.08). In the EU ranking, Finland is leading (4th, 5.50), and Luxembourg ranks 8th in this sub-ranking.

| Table 1     Luxembourg's position according to the GCI (2014-2015) |                      |                |                                      |                                       |  |  |  |  |  |  |
|--|----------------------|----------------|--------------------------------------|---------------------------------------|--|--|--|--|--|--|
| Country/Economy  | Rank<br>(out of 144) | Score<br>(1-7) | Rank among<br>2013-2014<br>economies | GCI 2013-2014<br>rank<br>(out of 148) |  |  |  |  |  |  |
| Switzerland  | 1                    | 5.70           | 1                                    | 1                                     |  |  |  |  |  |  |
| Singapore  | 2                    | 5.65           | 2                                    | 2                                     |  |  |  |  |  |  |
| United States  | 3                    | 5.54           | 3                                    | 5                                     |  |  |  |  |  |  |
| Finland  | 4                    | 5.50           | 4                                    | 3                                     |  |  |  |  |  |  |
| Germany  | 5                    | 5.49           | 5                                    | 4                                     |  |  |  |  |  |  |
| Japan  | 6                    | 5.47           | 6                                    | 9                                     |  |  |  |  |  |  |
| Hong Kong SAR  | 7                    | 5.46           | 7                                    | 7                                     |  |  |  |  |  |  |
| Netherlands  | 8                    | 5.45           | 8                                    | 8                                     |  |  |  |  |  |  |
| United Kingdom   | 9                    | 5.41           | 9                                    | 10                                    |  |  |  |  |  |  |
| Sweden   | 10                   | 5.41           | 10                                   | 6                                     |  |  |  |  |  |  |
| Norway   | 11                   | 5.35           | 11                                   | 11                                    |  |  |  |  |  |  |
| United Arab Emirates   | 12                   | 5.33           | 12                                   | 19                                    |  |  |  |  |  |  |
| Denmark  | 13                   | 5.29           | 13                                   | 15                                    |  |  |  |  |  |  |
| Taiwan, China  | 14                   | 5.25           | 14                                   | 12                                    |  |  |  |  |  |  |
| Canada   | 15                   | 5.24           | 15                                   | 14                                    |  |  |  |  |  |  |
| Qatar  | 16                   | 5.24           | 16                                   | 18                                    |  |  |  |  |  |  |
| New Zealand  | 17                   | 5.20           | 17                                   | 18                                    |  |  |  |  |  |  |
| Belgium  | 18                   | 5.18           | 18                                   | 17                                    |  |  |  |  |  |  |
| Luxembourg   | 19                   | 5.17           | 19                                   | 22                                    |  |  |  |  |  |  |
| Malaysia   | 20                   | 5.16           | 20                                   | 24                                    |  |  |  |  |  |  |
| Source: WEF  |                      |                |                                      |                                       |  |  |  |  |  |  |

This new 2014-2015 edition sees the authors try for the first time to estimate a new GCI composite index adjusted by the "sustainability over time" factor, at both a social and environmental level. According to the estimations, Luxembourg's performance would increase: the GCI composite index would move from a 5.17 index to a GCI sustainability-adjusted composite index of 5.85.

With regards to the ranking of Luxembourg in the three fundamental pillars:

- Luxembourg takes 7th place for the basic requirements of competitiveness: within this pillar, the country ranks 6th for institutions, 16th for infrastructure, 8th for macroeconomic environment and 36th for health and primary education;
- Luxembourg takes 22nd place for efficiency enhancers: within this pillar, the country ranks 43rd for higher education and training, 5th for goods market efficiency, 15th for labour market efficiency, 14th for financial market development, 1st for technological readiness and 96th for market size;

 Luxembourg takes 18th place for innovation and sophistication factors: within this pillar, the country ranks 21st for business sophistication and finally 16th for innovation.

| Chart 2<br>Luxembourg's performance within the different pillars |                      |                |
|--|----------------------|----------------|
| Global Competitiveness Index                                     | Rank<br>(out of 144) | Score<br>(1-7) |
| GCI 2014-2015  | 19                   | 5.2            |
| GCI 2013-2014 (out of 148)                                       | 22                   | 5.1            |
| GCI 2012-2013 (out of 144)                                       | 22                   | 5.1            |
| GCI 2011-2012 (out of 142)                                       | 23                   | 5.0            |
| Basic requirements (20.0%)                                       | 7                    | 6.0            |
| Institutions   | 6                    | 5.7            |
| Infrastructure   | 16                   | 5.7            |
| Macroeconomic environment  | 8                    | 6.4            |
| Health and primary education                                     | 36                   | 6.2            |
| Efficiency enhancers (50.0%)                                     | 22                   | 5.0            |
| Higher education and training                                    | 43                   | 4.9            |
| Goods market efficiency  | 5                    | 5.5            |
| Labor market efficiency  | 16                   | 4.9            |
| Financial market development                                     | 14                   | 5.1            |
| Technological readiness  | 1                    | 6.4            |
| Market size  | 96                   | 3.1            |
| Innovation and sophistication factors (30.0%)                    | 18                   | 4.9            |
| Business sophistication  | 21                   | 5.0            |
| Innovation   | 16                   | 4.8            |
|  |                      |                |



#### Frame 1 Results of the survey carried out in Luxembourg (WEF poll)

A yearly survey is carried out among business leaders in order to identify main factors hindering national competitiveness. With more specific regard to the results of the Luxembourg survey, it appears the main problems for doing

business in Luxembourg result from a restrictive labour regulation, an inadequately educated workforce, inefficient government bureaucracy and access to financing.



in their country from a list of 15, and to rank them from 1 (most problematic) to 5. Figures in this chart show the resulting answers weighted by their ranking.

## b. Global Competitiveness Index

The Swiss Institute IMD published the latest version of its annual report on competitiveness in May 2014, a report that has been published yearly since 1989. In this new edition, 60 countries are analysed through more than 300 criteria. These criteria are both quantitative and qualitative (resulting from an survey of business leaders), split into four main categories: economic performance, government efficiency, business environment and infrastructure. The United States leads the 2014 GCI global ranking (with a score 100 out of 100), followed by Switzerland (92.4) and Singapore (90.9). Luxembourg takes 11th position (score 82.1) in this global ranking, and its neighbouring countries rank 6th (Germany), 27th (France) and 28th (Belgium). The European GCI ranking is led by Switzerland, Sweden and Germany. Luxembourg takes 6th place in Europe. Within the European Union, the GCI ranking is led by Sweden, Germany and Denmark. In 2014 Luxembourg ranks 4th within the European Union.

| Table 2 IMD global ranking (2014) |      |      |        |                 |      |      |        |  |  |
|-----------------------------------|------|------|--------|-----------------|------|------|--------|--|--|
|                                   |      |      | Rank   |                 | Rank |      |        |  |  |
| Country                           | 2014 | 2013 | Change | Country         |      | 2013 | Change |  |  |
| USA                               | 1    | 1    | -      | Chile           | 31   | 30   | К      |  |  |
| Switzerland                       | 2    | 2    | -      | Kazakhstan      | 32   | 34   | 7      |  |  |
| Singapore                         | 3    | 5    | Z      | Czech Republic  | 33   | 35   | 7      |  |  |
| Hong Kong                         | 4    | 3    | Ы      | Lithuania       | 34   | 31   | Ы      |  |  |
| Sweden                            | 5    | 4    | К      | Latvia          | 35   | 41   | 7      |  |  |
| Germany                           | 6    | 9    | Z      | Poland          | 36   | 33   | К      |  |  |
| Canada                            | 7    | 7    | -      | Indonesia       | 37   | 39   | 7      |  |  |
| UAE                               | 8    | 8    | -      | Russia          | 38   | 42   | Z      |  |  |
| Denmark                           | 9    | 12   | Z      | Spain           | 39   | 45   | 7      |  |  |
| Norway                            | 10   | 6    | Ы      | Turkey          | 40   | 37   | Ы      |  |  |
| Luxembourg                        | 11   | 13   | 7      | Mexico          | 41   | 32   | Ы      |  |  |
| Malaysia                          | 12   | 15   | 7      | Philippines     | 42   | 38   | Ы      |  |  |
| Taiwan                            | 13   | 11   | Ы      | Portugal        | 43   | 46   | 7      |  |  |
| Netherlands                       | 14   | 14   | -      | India           | 44   | 40   | Ы      |  |  |
| Ireland                           | 15   | 17   | 7      | Slovak Republic | 45   | 47   | 7      |  |  |
| United Kingdom                    | 16   | 18   | 7      | Italy           | 46   | 44   | Ы      |  |  |
| Australia                         | 17   | 16   | Ы      | Romania         | 47   | 55   | 7      |  |  |
| Finland                           | 18   | 20   | 7      | Hungary         | 48   | 50   | 7      |  |  |
| Qatar                             | 19   | 10   | Ы      | Ukraine         | 49   | 49   | -      |  |  |
| New Zealand                       | 20   | 25   | 7      | Peru            | 50   | 43   | К      |  |  |
| Japan                             | 21   | 24   | Z      | Colombia        | 51   | 48   | К      |  |  |
| Austria                           | 22   | 23   | 7      | South Africa    | 52   | 53   | 7      |  |  |
| China Mainland                    | 23   | 21   | Ы      | Jordan          | 53   | 56   | 7      |  |  |
| Israël                            | 24   | 19   | Ы      | Brazil          | 54   | 51   | К      |  |  |
| Iceland                           | 25   | 29   | 7      | Slovenia        | 55   | 52   | Ы      |  |  |
| Korea                             | 26   | 22   | Ы      | Bulgaria        | 56   | 57   | 7      |  |  |
| France                            | 27   | 28   | Z      | Greece          | 57   | 54   | Ы      |  |  |
| Belgium                           | 28   | 26   | Ы      | Argentina       | 58   | 59   | Z      |  |  |
| Thailand                          | 29   | 27   | Ы      | Croatia         | 59   | 58   | Ы      |  |  |
| Estonia                           | 30   | 36   | 7      | Venezuela       | 60   | 60   | -      |  |  |
| Source: IMD                       |      |      |        |                 |      |      |        |  |  |

Between 2013 and 2014, Luxembourg gained 2 positions in the global ranking. However, one has to bear in mind, that Luxembourg was placed 11th in 2010 and 2011 already.

Regarding the four categories that make up the GCI composite index, Luxembourg ranks as follows:

In the first pillar "macroeconomic performance", Luxembourg takes 4th place in the global ranking. This first pillar is incidentally the one for which Luxembourg's performance is the highest. For example, Luxembourg performs particularly well for international business (4th) and foreign investments (3rd), but less well for pricing (41st);

- ▼ In the second pillar "government efficiency", Luxembourg takes 19th place. For example, Luxembourg comes 15th for public finance, 38th for fiscal policy, but 13th for its overall framework;
- ▼ In the third pillar "business environment" Luxembourg ranks 14th. For example, Luxembourg performs particularly well in finance (7th) and productivity (8th);
- ▼ In the fourth pillar "infrastructure" Luxembourg ranks 23rd in 2014. This is the pillar with Luxembourg's poorest performance. For example, Luxembourg takes 30th place for basic infrastructure, 22nd for technological infrastructure but 12th place for environment and health, or 14th for education.

#### Frame 2

#### Key attractiveness factors for Luxembourg (IMD survey)

in the annual survey carried out by IMD had to select those five factors they considered to be the key attractiveness indicators of Luxembourg's domestic econo- the legal environment (37%).

From a list of 15 indicators, respondents my. The five most quoted answers are policy stability and predictability (63%), the tax system (53.7%), infrastructure (42.6%), skilled workforce (40.7%) and



## c. Index of Economic Freedom

At the beginning of 2014, the American Heritage Foundation, in collaboration with *The Wall Street Journal*, published the 20th edition of the "Index of Economic Freedom". Economic freedom is defined as the absence of any government coercion or constraint on production, supply or consumption of goods and services beyond the extent necessary to protect and maintain the liberty of citizens. Economic freedom is measured through indicators spread among four categories ("rule of law", "government size", "regulatory efficiency" and "open markets") in 186 countries across the world, divided into sub-categories. This freedom is supposed to favour productivity and thus growth by supporting entrepreneurship and creation of value added. The more open an economy is (the closer its ranking is to the maximum index of 100), the fewer barriers there are to free trade and the better a country ranks. The underlying data used in this edition date primarily from 2012 and the beginning of 2013.

The global ranking 2014 is led by Hong Kong, Singapore and Australia. Luxembourg is in the 16th position worldwide with a score of 74.2 of 100. Luxembourg is therefore considered as "mostly free". The Netherlands ranks 15th (74.2), Germany 18th (73.4), Belgium 35th (69.9) and France 70th (63.5) in the global ranking. Within Europe, Luxembourg takes 7th position. The European ranking is led by Switzerland, Ireland and Denmark.

| Table 3<br><b>Top 20 score</b> |                 |               |
|--------------------------------|-----------------|---------------|
| World Rank                     | Country         | Overall Score |
| 1                              | Hong Kong       | 90.1          |
| 2                              | Singapore       | 89.4          |
| 3                              | Australia       | 82.0          |
| 4                              | Switzerland     | 81.6          |
| 5                              | New Zealand     | 81.2          |
| 6                              | Canada          | 80.2          |
| 7                              | Chile           | 78.7          |
| 8                              | Mauritius       | 76.5          |
| 9                              | Ireland         | 76.2          |
| 10                             | Denmark         | 76.1          |
| 11                             | Estonia         | 75.9          |
| 12                             | United States   | 75.5          |
| 13                             | Bahreïn         | 75.1          |
| 14                             | United Kingdom  | 74.9          |
| 15                             | The Netherlands | 74.2          |
| 16                             | Luxembourg      | 74.2          |
| 17                             | Taiwan          | 73.9          |
| 18                             | Germany         | 73.4          |
| 19                             | Finland         | 73.4          |
| 20                             | Sweden          | 73.1          |
| с т. II                        |                 |               |

Source: The Heritage Foundation

For the sub-categories of the composite index, Luxembourg demonstrated:

- Very good performance regarding property rights (score 90.0; 2nd place globally) and absence of corruption (84.1; 12th);
- Mixed results for fiscal freedom (62.8; 164th) and government spending (47.6; 138th);
- Good performance regarding business freedom (72.6; 66th) and monetary freedom (78.9; 50th), but mixed performance for the labour freedom (43.1; 162th);
- ▼ Very good performance for trade freedom (87.8; 11th), investment freedom (95.0; 1st) and financial freedom (80.0; 4th).

In conclusion, the Heritage Foundation makes the following observation with regard to Luxembourg: "Openness to global trade and investment has been the cornerstone of Luxembourg's efficient and dynamic economy. A high degree of macroeconomic stability minimizes uncertainty, and the transparent regulatory framework supports the operation of private enterprises, making Luxembourg an attractive place in which to conduct global business. Financial services represent an important economic sector in Luxembourg."

#### d. European innovation union scoreboard

Early March 2014, the European Commission published the 4th edition of the European "Innovation Union Scoreboard" (IUS). This scoreboard succeeds the European innovation scoreboard put in place under the Lisbon strategy (2000-2010). The purpose of this statistical tool, based on 25 indicators split into 3 main categories and 8 dimensions of innovation, is to allow monitoring the implementation of the Europe 2020 strategy and more particularly the innovation flagship initiative. It offers the Member States a comparative scoreboard of the relative performance of the EU Member States with regards to innovation as well as an analysis of strengths and weaknesses of national research and innovation systems. A composite index called "Summary innovation index" (SII) is then calculated based on the data of the scoreboard.

In this 2014 edition, the ranking of the Member States is led by Sweden, Denmark, Germany and Finland ("innovation leaders"). Luxembourg is in the 5th position in this edition, the Netherlands 6th, Belgium 7th and France 11th. Luxembourg thus takes first place among the countries of the "innovation followers" category, displaying a better performance than the EU average but not performing well enough to be among the category of students displaying performances at least +20% higher than the EU average.



The 2014 report also analyses the performance of countries over the years. Luxembourg shows a positive evolution for the SII composite index value, even if its score had temporarily dropped in 2010 and 2011 during the period of the economic and financial crisis.



In conclusion, the report notes the following regarding Luxembourg's strengths and weaknesses: "Relative strengths are in International scientific copublications, community trademarks, Venture capital investments and in Community designs. Luxembourg performs well below the average for Non-R&D innovation expenditures and New doctorate graduates. High growth is observed for International scientific copublications, Most cited scientific publications and R&D expenditures in the public sector. Strong declines are observed in Non-R&D innovation expenditures, Sales share of new innovations and R&D expenditures in the business sector".

#### e. Ranking comparison and correlation analysis

To illustrate, the table below shows an extract of the rankings of the four major composite indicators that had been reviewed, in which Lux-embourg is appearing<sup>3</sup>.

It is possible to analyse Luxembourg's evolution for these four major rankings. For example, Luxembourg takes 19th place in the WEF world ranking and thus gains 3 positions from the previous year. In the IMD global ranking, Luxembourg takes 11th place, moving up 2 positions.

| Ta<br>Fo | Table 4 Four major rankings (reports published in 2014) |                         |                |                        |                          |  |  |  |  |
|----------|---|-------------------------|----------------|------------------------|--------------------------|--|--|--|--|
|          | N°  | World Economic<br>Forum | IMD            | Heritage<br>Foundation | Commission<br>européenne |  |  |  |  |
|          |   | GCI                     | GCI            | Economic freedom       | SII                      |  |  |  |  |
| +        | 1.  | Switzerland             | United States  | Hong Kong              | Switzerland              |  |  |  |  |
|          | 2.  | Singapore               | Switzerland    | Singapore              | Sweden                   |  |  |  |  |
|          | 3.  | United States           | Singapore      | Australia              | Denmark                  |  |  |  |  |
|          | 4.  | Finland                 | Hong Kong      | Switzerland            | Germany                  |  |  |  |  |
|          | 5.  | Germany                 | Sweden         | New Zealand            | Finland                  |  |  |  |  |
|          | 6.  | Japan                   | Germany        | Canada                 | Luxembourg               |  |  |  |  |
|          | 7.  | Hong Kong               | Canada         | Chile                  | Netherlands              |  |  |  |  |
|          | 8.  | Netherlands             | United Arab    | Mauritius              | Belgium                  |  |  |  |  |
|          | 9.  | United Kingdom          | Denmark        | Ireland                | United Kingdom           |  |  |  |  |
|          | 10.   | Sweden                  | Norway         | Denmark                | Ireland                  |  |  |  |  |
|          | 11.   | Norway                  | Luxembourg     | Estonia                | Austria                  |  |  |  |  |
|          | 12.   | United Arab             | Malaysia       | United States          | Iceland                  |  |  |  |  |
|          | 13.   | Denmark                 | Taiwan         | Bahrain                | France                   |  |  |  |  |
|          | 14.   | Taiwan                  | Netherlands    | United Kingdom         | Slovenia                 |  |  |  |  |
|          | 15.   | Canada                  | Ireland        | Netherlands            | Estonia                  |  |  |  |  |
|          | 16.   | Qatar                   | United Kingdom | Luxembourg *           | Cyprus                   |  |  |  |  |
|          | 17.   | New Zealand             | Australia      | Taiwan                 | Norway                   |  |  |  |  |
|          | 18.   | Belgium                 | Finland        | Germany                | Italy                    |  |  |  |  |
|          | 19.   | Luxembourg              | Qatar          | Finland                | Czech Republic           |  |  |  |  |
|          | 20.   | Malaysia                | New Zealand    | Sweden                 | Spain                    |  |  |  |  |
|          | 21.   | Austria                 | Japan          | Lithuania              | Portugal                 |  |  |  |  |
|          | 22.   | Australia               | Austria        | Georgia                | Greece                   |  |  |  |  |
|          | 23.   | France                  | China          | Iceland                | Serbia                   |  |  |  |  |
|          | 24.   | Saudi Arabia            | Israel         | Austria                | Hungary                  |  |  |  |  |
| -        | 25.   | Ireland                 | Iceland        | Japan                  | Slovak Republic          |  |  |  |  |

Notes: Luxembourg's neighbouring countries (Germany, Belgium, France), and the Netherlands as a Member State of the Benelux, are highlighted in green when their ranking is better than Luxembourg's and otherwise in red.

\* In the report published by the Heritage Foundation in 2014, the composite index value is identical for the Netherlands and Luxembourg (74.2). Therefore, although it ranks 16th, Luxembourg could as well figure in the same rank as the Netherlands.

By extracting solely the European countries from this sample of the best global rankings, it appears for instance that Luxembourg ranks 10th in the WEF European ranking (8th within EU), 6th in the IMD ranking (4th EU), 7th in the Heritage Foundation ranking (6th EU) and 6th in the European Commission ranking (5th EU).

Annual changes in country rankings should be consulted with a certain caution, because over the years methodological changes in the calculation of the index may have occurred without a recalculation of the ranks for all the years.

| Table 5 Adjusted ranking with the Top 10 European countries |                         |                |                        |                          |  |  |  |  |  |  |
|---|-------------------------|----------------|------------------------|--------------------------|--|--|--|--|--|--|
| N°  | World Economic<br>Forum | IMD            | Heritage<br>Foundation | Commission<br>européenne |  |  |  |  |  |  |
| 1.  | Switzerland             | Switzerland    | Switzerland            | Switzerland              |  |  |  |  |  |  |
| 2.  | Finland                 | Sweden         | Ireland                | Sweden                   |  |  |  |  |  |  |
| 3.  | Germany                 | Germany        | Denmark                | Denmark                  |  |  |  |  |  |  |
| 4.  | Netherlands             | Denmark        | Estonia                | Germany                  |  |  |  |  |  |  |
| 5.  | United Kingdom          | Norway         | United Kingdom         | Finland                  |  |  |  |  |  |  |
| 6.  | Sweden                  | Luxembourg     | Netherlands            | Luxembourg               |  |  |  |  |  |  |
| 7.  | Norway                  | Netherlands    | Luxembourg *           | Netherlands              |  |  |  |  |  |  |
| 8.  | Denmark                 | Ireland        | Germany                | Belgium                  |  |  |  |  |  |  |
| 9.  | Belgium                 | United Kingdom | Finland                | United Kingdom           |  |  |  |  |  |  |
| 10.   | Luxembourg              | Finland        | Sweden                 | Ireland                  |  |  |  |  |  |  |

Note: \* In the report published by the Heritage Foundation in 2014, the value of the composite index is identical for the Netherlands and Luxembourg (74.2). Therefore, although it may be ranked 16th, Luxembourg could just as well figure in the same rank as the Netherlands. Source: *Observatoire de la compétitivité* 



Notes: The time axis refers to the report's year of publication. Time series should be consulted with caution, because methodological changes might have occurred without the ranks for all prior years being recalculated. Source: *Observatoire de la compétitivité* 

The four reports published in 2014 highlight that Luxembourg ranks within an interval from 4th position (IMD) to 8th (WEF). Luxembourg also ranks within this interval in the ranking established by the *Observatoire de la compétitivité*<sup>4</sup> in 2014. It may thus be concluded that Luxembourg is part of the top-ranked countries within the EU in those major rankings that are published yearly.

In general it is important to analyse the correlation between these four major benchmarks. Kendall's coefficient is suitable for this type of analysis as it measures the degree of agreement. This correlation has been calculated on the basis of the EU countries<sup>5</sup>. The coefficient takes a value between 0 (no relation) and 1 (a perfect agreement between rankings and judges).

| Table 6 Adjustment of the EU rankings considered in the four studies |                 |     |    |    |  |  |  |  |  |
|--|-----------------|-----|----|----|--|--|--|--|--|
| Countries  | WEF             | IMD | HF | CE |  |  |  |  |  |
| Germany  | 2               | 2   | 7  | 3  |  |  |  |  |  |
| Austria  | 9               | 9   | 11 | 10 |  |  |  |  |  |
| Belgium  | 7               | 11  | 13 | 7  |  |  |  |  |  |
| Bulgaria   | 20              | 24  | 19 | 26 |  |  |  |  |  |
| Croatia  | 25              | 26  | 25 | 21 |  |  |  |  |  |
| Denmark  | 6               | 3   | 2  | 2  |  |  |  |  |  |
| Spain  | 13              | 17  | 15 | 16 |  |  |  |  |  |
| Estonia  | 12              | 12  | 3  | 13 |  |  |  |  |  |
| Finland  | 1               | 8   | 8  | 4  |  |  |  |  |  |
| France   | 10              | 10  | 22 | 11 |  |  |  |  |  |
| Greece   | 26              | 25  | 26 | 18 |  |  |  |  |  |
| Hungary  | 22              | 22  | 17 | 19 |  |  |  |  |  |
| Ireland  | 11              | 6   | 1  | 9  |  |  |  |  |  |
| Italy  | 19              | 20  | 24 | 14 |  |  |  |  |  |
| Latvia   | 17              | 15  | 14 | 25 |  |  |  |  |  |
| Lithuania  | 16              | 14  | 10 | 22 |  |  |  |  |  |
| Luxembourg   | 8               | 4   | 6  | 5  |  |  |  |  |  |
| Netherlands  | 3               | 5   | 5  | 6  |  |  |  |  |  |
| Poland   | 18              | 16  | 16 | 23 |  |  |  |  |  |
| Portugal   | 14              | 18  | 21 | 17 |  |  |  |  |  |
| Slovak Republic  | 24              | 19  | 18 | 20 |  |  |  |  |  |
| Czech Republic   | 15              | 13  | 12 | 15 |  |  |  |  |  |
| Romania  | 21              | 21  | 20 | 24 |  |  |  |  |  |
| United Kingdom   | 4               | 7   | 4  | 8  |  |  |  |  |  |
| Slovenia   | 23              | 23  | 23 | 12 |  |  |  |  |  |
| Sweden   | 5               | 1   | 9  | 1  |  |  |  |  |  |
| Source: Observatoire de L  | a comnétitivité |     |    |    |  |  |  |  |  |

In past Competitiveness Reports a strong correlation between rankings could be noted. In the current 2014 edition Kendall's coefficient equals 0.84. As in the previous years there is a strong correlation between the four rankings within the  $EU^6$ .

- For more information regarding the ranking of the Observatoire de la compétitivité, see chapter 3 of the 2014 Competitiveness Report.
- UE-28 excluding Cyprus and Malta. The list of countries used for making this calculation has changed over the years. Since the publication of the 2011 Competitiveness Report, only EU Member States are taken into account. Since the 2014 edition, Croatia has been added as new EU Member State.
- Kendall's coefficient for the same countries (27) was 0.86 in 2006, 0.83 in 2007, 0.86 in 2008, 0.87 in 2009, 0.84 in 2010, 0.83 in 2011, 0.83 in 2012 and 0.83 in 2013. Comparability between results before 2011 and after 2011 is limited. On one hand, another list of countries was used from 2011 (only countries being part of the EU). In this 2014 report, Croatia was added as new Member State. On the other hand, the SII indicator calculated by the European Commission is taken from the European Innovation Union Scoreboard (EIU) since 2011 and not from the European Innovation Scoreboard (EIS) anvmore.

# 2.2.2 Other benchmarks

Besides these four major indicators, a multitude of other composite indexes and rankings can be found. Some of these indexes and rankings will be considered below.

#### a. General indicators of competitiveness

#### a.1 Euro Monitor

German Berenberg Bank and The Lisbon Council released their 2013 study on global health and adjustment of the economy of the 17 eurozone countries and Sweden, Poland and the United Kingdom. This study analyses and classifies the Member States of the euro area on the basis of two main composite indicators. On one hand according to the current state of health of the economy FHI (fundamental health indicator) through indicators linked to the budgetary situation, to foreign trade, to unit labour cost and to structural reforms. On the other hand according to the capacity of adjustment API (adjustment progress indicator) - through indicators related to international trade, to financial sustainability, to competitiveness and to structural reforms over a given period of time. The countries are subsequently ranked by sub-category and by indicator on a scale from 0 (worst performance) to 10 (best performance). According to the authors, on a global basis the majority of countries with scores above the average with regards to the FHI composite index of global health make less effort to improve their situation and thus receive lower scores for the API adjustment indicator. However they also point out that a weaker score for the API adjustment indicator could simply signify that the country in guestion does not want to make adjustments or that it does not need any, considering the good health of its economy.

According to this study, Luxembourg performs far better regarding the current health of its economy (score 7.0 / 3rd place) than regarding its adjustment to crisis and challenges (score 2.0 / 19th place). Germany ranks 2nd for FHI and 16th for API, Belgium 10th/18th, France 16th/14th and the Netherlands 5th/13th.

#### Table 7

| Countr | y ranking | according | to API | and FHI |
|--------|-----------|-----------|--------|---------|
|--------|-----------|-----------|--------|---------|

Adjustment Progress Indicator

| Rank |      | Country        | Total Score |        | External Adj. |      | Fiscal Adj. |      | Labour Cost Adj. |        |      | Reform drive |        |      |      |        |      |
|------|------|----------------|-------------|--------|---------------|------|-------------|------|------------------|--------|------|--------------|--------|------|------|--------|------|
| 2013 | 2012 |                | 2013        | Change | 2012          | 2013 | Change      | 2012 | 2013             | Change | 2012 | 2013         | Change | 2012 | 2013 | Change | 2012 |
| 1    | 1    | Greece         | 8.6         | 0.4    | 8.2           | 6.8  | 0.2         | 6.6  | 9.6              | 1.0    | 8.6  | 8.3          | 0.6    | 7.7  | 10.0 | 0.0    | 10.0 |
| 2    | 2    | Ireland        | 7.7         | 0.4    | 7.3           | 8.7  | -0.1        | 8.8  | 5.6              | 1.1    | 4.5  | 8.4          | 0.0    | 8.4  | 8.2  | 0.8    | 7.4  |
| 3    | 5    | Spain          | 6.9         | 0.7    | 6.2           | 7.6  | 0.5         | 7.1  | 6.5              | 2.3    | 4.2  | 5.7          | 0.0    | 5.7  | 7.7  | -0.1   | 7.8  |
| 4    | 4    | Portugal       | 6.7         | 0.2    | 6.5           | 7.1  | 0.4         | 6.7  | 6.7              | 0.2    | 6.5  | 5.3          | -0.4   | 5.7  | 7.7  | 0.7    | 7.1  |
| 5    | 6    | Slovakia       | 6.3         | 0.6    | 5.7           | 7.7  | 1.5         | 6.2  | 7.2              | 2.7    | 4.5  | 4.9          | -1.5   | 6.4  | 5.5  | n.a.   | n.a. |
| 6    | 3    | Estonia        | 6.2         | -0.3   | 6.5           | 7.2  | -1.7        | 8.9  | 2.2              | -0.2   | 2.4  | 6.6          | -1.8   | 8.3  | 8.8  | n.a.   | n.a. |
| 7    | 10   | Cyprus         | 6.1         | 1.8    | 4.3           | 7.1  | 1.6         | 5.5  | 4.1              | 0.0    | 4.1  | 7.2          | 3.9    | 3.4  | n.a. | n.a.   | n.a. |
| 8    | 7    | Poland         | 5.0         | -0.3   | 5.3           | 5.4  | 0.9         | 4.5  | 6.2              | -2.1   | 8.3  | 2.2          | 0.4    | 1.8  | 6.1  | -0.6   | 6.7  |
| 9    | 8    | Italy          | 4.6         | 0.1    | 4.6           | 4.4  | 0.6         | 3.8  | 6.5              | -0.7   | 7.2  | 2.5          | -0.4   | 2.9  | 5.2  | 0.8    | 4.4  |
| 10   | 12   | United Kingdom | 4.6         | 0.5    | 4.1           | 3.9  | 0.2         | 3.8  | 5.0              | 0.5    | 4.5  | 3.7          | 1.1    | 2.6  | 5.8  | 0.2    | 5.6  |
| 11   | 11   | Slovenia       | 4.3         | 0.0    | 4.3           | 6.5  | 0.7         | 5.8  | 5.2              | 0.8    | 4.4  | 3.3          | 0.7    | 2.7  | 2.2  | n.a.   | n.a. |
| -    | -    | Euro 17        | 4.2         | 0.2    | 3.9           | 4.3  | 0.2         | 4.1  | 5.0              | 0.7    | 4.3  | 2.5          | -0.1   | 2.6  | 5.0  | 0.3    | 4.8  |
| 12   | 9    | Malta          | 3.6         | -0.8   | 4.4           | 6.2  | -0.1        | 6.4  | 2.0              | -0.1   | 2.1  | 2.7          | -2.2   | 4.8  | n.a. | n.a.   | n.a. |
| 13   | 14   | Netherlands    | 3.4         | 0.1    | 3.3           | 5.2  | 0.5         | 4.8  | 3.1              | 0.3    | 2.8  | 2.9          | 0.4    | 2.5  | 2.4  | -0.6   | 3.0  |
| 14   | 15   | France         | 3.3         | 0.2    | 3.2           | 3.2  | 0.2         | 2.9  | 4.6              | 0.3    | 4.3  | 2.0          | 0.0    | 2.0  | 3.5  | 0.2    | 3.3  |
| 15   | 16   | Austria        | 3.2         | 0.2    | 3.0           | 3.0  | 0.3         | 2.6  | 2.4              | 1.5    | 0.9  | 1.2          | -0.6   | 1.8  | 6.1  | -0.6   | 6.7  |
| 16   | 18   | Germany        | 2.5         | 0.5    | 2.0           | 3.3  | -0.1        | 3.4  | 4.1              | 0.5    | 3.6  | 1.1          | 0.1    | 1.0  | 1.5  | 1.5    | 0.0  |
| 17   | 17   | Finland        | 2.4         | 0.0    | 2.4           | 1.9  | 0.9         | 1.0  | 0.2              | 0.0    | 0.2  | 2.8          | -0.8   | 3.6  | 4.7  | -0.2   | 4.9  |
| 18   | 19   | Belgium        | 2.1         | 0.1    | 2.0           | 3.2  | 0.2         | 3.0  | 2.1              | 0.1    | 2.0  | 1.4          | -0.4   | 1.8  | 1.6  | 0.4    | 1.1  |
| 19   | 20   | Luxembourg     | 2.0         | 0.7    | 1.3           | 2.6  | 1.5         | 1.1  | 0.5              | 0.4    | 0.2  | 4.2          | 0.5    | 3.7  | 0.6  | 0.6    | 0.0  |
| 20   | 13   | Sweden         | 1.9         | -1.6   | 3.5           | 2.4  | -0.5        | 2.9  | 0.0              | -3.7   | 3.7  | 1.0          | -0.7   | 1.7  | 4.3  | -1.3   | 5.6  |

Fundamental Health Indicator

| Rank  |      | Country        | Total Score |        |      | Trend growth |        | Competitiveness |      | Fiscal<br>sustainability |      | Resilience |        |      |      |        |      |
|---|------|----------------|-------------|--------|------|--------------|--------|-----------------|------|--------------------------|------|------------|--------|------|------|--------|------|
| 2013  | 2012 |                | 2013        | Change | 2012 | 2013         | Change | 2012            | 2013 | Change                   | 2012 | 2013       | Change | 2012 | 2013 | Change | 2012 |
| 1   | 1    | Estonia        | 7.4         | 0.0    | 7.4  | 6.6          | 0.2    | 6.5             | 6.3  | -0.2                     | 6.5  | 9.2        | -0.1   | 9.2  | 7.5  | 0.1    | 7.4  |
| 2   | 3    | Germany        | 7.3         | 0.3    | 7.0  | 6.4          | 0.1    | 6.3             | 8.1  | 0.1                      | 8.0  | 7.3        | 0.5    | 6.9  | 7.5  | 0.7    | 6.8  |
| 3   | 2    | Luxembourg     | 7.0         | -0.1   | 7.1  | 6.8          | 0.0    | 6.8             | 6.4  | -0.2                     | 6.6  | 9.3        | -0.2   | 9.5  | 5.7  | 0.2    | 5.5  |
| 4   | 7    | Slovakia       | 6.9         | 0.4    | 6.5  | 5.7          | 0.1    | 5.6             | 7.1  | 0.1                      | 6.9  | 7.4        | 1.2    | 6.3  | 7.6  | 0.4    | 7.2  |
| 5   | 5    | Netherlands    | 6.9         | 0.2    | 6.6  | 7.3          | 0.0    | 7.3             | 8.3  | 0.3                      | 8.0  | 5.8        | 0.6    | 5.2  | 6.1  | 0.0    | 6.0  |
| 6   | 4    | Sweden         | 6.7         | -0.2   | 6.9  | 7.1          | -0.1   | 7.2             | 5.9  | -0.3                     | 6.3  | 7.1        | -0.3   | 7.4  | 6.8  | -0.1   | 6.9  |
| 7   | 8    | Slovenia       | 6.4         | 0.3    | 6.1  | 6.0          | -0.1   | 6.0             | 5.7  | 0.2                      | 5.5  | 6.5        | 0.9    | 5.6  | 7.7  | 0.4    | 7.3  |
| 8   | 6    | Poland         | 6.4         | -0.1   | 6.5  | 6.0          | 0.1    | 5.9             | 7.2  | -0.1                     | 7.3  | 6.1        | 0.1    | 6.1  | 6.4  | -0.3   | 6.7  |
| 9   | 9    | Austria        | 5.9         | 0.1    | 5.7  | 5.9          | 0.0    | 6.0             | 5.8  | -0.2                     | 5.9  | 5.7        | 0.5    | 5.2  | 6.1  | 0.3    | 5.8  |
| -   | -    | Euro 17        | 5.8         | 0.3    | 5.5  | 5.0          | 0.0    | 5.0             | 6.2  | 0.1                      | 6.1  | 6.2        | 0.7    | 5.5  | 5.9  | 0.3    | 5.6  |
| 10  | 11   | Belgium        | 5.4         | 0.1    | 5.3  | 5.3          | -0.1   | 5.4             | 6.9  | 0.0                      | 6.9  | 4.2        | 0.2    | 4.0  | 5.2  | 0.2    | 5.0  |
| 11  | 14   | Ireland        | 5.3         | 0.6    | 4.8  | 5.3          | -0.2   | 5.5             | 7.4  | 0.2                      | 7.2  | 4.9        | 1.1    | 3.8  | 3.8  | 1.2    | 2.7  |
| 12  | 12   | United Kingdom | 5.3         | 0.2    | 5.1  | 5.3          | -0.1   | 5.4             | 6.2  | -0.2                     | 6.4  | 4.7        | 1.0    | 3.8  | 5.0  | 0.1    | 4.9  |
| 13  | 10   | Finland        | 5.3         | -0.2   | 5.4  | 5.8          | -0.1   | 5.9             | 3.4  | -0.4                     | 3.9  | 6.1        | -0.4   | 6.4  | 5.8  | 0.2    | 5.5  |
| 14  | 13   | Malta          | 5.2         | 0.2    | 5.0  | 4.3          | 0.1    | 4.1             | 6.2  | -0.5                     | 6.7  | 6.3        | 0.2    | 6.0  | 4.1  | 0.9    | 3.2  |
| 15  | 15   | Spain          | 4.9         | 0.4    | 4.5  | 3.7          | -0.1   | 3.9             | 5.0  | 0.6                      | 4.5  | 5.7        | 1.2    | 4.4  | 5.2  | -0.1   | 5.3  |
| 16  | 16   | France         | 4.7         | 0.2    | 4.5  | 4.8          | 0.1    | 4.7             | 4.0  | 0.0                      | 4.0  | 4.5        | 0.7    | 3.9  | 5.4  | 0.1    | 5.3  |
| 17  | 20   | Greece         | 4.5         | 1.0    | 3.6  | 3.5          | -0.4   | 4.0             | 4.4  | 0.8                      | 3.6  | 4.9        | 2.1    | 2.8  | 5.3  | 1.3    | 4.0  |
| 18  | 17   | Italy          | 4.5         | 0.1    | 4.4  | 3.3          | 0.0    | 3.3             | 3.6  | 0.0                      | 3.6  | 5.6        | 0.2    | 5.3  | 5.6  | 0.2    | 5.4  |
| 19  | 18   | Portugal       | 4.4         | 0.5    | 3.9  | 3.9          | 0.3    | 3.6             | 5.2  | 0.4                      | 4.8  | 4.5        | 0.7    | 3.7  | 4.1  | 0.7    | 3.4  |
| 20  | 19   | Cyprus         | 4.0         | 0.4    | 3.6  | 3.2          | -0.7   | 3.9             | 3.5  | 1.1                      | 2.5  | 5.6        | 0.0    | 5.6  | 3.6  | 1.2    | 2.4  |
| Source: Berenberg Bank / The Lisbon Council |      |                |             |        |      |              |        |                 |      |                          |      |            |        |      |      |        |      |

With particular reference to the fundamental health indicator FHI:

- Luxembourg ranks 3rd for growth potential (score 6.8);
- Luxembourg ranks 7th for competitiveness (score 6.4);
- Luxembourg ranks 1st (score 9.3) for public finance sustainability;
- ▼ Luxembourg takes 10th place (score 5.7) for recovery ability.

With regards to API:

- Luxembourg ranks 18th for external adjustment (score 2.6);
- Luxembourg ranks 18th for faculty of budgetary adjustment (score 0.5);
- Luxembourg ranks 8th with regards to labour costs (score 4.2);
- ▼ Luxembourg ranks 18th for its commitment to reform (score 0.6).

Luxembourg's success is in particular attributed to its openness to foreign trade (high proportion of exportations) and to its important financial centre, two factors that allow the country a high level of regulation (including on the labour market). The high proportion of export, the strong growth potential, healthy public balances, high household savings and a good current account surplus are regarded as being the strengths of the country. The extensive market regulation (products, services and labour market), the high level of private debt, the steep increase in nominal unit labour cost and the vulnerability facing shocks in the financial sector, are regarded as the main weaknesses of Luxembourg's economy.

#### a.2 WEF Europe 2020 competitiveness report

Following the release of the 2012 edition, the World Economic Forum (WEF) published the 2nd edition of its report on the analysis of the implementation of the Europe 2020 strategy within the European Union. The Europe 2020 strategy constitutes the EU ten-year strategy to implement a smart, sustainable and inclusive growth allowing the European Union to achieve high levels of employment, productivity and social cohesion. The report draws upon quantitative as well as qualitative data resulting from a WEF yearly survey among economic decision-makers within the Member States.

The composite indicators calculated by the WEF on the basis of this information are divided into three categories and seven sub-categories of indicators: smart growth (business environment, ICT, innovation and R&D, education and training); sustainable growth (environment); inclusive growth (labour and job market, social inclusion). Within the European Union, there are considerable gaps between Member States as to the implementation of the Europe 2020 strategy and the scores consequently diverge considerably. Thus, the WEF has calculated a national composite index for each Member States globally, as well as by category and sub-category.

The 2014 overall ranking is led by Finland, Sweden and the Netherlands. In the 2014 edition Luxembourg takes 8th place of the EU-28 (score 5.07 out of 7). Germany takes 5th place (5.28), Belgium 9th place (4.93) and France 10th place (4.81). The EU-28 scores 4.56 in average.

| Table 8 WEF-Europe 2020 ranking |                        |                         |   |  |                                   |  |  |  |
|---------------------------------|------------------------|-------------------------|---|--|-----------------------------------|--|--|--|
|                                 | Europe 2<br>20         | 020 index<br>14 Edition |   |  |                                   |  |  |  |
| Country                         | Rank<br>(out<br>of 28) | Score<br>(1-7)          | Rank using<br>2012 sample*<br>(out of 27) | Europe 2020<br>index 2012 edition<br>(out of 27) | Change<br>2012-2014<br>(constant) |  |  |  |
| Finland                         | 1                      | 5.70                    | 1   | 2  | 1                                 |  |  |  |
| Sweden                          | 2                      | 5.55                    | 2   | 1  | -1                                |  |  |  |
| Netherlands                     | 3                      | 5.41                    | 3   | 4  | 1                                 |  |  |  |
| Denmark                         | 4                      | 5.32                    | 4   | 3  | -1                                |  |  |  |
| Germany                         | 5                      | 5.28                    | 5   | 6  | 1                                 |  |  |  |
| Austria                         | 6                      | 5.16                    | 6   | 5  | -1                                |  |  |  |
| United Kingdom                  | 7                      | 5.13                    | 7   | 7  | 0                                 |  |  |  |
| Luxembourg                      | 8                      | 5.07                    | 8   | 8  | 0                                 |  |  |  |
| Belgium                         | 9                      | 4.93                    | 9   | 9  | 0                                 |  |  |  |
| France                          | 10                     | 4.81                    | 10  | 10   | 0                                 |  |  |  |
| Ireland                         | 11                     | 4.75                    | 11  | 12   | 1                                 |  |  |  |
| Estonia                         | 12                     | 4.74                    | 12  | 11   | -1                                |  |  |  |
| Spain                           | 13                     | 4.47                    | 13  | 15   | 2                                 |  |  |  |
| Malta                           | 14                     | 4.44                    | 14  | 18   | 4                                 |  |  |  |
| Portugal                        | 15                     | 4.44                    | 15  | 14   | -1                                |  |  |  |
| Slovenia                        | 16                     | 4.43                    | 16  | 13   | -3                                |  |  |  |
| Lithuania                       | 17                     | 4.38                    | 17  | 20   | 3                                 |  |  |  |
| Czech Republic                  | 18                     | 4.33                    | 18  | 16   | -2                                |  |  |  |
| Latvia                          | 19                     | 4.32                    | 19  | 19   | 0                                 |  |  |  |
| Cyprus                          | 20                     | 4.22                    | 20  | 17   | -3                                |  |  |  |
| Italy                           | 21                     | 4.05                    | 21  | 21   | 0                                 |  |  |  |
| Poland                          | 22                     | 3.97                    | 22  | 23   | 1                                 |  |  |  |
| Slovak Republic                 | 23                     | 3.91                    | 23  | 22   | -1                                |  |  |  |
| Croatia                         | 24                     | 3.87                    | n/a                                       | n/a  | n/a                               |  |  |  |
| Hungary                         | 25                     | 3.83                    | 24  | 24   | 0                                 |  |  |  |
| Greece                          | 26                     | 3.79                    | 25  | 25   | 0                                 |  |  |  |
| Bulgaria                        | 27                     | 3.75                    | 26  | 27   | 1                                 |  |  |  |
| Romania                         | 28                     | 3.64                    | 27  | 26   | -1                                |  |  |  |
| EU28                            |                        | 4.56                    |   |  |                                   |  |  |  |
| Source: WEF                     |                        |                         |   |  |                                   |  |  |  |

The WEF makes the following observation with regard to the implementation of the Europe 2020 strategy in Luxembourg: "Luxembourg remains stable, in 8th place overall, despite comparative improvements in terms of building a smarter and more inclusive economy, moving up three places to 7th and one place to 5th, respectively. The country continues to demonstrate one of the most pro-business environments in the EU (4th), with high levels of competition (2nd), low taxes (1st) and, in comparative terms to other European economies, fairly fluid access to finance (3rd). In addition, and following a strategic long-term vision to diversify its economy, Luxembourg continues to strongly develop its digital readiness (1st) and usage (8th), and strengthen its innovation system. Despite this progress, the country still suffers from relatively low levels of R&D (15th) and a shortage of scientists and engineers (19th), which is partially explained by its service-based economic structure that may rely on other sources than R&D to support and foster innovation. To continue supporting a well-performing knowledge-based economy, Luxembourg will need to address some of the persistent concerns about its educational system, both in terms of quality and quantity, to ensure a good supply of skilful labour, and to address any potential income disparities that may affect a fairly cohesive society (3rd) with effective government policies to reduce poverty and inequality (4th). More precisely, and according to the PISA results, while the quality of its educational system has improved in the past years, the country ranks 15th and continues to score below the EU average".

| Rank (out of 28)Score (1-7)Europe 2020 Index (2014 edition)85.1Europe 2020 Index (2012 edition)85.1Smart growth75.1Enterprise environment44.8Digital Agenda65.5Innovative Europe85.2Education and training194.8Inclusive growth55.3Labour market and employment94.6Social inclusion36.0Sustainability144.7Environmental sustainability144.7Environmental sustainability144.7Environmental and employment94.6Social inclusion36.0Sustainability144.7Environmental sustainability144.7Environmental sustainability144.7Environmental and employment94.6Social inclusion36.0Sustainability144.7Environmental sustainability144.7Environmental sustainability144.7Environmental and employment89.2Agenda94.6Social inclusion94.6Social inclusion94.6Social inclusion94.6Social inclusion99.6Social inclusion99.6Social inclusion99.6Social inclusion99.6Social inclusion9.6 <th>Chart 6<br/><b>Performances of Luxembourg</b></th> <th></th> <th></th>   | Chart 6<br><b>Performances of Luxembourg</b>                                     |   |                           |
|--|--|---|---------------------------|
| Europe 2020 Index (2012 edition)85.1Europe 2020 Index (2012 edition)85.1Smart growth75.1Enterprise environment44.8Digital Agenda65.5Innovative Europe85.2Education and training194.8Inclusive growth55.3Labour market and employment94.6Social inclusion36.0Sustainable growth144.7Environmental sustainability144.7Environmental sustainability144.7Social14.9Labour marketEducation<br>and employment  |  | Rank (out of 28)                            | Score (1-7)               |
| Europe 2020 Index (2012 edition)85.1Smart growth75.1Enterprise environment44.8Digital Agenda65.5Innovative Europe85.2Education and training194.8Inclusive growth55.3Labour market and employment94.6Social inclusion36.0Sustainable growth144.7Environmental sustainability144.7Environmental sustainability144.7Social76Justianability144.7Environmental sustainability144.7Social65Social65Social66Social66Social66Social66Social67Social66Social66Social66Social66Social66Social67Social67Social67Social67Social67Social67Social67Social67Social67Social66Social66Social67Social67Social7 <td>Europe 2020 Index (2014 edition)</td> <td>8</td> <td>5.1</td>   | Europe 2020 Index (2014 edition)   | 8   | 5.1                       |
| Smart growth1Enterprise environment4Digital Agenda6Digital Agenda6Innovative Europe8Education and training19At a second provide growth5Labour market and employment9Social inclusion3Social inclusion14Environmental sustainability14Social inclusion4,0Social inclusion5,0Social inclusion5,0Social inclusion5,0Social inclusion5,0Social inclusion5,0Social inclusion5,0Social inclusion5,0Social inclusion6,0Social inclusion6,0 <td>Europe 2020 Index (2012 edition)</td> <td>8</td> <td>5.1</td>   | Europe 2020 Index (2012 edition)   | 8   | 5.1                       |
| Enterprise environment44.8Digital Agenda65.5Innovative Europe85.2Education and training194.8Inclusive growth55.3Labour market and employment94.6Social inclusion36.0Sustainable growth144.7Environmental sustainability144.7Environmental sustainability144.7Social inclusion36.0Sustainable growth144.7Environmental sustainability144.7Social inclusion65.5Social inclusion65.5Environment76Social inclusion65.5Social inclusion86.0Social inclusion86.0Social inclusion94.6Social inclusion94.6Social inclusion94.6Social inclusion94.6Social inclusion99Labour market and employment99Burger WEF55Source: WEF55  | Smart growth   | 7   | 5.1                       |
| Digital Agenda 6 5.5<br>Innovative Europe 8 5.2<br>Education and training 19 4.8<br>Inclusive growth 5 5.3<br>Labour market and employment 9 4.6<br>Social inclusion 3 6.0<br>Sustainable growth 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability   | Enterprise environment   | 4   | 4.8                       |
| Innovative Europe 8 5.2<br>Education and training 19 4.8<br>Inclusive growth 5 5.3<br>Labour market and employment 9 4.6<br>Social inclusion 3 6.0<br>Sustainable growth 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability   | Digital Agenda   | 6   | 5.5                       |
| Education and training194.8Inclusive growth55.3Labour market and employment94.6Social inclusion36.0Sustainable growth144.7Environmental sustainability144.7Environmental sustainability144.7Social inclusion2Jigital AgendaSocial inclusion2-Labour market and employmentEducation and training= LuxembourgSource: WEFEducation and training= Finland (best performer)   | Innovative Europe  | 8   | 5.2                       |
| Inclusive growth 5 5.3<br>Labour market and employment 9 4.6<br>Social inclusion 3 6.0<br>Sustainable growth 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Entreprise<br>environment<br>Social inclusion 7<br>Entreprise<br>environment 4<br>Social inclusion 6<br>Harden 14<br>Harden 14 | Education and training   | 19  | 4.8                       |
| Labour market and employment       9       4.6         Social inclusion       3       6.0         Sustainable growth       14       4.7         Environmental sustainability       6       Digital Agenda         Social inclusion       3       2         Innovative Europe       -       Luxembourg         Labour market and employment       Education and training       -         Source: WEF       Source: WEF       -  | Inclusive growth   | 5   | 5.3                       |
| Social inclusion 3 6.0<br>Sustainable growth 14 4.7<br>Environmental sustainability 14 4.7<br>Environmental sustainability 14 4.7<br>Entreprise<br>environment<br>Social inclusion 7<br>Labour market<br>and employment Education<br>and training = Elu28<br>Finland (best performer)<br>Source: WEF   | Labour market and employment   | 9   | 4.6                       |
| Sustainable growth       14       4.7         Environmental sustainability       7       6         5       Digital Agenda       Agenda         Social inclusion       1       Innovative Europe         Labour market and employment       Education and training       = Luxembourg         Source: WEF       Source: WEF       = Finland (best performer)  | Social inclusion   | 3   | 6.0                       |
| Environmental sustainability 14 4.7  | Sustainable growth   | 14  | 4.7                       |
| Entreprise<br>environment<br>Social<br>inclusion<br>Labour market<br>and employment<br>Education<br>and training<br>Education<br>Education<br>and training<br>Education<br>Europe<br>Eluze<br>Finland (best performer)   | Environmental sustainability   | 14  | 4.7                       |
| Source: WEF  | Entreprise<br>environment<br>Social<br>Social<br>Labour market<br>and employment | ovative<br>ope<br>Luxemb<br>EU28<br>Finland | oourg<br>(best performer) |
|  | Source: WEF  |   |                           |

## b. Attractiveness and tax competitiveness indicators

#### b.1 Paying taxes

In November 2013, the World Bank, the International Finance Corporation and PwC released the 2014 edition of the "Paying Taxes" report. This is the ninth annual edition of the study aimed at measuring the fiscal complexity for businesses across 189 countries in the world. The analysis draws upon a case study of an SME, and the ranking is carried out according to three indicators: the total fiscal pressure actually borne by businesses (total tax rate TTR, total of taxes payable by an enterprise expressed as a percentage of pre-tax profit), the time necessary for businesses to satisfy all tax-related demands, and finally the number of payments that need to done. Through these three indicators, the study aims to measure the complexity of the fiscal system a business has to face. One of the main messages of the study is that the taxation of companies constitutes only one part of the total fiscal pressure a business has to bear, and that companies' nominal corporation tax rate constitutes a rather imperfect indicator to determine the actual fiscal pressure that is borne.

Luxembourg ranks 15th in the global ranking. Germany ranks 89th, Belgium 76th and France 52nd. With regards to total tax rate (TTR), Luxembourg records a TTR of 20.7%. Germany records a TTR of 49.4%, Belgium a TTR of 57.5% and France a TTR of 64.7%. With regards to the time necessary to satisfy fiscal obligations, Luxembourg counts an average of 55 hours. Germany counts 218 hours, Belgium 160 hours and France 132 hours in average. Finally, with regards to the number of payments that needs to be made by enterprises to suffice fiscal duties, Luxembourg records 23 payments. Germany records 9 payments, Belgium 11 and France 7 payments.

c. Financial sector attractiveness and competitiveness indicators

#### c.1 Global Financial Centres Index

The Z/Yen consultancy bureau and the Long Finance initiative released the 16th edition of the bi-annual competitiveness index of 83 financial centres around the world, the "Global financial centres index". In a world that is becoming increasingly globalised and interdependent through information and communication technologies, financial centres are faced with a greater competition than other sectors. In fact, financial services are at the heart of the global economy, acting as facilitators of international trade and foreign investments. The study is based on two types of sources to assess the competitiveness of financial centres. On the one hand the study uses 105 quantitative determinants and on the other hand it resorts to a barometer of appreciation on the basis of online surveys among professionals of the sector.

As defined in this study, competitiveness consists of five categories of indicators: the business environment (taxes, regulation, etc.), development of the financial sector, infrastructure (cost and availability of offices, etc.), human resources (training, flexibility, etc.) and global determinants of competitiveness (perception of cities as desirable places to live, etc.).

New York, London and Hong Kong occupy the first three positions in this new September 2014 edition. Luxembourg takes 15th place in a global ranking. On European level, Luxembourg takes 4th place after London, Zurich and Geneva. At European Union level, Luxembourg consequently takes 2nd place.

| Table 9 Top 20 of global financial centres |      |         |      |         |                |                |  |  |
|--|------|---------|------|---------|----------------|----------------|--|--|
|  |      | GFCI 16 |      | GFCI 15 | Changes        |                |  |  |
| Centre                                     | Rank | Rating  | Rank | Rating  | Rank           | Rating         |  |  |
| New York                                   | 1    | 778     | 1    | 786     | -              | ↓ 8            |  |  |
| London                                     | 2    | 777     | 2    | 784     | -              | $\downarrow$ 7 |  |  |
| Hong Kong                                  | 3    | 756     | 3    | 761     | -              | $\downarrow$ 5 |  |  |
| Singapore                                  | 4    | 746     | 4    | 751     | -              | $\downarrow$ 5 |  |  |
| San Francisco                              | 5    | 719     | 10   | 711     | 个 5            | <b>↑</b> 8     |  |  |
| Tokyo                                      | 6    | 718     | 6    | 722     | -              | $\downarrow$ 4 |  |  |
| Zurich                                     | 7    | 717     | 5    | 730     | ↓ 2            | ↓ 13           |  |  |
| Seoul                                      | 8    | 715     | 7    | 718     | ↓ 1            | ↓ 3            |  |  |
| Boston                                     | 9    | 705     | 8    | 715     | ↓ 1            | ↓ 10           |  |  |
| Washington D.C.                            | 10   | 704     | 13   | 706     | <b>↑</b> 3     | ↓ 2            |  |  |
| Toronto                                    | 11   | 703     | 14   | 705     | <b>↑</b> 3     | ↓ 2            |  |  |
| Chicago                                    | 12   | 702     | 15   | 704     | <b>↑</b> 3     | ↓ 2            |  |  |
| Geneva                                     | 13   | 701     | 9    | 713     | $\downarrow$ 4 | ↓ 12           |  |  |
| Vancouver                                  | 14   | 700     | 17   | 698     | <b>↑</b> 3     | <u>↑</u> 2     |  |  |
| Luxembourg                                 | 15   | 697     | 12   | 707     | 个 3            | ↓ 10           |  |  |
| Frankfurt                                  | 16   | 695     | 11   | 709     | $\downarrow$ 5 | ↓ 14           |  |  |
| Dubai                                      | 17   | 694     | 29   | 684     | 个 12           | 个 10           |  |  |
| Montreal                                   | 18   | 693     | 16   | 699     | ↓ 2            | ↓ 6            |  |  |
| Abu Dhabi                                  | 19   | 692     | 32   | 678     | 个 13           | <b>↑</b> 14    |  |  |
| Shanghai                                   | 20   | 690     | 20   | 695     | -              | ↓ 5            |  |  |

Source: Long Finance & Z/Yen

The 83 financial centres are also analysed through a matrix of different factors to determine a typical profile: the degree of connection of the financial centre, the range of financial services being offered and the degree of specialisation. On the basis of these three factors, Luxembourg as well as Beijing, Milan and Moscow, are considered to be a "global specialist" financial centre.

In the analysis of the volatility of the various financial centres, Luxembourg is considered to be a "dynamic" financial centre, placed between "stable" and "unpredictable" financial centres. This means that Luxembourg as a financial centre has the potential to evolve in either direction.



Finally, according to the online survey carried out worldwide among professionals of the financial sector, Luxembourg takes 5th place globally, and even 1st place in Europe of the financial centres that those professionals envisaged taking increasing role in years to come.

## d. Innovation indicators

## d.1 Global innovation index

The University of Cornell, INSEAD and the World Intellectual Property Organization (WIPO) issued the 7th edition of their "Global innovation index" study. Innovation is a crucial determinant for a long-term sustained economic growth. Relevant indicators are thus necessary to evaluate innovation capacity and innovation policies implemented by public authorities. This study goes further than traditional indicators used for measuring the R&D and innovation (for example R&D expenses, number of scientific publications, etc.) and focuses more on the interaction between different agents of the innovation system (businesses, public sector, higher education and society). The study consequently synthesises performance measured through different composite indicators, including the Global innovation index (GII).
The GII composite index, which can obtain a score between 0 for worse performance and 100 for the best performance, is calculated on the basis of two sub-indicators: inputs (institutions, human resources and research, infrastructure, market sophistication and business environment sophistication) and outputs (knowledge and technology, creativity) of the innovation system. The study includes 143 countries and is based on a total of 81 basic indicators.

The 2014 GII global ranking is led by Switzerland (score 64.78 out of 100), followed by the United Kingdom and Sweden. Luxembourg scores 56.86 and ranks 9th worldwide (12th in the last edition) and is ahead of its neighbouring countries: Germany is 13th (56.02), France 22th (52.18) and Belgium 23rd (51.69). The Netherlands takes 5th place (60.59).

| Table 10<br>Gil top 20 ranking |                  |      |        |      |        |      |                     |      |              |
|--------------------------------|------------------|------|--------|------|--------|------|---------------------|------|--------------|
| Country/Economy                | Score<br>(0-100) | Rank | Income | Rank | Region | Rank | Efficiency<br>Ratio | Rank | Median: 0.74 |
| Switzerland                    | 64.78            | 1    | HI     | 1    | EUR    | 1    | 0.95                | 6    |              |
| United Kingdom                 | 62.37            | 2    | HI     | 2    | EUR    | 2    | 0.83                | 29   |              |
| Sweden                         | 62.29            | 3    | HI     | 3    | EUR    | 3    | 0.85                | 22   |              |
| Finland                        | 60.67            | 4    | HI     | 4    | EUR    | 4    | 0.80                | 41   |              |
| Netherlands                    | 60.59            | 5    | HI     | 5    | EUR    | 5    | 0.91                | 12   |              |
| United States of America       | 60.09            | 6    | HI     | 6    | NAC    | 1    | 0.77                | 57   |              |
| Singapore                      | 59.24            | 7    | HI     | 7    | SEA0   | 1    | 0.61                | 110  |              |
| Denmark                        | 57.52            | 8    | HI     | 8    | EUR    | 6    | 0.76                | 61   |              |
| Luxembourg                     | 56.86            | 9    | HI     | 9    | EUR    | 7    | 0.93                | 9    |              |
| Hong Kong (China)              | 56.82            | 10   | HI     | 10   | SEA0   | 2    | 0.66                | 99   |              |
| Ireland                        | 56.67            | 11   | HI     | 11   | EUR    | 8    | 0.79                | 47   |              |
| Canada                         | 56.13            | 12   | HI     | 12   | NAC    | 2    | 0.69                | 86   |              |
| Germany                        | 56.02            | 13   | HI     | 13   | EUR    | 9    | 0.86                | 19   |              |
| Norway                         | 55.59            | 14   | HI     | 14   | EUR    | 10   | 0.78                | 51   |              |
| Israël                         | 55.46            | 15   | HI     | 15   | NAWA   | 1    | 0.79                | 42   |              |
| Korea, Republic of             | 55.27            | 16   | HI     | 16   | SEA0   | 3    | 0.78                | 54   |              |
| Australia                      | 55.01            | 17   | HI     | 17   | SEA0   | 4    | 0.70                | 81   |              |
| New Zealand                    | 54.52            | 18   | HI     | 18   | SEA0   | 5    | 0.75                | 66   |              |
| Iceland                        | 54.05            | 19   | HI     | 19   | EUR    | 11   | 0.90                | 13   |              |
| Austria                        | 53.41            | 20   | HI     | 20   | EUR    | 12   | 0.74                | 69   |              |

Source: Cornell University/INSEAD

Within the two sub-indicators:

- With a score of 58.78 out of 100, Luxembourg is 21st worldwide for the input category (institutions: 20th rank; human resources: 27th rank; infrastructure: 22th rank; market sophistication: 59th rank; trade environment sophistication: 2nd rank). For this sub-indicator, Luxembourg follows the Netherlands, Germany and France but is ahead of Belgium;
- With a score of 54.94 out of 100, Luxembourg is 5th worldwide for the output category (knowledge and technology: 16th rank; creativity: 3rd rank). Luxembourg follows the Netherlands but is ahead of Germany, Belgium and France.

In conclusion, the authors of the study make the following observation with regard to Luxembourg: "Luxembourg is ranked 9th in 2014 (up three places from 2013), the first time it has made its way into the top 10, with a strong performance in outputs (5th) and innovation efficiency (9th). Its pillar rankings of 2nd in Business sophistication (7th in 2013) and 16th in Knowledge and technology outputs (43rd in 2013) played a major role in achieving its place in the top 10. Its biggest strengths lie in the Creative outputs pillar, where it ranks 1st in four indicators: Madrid system trademark applications, cultural and creative services exports, national feature films produced, and generic top-level domains. Luxembourg's weaknesses remain in the cost of redundancy dismissal, tertiary enrolment, average QS university ranking top 3, ease of getting credit, ease of protecting investors, total value of stocks traded, market access to foreign markets for non agricultural exports, high-tech imports less re-imports, growth rate of GDP per worker, and high- and medium-high-tech manufactures".

## e. Globalization indicators

## e.1 KOF Index of Globalization

ETH Zurich released the 2014 edition of its index of globalization "KOF Index of globalization". This index measures economic, social and political dimensions of globalization on the basis of 23 variables. The economic dimension measures the flow of goods, services and capital, as well as information and perceptions linked to market exchange. It also measures the barriers to capital flow and market exchange. The social dimension measures the dissemination of ideas and information, of images and people, etc. The political dimension reflects the dissemination of government policies, such as the number of embassies in a country, the importance of affiliation to international organizations, etc. On the basis of these three sub-categories, the KOF index measures globalization on a scale of 1 (least globalized) to 100 (most globalized). The basic data used in this new edition date back to 2011.

The general ranking is led by Ireland (92.17), Belgium (91.61) and the Netherlands (91.33). Luxembourg takes 15th place with a score 84.57 of 100. France takes 21st place (82.76) and Germany 26th place (79.47).

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The performance of Luxembourg is particularly high in the economic dimension of globalization for which the country achieves a score of 92.53 out of 100 (3rd position). The Netherlands takes 5th place (91.17), Belgium 6th place (89.43) and Germany 58th (65.73). For social globalization, Luxembourg takes a score of 80.37 (24th position). The Netherlands takes 5th place (90.32), Belgium 7th place (90.17), France comes 10th (86.70) and Germany 15th (83.71). For political globalization, Luxembourg scores 79.60 and takes 61st place. France comes 1st in this dimension (97.76), Belgium 3rd (96.75), the Netherlands 15th (93.01) and Germany 19th (92.44).

Since the beginning of the 1970s, Luxembourg has become more and more globalized. The general index of globalization has increased from 71.56 in 1970 to 84.57 in 2011. The economic globalization has remained constant on a very high level during these years. Social globalization has also increased steeply from an index of 57.39 to 80.37 in 2011. Finally, political globalization has increased significantly from 61.91 to 79.60.

## e.2 Depth index of globalization

The Spanish business school IESE published the latest edition of its "Depth index of globalization" report on globalization and international integration of countries. The report defines globalization as the integration of a country with the rest of the world through its participation in international flows (and stocks) of products and services, capital, information and people. This report includes a composite indicator classifying countries by their degree of international integration, i.e. their degree of globalization, calculated by the flows (and stocks) of these four subcategories. The report is based solely on quantitative data and a total of 139 countries are analysed globally. The 2013 global ranking is led by Hong Kong and Singapore with Luxembourg taking 3rd place. Belgium comes 5th in the global ranking, the Netherlands 6th, Germany 38th and France 54th.



With regard to the four sub-categories on which the composite indicator and global ranking are based:

- Luxembourg takes 27th place for the pillar of products and services, losing 4 places to the previous edition of the report – Belgium comes 3rd, the Netherlands 5th, Germany 47th and France 104th;
- Luxembourg takes 1st for the pillar of capitals Belgium comes 8th, the Netherlands 10th, France 25th and Germany 46th;
- Luxembourg takes 3rd for the pillar of communication Belgium takes 5th place, the Netherlands 8th place, France 20th and Germany comes 21st;
- Luxembourg comes 1st for the pillar of people Germany takes 30th place, Belgium 40th, the Netherlands 41st and France 45th.

## f. Cost of living indicators

Consumer purchasing power and cost of living are important factors in the debate on territorial attractiveness and competitiveness. It is therefore not surprising that such rankings are periodically published.

For example, in June 2014 ECA International published a study on the cost of living for expatriates around the world. This study compares the price level in 440 cities and places of the world. Human resources professionals use this data to calculate cost of living premiums they grant their expatriates. ECA International defines and compares the level of cost of living on the basis of an average basket constituted of consumer goods and services. These items have been chosen because they represent products and services typically acquired by expatriates. Among these goods are "food", "basics" (drinks and tobacco, miscellaneous items and services) and "general" (clothing, appliances, restaurants). While the cost of living index reflects everyday expenses, the study does not include certain costs such as housing, utilities (electricity, gas, water), the purchase of a car and school expenses. Fluctuating exchange rates, inflation and the availability of goods and services impact on the cost of living of expatriates.

According to ECA International, the world's most expensive cities for expatriates are Caracas (Venezuela), Oslo (Norway) and Luanda (Angola). Luxembourg takes 58th place worldwide in 2014. The ranking of European cities is led by Oslo (2nd worldwide), Zurich (4th worldwide) and Geneva (5th worldwide). Luxembourg takes 19th place in this European ranking.

| Table 11 ECA International ranking |                 |                  |                  |  |  |  |  |  |  |
|------------------------------------|-----------------|------------------|------------------|--|--|--|--|--|--|
| Europe rank 2014                   | Location        | Global rank 2014 | Global rank 2013 |  |  |  |  |  |  |
| 1                                  | Oslo            | 2                | 1                |  |  |  |  |  |  |
| 2                                  | Zurich          | 4                | 7                |  |  |  |  |  |  |
| 3                                  | Geneva          | 5                | 8                |  |  |  |  |  |  |
| 4                                  | Stavanger       | 6                | 3                |  |  |  |  |  |  |
| 5                                  | Bern            | 7                | 10               |  |  |  |  |  |  |
| 6                                  | Basel           | 8                | 9                |  |  |  |  |  |  |
| 7                                  | Copenhagen      | 10               | 12               |  |  |  |  |  |  |
| 8                                  | Helsinki        | 13               | 20               |  |  |  |  |  |  |
| 9                                  | Stockholm       | 17               | 15               |  |  |  |  |  |  |
| 10                                 | Moscow          | 22               | 5                |  |  |  |  |  |  |
| 11                                 | Gothenburg      | 27               | 28               |  |  |  |  |  |  |
| 12                                 | Paris           | 28               | 38               |  |  |  |  |  |  |
| 13                                 | Berlin          | 32               | 48               |  |  |  |  |  |  |
| 14                                 | Brussels        | 40               | 58               |  |  |  |  |  |  |
| 15                                 | Central London  | 46               | 86               |  |  |  |  |  |  |
| 16                                 | Vienna          | 50               | 66               |  |  |  |  |  |  |
| 17                                 | Munich          | 54               | 73               |  |  |  |  |  |  |
| 18                                 | Dublin          | 56               | 75               |  |  |  |  |  |  |
| 19                                 | Antwerp         | 58               | 68               |  |  |  |  |  |  |
| 19                                 | Luxembourg City | 58               | 69               |  |  |  |  |  |  |
| 21                                 | Strasbourg      | 60               | 71               |  |  |  |  |  |  |
| 22                                 | Amsterdam       | 64               | 72               |  |  |  |  |  |  |
| 23                                 | Marseille       | 65               | 73               |  |  |  |  |  |  |
| 24                                 | Milan           | 66               | 77               |  |  |  |  |  |  |
| 25                                 | The Hague       | 67               | 83               |  |  |  |  |  |  |
| 26                                 | Lyon            | 68               | 80               |  |  |  |  |  |  |
| 27                                 | Rome            | 70               | 79               |  |  |  |  |  |  |
| 28                                 | Stuttgart       | 73               | 88               |  |  |  |  |  |  |
| 29                                 | Frankfurt       | 74               | 89               |  |  |  |  |  |  |
| 30                                 | Toulouse        | 75               | 84               |  |  |  |  |  |  |
| Source: ECA Internat               | tional          |                  |                  |  |  |  |  |  |  |

## g. Miscellaneous indicators

A multitude of other factors play an important role in the debate regarding territorial attractiveness and competitiveness: functioning and governance of public authorities, business environment, human resources, etc. There are regular publications on benchmarks and country rankings focusing on a multitude of these topics, some of which are reviewed below.

## g.1 Corruption perceptions index

The institutional and regulatory framework within which economic activities take place, impacts on the way resources are distributed, investment decisions are orientated and creativity and innovation are stimulated. Corruption thus weakens a country and harms the stability and security of the decisions economic agents make.

It is from this point of view that Transparency international, a anticorruption non-governmental organisation, published the 2013 edition of its annual composite index of corruption perception: the Corruption Perceptions Index (CPI). Country by country, the CPI composite index measures the corruption perception in the public sector. It is calculated on the basis of information from surveys carried out by international institutions among experts and business decision-makers. The results are then used to classify territories according to the degree of corruption perceived in the national public sector. The CPI ranges from 100 (barely corrupt) to 0 (highly corrupt) for the 177 analysed countries.

In this new edition, Denmark and New Zealand share the 1st place of the global ranking. Luxembourg is in the 11th world position with a score of 80/100. The Netherlands takes 8th place, Germany 12th, Belgium 15th and France 22nd. Within the European Union, Luxembourg is in the 5th position. Luxembourg thus features among those countries for which corruption in the public sector is perceived to be relatively low.

| Table 12<br>CPI country ranking |                   |       |  |      |                                  |       |  |  |  |
|---------------------------------|-------------------|-------|--|------|----------------------------------|-------|--|--|--|
| Rank                            | Country/Territory | Score |  | Rank | Country/Territory                | Score |  |  |  |
| 1                               | Denmark           | 91    |  | 22   | France                           | 71    |  |  |  |
| 1                               | New Zealand       | 91    |  | 22   | Saint Lucia                      | 71    |  |  |  |
| 3                               | Finland           | 89    |  | 26   | Austria                          | 69    |  |  |  |
| 3                               | Sweden            | 89    |  | 26   | United Arab Emirates             | 69    |  |  |  |
| 5                               | Norway            | 86    |  | 28   | Estonia                          | 68    |  |  |  |
| 5                               | Singapore         | 86    |  | 28   | Qatar                            | 68    |  |  |  |
| 7                               | Switzerland       | 85    |  | 30   | Botswana                         | 64    |  |  |  |
| 8                               | Netherlands       | 83    |  | 31   | Bhutan                           | 63    |  |  |  |
| 9                               | Australia         | 81    |  | 31   | Cyprus                           | 63    |  |  |  |
| 9                               | Canada            | 81    |  | 33   | Portugal                         | 62    |  |  |  |
| 11                              | Luxembourg        | 80    |  | 33   | Puerto Rico                      | 62    |  |  |  |
| 12                              | Germany           | 78    |  | 33   | Saint Vincent and the Grenadines | 62    |  |  |  |
| 12                              | Iceland           | 78    |  | 38   | Israël                           | 61    |  |  |  |
| 14                              | United Kingdom    | 76    |  | 38   | Taiwan                           | 61    |  |  |  |
| 15                              | Barbados          | 75    |  | 38   | Brunei                           | 60    |  |  |  |
| 15                              | Belgium           | 75    |  | 38   | Poland                           | 60    |  |  |  |
| 15                              | Hong Kong         | 75    |  | 40   | Spain                            | 59    |  |  |  |
| 18                              | Japan             | 74    |  | 41   | Cape Verde                       | 58    |  |  |  |
| 19                              | United States     | 73    |  | 41   | Dominica                         | 58    |  |  |  |
| 19                              | Uruguay           | 73    |  | 43   | Lithuania                        | 57    |  |  |  |
| 21                              | Ireland           | 72    |  | 43   | Slovenia                         | 57    |  |  |  |
| 22                              | Bahamas           | 71    |  | 45   | Malta                            | 56    |  |  |  |
| 22                              | Chile             | 71    |  | 46   | Korea (South)                    | 55    |  |  |  |

Source: Transparency International

### g.2 Best countries for business

In January 2014 Bloomberg published the 3rd edition of its global ranking of the attractiveness of countries for doing business. In this context, Bloomberg analyses 157 countries around the world. The composite index on which the ranking is based takes 6 criteria into account: degree of economic integration (weight of 10%), cost of setting up a business (20%), cost of labour and material (20%), cost of moving goods (20%), less-tangible costs such as corruption (20%) and finally the readiness of local consumers (10%). The composite index can take a value between 0 (worst performance) and 100 (best performance).

The global ranking is headed by Hong Kong, followed by Canada and the United States. With a total score of 74.3, Luxembourg takes 16th place globally in the 2014 edition, thus moving up 8 positions when compared to the 2013 ranking. Germany takes 5th place (79.9), the Netherlands 8th (78.0), France 11th (76.0) and Belgium 24th (71.3).

| •            |              |                |             |   |  |   |                                     |                                     |   |  |  |  |  |
|--------------|--------------|----------------|-------------|---|--|---|-------------------------------------|-------------------------------------|---|--|--|--|--|
| 2013<br>Rank | 2012<br>Rank | Country        | Total score | Degree of<br>economic<br>integration<br>score | Cost of<br>setting up<br>a business<br>score | Cost of<br>labor &<br>material<br>score | Cost of<br>moving<br>goods<br>score | Less-<br>tangible<br>costs<br>score | Readiness<br>of local<br>consumer<br>base score |  |  |  |  |
| 1            | 1            | Hong Kong      | 83.4        | 79.1  | 95.3   | 62.2                                    | 93.8                                | 88.8                                | 75.2  |  |  |  |  |
| 2            | 6            | Canada         | 81.5        | 93.3  | 79.2   | 69.0                                    | 83.9                                | 91.5                                | 76.2  |  |  |  |  |
| 3            | 2            | United States  | 80.2        | 93.5  | 78.1   | 73.5                                    | 87.4                                | 79.7                                | 71.1  |  |  |  |  |
| 4            | 8            | Singapore      | 80.1        | 76.0  | 89.4   | 56.0                                    | 91.5                                | 89.5                                | 71.9  |  |  |  |  |
| 5            | 6            | Australia      | 79.9        | 85.4  | 84.8   | 70.1                                    | 82.6                                | 83.3                                | 71.6  |  |  |  |  |
| 5            | 5            | Germany        | 79.9        | 92.1  | 70.4   | 70.9                                    | 88.4                                | 86.2                                | 74.7  |  |  |  |  |
| 7            | 10           | United Kingdom | 79.4        | 91.3  | 77.9   | 68.7                                    | 83.8                                | 85.2                                | 71.1  |  |  |  |  |
| 8            | 4            | Netherlands    | 78.0        | 78.9  | 74.0   | 63.8                                    | 88.9                                | 88.8                                | 70.7  |  |  |  |  |
| 9            | 16           | Spain          | 77.0        | 94.9  | 78.2   | 67.9                                    | 81.3                                | 76.0                                | 68.5  |  |  |  |  |
| 10           | 12           | Sweden         | 76.2        | 82.5  | 70.7   | 65.0                                    | 80.4                                | 87.1                                | 72.9  |  |  |  |  |
| 11           | 14           | France         | 76.0        | 91.5  | 73.5   | 63.3                                    | 80.8                                | 80.2                                | 72.6  |  |  |  |  |
| 12           | 3            | Japan          | 75.6        | 89.4  | 66.9   | 73.6                                    | 81.6                                | 74.6                                | 73.2  |  |  |  |  |
| 13           | 21           | South Korea    | 75.3        | 78.7  | 75.9   | 69.1                                    | 81.9                                | 78.2                                | 64.3  |  |  |  |  |
| 14           | 15           | Finland        | 75.2        | 81.6  | 70.9   | 61.7                                    | 79.8                                | 88.3                                | 68.7  |  |  |  |  |
| 15           | 19           | Norway         | 74.4        | 85.0  | 78.4   | 58.9                                    | 66.4                                | 88.1                                | 75.1  |  |  |  |  |
| 16           | 24           | Luxembourg     | 74.3        | 69.8  | 90.0   | 49.8                                    | 74.4                                | 91.3                                | 62.6  |  |  |  |  |
| 17           | 30           | Portugal       | 74.1        | 72.2  | 90.0   | 55.3                                    | 76.6                                | 80.8                                | 63.4  |  |  |  |  |
| 18           | 17           | Switzerland    | 73.4        | 72.7  | 69.5   | 60.9                                    | 75.3                                | 88.1                                | 74.0  |  |  |  |  |
| 19           | 9            | Denmark        | 73.3        | 77.7  | 71.2   | 58.9                                    | 72.6                                | 91.4                                | 66.8  |  |  |  |  |
| 20           | 22           | Ireland        | 73.2        | 74.0  | 89.7   | 51.4                                    | 68.9                                | 86.4                                | 65.3  |  |  |  |  |

Table 13
Top 25 of Bloomberg study (January 2014)

Source: Bloomberg

With regard to the six sub-categories, Luxembourg obtains a score of 69.8 for the degree of economic integration, 90.0 for cost of setting up a business, 49.8 for cost of labour and material, 74.4 for cost of moving goods, 91.3 for less tangible costs (e.g. corruption) and finally 62.6 for the readiness of local consumers.

### g.3 European cities and regions of the future 2014

Early 2014, fDi Magazine (part of the Financial Times group) published a new edition of its study aimed at measuring the attractiveness of European cities and regions for foreign investors. This attractiveness is measured on the basis of incoming foreign investments, economic development, and growth potential. The indicators that are being used to measure this attractiveness are split into 5 categories: economic potential, human resources and quality of living, costs, infrastructure, and business environment. A sixth category includes policies implemented to promote foreign investments. On the basis of the performances obtained, cities and regions are rated on a scale of 1 to 10 (maximum). There exist four categories globally with different rankings depending on the size of cities and regions analysed. A distinction is made between cities considered as "major", "large", "mid-sized", "small" and "micro" (less than 100,000 inhabitants). Regions are also split on the basis of their size into "large", "medium" and "small" (less than 1.5 million inhabitants).

In the ranking published in February 2014, Luxembourg City figures among those cities belonging to the "micro" category and the "Luxembourg region" is classified in the "small" category.

Luxembourg City takes 1st place in the category for the quality of its infrastructure and 8th place for its business environment. Luxembourg City is considered as having the greatest economic potential among all the cities in this category (1st place).

| Table 14         fDi Magazine ranking - Top 10 Micro European cities - Economic potential |            |                |  |  |  |  |  |  |  |
|---|------------|----------------|--|--|--|--|--|--|--|
| Rank  | City       | Country        |  |  |  |  |  |  |  |
| 1   | Luxembourg | Luxembourg     |  |  |  |  |  |  |  |
| 2   | Galway     | Ireland        |  |  |  |  |  |  |  |
| 3   | Harwich    | United Kingdom |  |  |  |  |  |  |  |
| 4   | Bath       | United Kingdom |  |  |  |  |  |  |  |
| 5   | Coburg     | Germany        |  |  |  |  |  |  |  |
| 6   | Monaco     | France         |  |  |  |  |  |  |  |
| 7   | Chester    | United Kingdom |  |  |  |  |  |  |  |
| 8   | Durham     | United Kingdom |  |  |  |  |  |  |  |
| 9   | Limerick   | Ireland        |  |  |  |  |  |  |  |
| 10  | Mechelen   | Belgium        |  |  |  |  |  |  |  |
| Comment (D) Manager   |            |                |  |  |  |  |  |  |  |

Source: fDi Magazine

With regard to the "Luxembourg region", it takes 6th place for its economic potential among the regions of the "small" category. Finally, the region takes 5th place of its category concerning its infrastructure.

### g.4 Sustainable governance indicators

In April 2014 the Bertelsmann Stiftung published the third edition of its study, which analyses sustainable public governance, called "Sustainable governance indicators". This latest edition includes 34 OECD countries and 28 EU Member States in its analysis, its main objective being to identify structural and procedural challenges for the implementation of public policies sustainable in the long term. Actually, challenges such as globalization, social inequalities, depleting resources, as well as demographic change are currently common problems to most developed economies and national responses brought to these challenges deserve to be monitored more closely. The 2014 SGI study includes three composite indices that enable to monitor a country's performance and to compare it to the performance of the other countries included in the study. Each of these three composite indices is generated from a multitude of qualitative and quantitative indicators, and can reach a value between 1 (worst performance) and 10 (best possible performance).

The composite index measuring the policy performance aims to measure the sustainable development of a country concerning economic, social and environmental development. According to the authors of the study a development sustainable at long term cannot be realised unless the measures a country takes are compatible amongst themselves and respect the balance between the three pillars. Luxembourg takes 8th place in the general ranking for this first composite index (score 6.88/10). Germany takes 6th place (7.26), the Netherlands 10th (6.75), France 14th (6.22) and Belgium 15th (6.18).

| Table 15     Ranking of policy performance |                           |        |                      |                    |                                |                            |                |  |  |  |  |
|--|---------------------------|--------|----------------------|--------------------|--------------------------------|----------------------------|----------------|--|--|--|--|
|  | R                         | anking |                      |                    |                                |                            |                |  |  |  |  |
| SGI<br>2014                                | Difference<br>to SGI 2011 | Trend  | Economic<br>Policies | Social<br>Policies | Environ-<br>mental<br>Policies | Policy<br>Perfor-<br>mance |                |  |  |  |  |
| 1  | -0.05                     | К      | 7.83                 | 7.76               | 8.25                           | 7.95                       | Sweden         |  |  |  |  |
| 2  | -0.01                     | Ы      | 7.73                 | 7.56               | 7.79                           | 7.69                       | Norway         |  |  |  |  |
| 3  | 0.27                      | 7      | 7.98                 | 7.01               | 7.91                           | 7.63                       | Switzerland    |  |  |  |  |
| 4  | 0.03                      | 7      | 7.85                 | 7.82               | 7.00                           | 7.56                       | Finland        |  |  |  |  |
| 5  | 0.02                      | 7      | 7.31                 | 7.58               | 7.34                           | 7.41                       | Denmark        |  |  |  |  |
| 6  | 0.27                      | 7      | 7.32                 | 6.86               | 7.60                           | 7.26                       | Germany        |  |  |  |  |
| 7  | -                         | -      | 6.93                 | 7.10               | 7.59                           | 7.21                       | Estonia        |  |  |  |  |
| 8  | -0.08                     | Ы      | 6.86                 | 7.36               | 6.41                           | 6.88                       | Luxembourg     |  |  |  |  |
| 8  | 0.18                      | 7      | 6.16                 | 7.34               | 7.13                           | 6.88                       | United Kingdom |  |  |  |  |
| 10   | 0.19                      | 7      | 6.88                 | 7.14               | 6.21                           | 6.75                       | Netherlands    |  |  |  |  |
| 11   | -                         | -      | 5.96                 | 6.54               | 7.46                           | 6.66                       | Lithuania      |  |  |  |  |
| 12   | -0.21                     | К      | 6.30                 | 7.76               | 5.39                           | 6.48                       | New Zealand    |  |  |  |  |
| 13   | 0.43                      | 7      | 6.46                 | 7.29               | 5.42                           | 6.39                       | Iceland        |  |  |  |  |
| 14   | 0.10                      | 7      | 5.71                 | 6.68               | 6.27                           | 6.22                       | France         |  |  |  |  |
| 15   | -0.18                     | Ы      | 6.30                 | 6.89               | 5.35                           | 6.18                       | Australia      |  |  |  |  |
| 15   | 0.08                      | 7      | 6.45                 | 6.30               | 5.79                           | 6.18                       | Belgium        |  |  |  |  |
| 15   | 0.10                      | 7      | 5.37                 | 6.58               | 6.57                           | 6.18                       | Czech Republic |  |  |  |  |
| 18   | -                         | -      | 5.75                 | 5.29               | 7.47                           | 6.17                       | Latvia         |  |  |  |  |
| 19   | 0.22                      | 7      | 6.41                 | 6.26               | 5.75                           | 6.14                       | Austria        |  |  |  |  |
| 20   | 0.01                      | 7      | 6.90                 | 7.33               | 4.11                           | 6.11                       | Canada         |  |  |  |  |
| 20   | 0.31                      | 7      | 6.88                 | 6.20               | 5.24                           | 6.11                       | South Korea    |  |  |  |  |

Source: Bertelsmann Stiftung

The second composite index measures the level of quality of democracy in a country through a range of various factors that are essential for guaranteeing a good functioning of the country's political system and its long-term stability. Luxembourg ranks 15th in the general ranking (score 7.77). Germany ranks 6th (8.64), the Netherlands 16th (7.70), Belgium 23rd (7.37) and France 28th (6.93).

| Table 1<br><b>Democ</b> | Table 16 Democracy ranking |         |                         |                |  |  |  |  |  |  |  |
|-------------------------|----------------------------|---------|-------------------------|----------------|--|--|--|--|--|--|--|
|                         | I                          | Ranking |                         |                |  |  |  |  |  |  |  |
| SGI<br>2014             | Difference<br>to SGI 2011  | Trend   | Quality of<br>Democracy |                |  |  |  |  |  |  |  |
| 1                       | -0.06                      | Ы       | 9.25                    | Sweden         |  |  |  |  |  |  |  |
| 2                       | 0.19                       | 7       | 9.10                    | Finland        |  |  |  |  |  |  |  |
| 3                       | -0.05                      | Ы       | 9.01                    | Norway         |  |  |  |  |  |  |  |
| 4                       | 0.23                       |         | 8.95                    | Denmark        |  |  |  |  |  |  |  |
| 5                       | 0.08                       |         | 8.70                    | Switzerland    |  |  |  |  |  |  |  |
| 6                       | 0.06                       |         | 8.64                    | Germany        |  |  |  |  |  |  |  |
| 7                       | -0.38                      | Ы       | 8.59                    | New Zealand    |  |  |  |  |  |  |  |
| 8                       | 0.80                       | 7       | 8.37                    | Poland         |  |  |  |  |  |  |  |
| 8                       | -0.27                      | Ы       | 8.37                    | United States  |  |  |  |  |  |  |  |
| 10                      | 0.02                       | 7       | 8.34                    | Ireland        |  |  |  |  |  |  |  |
| 11                      | -                          | -       | 8.28                    | Estonia        |  |  |  |  |  |  |  |
| 12                      | -                          | -       | 8.12                    | Lithuania      |  |  |  |  |  |  |  |
| 13                      | -                          | -       | 8.07                    | Latvia         |  |  |  |  |  |  |  |
| 14                      | -0.30                      | Ы       | 7.83                    | Australia      |  |  |  |  |  |  |  |
| 15                      | 0.16                       | 7       | 7.77                    | Luxembourg     |  |  |  |  |  |  |  |
| 16                      | -0.36                      | Ы       | 7.70                    | Netherlands    |  |  |  |  |  |  |  |
| 17                      | -0.50                      | Ы       | 7.68                    | Canada         |  |  |  |  |  |  |  |
| 18                      | 0.07                       | Z       | 7.60                    | Czech Republic |  |  |  |  |  |  |  |
| 19                      | -0.33                      | Ы       | 7.57                    | Iceland        |  |  |  |  |  |  |  |
| 20                      | 0.18                       | 7       | 7.51                    | Portugal       |  |  |  |  |  |  |  |
| Source                  | : Bertelsmann Sti          | ftung   |                         |                |  |  |  |  |  |  |  |

The third composite index is linked to political governance and measures the capacity for politics to guide public action. For this purpose it analyses especially the capacity of executive power to lead public administration efficiently as well as the degree of interaction that exists between the executive power and other institutions in taking decisions (e.g. supervisory and surveillance activities). Luxembourg takes 7th place in the general ranking (score 7.38). Germany ranks 8th (7.17), the Netherlands 16th (6.46), Belgium 20th (6.34) and France 27th (6.02).

| Table 17     Political governance ranking |                           |        |                       |                                  |            |                |  |  |  |  |  |
|---|---------------------------|--------|-----------------------|----------------------------------|------------|----------------|--|--|--|--|--|
|   | R                         | anking |                       |                                  |            |                |  |  |  |  |  |
| SGI<br>2014                               | Difference<br>to SGI 2011 | Trend  | Executive<br>Capacity | Executive<br>Account-<br>ability | Governance |                |  |  |  |  |  |
| 1   | -0.16                     | Ы      | 8.43                  | 8.41                             | 8.42       | Sweden         |  |  |  |  |  |
| 2   | 0.24                      | 7      | 8.56                  | 8.12                             | 8.34       | Finland        |  |  |  |  |  |
| 3   | -0.12                     | Ы      | 8.09                  | 8.55                             | 8.32       | Norway         |  |  |  |  |  |
| 4   | 0.04                      | 7      | 8.36                  | 8.21                             | 8.28       | Denmark        |  |  |  |  |  |
| 5   | -0.12                     | Ы      | 8.25                  | 6.70                             | 7.47       | New Zealand    |  |  |  |  |  |
| 6   | -0.22                     | Ы      | 7.60                  | 7.19                             | 7.39       | United States  |  |  |  |  |  |
| 7   | -0.05                     | R      | 6.85                  | 7.92                             | 7.38       | Luxembourg     |  |  |  |  |  |
| 8   | 0.14                      | 7      | 6.87                  | 7.47                             | 7.17       | Germany        |  |  |  |  |  |
| 9   | -0.36                     | Ы      | 7.16                  | 7.16                             | 7.16       | Australia      |  |  |  |  |  |
| 10  | -0.14                     | Ы      | 7.58                  | 6.52                             | 7.05       | Canada         |  |  |  |  |  |
| 11  | -0.07                     | Ы      | 7.16                  | 6.68                             | 6.92       | Switzerland    |  |  |  |  |  |
| 12  | -0.12                     | Ы      | 7.22                  | 6.61                             | 6.91       | United Kingdom |  |  |  |  |  |
| 13  | 0.38                      | 7      | 7.19                  | 6.23                             | 6.71       | Poland         |  |  |  |  |  |
| 14  | -0.43                     | Ы      | 6.31                  | 7.09                             | 6.70       | Iceland        |  |  |  |  |  |
| 15  | -0.03                     | Ы      | 6.15                  | 6.99                             | 6.57       | Austria        |  |  |  |  |  |
| 16  | -0.23                     | Ы      | 6.31                  | 6.60                             | 6.46       | Netherlands    |  |  |  |  |  |
| 17  | 0.04                      | 7      | 6.35                  | 6.51                             | 6.43       | Ireland        |  |  |  |  |  |
| 18  | -                         | -      | 6.42                  | 6.39                             | 6.40       | Estonia        |  |  |  |  |  |
| 19  | -                         | -      | 6.38                  | 6.38                             | 6.38       | Israël         |  |  |  |  |  |
| 20  | 0.15                      | 7      | 5.67                  | 7.01                             | 6.34       | Belgium        |  |  |  |  |  |

Source: Bertelsmann Stiftung

The chart below summarises Luxembourg's performance in the three composite indices of the 2014 SGI, as well as in the different sub-categories within them.



Finally, Bertelsmann foundation makes the following suggestions for Luxembourg; the country should:

- Keep an eye on the international competitiveness of its economy, both internally (high levels of wages in an international comparison, automatic wage indexation mechanism, failure of tripartite negotiations, etc.) and externally (changes of the VAT regime for the e-commerce, automatic information exchange in the financial sector, etc.);
- Reduce labour market segmentation as foreigners are currently mostly employed in the private sector (80% of jobs occupied by foreigners), whereas nationals mainly work in the public sector (90% of jobs occupied by Luxembourg citizens);
- Increasingly integrate non-nationals into the democratic process in order to increase the national identification of foreigners in Luxembourg;
- Revise the social security system;
- Reform national education in order to provide national residents with the competences required in a very competitive market.

### g.5 Global talent competitiveness index

In a globalised world, human capital is a key factor for national competitiveness as it is the origin of innovation and sustainable growth. Countries are competing in developing this human capital, but also in attracting and retaining it within their territory. In this context, the business school INSEAD, with the Human capital leadership institute and Adecco, published the 1st edition of the "Global Talent Competitiveness Index" (GTCI) towards the end of 2013. This composite index is based on an input-output model allowing it to evaluate those measures implemented to develop human capital and the performance of the measures implemented. The GTCI measures two categories of competence: midlevel/technical skills of labour force (LV skills) and high-level skills (GK skills) needed for innovation and entrepreneurship. This edition is based on 48 indicators and includes 103 countries around the world. The GTCI uses a score between 0 (worst performance) and 100 (best performance). In the 2013 edition, the global GTCI ranking is led by Switzerland, followed by Singapore and Denmark.

With a score of 68.70/100, Luxembourg ranks 5th globally. The Netherlands come 6th, Belgium 13th, Germany 16th and France 20th.

| Table 18<br><b>Human capital ranking</b> |               |              |
|--|---------------|--------------|
| Country                                  | Score (0-100) | Overall Rank |
| Switzerland                              | 74.83         | 1            |
| Singapore                                | 70.34         | 2            |
| Denmark                                  | 68.93         | 3            |
| Sweden                                   | 68.86         | 4            |
| Luxembourg                               | 68.70         | 5            |
| Netherlands                              | 68.16         | 6            |
| United Kingdom                           | 68.13         | 7            |
| Finland                                  | 67.73         | 8            |
| United States                            | 67.58         | 9            |
| Iceland                                  | 67.07         | 10           |
| Canada                                   | 66.27         | 11           |
| Norway                                   | 66.01         | 12           |
| Belgium                                  | 65.67         | 13           |
| Autria                                   | 65.64         | 14           |
| Australia                                | 65.01         | 15           |
| Germany                                  | 65.00         | 16           |
| New Zealand                              | 64.40         | 17           |
| Ireland                                  | 63.30         | 18           |
| United Arab Emirates                     | 60.87         | 19           |
| France                                   | 60.82         | 20           |
| Source: INSEAD                           |               |              |

With regard to the inputs sub-category, Luxembourg takes an overall 9th place globally with a score of 71.5 – Luxembourg comes 21st for enablers, 2nd for attraction, 14th for growth and 13th for retaining talent. For the outputs sub-category, Luxembourg takes an overall 2nd place on a global level with a score of 63.10 – Luxembourg comes 15th for mid-level/technical skills (LV) and 2nd for high skills (GK).

With regard to Luxembourg, the authors of the study make the following observation: "Luxembourg, the Netherlands and the United Kingdom, respectively in 5th, 6th and 7th places, also show how similar strong GTCI performances can be achieved through different paths. Luxembourg's 5th place comes from a contrasted performance between Input (9th) and Output (2nd) sub-indices. Few other top talent performers display such a large difference between the two GTCI sub-indices, with the possible exception of the Netherlands and Belgium, as mentioned below. For a number of years, Luxembourg, one of the smallest countries in the world, has demonstrated a remarkable ability to attract capital and talent through high levels of Internal and External Openness (for which it ranks 2nd overall); it also ranks 1st in the world for the prevalence of foreign ownership. Possibly handicapped by its size, Luxembourg is not performing as well on the Grow (14th) or Retain (13th) pillars. On the Output Sub-Index, its performance is also less spectacular for the LV pillar (15th), but remains high for GK, for which it ranks 2nd amongst all 103 countries, just behind Switzerland. Much of this may reflect Luxembourg's success in attracting financial companies, as well as private and public organisations focused on innovation".

# 2.3 Conclusions

Many reports are published each year on competitiveness and territorial attraction. Even if since the fall of 2008 the global financial crisis has prompted the economic policy debate to focus primarily on shortterm measures implemented to support the economy rather than on structural issues, still, in a general way, the interest in this type of comparative studies tends to grow with the increased phenomenon of globalization. There is no doubt that these rankings are the most publicized element. But the interpretation of these results goes much further than just the final rankings. One cannot lose sight of the inherent limitations of such an exercise: the relativity of the rankings, the quality of data used, the methodological differences and weaknesses, etc. Actually these rankings tell a more complex story than what their apparent simplicity would suggest.

- A rise or fall in the ranking does not mean that the performance of Luxembourg has improved or deteriorated over the past year. A development may also stem from the fact that other countries have experienced the effects of the crisis more or less severely than Luxembourg. It is essential to take this relativity into account in international comparisons.
- 2. It is worth noting that there is a time lag between the time of publication of the rankings and many statistics used therein. The composite indices analysed in this 2014 edition of the Report still often use statistics dating back to 2010, 2011, 2012 and 2013. Therefore these rankings should not be considered as short-term predicting tools.
- 3. Despite the attraction of their apparent simplicity, many rankings assume methodological differences. While the WEF attempts for example to measure the ability of countries to achieve sustainable economic growth, the IMD analyses the ability of countries to create and maintain a supporting environment for company competitiveness, as wealth creation is supposed to happen at the level of companies that operate within a national environment which either facilitates or hampers their competitiveness. Luxembourg's rankings therefore vary from one ranking to another. For example, while Luxembourg is 11th in the IMD world ranking, it is only 19th in the WEF ranking.
- 4. The different rankings are criticized over suffering from methodological weaknesses that appear especially in three areas: the quality of sources (primary and secondary data used), the core indicators used and the method for calculating the composite index (formulas, weights, etc.). For example, the "one size fits all" indicators used in the same way for all countries analysed, often prove to be inadequate to the specificities of Luxembourg, which is a very small economy that is widely open. The best-known example is the "GDP per capita" which, by its statistical construction, does not take into account the large flow of cross-border workers in Luxembourg<sup>7</sup>.

More than 40% of the labour force in Luxembourg is currently border-workers.

It strongly overestimates Luxembourg's performance. Another example is the number of Luxembourg students in higher education for which the data used often ignores the fact that a majority of Luxembourg students are studying abroad, which considerably underestimate Luxembourg's performance.

- 5. The detail of which countries are analysed has an impact on comparability. For example, the WEF compares 144 countries, the IMD only 60 and the Heritage Foundation 178. This affects the relative position of countries in the rankings. For example a decision could be made to only compare the EU in order to allow a better comparison. Luxembourg would then climb from the 19th world position to the 8th position (WEF), from 11th to 4th (IMD) and from 16th to 6th (Heritage Foundation).
- 6. There are countries or groups of countries in these rankings for which the performance is relatively close, i.e. whose numerical values oft he calculated composite indices are very close to each other, a fact that the mere country rankings can usually not show. All things being equal, a slight increase (or decrease) in the value of the composite index could therefore lead to a significant rise (or fall) in the rankings. The rankings should therefore not be looked at separately from the value of the composite index. Significant differences in the ranking of countries may sometimes be related to small differences in the index.

Following some of the above remarks, what should one finally think of these rankings<sup>8</sup> and how should they be interpreted? Even if they trigger numerous concerns, these reports provide a useful performance calibration tool worthy to monitor. *The Economist* noted recently that these international benchmarks and rankings do not constitute the whole truth and nothing but the truth, but they do certainly highlight some things. They may have some flaws but they do nevertheless provide useful information regarding territorial performance in a given domain. And according to *The Economist: "(...) that is hard to ignore"*. In Luxembourg, the Fondation Idea has recently focused on the importance of the monitoring of Luxembourg's competitiveness benchmarks<sup>10</sup> and comes to the same conclusion. These benchmarks and rankings "(...) *are considered to be very popular tools for measuring the degree of competitiveness of nations or regions that form them.*"

- <sup>8</sup> SWISSINFO, Assessing countries - How competitive are competitiveness rankings?, July 2013 http://www.swissinfo.ch/eng/business/How\_competitive\_are\_competitiveness\_ rankings.html?cid=36258206
- <sup>9</sup> For more information: http:// www.economist.com/blogs/ graphicdetail/2013/12/dailychart-1
- For further details: http:// www.fondation-idea.lu/wpcontent/uploads/2014/05/ IDEA\_idee\_01\_indicateurs\_ competitivite.pdf

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On one hand, these benchmarks summarize complex issues down to one single figure and are thus extremely efficient communication tools that favour political debate and allow public authorities to evaluate their policies by comparing them to best practice. On the other hand, due to press coverage, these benchmarks and rankings also have a significant impact on the brand image of a territory and can influence the investors' perception, even if they are more likely to be interested in the subcategories (e.g. rigidity of labour market, cost of energy, etc.) than merely in the position a territory takes in the final ranking. Over the last few years, this thematic information detailed in the benchmarks has incidentally allowed investors to acquire more refined data on markets and has ensured that these benchmarks have developed as decision-making tools able to influence on decisions of localisation of activity.

Consequently, it is important to avoid caving into the syndrome of ranking for the sake of ranking. The indications provided in the final ranking are often of a character too general to be used and should help to focalise attention and lead to a more rigorous analysis. There is, indeed, no unique recipe. Different policies may be compared, but each country needs to adapt them to its own socio-economic environment. The strategies implemented succeed when economic imperatives and national social cohesion are in perfect balance.

To this end, in 2003 the Tripartite Coordination Committee in Luxembourg had identified the need for a enlarged indicator scoreboard in order to gain a better insight into the competitiveness of the country, through indicators that take better reflect the specificities of the country than do the international benchmarks. The Committee entrusted Professor Fontagné (University Paris I - Sorbonne) the task of elaborating proposals (November 2004)<sup>11</sup>. Since then the *Observatoire de la compétitivité* updates this national scoreboard annually.

> <sup>11</sup> FONTAGNÉ L., Compétitivité du Luxembourg : une paille dans l'acier, Rapport pour le ministère de l'Économie et du Commerce extérieur, Luxembourg, November 2004, pp.102-120 For more details: http://www.odc.public.lu/ publications/perspectives/ PPE\_3.pdf

# 2.4 Bibliography

#### GARELLI S.

World competitiveness – an overview of the fundamentals of our theory and the history of our research, IMD's World Competitiveness Center

#### HATEM F.

Les indicateurs comparatifs de compétitivité, in Problèmes économiques n°2865, Paris, 22 December 2004

#### OCHEL W., ROEHN O.

Ranking of countries - the WEF, IMD, Fraser and Heritage indices, CESifo dice report, Journal for institutional comparisons, volume 4, n°2, summer 2006

#### Websites

http://composite-indicators.jrc.ec. europa.eu/

http://www.odc.public.lu/indicateurs/ benchmarks\_internationaux/index.html

http://www.swissinfo.ch/eng/business/ How\_competitive\_are\_competitiveness\_ rankings.html?cid=36258206

# 3 The Competitiveness Scoreboard

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# 3.1 The revision has finally started

Since the publication of the Fontagné report in 2004, the *Observatoire de la compétitivité* has updated the indicators of the Competitiveness scoreboard on a yearly basis. Professor Fontagné (Université Paris I – Sorbonne) set up this scoreboard with social partners in 2003. At the moment of its first publication, the scoreboard integrated 88 indicators spread among 10 categories. Over the last 10 years, many indicators have become unavailable and so the 2014 national Scoreboard includes only 77 indicators.

The Observatoire de la compétitivité demanded a revision of the Scoreboard in previous editions of the Competitiveness Report. This revision was initiated, in collaboration with the Economic and Social Council (ESC), at the beginning of 2014. During the morning debate aimed at presenting the 2013 Competitiveness Report to the social partners, it was unanimously accepted that after 10 years a revision was necessary. A number of Scoreboard indicators no longer provide relevant information. Other indicators need to be replaced by new indicators of better statistical quality, etc. This revision should take place during 2014 but until this revision is complete, the Observatoire will continue updating the Scoreboard under its current form.

# 3.2 Competitiveness Scoreboard 1.0

The Competitiveness Scoreboard is based upon the broad definition of the concept of competitiveness, as defined by the Economic and Social Council (ESC) and adopted by the Tripartite Coordination Committee, which assigns the following role to the government: "...the main role of the state is to contribute to achieving and maintaining a sustainable and high quality of life of the population of the country". According to the ESC, competitiveness is a means to achieve these goals. Also according to the ESC, a country can be considered as being competitive if: "its productivity increases at a similar or higher rate than that of its major trading partners having a comparable level of development, it manages to maintain a balance within an open market economy context, it has a high level of employment".

The notion of competitiveness being rather complex, the Scoreboard tries to shed some light on its different aspects and to simplify the overview so that policy-makers, employees and employers find the good balance in the formulation of future policies.

Table 1 **Competitiveness Scoreboard Indicators** 

#### Category 1: Macroeconomic Performance (12 indicators)

- A1: Gross National Income per capita PPS (2013)
- A2: Real growth rate of GDP (2013)
- A3: Growth in domestic employment as a % (2013)
- A4: Unemployment rate as a % (2013)
- A5: Inflation rate as a % (2013)
- A6: Public balance as a % of GDP (2013)
- A7: Public debt as a % of GDP (2013)
- A8: Gross fixed capital formation of the public administration (2013)
- A9: Terms of trade (2013)
- A10: Real effective exchange rate 1995=100 (2013)
- A11: Diversification Entropy coefficient (2013)
- A12: Foreign Direct Investment inflows and outflows (2013)

#### Category 2: Employment (9 indicators)

- B1: Employment rate as a % (Total) (2013)
- B2: Employment rate as a % (Men) (2013) B3: Employment rate as a % (Women) (2013)
- B4: Employment rate of persons aged 55-64 (Total) (2013)
- B5: Employment rate of persons aged 55-64 (Men) (2013)
- B6: Employment rate of persons aged 55-64 (Women) (2013)
- B7: Unemployment rate of persons under 25 (2013) B8: Long-term unemployment rate as a % (2013)

## B9: Persons holding a part-time job (2013)

#### Category 3: Productivity and Labour Costs (4 indicators)

- C1: Trends in total factor productivity (2013)
- C2: Trends in apparent work productivity (2013)
- C3: Productivity per hour worked as a percentage of U.S. figures (2013)
- C4: Changes in unit labour costs (2013)
- Costs / Revenue ratio in the banking sector (2006)\*

#### Category 4: Market Operations (8 indicators)

- Percentage of full-time employees on minimum wage<sup>1\*2</sup>
- D2: Price of electricity (ex-VAT) industrial users (2013)
- D3: Price of gas (ex-VAT) industrial users (2013)
- D4: Market share of the primary operator in cellular telephones (2010)
- Composite basket of fixed and cellular telecommunications (ex-VAT) (2004)\*
- D6: Composite basket of cellular telephone rates (ex-VAT) (2012)
- D7: Broadband Internet access rates (2012)
- D8: Basket of domestic royalties for 2 Mbits leased lines (ex-VAT) (2012)
- D9: Value of public tenders using open procedure procurement (2011)
- D10: Total State aid as a % of GDP (except horizontal objectives) (2011)
- Market share of the primary operator in fixed telecommunications<sup>3\*</sup>

#### Category 5: Institutional and Regulatory Framework (10 indicators)

- E1: Corporate tax rate (2013)
- E2: Income tax rate (2013)
- E3: Standard VAT rate (2013)
- E4: Tax wedge Single, without children (2013)
- E5: Tax wedge Married, with 2 children, one-wage-earner (2013)
- E6: Administration efficiency index (2013)
- E7: Law compliance index (2013)
- E8: Regulation quality index (2013)
- E9: Degree of sophistication of online public services (2010)
- E10: Full online availability of public services (2010)

Public sector wage costs\*

- "Eurostat would like to inform countries that the table «Full-time employees on the minimum wage» has been deleted on Eurostat's website as the methodological concept needs to be developed."
- Indicators signalled in light grey could not be updated for years and are therefore not taken into account for the analysis of the Scoreboard nor for the calculation of the composite indicator.
- Indicators marked with an asterisk have not been updated.

#### Table 1 Continued

#### Category 6: Entrepreneurship (4 indicators)

- F1: Propensity for entrepreneurship (2012)
- F2: Self-employed jobs as a percentage of total employment (2013)
- F3: Net change in number of companies start-up rate minus wind-up rate (2010)
- F4: Volatility amongst companies start-up rate plus wind-up rate of disappearance (2010)

#### Category 7: Education and Training (5 indicators)

- G1: Annual cost per student in public educational facilities (2011)
- G2: Part of the population aged 25 to 64 with at least a secondary education (2013)
- Share of population aged 25 to 34 with university education\*4
- G4: Share of human resources in scientific and technological fields as a % of total employment (2013)
- ▼ G5: Lifelong learning (participation of adults in training and teaching programmes) (2013) G6: Secondary school drop-outs (2013)
- Relative share of foreign nationals employment in science and technology human resources\*
  - Share of highly qualified workers (ICT) in total employment\*

#### Category 8: Knowledge Economy (13 indicators)

- H1: Internal R&D expenditure (2012)
- H2: Public R&D budget credits (2012)
- H3: Portion of public research financed by the private sector (2012)
- Percentage of sales allocated to the introduction of new products on the market (new or significantly improved products) (2003)\*
- H5: Number of researchers per 1,000 employed persons (2012)
- Scientific publications per million inhabitants (2005)\*
- H7: Number of USPTO patents per million inhabitants (2013)
- H8: Number of OEB patents per million inhabitants (2012)
- H9: Use of broadband connections by companies (2012)
- H10: Investment in public telecommunications as a percentage of gross fixed capital formation (2009)
- H11: Percentage of households that have Internet access at home (2013)
- H12: Number of cell and fixed phones per 100 inhabitants (2011)
- H13: Percentage of households that have broadband Internet access (2013)
- H14: Number of secure web servers per 100,000 inhabitants (2012)
- H15: Percentage of total employment in medium or high technology sectors (2012)

#### Category 9 : Social Cohesion (5 indicators)

- I1: Gini coefficient (2013)
- I2: At-risk-of-poverty rate after social transfers (2013)
   I3: At persistent risk of poverty rate (2013)
- I4: Life expectancy at birth (2012)
- I5: Gender wage gap (2012)

I6: Accidents graves du travail (2006)\*

#### Category 10: Environment (7 indicators)

- J1: Number of ISO 14001 certifications (2013)
- J2: Number of ISO 9001 certifications (2013)
- J3: Total greenhouse gas emissions (2012)
- J4: Share of renewable energy (2012)
- J5: Volume of municipal waste generated (2012)
- J6: Energy intensity of the economy (2012)
- 🔻 J7: Modal breakdown in transportation choice for passenger Percentage of car users (2012)

Source: Fontagné (2004)

For these indicators, indicators for Luxembourg are not available.

Since the 2004 Fontagné report, indicators of Luxembourg's Competitiveness Scoreboard are analysed in detail from two points of view. First, Luxembourg's position compared to the European average is highlighted.

- If Luxembourg shows a value that is 20% better (or equal) than the EU-x average, then the indicator is classified as "green" (favourable position).
- If Luxembourg shows a value that is between +20% and -20% in relation to the EU-x average, then the indicator is classified as "orange" (neutral position).
- If Luxembourg shows a value that is 20% lower (or equal) than the EU-x average, then the indicator is classified as "red" (unfavourable position).

This ranking is a purely visual tool to quickly see where Luxembourg is in comparison with the EU average.

Secondly, Luxembourg's performance is analysed over time by comparing the most recent data values with those from previous years. The arrows will indicate in which direction each indicator has recently changed (improvement or deterioration).

- ↑ If Luxembourg's performance has improved since the last edition of the Scoreboard, an arrow pointing upward will signal the indicator in question.
- → If Luxembourg's performance has remained stable since the last edition of the Scoreboard, a horizontal arrow will signal the indicator in question.
- ↓ If Luxembourg's performance has deteriorated since the last edition of the Scoreboard, an arrow pointing downward will signal the indicator in question.

Apart from the comparison with the European average, Luxembourg is also compared to the best and worst countries from the EU-x. As a reminder, the following acronyms are used:

| Table 2<br>Acronyms |             |    |            |    |                 |  |  |
|---------------------|-------------|----|------------|----|-----------------|--|--|
| DE                  | Germany     | FR | France     | NL | Netherlands     |  |  |
| AT                  | Austria     | GR | Greece     | PO | Poland          |  |  |
| BE                  | Belgium     | HU | Hungary    | РТ | Portugal        |  |  |
| BU                  | Bulgaria    | IE | Ireland    | SK | Slovak Republic |  |  |
| CY                  | Cyprus      | IT | Italy      | cz | Czech Republic  |  |  |
| HR                  | Croatia     | LV | Latvia     | RO | Romania         |  |  |
| DK                  | Denmark     | LT | Lithuania  | UK | United Kingdom  |  |  |
| ES                  | Spain       | LU | Luxembourg | SL | Slovenia        |  |  |
| EE                  | Estonia     | мт | Malta      | SE | Sweden          |  |  |
| FI                  | Finland     |    |            |    |                 |  |  |
| Source              | e: Eurostat |    |            |    |                 |  |  |

Finally, the indicators are synthesised by calculating a composite indicator with all the advantages and disadvantages this may imply. The composite indicator, combining all information in order to give a synoptic view, is a tool appreciated by the media, enjoying instantaneous compact information. In no instance does it replace a serious and thorough analysis, by indicator, domain and sector of activity. This Scoreboard does not come up with "pseudo-scientific" truths claimed by its critics: it merely measures a set of criteria based on the data supplied by the public statistics in a common conceptual framework.

The Observatoire de la compétitivité warns the reader against certain aspects: the yearly updating of data does not merely concern the previous year, but all the data from 2000 onwards is updated, depending on availability. This obviously has an influence on the outcome resulting from the current scoreboard, and especially on the ranking obtained from the composite indicator, as it is not stable in time and differences may appear from one edition of the report to the next for the same year. Thus, the yearly and quarterly data for the GDP are marked by two fundamental changes, namely the move to the new European System of Accounts ESA 2010 and the statistical revision of figures for the period 2000-2012. For example, annual changes in real GDP in 2013 were revised downwards: +2.0% instead of +2.1%, as mentioned in the last edition of accounts.<sup>5</sup>

The missing data in the Scoreboard have a significant impact on the outcome of the Scoreboard, including on the composite indicator. As several EU countries are not OECD members (Bulgaria, Cyprus, Croatia, Latvia, Lithuania, Malta and Romania), the ranking provided by the composite indicator should be interpreted with caution, since some underlying indicators are not available for these countries. The same applies to the indicators of the Market Operations category, often derived from the OECD database that is only updated every two years. The table below provides information on the percentage of missing data in the Scoreboard for all countries. Compared to the 2013 edition, this percentage has slightly changed due to the fact that Croatia has joined the 27 EU countries. For Croatia, the data concerning the years 2000 and 2001 are often missing.

<sup>5</sup> STATEC, Statnews N°37/2014

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#### Table 3 Non-availability of data over time, as a %

|   | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Macroeconomic Performance                 | 2.68  | 2.08  | 0.89  | 1.19  | 1.19  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 1.49  |
| Employment                                | 3.57  | 3.17  | 0.00  | 0.00  | 0.00  | 0.40  | 0.40  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Productivity and Labour Costs             | 1.79  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  | 0.89  |
| Market Operations                         | 50.45 | 58.48 | 33.04 | 55.80 | 19.64 | 45.54 | 17.86 | 32.14 | 16.96 | 31.70 | 15.63 | 42.86 | 50.89 | 75.89 |
| Institutional and Regulatory<br>Framework | 26.43 | 50.00 | 20.00 | 20.00 | 8.21  | 25.00 | 7.50  | 6.07  | 25.00 | 5.71  | 5.71  | 25.00 | 25.00 | 25.00 |
| Entrepreneurship                          | 16.96 | 16.96 | 16.96 | 16.96 | 16.07 | 29.46 | 29.46 | 7.14  | 29.46 | 5.36  | 29.46 | 75.89 | 51.79 | 76.79 |
| Education and Training                    | 21.43 | 14.29 | 2.86  | 3.57  | 2.86  | 0.71  | 2.14  | 1.43  | 2.86  | 2.14  | 3.57  | 0.71  | 20.00 | 20.00 |
| Knowledge Economy                         | 32.14 | 28.02 | 24.73 | 20.33 | 16.76 | 10.16 | 10.99 | 7.97  | 10.71 | 8.52  | 15.66 | 13.19 | 25.55 | 69.51 |
| Social Cohesion                           | 22.86 | 20.71 | 45.00 | 34.29 | 35.00 | 21.43 | 23.57 | 11.43 | 5.00  | 4.29  | 2.86  | 2.86  | 2.86  | 75.71 |
| Environment                               | 28.57 | 14.80 | 14.80 | 14.80 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 71.43 |

Source: Observatoire de la compétitivité

The Macroeconomic Performance, Employment, Productivity and Labour Costs, and Environment categories show the least missing data. Missing data are influenced by the source on which the data are based. Actually, when it comes to OECD data, data concerning EU Member States which are not members of the OECD are automatically missing.

For the more "structural" categories, data are published with some delay and a majority of 2013 data are not available for the Market Operations, Institutional and Regulatory Framework, Entrepreneurship, Knowledge Economy, Social Cohesion and Environment categories. From the moment they are available, this missing data obviously have a significant impact on the result of the ranking. The table above highlights the availability of data. The indicators with at least 95% of data available are represented on darker background.

This sub-chapter analyses the indicators of the 10 categories. The green, orange and red colours inform on the position of Luxembourg in comparison with the EU average (EU-x). Overall, the indicators of the Scoreboard have not changed a lot since 2009. In 2013, 30 out of the 73 indicators are green (stable in relation to 2012), 28 indicators are orange (stable in relation to 2012), and 15 indicators are red (stable in relation to 2012).

Since 2001, the number of indicators in red has continuously decreased in favour of indicators in orange and green, which have slightly increased over the years.



Source: Observatoire de la compétitivité

| Colour evolution since 2000 |      |      |         |      |      |      |      |      |      |      |      |      |      |      |
|-----------------------------|------|------|---------|------|------|------|------|------|------|------|------|------|------|------|
|                             | 2000 | 2001 | 2002    | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|                             | 8    | 7    | 8       | 7    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    | 8    |
| Macroeconomic               | 1    | 2    | 2       | 3    | 2    | 2    | 1    | 2    | 2    | 1    | 2    | 2    | 2    | 2    |
|                             | 1    | 1    | 0       | 0    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 0    | 0    |
|                             | 2    | 2    | 2       | 2    | 1    | 2    | 1    | 1    | 1    | 1    | 2    | 2    | 2    | 2    |
| Employment                  | 3    | 3    | 3       | 4    | 5    | 4    | 5    | 5    | 5    | 7    | 7    | 6    | 7    | 6    |
|                             | 4    | 4    | 4       | 3    | 3    | 3    | 3    | 3    | 3    | 1    | 0    | 1    | 0    | 1    |
| Deaduativity and            | 3    | 1    | 1       | 1    | 1    | 3    | 1    | 2    | 1    | 1    | 1    | 1    | 1    | 1    |
| Labour Costs                | 1    | 0    | 0       | 0    | 1    | 0    | 1    | 2    | 0    | 0    | 0    | 0    | 0    | 1    |
|                             | 0    | 3    | 3       | 3    | 2    | 1    | 2    | 0    | 3    | 3    | 3    | 3    | 3    | 2    |
|                             | 2    | 2    | 2       | 3    | 4    | 3    | 3    | 3    | 3    | 4    | 4    | 4    | 4    | 4    |
| Market Operations           | 4    | 4    | 4       | 3    | 4    | 4    | 3    | 3    | 3    | 2    | 1    | 1    | 1    | 1    |
|                             | 2    | 2    | 2       | 2    | 0    | 1    | 2    | 2    | 2    | 2    | 3    | 3    | 3    | 3    |
| Institutional and           | 5    | 5    | 6       | 6    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5    | 5    |
| Regulatory Framework        | 3    | 3    | 2       | 2    | 4    | 3    | 3    | 3    | 4    | 4    | 4    | 4    | 4    | 4    |
|                             | 2    | 2    | 2       | 2    | 1    | 2    | 2    | 2    | 1    | 1    | 1    | 1    | 1    | 1    |
|                             | 1    | 1    | 0       | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 1    | 1    | 1    |
| Entrepreneurship            | 2    | 2    | 3       | 2    | 2    | 2    | 3    | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
|                             | 1    | 1    | 1       | 2    | 2    | 2    | 1    | 2    | 1    | 1    | 1    | 1    | 1    | 1    |
| Education and               | 0    | 0    | 0       | 1    | 1    | 0    | 0    | 0    | 0    | 3    | 3    | 3    | 3    | 3    |
| Training                    | 3    | 3    | 4       | 2    | 3    | 4    | 4    | 3    | 4    | 1    | 1    | 1    | 1    | 1    |
|                             | 2    | 2    | 1       | 2    | 1    | 1    | 1    | 2    | 1    | 1    | 1    | 1    | 1    | 1    |
|                             | 5    | 5    | 5       | 5    | 5    | 5    | 6    | 7    | 6    | 7    | 4    | 5    | 4    | 4    |
| Knowledge Economy           | 2    | 2    | 2       | 3    | 3    | 4    | 4    | 3    | 5    | 4    | .7   | 6    | 7    | 7    |
|                             | 6    | 6    | 6       | 5    | 5    | 4    | 3    | 3    | 2    | 2    | 2    | 2    | 2    | 2    |
|                             | U    | U    | 1       | 1    | 1    | U    | U    | 1    | 1    | 1    | 2    | 2    | 2    | 2    |
| Social Cohesion             | 5    | 5    | 4       | 4    | 4    | 5    | 5    | 4    | 4    | 4    | 3    | 3    | 3    | 3    |
|                             | U    | U    | U       | 0    | U    | U    | U    | U    | U    | U    | U    | U    | U    | U    |
| Environment                 | 0    | 1    | 0       | 1    | 0    | 0    | 1    | 0    | 1    | 1    | 1    | 0    | 1    | 1    |
| Environment                 | 2    | 1    | 2       | 1    | 2    | 2    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
|                             | 3    | 4    | 3<br>25 | 3    | 3    | 3    | 4    | 27   | 4    | 4    | 20   | 21   | 4    | 4    |
| Total                       | 26   | 23   | 20      | 27   | 20   | 20   | 24   | 27   | 20   | 31   | 30   | 31   | 30   | 30   |
| Total                       | 20   | 20   | 20      | 24   | 17   | 17   | 10   | 28   | 17   | 20   | 28   | 20   | 28   | 28   |
| Total of indicators         | 21   | 20   | 72      | 22   | 72   | 72   | 17   | 10   | 72   | 10   | 10   | 10   | 10   | 13   |
|                             | /3   |      | /3      | /3   | /3   | /3   | /3   | /3   | /3   | /3   | /3   | /3   | /3   | /3   |





The previous table leads to the conclusion that the overall situation of Luxembourg has remained constant in relation to the EU average. Even if the notion of competitiveness is a relative one, an analysis of evolution of the Luxembourg indicators as compared to the previous year is essential. Out of 77 indicators, 41 have improved and 32 have deteriorated. For the category J Environment, no indicator has worsened compared to the previous available figures. In the category B Employment, half of the indicators have improved for Luxembourg whilst the other half has worsened. Luxembourg is still leading in the category A Macroeconomic Performance, yet 7 out of 12 indicators have worsened.

A more detailed analysis of each category, presented below in sections 3.2.1 - 3.2.10, is necessary to detect Luxembourg's strengths and weaknesses.

| 2005 2006 2007 2008 2009 2010 2011 2012 2013    |              |      |      |      |      |      |      |      |      |        |  |  |
|---|--------------|------|------|------|------|------|------|------|------|--------|--|--|
|   |              | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013   |  |  |
| A   | $\uparrow$   | 6    | 6    | 3    | 4    | 6    | 4    | 9    | 4    | 4      |  |  |
| Macroeconomic                                   | =            | 1    | 1    | 0    | 0    | 0    | 0    | 0    | 0    | C      |  |  |
| Performance (12)                                | $\downarrow$ | 5    | 5    | 9    | 8    | 6    | 8    | 3    | 8    | 8      |  |  |
| В   | $\uparrow$   | 3    | 7    | 4    | 5    | 7    | 4    | 5    | 4    | 9      |  |  |
| Employment (9)                                  | =            | 3    | 0    | 0    | 1    | 1    | 1    | 0    | 0    | C      |  |  |
|   | $\downarrow$ | 3    | 2    | 5    | 3    | 1    | 4    | 4    | 5    | C      |  |  |
| С   | $\uparrow$   | 0    | 3    | 1    | 3    | 3    | 2    | 3    | 0    | 1      |  |  |
| Productivity and                                | =            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | (      |  |  |
|   | $\downarrow$ | 4    | 1    | 3    | 1    | 1    | 2    | 1    | 4    | 3      |  |  |
| D   | $\uparrow$   | 4    | 4    | 3    | 5    | 4    | 5    | 2    | 6    | Ę      |  |  |
| Market Operations (8)                           | =            | 2    | 2    | 1    | 0    | 0    | 0    | 0    | 0    | (      |  |  |
|   | $\downarrow$ | 2    | 2    | 4    | 3    | 4    | 3    | 6    | 2    | 3      |  |  |
| E   | 个            | 6    | 8    | 2    | 4    | 2    | 4    | 6    | 6    | 7      |  |  |
| Institutional and Regu-<br>latory Framework(10) | =            | 4    | 2    | 3    | 3    | 3    | 2    | 2    | 2    | 2      |  |  |
| ,   | $\checkmark$ | 0    | 0    | 5    | 3    | 5    | 4    | 2    | 2    |        |  |  |
| F   | Т<br>—       | 0    | 0    | 1    | 1    | 1    | 2    | 1    | 2    | (      |  |  |
| Entrepreneurship (4)                            | =            | 6    | 0    | 0    | 0    | 2    | 2    | 2    | 2    | (<br>( |  |  |
|   | $\checkmark$ | 4    | 4    | 1    | 3    | 2    | 1    | 3    | 2    |        |  |  |
| G<br>Education and                              | -            | 1    | 4    | 'n   | 0    | 1    | 0    | 0    | 1    |        |  |  |
| Training (5)                                    |              | 3    | 1    | 4    | 2    | 2    | 4    | 2    | 1    | ſ      |  |  |
|   | $\mathbf{x}$ | 5    | 5    | 8    | 10   | 8    | 9    | 8    | 9    | 5      |  |  |
| H<br>Knowledge                                  | -            | 4    | 7    | 2    | 0    | 0    | 0    | 0    | 0    |        |  |  |
| Economy (13)                                    | ¥            | 4    | 1    | 3    | 3    | 5    | 4    | 5    | 4    | 4      |  |  |
|   | <b>・</b>     | 0    | 3    | 2    | 3    | 1    | 0    | 4    | 4    | 2      |  |  |
|   | =            | 2    | 0    | 1    | 1    | 3    | 2    | 0    | 0    | (      |  |  |
| Social Cohesion (6)                             | $\downarrow$ | 3    | 2    | 2    | 1    | 1    | 3    | 1    | 1    | 3      |  |  |
|   | $\uparrow$   | 2    | 3    | 1    | 1    | 4    | 3    | 6    | 5    | Ę      |  |  |
| J<br>Environment (7)                            | =            | 2    | 1    | 1    | 1    | 0    | 0    | 0    | 0    | (      |  |  |
| Environment (7)                                 | $\downarrow$ | 3    | 3    | 5    | 5    | 3    | 4    | 1    | 2    | 2      |  |  |
|   | $\uparrow$   | 27   | 43   | 26   | 39   | 38   | 34   | 47   | 43   | 46     |  |  |
| Total (77)                                      | =            | 19   | 13   | 8    | 6    | 8    | 5    | 2    | 3    | 4      |  |  |
|   | $\downarrow$ | 31   | 21   | 43   | 32   | 31   | 38   | 28   | 31   | 27     |  |  |
| Total of indicators                             |              | 77   | 77   | 77   | 77   | 77   | 77   | 77   | 77   |        |  |  |

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## 3.2.1 Macroeconomic Performance

| Table<br>Categ | <sup>6</sup><br>ory A Macroeconomic Performance                     |              |        |                   |       |       |       |        |           |           |
|----------------|---|--------------|--------|-------------------|-------|-------|-------|--------|-----------|-----------|
| Code           | Indicator   |              | LU     | Position<br>of LU | EU-28 | DE    | FR    | BE     | МІМ       | МАХ       |
| A1             | Gross national income at market<br>prices, per capita in PPS (2013) | $\downarrow$ | 178.9  | 1/27              | 100   | 127.6 | 110.1 | 118.5  | BU 45.6   | LU        |
| A2             | Growth rate of real GDP, as a %<br>(2013)                           | $\uparrow$   | 2.0    | 6 / 28            | 0.1   | 0.4   | 0.2   | 0.2    | CY-5.4    | LV 4.1    |
| A3             | Growth rate of domestic<br>employment, as a % (2013)                | $\downarrow$ | 1.7    | 5/28              | -0.3  | 0.6   | -0.2  | -0.2   | CY -5.2   | MT 3.3    |
| A4             | Unemployment rate, as a % (2013)                                    | $\checkmark$ | 6.9    | 5 / 28            | 10.8  | 5.3   | 10.3  | 8.4    | AT 4.9    | GR 27.5   |
| A5             | Inflation rate, as a % (2013)*6                                     | $\uparrow$   | 1.7    | 20/28             | 1.5   | 1.6   | 1     | 1.2    | GR -0.9   | HU 1.7    |
| A6             | Public balance, as a % of GDP<br>(2013)                             | $\uparrow$   | 0.6    | 1 / 28            | -3.3  | 0.0   | -4.3  | -2.7   | SL -14.7  | LU        |
| A7             | Public debt, as a % of GDP (2013)                                   | $\downarrow$ | 23.6   | 3 / 28            | 87.1  | 78.4  | 93.5  | 101.5  | EE 10     | GR 175.1  |
| A8             | Gross fixed capital formation,<br>as a % of GDP (2013)              | $\downarrow$ | 3.1    | 12 / 28           | 2.2   | 1.6   | 3.2   | 1.6    | AT 1.0    | R0 4.5    |
| A9             | Terms of trade (2013)   | $\uparrow$   | 107.1  | 3 / 28            |       | 98.24 | 98.1  | 97.5   | FIN 91.10 | R0 127.1  |
| A10            | Real effective exchange rate<br>(index 2000 =100) (2013)            | $\downarrow$ | 105.71 | 21/28             | 99.07 | 98.87 | 99.25 | 103.96 | UK 86.95  | SK 133.66 |
| A11            | Diversification – Entropy<br>coefficient (2013)⁵                    | $\downarrow$ | 0.88   | 21 / 28           | 0.90  | 0.88  | 0.90  | 0.88   | LT 0.81   | MT 0.92   |
| A12            | Market integration (2013)   | $\uparrow$   | 605.2  | 1 / 28            | 2.6   | 1.2   | -0.1  | -2.8   | MT -11    | LU        |

\*LU inflation rate: IPCN, other IPCH; harmonized unemployment rate EUROSTAT/BIT LU: Adem

Although the green colour is dominant in this category, it has to be noted that the situation has deteriorated for 7 out of the 12 indicators in Luxembourg as compared to the previous year.

Luxembourg has two orange indicators in this flagship category, namely inflation rate and entropy coefficient. Nevertheless, the "Inflation rate" indicator is below 2% in Luxembourg; thus the situation is currently not alarming, especially as the inflation differential with our neighbouring countries is decreasing.

Although Luxembourg has not yet reached historical performance with regards to growth, the country is still in the top ranking countries concerning the "Growth rate of real GDP", which has even increased from -0.2% to +2.0% between 2012 and 2013. The "Growth rate of domestic employment" shows a less important growth with a rate of 1.7% in 2013 compared with 2.5% in 2012, the EU average being -0.3%.

The "Unemployment rate" has slightly increased from 6.1% in 2012 to 6.9% in 2013. Nevertheless it remains well below the EU average of 10.8%.

Finally, "Terms of trade" have slightly improved. Compared to the other EU countries, Luxembourg's "Public debt" is still low (23.1% of GDP with a EU average of 87.1%) and is outperformed only by Estonia (10%). The "Public balance" indicator remains in the green zone and has slightly improved between 2012 and 2013 by moving from 0.0% of GDP (excess) to 0.6% of GDP (excess).





<sup>6</sup> The recent change of the NACE rev 1.1 (6 branches) revision in Nace rev.2 (10 branches) has a significant impact on the result of the entropy coefficient. In-depth analyses are necessary.

## 3.2.2 Employment

| Table<br>Categ | Table 7<br>Category B Employment              |              |      |                   |       |      |      |      |         |         |  |
|----------------|---|--------------|------|-------------------|-------|------|------|------|---------|---------|--|
| Code           | Indicator<br>2013                             |              | LU   | Position<br>of LU | EU-28 | DE   | FR   | BE   | MIN     | MAX     |  |
| B1             | Employment rate, as a % (aged 15-64)          | $\checkmark$ | 65.7 | 10 / 28           | 64.1  | 73.3 | 64.1 | 61.8 | HR 49.2 | SE 74.4 |  |
| B2             | Employment rate – Men (aged 15-64))           | $\checkmark$ | 72.1 | 9 / 28            | 69.4  | 77.7 | 67.9 | 66.4 | HR 52.8 | NL 78.7 |  |
| B3             | Employment rate – Women (aged 15-64)          | $\uparrow$   | 59.1 | 14 / 28           | 58.7  | 68.8 | 60.4 | 57.2 | GR 40.1 | SE 72.5 |  |
| B4             | Employment rate of persons aged 55-64, as a % | $\checkmark$ | 40.5 | 23 / 28           | 50.1  | 63.5 | 45.6 | 41.7 | SL 33.5 | SE 73.6 |  |
| B5             | Employment rate of persons aged 55-64 – Men   | $\uparrow$   | 48.3 | 22/28             | 57.5  | 69.8 | 48.3 | 47.7 | SL 41.8 | SE 76.9 |  |
| B6             | Employment rate of persons aged 55-64 – Women | $\checkmark$ | 32.4 | 22/28             | 43.3  | 57.5 | 43.1 | 35.8 | MT 18.4 | SE 70.3 |  |
| B7             | Unemployment rate of persons under 25, as a % | $\uparrow$   | 17.4 | 6 / 28            | 23.4  | 7.9  | 24.8 | 23.7 | DE 7.9  | ES 55.5 |  |
| B8             | Long-term unemployment rate, as a %           | $\checkmark$ | 1.8  | 5/28              | 5.1   | 2.4  | 4.2  | 3.9  | AT 1.2  | GR 18.4 |  |
| B9             | Persons holding a part-time job, as a %       | $\uparrow$   | 19.2 | 9 / 28            | 20.3  | 27.3 | 18.4 | 24.7 | BU 2.7  | NL 50.8 |  |

In the Employment category, 6 indicators are orange, thus close to the European average. Only two indicators are green: the unemployment rate of persons under 25 and the long-term unemployment rate. Whilst red indicators had disappeared in 2012 and 2010, there is one red indicator in 2013, namely the employment rate of older female workers. Furthermore, Luxembourg's performance has deteriorated compared to 2012 by 2.1 percentage points.

The employment rate has decreased by approximately 0.1 percentage point compared to 2012 and is at 65.7% in 2013. It should be noted that the employment rate in the scoreboard refers to the 15-64 age group whilst the employment rate of the Europe 2020 strategy (national target: 73%) refers to the 20-64 age group in order to minimize potential conflicts between employment policies and educational policies. The national employment rate of this age group is at 71.1% for 2013.

The employment rate of workers aged 55-64 has improved for several years, but remains below the EU average. The government has taken a series of measures to address the recommendation from Council to Luxembourg for 2012-2013 in order to increase the participation rate of older workers, as the law reforming the pension system entered into force on 1 January 2013.

The unemployment rate of young people (<25 years) has steadily increased for several years in Luxembourg. In 2000, this rate was still below 7%; in 2013, 17.4% of young people are looking for a job. This rate has slightly declined compared to 2012. Although this change should not be ignored in Luxembourg, the situation of young people under 25 is much more tragic in other countries. In Spain and Greece, this rate is as high as 55.5% and 51.9% respectively in 2013.

Following a recommendation from the European Union Council to Member States, Luxembourg has implemented a guarantee for young people that includes a set of measures to offer every young person aged 16- 25 either a job opportunity, an additional training, a vocational training or a placement in the four months after ending their studies or losing their job.<sup>7</sup>

| Empl | oym | ent |   |   |   |   |   |   |   |
|------|-----|-----|---|---|---|---|---|---|---|
| 2013 |     |     |   |   |   |   |   |   |   |
| 2012 |     |     |   |   |   |   |   |   |   |
| 2011 |     |     |   |   |   |   |   |   |   |
| 2010 |     |     |   |   |   |   |   |   |   |
| 2009 |     |     |   |   |   |   |   |   |   |
| 2008 |     |     |   |   |   |   |   |   |   |
| 2007 |     |     |   |   |   |   |   |   |   |
| 2006 |     |     |   |   |   |   |   |   |   |
| 2005 |     |     |   |   |   |   |   |   |   |
| 2004 |     |     |   |   |   |   |   |   |   |
| 2003 |     |     |   |   |   |   |   |   |   |
| 2002 |     |     |   |   |   |   |   |   |   |
| 2001 |     |     |   |   |   |   |   |   |   |
| 2000 |     |     |   |   |   |   |   | - |   |
| (    | ) 1 | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## 3.2.3 Productivity and Labour Costs

| Table<br>Categ | Table 8       Category C Productivity and Labour Costs |              |       |                   |       |       |       |      |          |         |  |
|----------------|--|--------------|-------|-------------------|-------|-------|-------|------|----------|---------|--|
| Code           | Indicator<br>2013                                      |              | LU    | Position<br>of LU | EU-28 | DE    | FR    | BE   | MIN      | ΜΑΧ     |  |
| C1             | Trends in total factor productivity                    | $\uparrow$   | -0.10 | 15 / 28           | -0.02 | -0.22 | -0.08 | 0.19 | CY -2.46 | UK 2.47 |  |
| C2             | Trends in apparent work productivity                   | $\uparrow$   | 0.4   | 12 / 28           | 0.4   | -0.1  | 0.4   | 0.4  | IR -2.6  | R0 3.7  |  |
| С3             | Productivity per hour worked, as a % of US<br>figures  | $\downarrow$ | 80    | 6/27              | 58    | 74    | 87    | 85   | R0 16    | FI 87   |  |
| C4             | Changes in unit labour costs                           | $\uparrow$   | 2.7   | 23 / 28           | 0.4   | 2.1   | 1.2   | 1.9  | GR -6.8  | EE 6    |  |
| *EU-1          | 5 ; **EU-25  |              |       |                   |       |       |       |      |          |         |  |

Three indicators in the "Productivity and Labour Costs" category have improved compared to the previous year. However, only productivity per hour worked as a percentage of US figures is displayed in green for Luxembourg.

Although nominal unit labour costs have improved as compared to the previous year, Luxembourg is in red for this indicator. The nominal ULC, which is also used in the EU macroeconomic imbalance procedure, compares the domestic nominal unit labour cost to the one of main trading partner countries. Thus, it includes the average labour cost of an economy and its level of productivity.

| 2013 |   |   |   |   |   |
|------|---|---|---|---|---|
| 2012 |   |   |   |   | - |
| 2012 |   |   |   |   |   |
| 2011 |   |   |   | - | 1 |
| 2010 |   |   |   |   |   |
| 2010 |   |   |   |   |   |
| 2009 |   |   |   |   |   |
| 2008 |   |   |   |   | - |
| 2000 |   |   | _ |   |   |
| 2007 |   |   |   | - |   |
| 2006 |   |   |   |   |   |
|      |   |   |   |   |   |
| 2005 |   |   |   |   |   |
| 2004 |   |   |   |   |   |
| 2002 |   |   |   |   |   |
| 2003 |   |   |   | 1 |   |
| 2002 |   |   |   |   |   |
| 2001 |   |   |   |   | - |
| 2001 |   |   |   |   |   |
| 2000 |   |   |   |   |   |
| ſ    | ı | 1 | 2 | 3 | 1 |
| Ľ    | , |   | 2 | 0 | f |
|      |   |   |   |   |   |

## 3.2.4 Market Operations

## Table 9

| Categ     | ory D Market Operations   |               |        |                   |               |         |        |         |              |               |
|-----------|---|---------------|--------|-------------------|---------------|---------|--------|---------|--------------|---------------|
| Code      | Indicator   |               | LU     | Position<br>of LU | EU-28         | DE      | FR     | BE      | MIN          | MAX           |
| D2        | Price of electricity (ex-VAT) –<br>industrial users, in € per 100 kWh<br>(2013)                     | $\uparrow$    | 0.0940 | 15 / 28           | 0.094         | 0.086   | 0.0771 | 0.0914  | FI<br>0.679  | CY<br>0.2002  |
| D3        | Price of gas (ex-VAT) – industrial<br>users, in € per GJ (2013)                                     | $\downarrow$  | 14.05  | 26 / 26           | 10.57         | 12.16   | 11.03  | 10.71   | R0<br>5.75   | LU            |
| D4        | Market share of the primary operator<br>in cellular telephones, as a %<br>(2010)                    | $\uparrow$    | 51     | 23 / 27           | 38            | 33      | 41     | 43      | P0<br>31     | CY<br>76      |
| D6        | OECD basket of mobile telephone<br>rates for large consumers, VAT<br>included – Total in USD (2012) | $\downarrow$  | 663.28 | 7 / 20            | 1097.26<br>** | 1336.47 | 293.32 | 1326.56 | AT<br>237.43 | HU<br>2288.76 |
| D7        | Broadband Internet access rates<br>in USD PPP/MB (VAT included)<br>(2012)                           | $\uparrow$    | 6.93   | 7 / 21            | 21.65 **      | 23.25   | 15.99  | 28.93   | DK<br>1.79   | P0<br>127.123 |
| D8        | OECD Basket of domestic royalties<br>for 2 Mbits leased lines (ex-VAT)<br>in USD (2012)             | $\uparrow$    | 8986   | 3 / 19            | 23623 **      | 13802   | 20262  | 14605   | DK<br>4754   | HO<br>3067549 |
| D9        | Value of public tenders using open<br>procedure procurement, as %<br>of GDP (2011)                  | $\downarrow$  | 1.30   | 26 / 27           | 3.4           | 1.3     | 4.0    | 3.0     | DE<br>1.3    | LV<br>17.6    |
| D10       | Total State aid as a % of GDP<br>(except horizontal objectives) (2011)                              | $\rightarrow$ | 0.24   | 3/27              | 0.51          | 0.53    | 0.62   | 0.43    | BU<br>0.10   | MT<br>1.60    |
| * = 1 1 4 | F **0F0D  |               |        |                   |               |         |        |         |              |               |

\*EU-15; \*\*0ECD

In this category we may note a "status quo" between 2010 and 2013.

Nevertheless, 4 indicators out of 8 have improved, 1 is stable and 3 have worsened, namely the price of energy (gas) for industrial users. The price of gas has indeed known a substantial increase between 2000 and 2013, rising from 4.93 to 14.05 EUR. The "Price of electricity" has also seen a major rise (from 0.075 EUR per kWh in 2005 to 0.094 EUR in 2013), a phenomenon which is the same within the European Union (0.0672 EUR in 2005 and 0.094 EUR per KWh in 2013) and which needs to be related to the developments in the oil price in international markets.

The "Market share of the primary operator in cellular telephones" has not changed since 2006 staying more or less stable at 51%. It should be noted that the latest figures date back to 2010.

Finally, the "Total State aid as a % of GDP (except horizontal objectives)" and "Value of public tenders using open procedure procurement" indicators are not published anymore by Eurostat.



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## 3.2.5 Institutional and Regulatory Framework

| Table<br>Categ | 10<br>ory E Institutional and Regulatory Framework                |               |       |                   |             |       |       |       |          |         |
|----------------|---|---------------|-------|-------------------|-------------|-------|-------|-------|----------|---------|
| Code           | Indicator   |               | LU    | Position<br>of LU | EU-28       | DE    | FR    | BE    | MIN      | МАХ     |
| E1             | Corporate tax rate, as a % (2013)                                 | $\downarrow$  | 29.22 | 22/28             | 22.60       | 29.58 | 33.33 | 33.99 | BU 10    | MT 35   |
| E2             | Income tax rate, as a % (2013)                                    | $\downarrow$  | 43.6  | 13 / 28           | 39.2        | 47.5  | 54.5  | 53.7  | BU 10    | SE 56.7 |
| E3             | Standard VAT rate, as a % (2013)                                  | $\rightarrow$ | 15    | 1 / 28            | 21.54       | 19    | 20    | 21    | LU       | HU 27   |
| E4             | Tax wedge – Single, without children,<br>as a % (2013)            | $\downarrow$  | 37    | 5/21              | 35.9 **     | 49.3  | 48.9  | 55.8  | IE 26.6  | BE      |
| E5             | Tax wedge – Married, with 2 children,<br>one wage-earner (2013)   | $\downarrow$  | 14.3  | 2/21              | 26.04<br>** | 33.8  | 41.6  | 41.00 | HO 6.38  | GR 44.5 |
| E6             | Administration efficiency index (2013)                            | $\downarrow$  | 1.62  | 5 / 28            | 1.14        | 1.52  | 1.47  | 1.59  | R0 -0.07 | FI 2.17 |
| E7             | Law compliance index (2013)                                       | $\downarrow$  | 1.79  | 6 / 28            | 1.10        | 1.62  | 1.40  | 1.40  | BU -0.14 | SE 1.95 |
| E8             | Regulation quality index (2013)                                   | $\downarrow$  | 1.76  | 6 / 28            | 1.17        | 1.55  | 1.15  | 1.29  | HR 0.44  | SE 1.89 |
| E9             | Degree of sophistication of online public services, as a % (2010) | $\uparrow$    | 87    | 18 / 27           | 90          | 99    | 94    | 92    | GR 70    | PT 100  |
| E10            | Full online availability of public services,<br>as a % (2010)     | $\uparrow$    | 72    | 20/27             | 82          | 95    | 85    | 79    | GR 48    | SE 100  |
| **0F0          | n.  |               |       |                   |             |       |       |       |          |         |

There has been a deterioration in the indicators of the tax environment for companies and households. Compared to the previous year, the indicators of the World Bank regarding the administration efficiency, the regulation quality and the law compliance have also deteriorated in Luxembourg.

The standard VAT rate has remained stable at 15% in Luxembourg since 1992. From January 2015, the VAT rates will increase in general by 2 percentage points: the normal VAT rate will increase from 15% to 17% (still remaining the lowest in the EU), the interim rates will increase from 12% to 14% and from 6% to 8%. However the super-reduced rate will remain at 3%. In this edition of the Report, a chapter analyses the impact a VAT increase had on inflation in other Member States.

Finally, the "Degree of sophistication of online public services" and the "Full online availability of public services" have not been updated since 2010.

#### Institutional and Regulatory Framework

| 2013 |   |   |   |   |   |     |     |     |     |      |
|------|---|---|---|---|---|-----|-----|-----|-----|------|
| 2012 |   |   |   |   |   |     |     |     |     |      |
| 2011 |   |   |   |   |   |     |     |     |     |      |
| 2010 |   |   |   |   |   |     |     |     |     |      |
| 2009 |   |   |   |   |   |     |     |     | _   |      |
| 2007 |   |   |   |   |   |     |     |     |     |      |
| 2000 |   |   |   |   |   |     |     |     |     |      |
| 2007 |   |   |   |   |   |     |     |     |     |      |
| 2006 | - |   |   |   |   |     |     |     |     | _    |
| 2005 | _ |   |   |   |   |     |     |     |     |      |
| 2004 |   |   |   |   |   |     |     |     |     |      |
| 2003 |   |   |   |   |   |     |     |     |     |      |
| 2002 | - |   |   |   |   |     |     |     |     |      |
| 2001 |   |   |   |   |   |     |     |     |     |      |
| 2000 | - |   |   |   |   |     |     |     |     |      |
| 1    | 0 | 1 | 2 | 3 | 4 | 5 6 | 5 1 | 7 8 | 3 9 | 7 10 |

# 3.2.6 Entrepreneurship

| Table<br>Categ | Table 11       Category F Entrepreneurship               |              |       |                   |       |       |       |       |         |          |  |  |
|----------------|--|--------------|-------|-------------------|-------|-------|-------|-------|---------|----------|--|--|
| Code           | Indicator  |              | LU    | Position<br>of LU | EU-28 | DE    | FR    | BE    | MIN     | МАХ      |  |  |
| F1             | Propensity for entrepreneurship,<br>as a % (2012)        | $\downarrow$ | 36    | 13 / 27           | 37    | 29    | 40    | 30    | SE 22   | LT 58    |  |  |
| F2             | Self-employed as a percentage of total employment (2013) | $\downarrow$ | 5.06  | 27 / 27           | 16.06 | 10.68 | 9.83  | 16.54 | LU      | GR 34.9  |  |  |
| F3             | Net change in number of companies,<br>as a % (2010)      | $\uparrow$   | 13.6  | 8 / 26            | 055   | 0.16  | 3.06  | 1.35  | LV -4.3 | LU       |  |  |
| F4             | Volatility among companies,<br>as a % (2010)             | $\uparrow$   | 28.54 | 18 / 26           | 19.86 | 17.28 | 16.78 | 9.11  | CY 7.74 | LT 36.48 |  |  |
| * EU-          | 15   |              |       |                   |       |       |       |       |         |          |  |  |

In the Entrepreneurship category, the performance of Luxembourg is within the EU average: two indicators are orange, one is green and one is red. It is noteworthy that two of the indicators have deteriorated compared to the previous year and the other two have improved.

According to a 2012 survey, 36% of Luxembourg population wish to work as freelancers, a rate similar to the EU average rate. This rate in Luxembourg has declined compared to 2009. Between 2009 and 2012, the preference to work as an employee has declined in 22 EU Member States. This can be explained by the effect of the financial crisis. Although approximately one third of Luxembourg population wishes to be selfemployed, only few people (5.8% of the population) put this into practice and work as freelancers.

| Entrepreneurship |   |   |   |   |   |  |  |  |
|------------------|---|---|---|---|---|--|--|--|
| 2013             |   |   |   |   |   |  |  |  |
| 2012             |   |   |   |   |   |  |  |  |
| 2011             |   |   |   |   |   |  |  |  |
| 2010             |   |   |   |   |   |  |  |  |
| 2009             |   |   |   |   |   |  |  |  |
| 2008             |   |   |   |   |   |  |  |  |
| 2007             |   |   |   |   |   |  |  |  |
| 2006             |   |   |   |   |   |  |  |  |
| 2005             |   |   |   |   |   |  |  |  |
| 2004             |   |   |   |   |   |  |  |  |
| 2003             |   |   |   |   |   |  |  |  |
| 2002             |   |   |   |   |   |  |  |  |
| 2001             |   |   |   |   |   |  |  |  |
| 2000             |   |   |   |   |   |  |  |  |
| (                | D | 1 | 2 | 3 | 4 |  |  |  |

#### Frame 1 **Global Entrepreneurship Monitor**

The Global Entrepreneurship Monitor (GEM) project is an annual assessment of entrepreneurial activity, aspirations and attitudes of individuals across a wide range of countries. Since its launch in 1999 with 10 countries, the project The gathered data provides useful inforcurrently includes nearly 100 "national teams" from all over the world who participate in this project. For the first time in 2013 Luxembourg participated in the largest ongoing study on the entrepreneurial dynamics in the world.

This study on entrepreneurship was conducted in collaboration with the University of Luxembourg, the CRP Henri Tudor, the Chamber of Commerce and STATEC under the "Global entrepreneur*ship monitoring*" (GEM) programme.

entrepreneurs creating an enterprise in Luxembourg do so because they see it as an opportunity. Luxembourg thus is clearly different from many countries where economic perspectives are poor and where the creation of a company is often the only way to generate an income. The study has also revealed an apparent paradox, which is highlighted in the survey.

Many participants in the study say they are ready to become entrepreneurs, but only a small minority put this ambition into practice.

mation to shape a solid policy favouring the creation of companies and the support they need. In fact, it is important to engage in changing our society's attitude towards bankrupt entrepreneurs who have to stop their activity. Whilst on one hand it is important to fight the phenomenon of fraudulent bankruptcies, a second chance should be granted to the bankrupt entrepreneur without being responsible. The small rate of women ready to become entrepreneurs is another axis demanding further efforts.

The GEM survey has confirmed that The results of the Luxembourg study may be consulted using the following link: http://www.statistiques.public.lu/fr/ actualites/entreprises/entreprises/2014/07/20140703/index.html

> For more information: http://www.gemconsortium.org/

#### 3.2.7 **Education and Training**

#### Table 12

| Category | GEd | ucation | and | Training |
|----------|-----|---------|-----|----------|
|          |     |         |     |          |

| Category G Education and Training |   |               |       |                   |       |      |      |      |            |            |
|-----------------------------------|---|---------------|-------|-------------------|-------|------|------|------|------------|------------|
| Code                              | Indicator   |               | LU    | Position<br>of LU | EU-28 | DE   | FR   | BE   | MIN        | МАХ        |
| G1                                | Annual cost per student in public educational<br>facilities, in PPS (2011)                              | $\rightarrow$ | 13033 | 28/28             | 6914  | 7493 | 7716 | 9088 | R0<br>2088 | LU         |
| G2                                | Part of the population having achieved at least the second cycle of secondary education, as a % (2013)  | $\uparrow$    | 80.5  | 14 / 28           | 75.2  | 86.3 | 75.1 | 72.8 | P0<br>40   | LT<br>93.4 |
| G4                                | Share of human resources in scientific and techno-<br>logical fields, as a % of total employment (2013) | $\uparrow$    | 58.6  | 1 / 28            | 42.9  | 45.7 | 48.1 | 50.3 | R0<br>25.7 | LU         |
| G5                                | Lifelong learning, as a % of the population aged between 25-64 (2013)                                   | $\uparrow$    | 14.4  | 7 / 28            | 10.4  | 7.8  | 17.7 | 6.7  | BU<br>1.7  | DK<br>31.4 |
| G6                                | Secondary school drop-outs, as a % (2013)   | $\uparrow$    | 6.1   | 5 / 28            | 11.9  | 9.9  | 9.7  | 11.0 | CR<br>3.7  | ES<br>23.5 |

Out of 5 indicators, 3 are green and 4 have improved compared to the previous year. Annual expenditure per student in public educational institutions in PPS<sup>8</sup> remains the highest in Luxembourg. For this indicator it is necessary to find an indicator measuring the efficiency of these expenses. It should be noted that Luxembourg's data for this indicator dates back to 2010.

Regarding the share of human resources in scientific and technological fields in total employment, Luxembourg achieves 58.6% in 2012. Since 2000, this percentage has steadily increased from 37.7%.

The Ministry of National Education has recently published an analysis of school dropouts in Luxembourg.<sup>9</sup> One interesting aspect of this analysis is discovering the different reasons of the early school leaving. This allows better assistance to be offered to the young early school leavers. Below is an extract of the outcome:

"Regarding the reasons given by the early school leavers, the following are the most frequently mentioned:

- ▼ 24.1% leave education because of school failure, compared to 28.3% the previous year;
- ▼ 3.8% feel they have been baldy orientated, compared to 22.4% the previous year;
- ▼ 11.1% mention they were unable to find an apprenticeship or the contract had been terminated; compared to 13.7% the previous year;
- 8.1% give personal reasons, compared to 13.3% the previous year;
- ▼ 7.6% report a lack of motivation to continue a vocational training or to attend their old school, a rate that has substantially declined compared to previous years (12.1% in 2010/2011);
- ▼ 4.4% of people questioned give no reason (14.0% the previous year)."

| _ducation and Iraining |   |     |   |   |     |   |  |  |
|------------------------|---|-----|---|---|-----|---|--|--|
|                        |   |     |   |   |     |   |  |  |
| 2013                   |   |     |   |   |     |   |  |  |
| 2012                   |   |     |   |   |     |   |  |  |
| 2011                   |   |     |   |   |     |   |  |  |
| 2010                   |   |     |   |   |     |   |  |  |
| 2009                   |   |     |   |   |     |   |  |  |
| 2008                   |   |     |   |   |     |   |  |  |
| 2007                   |   |     |   |   |     |   |  |  |
| 2006                   |   |     |   |   |     |   |  |  |
| 2005                   |   |     |   |   |     |   |  |  |
| 2004                   |   |     |   |   |     |   |  |  |
| 2003                   |   |     |   |   |     |   |  |  |
| 2002                   |   |     |   |   |     |   |  |  |
| 2001                   |   |     |   |   |     |   |  |  |
| 2000                   |   |     |   |   |     |   |  |  |
| (                      | ) | 1 2 | 2 | 3 | 4 5 | 5 |  |  |

http://www.oecd.org/edu/ Luxembourg-EAG2014-Country-Note.pdf

http://www.men.public.lu/ catalogue-publications/ secondaire/statistiquesanalyses/decrochage-scolaire/ decrochage-11-12/fr.pdf
### 3.2.8 Knowledge Economy

| Table<br>Categ | 13<br>ory H Knowledge Economy   |              |        |                   |         |        |        |        |              |              |
|----------------|---|--------------|--------|-------------------|---------|--------|--------|--------|--------------|--------------|
| Code           | Indicator   |              | LU     | Position<br>of LU | EU-28   | DE     | FR     | BE     | MIN          | МАХ          |
| H1             | Internal R&D Lisbon expenditure,<br>as a % of GDP (2012)  | $\uparrow$   | 1.46   | 15 / 28           | 2.07    | 2.98   | 2.29   | 2.24   | CY<br>0.46   | FI<br>3.55   |
| H2             | Public R&D budget credits,<br>as a % of GDP (2012)  | $\downarrow$ | 30.5   | 19 / 28           | 33.4    | 29.8   | 35.4   | 23.4   | BE.5         | CY<br>70.6   |
| H3             | Portion of public research financed<br>by the private sector, as a % of GDP (2012)                        | $\checkmark$ | 46.7   | 12 / 28           | 54.9    | 65.6   | 55.0   | 60.2   | CY 11        | DE           |
| H5             | Number of researchers per 1,000 employed<br>persons (public and private sectors taken<br>together) (2012) | $\uparrow$   | 8.25   | 9/22              | 7.53    | 8.22   | 8.81   | 9      | R0<br>1.81   | FI<br>14.93  |
| H7             | Number of USPTO patents per million inhabitants (2013)  | $\uparrow$   | 101    | 7 / 28            | 80      | 189    | 93     | 95     | LT 2         | SE<br>238    |
| H8             | Number of OEB patents per million<br>inhabitants (2012)   | $\downarrow$ | 134    | 7 / 28            | 108     | 277    | 126    | 133    | R0 2         | SE<br>289    |
| Н9             | Use of broadband connections by companies, as a % (2012)  | $\uparrow$   | 98     | 6 / 28            | 93      | 88     | 99     | 87     | R0<br>73     | CY<br>100    |
| H10            | Investment in public telecommunications,<br>as a % (2009)   | $\downarrow$ | 1.54   | 12/21             | 1.66*   | 1.16   | 1.33   | 1.91   | AT<br>0.76   | PT<br>2.75   |
| H11            | Percentage of households that have Internet access at home, as a % (2013)                                 | $\uparrow$   | 94     | 2 / 28            | 79      | 88     | 82     | 80     | BU 54        | NL<br>95     |
| H12            | Number of cell phones per 100 inhabitants<br>(2011)   | $\uparrow$   | 232.70 | 1/21              | 167.54* | 207.80 | 164.29 | 189.91 | SK<br>138.78 | LU           |
| H13            | Percentage of households that have broadband<br>Internet access (2013)                                    | $\uparrow$   | 70     | 14 / 28           | 76      | 85     | 78     | 79     | BU<br>54     | FI<br>88     |
| H14            | Number of secure web servers per 100,000<br>inhabitants (2012)  | $\uparrow$   | 203.68 | 3/21              | 96.04*  | 112.89 | 40.98  | 69.00  | GR<br>18.55  | NL<br>305.86 |
| H15            | Percentage of total employment in medium or high technology sectors (2012)                                | $\uparrow$   | 0.9    | 27 / 28           | 5.6     | 9.9    | 4.7    | 5.0    | CY<br>0.7    | CZ<br>10.5   |
| *0FCI          | n   |              |        |                   |         |        |        |        |              |              |

For this category the situation has slightly deteriorated since 2004. However, it has to be noted that 4 out of 15 indicators could not be updated: "Percentage of sales allocated to the introduction of new products", "Scientific publications per million inhabitants", "Investment in public telecommunications as a %" and "Number of cell and fixed phones per 100 inhabitants".

For the "Knowledge Economy" category, we can see that 4 out of the 13 indicators have deteriorated: the "Public R&D budget credits as a % of GDP" indicator has declined, as has the "Number of OEB patents per million inhabitants" moving to 134 in 2012 while the "Number of researchers per 1,000 employed persons" had increased. The "Use of broadband connections by companies" indicator has increased from 91% in 2008 to 98% in 2013, but Luxembourg remains in the orange zone. The "Portion of public research financed by the private sector, as a % of GDP" indicator has worsened.





## 3.2.9 Social Cohesion

| Table<br>Categ | 14<br>ory I Social Cohesion   |               |      |                   |       |      |      |      |         |         |
|----------------|---|---------------|------|-------------------|-------|------|------|------|---------|---------|
| Code           | Indicator   |               | LU   | Position<br>of LU | EU-28 | DE   | FR   | BE   | MIN     | МАХ     |
| 11             | Gini coefficient (2013)   | $\downarrow$  | 30   | 13 /28            | 30.6  | 29.7 | 30.5 | 26.6 | SK 24.2 | BU 35.4 |
| 12             | At-risk-of-poverty rate after social<br>transfers, as a % (2013)          | $\downarrow$  | 15.9 | 14 / 28           | 16.9  | 16.1 | 14.1 | 15   | CZ 8.6  | GR 23.1 |
| 13             | At persistent risk-of-poverty rate,<br>as a % (2013)                      | $\rightarrow$ | 7.1  | 7 / 27            | 10.2  | 10.4 | 7    | 9.8  | SE 4.1  | R0 18.2 |
| 14             | Life expectancy at birth in numbers of years (2012)                       | $\uparrow$    | 81.5 | 5 / 28            | 80.3  | 81   | 82.1 | 80.5 | LT 74.1 | IT 82.4 |
| 15             | Gender wage gap, as a % of gross hourly<br>wages of male employees (2012) | $\rightarrow$ | 13.6 | 5 / 28            | 21.7  | 25.6 | 14.1 | 15   | SL 7    | EE 28.9 |

Compared to the previous year, only one out of the 5 indicators for Social Cohesion has improved, namely the "life expectancy at birth" indicator. The other indicators have declined whilst the gender wage gap has remained stable in Luxembourg.

Considering life expectancy at birth, it would also be appropriate to analyse life expectancy "in good health". The "PIBien-être" (GDProsperity) scoreboard concentrates in more detail on these societal questions.

A Gini coefficient equalling 0 indicates that the entire population receives the same income (state of perfect equality). On the opposite, a Gini coefficient equalling 1 corresponds to the situation where a single individual would possess all incomes, while the others would receive an income equalling 0. For 2013, Gini coefficient for Luxembourg is 30%, ranking the country in the European average. In the Slovak republic, the Gini coefficient is the lowest and consequently the best in the EU (24.2%).

The at-risk-of-poverty rate after social transfers has deteriorated in comparison to the previous year and is currently at 15.9%. The at persistent risk-of-poverty rate has remained unchanged at 7.1% in 2013.

It should be noted that the "Work-related accidents" indicator has been removed from this category, as the data had not been updated since 2006.

| Soci | al Co | hesi | on |   |   |   |
|------|-------|------|----|---|---|---|
|      |       |      |    |   |   |   |
| 2013 |       |      |    |   |   |   |
| 2012 | _     |      |    |   |   | - |
| 2011 |       |      |    |   |   | - |
| 2010 |       |      |    |   |   |   |
| 2009 |       |      |    |   |   |   |
| 2008 |       |      |    |   |   |   |
| 2007 |       |      |    |   |   |   |
| 2006 |       |      |    |   |   |   |
| 2005 |       |      |    |   |   |   |
| 2004 |       |      |    |   |   |   |
| 2003 |       |      |    |   |   |   |
| 2002 |       |      |    |   |   |   |
| 2001 |       |      |    |   |   |   |
| 2000 |       |      |    |   |   |   |
| 2000 | n     | 1    | 2  | 3 | 4 | 5 |
|      | -     |      | _  | _ |   |   |

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### 3.2.10 Environment

| Table<br>Categ | Table 15 Category J Environment  |            |        |                   |       |       |      |      |             |             |  |  |  |
|----------------|--|------------|--------|-------------------|-------|-------|------|------|-------------|-------------|--|--|--|
| Code           | Indicator  |            | LU     | Position<br>of LU | EU-28 | DE    | FR   | BE   | MIN         | ΜΑΧ         |  |  |  |
| J1             | Number of ISO 9001 certifications<br>per million inhabitants (2013)  | $\uparrow$ | 482    | 22 / 28           | 880   | 686   | 451  | 342  | DK<br>273   | IT<br>2697  |  |  |  |
| J2             | Number of ISO 14001 certifications<br>per million inhabitants (2013)   | $\uparrow$ | 165.72 | 15 / 28           | 218   | 97    | 121  | 103  | P0<br>57    | CZ<br>456   |  |  |  |
| J3             | Total greenhouse gas emissions<br>(index 1990=100) (2012)  | $\uparrow$ | 98     | 20/28             | 82    | 77    | 89   | 83   | LT<br>43    | MT<br>157   |  |  |  |
| J4             | Share of renewable energy (2012)   | $\uparrow$ | 3.10   | 27 / 28           | 14.1  | 12.40 | 13.4 | 6.8  | MT<br>1.4   | SE<br>51    |  |  |  |
| J5             | Volume of municipal waste generated<br>in kg per person, per year (2012)   | $\uparrow$ | 662    | 26 / 28           | 492   | 611   | 534  | 456  | EE<br>279   | DK<br>668   |  |  |  |
| J6             | Energy intensity in kg of oil equivalent per thousand of euros (2012) <sup>10</sup>  | $\uparrow$ | 134    | 7 / 28            | 143   | 129   | 143  | 172  | IR<br>83    | BU<br>670   |  |  |  |
| J7             | Modal breakdown in transportation choice<br>for passenger method – Percentage of car<br>users in passenger kilometres (pkm) (2012) | $\uparrow$ | 105    | 25 / 27           | 92.3  | 93.9  | 95.2 | 97.6 | SK<br>103.5 | GR<br>103.4 |  |  |  |

The red colour is dominant in the Environment category, only one indicator being orange. However, all indicators have improved as compared to the latest available figures. It is noteworthy that the indicators of this category are often updated with some delay, and the majority of data dates back to 2012. In this category, a lot of indicators are part of the former Lisbon strategy. The European Commission has since developed new and more pertinent indicators in the last few years. During the revision of the Scoreboard, it is important to keep these new indicators into account. The EU sustainable development strategy highlights the need to achieve a decoupling of economic growth and transport demand in order to minimise environmental damage. Of course this implies choosing more energy-efficient and environmentally friendly modes of transport.

Luxembourg's renewable energy policy<sup>11</sup> is mainly guided by the EU legal framework, specifically by the 2009/28/EC Directive. The directive demands that each EU Member State increases its share of renewable energy in its final energy consumption in order to achieve a European share of renewable energy of 20% by 2020. Luxembourg has decided to achieve a share of 11% of renewable energy of its gross final energy consumption. With a significant projected increase in wind energy, biogas and solid biomass, Luxembourg aims to achieve its 11% target by an input of 4% of electricity, heating and cooling, a contribution of 5% of biofuels and electro-mobility, and approximately 2% through cooperation mechanisms. The biggest contribution should come from biofuels, mainly from biodiesel and electro-mobility, signifying an increase of 110% compared to 2005.



- <sup>10</sup> This indicator differs from the indicator chosen for the Europe 2020 strategy.
- <sup>11</sup> Energy Policies of IEA Countries : Luxembourg 2014 Review, International Energy Agency.

# 3.3 Competitiveness composite indicator

## 3.3.1 General result

In 2013 Luxembourg takes 6th position and thus gains 7 positions compared to the previous year. Sweden, Denmark, the United Kingdom and Finland are as usual leading the ranking. Germany (9th) loses one position whilst France (8th) and Belgium (15th) gain 3 positions each. The last positions are taken by Greece, Cyprus, Croatia, Hungary and Malta. The biggest loser of the general ranking is Estonia, falling from 5th to 14th position.

Luxembourg's 6th position is the best since the development of the Competitiveness Scoreboard. Over the period 2000-2012, Luxembourg gained a similar score in 2004 and 2005. By analysing the levels of the composite indicator represented in the chart below, one realises that some countries reach a very similar level for the composite indicator. Over the last few years we can see that the same group of countries occupies the first 5 positions, followed by a second group of countries among which Luxembourg figures. There is also a third group (Belgium, Slovak Republic, Poland, Romania, Ireland, Italy) followed behind by the last group (Bulgaria, Spain, Portugal, Hungary, Malta, Croatia, Cyprus, Greece).



The method for calculating the composite indicator remains unchanged. However, we take the opportunity to remind the calculation method. Only the updating of data may have an impact on the ranking of previous years.

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Concerning the methodology for calculating the composite indicator, we take the recommendations made by the audit into account (2010 Competitiveness Report, Perspectives de politique économigue N° 15).

For some indicators, there are outliers. In particular, the indicator<sup>12</sup> on the terms the basket of domestic royalties for 2 Mbits leased lines (D8). For each of these indicators, there is a country that has a value significantly higher than all other countries: Romania (A9), Luxembourg (A12) and Hungary (D8). Given that these indicators are likely to influence the result too much, extreme values are replaced by the value of the country in second position.

In order to address the problem of missing values, the "hot-deck imputation" method is used. The idea is to estimate a country's missing values based on the values of a country that shows a similar performance for the other indicators in the same category.

For the composite indicator calculation, basic indicators are standardized first. Each indicator is processed by the following formula by country j at time t.

$$y_{ij}^{t} = \frac{x_{ij}^{t} - \min_{j} x_{ij}^{t}}{\max_{j} x_{jj}^{t} - \min_{j} x_{ij}^{t}}$$

of trade (A9), direct investment (A12) and The composite index C for a category k (k = 1, ..., 10) at time is calculated by averaging the sub-indicators of this category in the new scale:

$$C_{k,j}^{t} = \frac{1}{m_{k}} \sum_{i=1}^{m_{k}} y_{ij}^{t}$$

The composite indices of the 10 categories are then standardized in order to balance the impact of the 10 categories in the final composite indicator.

$$\hat{C}_{k,j}^{t} = \frac{C_{k,j}^{t} - \min_{j} C_{k,j}^{t}}{\max_{j} C_{k,j}^{t} - \min_{j} C_{k,j}^{t}}$$

The final composite indicator CI is achieved by a simple arithmetic mean of its composite indicators, which means the 10 categories are equally weighted.

$$CI'_{j} = \frac{1}{10} \sum_{k=1}^{10} \hat{C}'_{k,j}$$

As every year, the Observatoire warns the reader that certain technical aspects have a considerable impact on the result of the ranking. Firstly, the positions of the seven countries that are not OECD members (Bulgaria, Cyprus, Croatia, Latvia, Lithuania, Malta and Romania) need to be put into perspective, as a number of the Scoreboard indicators do not exist for these countries.

Secondly, the ranking is constructed relatively, which means that Luxembourg's ranking also depends on the performance of the other countries. Even if Luxembourg's performance is bad, it may be that other countries have deteriorated much more, so that the relative position of Luxembourg improves at the end. The ranking does not say anything about the absolute performance of Luxembourg.

In other words, an improvement of a country's ranking may be caused by a deterioration in the performance of other countries. That is why the Observatoire de la compétitivité always recommends interpreting the ranking by completing it with the additional information provided by the Scoreboard, i.e. basic indicators.

> <sup>12</sup> Technically, these indicators have been identified by the fact they have a high skewness and kurtosis.

| Table<br>Com | e 16<br>posite indicator re | sults from 2000 to | 2013           |                |                |                |                |
|--------------|-----------------------------|--------------------|----------------|----------------|----------------|----------------|----------------|
|              | 2000                        | 2001               | 2002           | 2003           | 2004           | 2005           | 2006           |
| 1            | Sweden                      | Sweden             | Sweden         | Sweden         | Sweden         | Sweden         | Sweden         |
| 2            | Denmark                     | Denmark            | Finland        | United Kingdom | Finland        | Denmark        | Denmark        |
| 3            | Finland                     | Finland            | Denmark        | Finland        | Denmark        | Finland        | Netherlands    |
| 4            | United Kingdom              | United Kingdom     | United Kingdom | Denmark        | United Kingdom | United Kingdom | Finland        |
| 5            | Netherlands                 | Netherlands        | Ireland        | Netherlands    | Netherlands    | Netherlands    | United Kingdom |
| 6            | Luxembourg                  | Lithuania          | Netherlands    | Estonia        | Luxembourg     | Estonia        | Estonia        |
| 7            | Ireland                     | Ireland            | Luxembourg     | Luxembourg     | Austria        | Luxembourg     | Czech rep.     |
| 8            | Estonia                     | Luxembourg         | Estonia        | Ireland        | Lithuania      | Lithuania      | Germany        |
| 9            | Austria                     | Germany            | Austria        | Austria        | France         | Czech rep.     | Austria        |
| 10           | Germany                     | Austria            | Germany        | Lithuania      | Estonia        | Austria        | Luxembourg     |
| 11           | Lithuania                   | Estonia            | Latvia         | France         | Belgium        | Ireland        | Slovenia       |
| 12           | France                      | France             | France         | Czech rep.     | Ireland        | France         | Lithuania      |
| 13           | Latvia                      | Czech rep.         | Lithuania      | Germany        | Germany        | Slovenia       | Ireland        |
| 14           | Czech rep.                  | Slovenia           | Romania        | Slovenia       | Czech rep.     | Germany        | France         |
| 15           | Slovenia                    | Spain              | Slovenia       | Belgium        | Slovenia       | Latvia         | Latvia         |
| 16           | Spain                       | Romania            | Belgium        | Spain          | Croatia        | Belgium        | Belgium        |
| 17           | Belgium                     | Cyprus             | Czech rep.     | Latvia         | Romania        | Slovak rep.    | Croatia        |
| 18           | Italy                       | Belgium            | Spain          | Greece         | Spain          | Croatia        | Romania        |
| 19           | Cyprus                      | Croatia            | Cyprus         | Romania        | Bulgaria       | Bulgaria       | Spain          |
| 20           | Portugal                    | Slovak rep.        | Italy          | Italy          | Cyprus         | Spain          | Slovak rep.    |
| 21           | Romania                     | Italy              | Croatia        | Bulgaria       | Portugal       | Cyprus         | Cyprus         |
| 22           | Malta                       | Latvia             | Slovak rep.    | Hungary        | Italy          | Italy          | Greece         |
| 23           | Hungary                     | Greece             | Hungary        | Croatia        | Latvia         | Hungary        | Poland         |
| 24           | Greece                      | Hungary            | Bulgaria       | Slovak rep.    | Greece         | Malta          | Italy          |
| 25           | Croatia                     | Portugal           | Portugal       | Cyprus         | Slovak rep.    | Romania        | Malta          |
| 26           | Bulgaria                    | Bulgaria           | Malta          | Portugal       | Poland         | Poland         | Bulgaria       |
| 27           | Poland                      | Poland             | Greece         | Malta          | Hungary        | Portugal       | Hungary        |
| 28           | Slovak rep.                 | Malta              | Poland         | Poland         | Malta          | Greece         | Portugal       |
| Follo        | owing on next page          |                    |                |                |                |                |                |

| Tabl<br>Cont | Table 16<br>Continued |                |                |                |                |                |                |  |  |  |  |  |  |
|--------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|--|--|--|--|--|--|
|              | 2007                  | 2008           | 2009           | 2010           | 2011           | 2012           | 2013           |  |  |  |  |  |  |
| 1            | Sweden                | Sweden         | Sweden         | Sweden         | Sweden         | Sweden         | Sweden         |  |  |  |  |  |  |
| 2            | Netherlands           | Netherlands    | Netherlands    | Denmark        | Denmark        | Denmark        | Denmark        |  |  |  |  |  |  |
| 3            | Denmark               | Denmark        | Denmark        | Netherlands    | Netherlands    | Netherlands    | Netherlands    |  |  |  |  |  |  |
| 4            | Finland               | Finland        | United Kingdom | Finland        | Finland        | United Kingdom | United Kingdom |  |  |  |  |  |  |
| 5            | United Kingdom        | United Kingdom | Finland        | United Kingdom | United Kingdom | Finland        | Finland        |  |  |  |  |  |  |
| 6            | Slovenia              | Slovenia       | Czech rep.     | Luxembourg     | Germany        | Estonia        | Luxembourg     |  |  |  |  |  |  |
| 7            | Estonia               | Austria        | Austria        | Germany        | Austria        | Austria        | France         |  |  |  |  |  |  |
| 8            | Austria               | Germany        | Luxembourg     | Czech rep.     | Estonia        | Germany        | Austria        |  |  |  |  |  |  |
| 9            | Luxembourg            | Czech rep.     | Slovenia       | Estonia        | Slovenia       | Lithuania      | Germany        |  |  |  |  |  |  |
| 10           | Germany               | Estonia        | Germany        | Austria        | Czech rep.     | Latvia         | Latvia         |  |  |  |  |  |  |
| 11           | Ireland               | Luxembourg     | Ireland        | Slovenia       | Luxembourg     | Czech rep.     | Czech rep.     |  |  |  |  |  |  |
| 12           | Lithuania             | France         | France         | France         | Lithuania      | France         | Lithuania      |  |  |  |  |  |  |
| 13           | France                | Ireland        | Estonia        | Lithuania      | France         | Luxembourg     | Slovenia       |  |  |  |  |  |  |
| 14           | Czech rep.            | Bulgaria       | Poland         | Latvia         | Ireland        | Slovenia       | Estonia        |  |  |  |  |  |  |
| 15           | Latvia                | Belgium        | Belgium        | Ireland        | Latvia         | Ireland        | Belgium        |  |  |  |  |  |  |
| 16           | Belgium               | Lithuania      | Cyprus         | Poland         | Romania        | Poland         | Slovak rep.    |  |  |  |  |  |  |
| 17           | Cyprus                | Croatia        | Spain          | Slovak rep.    | Poland         | Slovak rep.    | Romania        |  |  |  |  |  |  |
| 18           | Spain                 | Cyprus         | Italy          | Belgium        | Belgium        | Belgium        | Poland         |  |  |  |  |  |  |
| 19           | Italy                 | Poland         | Portugal       | Italy          | Italy          | Bulgaria       | Ireland        |  |  |  |  |  |  |
| 20           | Poland                | Spain          | Croatia        | Romania        | Slovak rep.    | Italy          | Italy          |  |  |  |  |  |  |
| 21           | Slovak rep.           | Romania        | Bulgaria       | Bulgaria       | Bulgaria       | Romania        | Bulgaria       |  |  |  |  |  |  |
| 22           | Croatia               | Italy          | Romania        | Cyprus         | Croatia        | Portugal       | Portugal       |  |  |  |  |  |  |
| 23           | Greece                | Slovak rep.    | Slovak rep.    | Portugal       | Cyprus         | Spain          | Spain          |  |  |  |  |  |  |
| 24           | Bulgaria              | Portugal       | Lithuania      | Malta          | Spain          | Cyprus         | Croatia        |  |  |  |  |  |  |
| 25           | Malta                 | Greece         | Greece         | Spain          | Hungary        | Croatia        | Malta          |  |  |  |  |  |  |
| 26           | Portugal              | Malta          | Latvia         | Croatia        | Portugal       | Malta          | Hungary        |  |  |  |  |  |  |
| 27           | Romania               | Hungary        | Malta          | Hungary        | Malta          | Hungary        | Cyprus         |  |  |  |  |  |  |
| 28           | Hungary               | Latvia         | Hungary        | Greece         | Greece         | Greece         | Greece         |  |  |  |  |  |  |

Note: countries in bold show a maximum 5% difference from the final composite score compared to Luxembourg.

In the table above, the countries with a maximum 5% difference in the final result compared to Luxembourg are written in bold. We can see that the group surrounding Luxembourg has changed over time. In 2000 Luxembourg's performance was close to Ireland's and Estonia's. In 2005 the Netherlands become closer to the Scandinavian countries. Since 2006 the group around Luxembourg's performance gets constantly bigger: Austria, Germany; the Czech Republic, Lithuania and Slovenia become closer to Luxembourg's performance, which explains the jump Luxembourg has performed between 2012 and 2013. A slight improvement is enough for Luxembourg to get ahead of several countries.

### 3.3.2 Results per category

Is Luxembourg's ranking not contradictory with the analysis of indicators? By analysing the indicator development, we note that the number of indicators in green, orange and red has remained constant compared to the previous year. How did this jump from 13th position in 2012 to 6th position in 2013 occur? This question makes it necessary to consider the ranking by category. The aggregation formula gives equal weight to the 10 categories, regardless of the number of indicators within each category. Competitiveness in a broad sense is measured through the 10 categories of the Scoreboard. No dimension is prioritised by construction.

Luxembourg takes first position in the Macroeconomic Performance category and is in the top 10 EU countries in 3 other categories, namely the Institutional and Regulatory Framework, the Knowledge Economy and the Social Cohesion categories. Luxembourg gains 17 positions compared to 2012 in the Productivity and Labour Costs category. In the other categories, the ranking has remained stable in 2013 compared to 2012. The Productivity and Labour Costs category should be interpreted with caution, as the ranking in this category is very volatile given that the indicators depend largely on economic conditions and are constantly changing. So the indicators will be regularly revised and can therefore cause later changes in the ranking.

| ble 17 nking by category in 2013 Cot A Cot B Cot C Cot D Cot E Cot C Cot H Cot L Cot L |       |       |       |       |       |       |       |       |       |       |  |  |  |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|
|  | Cat A | Cat B | Cat C | Cat D | Cat E | Cat F | Cat G | Cat H | Cat I | Cat J |  |  |  |
| Germany  | 9     | 3     | 15    | 15    | 11    | 27    | 15    | 4     | 17    | 21    |  |  |  |
| Austria  | 15    | 7     | 18    | 3     | 10    | 19    | 17    | 6     | 10    | 14    |  |  |  |
| Belgium  | 19    | 15    | 5     | 13    | 22    | 21    | 21    | 9     | 9     | 23    |  |  |  |
| Bulgaria   | 6     | 20    | 26    | 12    | 23    | 4     | 20    | 28    | 27    | 20    |  |  |  |
| Cyprus   | 26    | 16    | 22    | 28    | 19    | 16    | 22    | 22    | 18    | 28    |  |  |  |
| Croatia  | 21    | 27    | 20    | 10    | 27    | 23    | 16    | 20    | 20    | 13    |  |  |  |
| Denmark  | 4     | 4     | 8     | 4     | 7     | 24    | 3     | 2     | 6     | 17    |  |  |  |
| Spain  | 27    | 26    | 1     | 24    | 18    | 17    | 26    | 19    | 21    | 12    |  |  |  |
| Estonia  | 5     | 6     | 27    | 7     | 5     | 15    | 4     | 11    | 25    | 5     |  |  |  |
| Finland  | 20    | 8     | 19    | 22    | 6     | 26    | 2     | 1     | 5     | 8     |  |  |  |
| France   | 10    | 13    | 4     | 6     | 20    | 11    | 12    | 10    | 7     | 19    |  |  |  |
| Greece   | 28    | 28    | 9     | 25    | 28    | 3     | 23    | 26    | 23    | 25    |  |  |  |
| Hungary  | 11    | 24    | 24    | 26    | 25    | 20    | 19    | 17    | 14    | 16    |  |  |  |
| Ireland  | 16    | 14    | 25    | 18    | 1     | 25    | 18    | 14    | 15    | 22    |  |  |  |
| Italy  | 22    | 25    | 17    | 16    | 24    | 8     | 25    | 15    | 16    | 4     |  |  |  |
| Latvia   | 3     | 10    | 13    | 17    | 9     | 2     | 10    | 24    | 24    | 6     |  |  |  |
| Lithuania  | 17    | 11    | 16    | 9     | 13    | 1     | 5     | 23    | 26    | 7     |  |  |  |
| Luxembourg   | 1     | 12    | 12    | 14    | 3     | 18    | 11    | 8     | 8     | 26    |  |  |  |
| Malta  | 8     | 17    | 21    | 27    | 14    | 22    | 28    | 13    | 11    | 27    |  |  |  |
| Netherlands  | 14    | 2     | 11    | 5     | 4     | 10    | 8     | 5     | 2     | 24    |  |  |  |
| Poland   | 13    | 21    | 23    | 11    | 17    | 6     | 9     | 25    | 19    | 15    |  |  |  |
| Portugal   | 24    | 19    | 14    | 23    | 16    | 9     | 27    | 18    | 22    | 18    |  |  |  |
| Romania  | 7     | 18    | 7     | 2     | 26    | 5     | 24    | 27    | 28    | 2     |  |  |  |
| United Kingdom   | 12    | 5     | 6     | 1     | 2     | 14    | 13    | 7     | 13    | 11    |  |  |  |
| Slovak republic  | 25    | 23    | 2     | 20    | 21    | 7     | 14    | 21    | 12    | 10    |  |  |  |
| Czech republic   | 18    | 9     | 28    | 19    | 12    | 12    | 7     | 16    | 4     | 1     |  |  |  |
| Slovenia   | 23    | 22    | 10    | 21    | 15    | 13    | 6     | 12    | 3     | 9     |  |  |  |
| Sweden   | 2     | 1     | 3     | 8     | 8     | 28    | 1     | 3     | 1     | 3     |  |  |  |

Note: Cat. A Macroeconomic Performance, Cat. B Employment, Cat. C Productivity and Labour Costs, Cat. D Market Operations, Cat. E Institutional and Regulatory Framework, Cat. F Entrepreneurship, Cat. G Education and Training, Cat. H Knowledge Economy, Cat. I Social Cohesion, Cat. J Environment.

Over the recent years, Luxembourg has improved its performance in the Education and Training (from 23 to 11) and Social Cohesion (from 13 to 8) categories, whereas the performance in the Environment category has remained poor through the years. In the Employment category, Luxembourg's ranking has deteriorated between 2004 and 2008 before recovering thereafter. Although the performance of some indicators in this category was worse compared to 2000 (for example the unemployment rate of young people has increased from 6.6% in 2000 to 17.4% in 2013), other countries show even worse results.

Luxembourg's rankings in the Macroeconomic Performances and Knowledge Economy categories were fairly stable between 2000 and 2013.

The Productivity and Labour Costs category is very volatile as the indicators depend heavily on economic conditions. So the indicators will regularly be revised and may thus provoke later changes in the ranking: therefore Luxembourg's 12th position in this category in 2013 needs to be interpreted with caution.

| Table 18         Ranking of Luxembourg by category between 2000 and 2013 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|  | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Macroeconomic<br>Performance   | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| Employment   | 13   | 14   | 13   | 15   | 17   | 16   | 17   | 17   | 19   | 11   | 9    | 11   | 11   | 12   |
| Productivity and<br>Labour Costs il                                      | 4    | 25   | 8    | 18   | 10   | 7    | 12   | 3    | 26   | 20   | 13   | 24   | 25   | 12   |
| Market Operations  | 16   | 13   | 13   | 13   | 10   | 15   | 12   | 16   | 16   | 10   | 11   | 10   | 14   | 14   |
| Institutional and<br>Regulatory<br>Framework                             | 6    | 6    | 3    | 3    | 3    | 3    | 5    | 4    | 4    | 3    | 3    | 2    | 2    | 3    |
| Entrepreneurship   | 14   | 17   | 23   | 19   | 18   | 22   | 21   | 26   | 23   | 20   | 19   | 18   | 18   | 18   |
| Education and<br>Training n  | 23   | 24   | 23   | 24   | 22   | 22   | 23   | 24   | 23   | 14   | 12   | 11   | 13   | 11   |
| Knowledge Economy  | 7    | 9    | 8    | 8    | 6    | 6    | 6    | 6    | 6    | 6    | 7    | 6    | 8    | 8    |
| Social Cohesion  | 6    | 13   | 11   | 11   | 8    | 10   | 11   | 9    | 6    | 10   | 5    | 5    | 5    | 8    |
| Environment  | 24   | 20   | 14   | 22   | 28   | 28   | 28   | 27   | 27   | 27   | 28   | 27   | 27   | 26   |

Source: Observatoire de la compétitivité

## 3.3.3 The composite indicator stress test

The *Observatoire de la compétitivité* has undertaken a stress test of its composite indicator. The test consists in excluding one by one the 77 indicators and recalculating the ranking. Other scenarios include not imputing missing values or not treating outliers. This gives 84 different scenarios.

The following table shows that Luxembourg takes 6th position in 96.4% of cases, 7th position in 2.4% and 8th in 1.2%. Luxembourg varies thus essentially in a range [6,8].

| Table 19<br>The 2013 stress test | able 19<br>he 2013 stress test, as a % |  |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----------------------------------|--|--|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Country                          | Main scenario                          | Average of 84<br>alternative scenarios | 1   | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Sweden                           | 1                                      | 1,0                                    | 100 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Denmark                          | 2                                      | 2,1                                    |     | 94 | 6  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Netherlands                      | 3                                      | 2,9                                    |     | 6  | 94 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| United Kingdom                   | 4                                      | 4,0                                    |     |    |    | 97 | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Finland                          | 5                                      | 5,0                                    |     |    |    | 2  | 97 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Luxembourg                       | 6                                      | 6,0                                    |     |    |    |    |    | 96 | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| France                           | 7                                      | 7,5                                    |     |    |    |    |    | 1  | 66 | 21 | 4  | 3  | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Austria                          | 8                                      | 7,8                                    |     |    |    |    |    | 2  | 20 | 67 | 9  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Germany                          | 9                                      | 9,0                                    |     |    |    |    |    |    | 3  | 8  | 67 | 20 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Latvia                           | 10                                     | 9,9                                    |     |    |    |    |    |    | 4  |    | 15 | 69 | 4  | 4  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Czech republic                   | 11                                     | 11,1                                   |     |    |    |    |    |    | 2  | 1  | 2  | 7  | 63 | 16 | 7  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Lithuania                        | 12                                     | 12,6                                   |     |    |    |    |    |    |    |    |    |    | 13 | 34 | 38 | 11 | 1  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |
| Slovenia                         | 13                                     | 12,6                                   |     |    |    |    |    |    |    |    |    |    | 10 | 33 | 45 | 10 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Estonia                          | 14                                     | 13,5                                   |     |    |    |    |    |    |    |    |    |    | 6  | 10 | 8  | 75 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Belgium                          | 15                                     | 15,4                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    | 72 | 21 | 3  | 2  |    |    |    |    |    |    |    |    |    |    |
| Slovak republic                  | 16                                     | 16,4                                   |     |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 13 | 36 | 39 | 6  | 2  |    |    |    |    |    |    |    |    |    |
| Romania                          | 17                                     | 16,7                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    | 11 | 33 | 36 | 4  | 13 |    |    |    |    |    |    |    |    |    |
| Poland                           | 18                                     | 17,8                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 2  | 14 | 77 | 4  |    |    |    |    |    |    |    |    |    |
| Ireland                          | 19                                     | 18,6                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 4  | 6  | 9  | 79 |    |    |    |    |    |    |    |    |    |
| Italy                            | 20                                     | 20,0                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 10 |    |    |    |    |    |    |    |    |
| Bulgaria                         | 21                                     | 21,3                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 79 | 13 | 4  | 1  | 1  |    |    |    |
| Portugal                         | 22                                     | 22,1                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 11 | 70 | 14 | 2  | 1  |    |    |    |
| Spain                            | 23                                     | 23,2                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 9  | 64 | 14 | 10 |    |    |    |
| Croatia                          | 24                                     | 24,5                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 9  | 5  | 25 | 9  | 2  | 2  |
| Malta                            | 25                                     | 24,4                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 7  | 6  | 2  | 22 | 48 | 13 |    |    |
| Hungary                          | 26                                     | 25,5                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 4  | 9  | 13 | 71 | 1  |    |
| Cyprus                           | 27                                     | 27,0                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 1  | 95 | 3  |
| Greece                           | 28                                     | 27,9                                   |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 4  | 1  | 94 |

Source: Observatoire de la compétitivité

## 3.3.4 Evolution of the final position of Luxembourg in the Competitiveness Scoreboard over time

The Competitiveness Scoreboard ranking is not fixed over time. In fact, the data are reviewed regularly by the various organizations that serve as major sources, such as Eurostat, OECD and the World Bank. In particular, national accounts are regularly updated, which has a significant influence on some of the indicators. Another factor is the non-availability of certain data when publishing the Competitiveness Report: part of the data, especially for the Social Cohesion and Environment categories, are published with some delay, and other data are only issued every two years (e.g. several indicators of the Market Operations category).

These factors explain the 2012 ranking does not remain fixed. Once all the data is available, the final ranking can change more or less dramatically. The following table shows the ranking variation of Luxembourg over time, depending on the publication of the Competitiveness Report:

| Table 20         Evolution of the position of Luxembourg in the Competitiveness Scoreboard over time |          |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|  | 2000     | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Competitiveness Report 2007  | 2        | 7    | 7    | 8    | 6    | 5    | 5    |      |      |      |      |      |      |      |
| Competitiveness Report 2008  | 5        | 7    | 5    | 8    | 6    | 7    | 6    | 9    |      |      |      |      |      |      |
| Competitiveness Report 2009  | 7        | 9    | 9    | 9    | 7    | 8    | 8    | 10   | 13   |      |      |      |      |      |
| Competitiveness Report 2010  | 6        | 11   | 9    | 9    | 8    | 6    | 8    | 9    | 11   | 9    |      |      |      |      |
| Competitiveness Report 2011  | 8        | 11   | 9    | 10   | 6    | 6    | 9    | 8    | 10   | 9    | 10   |      |      |      |
| Competitiveness Report 2012  | 6        | 10   | 10   | 9    | 6    | 6    | 11   | 9    | 9    | 6    | 8    | 11   |      |      |
| Competitiveness Report 2013  | 7        | 10   | 8    | 9    | 6    | 6    | 11   | 9    | 9    | 8    | 8    | 9    | 13   |      |
| Competitiveness Report 2014  | 6        | 9    | 7    | 7    | 6    | 7    | 11   | 9    | 10   | 8    | 6    | 10   | 13   | 6    |
| Source: Observatoire de la compé   | titivitó |      |      |      |      |      |      |      |      |      |      |      |      |      |

In the 2012 Competitiveness Report, Luxembourg was ranked 11th for the year 2011, and after reviewing several indicators and receiving other data not yet available at the time of its release, Luxembourg gained two positions. The composite indicator stress test published in the 2012 edition showed that "Luxembourg is ranked 9th in 1% of cases, 10th in 32% of cases, 11th in 66% of cases and 12th in 1% of cases. Luxembourg varies thus essentially in a range [10, 11]."<sup>13</sup>

<sup>13</sup> 2012 Competitiveness Report, page 91. In general, we can say that changes in Luxembourg's position were small in the latest editions of the Competitiveness Report. Other countries, especially non-OECD countries, vary more, as part of the data is not available, and a revision of the indicators has a greater effect on the final score. Finally, it should be noted this is a relative ranking and Luxembourg's position depends not only on its own performance but also on the performance of other countries.

In 2010 the *Observatoire de la compétitivité* had commissioned an audit with the Joint Research Centre (JRC)<sup>14</sup> of the European Commission<sup>15</sup>. This JRC is the centre of excellence in quantitative analysis that has collaborated, among other things, in drafting the OECD manual on the construction of mathematical indicators. This audit was performed in order to carry out a thorough statistical analysis and a critical assessment of the Scoreboard and of the competitiveness composite indicator while providing suggestions for possible improvements. Following the recommendations of the external audit, the *Observatoire de la compétitivité* took into account some changes in the imputation of missing values, the processing of outliers and of strongly correlated indicators<sup>16</sup>. These recommendations have been implemented since the 2010 Competitiveness Report.

In general, the external audit by Michaela Saisana was very positive about the *Observatoire de la compétitivité*'s Competitiveness Scoreboard composite indicator. She emphasized the transparency in the calculation of the indicator and the precise definition of competitiveness, the phenomenon to be measured. The indicator also does not simply reflect the size of the country. Indeed, the result of the composite indicator is not correlated with a country's population or the gross domestic product (GDP). A simple correlation with GDP would portray the competitiveness of Luxembourg as simply productivity, but for the *Observatoire de la compétitivité* the competitiveness definition of the ESC prevails and is much broader.

The *Observatoire de la compétitivité* has always advocated an analysis on multiple levels, i.e. not simply establishing a mere country ranking. On the contrary, a detailed analysis of indicators is essential, as it was done in this chapter.

- <sup>14</sup> For more information: http://composite-indicators. jrc.ec.europa.eu/
- <sup>15</sup> Perspectives de politique économique N°15 : The Luxembourg Competitiveness Index: Analysis & Recommendations: http://www.odc.public.lu/ publications/perspectives/ PPE\_015.pdf
- Details of the changes are explained in point 3.4 of the 2010 Competitiveness report.

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## 3.4 Competitiveness Scoreboard 2.0

Since the production of the Competitiveness Scoreboard many other scoreboards have been created along the way. The Scoreboard PIBienêtre, sustainable development, the macroeconomic imbalance procedure as well as the indicators of the EU 2020 strategy. During the revision of the Scoreboard, it is important to bring the Competitiveness Scoreboard in line with those other scoreboards (EU 2020, PIBien-être, MIP) and to refocus on competitiveness. However each scoreboard needs to have the same level of importance. Each strategy is supposed to unite a whole series of public policies in order to make the objectives of economic growth and protection of the environment compatible. The sustainability of public finances in the long term is a section that is not yet developed enough in Luxembourg.



In the preface of the 2013 Competitiveness Report, the Minister of Economy and Foreign Trade, Mr Étienne SCHNEIDER, expressed the following wish: "...In order to ensure better operational and integrated monitoring of this competitiveness, I suggest to introduce a new system of indicators at the national level, based on the European Union's macroeconomic imbalances' procedure scoreboard, called "MIP". This new system should allow us to better detect any significant internal and external deterioration in our competitiveness. But I also want this new system of indicators to be further enriched by the ongoing discussions in the Economic and Social Council and in the Higher Council for Sustainable Development within a long-term perspective of the PIBien-être project and, after consulting the Tripartite Coordination Committee, I hope this new system will be enshrined in a new 'Law on competitiveness'. This law would replace the set of obsolete indicators mentioned in the Grand-Ducal Regulation of 4 April 1985 adopted in application of the amended law of 24 December 1977, that is to say, the law establishing the Tripartite Coordination Committee."

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In order to meet this demand, the Economic and social Council has established a working committee with the objective to revise the Scoreboard together with STATEC and the *Observatoire de la compétitivité*.

This revision should first make a thorough review and an analysis of the current state before settling on the objectives and purpose of indicators, proceed in stages and consider above all which indicators are still relevant and available, while keeping statistical quality in mind. Then, a structure that best reflects all aspects of competitiveness needs to be determined. Tin the current Scoreboard there are 10 categories.

Finally, for the education and entrepreneurship indicators, national experts need to be consulted in order to find indicators that best reflect the situation in Luxembourg. For example, the expenditure in education does not give any information on its efficiency, and entrepreneurship is not described sufficiently by the single indicator on the ratio of number of freelancers to the working population.

## 4 Luxembourg in the European semester

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This chapter is monitoring Luxembourg's indicators and targets within the framework of the European Union strategy for growth and jobs (Europe 2020 strategy) and the macroeconomic imbalance procedure (MIP)<sup>1</sup>. These two pillars of the new European economic governance were implemented by the REGULATION (EU) N° 1175/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 November 2011 amending Council Regulation (EC) n° 1466/97 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies<sup>2</sup>. Recitals of this regulation refer to interdependent policies on European economic governance "(9) The improved economic governance framework should rely on several interlinked policies (...), in particular a Union strategy for growth and jobs, (...) an effective framework for preventing and correcting excessive government deficits (the SGP), a robust framework for preventing and correcting macroeconomic imbalances (...)".

## 4.1 The new European economic governance

Since the European ten-year strategy for growth and jobs, called Lisbon strategy, expired in 2010, the European Council had set up in 2010 the foundations of new European economic governance. Since 2011 it is part of the "European semester", in an integrated and parallel way, according three pillars: 1) the thematic coordination of structural policies (Europe 2020 strategy); 2) the surveillance of macroeconomic imbalances procedure (MIP); 3) the coordination of budgetary policies (Stability and Growth Pact).

EU Member States must agree each year on a series of concrete actions to be implemented within a period of twelve months. These commitments are reflected in the National Reform Programmes (NRPs) developed as part of the Europe 2020 strategy and in the Stability programmes developed under the SGP, which Member States are required to submit each year during the European Semester. In January 2014, following the publication by the Commission of its annual growth survey, the priorities of which have been validated by the European Council in March 2014, the fourth European Semester was launched. Then, in April 2014, Luxembourg sent its NRP and SGP to the European Commission<sup>3</sup>. Based on these two documents, the Commission published its proposals for the 2014-2015 recommendations for each EU Member State by the end of May.

- However, the analysis of the situation of Luxembourg in the coordination of budgetary policies (SGP) is not the subject of this section. With regards to the economic policy measures implemented by Luxembourg to achieve the objectives of the Europe 2020 strategy, reference is made to the 2014 NRP, submitted in April 2014 by the government to the European Commission within the framework of the 2014 European Semester.
- For additional details: http://eur-lex.europa.eu/Lex-UriServ/LexUriServ.do?uri=OJ: L:2011:306:0012:0024:FR:PDF
- GOVERNMENT OF GRAND-DUCHY OF LUXEMBOURG, Programme national de réforme Luxembourg 2020, Luxembourg, April 2014. For additional details: http:// www.odc.public.lu/actualites/2013/04/PNR\_Luxembourg\_2020/index.html

#### Chart 1

#### Excerpts from the calendar of the "European Semester" and the "National Semester" in Luxembourg

|  |                                  | European Sem   | ester   |   |   |  |  |
|--|----------------------------------|--|---|---|---|--|--|
|  | Nov. t-1                         | January  | February  | March   | April   | May  | June   |
| European<br>Commission                             | Annual<br>Growth<br>Survey       |  |   |   |   | Proposals for<br>country-<br>specific<br>recommenda-<br>tions (CSR)) |  |
| Council of<br>Ministers and<br>European<br>Council |                                  |  | Discussions in<br>Ministers and S<br>European Cour<br>guidelines and  | the Council of<br>Spring<br>ncil's<br>priorities  |   |  | Discussions on<br>proposals and<br>approval of<br>CSRs by the<br>European<br>Council   |
| Government   |                                  | Macroeconomi<br>(STATEC)<br>Europe 2020 (N<br>network and Fo<br>coordination | c forecast<br>Government re<br>and integratior<br>multiannual ex<br>project for pub<br>and other publ<br>IRP) interdepart<br>precasting Com | evenue analysis<br>o of the draft<br>ependiture<br>lic investment<br>ic expenditures<br>tmental<br>mittee (SGP) | Government<br>meeting and<br>"State of the<br>Nation" address<br>NRPs and SGPs<br>(t+3) submission<br>(by 30/04 at the<br>latest) |  | Coordination of<br>discussions on<br>the CSRs<br>proposals in the<br>various<br>committees in<br>Brussels<br>[Economic<br>Policy<br>Committee,<br>etc.]. |
| Chamber of<br>Deputies                             |                                  | Consultation w<br>through the Ec<br>Commission (N                            | ith the Chamber<br>onomy, Foreign<br>IRP) and the Fin   | r of Deputies abo<br>Trade and Solida<br>ance and Budge   | out the NRP/SGP<br>arity Economy<br>t Committee (SGP)   |  | Debate in the<br>Chamber of<br>Deputies on<br>CSR proposals  |
| Social<br>partners and<br>civil society            | Consultation w<br>thematic semir | ith the social pa<br>hars, interviews  | rtners (e.g. Eco<br>, etc.  | nomic and Socia   | l Council) and civil s  | society through  |  |

|  | National Semester  |       |  |   |   |  |  |  |  |
|--|--|-------|--|---|---|--|--|--|--|
|  | July   | Sept. | Oct.   | Nov.                                    | Dec.  |  |  |  |  |
| European<br>Commission                       |  |       | Publication of an opin<br>annual budget of the                       | iion on the t +1 draft<br>Member States |   |  |  |  |  |
| Council of Ministers<br>and European Council | Adoption of CSRs<br>by the Council<br>of Ministers   |       |  |   |   |  |  |  |  |
|  | CSRs implementation, especially through the bill on State's revenue and expenditure budget for the year t +1                           |       |  |   |   |  |  |  |  |
| Government                                   |  |       | Draft annual budget<br>t+1 submission<br>(by 15/10 at the<br>latest) |   | Annual budget t +1<br>vote<br>(by 31/12 at the<br>latest) |  |  |  |  |
| Chamber of Deputies                          | Discussions in the context of the vote on the bill on State's revenue and expenditure budget for the year t +1                         |       |  |   |   |  |  |  |  |
| Social partners and civil society            | Consultation with the social partners (e.g. Economic and Social Council) and civil society through thematic seminars, interviews, etc. |       |  |   |   |  |  |  |  |

| Thema  | Thematic distribution of proposals for country-specific recommendations (2014-2015) |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
|--|---|-----------------------------------|---------------------|------------------|-------------------------------|-------------------|-----------------------|----------------------------------|---|------------------------|---|--------------------------------|--------------------------------|----------------------------|------------------------------|------------------------|------------------------------|
|  |   |                                   | fir                 | Public<br>nances | Fir                           | ancial<br>sector  |                       |                                  |   | Stru<br>re             | tructural Employment a reforms social polic |                                | Employ<br>socia                |                            | ent and<br>olicies           |                        |                              |
|  | Sound public<br>finances  | Pension and<br>healthcare systems | Fiscal<br>framework | Taxation         | Banking and access to finance | Housing<br>market | Network<br>industries | Competition in<br>service sector | Public administration<br>and smart regulation | R&D and i<br>nnovation | Ressource<br>efficiency                     | Labour market<br>participation | Active labour<br>market policy | Wage setting<br>mechanisms | Labor market<br>segmentation | Education and training | Poverty and social inclusion |
| AT   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| BE   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| BG   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| CZ   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| DE   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| DK   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| EE   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| ES   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| FI   | _   | _                                 |                     | _                |                               |                   |                       | _                                | _   |                        |   |                                |                                |                            |                              |                        |                              |
| FR   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   | _                              |                                |                            |                              |                        |                              |
| HR   |   | _                                 |                     |                  |                               |                   |                       | _                                |   |                        | _   | _                              |                                |                            |                              |                        | _                            |
| HU   | _   | _                                 |                     | _                | _                             |                   |                       | _                                | _   |                        |   | _                              |                                |                            |                              |                        | _                            |
| IE   |   |                                   |                     |                  |                               |                   | _                     |                                  |   |                        |   |                                |                                | _                          | _                            |                        |                              |
| IT   |   | _                                 |                     |                  |                               |                   |                       |                                  |   |                        | _   |                                |                                |                            |                              |                        |                              |
| LI   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| LU   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| LV   |   |                                   |                     |                  | _                             |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
|  | -   | -                                 |                     | -                |                               | -                 |                       |                                  | _   |                        |   | _                              |                                |                            |                              |                        |                              |
|  |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| PL<br>DT   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| PO   | -   |                                   |                     |                  |                               |                   |                       |                                  | -   |                        |   | _                              |                                |                            |                              |                        | -                            |
| SE   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| SL   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| SK   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| UK   |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |
| Note: Country-specific recommendations for 2014-2015 proposed by the Commission on 2 June 2014. Cyprus and Greece should |   |                                   |                     |                  |                               |                   |                       |                                  |   |                        |   |                                |                                |                            |                              |                        |                              |

## Table 1 Thematic distribution of proposals for country-specific recommendations (2014-2015)

Note: Country-specific recommendations for 2014-2015 proposed by the Commission on 2 June 2014. Cyprus and Greece should implement commitments under EU/IMF financial assistance programmes. Recommendations for Portugal are conditioned by exit from the programme. More information at: http://ec.europa.eu/europe2020/index\_en.htm Source: European Commission (June 2014)

On the basis of the proposals, discussions and negotiations in the different Committees and the formations of the Council of Ministers in Brussels based on that ones, the Council finally adopted in July 2014 the latest version of the legal document with the new recommendations. This ended the 2014 European Semester and launched the "National Semester" in the Member States, which now need to ensure that these recommendations are implemented within the context of their budgetary discussions. Since 2013 Member States have to submit their draft annual budget plan for the following year to the Commission by mid-October at the latest<sup>4</sup>. This standardised report should include information on how country-specific recommendations are integrated in national budget debates.

> For example, see the Luxembourg 2013 Draft Budget Plan: http://www.mf.public.lu/ publications/projet\_budget/ plan\_budget\_151013.pdf

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In comparison with the recommendations of the previous year and with the reforms implemented since then by Luxembourg within the context of its NRP, it is noteworthy that in 2014 the Council requested Luxembourg to strengthen the implemented reforms (particularly for the pension issue, wage-setting, etc.). During the next European semester (2015), the Commission will assess how Luxembourg implemented the 2014-2015 recommendations it was assigned in July 2014.

#### Table 2

## Country-specific recommendations made for Luxembourg by the Council during the 2011, 2012, 2013 and 2014 European Semesters

| 2011 European Semester for 2011-2012 <sup>5</sup>   | 2012 European Semester for 2012-2013 <sup>6</sup>  | 2013 European Semester for 2013-2014 <sup>7</sup>  | 2014 European Semester for<br>2014-2015 <sup>8</sup>  |
|---|--|--|---|
| To take advantage of the<br>improving cyclical conditions,<br>to strengthen the fiscal effort<br>and to use unexpected additional<br>revenue in order to further<br>reduce the headline deficit and<br>reach the medium-term<br>objective in 2012   | To preserve a sound fiscal<br>position by correcting any<br>departure from a MTO that<br>ensures the long-term<br>sustainability of public finances,<br>in particular taking into account<br>implicit liabilities related to<br>ageing; to this end, to reinforce<br>and rigorously implement the<br>budgetary strategy, supported<br>by sufficiently specified<br>measures, for the year 2013<br>and beyond, including meeting<br>the expenditure benchmark | Preserve a sound fiscal position<br>and to remain at the medium-<br>term objective so as to ensure<br>the long-term sustainability<br>of public finances, in particular<br>by taking into account implicit<br>liabilities related to ageing. To<br>strengthen fiscal governance<br>by adopting a medium-term<br>budgetary framework covering<br>the general government and<br>including multi-annual<br>expenditure ceilings, and by<br>putting in place the independent<br>monitoring of fiscal rules | To preserve a sound fiscal position<br>in 2014; significantly strengthen the<br>budgetary strategy in 2015 to ensure<br>that the medium-term objective is<br>achieved and remain at the medium-<br>term objective thereafter, in order to<br>protect the long-term sustainability<br>of public finances, in particular by<br>taking into account implicit liabilities<br>related to ageing. Strengthen fiscal<br>governance by speeding up the<br>adoption of a medium-term<br>budgetary framework covering the<br>general government and including<br>multi-annual expenditure ceilings,<br>and by putting into place the<br>independent monitoring of fiscal<br>rules. Further broaden the tax base,<br>in particular on consumption. |
| To propose and implement a<br>broad pension reform to ensure<br>the long-term sustainability of<br>the pension system, starting<br>with measures that will increase<br>the participation rate of older<br>workers, in particular by<br>discouraging early retirement.<br>With a view to raising the<br>effective retirement age,<br>measures such as a link<br>between the statutory<br>retirement age and life<br>expectancy, could be considered; | To strengthen the proposed<br>pension reform by taking<br>additional measures to increase<br>the participation rate of older<br>workers, in particular by<br>preventing early retirement,<br>and by taking further steps to<br>increase the effective retirement<br>age, including through linking<br>the statutory age to life<br>expectancy, in order to ensure<br>the long-term sustainability of<br>the pension system                                   | To curb age-related expenditure<br>by making long-term care more<br>cost effective, in particular<br>through a stronger focus on<br>prevention, rehabilitation and<br>independent living, strength-<br>ening the recently adopted<br>pension reform, taking<br>additional measures to curb<br>early retirement and increasing<br>the effective retirement age,<br>including by linking the statutory<br>retirement age to life<br>expectancy.  | In view of ensuring fiscal sustain-<br>ability, to curb age-related<br>expenditure by making long-term<br>care more cost-effective, pursue<br>the pension reform so as to increase<br>the effective retirement age,<br>including by limiting early<br>retirement, by aligning retirement<br>age or pension benefits to change<br>in life expectancy. Reinforce efforts<br>to increase the participation rate<br>of older workers, including by<br>improving their employability<br>through lifelong learning.   |

Continuing on next page

- <sup>5</sup> For additional details: http://register.consilium.europa.eu/pdf/fr/11/st11/st11321re02.fr11.pdf
- <sup>6</sup> For additional details: http://register.consilium. europa.eu/pdf/fr/12/st11/ st11263.fr12.pdf
- <sup>7</sup> For additional details: http://register.consilium. europa.eu/pdf/en/13/st10/ st10644-re01.en13.pdf
- <sup>8</sup> For additional details: http://register.consilium. europa.eu/doc/srv?l= EN&f=ST%2010795%20 2014%20REV%201

| Table 2   |
|-----------|
| Continued |

| To take steps to reform, in<br>consultation with social partners<br>and in accordance with national<br>practices, the system of wage<br>bargaining and wage indexation,<br>to ensure that wage growth<br>better reflects developments in<br>labour productivity and<br>competitiveness; | To take further steps to reform,<br>in consultation with the social<br>partners and in accordance with<br>national practice, the wage<br>bargaining and wage indexation<br>system, with a view to preserve<br>the competitiveness of the<br>Luxembourg economy in the<br>longer term, as a first step<br>by maintaining the current<br>one-year indexation interval<br>beyond 2014 and by reducing<br>the impact of energy and other<br>volatile items on the reference<br>index | Beyond the current freeze,<br>to take further structural<br>measures, in consultation<br>with the social partners and<br>in accordance with national<br>practices, to reform the wage<br>setting system, including wage<br>indexation, to improve its<br>responsiveness to productivity<br>and sectorial developments<br>and labour market conditions<br>and to foster competitiveness;<br>to set up efforts to diversify<br>the structure of the economy,<br>fostering private investment<br>in research, and notably by<br>developing cooperation between<br>public research and firms | To speed up the adoption of<br>structural measures, in consultation<br>with the social partners and in<br>accordance with national practices,<br>to reform the wage setting system<br>including wage indexation with a<br>view to improving the responsive-<br>ness of wages to productivity<br>developments, in particular at<br>sectoral level. Pursue the<br>diversification of the structure of<br>the economy, including by fostering<br>private investment in research and<br>further developing cooperation<br>between public research and firms. |
|---|--|--|--|
| To take steps to reduce youth<br>unemployment by reinforcing<br>training and education<br>measures aimed at better<br>matching young people's<br>qualifications to labour demand.   | To continue efforts to reduce<br>youth unemployment by<br>reinforcing stakeholders'<br>involvement, and by strength-<br>ening training and education<br>measures, in particular for<br>those with low education level,<br>with the aim of better matching<br>young people's skills and<br>qualifications to labour demand  | To set up efforts to reduce youth<br>unemployment by improving the<br>design and monitoring of active<br>labour market policies; to<br>strengthen general and<br>vocational education to better<br>match young people's skills of<br>with labour demand, in<br>particular for people with<br>migrant background; to take<br>resolute action to increase the<br>participation rate of older<br>workers, including by improving<br>their employability through<br>lifelong learning  | To pursue efforts to reduce youth<br>unemployment for low-skilled jobs<br>seekers, including those with a<br>migrant background, through a<br>coherent strategy, including by<br>further improving the design and<br>monitoring of active labour market<br>policies, addressing skills<br>mismatches, and reducing financial<br>disincentives to work. To that effect,<br>accelerate the implementation of<br>the reform of general and vocational<br>education and training to better<br>match young people's skills with<br>labour demand.             |
| /   | To ensure that the targets for<br>reducing greenhouse gas<br>emissions from non-ETS<br>(Emissions Trading System)<br>activities will be met, in<br>particular by increasing taxation<br>on energy products   | To set up measures to meet the<br>target for reducing non-ETS<br>greenhouse gas emissions, in<br>particular by increasing taxation<br>on energy products for transport   | To develop a comprehensive<br>framework and take concrete<br>measures to meet the 2020 target<br>for reducing greenhouse gas<br>emissions from non-ETS activities,<br>especially through the taxation of<br>energy products for transports.  |
| /   | /  | To take measures to address the<br>debt-bias in corporate taxation<br>and to extend the application of<br>the standard VAT rate  | /  |

Source: EU Council (July 2011, July 2012, July 2013, July 2014) Note: The chronological sequence does not match the numbering of legal documents but has been adapted to facilitate monitoring over time.

Since the launch of the European Semester in 2011, the progress of the EU Member States in implementing country-specific recommendations is uneven. The qualitative analysis of the reforms of each Member State is the key component of the Commission's assessment, particularly because of the national specificities of each Member State. Nevertheless, the European Commission published in autumn 2014 a global qualitative assessment<sup>9</sup> of the implementation of the 2012 and 2013 country-specific recommendation in order to gain an overview of the implementation. Based on this analysis, a composite indicator has been calculated, enabling the assessment of the current state. According to this indicator, the global implementation of the 2013 country-specific recommendation is approximately at 40% ("some progress"). This is higher than what critics of the European Semester process have argued, but it also shows that a more stringent implementation is necessary to enable the EU to face its challenges.



Source: European Commission Semester SWDs 2013 and 2014 Note: Bars show the synthetic indicator of CSR implementation per Member State on the basis of equal weights for each CSR per country. The dotted line [EU average] is based on equal weights for each CSR regardless of the country to which it was addressed; thus, countries with a larger number of CSRs have greater weight in the EU average than countries with fewer CSRs. Member States in a macroeconomic adjustment programme linked to EU financial asistance do not receive CSRs and therefore neither appear in the chart nor feature in the EU average.

The European Commission considers that Luxembourg figures among those Member States where implementation of recommendations is the weakest and therefore ranks bottom for this composite indicator ("*limited progress*").

> For additional details: http://ec.europa.eu/economy\_ finance/publications/economic\_briefs/2014/pdf/eb37\_en.pdf

From 2013 onwards the European Semester formally spreads over the second semester for euro area members, since two new European regulations (called "Two Pack") have entered into force in May. They further strengthen the budgetary surveillance and transparency in relation to the SGP and the four regulations already included in the legislative package passed in 2011 ("Six Pack")<sup>10</sup>. These two new regulations introduce in particular a common budgetary calendar. Each Member State shall submit annually by 30 April its medium-term budget planning (t+3), by 15 October its draft annual budget (t+1) and by 31 December the final approved budget. A major innovation of the *Two pack* is that the European Commission may now examine the draft annual budget goes against the broad medium-term SGP guidelines, it may request the Member State to revise its draft annual budget.

## 4.2 Thematic coordination of structural policies

## 4.2.1 Implementation of thematic coordination under the Europe 2020 strategy

The Europe 2020 strategy<sup>11</sup>, which is a central element of the EU's response to the global economic crisis, has been designed to update and replace the Lisbon strategy<sup>12</sup> that was launched in March 2000 and renewed in 2005 as a European strategy for growth and jobs. This new strategy involves closer coordination of economic policies and focuses on the key areas where action must be taken to boost the potential of sustainable and inclusive growth and competitiveness in Europe. It was considered that the end of the crisis should be the entry point into a social market economy, a greener and smarter economy, in which prosperity will be the result of the capacity to innovate and of a better use of resources, and where knowledge will be a key element. In early 2010, the Commission made proposals to implement this new Europe 2020 strategy<sup>13</sup>. In March 2010, on the basis of a communication from the Commission, the European Council discussed and approved the strategy's main elements, including key objectives which will guide its implementation, as well as provisions to improve monitoring. The European Council agreed on a series of elements<sup>14</sup>. The June European Council<sup>15</sup> finally completed the development of the new Europe 2020 strategy. The European Council confirmed in particular five major EU objectives, which are shared objectives guiding the action of Member States and of the EU in terms of promoting employment, improving the conditions for innovation and R&D, achieving the objectives in the field of climate change and energy, improving education levels and promoting social inclusion, in particular by reducing poverty:

- For additional details: http:// ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item\_ id=6662&tpa=0&tk=&lang=fr
- For additional information: http://ec.europa.eu/eu2020/ index fr.htm
- <sup>12</sup> For additional information: http://ec.europa.eu/archives/ growthandjobs\_2009/
- <sup>13</sup> EUROPEAN COMMISSION, EUROPE 2020 - A strategy for smart, sustainable and inclusive growth, COM(2010) 2020, Brussels, 3.3.2010
- <sup>14</sup> EUROPEAN COUNCIL, Conclusions, Brussels, March 2010. For additional information: http://www.consilium.europa. eu/uedocs/cms\_data/docs/ pressdata/fr/ec/113602.pdf
- <sup>15</sup> EUROPEAN COUNCIL, Conclusions, Brussels, June 2010. For additional information: http://www.consilium.europa. eu/uedocs/cms\_data/docs/ pressdata/fr/ec/115348.pdf

- Aiming to raise to 75% the employment rate for women and men aged 20-64, including through the greater participation of young people, older workers and low-skilled workers and the better integration of legal migrants;
- improving the conditions for research and development, in particular with the aim of raising combined public and private investment levels in this sector to 3% of GDP; the Commission will elaborate an indicator reflecting R&D and innovation intensity;
- reducing greenhouse gas emissions by 20% compared to 1990 levels; increasing the share of renewables in final energy consumption to 20%; and moving towards a 20% increase in energy efficiency; the EU is committed to taking a decision to move to a 30% reduction by 2020 compared to 1990 levels as its conditional offer with a view to a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities;
- improving education levels, in particular by aiming to reduce school dropout rates to less than 10% and by increasing the share of 30-34 years old having completed tertiary or equivalent education to at least 40%;
- promoting social inclusion, in particular through the reduction of poverty, by aiming to lift at least 20 million people out of the risk of poverty and exclusion. The population is defined as the number of persons who are at risk-of-poverty and exclusion according to three indicators (at-risk-of poverty; material deprivation; jobless household), leaving Member States free to set their national targets on the basis of the most appropriate indicators.

| Chart 3 Priorities and objectives of the Europe 2020 strategy |  |   |  |  |  |  |
|---|--|---|--|--|--|--|
|   | Targets  | Flagship initiatives  |  |  |  |  |
| Smart<br>Growth   | <ul> <li>- 3% of GDP to be invested in the research<br/>and development (R&amp;D) sector.</li> <li>- Reduce the rates of early school leaving<br/>to below 10% and at least 40% of 30 to<br/>34 year olds to have completed tertiary<br/>or equivalent education.</li> </ul> | - Innovation Union<br>- Youth on the move<br>- A digital agenda for Europe  |  |  |  |  |
| Sustainable<br>Growth   | <ul> <li>Reduce greenhouse gas emissions by 20% compared to 1990 levels.</li> <li>Increase the share of renewables in final energy consumption to 20%.</li> <li>20% increase in energy efficiency.</li> </ul>  | <ul> <li>Resource efficient Europe</li> <li>An industrial policy for</li> <li>the globalisation era</li> </ul>                |  |  |  |  |
| Inclusive<br>Growth   | <ul> <li>75% of 20 to 64 year old men ans women<br/>to be employed.</li> <li>Reduce poverty by lifting at least 20 million<br/>people out of the risk of poverty and social<br/>exclusion.</li> </ul>  | <ul> <li>An agenda for new skills<br/>and jobs</li> <li>European platform against<br/>poverty and social exclusion</li> </ul> |  |  |  |  |
|   |  |   |  |  |  |  |

Source: Eurostat

## 4.2.2 Priorities, objectives and indicators

Obviously the new governance of the Europe 2020 strategy, including main European objectives and monitoring indicators, will not alone create growth, jobs and prosperity. It should nevertheless ensure that major emphasis on quantitative targets and indicators. Implementing policies without measurable goals and without monitoring indicators is not the way forward because the assessment would then be totally subjective. Despite the many limitations of the indicators (data availability, comparability, etc.) such a tool for decision support is the best way to measure the performance of policies. Past experience has shown that for a successful monitoring the system must meet certain initial conditions. It is not enough to base the monitoring mechanism only on territory rankings resulting from a list of indicators selected during painstaking negotiations and based on compromise (and which is therefore likely to please everyone); to discuss objectives and indicators only amongst experts, without ensuring an adequate involvement of the general public; to be restricted to ex-ante indicators (input) measuring the resources invested, without resorting to indicators measuring expost performance and the efficiency of the resources involved (output).

The "thematic coordination of structural policies" component of the Europe 2020 strategy is based on three priorities, five goals and ten indicators:

- Three mutually reinforcing priorities smart growth, sustainable growth and inclusive growth;
- Five major European goals to reach by 2020 to improve the conditions for R&D, to improve education levels, to reach the climate change and energy objectives, to promote employment and to reduce poverty;
- Ten indicators to measure the progress in achieving the objectives - gross domestic expenditure on R&D, early school leaving rate, proportion of higher education graduates or with an equivalent level of education, greenhouse gas emissions, share of renewable energy sources in final energy consumption, energy efficiency, employment rate for women and men aged 20-64, risk of poverty, material deprivation and jobless household.





These priorities and objectives are closely linked. For example, higher education levels improve employability and help increase the employment rate, which helps reduce poverty, and a greater R&D and innovation capacity combined with increased resource efficiency improves competitiveness and promotes job creation. Investing in cleaner and low carbon technologies improves the environment, contributes to fight against climate change and creates new business and job opportunities.



Given the diversity of EU Member States and their varying levels of development, applying the same objectives and criteria to all Member States as it had been originally done in the context of the Lisbon Agenda, has not proven to be the right approach. The major European objectives therefore no longer apply uniformly to all Member States in the context of Europe 2020. They are European objectives to be broken down into national targets, according to the initial conditions and specificities of each Member State, in dialogue with the European Commission.

| Table 3<br>National targ                     | ets set by Lu | xembourg   |   |
|--|---------------|--|---|
|  |               | European objective 2020  | Luxembourg target 2020  |
| <b>Priority 1</b><br>"smart<br>growth"       | Objective 1   | "() raising combined public and private investment levels to 3% of GDP"  | 2.3 to 2.6% interval  |
|  | Objective 2   | "() reduce the early school leaving rate to <b>less than 10%</b> "   | sustainably less than <b>10%</b> ª  |
|  |               | "() increasing the share of people aged 30-34 who<br>graduated from higher education or reached an equivalent<br>level to <b>at least 40%"</b> | <b>66%</b> <sup>b</sup>   |
| <b>Priority 2</b><br>"sustainable<br>growth" | Objective 3   | "() reducing greenhouse gas emissions by <b>20%</b> ()"  | Reducing non-ETS greenhouse gas emissions<br>by <b>-20%</b> compared to 2005 (emissions of<br>approximately <b>8.085 Mt CO</b> <sub>2</sub> in 2020) <sup>c</sup> |
|  |               | "() increasing the share of renewable energy sources<br>in final energy consumption to <b>20%</b>  | <b>11%</b> °<br>(2015/2016 average 5.45%)   |
|  |               | "() moving towards a <b>20%</b> increase in energy efficiency"   | 2016 target: <b>14.06%</b><br>2020 target: final energy consumption<br><b>49,292 GWh</b><br>(i.e. 52,111 GWh of primary energy) <sup>d</sup>                      |
| <b>Priority 3</b><br>"inclusive<br>growth"   | Objective 4   | "() raise to <b>75%</b> the employment rate for women and men aged 20-64"  | <b>73%</b><br>(71.5% for 2015)  |
|  | Objective 5   | "() lift at least <b>20 million people</b> out of the risk of poverty and exclusion."  | reduce the number of people at risk<br>of poverty or social exclusion by<br><b>6,000 people</b> by 2020   |

Sources: European Council, Eurostat

Observations: p=provisional, u=unreliable

<sup>a</sup> National data will also be used as a measuring instrument, since the indicator calculated by Eurostat, from the Labour force survey, is not fully representative for Luxembourg. Attention should be paid to producing statistics that better distinguish people who attended schools in Luxembourg, in order to measure the quality of the national education system (national resident population) and assess the ability of the Luxembourg school system to train young people.

<sup>b</sup> Luxembourg would like this indicator to provide information on the ability of the national education system to make young people able to successfully complete tertiary education, rather than it being a reflection of the skills needed within the higher education labour market. In Luxembourg there is a strong disparity by country of birth while in neighbouring countries, the differences between these two populations are much less pronounced and the proportion of graduates in these countries is higher among indigenous people than among non-indigenous people.

<sup>c</sup> For greenhouse gas emissions and renewable energy binding national targets already existed before the launch of the Europe 2020 strategy. For the 2013-2020 post-Kyoto period only non-ETS sectors are subject to targets set at Member State level. The 2020 non-ETS emissions reduction objective is compared to the level of 2005.

<sup>d</sup> The 2020 objectives are included in the 2012/27/EU directive. Pursuant to article 3, the Ministry of the Economy notified the Commission in July 2013 of its national indicative energy efficiency target in the form of an absolute level of primary energy consumption and of final energy consumption by 2020.

Each country will have to meet its own national commitments by 2020. European objectives can only be achieved if, on the one hand the sum of national targets leads to the fulfilment of European objectives and on the other hand, the first condition being fulfilled, if each Member State meets its national commitments for 2020. This type of governance therefore includes a *de facto* system of "peer pressure", which should ensure that countries that do not adequately implement their national commitments are called to order by their peers as they may cause the failure of major European objectives, and therefore also the efforts of those countries that have fulfilled their commitments.

Eurostat publishes periodically monitoring indicators for each Member State<sup>16</sup> in order to be able to annually take stock of the state and determine if performances are going in the right direction.

#### Frame 1

#### Assessment of the Europe 2020 strategy

Towards the end of 2013, Eurostat published a report<sup>17</sup> on the progress achieved in implementing the Europe 2020 strategy within the EU. Following findings were made with regard to Luxembourg: *"In 2012 Luxembourg was a top performer in terms of meeting national Europe 2020 targets on tertiary education; the country overachieved its tertiary education target by 9.6 percentage points.* 

Similarly, Luxembourg exceeded its early school leaving target ahead of time, and it was closer to its employment target than the EU average. Despite being nearer its 2020 R&D expenditure target than the EU average, the gap has widened since 2009. Much bigger efforts than the EU average are needed to reduce the gaps to the targets on renewable energies and GHG emissions."



Source: Eurostat (2013)

Early 2014 the European Commission published then a mid-term assessment<sup>18</sup> of the Europe 2020 strategy. It analysed EU performance in its whole in relation to the path compared to 2020 objectives, as well as the progress achieved by each Member State for each of the 5 major European objectives. Based on this Europe 2020 strategy report, the European Commission has learnt some preliminary lessons of the first years the strategy has been implemented.

Given these first results and in the context of a gradual recovery of the European economy, the Commission has decided to set out the strategy for the upcoming years. Thereafter, the Commission launched a public consultation<sup>19</sup> on the Europe 2020 strategy. Questions asked in this consultation aim to gather different points of view on lessons to be learnt from the first few years of the Europe 2020 strategy implementation and on elements to be taken into consideration for its future, in order to set up the EU after-crisis growth strategy.

- For additional details: http://epp.eurostat.ec.europa. eu/portal/page/portal/ europe\_2020\_indicators/ headline\_indicators The new Europe 2020 indicators will replace in the future the Lisbon structural indicators used in the Observatoire de la compétitivité's Competitiveness Scoreboard.
- <sup>17</sup> For additional details: http://epp.eurostat.ec.europa. eu/cache/ITY\_OFFPUB/ KS-02-13-238/EN/KS-02-13-238-EN.PDF
- <sup>18</sup> For additional details: http://ec.europa.eu/europe 2020/pdf/europe2020stocktaking\_en.zip
- <sup>19</sup> For additional details: http://ec.europa.eu/europe 2020/public-consultation/ index\_fr.htm

#### Frame 2 The Europe 2020 strategy assessed by the World Economic Forum (2014)

In June 2014 the World Economic Forum The WEF concludes the following regar-(WEF) published the second edition of its report on the analysis of the Europe 2020 strategy implementation within the European Union (EU)<sup>20</sup>. The Europe 2020 strategy is the ten-year strategy of the EU for implementing a smart, sustainable and inclusive growth enabling the EU to achieve a high level of employment, productivity and social cohesion. The report is based on both quantitative and qualitative data from a WEF yearly survey of economic decision-makers within the Member States. The composite indices calculated by the WEF on the basis of this information are split into three categories and seven sub-categories of indicators: smart growth: enterprise environment, ICT, innovation and R&D, education and training; sustainable growth: environment; inclusive growth: labour market, social inclusion. Within the EU, there are considerable gaps between Member States regarding the implementation of the Europe 2020 strategy. The WEF has consequently calculated a national composite index for each Member State enabling a comparison between Member States, overall, as well as by category and sub-category. The 2014 global ranking is led by Finland, Sweden and the Netherlands. In the 2014 edition, Luxembourg is at 8th position of the EU-28 (score 5.07 out of 7). Germany takes 5th place (5.28), Belgium 9th place (4.93) and France 10th place (4.81). EU-28 takes an average score of 4.56.

ding the implementation of the 2020 strategy in Luxembourg: "Luxembourg remains stable in 8th place overall, despite comparative improvements in terms of building a smarter and more inclusive economy, moving up three places to 7th and one place to 5th, respectively. The country continues to demonstrate one of the most pro-business environments in the EU (4th), with high levels of competition (2nd), low taxes (1st) and, in comparative terms to other European economies, fairly fluid access to finance (3rd). In addition, and following a strategic long-term vision to diversify its economy, Luxembourg continues to strongly develop its digital readiness (1st) and usage (8th), and strengthen its innovation system. Despite this progress, the country still suffers from relatively low levels of R&D (15th) and a shortage of scientists and engineers (19th), which is partially explained by its service-based economic structure that may rely on other sources than R&D to support and foster innovation. To continue supporting a well-performing knowledge-based economy, Luxembourg will need to address some of the persistent concerns about its educational system, both in terms of quality and quantity, to ensure a good supply of skilful labour, and to address any potential income disparities that may affect a fairly cohesive society (3rd) with effective government policies to reduce poverty and inequality (4th). More precisely, and according to the PISA results, while the quality of its educational system has improved in the past years, the country ranks 15th and continues to score below the EU average.

> <sup>20</sup> For additional details: http://reports.weforum.org/ europe-2020-competitivenessreport-2014/



The following pages will analyse the updated indicators for Luxembourg in more detail and a descriptive overview<sup>21</sup> of its performance will be presented as well as a comparison between Luxembourg and its neighbouring countries<sup>22</sup>. Reference is made to the 2013 NRP for Luxembourg for more details on the measures implemented, in order to explain the evolution of the indicators.

- On its website Eurostat provides comments regarding the quality of the statistics for the different Member States (series breaks, projections, uncertain data, etc.), which will not be repeated here.
- For more details about other EU Member States: EUROSTAT, Europe 2020 Strategy - towards a smarter, greener and more inclusive EU economy?, statistics in focus 39/2012, 21.9.2012

#### A. Smart growth

#### a.1 Improving conditions for innovation and R&D

Investment in R&D, along with human capital, is essential for the development of knowledge and new technologies. The Barcelona European Council set the spending target of 3% of GDP on R&D in March 2002. This was one of the two key objectives of the former Lisbon strategy. The logic underlying the setting of this objective was that knowledgebased economies allocated a significant portion of their resources to R&D when the Lisbon strategy was launched (e.g. in 2000 2.7% in the United States and 3% in Japan). For the Europe 2020 strategy, it was proposed that this 3% target be maintained as a symbol, to focus political attention on the importance of R&D. The evolution of this indicator will largely depend on structural factors and public policies promoting R&D.

#### Frame 3 **Capitalisation of R&D expenditure**

In order to better reflect economic reality and thanks to statistical progress achieved since the 1995 version, the new European System of Accounts (ESA 2010) makes changes for the treatment of research and development expenditure in the national accounting system. It grants it the characteristic of a fixed asset that does not disappear in the production process. In other words, the R&D expenditure of an economy are no longer accounted for as consumptions, but as a fixed capital formation (GFCF).

Participation of STATEC in Eurostat's pilot exercises has shown that the impact of this methodological change would result in an increase by 1.3% in Luxembourg's GDP. The GFCF should increase by 4.7%. Among all the methodological changes accompanying the implementation of the ESA 2010, the capitalisation of R&D expenditure has the greatest impact on GDP<sup>23</sup>.



STATEC, Regards sur la capitalisation des dépenses de recherche et développement, August 2014

In 2012 the EU-28 achieves a rate of 2.03% of gross expenditure in R&D. Among the Member States, Finland achieves the highest R&D rate (approximately 3.55% of GDP) and Cyprus the lowest (approximately 0.46%). Luxembourg achieves a 1.46% rate of GPD in 2012.

Luxembourg has set in its NRP a national target within a range of 2.3% to 2.6% of GDP to be achieved by 2020. According to latest available data (temporary data, 2012), Luxembourg is still a long way from its national targets for 2020, and also far below the linear trend necessary to achieve the 2020 national targets.



Note: The green line connecting the years 2010-2020 is an example to illustrate the linear trend Luxembourg's performance should display after 2010 in order to achieve national target set for 2020.

Public budgets for RDI are increasing every year since 2003 (public and higher education sector). However this is not the case for research carried out by companies in the private sector, which represent - according to the latest available data - approximately two thirds of all spending on research at national level. Provided in million euros, they have decreased since 2007. Close analysis at business sector level show that R&D in the service sector is the main cause of this decrease in the private R&D in Luxembourg, but somehow also R&D in the manufacturing industries.

> <sup>24</sup> Definition: R&D comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications (Frascati Manual, 2002 edition, § 63). R&D is an activity where there are significant transfers of resources between units, organizations and sectors and it is important to trace the flow of R&D funds.

#### a.2 Improving education levels

Investments in human resources alongside those in R&D are essential to ensure the development of knowledge and new technologies. The objective of the Europe 2020 strategy is smart and inclusive growth, two objectives are fixed for education and training. The trajectory of these two indicators is determined by demographic and social changes as well as political and institutional reforms, and should not therefore be influenced by cyclic fluctuations.



#### a.2.1 Early school leavers

In 2013 the EU-28 shows an average early school-leaving rate of  $11.9\%^{25}$ . Within the EU, Croatia has the lowest rate (3.7%) and Spain the highest (23.5%). According to this indicator calculated by Eurostat, Luxembourg has a rate of 6.1% in 2013, making its performance better than the EU average.

25 Definition: From 20 November 2009, this indicator is based on annual averages of quarterly data instead of one unique reference quarter in spring. See footnotes for further details. Early school leavers refers to persons aged 18 to 24 fulfilling the following two conditions: first, the highest level of education or training attained is ISCED 0, 1, 2 or 3c short, second, respondents declared not having received any education or training in the four weeks preceding the survey (numerator). The denominator consists of the total population of the same age group, excluding no answers to the questions "highest level of education or training attained" and "participation to education and training". Both the numerators and the denominators come from the EU Labour Force Survey.



However, the underlying statistics of this indicator calculated by Eurostat result from the Labour Force Survey (LFS) and are prone to yearly variations for Luxembourg, due to the limited size of the survey sample. The Ministry of National Education in Luxembourg has therefore set up its own national survey on early school leaving, and levels of early school leaving calculated for Luxembourg are not identical. Nevertheless, it appears that according to both indicators – the one calculated by Eurostat and the one calculated at national level – the phenomenon of early school leaving in Luxembourg is declining.

| School year | Early school-leaving rate   |
|-------------|---|
| 2003/2004   | 17,2%   |
| 2005/2006   | 14,9%   |
| 2006/2007   | 9,4%  |
| 2007/2008   | 11,2%   |
| 2008/2009   | 9,0%  |
| 2009/2010   | 9,0%  |
| 2010/2011   | 9,0%  |
| 2011/2012   | 9,2%  |
|             | School year<br>2003/2004<br>2005/2006<br>2006/2007<br>2007/2008<br>2008/2009<br>2009/2010<br>2010/2011<br>2011/2012 |

Statistics on early school-leaving rate according to the national study on early school

Source: Ministry of National Education, Childhood and Youth

Definitions: The notion of "early school leavers" refers to young people who permanently left school without a diploma and who joined the labour market, benefiting from a professional integration measure or not having a specific occupation. It also includes young people who, after an initial leaving, have re-registered in a school, and then left again during the same period of observation, and for whose any additional information on their current situation is not available.

Note: National early school-leaving rate not available for 2004/2005

Table 4

The EU objective is an early school-leaving rate of less than 10% in 2020. Luxembourg endorses this objective and has set a national target to keep the early school-leaving rate permanently below 10%. This national target could even be adapted if the early school-leaving rate would stabilized for the long term below 10% by 2015<sup>26</sup>. Currently, Luxembourg has already achieved this 2020 target, according to both the Eurostat school-leaving indicator and the national indicator.

The statistics compiled by Eurostat also allow a more detailed analysis of the status of young early school leavers, such as whether they are employed or not. According to the latest available statistics, approximately half of the young people in question are unemployed in 2013. With 2% in 2013, more than half of them would like to work (looking for work or not).



#### a.2.2 Share of higher education graduates

The EU-28 displays an average rate of 36.8% of graduated people (30-34 years old) in higher education in 2013. Luxembourg takes 2nd place in the EU with a rate of 52.5% in 2013, just behind Ireland (52.6%). So Luxembourg clearly outperforms the average performance of the EU. Italy has the lowest rate in the EU with a rate of 22.4%.

Measuring instrument: national study on early school leaving.



Note: The green line connecting the years 2010-2020 is an example to illustrate the linear trend Luxembourg's performance should display after 2010 in order to achieve national target set for 2020.

The overall EU objective is to achieve a rate of 40% of people aged 30-34 graduated in higher education by 2020. Luxembourg set a much higher rate in its NRP (66%). Since 2000 Luxembourg has experienced a significant increase in this indicator: it rose from 21.2% to 52.5% in 2013. The country thus already exceeds the European objective for this age group and is also currently on the right track towards achieving its ambitious objective by 2020. An analysis of this indicator for older age groups than 30-34 shows that the older the analysed age group is, the lower the rate is.

<sup>27</sup> Definition: The share of the population aged 30-34 years who have successfully completed university or university-like (tertiary-level) education with an education level ISCED 1997 (International Standard Classification of Education) of 5-6.



As the indicator for early school leaving, this indicator results from the Labour Force Survey (LFS). It is not fully representative for Luxembourg since on the one hand it includes foreign graduates living and working in Luxembourg (currently around 45% of residents in Luxembourg do not have Luxembourg nationality), and on the other hand it can neither capture national from Luxembourg who graduated and work abroad, nor the cross-border workers. According to Luxembourg's NRP (2012), the actual rate of higher education graduates among the sole national Luxembourg residents is lower than the one of foreign residents in Luxembourg. Aside from the current indicator used in the context of the Europe 2020 strategy, giving an indication of the qualification of Luxembourg's labour force, Luxembourg needs also to follow indicators allowing it to better distinguish people who attended Luxembourg schools in order to more accurately assess the quality of the national education system and thus to provide more information on the Luxembourg national school system's ability to enable young people to successfully complete a tertiary education<sup>28</sup>.

> 28 According to the 2012 NRP, in Luxembourg 30% of people aged between 25 and 64 are higher education graduates. This proportion is 31% in Belgium and 26% in France. In Luxembourg however, there is a large disparity per country of birth. Indeed, among people born in Luxembourg, only 22% have a higher education degree, while this proportion is 40% among those born abroad. In neighbouring countries, the differences between these two populations are much less marked. Moreover, in these countries the proportion of higher graduates is higher among indigenous people than among non-indigenous people.
## B. Sustainable growth

## b.1 Reaching the climate change and energy objectives

In order to reach the climate change and energy objectives, the objectives set at the European Council in March 2007 were kept within the framework of the Europe 2020 strategy. The greenhouse gas emissions reduction targets and the share of renewable energy in the total energy consumption are legally binding.<sup>29</sup>



## b.1.1 Greenhouse gas emissions

For the 2013-2020 post-Kyoto period only non-ETS sectors are subject to fixed objectives in the Member States. For Luxembourg, the target of reducing non-ETS gas emissions amounts to an emission reduction of 20% in 2020 compared to the level in 2005. In 2012, according to latest available Eurostat data, Luxembourg is at an index level of 94.65. The country is thus below the 2005 emission level.

> <sup>29</sup> See EU Directive 2006/32/CE. The reduction in energy consumption is a policy objective endorsed by the Member States in their Energy efficiency action plan.





## b.1.2 Share of renewable energy in energy consumption

In 2012 the share of renewable energy in the gross final consumption of energy averaged around 14.1% in the EU-28. This share was the highest in Latvia with 35.8% and the lowest in Malta with 1.4%. Luxembourg displayed a rate of 3.1% in 2012 and was thus among those EU Member States with the worst performance.



Note: The green line connecting the years 2010-2020 is an example to illustrate the linear trend Luxembourg's performance should display after 2010 in order to achieve national target set for 2020.

As a target, the EU has set the share of renewable energy to 20% by 2020. In this context, Luxembourg has set an overall target of 11% share of renewable energy in final energy consumption<sup>31</sup> by 2020, with a series of interim targets. Luxembourg is currently in this interim evolution but will have to make significant efforts challenge in the coming years to achieve its 2020 national target.

In 2012 the share of renewable energy in Luxembourg was highest in heating and cooling (5%), followed by electricity (4.6%) and transport (2.2%).

- 30 Definition: This indicator is calculated on the basis of energy statistics covered by the Energy Statistics Regulation. It may be considered an estimate of the indicator described in Directive 2009/28/ EC, as the statistical system for some renewable energy technologies is not yet fully developed to meet the requirements of this Directive. However, the contribution of these technologies is rather marginal for the time being. More information about the renewable energy shares calculation methodology and Eurostat's annual energy statistics can be found in the Renewable Energy Directive 2009/28/EC, the Energy Statistics Regulation 1099/2008 and in DG ENERGY transparency platform http://ec.europa.eu/energy/ renewables/index\_en.htm
- <sup>31</sup> For more details on renewable energy production [22 July 2013]: http://www.eco.public.lu/ salle\_de\_presse/com\_ presse\_et\_art\_actu/2013/07/ tarification\_e\_renouvelables/ pdf.pdf





For 2020, the directive on energy efficiency defines an objective of energy efficiency at European level and requires Member States to fix a national indicative target. The EU objective set for 2020 is a rise of 20% in energy efficiency. For reasons of comparability, this objective has to be expressed in both level of primary and final energy consumption. Based on this information of energy consumption, Eurostat calculates primary and final energy consumption (Mtoe)<sup>32</sup> to measure progress in energy efficiency.

In its 2014 NRP Luxembourg has set the target of a final energy consumption of 49.292 GWh for 2020 (i.e. 52.111 GWh of primary energy).



<sup>2</sup> Definition: The term "primary energy consumption" means gross inland consumption with the exception of any nonenergy use of energy products (e.g. natural gas used not for combustion but for the production of chemicals). This quantity is relevant to measure the actual energy consumption. "Percentage of savings" is calculated using 2005 values and their forecasts for 2020. The Europe 2020 target will be achieved when this value reaches the level of 20%. Since the reference year 2005, the primary energy consumption has decreased significantly in Luxembourg. In 2012, the index level is 91.7 and has thus declined by 8.3%. The final energy consumption shows the same downwards trend, with a 93.3 index in 2012, having decreased by 6.7% in Luxembourg compared to 2005. With the exception of the EU as a whole, this indicator is still not providing any information on national energy efficiency *per se* for the different EU Member States. In fact, this indicator currently only considers the volume of energy consumption at the level of countries, without connecting this information to any value of reference. A simple decrease (or rise) in this energy consumption could for example be linked to a change in the economic structure or to a decrease (increase) in the economic activity, without necessarily giving information on energy efficiency.

## C. Inclusive growth

## c.1 Promoting employment

The Lisbon strategy (2000-2010) included a target related to employment policies, namely the employment rate. The new Europe 2020 target shows two major changes compared to the former Lisbon objective: firstly, the age range considered (20-64 for 2020 instead of 15-64 for 2010) in order to reduce potential conflicts between employment policies and education policies, and secondly the reference value to be achieved (75% by 2020 instead of 70% by 2010). Developments in the employment rate depend on many uncertainties, which must be considered when setting quantified targets for the Europe 2020 strategy. Indeed, the employment rate indicator is a very cyclical indicator. The actual exit date of the crisis will play a key role in the evolution of this indicator.





In 2013 the EU-28 displayed an average employment rate of 68.3%. Sweden's rate is the highest with 79.8% and Greece the lowest with 53.2%. Luxembourg's national employment rate is at 71.1%, thus exceeding the average performance of the EU for this indicator.



#### 33 Definition: The employment rate is calculated by dividing the number of persons aged 20 to 64 in employment by the total population of the same age group. The indicator is based on the EU Labour Force Survey. The survey covers the entire population living in private households and excludes those in collective households such as boarding houses, halls of residence and hospitals. Employed popula-tion consists of those persons who during the reference week did any work for pay or profit for at least one hour, or were not working but had jobs from which they were temporarily absent.

#### Source: Eurostat

Note: Note: The green line connecting the years 2010-2020 is an example to illustrate the linear trend Luxembourg's performance should display after 2010 in order to achieve national target set for 2020.

Luxembourg set a national target of employment rate of 73% to be achieved by 2020, with an interim target of 71.5% in 2015. Since 2000 Luxembourg shows an upward trend regarding the employment rate. The employment rate has increased from 67.4% in 2000 to 71.1% in 2013. These performances are on the right way to achieve the national targets set for 2015 and 2020.

This average development of the employment rate, which is an average for the resident workforce, does however hide considerable differences in the employment rate depending on the socio-economic category observed. By proceeding to a narrower segmentation of the employment rate, for example according to gender or age of the worker, we can see important fluctuations in the employment rate. For example, the employment rate of men is at around 78% in 2013 while the rate of women is at 64%. The employment rate of older people is at about 23% in 2013, while the one of people aged 25-54 is at over 80%.



The increase in the overall employment rate in Luxembourg since 2000 is mainly due to increases among women and older workers. Although a higher employment rate generally allows increasing the supply of domestic labour, boosting growth and relieving social spending and public spending, these statements must be put in perspective in the case of Luxembourg. Labour supply in Luxembourg consists of three components: the indigenous, cross-border and the immigrant offers. However cross-border workers are not considered in the definition of the employment rate. This is a purely national concept, related to the place of residence of the worker. Yet cross-border workers in Luxembourg make up more than 40% of domestic employment. As noted by the Economic and Social Council (ESC)<sup>34</sup>, this indicator "is not representative of macroeconomic reality in Luxembourg and is even less suitable for a macroeconomic employment target, on which employment policy should be defined". In contrast, the employment rate for young people, women and older workers is useful for understanding the use of human resources in the economy.

ESC. Deuxième avis sur les Grandes Orientations des Politiques Économiques des États membres et de la Communauté (GOPE), Luxembourg, 2003. For additional information: http://www.ces.public.lu/fr/ avis/index.html

## c.2 Reducing poverty

The European objective that was initially proposed by the European Commission for social inclusion focused on reducing poverty by 20 million people at risk of poverty. However, in order to meet the Europe 2020 strategy objective of promoting inclusive growth, the European Council in March 2010 had asked the Commission for work further on social inclusion indicators, including also non-monetary indicators. In June 2010 the European Council decided to ensure that 20 million people at least no longer be faced with the risk of poverty and exclusion, and defined this population as the number of people at risk of poverty and exclusion according to three indicators, Member States being free to set their national targets on the basis of indicators they consider most appropriate among these:

- At-risk-of-poverty rate: people living on less than 60% of the national median income. The at-risk-of-poverty rate is the key indicator to measure and monitor poverty in the EU. This is a relative measure of poverty, linked to the income distribution, which takes into account all sources of monetary income, including market revenues and social transfers. It reflects the role of employment and social protection in the prevention and reduction of poverty;
- Material deprivation rate: people whose lives are severely limited by a lack of resources, experiencing at least four of the nine defined situations of deprivation<sup>35</sup>. The material deprivation rate is a nonmonetary measure of poverty, which also reflects the different levels of prosperity and quality of life in the EU, as it is based on a single European level;
- People living in jobless households: this population is defined relative to zero or very low work intensity over an entire year, in order to properly reflect the situations of prolonged exclusion from the labour market. These are people living in families in a situation of long-term exclusion from the labour market. The long-term exclusion from the labour market is one of the main factors of poverty and increases the risk of transmission of disadvantage from one generation to another.

The risks that have an impact on the evolution of poverty indicators are related to macroeconomic developments, but also to the ability of employment policies to promote an inclusive labour market and employment opportunities for all and to the welfare system's capacity to improve efficiency and effectiveness because of the constraints on public finances. Note that monetary indicators of poverty, such as the poverty rate or the rate of material deprivation, are significantly limited. They do not take into account the many non-monetary public services that are available to citizens. In Luxembourg, among other things, we can also mention in this context the service vouchers that are not taken into account.

Definition: Currently the agreed EU material deprivation indicator is defined as the share of people are concerned with at least 3 out of the 9 following situations: people cannot afford i) to pay their rent or utility bills, ii) keep their home adequately warm, iii) face unexpected expenses. iv) eat meat, fish, or a protein equivalent every second day, v) a week of holiday away from home once a year, vi) a car, vii) a washing machine, viii) a colour tv, or ix) a telephone.

#### Chart 21 Risk of poverty and social exclusion indicator



Source: Eurostat

For a more comprehensive view of people experiencing poverty or exclusion, Eurostat has developed an indicator to better quantify the percentage of the population facing the risk of poverty or exclusion, by combining the three individual indicators mentioned above.

An analysis of the "People at risk of poverty or social exclusion" indicator shows that 24.5% of the total population in the EU-28 was at risk in 2013. The Czech Republic has the lowest rate (14.6%) and Bulgaria the highest rate (48%). Luxembourg displays a rate at 19% in 2013, affecting about 95,600 people.



national target set for 2020.

In its NRP Luxembourg has adopted a national target for 2020, which is to reduce by 6000 the number of people at risk of poverty or social exclusion. With 95,600 people in 2013, Luxembourg is way above the downward trend necessary to reach its national target by 2020, according to the methodology used by the European Commission in its assessment<sup>36</sup> half way to the Europe 2020 strategy, taking 2008 as the reference year. The national target would need Luxembourg to display 6000 people less in 2020 as compared to 2008 (72,000 people). This would imply that in 2020 only 66,000 people should be at risk of poverty or social exclusion in Luxembourg.

Examining the intersections of the three sub-indicators reveals that the vast majority of people (77,100 people) at risk of poverty or social exclusion are excluded in only one of the three dimensions (risk of poverty, severe material deprivation or living in households with very low work intensity). The remaining 14,400 people, i.e. 3% of the total population, are faced by multiple exclusion and are excluded in at least two out of three dimensions concerned.

> <sup>36</sup> EUROPEAN COMMISSION, Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth - ANNEX 1, Brussels, March 2014



By analysing separately the three underlying indicators for the year 2013, we can see that, regarding the indicator for people at-risk-of poverty after social transfers, Luxembourg has a rate of 15.9% in 2013 (79,800 people); for the indicator of people experiencing severe material deprivation, Luxembourg has a rate of 1.8% (8,900 people); concerning the indicator for people living in households with very low work intensity, Luxembourg has a rate of 7.4% (21,900 people).

# 4.2.3 Intermediate conclusions

Based on the Europe 2020 updated data and pending the next issue of the annual growth survey that will be published in November 2014, we can see that Luxembourg:

- Must still make significant efforts in R&D;
- Is on the right path in terms of education;
- Must make significant efforts on climate change and in the field of energy;
- Is on the right track in terms of employment;
- And finally, must ensure to reduce the number of people at risk of poverty or exclusion.

| Summary table of the Europe 2020 strategy objectives (July 2014) |   |  |                        |                  |                         |                               |  |  |  |  |
|--|---|--|------------------------|------------------|-------------------------|-------------------------------|--|--|--|--|
| Priorities   | Smart growth Sustainable                    |  |                        |                  |                         |                               |  |  |  |  |
| Objectives   | Improving conditions for innovation and R&D | Improvir   | ng education<br>levels | Rea              | ching the clim<br>energ | nate change/<br>gy objectives |  |  |  |  |
| Indicators   | R&D<br>D                                    | Early<br>School-<br>leaving<br>rate<br>Higher<br>education |                        | GHG<br>emissions | Renewable<br>energy     | Energy<br>efficiency          |  |  |  |  |
|  |   |  |                        |                  |                         |                               |  |  |  |  |

employment poverty Poverty Employmen' rate % of 20-64 % of 30-34 Unit % of GDP % Mtoe % % Persons years old years old LU \* 1,46 52,5 9,85 3,1 71,1 95 000 6.1 1 Tendency \*\* + + + + -2015 5,45% 14,06%\*\*\* 71,5% 1 n.d. Objective 2020 -6 000 49.292 8,3\*\*\*\* 73,0% 2,3-2,6% <10% 66% 11% GWh\*\*\*  $(= 66\ 000)$ Objective

Source: Eurostat / 2014 NRP

Notes: \* Update according to the most recent data available

\*\* Improvement (+), Deterioration (-), Stagnation (0)

\*\*\* 2016 Interim objective

\*\*\*\* -20% compared to 2005

\*\*\*\*\* Final energy consumption

## 4.2.4 Mid-term review of the Europe 2020 strategy

The Europe 2020 strategy, launched in 2010, will reach its mid-term in 2015. The European Commission suggested taking stock of the Europe 2020 strategy. Subsequently, early March, the Commission adopted a communication entitled "Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth"<sup>37</sup>, drawing several preliminary lessons from the first years of implementation of the strategy.

The European Commission considers that the reasons for the implementation of the Europe 2020 strategy are just as important in 2014 than they were in 2010. Moving out of the worst economic and financial crisis of its history, the EU needs to strengthen its strategy for smart, sustainable and inclusive growth in order to ensure its position on the global stage. The analysis of the European Commission gives a mixed picture of the headline objectives and flagship initiatives. Although in terms of education, climate and energy, the EU is close to reach the objectives it adopted, this is not the case for employment, R&D or the reduction of poverty. The transposition of these objectives into national level targets has also pointed out several worrying trends, such as an increase in the differences between the best and worst performing Member States. In many ways, the 2010-2014 period served to lay the foundation for the results that should be obtained in years to come. At this stage, the European Commission has not drawn any conclusion on policies being led, nor has it made any recommendation on policies to be led. The Commission estimates in fact that it is necessary to first launch, at EU level, a public consultation with all stakeholders on lessons to be learnt and on the main elements that should define the next stages of the EU post-crisis growth strategy.

For additional details: http://ec.europa.eu/europe2020/pdf/europe-2020stocktaking\_fr.pdf

Inclusive growth

Reducina

Promoting

The Commission launched this public consultation<sup>38</sup> in May 2014. After this consultation, the Commission will make suggestions regarding the continuation of the strategy beginning 2015.

# 4.3 The macroeconomic surveillance

# 4.3.1 Implementation of the monitoring of macroeconomic imbalances

Macroeconomic imbalances can cause economic crises, particularly in a monetary union because of the limited number of tools available to policy makers. The years before the financial and economic crisis were characterized in the euro area by divergent macroeconomic developments that have created imbalances among Member States. However before the onset of the global economic and financial crisis, little attention was paid to these imbalances within the EU, in particular within the euro area. For example, public and private debt rose sharply in Greece, real estate bubbles were created in Spain and Ireland, and Italy, Spain, Portugal and Greece experienced significant losses in cost competitiveness<sup>39</sup>. Public attention only started to focus on this unhealthy situation after the crisis began. As a result, new challenges have arisen in monetary policy and coordination of economic and fiscal policies because of the interdependence of the European economies and because the existing mechanisms were insufficient. It was therefore important to reinforce and further coordinate economic policy.

So, the Commission proposed to further strengthen the coordination of economic policy. In its May 2010 communication "Reinforcing Economic Policy Coordination", the Commission highlighted a persistent accumulation of macroeconomic imbalances, which is able to destabilize the euro area and the functioning of the European Monetary Union. Based on this communication, in June 2010 the European Council decided to establish a European stabilization mechanism. The Commission subsequently developed its ideas in its "Enhancing economic policy coordination for stability, growth and jobs - Tools for stronger EU economic governance" communication on the governance of economic policy and proposed to develop a new structured mechanism to detect and to correct macroeconomic imbalances. In order to better detect these imbalances, the Commission along with the Member States established a first scoreboard with economic and financial indicators. On 29 September 2010, the Commission finally proposed a legislative package ("six-pack"), which includes the monitoring of internal and external macroeconomic imbalances in the Member States, such as housing and increasing differences in cost competitiveness between Member States<sup>40</sup>. The European Parliament finally voted this legislative package on economic governance on 28 September 2011 and the European regulation entered into force in late 2011 before the beginning of the European Semester of last year (2012).

- For additional details: http://ec.europa.eu/ europe2020/publicconsultation/index\_fr.htm
- <sup>39</sup> MONETARY POLICY & THE ECONOMY, Prevention and Correction of Macroeconomic Imbalances: the Excessive Imbalances Procedure, Q4/2011
- Based on the two European regulations 1176/2011 and 1174/2011. For additional details: http://eur-lex.europa.eu/ LexUriServ/LexUriServ.do?ur i=CELEX:32011R1176 .EN :NOT http://eur-lex.europa.eu/Lex-UriServ/LexUriServ.do?uri=CE LEX:32011R1174:EN:NOT

## 4.3.2 Macroeconomic imbalance procedure

The monitoring procedure includes a preventive and a corrective arm.

## a. The preventive arm

In the preventive component of the procedure, a scoreboard was established and is published annually by the Commission. The first edition of this scoreboard was published in the first Alert Mechanism Report (AMR)<sup>41</sup> in February 2012. For each Member State this mechanism analyses several indicators compared with "alert thresholds" and is accompanied by an economic reading of the indicators, so as to not limit the interpretation to a "mechanical" reading. This procedure allows the Commission to identify a potential risk. If this initial scoreboard reveals the existence of a potential macroeconomic imbalance within a Member State, in a second step the Commission calls for an in-depth analysis. This further analysis examines the origin, nature and severity of a potential imbalance.

In the analytical work carried out within the context of the implementation of this scoreboard, it proved to be very difficult to agree on "one size fits all" indicators for all Member States, which can take into account both the specificities of each Member State and the potential methodological problems. It was thus agreed that the results should not be limited to a "mechanical" interpretation but to accompany the reading by an economic analysis. The selection of indicators is mainly based on four guidelines: indicators should detect the major macroeconomic imbalances and signs of loss of competitiveness; indicators should enable the analysis of both the level and flows; indicators should serve as an important communication tool; the statistical quality of data should be high and suitable to make international comparisons.

The adopted scoreboard includes eleven indicators divided into two categories: external and internal imbalances. The analysis of external imbalances includes indicators such as the current account balance (foreign exchange of a country), or factors having a direct impact on this aggregate such as cost competitiveness. In terms of internal imbalances, the experience gained through the crises in the past has allowed identifying various key indicators such as unusual developments in the financial sector; extreme changes in credit with a high increase in house prices. Statistics that are used annually in the scoreboard are available from the Commission<sup>42</sup> and Eurostat<sup>43</sup> publishes the data that are updated periodically during the year.

- <sup>41</sup> EUROPEAN COMMISSION, Alert Mechanism Report, Report prepared in accordance with Articles 3 and 4 of the Regulation on the prevention and correction of macroeconomic imbalances, Brussels, 14.2.2012 COM(2012)68 final
- <sup>42</sup> For additional details: http://ec.europa.eu/economy\_ finance/indicators/economic\_ reforms/eip/
- <sup>43</sup> For additional details: http://epp.eurostat.ec.europa. eu/portal/page/portal/excessive\_imbalance\_procedure/ imbalance\_scoreboard

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AMR scoreboard Indicators and thresholds (November 2013)

|  | External imbalan   | ces and comp  | etitiveness  |   |  |                               |  |  |  |  |
|--|--|---|--|---|--|-------------------------------|--|--|--|--|
| Indicator  | 3-year average of<br>current account<br>balance as a % of<br>GDP   | Net Inter<br>Investme<br>as a % of                            | Net International<br>Investment Position<br>as a % of GDP                        |   | % change (3 years)<br>of Real Effective<br>Exchange Rate,<br>HICP deflators<br>relative to 41<br>industrial countries<br>[a] |                               | % change (5 years)<br>in export market<br>shares   |  | % change (3 years)<br>in <b>nominal unit<br/>labour cost</b> (b)   |  |
| Data source  | EUROSTAT (Balan<br>of Payments<br>statistics)  | ce EUROSTA<br>of Payme<br>statistics                          | EUROSTAT (Balance<br>of Payments<br>statistics)                                  |   | DG ECFIN (Data<br>base Price and Cost<br>competitiveness)  |                               | EUROSTAT (Balance<br>of Payments<br>statistics)  |  | EUROSTAT (National<br>Accounts)  |  |
| Indicative<br>thresholds   | 4/+6%<br>Lower quartile (al<br>used as a reference<br>for upper thresho  | -35%<br>so Lowerqu<br>ce<br>(d)                               | -35%<br>Lower quartile   |   | +/-5% EA<br>+/- 11% non EA<br>Lower and upper<br>quartiles of EA -/+<br>standard deviation<br>of EA                          |                               | -6%<br>Lower quartile  |  | +9% EA<br>+12% non EA<br>Upper quartile EA<br>+3%  |  |
| Some additional<br>indicators to be<br>used in economic<br>reading | Net lending/<br>borrowing vis-à-v<br>ROW as % of GDP   | Net Exte<br>is as % GDF<br>Inward F<br>and stocl<br>of GDP    | Net External Debt<br>as % GDP<br>Inward FDI flows<br>and stocks as a %<br>of GDP |   | Real effective<br>exchange rate<br>vis-à-vis rest<br>of the euro area  |                               | Relative export<br>market shares<br>relative to advanced<br>economies; Labour<br>productivity; Trend<br>TFP growth |  | Nominal unit labour<br>costs (changes over<br>1, 5, 10 years);<br>Effective unit labour<br>cost relative to the<br>rest of euro area |  |
|  | Internal imbaland  | es  |  |   |  |                               |  |  |  |  |
| Indicator  | y-o-y % change<br>in <b>deflated</b><br>house prices (c)   | Private secto<br>credit flow<br>(consolidate<br>% of GDP (d), | or Unem<br>rate -<br>d) as 3-year<br>(e)   | ployment<br>- average                                 | Private se<br>debt<br>(consolida<br>% of GDP (   | ector<br>ated) as<br>[d], (e) | General<br>government<br>sector debt<br>as % of GDP  |  | y-o-y % change<br>in total financial<br>sector<br>liabilities,<br>non-consoli-<br>dated data   |  |
| Data source  | EUROSTAT   | EUROSTAT<br>(Labour Forc<br>Survey)                           | EURO<br>e (Natio<br>Accou  | STAT EUROSTAT<br>nal (National<br>nts) Accounts)      |  | Г                             | EUROSTAT<br>(EDP – treaty<br>definition)   |  | EUROSTAT<br>(National<br>Accounts)   |  |
| Indicative<br>thresholds   | +6%<br>Quartile<br>supérieur   | +15%<br>Quartile<br>supérieur                                 | +10%   |   | 133%<br>quartile<br>supérieur  |                               | +60%   |  | 16,5%  |  |
| Some additional<br>indicators to be<br>used in economic<br>reading | Real house<br>price changes<br>(cumulated<br>over 3 years);<br>Nominal house<br>price index<br>Value-added in<br>residential<br>construction | Change in<br>private debt                                     | Partic<br>rate, l<br>and yc<br>unemj<br>povert<br>indica                         | ipation<br>ong-term<br>outh<br>oloyment<br>ty<br>tors | Private se<br>debt base<br>non-conso<br>dated data   | ector<br>don<br>bli-<br>a     |  |  | Debt over equity<br>ratio  |  |

Source: European Commission

Notes:

(a) For EU trading partners HICP is used while for non-EU trading partners, the deflator is based on a CPI.
(b) Index providing ratio of nominal compensation per employee to real GDP per person employed.
(c) Changes in house prices relative to the consumption deflator.
(d) Private sector is defined as non-financial corporations; households and non-profit institutions serving households.
(e) Sum of loans, and securities other than shares.

For each of these indicators, the Commission - in collaboration with Member States - also defined the thresholds at which performances can be regarded as potentially "at risk" based on the historical statistical distribution of each indicator<sup>44</sup>. This means that if a Member State exceeds a threshold, it could display a macroeconomic imbalance. It is important to stress that the defined thresholds are usually the same for all Member States, making a difference only in some cases between Member States being in or out the euro area. However the thresholds should not be considered as political objectives to be reached, but should only be used to identify developments that may lead to imbalances<sup>45</sup>.

## b. The corrective arm

If in-depth examination, which is performed after the scoreboard-based analysis, finds that an excessive macroeconomic imbalance exists in a Member State, the corrective arm of the procedure is triggered. The Member State concerned is then placed in an excessive imbalances situation. In this case the Member State must submit a corrective action plan to the Council specifying concrete measures and a detailed implementation schedule. The Commission and the Council assess the corrective action plan that is either found to be satisfactory, which leads to the issuing of regular progress reports to the Council, or insufficient, and the Member State is requested to amend its action plan. If, after the amendments, the action plan remains insufficient, the Council adopts sanctions on the basis of recommendations of the Commission, unless the Council supports the arguments of exceptional economic circumstances by a reverse qualified majority.

- <sup>44</sup> For more details about the implementation methodology of the AMR scoreboard: EUROPEAN COMMISSION, Scoreboard for the surveillance of macroeconomic imbalances, European Economy. Occasional Papers 92, Brussels, February 2012. Source: http://ec.europa. eu/economy\_finance/publications/occasional\_paper/2012/ op92\_en.htm
- <sup>45</sup> CENTRE FOR EUROPEAN POLICY STUDIES, Macroeconomic Imbalances in the Euro Area: symptom or cause of the crisis?, Policy Brief n°266, April 2012

## 4.3.3 The 2014 edition of the macroeconomic imbalance procedure

The third edition of the scoreboard was published in the alert mechanism report in November 2013 in the framework of the European Semester. In this edition Luxembourg exceeds four thresholds: the current account balance, the nominal unit labour cost, the private sector debt and the evolution of the overall export market shares. Regarding the overrun of the current account balance and the private sector debt thresholds, the European Commission is not too worried because these overruns are due first to an enormous concentration of the economic activities and secondly to corporate intra-group financing. On the other hand, the Commission emphasises that Luxembourg price competitiveness decreased as a result of a wage increase and a low productivity growth. In the two previous editions of the mechanism alert report, no in-depth analysis was required for Luxembourg even if it had overrun the set threshold. However in this edition the macroeconomic imbalance monitoring did not stop directly at the end of 2013, and Luxembourg underwent an in-depth examination by the European Commission, as many other Member States: "In the previous rounds of the MIP, Luxembourg was not identified as experiencing macroeconomic imbalances. In the updated scoreboard a number of indicators are above their indicative thresholds, namely the current account surplus, unit labour costs, the private sector debt and the loss in export market shares. The very large surplus hides a persistent deficit of the trade balance. Moreover, recently losses in export market shares have become a source of concern. Not only the trade balance hit a new historical deficit, but the country has also lost market shares in (mostly financial) services since 2007. Moreover, the nominal ULC have risen substantially faster than in the euro area since 2008, and exceeds the threshold, in spite of recent measures to contain wages, and have weakened the competitive position of the domestic industry. The high private indebtedness, mainly of non-financial corporates. increases the vulnerability of enterprises and may partly be due to the existence of a bias in favour of debt rather than equity in the tax legislation. While the financial sector remains overall sound, the financial crisis has dented the growth potential of the sector and raises concerns about the impact of a less dynamic sector for both the employment and the sustainability of public finances, also taking into account costs related to an ageing population. Overall the Commission finds it useful to conduct an in-depth analysis with a view to assessing whether imbalances exist."

| Table 7  |
|--|
| AMR scoreboard indicator results (November 2013 edition) |

|                 | External imb      | balances and o              | ompetitivene        | ess                      |                             |                       |                             |                       |                             |  |
|-----------------|-------------------|-----------------------------|---------------------|--------------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|--|
| Year<br>2012    | Current acco      | ount balance<br>as % of GDP | NIIP as %<br>of GDP | Real EER                 | (42 IC - HICP<br>deflators) | Export ma             | arket shares                | 1                     | Nominal ULC                 |  |
|                 | 3 year<br>average | p.m.: level<br>year 2012    |                     | Change as<br>% (3 years) | p.m.:<br>yearly %<br>change | % change<br>(5 years) | p.m.:<br>yearly %<br>change | % change<br>(3 years) | p.m.:<br>yearly %<br>change |  |
| Thres-<br>holds | -4/+6%            | -                           | -35%                | ±5% &<br>±11%            | -                           | -6%                   | -                           | +9% &<br>+12%         | -                           |  |
| BE              | -0,4              | -2,0                        | 48                  | -4,3                     | -2,3                        | -14,9                 | -5,2                        | 6,6                   | 4,1                         |  |
| BG              | -0,9              | -1,3                        | -80                 | -4,0                     | -2,0                        | 4,8                   | -5,5                        | 7,4                   | -0,5                        |  |
| CZ              | -3,0              | -2,4                        | -50                 | 0,4                      | -2,8                        | -4,2                  | -4,6                        | 3,9                   | 3,8                         |  |
| DK              | 5,9               | 6,0                         | 38                  | -7,7                     | -2,8                        | -18,6                 | -4,8                        | 1,0                   | 1,6                         |  |
| DE              | 6,5               | 7,0                         | 42                  | -8,9                     | -3,2                        | -13,1                 | -4,6                        | 3,0                   | 3,1                         |  |
| EE              | 0,9               | -1,8                        | -54                 | -3,4                     | 0,6                         | 6,5                   | -4,1                        | -2,8                  | 4,2                         |  |
| IE              | 2,3               | 4,4                         | -112                | -12,2                    | -4,3                        | -16,3                 | -3,3                        | -10,4                 | 0,0                         |  |
| EL              | -7,5              | -2,4                        | -109                | -4,5                     | -3,9                        | -26,7                 | -7,3                        | -8,1                  | -6,2                        |  |
| ES              | -3,1              | -1,1                        | -93                 | -5,2                     | -2,3                        | -14,6                 | -4,9                        | -5,6                  | -3,0                        |  |
| FR              | -1,8              | -2,2                        | -21                 | -7,8                     | -3,2                        | -14,0                 | -6,8                        | 4,1                   | 2,1                         |  |
| HR              | -0,5              | 0,0                         | -89                 | -8,3                     | -2,6                        | -24,7                 | -7,4                        | 0,8                   | 1,2                         |  |
| IT              | -2,3              | -0,4                        | -25                 | -6,2                     | -1,8                        | -23,8                 | -5,0                        | 3,1                   | 2,3                         |  |
| СҮ              | -6,7              | -6,9                        | -82                 | -5,8                     | -1,9                        | -26,6                 | -9,4                        | 0,8                   | -2,7                        |  |
| LV              | -0,6              | -2,5                        | -67                 | -8,5                     | -1,4                        | 12,3                  | 5,4                         | -5,8                  | 3,4                         |  |
| LT              | -1,3              | -0,2                        | -53                 | -6,7                     | -2,0                        | 29,3                  | 5,7                         | 4,6                   | 1,9                         |  |
| LU              | 7,0               | 6,6                         | 169                 | -2,3                     | -1,4                        | -18,3                 | -4,0                        | 9,8                   | 4,7                         |  |
| HU              | 0,6               | 1,0                         | -103                | -1,2                     | -2,3                        | -17,8                 | -7,4                        | 4,4                   | 2,7                         |  |
| MT              | -1,6              | 1,6                         | 25                  | -7,7                     | -2,1                        | 4,5                   | -1,9                        | 4,9                   | 3,7                         |  |
| NL              | 8,8               | 9,4                         | 47                  | -6,0                     | -1,8                        | -12,0                 | -3,3                        | 3,3                   | 2,8                         |  |
| AT              | 2,2               | 1,6                         | 0                   | -4,7                     | -1,7                        | -21,2                 | -6,3                        | 4,1                   | 3,0                         |  |
| PL              | -4,6              | -3,7                        | -67                 | 1,3                      | -2,3                        | 1,3                   | -2,7                        | 4,4                   | 2,0                         |  |
| PT              | -6,5              | -2,0                        | -115                | -4,0                     | -1,5                        | -16,0                 | -5,3                        | -5,3                  | -3,1                        |  |
| RO              | -4,4              | -4,4                        | -68                 | -1,9                     | -6,0                        | 5,9                   | -7,1                        | 4,8                   | 6,5                         |  |
| SI              | 1,2               | 3,3                         | -45                 | -4,5                     | -1,2                        | -19,9                 | -6,9                        | 0,4                   | 0,8                         |  |
| SK              | -1,7              | 2,2                         | -64                 | -3,2                     | 0,0                         | 4,2                   | 1,5                         | 0,9                   | 1,0                         |  |
| FI              | -0,5              | -1,7                        | 18                  | -8,3                     | -2,7                        | -30,8                 | -7,1                        | 4,8                   | 4,4                         |  |
| SE              | 6,2               | 6,0                         | -10                 | 10,1                     | -0,8                        | -18,8                 | -6,0                        | 0,7                   | 2,9                         |  |
| UK              | -2,8              | -3,8                        | -9                  | 5,8                      | 4,3                         | -19,0                 | -1,7                        | 6,1                   | 3,0                         |  |

Continued next page

| Table 7<br>Continued |                       |                               |                             |                                       |                   |                     |   |  |  |  |
|----------------------|-----------------------|-------------------------------|-----------------------------|---------------------------------------|-------------------|---------------------|---|--|--|--|
|                      | Internal imbalan      | ces                           |                             |                                       |                   |                     |   |  |  |  |
| Année<br>2012        | Yearly %<br>change in | Private sector<br>credit flow | Private sector<br>debt as % | General<br>government<br>debt as % of | Une               | mployment rate      | Yearly %<br>change in total<br>financial sector |  |  |  |
|                      | prices                | consolidated                  | consolidated                | GDP,<br>consolidated                  | 3 year<br>average | p.m.: level<br>2012 | liabilities                                     |  |  |  |
| Thres-<br>holds      | +6%                   | 14%                           | 133%                        | 60%                                   | 10%               | -                   | 16,5%   |  |  |  |
| BE                   | -0,2                  | -1,5                          | 146                         | 100                                   | 7,7               | 7,6                 | -3,9  |  |  |  |
| BG                   | -5,3 (p)              | 2,,5                          | 132                         | 19                                    | 11,3              | 12,3                | 10,1  |  |  |  |
| CZ                   | -3,9                  | 0,6                           | 72                          | 46                                    | 7,0               | 7,0                 | 5,4   |  |  |  |
| DK                   | -5,1                  | 6,1                           | 239                         | 45                                    | 7,5               | 7,5                 | 5,0   |  |  |  |
| DE                   | 1,8                   | 1,5                           | 107                         | 81                                    | 6,2               | 5,5                 | 4,4   |  |  |  |
| EE                   | 3,5                   | 4,7                           | 129                         | 10                                    | 13,2              | 10,2                | 12,9  |  |  |  |
| IE                   | -11,7                 | -1,6                          | 306                         | 117                                   | 14,4              | 14,7                | -0,7  |  |  |  |
| EL                   | -12,4 (1)             | -6,8                          | 129                         | 157                                   | 18,2              | 24,3                | -3,4  |  |  |  |
| ES                   | -16,9                 | -10,5                         | 194                         | 86                                    | 22,3              | 25,0                | 3,3   |  |  |  |
| FR                   | -2,3                  | 3,5                           | 141                         | 90                                    | 9,9               | 10,2                | -0,1  |  |  |  |
| HR                   | -2,4                  | -2,1                          | 132                         | 56                                    | 13,8              | 15,9                | 0,9   |  |  |  |
| IT                   | -5,4 (p)              | -1,0                          | 126                         | 127                                   | 9,2               | 10,7                | 7,1   |  |  |  |
| СҮ                   | -2,2                  | 10,0                          | 299                         | 87                                    | 8,7               | 11,9                | -1,9  |  |  |  |
| LV                   | -0,6                  | -1 (p)                        | 91,7 (p)                    | 41                                    | 16,9              | 15,0                | 4,1 (p)   |  |  |  |
| LT                   | -3,2                  | -0,3                          | 63                          | 41                                    | 15,6              | 13,4                | -0,3  |  |  |  |
| LU                   | 2,5                   | -5,0                          | 317                         | 22                                    | 4,8               | 5,1                 | 11,3  |  |  |  |
| HU                   | -9,2                  | -6,1                          | 131                         | 80                                    | 11,0              | 10,9                | -8,3  |  |  |  |
| MT                   | 0,3                   | -1,6                          | 155                         | 71                                    | 6,6               | 6,4                 | 4,1   |  |  |  |
| NL                   | -8,7                  | 0,2                           | 219                         | 71                                    | 4,7               | 5,3                 | 4,9   |  |  |  |
| AT                   | na (2)                | 2,7                           | 147                         | 74 (3)                                | 4,3               | 4,3                 | -0,9  |  |  |  |
| PL                   | -5,9 (e)              | 3,4                           | 75                          | 56                                    | 9,8               | 10,1                | 9,6   |  |  |  |
| PT                   | -8,6 (p)              | -5,4                          | 224                         | 124                                   | 13,6              | 15,9                | -3,6  |  |  |  |
| RO                   | -9,2                  | 0,9                           | 73                          | 38                                    | 7,2               | 7,0                 | 5,3   |  |  |  |
| SI                   | -8,4                  | -2,9                          | 114                         | 54                                    | 8,1               | 8,9                 | -0,8  |  |  |  |
| SK                   | -5,9                  | 3,2                           | 73                          | 52                                    | 14,0              | 14,0                | 2,6   |  |  |  |
| FI                   | -0,5 (p)              | 9,0                           | 158                         | 54                                    | 8,0               | 7,7                 | -0,2  |  |  |  |
| SE                   | -0,2                  | 1,8                           | 212                         | 38                                    | 8,1               | 8,0                 | 4,4   |  |  |  |
| UK                   | -0,9                  | 2,6                           | 179                         | 89                                    | 7,9               | 7,9                 | -4,3  |  |  |  |

Note: (1) Eurostat estimate based on HPI data from Bank of Greece produced in accordance with ELSTAT. (2) HPI data up until 2011 by Statistics Austria. For 2012, Eurostat estimates a deflated rate of 9.6% based on non-harmonised HPI data by the ECB and the Central Bank of Austria. (3) Eurostat expressed a reservation on Austrian general government sector debt, see Eurostat press release 152/2013. (4) p = provisional data, e = estimations. Source: European Commission

Following the alert mechanism report of November 2013, the Commission thoroughly analyses the origin, nature and severity of a potential macroeconomic imbalance a Member State could face. After the indepth analysis undertaken by the European Commission, it concluded in March 2014 that:

- Three Member States are not experiencing any imbalances (Denmark, Malta and Luxembourg);
- Eleven Member States are facing a risk, but it may not be considered as excessive;
- Three Member States are experiencing an excessive imbalance (Slovenia, Croatia, Italy).

| Tabl<br>Ove | .e 8<br>rview table of c | onclusions per Member State for which in-depth analysis was undertaken i  | n 2014  |
|-------------|--------------------------|---|---|
|             | MIP                      |   |   |
|             | Finding                  | Follow-up   | SGP   |
| BE          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Excessive deficit, deadline for correction: 2013  |
| BG          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Not yet at MTO  |
| DE          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Overachieving MTO   |
| DK          | No imbalance             | Recommendations to be adopted under the European Semester   | Excessive deficit, deadline for correction: 2013  |
| IE          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues. Specific monitoring: post-programme surveillance  | Excessive deficit, deadline for correction: 2015  |
| ES          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues. Specific monitoring: post-programme surveillance  | Excessive deficit, deadline for correction: 2016  |
| FR          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues. Specific monitoring to be put in motion   | Excessive deficit, deadline for<br>correction: 2015 The Commission<br>adopts today a recommendation (*) |
| HR          | Excessive<br>imbalance   | Recommendations to be adopted under the European Semester, including<br>on MIP-related issues. Decision to be taken in June on subsequent steps<br>under the MIP. Specific monitoring to be put in motion | Excessive deficit, deadline for correction: 2016  |
| IT          | Excessive<br>imbalance   | Recommendations to be adopted under the European Semester, including<br>on MIP-related issues. Decision to be taken in June on subsequent steps<br>under the MIP. Specific monitoring to be put in motion | Not yet at MTO  |
| LU          | No imbalance             | Recommendations to be adopted under the European Semester   | Overachieving MTO   |
| HU          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Not yet at MTO  |
| мт          | No imbalance             | Recommendations to be adopted under the European Semester   | Excessive deficit, deadline for correction: 2014  |
| NL          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Excessive deficit, deadline for correction: 2014  |
| SI          | Excessive<br>imbalance   | Recommendations to be adopted under the European Semester, including<br>on MIP-related issues. Decision to be taken in June on subsequent steps<br>under the MIP. Specific monitoring to be put in motion | Excessive deficit, deadline for<br>correction: 2015 The Commission<br>adopts today a recommendation (*) |
| SE          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Overachieving MTO   |
| FI          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Not yet at MTO  |
| UK          | Imbalance                | Recommendations to be adopted under the European Semester, including on MIP-related issues  | Excessive deficit, deadline for correction: 2014-5  |
|             |                          |   |   |

(\*) The Recommendations under the "2-pack" (Reg. No 473/2013) regarding measures to be taken in order to ensure a timely correction of its excessive government deficit only concern euro area Member States. MTO: Medium-term fiscal objective. Euro area Member States for which an IDR was prepared are shaded. In its 20104 in-depth examination<sup>46</sup> of Luxembourg, the European Commission came to the following conclusion: "The macroeconomic challenges of Luxembourg have not been identified as imbalances in the sense of the MIP. They stem from a growth model based on an efficient financial sector, which has weathered the crisis well. Still, losses in the manufacturing competitiveness, the evolution of the housing market and the high level of indebtedness of the private sector deserve continued monitoring. More specifically, the analysis of the current account surplus shows that it does not stem from an anaemic domestic demand, but is rather the result of the particular growth model of the country strongly based on financial services. Still, it masks a large and steadily increasing deficit in merchandise trade, which broadly comes from disappointing exports. Losses of export market shares are largely associated with unit labour costs rising much faster than in trading partner countries, driven to a certain extent by the wage setting mechanism. In such regard, finding a structural solution to the temporary modulation of the automatic wage indexation constitutes a challenge. Risks to the domestic financial stability stemming from the presence of a large financial sector exist, but they are relatively contained as the sector is diversified and specialised at the same time. Furthermore, domestic banks post sound capital and liquidity ratios. The high level of indebtedness of the private sector and in particular of the non-financial corporations mainly reflects the presence of a large number of multinational firms that use their branches or subsidiaries in Luxembourg for intra-group financing operations. The dynamism of house prices represents an increasing source of concern. Finally, the current favourable position of public finances is highly dependent on the sustainability of the growth model based on a buoyant financial sector and presents a high sustainability risk in the long term. In this vein, the recently implemented pension reform is insufficient to cope with the challenge. However the structural balance is above the medium-term objective." The European Commission did not consequently consider Luxembourg's macroeconomic challenges in 2014 as imbalances in the sense of the macroeconomic imbalance procedure. The procedure was consequently stopped anew this year in the preventive arm of the procedure, even if this year it was already in the second stage of the preventive process, and no longer in the first stage as was the case for the two previous editions.

> <sup>6</sup> EUROPEAN COMMISSION, Macroeconomic Imbalances Luxembourg 2014, DG ECFIN – European economy, occasional papers 183, Brussels, March 2014

# 4.3.4 Updating alert mechanism scoreboard data

The data used in this chapter to illustrate the position of Luxembourg under the alert mechanism come from Eurostat database. This is an update of the data published in the last AMR scoreboard. Therefore differences can occur between the present results in the 2014 Competitiveness Report and those of the last alert mechanism scoreboard (November 2013). The present data were downloaded in early July 2014, and are thus an update halfway between the last alert mechanism report and the one that the Commission will publish in November 2014 in the context of its annual growth survey, which will launch the 2015 European semester.

## 4.3.4.1 External and competitiveness imbalances

## a. The current account balance<sup>47</sup>

Regarding the current account balance, unlike a country financing need (negative balance), a financing capacity (positive balance) does not seem an evidence of imbalance since it doesn't threaten the sustainability of its external debt. For this indicator, it has been agreed under the MIP that a country is potentially at risk if it has a current account balance with either a deficit higher than -4% of GDP or a surplus of over 6% of GDP.

The crisis has had a significant impact on the current account balance, both for Member States with surpluses and countries with deficit.

Since 2000 Luxembourg exceeds the MIP's upper threshold, and therefore, in theory, has a "too high" current account balance, according to the MIP criteria. We also notice that in recent years the country is increasingly moving towards the upper limit value and reaches, according to the last available data, a value lower than this threshold (5.9%). In Luxembourg only the services balance is in surplus. Financial services alone represent by far the greatest proportion of this surplus, although other business services, telecommunication services, transport services and insurance are also in surplus. On the contrary other partial balances are in deficit.

> <sup>47</sup> The balance of payments is a statistical statement that systematically summarizes, for a specific period, the economic transactions of an economy with the rest of the world. It is divided into three main sub-balances: the current account, the capital account and the financial account. The current account is the main determinant of the financing capacity or of an economy; it provides important information on the economic relations of a country with the rest of the world. It reports all transactions (other than those recorded under financial headings) in economic values that occur between resident and non-resident units.





## b. Net international investment position<sup>48</sup>

The indicator of the net external position provides information on the relationship between foreign assets and the external debt of a country. For this indicator, it has been agreed under the MIP that a country is potentially at risk if it has a negative balance over -35% of GDP.



Source: Eurostat; orange line = threshold of -35% set by MIP

Note: A Member State is considered to be at risk of imbalance if its net international position is below -35% of GDP. If the indicator is above this threshold, a Member State is not considered to be at risk.

<sup>48</sup> The statistics of the international investment position (IIP) records the status of financial assets and liabilities of a country relative to the rest of the world. They are an important measure of the net position of the domestic economic sectors relative to the rest of the world. The net international investment position (NIIP) is calculated by the difference between assets and liabilities in the IIP. It allows a stock flow analysis of external positions. In line with a significant current account surplus, Luxembourg complies with set criteria regarding the balance of the net international investment position. Its foreign assets are much higher than its foreign liabilities. In this context, the situation of Luxembourg is particular within the EU because the size of the financial centre is very large compared to the size of the country. The net international investment position is characterised by a significant and persistent negative international investment position of the non-financial sector (loans). However, this is more than compensated by a positive international position generated by the financial sector (including the Central Bank) so that Luxembourg's net international investment position remains broadly positive.

## c. The real effective exchange rate (REER)49

The REER indicator tracks the evolution of price competitiveness and cost competitiveness by analysing the relationship between domestic prices or costs and foreign prices or costs in euro. Thus an increase in the REER is usually equivalent to a decline of competitiveness, due tot he fact that domestic prices/costs increase faster than those in foreign countries. The REER is constructed from currencies of major trading partners.





For this indicator, it has been agreed for the euro area Member States that a country is potentially at risk if the REER indicator is above + 5% or under -5%. In 2004 and 2005 Luxembourg, like its neighbours, had exceeded the upper threshold. Between 2006 and 2012 Luxembourg is between the upper and lower thresholds and fulfils therefore the procedure criteria.

The REER aims to assess the price competitiveness or the cost competitiveness of a country compared to its main competitors in international markets. Changes in cost competitiveness and price competitiveness depend not only on changes in the exchange rate, but also on the cost and price evolution. The REER that is specific to scoreboard indicators for excessive imbalance procedure is deflated with the price index (total economy) compared to a group of 36 countries (i.e. EU-27 and 9 other industrialized countries: Australia, Canada, USA, Japan, Norway, New Zealand, Mexico, Switzerland and Turkey). Double weighting of exports is used to calculate the REER in order to take into account not only of competition on the domestic markets of the various competitors, but also on other export markets. An increase in the index indicates a loss of competitiveness.

## d. Share of world exports<sup>50</sup>

The AMR scoreboard includes an indicator on changes in the market share of a country in global exports of goods and services, in order to measure in volume the slow and persistent losses in competitiveness. It is an outcome indicator, which also captures the components of non-cost competitiveness, or the ability of a country to exploit new business opportunities due to the increased demand from emerging economies. For this indicator, it has been agreed under the MIP that a country is potentially at risk if this indicator is less than -6%.



Source: Eurostat, orange line = threshold of -6% set by the MIP Note: A euro area Member State is considered to be at risk of imbalance if the change in its share of world exports is below -6%. If the indicator is above this threshold, a Member State is not considered to be at risk.

Between 2000 and 2010, Luxembourg respected the set threshold. However, like its neighbouring countries, Luxembourg has lost market shares globally since then. As such, it does not respect anymore this threshold since 2011, although the negative trend seems to have stopped between 2012 and 2013.

> <sup>50</sup> This indicator shows the evolution of the export shares of goods and services of the EU Member States in total world exports. Data on the values of exports of goods and services are developed in the context of the balance of payments of each country. To take into account the structural losses of competitiveness that can accumulate over long periods. the indicator is calculated by comparing year Y to year Y-5. The indicator is based on the data from the balance of payments provided to Eurostat by the 27 EU Member States.

## e. Nominal unit labour costs<sup>51</sup>

The nominal unit labour costs (nominal ULC) are the indicator traditionally used to measure the cost-competitiveness of an economy. The change in domestic nominal unit labour costs of a country, or the cost of labour per unit of value added produced, is compared to those of the main trading partner countries. Thus this indicator includes two factors: firstly, the average labour cost in an economy and secondly, the level of productivity. For this indicator, it has been agreed that a country is at risk if this indicator is higher than +9%.

Luxembourg had exceeded the threshold in 2001-2003 and exceeds it again from 2008 on, a period during which Luxembourg also shows much higher increases in its ULC than its neighbours. The increase since 2008 is mainly linked to the collapse of productivity in almost all sectors. This unfavourable evolution in Luxembourg may be explained by the larger weight of the financial sector in the Luxembourg economy, a sector that, by its large loss of productivity in recent years has greatly contributed to the increase of the ULC in Luxembourg. The same explanation applies to changes in the manufacturing sector, which has carried out major plans to safeguard jobs in the recent years of crisis.



Source: Eurostat, orange line = threshold of +9% for euro area Member States Note: A euro area Member State is considered to be at risk of imbalance if the change in its nominal ULC is above +9%. If the indicator is below this threshold, a Member State is not considered to be at risk. The nominal unit labour costs (NULC) are defined as the ratio of total employees compensation (D1), in millions of national currency, relative to the total number of employees, divided by the ratio of GDP at market prices in millions, expressed in chain-linked volume for the reference year 2005 (CLV05) with the 2005 exchange rate into national currency relative to the total number of people employed. The change in nominal unit labour costs is the change in the total compensation of employees by number of employees not covered by the change in labour productivity as well as the change in the proportion of employees in total employment. The input data are obtained through official data transmissions from countries' national accounts in the ESA95 transmission programme. Data are expressed as a percentage change in indices between the year Y and the year Y-3.

## 4.3.4.2 Internal Imbalances

## a. Housing prices<sup>52</sup>

This indicator measures changes in the acquisition prices of real estate within the EU Member States to detect internal imbalances linked to a potential "housing bubble". It has been agreed under the MIP that a country is at risk if this indicator is higher than +6%.



Note: A euro area Member State is considered to be at risk of imbalance if the change in housing prices is above +6%. If the indicator is below this threshold, a Member State is not considered to be at risk.

Regarding the change in real estate prices (housing) in Luxembourg, prices have risen almost without interruption since 2001, except during the years 2008 and 2009. Luxembourg has exceeded the set upper threshold every year between 2001 and 2006 but has not exceeded it since 2007. Since 2010, Luxembourg has displayed a positive real change in housing prices, which is nevertheless below the set threshold.

<sup>52</sup> The deflated index of housing prices is the ratio between the housing price index and the deflator of private final consumption expenditure (households and non-profit institutions). Therefore this indicator measures inflation in the housing market compared to that of final consumption of households and NPI. Eurostat index of housing prices reflects the price changes of all types of housing purchased by households (apartments, detached non-detached houses, etc.), both new and existing, regardless of their final use and previous owner. Only market prices are considered, so built housing on own account is excluded. The land is included. Data show changes in percentage from year A compared to the year A-1.

## b. The private sector credit flow<sup>53</sup>

This indicator measures the credit flow of the private sector that corresponds to the net changes in liabilities of the non-financial corporate sectors, households and non-profit institutions serving households. A country is at risk if this indicator is above +15%. Luxembourg has met the threshold set by the MIP, even if the threshold was overrun once in 2007.



Source: Eurostat, orange line = threshold of +15% set by MIP Note: A Member State is considered to be at risk of imbalance if the change of private sector credit flows is above +15%. If the indicator is below this threshold, a member State is not considered to be at risk.

## c. Private sector debt<sup>54</sup>

The private sector debt indicator is important because if it is excessively high, private sector debt involves significant risks to growth and financial stability of a country. The indicator measures the level of private debt oft he economy: non-financial corporations, private households and non-profit institutions serving households (as a % of GDP). The indicator is based on non-consolidated data, meaning it includes for example intra-sector debt at national level. It has been agreed that a country is potentially at risk if this indicator is above +133% of GDP.

- The private sector credit flow corresponds to the net changes in liabilities of the non-financial corporate sectors (S.11), households and non-profit institutions serving households (S.14 S.15) incurred during the vear. The instruments included in the calculation of private sector credit flows are the 'Securities other than shares" (F.3) and "Credits" (F.4), to the exclusion of any other instrument. The concepts used in the definition of sectors and instruments are consistent with ESA95. Data are expressed in EUR million and calculated on a non-consolidated basis, i.e. by including transactions among units of the same sector.
- 54 The private sector debt corresponds to the outstanding amount of liabilities of non-financial corporate sectors (S.11), households and non-profit institutions serving households (S.14 S.15). Instruments included in the calculation of the private sector debt are "Securities other than shares" (F.3) and "Credits" (F.4), to the exclusion of any other instrument. The concepts used in the definition of sectors and instruments are consistent with ESA95. Data is expressed in EUR million and calculated on a non-consolidated basis, i.e. including transactions between units of the same sector.



Source: Eurostat; orange line = threshold of 133% set by MIP Note: A Member State is considered to be at risk of imbalance if the debt of its private sector exceeds 133% of GDP. If the indicator is below this threshold, a Member State is not considered to be at risk.

Since this indicator is available for Luxembourg (2006), it overruns the threshold set by the MIP. However, in Luxembourg this indicator should be interpreted with caution because non-financial companies incur most of this private sector debt. Given the liquidity of financial markets and the experience in international transactions, a company may choose to incur debt through funding in Luxembourg, not for its own need but for another related entity that may be located abroad (e.g. intra-group loans). This debt then contributes to the nominator of the "private sector debt relative to GDP" indicator used here, without taking into account the added value produced by this funding if it is out of Luxembourg because the GDP (denominator) is a national concept. For a small and very open economy such as Luxembourg, this indicator therefore tends to be overestimated because the nominator (debt) is overvalued and the denominator (GDP) is undervalued because the added value created abroad from these sources of financing (debt) raised inside the country is not taken into account. With particular regard to private household debt, this debt results mainly from loans taken for housing acquisition, and is close to the euro area average.

## d. General government gross debt<sup>55</sup>

This indicator takes into account the potential contribution of public sector debt to macroeconomic imbalances. The definition used is that set by the Stability and Growth Pact (SGP). This indicator is not included to monitor the risk of unsustainable public finances, but should be considered as a complement to the indicator on private debt. A high level of government debt is more alarming when accompanied by a high level of private debt. For this indicator, it has been agreed under the MIP that a country is potentially at risk if this indicator is above +60% of GDP.

Luxembourg has a public sector debt level well below the "Maastricht" threshold, and well below that of its neighbours, although since 2007 public sector debt has also started to rise sharply in Luxembourg.



Source: Eurostat, orange bar = threshold of 60% set by the Maastricht treaty Note: A Member State is considered to be at risk of imbalance if its public debt exceeds 60%of GDP. If the indicator is below this threshold, a Member State is not considered to be at risk.

## e. The unemployment rate<sup>56</sup>

This indicator is intended to monitor high and persistent unemployment rates and it points to a possible misallocation of resources (incompatibility) and the general lack of responsiveness in the economy. It should therefore be read in conjunction with other more future-oriented indicators and should be used to better understand the potential severity of macroeconomic imbalances. It has been agreed that a country is at risk if this indicator is above 10%. Luxembourg has an unemployment rate well below the threshold set by the MIP, although since 2000 unemployment has risen sharply in Luxembourg. In 2013 the unemployment rate in Luxembourg is slightly lower than the one in Germany or in the Netherlands.

- General government gross debt is defined in the Maastricht Treaty as the consolidated gross debt of the whole general government sector in nominal value at the end of the year. The government sector includes the following subsectors: central government, State government, local government and social security funds. Definitions are available in the 479/2009 Regulation as amended by the 679/2010 Council Regulation. National data for the general government sector are consolidated over sub-sectors. The series are available as a percentage of GDP. GDP denominator comes from the ESA95 transmission programme, and not from the EDP notifications. The revised GDP data being transmitted in a delayed schedule, it may result in potential differences in debt as a % of GDP, according to the source, EDP or AMR scoreboard.
- 56 The unemployment rate represents the number of unemployed persons as a percentage of the labour force as defined by the International Labour Organization (ILO). The labour force consists of employed and unemployed persons. Unemployed persons are those aged 15 to 74 who: - were jobless during the reference week were available for work during the next two weeks - and were either looking actively for a job during the previous four weeks or had already found a job that began in the following three months. Data are 3-year moving averages, i.e. year A data are the arithmetic mean of the years A, A -1, A -2. In this context, it is not the national definition of unemployment used in Luxembourg, which is the one used by the Agency for Employment Development (ADEM): "The unemployment rate is the ratio between the number of resident jobseekers available and the labour force. The latter consists of all persons living in the country who are working (employee or self-employed) or looking for a job (jobseeker)." For more details: http://www.adem.public. lu/publications/communiques/ Note\_technique\_sur\_les DSM\_-\_ADEM\_24\_02\_2012. pdf





## f. Total financial sector liabilities<sup>57</sup>

This indicator measures the evolution of the sum of the liabilities of the entire financial sector of a country. The indicator is expressed as an annual growth rate. For this indicator, it has been agreed under the MIP that a country is potentially at risk if this indicator is higher than +16.5%. Since this indicator has been available, Luxembourg has been below the limit set by the MIP. However, the annual change is stronger in Luxembourg than in its neighbouring countries and the country is in general closer to the limit threshold than its neighbouring countries.



<sup>57</sup> Total financial sector liabilities measure the evolution of the sum of all liabilities (including currency and deposits, securities other than shares, loans, shares and other equity, insurance technical reserves and other accounts payable] of the entire financial sector. The indicator is expressed as an annual growth rate.

Source: Eurostat; orange line = threshold of 16.5% set by MIP Note: A Member State is considered to be at risk of imbalance if the growth rate of the total financial sector liabilities exceeds +16.5%. If the indicator is below this threshold, a Member State is not considered to be at risk.

#### 4.3.4.3 Intermediate conclusions

Based on the updated data used in this chapter, and pending the AMR report in 2015, we note that Luxembourg has overrun three threshold: the change in global export market share, the debt of the private sector and the nominal unit labour costs.

| Table 9       Summary table of the alert mechanism update (July2014) |                    |                           |                                 |                 |                |                                 |                               |                        |                       |                      |   |
|--|--------------------|---------------------------|---------------------------------|-----------------|----------------|---------------------------------|-------------------------------|------------------------|-----------------------|----------------------|---|
|  |                    |                           | E                               | xternal im      | balances       | Internal imbalance              |                               |                        |                       |                      |   |
|  | Current<br>account | Net external<br>positions | Real effective<br>exchange rate | Market<br>share | Nominal<br>ULC | Housing<br>prices<br>- deflated | Private sector<br>credit flow | Private sector<br>debt | Public sector<br>debt | Unemployment<br>rate | Financial<br>sector<br>liabilities<br>financier |
| LU *   | +5,9               | +184,1                    | -2,3                            | -6,8            | +11,3          | +3,6                            | -5,0                          | 317,4                  | 23,1                  | 5,3                  | +11,3   |
| Thresholds **  | > -4%<br>< +6%     | ><br>-35%                 | > -5%<br>< +5%                  | ><br>-6%        | <<br>+9%       | <<br>+6%                        | <<br>+15%                     | <<br>160%              | <<br>60%              | <<br>10%             | <<br>+16,5%                                     |
| Courses Eurostat   |                    |                           |                                 |                 |                |                                 |                               |                        |                       |                      |   |

Note: \* Situation according to the data available on 7 July 2014. \*\* Conditions for not being considered imbalanced (for some indicators these thresholds are different for the euro area Member States and for other Member States).

Two major events will have an impact on time series in the next scoreboard editions used in the macroeconomic imbalances procedure:

- ▼ In 2014 the European System of Accounts (ESA) 1995 moved to the ESA 2010. This transition to the ESA 2010 takes place in a coordinated way in the EU countries and leads to the modification of a certain number of accounting rules. This major review will allow updating all figures used in account calculating. At the international accounts level, the sixth edition of the Balance of Payments and International Investment Position Manual (BPM), published by the International Monetary Fund (IMF), acts as a framework for statistics on transactions and positions between an economy and the rest of the world. The revision of the manual has allowed strengthening theoretical foundations and links with other macroeconomic statistics, and especially with national accounts;
- European regulation on the macroeconomic imbalance procedure provides for a review of the indicators used on a three-yearly basis. This implies that during the 2014/2015 period some changes may occur in the alert mechanism and in the scoreboard.

## **Bibliography** 4.4

#### **CENTRE FOR EUROPEAN REFORM**

The new Commission's economic philosophy, in Policy brief, February 2010

#### CENTRE FOR EUROPEAN POLICY STUDIES

Macroeconomic Imbalances in the Euro Area: symptom or cause of the crisis?. Policy Brief n°266, April 2012

#### EUROPEAN COMMISSION, EUROPE 2020

Une stratégie pour une croissance intelligente, durable et inclusive, COM(2010) 2020 Brussels, 3.3.2010

#### EUROPEAN COMMISSION

Alert Mechanism Report 2014, Brussels, November 2013

#### **EUROPEAN COMMISSION**

État des lieux de la stratégie Europe 2020 pour une croissance intelligente, durable et inclusive, Brussels, March 2014

#### **EUROPEAN COMMISSION**

Macroeconomic Imbalances Luxembourg 2014, European economy -Occasional Papers 183, March 2014

EUROPEAN COUNCIL Conclusions, Brussels, 26 March 2010

#### **DEUTSCHE BANK RESEARCH**

European Commission publishes first Alert Mechanism Report on Macroeconomic Surveillance, 20 February 2012

#### EUROPEAN POLICY CENTRE

Europe 2020: better - but still not good enough, in Commentary, 5.3.2010

#### EUROPEAN POLICY CENTRE

Europe 2020: delivering well-being for future Europeans, in Challenge Europe, March 2010

#### EUROSTAT

Europe 2020 Strategy - towards a smarter, greener and more inclusive EU economy?, statistics in focus 39/2012, 21.9.2012

#### EUROSTAT

Smarter, greener, more inclusive? Indicators to support the Europe 2020 strategy - 2013 edition, Eurostat statistical books, Luxembourg, 2013

LUXEMBOURG GOVERNMENT

Programme national de réforme Luxembourg 2020, Luxembourg, April 2011

### LUXEMBOURG GOVERNMENT

Programme national de réforme Luxembourg 2020, Luxembourg, April 2012

#### LUXEMBOURG GOVERNMENT

Programme national de réforme Luxembourg 2020, Luxembourg, April 2013

#### LUXEMBOURG GOVERNMENT

Programme national de réforme Luxembourg 2020, Luxembourg, April 2014

#### LISBON AGENDA GROUP

On the EU2020 strategy: contributions after the Lisbon agenda experience, January 2010

#### LISBON COUNCIL

Innovating Indicators: Choosing the Right Targets for EU 2020, Brussels, e-brief issue 04/2009

#### LISBON COUNCIL

If not now, then when? Using Europe 2020 to move from crisis management to restoring confidence and growth, Brussels, e-brief issue 07/2010

#### LISBON COUNCIL

An action plan for Europe 2020 strategic advice for the post-crisis world, Brussels, March 2011

#### MINISTRY OF THE ECONOMY

AND FOREIGN TRADE 2012 Competitiveness Report. Luxembourg, October 2012

#### MINISTRY OF THE ECONOMY AND FOREIGN TRADE

2013 Competitiveness Report Luxembourg, October 2013

#### **MONETARY POLICY & THE ECONOMY**

Prevention and Correction of Macroeconomic Imbalances the Excessive Imbalances Procedure, Q4/2011

#### PISANI-FERRY J.

Repenser la gouvernance économique de la zone euro, Bruegel policy contribution, in Problèmes économiques n°3001, Paris, September 2010

#### WEF

The Europe 2020 competitiveness report: building a more competitive Europe, Geneva, 2012

#### WEBSITES

http://epp.eurostat.ec.europa.eu/portal/ page/portal/europe\_2020\_indicators/ headline\_indicators

http://ec.europa.eu/eu2020/index\_fr.htm

http://ec.europa.eu/economy finance/ indicators/economic\_reforms/eip/

http://epp.eurostat.ec.europa.eu/portal/ page/portal/excessive imbalance procedure/imbalance\_scoreboard

# 5 Analysis of the economic impact of the government's new priority sectors

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# 5.1 Context

Until the 1970s, Luxembourg's economy was dominated by the steel industry, which experienced a considerable growth from 1950 onwards.

This steel industry boom and its dominance in the creation of economic wealth in Luxembourg led the Luxembourg government to a policy of industrial diversification. From 1950s Luxembourg has been able to attract the first U.S. (non-steel) companies such as Goodyear (tyre production), DuPont de Nemours (polyester production) and Monsanto (nylon thread production) coupled with the development of the financial sector. With the creation of the *Société Nationale de Crédit et d'Investis-sement* (SNCI) (National Credit and Investment Company), industrial areas and around a hundred new companies since 1980, industrial diversification was evidenced by a decrease in the share of steel industry and an increase in other industries in Luxembourg's gross domestic product (GDP).

During the 1970s, Luxembourg's steel industry, which was still then the main pillar of the Luxembourg economy, was strongly affected by the steel and oil crises (Chart 1).



Subsequently the whole of the industry and steel industry decreased in total value from 47% and 28% in 1970 to 8% and 2% in 2011.

Corresponding to the continuing decline of the steel industry, the financial sector emerged in Luxembourg during the 80s and 90s, mainly due to a favourable regulatory and tax framework compared to other European countries. Despite this shift from an industrial fabric to a services economy, the monolithic structure of the Luxembourg economy remained intact. Indeed, the heavy dependence on the steel industry in the industrial era has been followed by the strong dependence on the financial sector since the 80s. Now, Luxembourg is facing a shift towards a services economy: in 1960 less than 40% of gross value added was created by the services sector, while in 2010 services made up approximately 87% of gross value added. At the same time the industry share in the Luxembourg economy decreased from 50% in 1960 to about 7% in 2010 (Chart 2). In 2013 services and industry sectors represented 87.5% and 5.9% respectively of the total value added.



The steel and oil crises of the 1970s and the 2008 financial crisis have highlighted the vulnerability of and economy that is dependent on one sector of activity, and the need for sectoral diversification. Especially for small countries such as Luxembourg, spreading risks over several sectors is a major challenge.

An analysis published in the 2007 Competitiveness Report<sup>1</sup> describes the specialization of Luxembourg in the field of financial intermediation from 1985 onwards and highlights the difficulty and the importance of diversification for a small economy such as Luxembourg to protect itself against the possibility of sectoral shocks.

> Ministry of Economy and Foreign Trade, Bilan compétitivité 2007, "En route vers Lisbonne" - "An Analysis of the sectoral diversification of a small open economy: the case of Luxembourg", 2007
#### The industry: an evolving concept

For many years, "industrialisation" went hand in hand with economic development, increase in productivity and improvement of socioeconomic well-being by exploiting economies of scale and by exporting to more or less distant markets.

Deindustrialisation reflects the major transformation of the production equipment in the developed world. In fact, the tertiary sector has increasingly developed for several decades now, mainly because of a higher service demand due to a rise in individual income. Information and communication technology applications have also become increasingly present in the production process and have allowed an increase in service productivity and a supply at a lower marginal price whilst emphasising scale effects of services. Furthermore, "the diminution of jobs in the traditional industrial sector results partly from a 'statistical illusion' due to numerous activities, from design to data processing and to transport, cleaning and security, which were subcontracted by industrial companies to specialised service providers"<sup>2</sup>. Thus, the traditional distinction between services and industry becomes more vague and it becomes increasingly difficult to measure inter-sectoral interactions, given the importance of service outsourcing and changing technological links between industry and services. Manufacturing industries resort to different service producers at different levels of intensity.

The "filière" approach integrates these two levels of analysis: it considers the sequence of design, R&D, supply, production and commercialisation phases<sup>3</sup>. This allows identifying the different segments of the production process and their level of interdependence. Thus, from the point of view of the company, this approach considers not only market strategies but also sourcing, technology, provision and logistics strategies. From the point of view of the industry, this approach goes much further than the sectoral decomposition and considers synergies between sectors, technologies and territories. According to this approach, a *filière* (chain) includes industrial activities as well as services. This set will determine the competitiveness of a company.

Therefore it is difficult to analyse the importance of the industrial sector through conventional macroeconomic or sectoral analyses as they often do not reflect the characteristics of this sector adequately and do not take the strong link with technologies into consideration. This type of analysis would therefore be more relevant at the subsector level and even at the production activities or tasks level in order to take new realities of the industrial system into consideration as well as their configurations in the overall production system. As the production process continues to change, thanks especially to innovation and research, a more dynamic analysis would be necessary.

If a classification such as NACE codes<sup>4</sup> is useful, it is essential not to get trapped in categories but rather analyse the complexity of interactions between sectors as well as the link between different activities carried out within different companies (e.g. RTL Group's activity is strongly linked to the ICT sector but is classified under NACE code 70.10 – Activities of head offices and does therefore not fall within the ICT definition).

- <sup>2</sup> Andreoni, Gregory, Why and How Does Manufacturing Still Matter: Old Rationales, New Realities, 2013 Lionel Fontagné and Jean-Hervé Lorenzi, Désindustrialisation et délocalisations, Rapport CAE, La Documentation française, Paris, 2005
- <sup>1</sup> Bianchi, Labory, Structural Transformations in Industry and *Filières*, 2013
- NACE: Statistical classification of economic activities of the European Community

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Until now, the "conventional" or traditional industrial sector has been defined as all activities concerned with the mass production of goods by the processing of raw materials<sup>5</sup>.

In this Report, we prefer to propose a broader definition, by using the sections of national accounts, which combine activities related to manufacturing (B) and mining and quarrying (C) as well as to electricity, gas, steam and air conditioning supply (D) and water supply: sewerage, waste management and remediation activities (E). The definition of "broader" industry could take the following sectors into consideration: construction (F), transportation and storage (H) and information and communication (J), given the strong link between these activities and the industrial sector resulting from the outsourcing of certain activities from industry towards the service sector (Chart 3). This is only a first approach and other analytical criteria are necessary to give a deeper understanding of what represents industry in the wider sense.



#### Chart 3 Share of the industry in the total gross value added (GVA) according to the traditional and broader definition

Source: STATEC, Observatoire's calculations

<sup>5</sup> Larousse dictionary, 2014

A significant difference can be noted for the industry in national economy depending on which definition is used. While according to the "traditional" definition, the manufacturing industry represented 5.9% of the total sum of gross value added at base prices in 2013, according to the "broader" definition it represented 22.5% of the total in the same year. Since 1995, a decline in the share of Luxembourg's economy accounted for by industry can be noted, a tendency similar to the one of other developed countries facing a relative deindustrialisation of the economy. However, by broadening the definition of the sector, it can be noted that it represents more than a fifth of the gross value added of the total of the country. Given the fact that transportation of passengers should be considered as a service, it would be more relevant to only consider the share of transportation of goods in this definition. Based on an estimation of activities in this sector, it is thus possible to reckon the share of gross value added of the industry in the broad sense (thus excluding the transportation of passengers) at 20.6% of the economy in 2013.

We may also see this relative deindustrialisation in the decrease of the industry in total employment (Chart 4).



The share of employment has declined from 16.5% in 1995 to 9.5% in 2013. However according to a broader definition of the industry, it still represents more than 30% of the total employment in Luxembourg. Based on the approach defined above, it is possible to estimate the share of the total employment of the industry in a broader sense (excluding the transportation of passengers) at 28.2% in 2013.

<sup>6</sup> STATEC, author's calculation

## 5.2 Objective of the study

In order to strengthen Luxembourg economy and to protect the country against possible external shocks, Luxembourg's government initiated in 2004 its new economic diversification policy, on a multi-sectoral specialisation basis. To date, there are five priority sectors:

- Information and communication technologies (ICT);
- Space technologies;
- Logistics;
- Health sciences and technologies;
- Eco-technologies.

Nowadays, the government wishes to increase the number of statistics and indicators, both quantitative and qualitative, to assess how these five sectors of specialisation are evolving in order to better measure their development as well as their impact on the national economy.

This project is also supporting the government and the efforts to seek foreign investment as well as to promote Luxembourg's territorial attractiveness abroad.

The study analyses each of the above-mentioned sectors with the aim of better defining them. It also aims to establish a statistical profile using indicators. Over time, this information will enable to assess each sector's scope in the Luxembourg economy and to contribute to a periodical monitoring of their development over time.

Note: A first analysis of the new priority sectors had been undertaken on the occasion of the publication of the 2013 Competitiveness Report. Since then the space technologies sector has been attached to the Ministry of the Economy, joining the four other new sectors that were already under the competence of the Ministry. Furthermore, the definitions of the sectors have been readapted in order to be even more representative of the ongoing activities in Luxembourg. A further analysis, taking more indicators into account, is currently underway.

## 5.3 Approach used

The fact that there is no official statistical classification of the five sectors we wish to analyse and monitor over time makes the whole exercise rather difficult. Concerning the national accounts, for example, the economic activities are grouped according to two standard aggregations of ISIC<sup>7</sup>/NACE categories.

> International standard industrial classification of all economic activities

The first, known as "high-level aggregation", aggregates the ISIC/NACE sections into 10 or 11 categories. The second, called "intermediate aggregation", aggregates divisions into 38 categories (Table 1)<sup>8</sup>. However the five sectors the Ministry of the Economy wishes to develop do not necessarily follow these aggregates. Thus, it is often not possible to use this approach to define each of these five sectors.

| Table 1 Intermediate aggregation used in the national accounts |      |  |  |  |  |  |
|--|------|--|--|--|--|--|
| Section  | Code | ISIC Rev. 4/NACE Rev. 2  |  |  |  |  |
| А  | А    | Agriculture, forestry and fishing  |  |  |  |  |
| В  | В    | Mining and quarrying   |  |  |  |  |
|  | CA   | Manufacture of food products, beverages and tobacco products   |  |  |  |  |
|  | СВ   | Manufacture of textiles, apparel, leather and related products   |  |  |  |  |
|  | CC   | Manufacture of wood and paper products, and printing   |  |  |  |  |
|  | CD   | Manufacture of coke, and refined petroleum products  |  |  |  |  |
|  | CE   | Manufacture of chemicals and chemical products   |  |  |  |  |
|  | CF   | Manufacture of pharmaceuticals, medicinal chemical and botanical products  |  |  |  |  |
| С  | CG   | Manufacture of rubber and plastics products, and other non-metallic mineral products                                       |  |  |  |  |
|  | СН   | Manufacture of basic metals and fabricated metal products, except machinery and equipment                                  |  |  |  |  |
|  | CI   | Manufacture of computer, electronic and optical products   |  |  |  |  |
|  | CJ   | Manufacture of electrical equipment  |  |  |  |  |
|  | СК   | Manufacture of machinery and equipment n.e.c.  |  |  |  |  |
|  | CL   | Manufacture of transport equipment   |  |  |  |  |
|  | СМ   | Other manufacturing, and repair and installation of machinery and equipment  |  |  |  |  |
| D  | D    | Electricity, gas, steam and air-conditioning supply  |  |  |  |  |
| Е  | E    | Water supply, sewerage, waste management and remediation   |  |  |  |  |
| F  | F    | Construction   |  |  |  |  |
| G  | G    | Wholesale and retail trade, repair of motor vehicles and motorcycles   |  |  |  |  |
| Н  | Н    | Transportation and storage   |  |  |  |  |
| 1  | I    | Accommodation and food service activities  |  |  |  |  |
|  | JA   | Publishing, audiovisual and broadcasting activities  |  |  |  |  |
| J  | JB   | Telecommunications   |  |  |  |  |
|  | JC   | IT and other information services  |  |  |  |  |
| К  | K    | Financial and insurance activities   |  |  |  |  |
| L  | L    | Real estate activities   |  |  |  |  |
|  | MA   | Legal, accounting, management, architecture, engineering, technical testing and analysis activities                        |  |  |  |  |
| М  | MB   | Scientific research and development  |  |  |  |  |
|  | MC   | Other professional, scientific and technical activities  |  |  |  |  |
| Ν  | Ν    | Administrative and support service activities  |  |  |  |  |
| 0  | 0    | Public administration and defence, compulsory social security  |  |  |  |  |
| Р  | Ρ    | Education  |  |  |  |  |
| Q  | QA   | Human health services  |  |  |  |  |
|  | QB   | Residential care and social work activities  |  |  |  |  |
| R  | R    | Arts, entertainment and recreation   |  |  |  |  |
| S  | S    | Other services   |  |  |  |  |
| т  | Т    | Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use |  |  |  |  |
| U  | U    | Activities of extra-territorial organisations and bodies   |  |  |  |  |
|  |      |  |  |  |  |  |

Source: STATEC

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<sup>8</sup> STATEC, NACELUX Rev. 2 Luxembourg version of NACE Rev. 2, Statistical classification of economic activities of the European Community. Introduction, structure and explanatory notes. It was therefore necessary to undertake a documentary research in order to establish an inventory of the definitions used to define each sector. However, during the implementation of the approach to be used in this analysis, other difficulties arose.

The first one is the *lack of a universally accepted definition* for each sector. While some sectors, such as ICT and logistics, are defined in a more uniform and accurate manner by different international organisations (e.g. OECD, Eurostat), others sectors such as science and health technologies or eco-technologies, do not have a universally accepted definition, given that they are more a production process than a product or an industry<sup>9</sup>, and so some sectors do not appear clearly in existing classifications.

A second difficulty is the *lack of an official directory of companies* for each sector. Although definitions used by organisations to build a register of companies often differ from the needs of each organisation (prospecting for investment, promoting the sector, economic development, clusters, ...), in most cases, there were no lists of the companies in each sector before the beginning of this project. Only the *Luxembourg Cluster Initiative* had established a list for some sectors, despite the fact that the definitions used did not necessarily correspond to those adopted in this study.

National statistics often refer to NACE codes in its analyses in order to define the different sectors of activity. However the NACE codes approach cannot be used for all sectors concerned in this study, as these codes refer to the *principal activity of the company*, i.e. representing more than 50% of the total value added of the company. Thus, the indicators calculated through this approach will not necessarily take into account those companies operating in one of the sectors analysed but whose principal activity is different.

Another difficulty area is that the five sectors analysed are at *different stages of development* in Luxembourg. While the logistics and ICT sectors are already developed, the science and health technologies, eco-technologies and space technologies sectors are still in the start-up phase. The indicators of the different sectors should be interpreted individually and within the same sector in order to take into account the different stages of development of each sector. For example, first investments in the ICT sector began over 25 years ago against 10 years for those in the science and health technology sector. Thus the performance of each sector is likely to differ also according to the level of development.

Furthermore, there is a characteristic specific to certain sectors, *the time to market*. The necessary timescale to finalise a project or to place a product on the market is very long in some sectors.

<sup>9</sup> 0ECD, Frascati Manual, 2002

For example, in the science and health technologies and space technologies sectors the interval between the investments made and the return may be ten years or more. This factor, combined with the stage of development of the sector, is why certain indicators used for the macroeconomic analysis do not take into account the time necessary to get a return on investment, given the novelty of certain sectors. In fact, the investments made over the last years will only have an economic impact in the long term.

Last but not least there is the issue of *interdependence of sectors*. Some of the priority sectors are interconnected and have a direct or indirect impact on other sectors. It is therefore difficult to define the outline and limits of each sector. It has been demonstrated, for example, that that the use of ICT has a high impact on other sectors<sup>10</sup> (such as financial services, biomedicine, automotive sector and logistics<sup>11</sup>) in terms of productivity. Companies using ICT in a more intensive way in manufacturing or service sectors are more productive, grow more rapidly, invest more, and are more profitable<sup>12</sup>.

Two approaches may be used to define each sector. The first approach is to build a register of companies active in each sector based on contacts established by the Ministry of the Economy with companies already active in Luxembourg as well as prospects. Whilst this "company" approach would enable a clear identification of those companies actually active in each sector, it is difficult to implement, especially for the larger sectors, as this task has never been undertaken before and there is no available list of companies for some sectors. Furthermore, besides the fact that this approach implies a considerable investment in terms of resources and time (the ICT sector includes more than a thousand companies and building such a register would require significant effort whilst running the risk of not being exhaustive considering the size of the sector), it also has some drawbacks. It makes the comparability difficult at inter-sectoral and international level, implies a yearly monitoring of each "entering" and "outgoing" actor of the sector in order to avoid overestimating or undervaluing the size of the sector and, given the size of the sample, it is possible to face problems of access to and disclosure of information for data confidentiality reasons. The second approach is based on the use of definitions recognised by both national and international statistical agencies. This "statistics" approach is more immediate for certain sectors but often implies a lack of recent data as establishing indicators to analyse (time of submission of the companies' accounts, time of data analysis, etc.) takes several years.

It was therefore considered relevant to combine these two approaches in order to define the sectors and gain an estimation of the size of these sectors according to their characteristics. Given the fact that there is no definition universally recognised by the different national and international statistical agencies, or by the other institutions directly implicated for each sector, an ad hoc approach had to be developed for each sector according to its specificities and the availability of public information that could be collected.

- <sup>10</sup> World Bank, Information & Communication Technologies Sector Strategy, 2011
- <sup>11</sup> Delano, Luxembourg changes its focus, 2014
- <sup>12</sup> World Bank, Qiang, Clarke, and Halewood 2006, p.57

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A sector-specific analysis has been undertaken with the aim of better understanding the different definitions used in the literature, understand their limits and implement the most exhaustive and representative definition.

Given that the definitions used in this analysis are based on a literature review and on approaches used in similar exercises carried out by other national or international organisations, the definition was created so as to be coherent with the one used by the government and other agencies involved in promoting Luxembourg abroad.

Whilst the approach based on using lists of companies from each sector would be preferable in order to get a more accurate estimation of the weight of each sector in the national economy, it has been considered more relevant at this stage to create a list of companies only for smaller sectors and for which it is easier to identify the players in the sector in a more comprehensive manner. It was therefore decided to use definitions universally accepted by international institutions where available readapting them in order to meet the definitions the government uses for the sectors.

Once the definition has been established for each sector, indicators enabling to measuring the impact of the sector have been selected for both private companies and public research centres. This selection of indicators has been based on impact studies already carried out in other countries.

The national data available from STATEC or the Trade and Companies Register should consequently allow establishing the statistical profile of each sector as well as the impact of the five sectors on Luxembourg's economy.

Finally, based on this information and interviews organised with the involved players from the different sectors (ministry, Luxinnovation, heads of companies), it will be possible to establish an analysis of activities in Luxembourg for each sector. Strenghts, weaknesses, opportunities and threats (SWOT) could also be analysed in order to better position Luxembourg with regard to leading countries in these fields.



A diagram of the approach used is represented in Chart 5.

## 5.4 Definition of sectors

## 5.4.1 Information and communication technologies (ICT)

In the context of the National Reform Programme, Luxembourg government has implemented a "ICT and broadband national action plan" in 2009. This plan highlights the necessity to develop and widen existing capacities and the importance to connect the country to global networks in order to meet users' current and future needs, whether they are professionals or individuals. The development of the ICT sector in Luxembourg aims to meet consumers' increasing needs, to remain competitive at international level due to productivity gains of new technologies, to have access thanks to ICT to both domestic and international market considering the limited size of Luxembourg and to develop an economic model more able to resist possible future financial shocks<sup>13</sup>.

At international level, the OECD and the European Union regard information and communication technologies as a priority in order to stay competitive in an increasingly globalised and digitalised world.

For a few years now, government efforts to promote Luxembourg have been dedicated to attracting companies active at different levels in the ICT sector as well fostering the development of their activities in Europe from the Grand Duchy.

Nowadays, the ICT sector in Luxembourg includes among others numerous renowned international players in different fields such as data storage (EBRC, Datacenter Luxembourg, etc.) and satellite telecommunication (SES) but also e-commerce activities (Amazon, eBay, iTunes, etc.).

> <sup>13</sup> Ministry of State - Medias and communication service, Plan d'action national en matière de TIC et de haut-débit, 2009

#### Literature review and chosen definition

The literature indicates there are two ways to define the ICT sector: the first approach is to use industry classifications whilst the second one is to build a register of companies or establishments related to the studied sector<sup>14</sup>. Whilst the first approach is used in an almost systematic way to analyse this sector given the level of data availability, the building of a register of companies or establishments active in the specific sector is less systematic because the collected information does not necessarily fulfil the criteria statistical agencies use. Furthermore, this approach does not apply to Luxembourg as there are currently no comprehensive lists including all ICT companies as well as their activities in the country. Thus, the literature suggests using the first approach.

There are several industry classifications, which allow classifying economic activities occurring in a specific territory and making comparisons over time. The OECD<sup>15</sup> and Eurostat classifications are considered the reference at international level.

According to the definition used by the OECD since 2007, candidate industries for being part of the sector have to comply with the following general principle: "The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means including transmission and display"<sup>16</sup>. According to ISIC Rev. 4, this definition divides the ICT sector into three sub-sectors: manufacturing industries, trade industries and service industries. Eurostat defines information and communication technologies as "all technical means used to handle information and aid communication. This includes both computer and network hardware, as well as their software". Eurostat uses its own industry classification, the Statistical classification of economic activities in the European Community (NACE), derived from the ISIC Rev.4 classification and is thus defining the manufacturing and service activities.

A table of correspondence between the ISIC codes, used by the OECD, and the NACE codes, used by Eurostat, is presented in Table 2 and will be used to calculate the indicators of the sector.

- <sup>14</sup> Institut de la statistique du Québec, Profil statistique du Secteur des Technologies de l'information et des communications (TIC), 2011
- <sup>15</sup> OECD: Organisation for Economic Co-operation and Development
- <sup>16</sup> OECD, Guide to measuring the information society, 2011

| Codes for ICT-related activities |                     |                          |                         |  |
|----------------------------------|---------------------|--------------------------|-------------------------|--|
| Sub-sectors<br>(OECD)            | ISIC Code<br>(OECD) | Activities<br>(Eurostat) | NACE Code<br>(Eurostat) | Description  |
|                                  | 0/40                | ICT                      | 26.110                  | Manufacture of electronic components                               |
|                                  | 2010                |                          | 26.120                  | Manufacture of loaded electronic boards                            |
| ICT                              | 2620                |                          | 26.200                  | Manufacture of computers and peripheral equipment                  |
| industries                       | 2630                | manufacturing            | 26.300                  | Manufacture of communication equipment                             |
|                                  | 2640                |                          | 26.400                  | Manufacture of consumer electronics                                |
|                                  | 2680                |                          | 26.800                  | Manufacture of magnetic and optical media                          |
| ICT                              | 4651                | ICT services             | 46.510                  | Wholesale of computers, computer peripheral equipment and software |
| industries                       | 4652                |                          | 46.520                  | Wholesale of electronic and telecommunications equipment and parts |
|                                  | 5000                |                          | 58.210                  | Publishing of computer games                                       |
|                                  | 2820                |                          | 58.290                  | Other software publishing  |
|                                  | 6110                |                          | 61.100                  | Wired telecommunications activities                                |
|                                  | 6120                |                          | 61.200                  | Wireless telecommunications activities                             |
|                                  | 6130                |                          | 61.300                  | Satellite telecommunications activities                            |
|                                  | 6190                |                          | 61.900                  | Other telecommunications activities                                |
| ICT                              | 6201                |                          | 62.010                  | Computer programming activities                                    |
| industries                       | 4202                |                          | 62.020                  | Computer consultancy activities                                    |
|                                  | 6202                |                          | 62.030                  | Computer facilities management activities                          |
|                                  | 6209                |                          | 62.090                  | Other information technology and computer service activities       |
|                                  | 6311                |                          | 63.110                  | Data processing, hosting and related activities                    |
|                                  | 6312                |                          | 63.120                  | Web portals  |
|                                  | 9511                |                          | 95.110                  | Repair of computers and peripheral equipment                       |
|                                  | 9512                |                          | 95.120                  | Repair of communication equipment                                  |

Note: The table represents the NACE Codes Rev. 2 corresponding to the ICT definition of Eurostat and the OECD based on the ISIC Rev. 4 codes

However, this definition is limited to the activities of the ICT-producing sectors and does not include related activities, depending on ICT. In fact, digital economy is not limited to one sector of activity in particular and many sectors, producers and users rely on ICT. As such we may distinguish three categories of ICT players<sup>17</sup>:

Table 2

- The ICT producing sector, in the strict meaning of the OECD or Eurostat (hardware and electronic components, telecommunications, IT services and softwares, ...);
- Activities with digital content whose existence is linked to the rise of ICT (online services, video games, e-shopping, ...);
- ICT user sectors, which use these technologies that enable them to gain in productivity, but whose activity pre-exist to the emergence of ICT (banking, insurance, automotive, aeronautics, distribution, administration and tourism, ...).

<sup>17</sup> Sociétal n°73, L'impact de l'économie numérique, 2011



Source: Sociétal n°73, L'impact de l'économie numérique, 2011

Given the complexity of connections between ICT and the other sectors or industries, it is difficult to give a comprehensive definition of the ICT sector and to measure the impact these technologies have on the efficiency of the user sectors.

Therefore, based on this model, the definition of the ICT sector could be broadened and two definitions could be used:

- Definition in the strict sense: based on the OECD and Eurostat definition of the ICT sector, this definition includes the producing activities of the ICT equipment and software (manufacturing activities), distribution of ICT products and services (trade activities) as well as service provision enabling ICT operations (service activities)<sup>18</sup>;
- Definition in the broader sense: this definition is more difficult to determine as it includes other ICT-related activities. It includes, for example, activities whose existence is linked to ICT emergence (e.g. e-commerce and the content and media sectors).

While the definition in the strict sense has now been chosen to quantify core activities connected to the ICT sector, it is less obvious to determine and to measure the other activities that should be included in the definition in the broader sense in order to gain a more complete and representative evaluation of the sector in question. This approach of listing companies is complex and not standardised. Despite efforts to be as exhaustive as possible in defining ICT, it is difficult to define the exact outline of ICT in the broader sense, given the level of interdependence between ICT and the other sectors or industries.

> <sup>18</sup> OECD, Guide to measuring the information society, 2011

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A definition of the sector in the broader sense could this way be established at least in an approximate manner, in order to allow a better evaluation of the size of the ICT sector. This analysis will also list the research activities in the ICT sector and carried out by public institutions, based on these definitions.

The specificities of Luxembourg compared to other leading countries in the ICT sector could be analysed once the statistic profile is implemented.

### 5.4.2 Space technologies

In 1985 Luxembourg's government decided to get into the sector of space technologies by creating the Société Européenne des Satellites (SES), one of today's major players in the sector. Afterwards the country tied in with the spatial sector when Luxembourg became a member of the European Space Agency (ESA), on 30 June 2005, after an agreement of cooperation on telecommunication programmes (ARTES) of the Agency. So Luxembourg became the 17th Member State of the ESA<sup>19</sup>.

Besides the opportunities of development combined with technological competence of national players, this accession confirmed the government commitment to promote Luxembourg as the host country for innovative projects in advanced technologies<sup>20</sup>.

#### Literature review and chosen definition

The definition of space technologies does not include one single type of activity but rather several types present in different fields of science and technology. The *Frascati Manual* quotes some of them, such as astronomy (including astrophysics, space science), aerospace engineering, applied mechanics, thermodynamics, meteorological and atmospheric sciences, climate research, etc. In 2007, those fields were reviewed and they currently include new fields (such as nanotechnologies) and a more detailed level of breakdown to take into account new developments in the sector.

According to the NASA definition of technology, space technology can be defined as being "a solution that arises from applying the disciplines of engineering science to synthesize a device, process, or subsystem, to enable a specific capability"<sup>21</sup> in the space sector.

- <sup>19</sup> ESA Members States: Germany, Austria, Belgium, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Norway, Netherlands, Poland, Portugal, Czech republic, Romania, United Kingdom, Sweden, and Switzerland.
- <sup>20</sup> Luxembourg portal for innovation and research, Luxembourg space policy
- <sup>1</sup> NASA, Strategic Space Technology Investment Plan, 2012

The OECD refers to a commonly accepted definition of the aerospace sector, based on the more complete definition stated by Weiss and Amir in 1999: "The space sector includes all actors involved in the systematic application of engineering and scientific disciplines to the exploration and utilisation of outer space, an area which extends beyond the earth's atmosphere."22, that is to say 100-120 km above the Earth. This organisation defines the space economy as "the full range of activities and the use of resources that create and provide value and benefits to human beings in the course of exploring, understanding, managing and utilising space. Hence, it includes all public and private actors involved in developing, providing and using space-related products and services, ranging from research an d development, the manufacture and use of space infrastructure (ground stations, launch vehicles and satellites) to space-enabled applications (navigation equipment, satellite phones, meteorological services, etc.) and the scientific knowledge generated by such activities. It follows that the space economy goes well beyond the space sector itself, since it also comprises the increasingly pervasive an d continually changing impacts of space-derived products, services and knowledge on economy and society."23. The fields of application of these technologies are satellite communications, satellite navigation, and satellite Earth observation, space exploration and space science.

Even if the definition of the sector is rather clear, it is difficult to identify companies active in the sector using existing systems of industry classification. In fact, the OECD as well as Eurostat use a system of classification based respectively on the ISIC 3530 code – Manufacture of air and spacecraft – and on the 35.30 NACE code (Rev. 1.1), which corresponds according to NACE Rev. 2 to the NACE 28.99, 30.30 and 33.16 codes (Table 3)<sup>24</sup>.

| Table 3 NACE codes for space technology related activities |                     |   |  |
|--|---------------------|---|--|
| NACE Rev. 1.1<br>Code                                      | NACE Rev. 2<br>Code | Description   |  |
|  | 28.99               | Manufacture of other special-purpose machinery n.e.c.   |  |
| 35.3   | 30.30               | Manufacture of air and spacecraft and related machinery |  |
|  | 33.16               | Repair and maintenance of aircraft and spacecraft       |  |
|  |                     |   |  |

Although the classification systems share some comparability in their approaches and definitions with the United States, for example, this approach is not adapted to the space technology sector in Luxembourg. In fact, no company is listed under the NACE codes defined above due to the method of classification used that is based on the core activity carried out by a statistical unit<sup>25</sup>. The activity accounting for over 50% of the total value added of this unit will be considered as the core activity and will determine the classification according to NACE Rev. 2<sup>26</sup>. Yet in Luxembourg the companies in this sector often carry out another activity that is considered as being the core business as it generates a higher income compared to space activities. They are therefore classified under other NACE codes than the ones previously identified.

- <sup>22</sup> OECD, Handbook on measuring the space economy, 2012
- <sup>23</sup> Definition adapted from the OECD Handbook on Measuring the Space Economy, 2012, ESA
- <sup>24</sup> Institut de la statistique du Québec, Profil statistique de l'industrie aérospatiale, 2009
- <sup>25</sup> The statistical unit for business demography is the enterprise. It has been defined in the Regulation on statistical units (Council Regulation (EEC) No 696/93 of 15 March 1993) as the smallest combination of legal units that is an organizational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources, STATEC
- <sup>26</sup> STATEC, NACELUX Rev. 2, Luxembourg version of NACE Rev. 2, Statistical classification of economic activities of the European Community. Introduction, structure and explanatory notes, 2008

While industry classifications mentioned above allow an analysis of the sector at international level, they are not adapted to the specificities of the Luxembourg sector.

Given the limited number of players in the space technology sector, it was considered more relevant to build a register of the main players in the sector. Currently in Luxembourg there are some 20 companies active in the space technology sector, and 3 public research centres (CRP Gabriel Lippmann, CRP Henri Tudor and the University of Luxembourg).

However it is important to note that several of these companies are currently classified under NACE codes as being part of the definition of other sectors, mainly ICT ones. In fact, the ICT sector is often dependent on developments carried out in the space sector as it uses the same technology for the content distribution, for instance, but also and vice versa. Also, the ICT definition by the OECD includes the "Cable, satellite and other pay-programme distribution" and "Satellite telecommunication" as well as (Chart 7).



To avoid double-counting companies active in the space technology sector but falling within the ICT definition, it would be important to identify the part of the space-related activity when measuring the ICT sector in order to better estimate the weight of both sectors in the economy of the Grand-Duchy. Given the difficulty in obtaining data relating to the space technology sector, while dissociating them from ICT activities, an ad hoc approach could be developed in order to estimate the weight of this sector in the national economy.

### 5.4.3 Logistics

The review of the 2001 White Book<sup>27</sup> stressed the key role of logistics in ensuring sustainable and competitive mobility in Europe and contributing to meeting other objectives, such as a cleaner environment, security of energy supply, transport safety and security.

Prospects for international exchange growth as well as the location of numerous production sites towards Eastern Europe and Asia, has fostered the government to choose logistics as one of the target sectors of its policy of development and multi-sectoral specialisation, despite the impact of the financial crisis on the freight transport sector, and particularly on the shipping industry<sup>28</sup>, and despite the decrease in trading goods, the increase in protectionism and lower industrial activities, whether in Luxembourg or in Europe.

Nowadays Luxembourg is an operational base for numerous global logistics companies such as Cargolux, China Airlines, Cobelfret, DB Schenker, DHL, Kühne + Nagel, Morrisson Express, Nippon Express, Panalpina, TNT, Yangtze River and Yusen Air & Sea, to quote but a few. These companies have already chosen Luxembourg as their operational base for their high-added value logistics activities<sup>29</sup>.

#### Literature review and chosen definition

The literature presents different definitions of logistics. The European Commission definition states "freight transport logistics policy focuses on the planning, organisation, management, control and execution of freight transport operations in the supply chain."<sup>30</sup>

In addition to an important transport component, logistics is mainly a value added service which allows ensuring supply, production and distribution of goods. With the production and demand globalisation, logistics activities have grown larger and larger. Today a substantial number of companies have decided to focus on their core business and to outsource their logistics activities<sup>31</sup>. Over the past two decades logistics activities have steadily developed: the range of logistics activities has expanded due to an increasing importance of logistics in a globalised economy with an increasing demand that has grown more and more sophisticated, as well as to ICT development and e-commerce. Gradually, the activities have become more and more outsourced and are nowadays carried out by specialised companies. These companies offer complete solutions to their clients by organising an integral and continued management of all activities of the logistics process ("contract logistics").

- <sup>27</sup> European Commission, Keep Europe Moving - Sustainable mobility for our continent, COM (2006) 314.
- <sup>28</sup> European Commission, Transports et logistique -Analyse sectorielle détaillée des compétences naissantes et activités économiques dans l'Union européenne, 2009
- <sup>29</sup> http://www.luxembourg.public. lu/fr/economie/logistique/
- <sup>30</sup> European Commission, Plan d'action pour la logistique du transport de marchandises, COM (2007) 0607
- <sup>31</sup> Deutsche Bank Research, Logistics in Germany – A growth sector facing turbulent times, 2008

The literature review shows that it is possible to measure the activities of companies in this sector through the NACE codes. In the analysis of the economic impact of the logistics sector on the national economy, it was decided to only take into account the aspect related to freight transport and to exclude activities related to passenger transport. A selection of NACE codes relevant to our study has been chosen. Freight transport logistics codes most often used in this type of studies are the NACE Rev. 2 codes, ranging from 49 to 53, with the exception of the codes relating to the transport of passengers (codes 49.10, 49.30, 50.10, 50.30 and 51.10)<sup>32</sup>. However, given that to date there are no companies in Luxembourg indexed under the NACE codes having links to transport via pipeline (code 49.50), space transport (code 51.22), nor postal activities under universal service obligation (code 53.10), the relative codes have been excluded from the list of NACE codes to be analysed. Finally, as removal services are not considered as being part of the logistics sector during economic missions and events promoting the country abroad, it was decided to only refer to NACE codes in Table 4 to measure the impact the logistics sector has on economy.

| Table 4 NACE codes for logistics related activities |   |  |  |
|---|---|--|--|
| NACE Rev. 2 Code                                    | Description   |  |  |
| 49.200  | Freight rail transport                                |  |  |
| 49.410  | Freight transport by road                             |  |  |
| 50.200  | Sea and coastal freight water transport               |  |  |
| 50.400  | Inland freight water transport                        |  |  |
| 51.210  | Freight air transport                                 |  |  |
| 52.100  | Warehousing and storage                               |  |  |
| 52.210  | Service activities incidental to land transportation  |  |  |
| 52.220  | Service activities incidental to water transportation |  |  |
| 52.230  | Service activities incidental to air transportation   |  |  |
| 52.240  | Cargo handling  |  |  |
| 52.290  | Other transportation support activities               |  |  |
| 53.200  | Other postal and courier activities                   |  |  |

However this approach is probably not comprehensive for the same reasons mentioned above and relating to the core activity of the company and to the attribution of the NACE codes. Most likely it underestimates the size of the sector given that some companies carrying out important activities in the logistics sector, as for example the NAMSA (NATO) or the Post, are not registered under the above NACE codes although they carry out numerous services linked to this sector. Nevertheless this approach allows obtaining a proxy, which is quite easy to measure, and which can be replicated regularly over time until a register companies specific to this sector is built.

> <sup>2</sup> Deutsche Bank Research, German logistics sector back on growth track, 2010

### 5.4.4 Health sciences and technologies

Health sciences and technologies have been one of the pillars of the economy diversification strategy of the government since 2004. This new sector, initiated through the development of the government "Health Technologies" national action plan prepared in 2007, aims to promote Luxembourg as the host country for the development of health sciences and technologies whilst valuing the current competences of the country.

In 2008 Luxembourg implemented a strategic partnership with three globally renowned American research institutes, a key initiative aimed at giving new dynamics to the sector. This collaboration has led so far to three flagship projects: the creation of the Integrated BioBank of Luxembourg (IBBL), the implementation of the Luxembourg Centre for Systems Biomedicine (LCSB) at the University of Luxembourg as well as the launch of a lung cancer project situated in the premises of the CRP-Santé.

In 2010 the leaders of the three flagship projects mentioned above created the "personalized medicine consortium", a virtual structure aimed at grouping the different expertises and to ensure synergies. The know-how of the different players was grouped in 2008, through the creation of the *Luxembourg BioHealth Cluster*.

This sector, considered as promising on the medical as well as economic plan, has experienced an interesting expansion since then, but is at the same time exposed to an acute international competition.

#### Literature review and chosen definition

As with sectors analysed earlier, a literature review was carried out in order to propose a definition. However, several definitions have been listed and differ greatly according to the source used.

In fact, a few years ago the sector was still defined only with regards to biotechnology activities, as was the case in 2013 Competitiveness Report. Nowadays this sector covers a much larger scope of activities linked to the science and health fields.

The literature review carried out has proven that there is a strong link between the definitions of biotechnology and life sciences, despite the fact that there is no unique definition of the sector. The definitions of the life science sector differ between organisations, which is partly due to regional (or national) differences in terms of dominant economic activities forming the life science sector. Besides the diverse conceptions, it is necessary to mention that the definitions of the different organisations may change over time. In fact, the different organisations sometimes change their definition of the sector from one publication to the next. These modifications can be explained either by the changes introduced in industry classifications or the development of the sector (e.g. new companies appearing on the territory).

Despite these differences, there is a certain similarity between the definitions of the three specialised institutions: the Battelle Memorial Institute, the Anderson Economic Group and the Milken Institute. The NAICS<sup>33</sup> codes common to the three definitions can be found in Table 5.

| Table 5         NAICS codes common to the definitions of the Battelle Memorial Institute,         the Anderson Economic Group and the Milken Institute |  |  |  |
|--|--|--|--|
| NAICS<br>Code  | Description  |  |  |
| 325199   | All other basic organic chemical manufacturing                           |  |  |
| 325411   | Medicinal and botanical manufacturing                                    |  |  |
| 325412   | Pharmaceutical preparation manufacturing                                 |  |  |
| 325413   | in-vitro diagnostic substance manufacturing                              |  |  |
| 325414   | Biological product (except diagnostic) manufacturing                     |  |  |
| 334510   | Electromedical and electrotherapeutic apparatus manufacturing            |  |  |
| 334517   | Irradiation apparatus manufacturing                                      |  |  |
| 339112   | Surgical and medical instrument manufacturing                            |  |  |
| 339113   | Surgical appliance and suplies manufacturing                             |  |  |
| 339114   | Dental equipment and supplies manufacturing                              |  |  |
| 339115   | Ophthalmic goods manufacturing   |  |  |
| 339116   | Dental laboratories  |  |  |
| 541380   | Testing laboratories   |  |  |
| 541710   | Research and development in the physical, engineering, and life sciences |  |  |
| 621511   | Medical laboratories   |  |  |
| 621512   | Diagnostic imaging centers   |  |  |

<sup>33</sup> NAICS: North American Industry Classification System Even if it did not publish on the sector of life sciences, the OECD has produced a document on biotechnology providing a single definition of the latter: "The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services"<sup>34</sup>. However, this definition comes with the following note: "the single definition should always be accompanied by the list-based definition which operationalises the definition for measurement purposes". In fact, a list-based definition defines a sector by providing a list of activities or products that are emerging and for this reason the OECD definition should be used as an interpretative guideline to the single definition used by each institution. This warning should also be used in each definition in the life sciences sector.

Nevertheless it is interesting to take into account one of the conclusions taken from a study carried out by Statistics Canada to define the biotechnology sector based on the definition proposed by the OECD: "there is no industry classification which specifically identifies biotechnology, as this is a process. The outputs of a business are not split between whether they are biotechnologically produced, or otherwise"<sup>35</sup>. This quote contains two key ideas: as a production process, biotechnology cannot be directly codified by using the most common systems of industry classification, and it cannot be regarded as one or more products. Consequently, biotechnology cannot be codified according to the criteria under which classes are formed in the official industry classifications. The use of certain processes in the production chain determines the class an establishment or company belongs to in the systems of industry classification. There is, however, no code of industrial activities for which biotechnology is primarily used or for which biotechnology is the only production process used. Hence it is not explicitly mentioned by one or another official system of industry classification. However, as a process, it serves to define several industry activity codes. It is an "ubiquitous technology used in several industrial sectors"<sup>36, 37</sup>.

References to the term "biotechnology" are widely spread, however there are many "kinds" of biotechnology. They have different characteristics and applications (Chart 8).

- <sup>34</sup> OECD, A Framework for Biotechnology Statistics, 2005
- <sup>35</sup> Adapted from Statistics Canada, Internationally comparable indicators on biotechnology, 2001
- <sup>36</sup> Adapted from Statistics Canada, Internationally comparable indicators on biotechnology, 2001
- <sup>37</sup> Institut de la statistique du Québec, Revue de la littérature du secteur des sciences de la vie, 2010

| Chart 8 Colours of biotechnology <sup>38</sup>                              |  |  |  |
|---|--|--|--|
|   | Red<br>biotechnologies<br>HEALTHCARE     | Refers to medicinal, diagnosis and therapeutic approaches<br>(e.g. stem cell therapy, gene therapies,) produced through<br>recombinant technology (i.e. by combining DNA sequences<br>that would not occur naturally).<br>Focuses on healthcare applications using genomics and<br>proteomics.   |  |
|   | Green<br>biotechnologies<br>AGRICULTURE  | Refers to plant breeding through specific techniques such<br>as genetic modification and marker assisted selection that<br>improve efficiency compared to traditional selection.<br>These technologies use the plant organism and their cells<br>to produce food products, biomaterials or energy.   |  |
| Excluded from the definition of the "life sciences and technologies" sector | White<br>biotechnologies<br>INDUSTRY     | Group industrial applications using biological systems (enzymes<br>and micro-organisms) as an alternative to classic chemical<br>processes for producing bio-based products with the aim of<br>producing more efficiently and more ecologically.<br>First uses are in the polymer, fuel, solvent, construction, textile,<br>and all mainly chemical product sectors. |  |
|   | Blue<br>biotechnologies<br>MARINE LIFE   | Develop products linked to marine biodiversity.<br>Marine and aquatic applications of biotechnology are used<br>in the fields of health, cosmetics, aquaculture and food-<br>processing industry.  |  |
|   | Yellow<br>biotechnologies<br>ENVIRONMENT | Gather all biotechnologies related to the protection of the environment and to the treatment or elimination of pollution.  |  |

The literature review confirms the difficulty in establishing a unique definition of the sector. It is nevertheless essential to define those activities considered as an integral part of the life sciences and technologies sector according to activities present in Luxembourg as well as to the definition used by the government.

Initially the health sciences and technologies sector was limited to "health technologies" due to a particular government interest for medical devices. Over time, the definition of the sector has been broadened and became "new technologies and life sciences", taking into account apart from the biomedical field, benefits and synergies between sectors and technologies. While communication was principally done through the term "health sciences and technologies", it was considered more relevant to broaden the definition of the sector to "life sciences and technologies" in order to take into account all the activities of the sector present in Luxembourg.

> <sup>38</sup> Adapted from EuropaBio, What is biotechnology? and from PwC, Regional biotechnology, 2011

Therefore, in order to better define the sector in Luxembourg, the definition of health technologies, proposed by the HTA<sup>39</sup> should also be taken into consideration. According to this source, health technology refer to any "*intervention that may be used to promote health, to prevent, diagnose or treat acute or chronic disease, or for rehabilitation. Health technologies include pharmaceuticals, devices, procedures and organisational systems used in health care*".

Hence, a first approach based on the NACE industry codes was used to make a first selection of main benchmarking activities for the sector in question (Table 6).

| Table 6         NACE codes for health sciences and technologies related activities |   |  |  |
|--|---|--|--|
| NACE Rev. 2<br>Code  | Description   |  |  |
| 20.140   | Manufacture of other organic basic chemicals                                    |  |  |
| 20.200   | Manufacture of pesticides and other agrochemical products                       |  |  |
| 20.590   | Manufacture of other chemical products n.e.c.                                   |  |  |
| 21.100   | Manufacture of basic pharmaceutical products                                    |  |  |
| 21.200   | Manufacture of pharmaceutical preparations                                      |  |  |
| 26.600   | Manufacture of irradiation, electro-medical and electrotherapeutic equipment    |  |  |
| 32.501   | Manufacture of dental prosthesis  |  |  |
| 32.502   | Manufacture of non-dental prosthesis and orthopaedic items                      |  |  |
| 32.509   | Manufacture of medical and dental instruments and supplies n.e.c.               |  |  |
| 33.130   | Repair of electronic and optical equipment                                      |  |  |
| 72.110   | Research and experimental development on biotechnology                          |  |  |
| 72.190   | Other research and experimental development on natural sciences and engineering |  |  |
| 74.900   | Other professional, scientific and technical activities n.e.c.                  |  |  |
| 86.901   | Medical laboratory  |  |  |
| 86.909   | Other human health activities n.e.c.  |  |  |

However this approach overestimates the sector given that many companies registered under these NACE codes do not necessarily carry out activities linked to those mentioned in the beginning of the chapter.

Given the limited size of the "life sciences and technologies" sector in Luxembourg, a "manual" screening of the companies was carried out, in order to produce a more realistic statistical profile of the activities in Luxembourg. However, this approach will not allow comparing the sector at international level, until the adoption of a single and official definition of the sector.

This definition of the sector in Luxembourg needs to take into account aspects linked to the scientific part as well as those linked to pharmaceuticals, devices, procedures and organisational systems linked to health and life sciences. This sector should be understood in its broadest sense and include biotechnology, manufacturing industries of medical devices as well as the diagnosis sector.

> <sup>39</sup> HTA glossary, International Network of Agencies for Health Technology Assessment (INAHTA) and Health Technology Assessment international (HTAi)

In order to better estimate the weight the sector has in Luxembourg economy, the following have been included in the definition of the sector:

- Red" and "green" biotechnology companies: in Luxembourg the sector is mainly based on the so-called "red" biotechnologies i.e. linked to research activities (e.g. genomics and proteomics) and to medical and therapeutic approaches (e.g. stem cell therapies and gene therapy...) but also on the so-called "green" biotechnologies relating to agriculture (e.g. insect pest-resistant crops...), livestock and agribusiness. As these activities do exist, they have to be included in the definition of the sector. With regard to "white" biotechnologies (concerning product manufacturing, invention of processes or industrial-scale production of bioenergy from the biomass), "blue" biotechnologies (linked to the aquatic world) and "yellow" biotechnologies (linked to the protection of the environment), they are not considered as being part of the life sciences and technologies sector (Chart 8);
- Companies producing medical devices: these companies combine science and engineering to create innovations beneficial to the health system as well as to the society. Progress in medical devices improves the accuracy of diagnosis, treatments, reduces long-term disability and allows providing better medical care. According to the NAICS classification, the following are included:
  - In-vitro and in-vivo diagnostic substances,
  - Electro-medical apparatus,
  - Instruments of analysis,
  - X-ray apparatus and tubes,
  - Laboratory material and apparatus,
  - Surgical and medical instruments,
  - Surgical supply and apparatus,
  - Dental supply and equipment manufacturing,
  - Ophthalmic goods manufacturing,
  - Dental laboratories;
- Contract Research Organisations (CRO): they implement quality clinical trials mainly on behalf of pharmaceutical, biotechnological and medical device companies. The CRO offer different services such as clinical trial management, product development and commercialisation of products;
- Research institutions: university laboratories and research institutes employ scientists, which focus on innovative research in specific sectors but also train next generation scientists through study programmes. Benefitting mainly from public financing, these institutes carry out basic and applied research in life sciences. These institutions often attract highly qualified researchers<sup>40</sup> and contribute significantly to the growth of biotechnology industry.

Adapted from PwC, Combining Strengths, Maximizing Impact, 2011 This methodology enabled to create a list of 34 companies active in the sector in 2013, broken down as follows:

- 17 biotechnology companies;
- 6 private research institutions;
- 4 companies producing medical devices;
- ▼ 7 contract research organisations / support service.

Finally, it is necessary to take into account the fact that several pharmaceutical companies are established in Luxembourg and carry out some of their business from the Grand Duchy. However, unlike worldrenowned clusters where they carry out their production activities of biological and medical products or their research and development activities, pharmaceutical companies in Luxembourg have until now mainly carried out trade and distribution activities of their products, unless rare exceptions when research and development operations also occur in Luxembourg. At this stage it is therefore difficult to include these companies as part of the sector given their main activity in the country. It is nonetheless important to monitor the development of their activities as they could develop if the dynamics in the sector were even more favourable over time.

## 5.4.5 Eco-technologies

In the context of a change towards a greener, more sustainable and more efficient economy, which is currently developing in Europe and worldwide, and in view of its economic diversification policy, Luxembourg government adopted the "eco-technologies" action plan in 2009, aimed at fostering the innovation and development of environmental technologies. This action plan introduces two new laws to promote eco-technologies in Luxembourg: the law of 5 June 2009 to promote research, development and innovation, as well as the law of 18 February 2010 on help schemes for environmental protection and rational use of natural resources.

The action plan has a double objective:

- Economic: "develop the eco-technology field as a diversification branch of Luxembourg's economy";
- Environmental: "improve the productivity of natural resources, especially energy resources, and reduce environmental impacts"<sup>41</sup>.

The eco-technology sector nowadays gathers the companies and research institutes active in development, production and research of environmental technologies.

Ministry of the Economy,
 Présentation du plan d'action
 "Éco-technologies", 2009

#### Literature review and chosen definition

Eco-technologies can be defined as "all technologies whose use is less environmentally harmful than the use of usual techniques fulfilling the same need."<sup>42</sup> The expression "eco-technology" describes all environmental technologies, including less environmentally harmful technologies not having an explicit ecological purpose, and thus groups all products, processes and services respectful of the natural environment.

There are three types of eco-technologies, according to their application:

- Curative (external) eco-technologies implemented or developed with an environmental intent in order to reduce the effect of emissions from production and consumption systems (e.g. waste collection, rehabilitation of contaminated soils)<sup>43</sup>;
- Preventive (integrated) eco-technologies modifying traditional human production systems in order to reduce their effect on the environment. They anticipate curative technologies and are usually implemented for economic reasons or due to regulations. They also aim to improve the performance of curative eco-technologies (e.g. installation of filters);
- 3) Natural resources management eco-technologies. They refer to renewable energies and deal with areas of production of specific equipment, technologies and materials, service supply, construction and installation work for the following activities: air, waste, renewable energy, energy management, agriculture, forest, etc. (e.g. solar panels)<sup>44</sup>.

However there is no industry classification comprising these activities in an exhaustive way. In 2010 Ernst & Young tried to list the eco-technology activities in France by using NACE classifications, but the companies were listed under 80 different codes. Furthermore, certain codes gathered activities, which were not always entirely linked to eco-technologies. In fact, eco-technologies may be considered as production processes and can thus not be directly codified by the industry classification systems, as they cannot be assimilated to one or several products. These technologies can be implemented in several industries. Consequently, as with bio-technology, eco-technologies cannot be codified based on official industry classifications. A classification based on industries grouped in the three main eco-technology families described above was thus implemented<sup>45</sup>.

- <sup>42</sup> European Commission, Environmental Technologies Action Plan (ETAP), 2004 and Ministry of the Economy, Plan d'action "Éco-technologies", 2009
- <sup>43</sup> Entreprises Magazine, Ecodev: le cluster des éco-technologies et du développement durable au Luxembourg, 2009
- 44 Ministry of the Economy, Plan d'action "Éco-technologies", 2009
- <sup>45</sup> Ernst & Young, Les clusters mondiaux dans le domaine des éco-technologies: enseignements, perspectives et opportunités, 2010

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In collaboration with the *Luxembourg EcoInnovation Cluster*, the Ministry of the Economy established a first list in 2008, identifying the ecocompanies present in Luxembourg. Eco-companies are to be understood as companies whose corporate purpose is to develop, manufacture and sell products, techniques and services, which are designed for the protection of the natural environment<sup>46</sup>, such as filters or waste management. So, the selection of eco-companies was based on two priority axes:

- 1. Innovative materials, such as biodegradable materials, materials for sustainable construction or nanomaterials;
- Rational use of natural resources, such as the conversion of biomass into energy, sustainable mobility, energy storage, photovoltaics, or the water treatment<sup>47</sup>.

This lists included companies having at least of the two quotes economic activity areas in their corporate objects.

Table 7 details the main activities of these eco-companies in Luxembourg, gathered into 4 categories according to their main objective: water treatment (e.g. water treatment solutions), eco-construction (e.g. passive house), waste management (e.g. household waste collection and recycling) and renewable energies (e.g. photovoltaic system)<sup>48</sup>.

- <sup>46</sup> Ministry of the Economy, Plan d'action "Éco-technologies", 2009
- <sup>47</sup> Ministry of Economy and Foreign Trade, Strategic Background Paper - Clean / Green Technologies, June 2012
- <sup>48</sup> Luxembourg EcoInnovation Cluster

| Detail of eco-technological activities in Luxembourg |   |  |  |
|--|---|--|--|
| Objectives   | Activities  |  |  |
| Pollution  | Limitation of sound nuisances   |  |  |
| management   | Treatment and depollution of polluted sites and grounds   |  |  |
| (curative and  | Reduction and treatment of emissions, deodorisation   |  |  |
| ·····,   | Metrology and Instrumentation – Analysis  |  |  |
|  | Analyse of air quality  |  |  |
|  | Prevention of sound nuisances   |  |  |
|  | Capture et sequestration of CO <sub>2</sub>   |  |  |
|  | Metrology and Instrumentation - Treatment   |  |  |
| Optimisation of                                      | Eco-conception  |  |  |
| consumption of<br>natural<br>resources               | Energetic efficiency for building and industry (energetic diagnostic, lightning, isolation, air conditioning, energetic services) |  |  |
|  | Eco-construction (advice, construction technique, supply and installation of eco-materials, urbanism)                             |  |  |
|  | Bio-resources   |  |  |
|  | Nano-materials  |  |  |
|  | Polymers  |  |  |
|  | Eco-performing materials  |  |  |
|  | Energetic infrastructures (Smart Grids)   |  |  |
|  | Energy storage  |  |  |
|  | Green chemistry   |  |  |
|  | Common transport and e-mobility   |  |  |
|  | Ecological agriculture (ecological treatment in agriculture)  |  |  |
|  | Water management  |  |  |
|  | Recycling   |  |  |
| Energy   | Biofuel, biogas and biomass   |  |  |
| production from                                      | Solar photovoltaics   |  |  |
| sources  | Solar concentration   |  |  |
|  | Marin energies  |  |  |
|  | Wind energy   |  |  |
|  | Hydroelectric energy (big and small)  |  |  |
|  | Hydrogen and fuel cells   |  |  |
|  |   |  |  |

T. 1.1. 7

This first approach has allowed quantifying eco-technology activities in Luxembourg. Work is currently in progress to update this list of companies based on a more accurate definition, including especially the "innovative enterprise" concept, i.e. which is bringing an improvement to the state of art in its field. This company will thus sell new products and services, often based on new technologies or on scientific research findings<sup>49</sup>. This principle could thus define eco-companies in the strict sense of the term, while those companies focusing on rational management of natural resources would be part of the sector but according to a broader definition of the term.

The analysis could also include the research activities linked to the eco-technology sector and that are carried out in public institutions of the country.

<sup>49</sup> Luxembourg portal for innovation and research, Creation of innovative businesses

## 5.5 Indicators being analysed

In order to be able to analyse the impact of the new sectors on Luxembourg's economy, it would be useful to collect and analyse among others the following data for each of the five identified sectors:

- Number of companies;
- Number of people employed;
- Value added at factor cost;
- Turnover;
- Gross investment in tangible goods;
- Imports;
- Exports.

The information will be analysed on an aggregated basis thanks to information collected through the "Structural business statistics" study organised by STATEC, as well as through company balance sheets and other public sources.

As stressed by the OECD Growth Project: "something new is taking place in the structure of OECD economies...and this transformation might account for the high growth recorded in several OECD countries. Policies that engage ICT, human capital, innovation and entrepreneurship in the growth process, alongside fundamental policies to control inflation and instil competition while controlling public finances are likely to bear the most fruit over the longer term"<sup>50</sup>. According to the same source, investment in intangibles is found to contribute as much to labour productivity growth as investment in tangibles in the United States for the period 1995-2003. Thus, the OECD considers that the knowledge embedded in the intangible assets (in particular human capital, R&D, patents, software and organisational structures) is more and more crucial for economic performance and for business and country growth.

Therefore, it would be important to try to measure the impact public investments have had in the research field and to assess, as far as possible, their impact in terms of intangible effects. This information would be particularly relevant for Luxembourg as public research institutes, which often receive state funding, often produce patents and licences, which cannot be measured in macroeconomic terms.

> <sup>50</sup> OECD, Creating value from intellectual assets, Meeting of the OECD Council at ministerial level, 2006

With this in mind, the Ministry of the Economy is currently implementing a list of specific indicators that will be collected from the different public institutions of Luxembourg that are carrying out research activities in the five sectors in question in this study. The main indicators collected will be the following ones:

- Number and type of employees;
- ▼ Number and type of national and international collaborations;
- Number and impact factor<sup>51</sup> of publications;
- Number of patents/licences;
- Sources of financing.

As far as possible, some of these indicators could also be analysed from a "company" point of view through OECD databases that record the number of patents registered by sector.

## 5.6 Conclusion

As a result of numerous efforts and investments Luxembourg made in the five priority sectors, the government wishes to increase the number of statistics and indicators available to assess the development and impact of the five sectors on national economy:

- Information and communication technologies (ICT);
- Space technologies;
- Logistics;
- Health sciences and technologies;
- Eco-technologies.

<sup>51</sup> The impact factor is a journal indicator, standardising the number of citations compared to the number of the journal publications (Source: upmc.fr). To achieve this, the sectors were first defined based on a literature review. The sectors were defined as follow:

- ICT definition is based on the Eurostat definition and refers to the ICT producing sector (hardware and electronic components, telecommunications, IT services and software...). This definition could be broadened to digital content activities whose existence is linked to emergence of ICT (e-commerce, content and media), should this information be quantifiable;
- Logistics only includes activities linked to freight transport and can be calculated through specific NACE codes;
- Health sciences and technologies refer to science and life technology fields. In Luxembourg this sector includes "red" and "green" biotechnology companies, companies producing medical devices, contract research organisations and research institutions;
- Eco-technologies are defined as all technologies where their use is less environmentally harmful than the use of usual techniques fulfilling the same need. There are three types of eco-technologies, according to their application: curative eco-technologies implemented or developed with an environmental intent in order to reduce the effect of emissions from production and consumption systems, preventive eco-technologies modifying traditional human production systems in order to reduce their effect on the environment, and natural resources management eco-technologies;
- The definition of the space technology sector follows the one provided by the OECD: "The space sector includes all actors involved in the systematic application of engineering and scientific disciplines to the exploration and utilisation of outer space, an area which extends beyond the earth's atmosphere."

While ICT and logistics sectors may be defined through NACE codes, the health sciences and technologies, eco-technologies and space technologies sectors in Luxembourg cannot be defined through this methodology. Thus, for these sectors it was necessary to build a list of companies in order to measure the sector as accurately as possible.

The following steps of the project are to calculate a series of indicators, based on chosen definitions, that allow assessing the impact of these new sectors for the country. An analysis of strengths and weaknesses as well as opportunities and threats for each sector could be developed to better identify the points that could be improved with the aim of further developing these sectors.

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## 5.7 Bibliography

#### ANDREONI, GREGORY

Why and How Does Manufacturing Still Matter: Old Rationales, New Realities, 2013

#### **BIANCHI, LABORY**

Structural Transformations in Industry and Filières, 2013

#### EUROPEAN COMMISSION

Environmental Technologies Action Plan (ETAP), 2004

#### EUROPEAN COMMISSION

Keep Europe Moving - Sustainable mobility for our continent, COM (2006) 314

#### EUROPEAN COMMISSION

Plan d'action pour la logistique du transport de marchandises, COM (2007) 0607

#### EUROPEAN COMMISSION

Transports et logistique - Analyse sectorielle détaillée des compétences naissantes et activités économiques dans l'Union européenne, 2009

#### DELANO

Luxembourg changes its focus, 2014

#### DEUTSCHE BANK RESEARCH

German logistics sector back on growth track, 2010

#### DEUTSCHE BANK RESEARCH

Logistics in Germany - A growth sector facing turbulent times, 2008

#### ENTREPRISES MAGAZINE

Ecodev : le cluster des éco-technologies et du développement durable au Luxembourg, 2009

#### **ERNST & YOUNG**

Les clusters mondiaux dans le domaine des éco-technologies : enseignements, perspectives et opportunités, 2010 EuropaBio, What is biotechnology?

#### EUROPEAN VENTURE CAPITAL ASSOCIATION (EVCA)

The Cost of Capital for Early Stage Biotechnology Ventures, Cockburn and Lerner, 2009

#### HTA GLOSSARY

International Network of Agencies for Health Technology Assessment (INAHTA) and Health Technology Assessment international (HTAi)

#### INSTITUT DE LA STATISTIQUE DU QUÉBEC

Profil statistique du Secteur des Technologies de l'information et des communications (TIC), 2011

#### INSTITUT DE LA STATISTIQUE DU QUÉBEC Profil statistique de l'industrie

aérospatiale, 2009

#### INSTITUT DE LA STATISTIQUE DU QUÉBEC

Revue de la littérature du secteur des sciences de la vie, 2010

#### LUXEMBOURG ECOINNOVATION CLUSTER

MINISTRY OF STATE - MEDIA AND COMMUNICATION SERVICE

Plan d'action national en matière de TIC et de haut-débit, 2009

#### MINISTRY OF ECONOMY AND FOREIGN TRADE

Bilan compétitivité 2007, « En route vers Lisbonne » - « An Analysis of the sectoral diversification of a small open economy: the case of Luxembourg », 2007

#### MINISTRY OF THE ECONOMY

Présentation du plan d'action « Éco-technologies », 2009

MINISTRY OF THE ECONOMY Plan d'action « Éco-technologies », 2009

#### MINISTRY OF ECONOMY AND FOREIGN TRADE

Strategic Background Paper - Clean / Green Technologies, June 2012

#### NASA

Strategic Space Technology Investment Plan, 2012

#### OECD

Actifs immateriels et création de valeur, Réunion du conseil de l'OCDE au niveau ministeriel, 2006

#### OECD

Cadre pour les statistiques de la biotechnologie, 2005

#### OECD

Guide to measuring the information society, 2011

#### OECD

Handbook on measuring the space economy, 2012

**OECD** Manuel de Frascati, 2002

LUXEMBOURG PORTAL FOR INNOVATION AND RESEARCH Creation of innovative businesses

LUXEMBOURG PORTAL FOR INNOVATION AND RESEARCH Luxembourg space policy

#### PWC Combining

Combining Strengths, Maximizing Impact, 2011

**PWC** Regional biotechnology, 2011

**SOCIETAL N°73** L'impact de l'économie numérique, 2011

#### STATEC

Le Luxembourg 1960-2010. L'essor du secteur tertiaire au Luxembourg, 2012

#### STATEC

Le Luxembourg 1960-2010. L'évolution économique globale du Luxembourg sur la longue durée, 2012

#### STATEC

NACELUX Rév. 2 Version luxembourgeoise de la NACE Rév. 2, nomenclature statistique des activités économiques dans la Communauté européenne. Introduction, structure et notes explicatives.

#### STATISTICS CANADA

Indicateurs comparables au niveau international pour la biotechnologie, 2001

#### WORLD BANK

Information & Communication Technologies Sector Strategy, 2011

#### WORLD BANK

Qiang, Clarke, and Halewood 2006, p.57

# 6 The effects of automatic wage indexation

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## 6.1 Introduction

For decades automatic wage indexation has been the most discussed topic in the economic, social and political debates in Luxembourg. Indexation is a sacrosanct asset in Luxembourg, which could explain the relative restraint of unions with regard to wage demands: without the need to negotiate, wages automatically adapt to development of consumer prices in order to stabilize purchasing power.

The mechanism of wage indexation on prices can be institutionalised by law. As is happening in Luxembourg and Belgium, but also in Cyprus, Malta and Spain, which have introduced, at least partially, a mechanism of automatic wage adjustment to inflation<sup>1</sup>. A partial or total indexation can also proceed from wage agreements resulting from collective or individual negotiations, and can be found in most developed countries. In fact, every country has a more or less explicit mechanism of wage adjustment to price developments.

Wage indexation on prices may be considered as being one of the institutional characteristics leading to real wage rigidity, which is held liable for bad adjustment on the labour market and thus the persistence of unemployment. It is one of the foundations on which many international organisations such as the OECD, IMF and the European Commission rest on to recommend Luxembourg to reform or to abandon the traditional indexation mechanism, to which employees and trade unions got attached<sup>2</sup>.

Wage indexation has generated a series of national and international studies over the last few years, each taking a different entry point in terms of methodology, data or level of analysis. A brief overview of the studies carried out by the International Monetary Fund (IMF), the National Bank of Belgium (NBB) and the Catholic University of Louvain (UCL) are presented in this chapter. Recently, as part of the work of the *Observatoire de la formation des prix* (Observatory on price formation) under the Ministry of the Economy, a legal study has focused in particular on conventional and automatic mechanisms of price adjustment of contractual relations<sup>3</sup>. Furthermore, based on interviews in craft and commercial businesses located in Luxembourg, a microeconomic study has analysed the mechanisms of price adjustment by companies in Luxembourg<sup>4</sup>.

The Observatoire de la compétitivité under the Ministry of the Economy commissioned the University of Luxembourg in 2013 to carry out an in-depth study analysing the potential effects of automatic wage indexation on wage formation process in Luxembourg compared to its neighbouring countries<sup>5</sup>. The study was undertaken by Henri Sneessens and Arnaud Bourgain from CREA of the University of Luxembourg, and by Fatemeh Shadman and Kirti Mehta from MeSh Analytics. The purpose of tis study is to ascertain if wage formation in Luxembourg (and Belgium) is indeed more rigid than it is in Germany and France.

- EuroFound (2010), Wage Indexation in the European Union, Background Paper, European Foundation for the Improvement of Living and Working Conditions, 2010.
- 2 For example, an extract from the Council recommendation on Luxembourg's 2014 National reform programme and delivering a Council opinion on Luxembourg's 2014 Stability programme: Based on its analysis finally recommended the following to Luxembourg: Speed up the adoption of structural measures, in consultation with the social partners and in accordance with national practices, to reform the wage setting system including wage indexation with a view to improving the responsiveness of wages to productivity developments, in particular at sectoral level.
- <sup>3</sup> "Modalités de la réglementation des clauses d'indexation de prix en France, Allemagne, Belgique et Luxembourg", Perspectives de politique économique N°19, May 2012.
- <sup>4</sup> "Étude des adaptations de prix des entreprises au Luxembourg", Perspectives de politique économique N°26, July 2013.
- Perspectives de politique économique N°28: Formation des salaires et indexation automatique : analyse comparative de quatre pays européens. July 2014.

## 6.2 Brief history of automatic wage indexation in Luxembourg

The automatic indexation mechanism first appeared in Luxembourg in 1921 by an indexation clause introduced for salaries and pensions of the railway staff and civil servants. It was progressively extended to other categories of beneficiaries and incomes. After several changes in the rules of calculation, the automatic wage indexation was generalised for all private and public wages, for pensions and training allowances by the law of 27 May 1975.

First, we should clarify that the official expression to designate the mechanism of general wage and pension indexation, more commonly known in national language as "Den Index", is "the sliding wage scale".

The automatic wage adjustment is bound to the sliding scale mechanism to the price dynamics of Luxembourg economy, namely inflation. The original idea behind this important social asset of the 20th century is the preservation of the purchasing power of wage earners. Inflationary movements caused by major economic upheavals often questioned the automatic nature of the mechanism.

All the terms and conditions of the indexation system are laid down in article 11 of the modified law of 22 June 1963 on the pay system of civil servants<sup>6</sup>.

The law of 27 May 1975<sup>7</sup> generalises the automatic wage adjustment mechanism. Since then, the "rates of wages and salaries resulting from the law, the collective agreement and the individual employment contract are adjusted to the changes in the cost of living, pursuant to article 11(1) of the law of 22 June 1963, on the pay system of civil servants".

The system has undergone a number of temporary modifications. Following the high inflation caused by the two oil price shocks, the number of indexation brackets released per year was limited several times by the State (in 1981, 1982, 1983 and 1984). In 1984 a legal provision organised this limitation. Since 2006, the government decided to postpone the adjustment several times because of the sharp increase in petrol price. Furthermore, certain taxes and charges were neutralised in the sliding wage scale (such as tobacco tax or ecologically driven taxes). Then, in the context of a budgetary consolidation and competitiveness plan decided in December 2010, the indexation system was adapted for 2011 and then for 2012, 2013 and 2014.

Law of 27 May 1975 on generalisation of the sliding wage and salary scale

<sup>&</sup>lt;sup>6</sup> Coordinated text of the law of 22 June 1963 on the pay system of civil servants, as amended

However the wage-setting process goes beyond the automatic indexation system. The "tripartite" negotiation method is a major feature of "Luxembourg social model", based on the search for a consensus. During the steel crisis, setting up the Tripartite Coordination Committee (1977), composed of representatives of employers, employees and government, enabled to significantly mitigate social consequences of the restructuring of the steel industry, by adopting a large-scale early retirement system and massive professional reorientations. Since 2006, the attention given to competitiveness is taking precedence in discussions of social dialogue institutions, in the context of an economic slow-down, and has made negotiated agreements more difficult.

## 6.3 The functioning of the automatic wage indexation mechanism<sup>8</sup>

Due to its successive adaptations, the indexation mechanism has become more complicated over time. The diagram below shows the different current monthly steps in the process, which results in the mechanical wage adjustment.



Économie et Statistiques. STATEC Working paper 43: http://www.statistiques.public. lu/catalogue-publications/ economie-statistiques/ 2010/43-2010.pdf The automatic release of indexation brackets is directly linked to the national consumer price index (CPI). This index is the reference tool for determining inflation, defined as the overall price increase in an economic area. In Luxembourg, the CPI is calculated on the basis of the methodology harmonised at European level and it is published monthly by STATEC.

The results are submitted for opinion to a commission of representatives of trade unions and employers' organisations, government, Central bank and experts. This commission is in charge of advising and assisting STATEC in establishing the index. The index is currently disseminated in base 100 = 2005, which means that the average of the monthly indices for 2005 equals 100 (Step 1).

For the sliding wage scale purpose, the general index is also published monthly in base 100 = 1.1.1948. The shift from one base to another, representing a mere change of scale, is achieved by a connection coefficient. The operation is to multiply the index expressed in base 100 = 2005 by the connection coefficient to obtain the index in base 100 = 1.1.1948 (Step 2).

The following step is to calculate the six-month average of the consumer index price expressed in base 100 = 1.1.1948, it corresponds to the arithmetic mean of indexes base 100 = 1.1.1948 of the last 6 available months (6-month moving average) (Step 3).

Every month the six-month average of the CPI expressed in base 100 = 1.1.1948 is compared with the *cote d'échéance* (maturity rating) (Step 4). If the six-month average is lower than the *cote d'échéance*, no indexation is released (move to Step 5). If the six-month average is higher than or equal to the *cote d'échéance*, an indexation is released (move to Step 5a).

The cote d'échéance is increased by 2.5% each time the sliding scale mechanism is released. The release of an indexation bracket for exceeding a cote d'échéance also results in the introduction of a new cote d'application (application rating). The cote d'application is the index mentioned in contracts of employment. In the month of indexation bracket application, or in other words, in the month of paying an indexation bracket, this index is increased by 2.5%. The enforcement of a new cote d'application entails thus the adjustment of all wages, salaries and pensions. An indexation bracket leads to an increase in the gross salary by 2.5% in each indexation. It generally occurs (in a non-modulated system) the month following the excess over the cote d'échéance by the six-month average (Step 6).
# Numerical example of the last non-modulated release of the sliding scale in 2010

Each month STATEC establishes the consumer price index using a methodology harmonised at European level. This index is currently disseminated in base 100 = 2005, which means that the average of the monthly indices for 2005 equals 100. In June 2010 this index took the value 111,44.

For the sliding wage scale purpose, the general index is also published monthly in base 100 = 1.1.1948 by a connection coefficient. The law of 27 June 2006<sup>9</sup> states that tax and duty increase on tobacco products is neutralised when computing the indexation. This coefficient also neutralises the social contribution and the climatic contribution on fuel, water taxes and alcopops taxes. In this way, the effects of tax and duty increase are reflected on the base 100 in 2005 series but are not taken into account in the base 100 of 1 January 1948 series. This coefficient will change in value in case of a tax and duty adjustment. Between June 2009 and May 2010, the coefficient was 6.81046 before dropping to the value 6.8086 from June 2010 to May 2011. The general index of May 2010 (base 1.1.1948) took thus the value 759.03 (111,44 \* 6,81046).

| Table 1         Numerical example of the last non-modulated release of the sliding scale in 2010 |              |              |               |               |             |              |              |  |
|--|--------------|--------------|---------------|---------------|-------------|--------------|--------------|--|
|  | Jan.<br>2010 | Feb.<br>2010 | March<br>2010 | April<br>2010 | Mai<br>2010 | June<br>2010 | July<br>2010 |  |
| CPI (base 100 = 2005)  | 108,99       | 110,29       | 110,92        | 111,24        | 111,45      | 111,44       | 111,07       |  |
| Connection coefficient   |              |              |               |               | 6,81046     |              | 6,8086       |  |
| General index connected to base 1.1.1948   | 742,27       | 751,13       | 755,42        | 757,60        | 759,03      | 758,75       | 756,23       |  |
| Six-month average of indexes connected to base 1.1.1948  | 746,93       | 747,46       | 748,84        | 750,71        | 752,31      | 754,03       | 756,36       |  |
| Cote d'échéance  | 753,62       | 753,62       | 753,62        | 753,62        | 753,62      | 753,62       | 772,46       |  |
| Cote d'application   | 719,84       | 719,84       | 719,84        | 719,84        | 719,84      | 719,84       | 737,83       |  |
| Source: STATEC   |              |              |               |               |             |              |              |  |

The following step is to calculate the six-month average of the consumer index price expressed in base 100 = 1.1.1948. This value was 752.31 in May 2010 and thus lower than the *cote d'échéance* of 753.62, and no indexation was released.

In June 2010, however, the six-month average (754.03) was higher than the *cote d'échéance*, an indexation bracket was consequently released. For July 2010, a new *cote d'échéance* was introduced (increase by 2.5%) as well as a new *cote d'application*. The *cote d'application* is the index mentioned in contracts of employment. In the month of paying an indexation bracket, this index is increased by 2.5%, in this case in July 2010. The enforcement of a new *cote d'application* entails thus the adjustment of all wages, salaries and pensions.

> Law of 27 June 2006 adapting certain terms for the application of the sliding wage and salary scale.

| Step 1:  | CPI (base 100 = 2005) of May 2010   | 111,45          |
|----------|---|-----------------|
| Step 2:  | Multiplied by the connection coefficient                                  | * 6,81046       |
|          | = General index connected to 1.1.1948                                     | 759,03          |
| Step 3:  | Calculation of the six-month average of the general index =               | 752,31          |
| Step 4:  | Comparison to the cote d'échéance:  | 753,62          |
| Step 5:  | If the six-month average < cote d'échéance                                |                 |
|          | May 2010:   | 752,31 < 753,62 |
|          | $\rightarrow$ no indexation   |                 |
| Step 5a: | If the six-month average > cote d'échéance                                |                 |
|          | June 2010:  | 754,03 > 753,62 |
| Step 5b: | ightarrow a new cote d'application becomes effective                      | → 737,83        |
|          | $\rightarrow$ indexation (adjustment of all wages, salaries and pensions) |                 |

In recent years, the automatic indexation mechanism has been adjusted on several occasions:

- In order to limit the effects of high inflation, social partners and the government have decided to postpone the application of the indexation bracket from August 2006 to December 2006. The indexation bracket that was meant to be applied in December 2007 was postponed to March 2008 and the July 2008 one to March 2009<sup>10</sup>;
- In 2011 the application of the indexation bracket was postponed from May to October<sup>11</sup>;
- In January 2012 the Chamber of Deputies adopted the modulation of the automatic wage indexation until December 2014<sup>12</sup>. In this way the adjustment released by exceeding a first cote d'échéance in 2012 was implemented on 1 October 2012. "For 2012, 2013 and 2014 at least twelve months have to elapse between two adjustments of salaries, wages, pensions, annuities and other allowances". Therefore, the application of the index bracket planned for March 2013 was postponed until October 2013. In 2014 consumer prices slowed sharply at international level, which resulted in a level of inflation close to 1%. According to the latest STATEC forecasts, there will be no indexation bracket applied in 2014. The next indexation bracket is forecast for the first term in 2015<sup>13</sup>.

The following chart shows the effect of modulations of the *cote d'application* from 2006 to 2014. The green curve shows the *cote d'application* of the real sliding scale applied between 2006 and 2014, while the purple curve shows the *cote d'application* if the wage indexation mechanism had not been modulated. These modulations resulted in a delay of 34 months on the total *cote d'application* for the 6 modulations over this period.

- <sup>10</sup> Law of 27 June 2006 adapting certain terms for the application of the sliding wage and salary scale.
- <sup>11</sup> Law of 8 April 2011 adapting certain terms for the application of the sliding wage and salary scale and modifying the article 11 of the amended law of 22 June 1963 on the pay system of civil servants.
- <sup>12</sup> Law of 31 January 2012 adapting certain terms for the application of the sliding wage and salary scale and modifying the article 11 of the amended law of 22 June 1963 on the pay system of civil servants.
- <sup>13</sup> STATEC, Note de conjoncture n°1/2014



For the period after 2014, the government has decided to reintroduce the "non-modulated" system of automatic wage indexation, as provided for in the modified law of 22 June 1963, whilst taking into account the economic situation and the price development.

Between two wage and salary adjustments to the consumer price index, an average of 12 months needs to elapse in the period from July 2014 to July 2018. If it becomes obvious that there might be problems in respecting this spacing principle, consultations will take place regarding the measures necessary to resolve this situation. In the event of disagreement on measures to be implemented, the government will undertake the legislative initiative to take the necessary measures, in accordance with the coalition agreement.

# 6.4 A brief overview of recent Belgian studies

The 2010 Competitiveness Report<sup>14</sup> presented a series of studies addressing the problems of wage indexation in Luxembourg and its link to wage cost, inflation and competitiveness. Meanwhile, other international analyses on this polemic topic have been published. This section presents two Belgian reports analysing on one hand possible alternatives to the current Belgian automatic mechanism and on the other hand the effects of indexation on Belgian competitiveness. A third study by the International Monetary Fund (IMF) suggests that the inflation differential between Luxembourg and the euro area partially originates in the automatic wage indexation.

### 6.4.1 National Bank of Belgium: Indexation in Belgium: scale, nature and consequences for the economy, and possible alternatives

In June 2012 the National Bank of Belgium (BNB) published a report<sup>15</sup> on the indexation system in Belgium and examined some possible alternatives to the current mechanism. Although there are some differences between the Belgian and Luxembourgish indexation mechanism, this report may be a valuable input to the debate on the smooth functioning of inflation compensation. In the past, Belgium received similar recommendations to that Luxembourg has received regarding the reform, if not suppression, of the automatic wage indexation mechanism. For example, to exclude all energetic components of the reference index (OECD, 2011), to take into account productivity and competitiveness (European Commission, 2011 and 2012) or greater flexibility in sectorial wage bargaining, improvement of cost competitiveness whilst avoiding second-round effects (IMF, 2011).

Belgium is characterised by a very high degree of wage indexation, as the indexation applies to nearly all workers. Belgium and Luxembourg differ from the majority of the euro area countries as the automatic indexation is applied significantly only in Spain and Cyprus. Furthermore, in Belgium and Luxembourg, indexation is based integrally on inflation observed in the past. In some euro area countries, less formal or implicit indexation mechanisms are often based on expected inflation. They are less prone to wage-price spirals than the risk caused by automatic wage indexation mechanisms based on observed inflation.

- <sup>14</sup> "2010 Competitiveness Report", Perspectives de politique économique N°16, October 2010.
- <sup>15</sup> National Bank of Belgium (2012), Indexation en Belgique : ampleur, nature et conséquences pour l'économie et alternatives possibles, June 2012.

| Table 2   |
|---|
| Companies baying policies in which wages are adapted to inflation (1) (perceptage of total number of companies) |

|                     | Information specific to each company (2) |  |       |          |   | Information specific   |
|---------------------|--|--|-------|----------|---|------------------------|
|                     | Automatic lin                            | omatic linking of wages to No formal rule, but inflation is inflation taken into account |       |          | to each country:<br>coverage rate of<br>institutionalised |                        |
|                     | Noted                                    | Expected   | Noted | Expected | Total   | indexation clauses (3) |
| Luxembourg          | 100                                      | 0,0  | 0,0   | 0,0      | 100   | High                   |
| Belgium             | 98,2                                     | 0,0  | 0,0   | 0,0      | 98,2  | High                   |
| Spain               | 38,3                                     | 16,2   | 10,9  | 5,0      | 70,4  | High                   |
| Slovenia            | 20,3                                     | 2,7  | 32,2  | 5,1      | 60,3  | Low                    |
| Slovakia            | 16,1                                     | 4,8  | 24,4  | 9,6      | 59,9  | n.                     |
| Estonia             | 2,9                                      | 1,8  | 35,4  | 20,8     | 53,8  | Zero                   |
| Portugal            | 2,7                                      | 6,5  | 13,3  | 29,1     | 51,8  | Zero                   |
| Cyprus (4)          | 38,7                                     | 2,1  | 6,4   | 1,8      | 48,5  | High                   |
| Greece              | 14,8                                     | 5,2  | 12,1  | 10,6     | 47,1  | Zero                   |
| France              | 8,9                                      | 2,0  | 21,2  | 8,0      | 33,1  | Very low               |
| Austria             | 8,6                                      | 1,3  | 9,2   | 2,8      | 23,6  | Very low               |
| Italy               | 1,2                                      | 0,5  | 2,6   | 1,5      | 6,2   | Very low               |
| Germany             | n.                                       | n.   | n.    | n.       | n.  | Zero                   |
| Euro area countries | 16,3                                     | 4,1  | 9,7   | 5,5      | 34,7  |                        |

Source: BNB, Druant et al (2009), Du Caju et al. (2009)

(1) Weighted results based on employment and re-scaled by excluding missing answers.

(2) As some companies apply several different methods for adjustment to inflation,

the total is not necessarily equal to the sum of the two modalities.

(3) Very low: 1-25%, low: 26-50%, medium: 51-75%, high: 76-100%.

(4) Cyprus is not included in the calculation of the total as the survey was carried out at a later stage and the results are not completely comparable.

Since 1994, the indexation in Belgium is based on the "health index", i.e. on total consumer price index excluding fuel, alcohol and tobacco, isolating it from shocks on these product prices. Furthermore, the law of 26 July 1996 relative to employment promotion and competitiveness preventive safekeeping has included indexation in a much larger frame, setting out guidelines on the wage formation in the private sector. Social partners are thus invited to take into account the effect of the indexation mechanism when determining real wage increases and reconciling the practice of indexation and a moderate overall wage increase, which has to be - pursuant to the law - in line with the development of wage costs in the three main neighbouring countries (Germany, France, Netherlands).

# Macroeconomic effects of different indexation mechanisms

The BNB report analysed several alternatives to the mechanism of wage indexation currently in force (indexation to the health index). Considered alternatives are:

- A mechanism of "full" indexation to the national consumer price index (CPI);
- An indexation to long-term inflation (or to underlying inflation, an indexation corresponding to that of an absence of indexation to past inflation);
- An indexation mechanism to a price index without energetic products;
- An indexation mechanism to slower health index.

The following counterfactual analysis compares the development of some key variables if the indexation mechanism had been different during the period from the first quarter in 2007 to the fourth quarter in 2010.



It appears that a full indexation mechanism to consumer price index (CPI) would have caused a higher inflation on the total period considered (except the year 2009 when oil prices sharply decreased), compared to an indexation to an index ignoring energy products. An indexation based on long-term inflation would have reduced inflation even more than a mechanism ignoring energy products. A slower mechanism would not modify things fundamentally.



An indexation to an index excluding energy or to long-term inflation would have a positive effect on all variables. Given the relative importance of unfavourable cost shocks over the period 2007-2010, an alignment with long-term inflation would have had a cumulative effect on private output of 0.8%, i.e. an additional 0.2% growth per year in average through, among others, a reinforced competitiveness that increasingly supports exports. This additional production would have been accompanied by a volume of employment approximately 0.6% higher in the end.

However, the authors of the report also highlight the role indexation played during the recession of 2008-2009. The great recession was preceded by sharp rises in crude oil prices and in prices of food commodities, and indexation in Belgium (as in Luxembourg) is characterised by some delay. The upward impact of indexation occurred at the moment when economic activity declined significantly and it played a stabilising role on household disposable income during the recession year, in 2009.



The implementation of alternative indexation mechanisms would probably have negative consequences for the lowest income groups. In fact, a significant part of their consumption is dedicated to energy products (heating fuel, natural gas, electricity) and food products. By excluding these products from calculation of the indexation, a price increase would no longer be transferred onto wages through the automatic wage mechanism. Another factor refers to the fact that lower income groups have a smaller margin to compensate possible reforms of indexation. Their consumption profile leaves few possibilities of substitution given the important part of essential expenses. This is why it is occasionally suggested to maintain indexation for lower incomes at a certain threshold, and once this threshold is reached, to grant a fixed amount corresponding to a rise in percentage applied to the threshold of income (a principle called "in cents instead of percentages"). Such a system may result in a more modest increase in gross salaries and therefore benefit competitiveness, while preserving the purchasing power of the lowest incomes.

If such a system was applied, no doubt it would have dynamic effects and encourage to seek mechanisms aimed at further raising higher incomes that are above the threshold. Compared to the current system, indexation would not be automatic anymore for all workers, regardless of their salary level. Consequently, the wage formation process would become more complex on one hand and more flexible on the other, at least for those wages above the threshold. The "in cents instead of percentages" principle may also result in tension between workers whose salary level is slightly lower than the fixed threshold and those whose salary level is slightly higher. Furthermore, labour costs of workers below the threshold would increase more rapidly in relative terms than labour costs of workers receiving a (slightly) higher wage, while it is precisely the lower paid workers that often fall in the productivity trap. Consequently, this system aimed to preserve purchasing power of the lowest incomes could end up contributing to a new marginalisation of low paid/low qualified work, while work is the best guarantee against poverty and social exclusion. Furthermore, these risk groups have a particularly low employment rate in Belgium. Thus, this system does not appear to be the most appropriate in protecting the lowest incomes and bringing a series of social adjustments, especially as these normally happen during the secondary distribution of income and not the first one.

#### Table 3

#### Summary: Alternatives to the automatic indexation system based on the health index

|  | Advantages  | Inconveniences   |
|--|---|--|
| Automatic enforcement of the 1996 law:<br>automatic correction mechanisms  | Avoids the apparition of a long-lasting competitive handicap.   | Remedial rather than preventive.<br>Difficult to realise as long as the current<br>indexation system stays in place.   |
| Further delaying the transmission<br>of the health index to incomes<br>(for example by greater smoothing<br>or bigger steps)   |   | Limited effect.  |
| Further decreasing the current health<br>index coverage<br>by excluding:<br>• all energy products<br>• the same + food products<br>• the same + increases in indirect taxation | A reduced exposure to raw material price<br>shocks and cost shocks reduces the<br>volatility of real economy and inflation.<br>Partial indexation reduces the volatility of<br>real economy in case of demand shocks.<br>Wage negotiations: more reliable<br>reference index, reduced need for ex post<br>corrections.  | Partial indexation increases the volatility<br>of real economy and inflation in case of<br>raw material price shocks and cost shocks<br>still present in the index.<br>Partial indexation increases the volatility<br>of inflation in case of demand shocks.<br>Reduced margin for sectoral and<br>inter-company differentiation and for<br>taking into account productivity.<br>Loss of representativeness of the<br>reference index. |
| Replacing the health index by a fixed value<br>consistent with price stability<br>("less than and close to 2%")  | Perfect insulation against raw material<br>price and cost shocks from abroad<br>reduces the volatility of real economy<br>and inflation to a maximum.<br>Reduces the volatility of inflation in case<br>of demand shock.<br>Wage negotiations: more reliable<br>reference, reduced need for ex post<br>corrections.<br>Consistent with the monetary policy<br>regime. | Increases the volatility of real economy<br>in case of demand shock.<br>Reduced margin for sectoral and<br>inter-company differentiation and for<br>taking into account productivity.  |
| In cents instead of percentages  | Reduces the volatility of real economy<br>and inflation in case of raw material<br>shock and cost shocks.<br>Partial indexation reduces the volatility<br>of real economy in case of demand shock.<br>Wage negotiations: reduced need for<br>ex post corrections.   | Reduced possibility of protection as the<br>in-cent shift threshold increases.<br>Partial indexation increases the volatility<br>of inflation in case of demand shock.<br>Growing complexity of the negotiation<br>system.<br>Detrimental to low-skilled jobs<br>(low productivity trap).  |
| Source: BNB  |   |  |

### 6.4.2 Bodart and Shadman: Indexation and competitiveness in Belgium

In November 2013 the Institute of economic and social research (IRES) of the University of Louvain (UCL) published a study on indexation and competitiveness in Belgium<sup>16</sup>. Contrary to other studies, which examine the impact indexation has on price and wage formation, this article focuses on the impact on Belgian competitiveness measured by the effective exchange rate.

It is nevertheless difficult to measure the impact of indexation on competitiveness, as it depends on multiple factors. The mere observation that labour costs would increase faster in Belgium than abroad is not a sufficient argument to say that indexation has a negative impact on competitiveness. Other factors, such as tax system, productivity at work or workers' bargaining power, could also be the origin of the difference in trends between Belgium and its neighbouring countries.

The methodology used by the authors of this article involves looking indirectly for "evidence" that *clearly* indicates that indexation has indeed had a negative impact on the competitiveness of the Belgian economy (compared to Germany, France and the Netherlands). Two hypotheses are thus statistically tested:

- If wage indexation does actually harm the competitiveness of Belgium, we may assume that Belgian competitiveness would be particularly affected by unfavourable supply shock, such as an increase in oil prices. As an increase in oil prices (if it lasts for some time) inevitably leads to an increase in the general level of consumer prices, through indexation, wages also increase as a result of the oil shock and, as this mechanism is applied only in Belgium, Belgian competitiveness deteriorates. Consequently the authors examine if, as suggested by this reasoning, changes in oil prices have a negative impact on Belgian competitiveness. The authors also examine the same relationship for Belgium's neighbouring countries. If there is no impact detected in these countries or if the impact is considerably lower than the one estimated for Belgium, we consider that we have an evidence – indirect and certainly not definitive – that indexation harms the competitiveness of Belgian economy;
- In 1994 the indexation mechanism was reviewed with the aim of (i) delaying wage adjustment and (ii) reducing the influence of oil prices and some indirect taxes on wage developments. If there is an impact on Belgian competitiveness, this impact should consequently be lower from 1994 on, which should lead to a lower sensitivity of Belgian competitiveness to changes in oil prices.

<sup>6</sup> Bodart V., Shadman F. (2013), Indexation et compétitivité en Belgique, *Regards économiques*, UCL, n°107, November 2013: http://www.regards-economiques.be/images/reco-pdf/ reco 136.pdf Competitiveness will be measured from indices comparing the level of prices or wage cost in Belgium to the same variables in Germany, France and the Netherlands. Two different models will be used: an "overall" model and a "restricted" model used only with those countries Belgium is in competition with.

#### Oil price and "overall" competitiveness

In Belgium, France and Germany, oil prices have a statistically significant impact on the real effective exchange rate. In each of these three countries, the estimated coefficient is positive, implying that a rise in the oil prices goes along with a long-term appreciation of the real effective exchange rate, i.e. a deterioration in the overall competitiveness of the country. The impact of oil prices is the highest in Belgium: a 10% increase in the oil prices results in an appreciation of the real effective exchange rate of Belgium of approximately 1.24%. The difference of the impact with Germany (0.9%) and France (1.04%) is weak. The impact of oil prices on Belgium's overall competitiveness does not decline after the 1994 reform of the indexation mechanism.

In case of oil shock<sup>17</sup>, the estimated coefficient is positive for Belgium, France and the Netherlands, implying a short-term decline in the competitiveness of these countries. For Belgium, the impact of the "oil shock" variable is unchanged since 1994.

| Table 4 Estimation of the long-term impact of oil prices on "overall" competitiveness (1970-2007) |         |          |           |             |  |  |  |
|---|---------|----------|-----------|-------------|--|--|--|
|   | Belgium | Germany  | France    | Netherlands |  |  |  |
| Oil price   | 0,124** | 0,090**  | 0,106***  | -0,097      |  |  |  |
| Oil price x Break 1994  | -0,004  | 0,009    | -0,020*** | -0,036*     |  |  |  |
| Oil shock   | 0,050** | -0,050** | 0,018*    | 0,193**     |  |  |  |
| Oil shock x Break 1994 0,010 -0,210 0,330** -1,390*   |         |          |           |             |  |  |  |
| * = statistically significant at the 10% threshold  |         |          |           |             |  |  |  |

\*\* = statistically significant at the 5% threshold \*\*\* = statistically significant at the 1% threshold Source: UCL

### Petrol price and "restricted" competitiveness

The long-term impact of an increase in oil price on the relative level of labour cost between Belgium and its three neighbouring countries is quite low. In this sector protected from foreign competition, the level of labour cost per person increases by approximately 0.8% in the long term as a result of a 10% increase in oil prices (1st chart).

<sup>17</sup> This variable is constructed by comparing monthly oil prices with the maximum price in the last 12 months: if the current price is higher than this maximum, the variable takes the value equalling the percentage of this difference, and 0 otherwise.



Conversely, the relative level of unit labour cost between Belgium and the three other countries declines in the long term by approximately 1% in case of a 10% oil rise (2nd chart). Usually, the short-term impact on wage competitiveness is much higher than the long-term one. The most obvious cases are those of competitiveness measured in terms of unit labour cost in the exposed sector and manufacturing industry: a rise of 0.20% to 0.25% is noted four years after an oil shock, whilst in the long term, the effect is near zero in the exposed sector and significantly declines in the manufacturing industry.



Source: UCL

Note: sector exposed to foreign competition: manufacturing industry, agriculture, mining and extractive industry, transport sector.

To conclude, the indexation mechanism is not a determining factor of the long-term development of Belgian competitiveness. The 1994 reform of the mechanism has no consequences on competitiveness of the Belgian economy. In the short term, indexation tends to have negative consequences for some sectors, especially those exposed to foreign competition. This negative difference only tends to disappear after several years.

### 6.4.3 IMF: Inflation differential between Luxembourg and the euro area

When a country joins the International Monetary Fund (IMF), it agrees to submit its economic and financial policies to the examination of the international community. Regular monitoring of economies and political guidance aim to identify weaknesses that could potentially lead to financial or economic instability. Individual surveillance of each member country (through bilateral discussions with the government, central bank officers and often with members of Parliament and representatives of companies, trade unions and civil society) is known as "article IV consultations"<sup>18</sup>.

In the last report on Luxembourg in 2014<sup>19</sup>, the IMF "believes that automatic indexation of wages may be partially responsible for the strong dynamism of labor costs and inflation in recent years. Strong wage increases can trigger higher inflation than in euro area partners, as the rise in inflation automatically causes wages to increase, and as a second round response, the subsequent rise in wages increases inflation further - a process that can result in labor cost increases that diverge from productivity gains. As a first indication, the inflation differential between Luxembourg and the euro area has been relatively persistent, at close to 1 percentage point per annum."



- "[...]each member undertakes to collaborate with the Fund and other members to assure orderly exchange arrangements and to promote a stable system of exchange rates. (...)the Fund shall exercise firm surveillance over the exchange rate policies of members, and shall adopt specific principles for the guidance of all members with respect to those policies. Each member shall provide the Fund with the information necessary for such surveillance, and, when requested by the Fund, shall consult with it on the member's exchange rate policies. http://www.imf.org/external/ pubs/ft/aa/pdf/aa.pdf
- <sup>9</sup> http://www.imf.org/external/ pubs/ft/scr/2014/cr14118.pdf

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It is noteworthy that the IMF bases its observations on Eurostat data. Luxembourg inflation is thus measured by harmonised index of consumer price (HICP), whereas the national consumer price index (NCPI) gives a more accurate picture of national consumption as it excludes the consumption of non-residents, which may be significant for some categories such as oil products or tobacco products (products for which border-crossers and tourists spend a lot on in Luxembourg). Luxembourg inflation measured by HICP is usually higher than inflation measured by NCPI, especially in case of a steep rise in energy prices, given that this category has a higher weight in HICP. Between 1999 and 2013, the inflation of the euro area reached 2.0% in annual average, Luxembourg's inflation was 2.3% (NCPI) and 2.6% (HICP). The inflation differential between Luxembourg and the euro area suggested by the IMF is thus less significant in reality.

An econometric analysis carried out by the IMF suggests that at least half of the inflation differential with the euro area could result from the automatic wage indexation. In a model linking Luxembourg inflation to the euro area inflation and the specific effects such as automatic indexation and the review of the minimum wage, the latter contribute to 0.5% to 1% of the annual inflation rate.

| Table 5     Inflation differential between Luxembourg and euro area |         |          |          |  |  |
|---|---------|----------|----------|--|--|
| Luxembourg inflation  | Diff 1/ | Level    | Level    |  |  |
| Constant  | 0.55*** | 1.67***  | 1.25***  |  |  |
| Euro area inflation   |         | 0.45***  | 0.58***  |  |  |
| Output gap  |         | 0.02     | 0.03     |  |  |
| Indexation (-1)   | 0.53*** |          | 0.59***  |  |  |
| Minwage (-1)  | 0.37    |          | 0.40**   |  |  |
| Observations  | 47      | 47       | 47       |  |  |
| R2  | 0.13    | 0.28     | 0.48     |  |  |
| AR(1) error coef.   |         | -0.36*** | -0.52*** |  |  |
| Durbin-Watson   | 2.61    | 1.97     | 2.09     |  |  |
|   |         |          |          |  |  |

1/ Differential with euro area inflation 2/\*\*\* < 1 percent, \*\* < 5 percent, \* < 10 percent Sources: IMF staff estimations

The spikes in inflation occur during the quarter following the automatic wage indexation. In this context, the IMF believes that temporary arrangements implemented by the law of 31 January 2012<sup>20</sup> have helped in the supposed negative effect of automatic indexation, but a permanent system less favourable to high persistence of inflation should be designed to preserve competitiveness. This is particularly important as the increase in remuneration of work was accompanied by a decline in work productivity since the crisis.

Law of 31 January 2012 adapting certain terms for the application of the sliding wage and salary scale and modifying the article 11 of the amended law of 22 June 1963 on the pay system of civil servants.

### 6.5

## The Sneessens-Bourgain-Shadman-Mehta study on wages and automatic indexation in Luxembourg

In July 2014 the *Observatoire de la compétitivité* under the Ministry of the Economy published a study entitled "Wage formation and automatic indexation: comparative analysis of four European countries" commissioned to the University of Luxembourg<sup>21</sup>. The study was motivated by methodological doubts about a study by the European Commission published in 2011, which concluded that countries with a wage indexation system presented a more rigid wage formation behaviour than those countries without automatic wage adjustment (see frame).

#### Frame 1

#### European Commission: Labour market developments in Europe, 2011

In a report by the Directorate General for Economic and Financial Affairs (DG ECFIN)<sup>22</sup>, the European Commission concluded that countries with a wage indexation system had a more rigid wage formation behaviour than those countries without automatic wage adjustment. The sample of the DG ECFIN study covers the 27 EU Member States and the period 1980 to 2007. The countries are grouped into two subsets: those with and those without a statutory wage indexation mechanism (Belgium, Cyprus, Luxembourg, Malta and Spain).

The differences observed in the parameter values in each of the two groups are interpreted as reflecting consequences of the automatic indexation and its impact on wage developments.

The two following tables summarize the DG ECFIN's findings: the first table gives the long-term relations (with and without the "terms of trade" variable), the second in the form of the error correction models (with and without the "terms of trade" variable).

In the first table, all variables appear with the expected sign for countries without indexation, in particular the unemployment rate, which is negative. This is to say that the unemployment rate has a negative influence on the nominal wage, in line with the economic theory (if the unemployment rate increases, salaries decrease). Inflation (CPI) has a positive relation to nominal wage, as does labour productivity. For the five countries with indexation however the unemployment rate does not show the right sign. In the error correction models, the results are less clear: the unemployment rate is hardly significant (at 10%) when the terms of trade variable is present for the countries without indexation. Once again, the unemployment rate does not have the right sign for the countries with indexation.

According to the Commission, "It appears that the countries with indexations systems exhibit on average a weaker reaction of wages to unemployment and terms of trade, after controlling for their response to prices and productivity".

- Perspectives de politique économique N°28: Formation des salaires et indexation automatique : analyse comparative de quatre pays européens. July 2014: http://www.odc.public.lu/ publications/perspectives/ PPE\_028.pdf
- <sup>22</sup> "Labour Market Developments in Europe", 2011, European Commission.



Wages and institutions: evidence from long-run wage equations, various sample splits, EU27, 1980-2007

|  | (9) (10)                           |  | (11)  | (12)      |  |
|--|------------------------------------|--|---|-----------|--|
| Dependent variable: log<br>of nominal compensation<br>per employee | Countries with<br>systems<br>whole | nout indexation<br>throughout the<br>sample period | Countries with indexatio<br>systems throughout th<br>whole sample perio |           |  |
| Explanatory variables  |                                    |  |   |           |  |
| Log CPI  | 1.011**                            | 0.965**  | 1.021**   | 0.955**   |  |
|  | [0.0294]                           | [0.0176]   | [0.0171]  | [0.0511]  |  |
| Unemployment rate  | -0.00511+                          | -0.00396* 0.000174                                 |   | 0.000251  |  |
|  | [0.00253] [0.00187]                |  | [0.00190]   | [0.00223] |  |
| Log labour productivity  | 0.803**                            | 3** 0.827** 0.789**                                |   | 0.868**   |  |
|  | [0.0644]                           | [0.0489]   | [0.0296]  | [0.0692]  |  |
| Log terms of trade   |                                    | 0.464**  |   | 0.134     |  |
|  |                                    | [0.125]  |   | [0.0732]  |  |
| Constant   | -2.513**                           | -4.502**   | -2.622**  | -3.073**  |  |
|  | [0.0935]                           | [0.553]  | [0.0617]  | [0.226]   |  |
| Observations   | 448                                | 448  | 101   | 101       |  |
| R-squared  | 0.99                               | 0.992  | 0.992   | 0.993     |  |
| Number of countries  | 22                                 | 22   | 5   | 5         |  |

Wages and institutions: evidence from Error Correction Models, various sample splits, EU27, 1980-2007

|   | (9) (10)                           |   | (11)   | (12)       |  |
|---|------------------------------------|---|--|------------|--|
| Dependent variable: Δlog<br>of nominal compensation<br>per employee | Countries with<br>systems<br>whole | out indexation<br>throughout the<br>sample period | Countries with indexation<br>systems throughout the<br>whole sample period |            |  |
| Explanatory variables   |                                    |   |  |            |  |
| ΔLog CPI  | 0.967**                            | 0.968**   | 0.849**  | 0.855**    |  |
|   | [0.0459]                           | [0.0427]  | [0.0611]   | [0.0752]   |  |
| ∆Unemployment rate  | -0.00425*                          | -0.00358+   | 0.00432**  | 0.00441**  |  |
|   | [0.00185]                          | [0.00187]   | [0.000737]   | [0.000835] |  |
| ∆Log labour productivity  | 0.463**                            | 63** 0.500** 0.162+                               |  | 0.177*     |  |
|   | [0.146] [0.133]                    |   | [0.0648]   | [0.0494]   |  |
| ∆Log terms of trade   |                                    | 0.147*  |  | -0.0355    |  |
|   |                                    | [0.0673]  |  | [0.0233]   |  |
| Error correction term   | -0.0941*                           | -0.151*   | -0.265**   | -0.302**   |  |
|   | [0.0452]                           | [0.0545]  | [0.0185]   | [0.0424]   |  |
| Constant  | 0.0116**                           | 0.0116** 0.00997* 0.0139*                         |  | 0.0136**   |  |
|   | [0.00402] [0.00363] [0.001         |   | [0.00189]  | [0.00244]  |  |
| Observations  | 426                                | 426   | 96   | 96         |  |
| R-squared   | 0.777                              | 0.788   | 0.778  | 0.796      |  |
| Number of countries   | 22                                 | 22  | 5  | 5          |  |

Estimation method: least Square Dummy Variables. Robust standard errors in brackets. Clustering of standard errors by country. \*\*p<0.01, \*p<0.05, +p<0.1 Countries with indexation throughout the sample period: Belgium, Cyprus, Spain, Luxembourg, Malta. Source: Commission services Following the publication of this study, the *Observatoire de la compétitivité*, commissioned in 2013 a further study analysing potential effects of automatic indexation on wage formation in Luxembourg and a comparison with neighbouring countries. The objective of the study was to ascertain whether wage formation in Luxembourg (and Belgium) was indeed more rigid than in Germany or France. The study was undertaken by Henri Sneessens and Arnaud Bourgain from the CREA of the University of Luxembourg and by Fatemeh Shadman and Kirti Mehta from MeSh Analytics.

European Commission Report estimates have first been recalculated for all 27 countries, then individually, and extending the observation period with data up to 2012 in order to include the crisis years. By adding this data, the contrast between countries with indexation and those without such a mechanism disappears and the hypothesis that wages in countries with indexation would be less reactive to unemployment is no longer confirmed.

The authors from the University of Luxembourg made a few comments regarding the European Union study:

- Considerable estimation biases may result from bringing together countries with very different economic structures and which only have in common the presence or absence of a wage indexation mechanism;
- Because of the small number of observations, the ordinary least squares estimation method of a long-term relation may suffer potentially significant biases. The recalculation with more recent data has substantially modified the results;
- The study analyses the behaviour of economies in its entirety, including the non-profit sector. A different behaviour can be expected between the trade and non-profit sector;
- There is a difference in the development of hours worked in each country, which is not included in the calculation of the European Commission study.

Contrary to the European Commission's method, the authors of the study used a VAR model (Vector Auto Regressive). In these simultaneous equations, all variables are initially considered endogenous. Each variable is explained by its own past values as well as past values of all the other variables of the model. This system allows the consideration of the relations that can exist between variables, a characteristic which is not possible with the ordinary least squares (OLS) method used in the European Commission report. Main wage determinants from a standard wage formation model adapted to open economies are:

- Consumer price index (expected sign: +);
- Unemployment rate (-);
- ◄ Hourly labour productivity (+);
- Competitiveness and profitability (+).

The estimation of the VAR model in this study has made a distinction between overall economy and the sole market sector for each country (Luxembourg, Belgium, Germany and France) over the period from 1976-2011. This distinction was necessary as the method for determining wages and prices is quite different in trade and non-profit sectors of the economy. A further analysis at the sector level (manufacturing industry and trade services) was carried out for Luxembourg.

We obtain the right sign for each coefficient of the long-term equilibrium relationship for the **overall economy** of the four countries. The coefficient on the unemployment rate in France is close to Belgium's, but much lower than Luxembourg's. The error correction term has a much higher coefficient than for Luxembourg but remains close to Belgium's. With regard to Germany, reunification caused a problem for a part of the available series; the data analysis is thus limited to pre-reunification data to 1986.

The **market sector** is more affected by competitiveness at the international level; it is thus useful to distinguish between this sector and the whole economy of the four countries. The two countries with indexation, Luxembourg and Belgium, have higher unemployment rate coefficients than the countries without indexation. The coefficients on the unemployment rate variable and the hourly productivity variable are higher in Belgium.

For the four countries, no matter what level of desegregation, the econometric estimates result, in the long-term relationship, in a coefficient on indexation that is not significantly different from 1. In the long term, even if it is not institutionalised, indexation seems to be ascertained in these four economies.

As regards the effect of the unemployment rate on hourly pay, the coefficients for the four countries show some differences but are fairly close, and above all they are significant. This is a major difference with the European Commission study, which obtained non-significant results for the group of countries with indexation.

| Summary table: Elasticity of nominal wages to different variables |            |         |        |         |  |  |
|---|------------|---------|--------|---------|--|--|
|   | Luxembourg | Belgium | France | Germany |  |  |
| Flexibility to consumer price                                     |            |         |        |         |  |  |
| Overall economy   | 1          | 1       | 1      | 1       |  |  |
| Market sector   | 1          | 1       | 1      | 1       |  |  |
| Industry  | 1          |         |        |         |  |  |
| Market services   | 1          |         |        |         |  |  |
| Effect of unemployment rate                                       |            |         |        |         |  |  |
| Overall economy   | -0,066     | -0,013  | -0,011 | -0,014  |  |  |
| Market sector   | -0,034     | -0,062  | -0,019 | -0,014  |  |  |
| Industry  | -0,067     |         |        |         |  |  |
| Market services   | -0,078     |         |        |         |  |  |
| Elasticity to hourly productivity                                 |            |         |        |         |  |  |
| Overall economy   | 0,593      | 0,647   | 0,698  | 1       |  |  |
| Market sector   | 0,377      | 1,029   | 0,819  | 1       |  |  |
| Industry  | 0,183      |         |        |         |  |  |
| Market services   | 0,580      |         |        |         |  |  |
| Elasticity to competitiveness indicator†                          |            |         |        |         |  |  |
| Overall economy   | 0,944      | -0,088  | -0,228 | 2,015   |  |  |
| Market sector   | 0          | -0,555  | -0,430 | 1,755   |  |  |
| Industry  | 0,676      |         |        |         |  |  |
| Market services   | 0          |         |        |         |  |  |
| Error coefficient term  |            |         |        |         |  |  |
| Overall economy   | -0,095     | -0,401  | -0,384 | -0,198  |  |  |
| Market sector   | -0,142     | -0,120  | -0,162 | -0,223  |  |  |
| Industry  | -0,397     |         |        |         |  |  |
| Market services   | -0,147     |         |        |         |  |  |

Table /

+ Signs and values obtained vary according to the competitiveness indicator used. These are the terms of trade for goods and services for Luxembourg, the terms of trade for goods for Germany and the real effective exchange rate, based on unit labour costs for Belgium and France. For the latter, a rise in the index corresponds to a loss of competitiveness.

The VAR model allows calculating the dynamic effects of a random shock on other variables of the system. As the system is interdependent, a price shock will affect all variables. The impact on nominal wages comes directly via (automatic or not) wage indexation to consumer prices, but also indirectly via other variables of the system. The consequences of a price shock are particularly interesting to examine. In fact the concern is that the magnitude and the speed of the price-salary loop is higher in countries with automatic indexation mechanisms, so that a price shock would lead to a higher loss of competitiveness and higher rises in unemployment in these countries.

The following charts show the effects on (real) hourly wages of a 1% exogenous shock on prices in period 1. The shock implies a decline in real wage in period 1 (see first chart), before this decline is rapidly compensated. The adjustments of nominal wages bring rather quickly real wages to their new equilibrium values (slightly higher than starting real wage in Germany and slightly lower in other countries). As real wage increases in Germany, the effect on apparent labour productivity is negative.

There is no significant difference between countries with or without automatic wage indexation. The catch-up in salaries seems to be a bit slower in Luxembourg, as real wages stabilise at their new equilibrium value only after five years, compared to three years in other countries (see second chart).



Source: "Formation des salaires et indexation automatique : analyse comparative de quatre pays européens"

#### Chart 10

Cumulative effects on real hourly wage of the market sector as a result of a 1% shock on consumer prices



Source: "Formation des salaires et indexation automatique : analyse comparative de quatre pays européens"

The price shock implies a slight but steady increase in the unemployment rate in all countries. The cumulative effect on unemployment is 0.1 percentage point in Luxembourg, 0.3 in Belgium, 0.4 in Germany and 0.5 in France.



Source: « Formation des salaires et indexation automatique : analyse comparative de quatre pays européens »

The dynamic adjustment of the considered models as a result of an exogenous price shock shows a one-off impact that is very similar impact among the four countries. Therefore, there is no reason to conclude that the wage indexation mechanism would prevent wage adjustment dynamics. The simulation exercise of a price shock on real wages ascertains the long-term unit indexation. In fact, the impact of a price shock on real wages is limited n the short term for the four economies concerned and is zero after a few years.

# 6.6 Conclusion

The institutionalised mechanism of automatic wage indexation to consumer prices has been the essential pillar in the wage formation process for several decades in Luxembourg. However, automatic indexation has often been suspected of being the main cause of the faster inflation developments in Luxembourg, and of being a source of loss of profitability and competitiveness via the automatic transmission to wages.

However, several analyses have proven that in the long term, the wage formation does not differ in countries with an institutionalised indexation mechanism or without such a mechanism. "There is no automatic link between indexation and loss of competitiveness. While it is true that a poorly managed indexation mechanism can lead to a loss of competitiveness, in case of an oil shock for example, it is wrong to believe that indexation is the systematic cause of problems of competitiveness. Let us compare the situation of Germany and France, for example. None of these countries has an automatic indexation mechanism but their respective situation in terms of competitiveness is nevertheless totally different".<sup>23</sup>

Inflation compensation is not only normal, but also inevitable and even desirable, institutionalised or not. The results of the study carried out by the University of Luxembourg have proven that the existence of an indexation system does not lead to significant changes in the wage formation in the long term. Even in the short or medium term, the dynamics of wage formation does not seem to be very different if there is an automatic indexation or not.

An interesting point, which has not been analysed enough so far, is to find out the degree to which wage formation in the financial and public sector - two major sectors in Luxembourg - has had an impact on wages in the other sectors of Luxembourg economy. The predominance of one sector could have a negative impact on competitiveness of others: for example, the industry sector, which is subject to a strong foreign competition, would be faced with a kind of "Dutch disease"<sup>24</sup>.

- <sup>23</sup> Arnaud Bourgain and Henri Sneessens (researchers at the University of Luxembourg and authors of the study "Formation des salaires et indexation automatique"), paperjam.lu on 17.07.2014
- <sup>24</sup> The "Dutch disease" is an economic phenomenon in which a competitive sector at international level (such as the financial sector for Luxembourg) penalises the other (uncompetitive) sectors subject to international competition, due to a shifting of labour into the very competitive sector and a general increase in prices and incomes of an economy.

# 6.7 Bibliography

#### ALLEGREZZA S., HURY J.,

LAMBORAY C. (2010) Les modulations du mécanisme d'indexation automatique des salaires, *Économie et statistiques*, STATEC, N° 43, August 2010.

#### NATIONAL BANK OF BELGIUM (2012)

Indexation en Belgique : ampleur, nature et conséquences pour l'économie et alternatives possibles, June 2012.

#### BODART V., SHADMAN F. (2013)

Indexation et compétitivité en Belgique, Regards économiques, UCL, N° 107, November 2013.

#### EUROFOUND (2010)

Wage Indexation in the European Union, Background Paper, European Foundation for the Improvement of Living and Working Conditions, 2010.

#### EUROPEAN COMMISSION - DG FOR ECONOMIC AND FINANCIAL AFFAIRS (2011)

Labour Market Developments in Europe, 2011.

### INTERNATIONAL MONETARY FUND (2014)

Luxembourg. Staff Report for the 2014 Article IV Consultation, April 2014.

#### MINISTRY OF ECONOMY AND FOREIGN TRADE (2012)

Modalités de la réglementation des clauses d'indexation de prix en France, Allemagne, Belgique et Luxembourg, *Perspectives de politique économique N° 19*, May 2012.

#### MINISTRY OF ECONOMY AND FOREIGN TRADE (2013)

Étude des adaptations de prix des entreprises au Luxembourg, *Perspectives de politique économique* N° 26, July 2013.

#### MINISTRY OF THE ECONOMY (2014)

Formation des salaires et indexation automatique : analyse comparative de quatre pays européens, *Perspectives de politique économique N° 28*, July 2014.

# 7 Impact assessment of the VAT increase

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# 7.1 Background information

Value added tax (VAT) is a tax on final consumption. It is an income in the general budget of the State: It applies to economic activities that are subject to payment and that are carried out by freelancers. The amount of the tax is proportional to the selling price before tax.

Value added tax is charged in successive stages, i.e. at each transaction in the production and distribution process. As at each stage of the production and distribution process, the tax paid on the inputs can be deducted, only the added value is taxed at this stage. VAT is thus a unique consumption tax, which is paid in instalments.

The rate paid is the same regardless of the consumer's income. Value added tax is therefore not a redistributive tax but an indirect one.

## 7.2 Adjustments of the VAT rate

### 7.2.1 Consequences of a VAT rate change on end prices

VAT is proportional to pre-tax price and is added to it to form the price inclusive of taxes, which is the price paid by the final consumer. When the VAT rate changes, the transmission of the VAT rate change to the price inclusive of taxes depends on the response of the pre-tax price:

 If the pre-tax price is not changed, the price inclusive of taxes merely reflects the change in the VAT rate. This effect corresponds to a full transmission of the VAT change to the price inclusive of taxes;



 Conversely, companies can choose to modify the pre-tax price in order to keep a constant price inclusive of taxes. This effect corresponds to a no transmission of the VAT rate change.



According to several studies<sup>1</sup>, a partial transmission is more likely.

In fact, some companies in a competitive situation could prefer to reduce pre-tax prices, and thus their margin, in order to limit a possible decline in demand resulting from a VAT increase. The business response could also depend on the more or less significant reaction of demand to VAT rate changes and on the degree of competition of each market. The study on price adjustment of businesses in Luxembourg, published in July 2013 by OFP<sup>2</sup>, showed that external pressures (such as rent or taxes) are minor triggering factors of a price change. The development in personnel costs and the pressure from suppliers play a more dominant role in the revision and adjustment of prices.

Other uncertain factors may influence the upward effect of consumer prices: an increase in the standard tax rate of two percentage points, as announced in Luxembourg in 2015, implies small price increases. For numerous psychological prices ending in 9 or  $0^3$ , which are relatively inelastic by nature, a smaller inflationary impact at short term than expected may occur. For example, a product at  $\in$  9.99 would rise to  $\notin$  10.17 in the case of a full transmission of the VAT increase onto the end price. The company could decide to stay under this  $\notin$  10 psychological barrier and not pass on this VAT increase onto the end price.

- For example: Carare and Danninger (2008): "Inflation Smoothing and the Modest Effect of VAT in Germany", *IMF Working Paper 175* - Carbonnier (2009): "Différence des ajustements de prix à des hausses ou baisses de taux de TVA : un examen empirique à partir des réformes françaises de 1995 et 2000", Économie et Statistique, N° 413, P.3-20-Bundesbank (2008), "Preisund Mengenwirkungen der Mehrwertsteueranhebung zum 1. Januar 2007", Monatsbericht, April 2008.
- <sup>2</sup> http://www.odc.public.lu/ publications/perspectives/ PPE\_026.pdf
- <sup>3</sup> Levy D., Lee D., Chen H., Kauffman R., and Bergen M., "Price Points and Price Rigidity", *Review of Economics* and Statistics, vol. 93(4), p. 1417-1431

### 7.2.2 The "social VAT" concept

The social VAT concept was seriously discussed in the years 2004-2007 in France. The social VAT system was first adopted in Denmark in the late 1980s<sup>4</sup>, and the increase in the VAT rate in Germany can also be partly considered as a social VAT.

The system consists in changing how the social protection is operating, by increasing the VAT and lowering social security contributions by the same amount. As social security contributions decrease, labour cost also decreases, making products more attractive at international level. Thus, there is a double effect: job creation and improvement of competitiveness. Social VAT applies to all goods and services sold on the national territory, whether they are produced on this territory or imported from abroad. It does not apply to exports.

Competitiveness is determined for the export by sales prices, net of tax, and in the domestic market by sales prices including VAT. Consequently, everything that allows reducing sales prices excluding VAT contributes to improve export competitiveness of national companies. Everything that causes an increase in prices including VAT of imported products (without an increase in prices of domestic-produced goods) improves the competitiveness of national industry on the domestic market.

However, a decrease in purchasing power could result from it if the decrease in social security contributions does not offset the VAT increase. The prices of imported goods increase as they do not benefit from the decrease in social security contributions but are affected by the VAT increase. This increase in the price of only some products could increase inflation. According to the opponents, social VAT could also have a deadweight effect for some companies, which could take advantage of the decreased contributions in order to increase their profits.

Denmark was the first country to adopt the principle of social VAT. The general idea was a transfer of contributions of both employers and employees on final consumers in order to finance social protection. Social VAT was introduced progressively between 1987 and 1992. Social contributions related to unemployment and disability insurance paid by employers were removed and VAT increased from 22% to 25% in 1992<sup>5</sup>. It should be noted that there is no intermediate or reduced rate in Denmark, all products and services are taxed at 25%. The introduction of the social VAT in Denmark can be regarded as a success: in the late 1980s, the country was in a crisis period and a series of reforms that reinforced each other improved Danish competitiveness. From 1990, the current account had become positive after being negative for several consecutive years, the unemployment rate has decreased from 1992 and inflation could be kept under control despite the rise in VAT (cf. following chart).

- <sup>4</sup> http://www.usherbrooke.ca/ chaire-fiscalite/fileadmin/ sites/chaire-fiscalite/documents/Taxes\_a\_la\_consommation/Presentation-Paquin-TVA-Sociale-18mars2011.pdf
- Marini, Philippe. L'expérience danoise : une réussite bien réelle qui mérite attention. http://www.senat.fr/rap/r04-052/r04-05233.html : Rapport d'information N°52 du Sénat, 2004.



In Germany, the standard VAT rate increased from 16% to 19% on 1 January 2007 while contributions to unemployment insurance were reduced from 6.5% to 4.2%. This 2.3 percentage point decline is equal to one VAT point<sup>6</sup>. The reduced rate has not changed since then.

There are many assessments of the potential impact of a social VAT type measure, especially in France where the effects of the social VAT have been studied since 2004. An analysis by the DGTPE (Directorate General for Treasury)<sup>7</sup> and an analysis by the Paris Chamber of Commerce envisioned, through an overall economic model (increase in the standard VAT rate to 20.8% and a decline of 2.1 points of employer contributions), a slight positive effect on employment after 2 years (+23,000 jobs, equalling a decrease in unemployment of 0.1%) and a neutral effect on activity. Obviously the results depend on hypotheses. The long-term effects of a social VAT have been simulated by the DGTPE via a stylised economy model, under strong hypotheses:

- Capitals are perfectly mobile;
- Wages adjust in order to balance the labour market and the minimum wage does not compel wage developments.

In order to ensure the ex post balance of public finances, a decline of 2.1 percentage points of social security contributions (0.5% of GDP) has to be compensated by a VAT increase in the range of 0.6% of the GDP. Taking into account these elements has little impact upon the obtained results: a recessionary effect on the GDP and investment can be found but employment declines slightly (-2,000 jobs).

See also : "Beitragssenkung in der Arbeitslosenversicherung" de Karl-Bräuer-Institut des Bundes der Steurzahler, March 2007

http://de.scribd.com/doc/ 48216275/Annexe-IV-TVAsociale-24-05bis The ministry of Economy and Finances studied the introduction of social VAT in a 2007<sup>8</sup> report, emphasising its limitations and problems: the effects depend on the speed of transmission of the decrease in social security contributions to producer prices, on the degree of competition in some sectors and on the implementation of an active price moderation policy in order to prevent any cyclical risk.

In the *Figaro* of 11 September 2007, the Minister of Economy and Finances at the time, Christine Lagarde, gave the following explanation, regarding social VAT: "As such, at this stage of our growth and without any solid flanking measures for maintenance of prices, (it) would not be appropriate as it would be a source of inflation and probably not create many jobs"<sup>9</sup>.

The social VAT effects are difficult to predict. The positive example of Denmark cannot be limited to the introduction of social VAT, but should be considered as being part of a series of in-depth reforms. The social VAT concept has been studied thoroughly in France in the last decade but the results do not show the expected effects. The results also depend heavily on the economic environment of each country and on the hypotheses used in the models. The social VAT project should be placed within a global perspective of tax reform, giving back coherence and justice to all compulsory levies, as stressed by the *Observatoire français des conjonctures économiques*<sup>10</sup>.

# 7.2.3 Empirical calculation of the impact of changes in the VAT rate

It is usually difficult to calculate the impact of a VAT increase has on the inflation rate because numerous shocks can occur during the same period, such as an oil shock, an increase in demand, etc. Price changes resulting from other factors can coincide with the adjustment of VAT and it is impossible to directly observe the level of inflation without VAT rate changes. Yet the precise measure of the inflationary impact of a VAT change corresponds in fact to the difference between the inflation observed after the change and the *hypothetical* or *counterfactual* inflation, which would have been observed without this change. In order to estimate a hypothetical inflation, it is necessary to construct a measure of inflation, which is as close as possible to what inflation would have been without a VAT change.

The methodology of the empirical calculation of this section was used in an article by the *Banque de France* to estimate the impact of French VAT increase in August 1995<sup>11</sup> through "double differences" method. This method is based on inflation rates of neighbouring countries displaying similar consumption spending structures, but are unaffected by VAT changes (see first example, German VAT increase in January 2007). The inflation in the euro area (excluding Germany) is used as reference in the following comparison. The impact of the VAT change is thus assessed as the difference between inflation differentials in Germany and the euro area before and after the VAT change.

- <sup>8</sup> Ministry of Economy, Finance and Employment (2007), "Étude sur la possibilité d'affecter une partie de la TVA au financement de la protection sociale en contrepartie d'une baisse des charges sociales pesant sur le travail".
- http://www.lefigaro.fr/ impots/2007/09/11/05003-20070911ARTWWW90427-la\_ tva\_sociale\_devra\_attendre\_. php
- <sup>10</sup> http://www.ofce.sciences-po. fr/blog/tva-%C2%AB-sociale-%C2%BB-antisociale/
- <sup>11</sup> Gautier and Lalliard (2014): "How do VAT changes affect inflation in France?", Banque de France. Quarterly Selection of Articles. No. 32



#### Frame 1: Methodology

#### The empirical measure of the impact of VAT rate changes on end prices is based on the "double differences" method.

At first the difference is calculated. The inflation in the euro area (FA) (excl between monthly inflation of harmonised index of consumer price (HICP) of January 2007 (month of the German VAT change) and the average inflation in January in the reference period 1996- Difference EA = inflation 01.2007 EA -2013 (excl. 2007):

Difference DE = inflation 01.2007 DE average inflation 01.1996 to 01.2013 DE The impact of the VAT change in Germany (excl. 2007)

This difference is used to measure the inflation differential observed for Germany in January 2007 compared to a "standard" situation. However it could also partly result from other factors, which occurred at the same time. For this reason, the hypothetical inflation is calculated; it should be close to what inflation would have been in Germany without the increase in the VAT rate.

Germany) is used under the assumption that it depends on the same cyclical factors than inflation in Germany:

average inflation 01.1996 to 01.2013 EA (excl. 2007)

in 2007 is measured by the difference between the inflation differential between 2007 and the reference period for Germany, and the same differential for the euro area (excl. Germany), which cancels out the effects of cyclic shocks. The estimation by "double differences" of the impact of VAT changes on inflation is calculated as follows:

Impact of VAT = Difference DE – Difference FΑ

#### 7.2.3.1 Germany in January 2007

In January 2007 the standard VAT rate in Germany increased from 16% to 19%. This 3-percentage-point increase is one of the highest that has occurred in the past few years in the euro area. Given that the German government had already announced this increase in December 2005, price adjustments could be spread over a longer period of time, which makes the impact of the VAT increase on inflation more difficult to measure. In case of full and immediate impact, the price of the affected products should have increased by 2.6%, and the impact on the consumer price index should have been 1.4 percentage point (annual inflation)<sup>12</sup>.

However inflation did not increase significantly in Germany in 2007 (2.28%) compared to 2006 (1.78%), and the difference with inflation in the euro area (2.14%) was not significant, indicating that the impact of the increase in the VAT rate was weaker than feared.

Another reason for the modest increase in inflation was the reduction in unemployment insurance contributions from 6.5% to 4.2% at the same time, which means a kind of social VAT, presented in the previous section of this chapter.

> <sup>12</sup> Bundesbank (2006), "Anhebung der Mehrwertsteuer und mögliche Vorzieheffekte", Monatsbericht, May 2006.



Double differences

In January 2007 monthly inflation declined by 0.19% compared to December 2006 in Germany (the annual rate of change was 1.79%), whilst the monthly progress between 1996 and 2013 (excl. 2007) was -0.22% (yearly inflation 1.53%). Traditionally, the monthly progress declines in January compared to December of the previous year because of sales and seasonal products as holiday packages.

Thus, inflation in January 2007 was similar to the average inflation in January during the reference period in Germany. However the increase in the VAT in Germany could compensate a sharper price decline, linked to other factors. The monthly progress in the euro area (excl. Germany) was -0.65% in January 2007 compared to an average progress of 0.37% in the reference period (annual inflation 2.13%). The drop in prices is thus sharper in January 2007 than during the years 1996 to 2013 in the euro area than in Germany.

#### Table 1 Impact of the VAT increase in Germany in January 2007 (Percentage change compared to the previous month)

|                    |  | November<br>n-1 | Décember<br>n-1 | January<br>n | February<br>n | March<br>n |
|--------------------|--|-----------------|-----------------|--------------|---------------|------------|
| Germany            | Average inflation 1996-2013 (excl. Nov. 06-March 07) | -0,10           | 0,74            | -0,22        | 0,48          | 0,21       |
|                    | Inflation 2007                                       | -0,10           | 0,88            | -0,19        | 0,49          | 0,19       |
|                    | Difference between 2007 and 1996-2013                | 0,00            | 0,14            | 0,03         | 0,01          | -0,02      |
| Euro area          | Average inflation 1996-2013 (excl. Nov. 06-March 07) | 0,05            | 0,14            | -0,37        | 0,28          | 0,83       |
| (excl.<br>Germany) | Inflation 2007                                       | 0,11            | 0,18            | -0,65        | 0,24          | 0,86       |
|                    | Difference between 2007 and 1996-2013                | 0,06            | 0,03            | -0,28        | -0,05         | 0,03       |
|                    | Impact of the VAT increase (monthly inflation)       | -0,05           | 0,11            | 0,30         | 0,05          | -0,04      |

Source: Eurostat, calculations: ODC

Thus, assuming that the inflation in the euro area depends on the same cyclical factors than the German inflation, we may conclude that the impact of the VAT change in Germany in 2007 equals the difference between the inflation differential between 2007 and the reference period for Germany and the same differential of the euro area (excl. Germany). According to this calculation, the impact of the increase in VAT rate in January 2007 is 0.30% (0.52% for the rate of change over 12 months).

Table 2 Impact of VAT increase in Germany in January 2007

(Percentage change compared to the month of the previous year)

|                                 |  | November<br>n-1 | Décember<br>n-1 | January<br>n | February<br>n | March<br>n |
|---------------------------------|--|-----------------|-----------------|--------------|---------------|------------|
| Germany                         | Average inflation 1996-2013 (excl. Nov. 06-March 07) | 1,58            | 1,60            | 1,53         | 1,54          | 1,55       |
|                                 | Inflation 2007                                       | 1,50            | 1,38            | 1,79         | 1,88          | 1,98       |
|                                 | Difference between 2007 and 1996-2013                | -0,09           | -0,21           | 0,25         | 0,34          | 0,43       |
| Euro area<br>(excl.<br>Germany) | Average inflation 1996-2013 (excl. Nov. 06-March 07) | 2,09            | 2,09            | 2,13         | 2,11          | 2,17       |
|                                 | Inflation 2007                                       | 2,00            | 3,06            | 1,86         | 1,85          | 1,92       |
|                                 | Difference between 2007 and 1996-2013                | -0,08           | 0,97            | -0,27        | -0,26         | -0,25      |
|                                 | Impact of the VAT increase (annual inflation)        | -0,01           | -1,18           | 0,52         | 0,61          | 0,67       |

Source: Eurostat, calculation: ODC

According to the Federal bank of Germany, the monthly seasonally adjusted rise was 0.4%, meaning VAT increase had effects on inflation, even if the price of a barrel of Brent had decreased by 11% in January 2007 compared to December 2006. Fuel oil even decreased by 5% between December 2006 and January 2007 despite the VAT increase<sup>13</sup>. The economic environment (economic recovery and decrease in fuel price) has favoured the initial absorption of the VAT increase.

> 13 Bundesbank (2008), "Preisund Mengenwirkungen der Mehrwertsteueranhebung zum 1. Januar 2007' Monatsbericht, April 2008















▼ Inflation at constant tax rates (Eurostat)

Since October 2009 Eurostat has published a consumer index price at constant tax rates (HICP-CT) where tax rates on products stay constant in the observation period compared to the reference period. Thus, in case of a change in tax rates, the difference between the HICP and HICP-CT indicates the effect of the change in the tax rate on price changes, assuming that tax changes are instantly and fully transmitted onto the end price. Due to this hypothesis, the simulated inflation rates can only be an approximation. It is difficult to measure the impact on the final price in the case of an increase in the VAT rate. Measures that are linked to a product or a specific category of products, such as a change in tobacco excise duties, are easier to quantify.

In January 2007 the annual inflation was 1.79% in Germany. According to Eurostat, the inflation rate at constant tax rates would have been 0.20%, the impact of a VAT increase would thus have been 1.6 percentage point in January 2007. In terms of yearly average, the difference between the actual inflation rate and the constant tax rate remains at 1.6 point of percentage. In January 2008 the difference between the actual rate and the simulated rate has mechanically decreased following the disappearance of the base effect.



It is noteworthy that this Eurostat calculation risks to under-estimate the inflation rate at constant tax rates. In fact, this is based on the hypothesis that the increase in the VAT rate is instantly and fully transmitted to the end price, which is not the case according to several studies<sup>14</sup>. According to an IMF study<sup>15</sup>, the effective increase in the German inflation rate was much smaller than feared. A reason for this rather modest increase is the long announcement period initiated in December 2005, leading to prices that would have already risen partly in 2006 and to a smoothing of inflation.

#### 7.2.3.2 The Netherlands in October 2012

In order to reduce the budget deficit of the Netherlands, the Dutch government announced a series of changes in the presentation of its stability program in April 2012<sup>16</sup>. These changes included an increase in the standard VAT rate from 19% to 21% in October 2012 (the reduced rate remained unchanged at 6%), an increase in excise duties and the introduction of reforms regarding the charging scheme of medical and paramedical services, road passenger transport and pharmaceutical products. As a result of these reforms, the increase in the consumer price index has been faster in the Netherlands than in the euro area and neighbouring countries.

The 12-month rate of change jumped from 2.55% (September 2012) to 3.26% (October 2012). Over the following 12 months, the base effect led the 12-month rate of change to remain on a high level until October 2013 (as the prices before and after the VAT increase were compared to each other), when the rate moved mechanically to 1.31% and thus to a level similar to the ones of other European countries.



- See footnote 1.
- <sup>5</sup> Carare and Danninger (2008): "Inflation Smoothing and the Modest Effect of VAT in Germany", *IMF Working Paper* 175
- <sup>16</sup> Stability Programme of the Netherlands. April 2012 Update: http://ec.europa.eu/ europe2020/pdf/nd/sp2012\_ netherlands\_en.pdf
Double differences

The monthly rise in October 2012 was 0.81% in the Netherlands. This increase was clearly higher than the average increase of this month during the reference period (1996 to 2013 excl. 2012), therefore it does appear that the prices reacted strongly to the increase in the VAT rate. The identical calculation for the euro area also shows a faster rise of prices in 2012 compared to the reference period, but it is significantly less pronounced (0.23% in October 2012 compared to 0.15% between 1996 and 2013).

According to this simulation, the impact of the VAT increase on the Dutch inflation rate was 0.65% in October 2012. Contrary to the example of Germany in 2007, the impact of the VAT increase is only visible during the adjustment month and not during the preceding months or the month following the increase.

Impact of the VAT increase in the Netherlands in October 2012 (Percentage change compared to the previous month)

|   |  | August | September | October | November | December |
|---|--|--------|-----------|---------|----------|----------|
| Netherlands                                 | Average inflation 1996-2013 (excl. 2012)       | 0,20   | 0,75      | 0,08    | -0,21    | -0,40    |
|   | Inflation 2012                                 | 0,07   | 0,48      | 0,81    | -0,48    | -0,13    |
|   | Difference between 2012 and 1996-2013          | -0,13  | -0,26     | 0,73    | -0,27    | 0,27     |
| Euro area<br>(excluding the<br>Netherlands) | Average inflation 1996-2013 (excl. 2012)       | 0,10   | 0,23      | 0,15    | 0,03     | 0,36     |
|   | Inflation 2012                                 | 0,40   | 0,74      | 0,23    | -0,20    | 0,40     |
|   | Difference between 2012 and 1996-2013          | 0,29   | 0,51      | 0,08    | -0,23    | 0,04     |
|   | Impact of the VAT increase (monthly inflation) | -0,42  | -0,77     | 0,65    | -0,04    | 0,23     |
|   |  |        |           |         |          |          |

Source: Eurostat, calculations: ODC

The same calculation with the annual rate of change also shows a major impact of the VAT increase on the Dutch inflation, and the impact is not only visible during the adjustment month but also the following months.

| Table 4 Impact of the VAT increase in the Netherlands in October 2012 (Percentage change compared to the month of the previous year) |   |        |           |         |          |          |  |  |
|--|---|--------|-----------|---------|----------|----------|--|--|
|  |   | August | September | October | November | December |  |  |
|  | Average inflation 1996-2013 (excl. 2012)      | 2,24   | 2,17      | 2,09    | 2,07     | 2,07     |  |  |
| Netherlands  | Inflation 2012                                | 2,55   | 2,55      | 3,26    | 3,18     | 3,37     |  |  |
|  | Difference between 2012 and 1996-2013         | 0,31   | 0,37      | 1,17    | 1,10     | 1,30     |  |  |
| Euro area  | Average inflation 1996-2013 (excl. 2012)      | 1,78   | 1,80      | 1,79    | 1,80     | 1,81     |  |  |
| (excluding the Netherlands)  | Inflation 2012                                | 2,46   | 2,45      | 2,33    | 2,03     | 2,06     |  |  |
|  | Difference between 2012 and 1996-2013         | 0,68   | 0,65      | 0,54    | 0,23     | 0,25     |  |  |
|  | Impact of the VAT increase (annual inflation) | -0,37  | -0,28     | 0,63    | 0,87     | 1,04     |  |  |
|  |   |        |           |         |          |          |  |  |

Source: Eurostat, calculations: ODC

Table 3

















▼ Inflation at constant tax rates (Eurostat)

Since 2013 Eurostat does not only publish the differences of the total inflation rate, but also the differences per category.

In October 2012 actual inflation was 3.26% whilst simulated inflation was 2.17%. The actual rate remained over 3% until July 2013 (with the exception of the month of April when inflation went down to 2.8%) whilst the simulated rate remained under the 2% mark in 2013. In fact, the VAT increase and other budget measures led to an actual inflation approximately 1.5 percentage point higher than the consumer price index at constant tax rates. In October 2013 the actual rate declined mechanically following the disappearance of the base effect, and the difference between the actual rate and the simulated rate declined by approximately 0.6 percentage point.



The price developments of food products and non-alcoholic beverages were identical, given the fact that the reduced VAT rate of 6% (applied to food products, non-alcoholic drinks, public transport, books, hotel industry, etc.) did not change. The price developments of the "alcoholic drinks and tobacco" category shows a difference of 6.9% in 2013, the "health" category (as a result of the adjustment of medical and paramedical services and pharmaceutical products) shows a difference of 3.3%.

#### Table 5

Actual inflation and inflation at constant tax rates in the Netherlands (Percentage change of 2013 compared to 2012)

|  | Actual<br>inflation | Inflation at<br>constant<br>tax rates | Difference |
|--|---------------------|---------------------------------------|------------|
| Food and non-alcoholic beverages                 | 2,4                 | 2,4                                   | 0,0        |
| Alcoholic beverages and tobacco                  | 9,5                 | 2,6                                   | -6,9       |
| Clothing and footwear                            | 0,4                 | -0,8                                  | -1,2       |
| Housing, water, electricity and fuels            | 2,6                 | 1,2                                   | -1,4       |
| Furnishings, household equipment and maintenance | 0,6                 | -0,5                                  | -1,1       |
| Health   | 5,4                 | 2,1                                   | -3,3       |
| Transport  | 2,4                 | 0,2                                   | -2,2       |
| Communications                                   | -1,8                | -3,0                                  | -1,2       |
| Recreation, entertainment and culture            | 2,3                 | 1,8                                   | -0,5       |
| Education  | 2,2                 | 2,3                                   | 0,0        |
| Hotels, cafés, restaurants                       | 1,6                 | 1,3                                   | -0,3       |
| Other goods and services                         | 5,1                 | 3,6                                   | -1,5       |
| Source: Eurostat                                 |                     |                                       |            |

#### 7.2.3.3 France in January 2014

In the context of improvements to the competitiveness of companies, the French government decided to introduce a tax credit for competitiveness and employment (TCCE)<sup>17</sup> in January 2013. Its objective is the financing of investment, research and innovation of French companies that allows a tax saving equivalent to 4% of the total payroll (excl. wages higher than 2.5 times the minimum wage). In 2014 this rate increased to 6%. To finance this measure, the government reduced State expenditures and decided to increase the VAT rate from January 2014 onwards. The standard rate increased from 19.6% to 20% and the intermediate rate that applies to some goods and services of the tourism, culture, restaurant services and real estate categories, increased from 7% to 10%.

However an increase of 0.4 percentage point in the standard rate does not have any major effects on the inflation rate: in the first half of 2014, the French inflation rate (0.81%) was lower than the Belgian rate (0.89%), the German one (0.96%) and the Luxembourg one (0.98%). The increase in the intermediate rate had a more visible impact for the *hotels, cafés and restaurants* category of the consumer price index, which increased by 2.86% during the first six months of the year 2014 (euro area average: 1.49%).

> <sup>17</sup> http://www.economie.gouv.fr/ ma-competitivite/quest-quecredit-dimpot-pour-competitivite-et-lemploi



#### Double differences

As is always the case at the beginning of the year, the monthly inflation declines in January 2014 by 0.64% compared to December 2013. The average inflation in January of the reference period (1996 to 2013) was -0.17%; the rise was thus lower even if the VAT rate had increased. This can be explained by the general economic situation of the euro area in 2014, when a disinflationary environment was prevailing, and thus a comparison with historic inflation rates is not always useful. However, the difference between 2014 and the reference period for the euro area (excl. France) is even higher, the impact of the increase in the VAT rate is thus 0.21% in January 2014.

#### Table 6 Impact of the VAT increase in France in January 2014 (Percentage change compared to the previous month)

|                             |  | Novembre<br>n-1 | December<br>n-1 | January<br>n | February<br>n | March<br>n |
|-----------------------------|--|-----------------|-----------------|--------------|---------------|------------|
|                             | Average inflation 1996-2013                    | 0,02            | 0,20            | -0,17        | 0,39          | 0,52       |
| France                      | Inflation 2014                                 | -0,03           | 0,38            | -0,64        | 0,61          | 0,51       |
|                             | Difference between 2014 and 1996-2013          | -0,06           | 0,18            | -0,48        | 0,22          | -0,01      |
|                             | Average inflation 1996-2013                    | 0,01            | 0,28            | -0,30        | 0,26          | 0,55       |
| Euro area<br>(excl. France) | Inflation 2014                                 | -0,09           | 0,28            | -0,98        | 0,17          | 0,86       |
| (exett France)              | Difference between 2014 and 1996-2013          | -0,10           | 0,00            | -0,68        | -0,08         | 0,31       |
|                             | Impact of the VAT increase (monthly inflation) | 0,05            | 0,17            | 0,21         | 0,30          | -0,32      |

Source: Eurostat, calculations: ODC

Analyses of the annual inflation rates show anew the disinflationary environment in France and the euro area, but the impact of the increase seems to be less important.

Table 7 Impact of the VAT increase in France in January 2014

(Percentage change compared to the month of the previous year)

|                 |   | Novembre<br>n-1 | December<br>n-1 | January<br>n | February<br>n | March<br>n |
|-----------------|---|-----------------|-----------------|--------------|---------------|------------|
|                 | Average inflation 1996-2013                   | 1,71            | 1,72            | 1,68         | 1,68          | 1,69       |
| France          | Inflation 2014                                | 0,82            | 0,84            | 0,76         | 1,06          | 0,75       |
|                 | Difference between 2014 and 1996-2013         | -0,89           | -0,88           | -0,92        | -0,62         | -0,94      |
|                 | Average inflation 1996-2013                   | 1,64            | 1,65            | 1,59         | 1,59          | 1,63       |
| Euro area       | Inflation 2014                                | 0,69            | 0,67            | 0,62         | 0,46          | 0,35       |
| (exect i funce) | Difference between 2014 and 1996-2013         | -0,95           | -0,98           | -0,97        | -1,13         | -1,28      |
|                 | Impact of the VAT increase (annual inflation) | 0,06            | 0,09            | 0,05         | 0,51          | 0,34       |

Source: Eurostat, calculations: ODC



▼ Inflation at constant tax rates (Eurostat)

According to inflation at constant tax rates, published by Eurostat, the effect of an increase in the different VAT rates was 0.54% in January 2014. The actual inflation rate recorded was 0.76% and inflation at constant tax rates was 0.22%. The biggest difference between actual inflation and simulated inflation was recorded in the *hotels, cafés and restaurants* category: the difference between the two rates was 2.29% for the first six months of the year 2014.

| Ta | ble | 8 |
|----|-----|---|
|    | ~   | ~ |

Actual inflation and inflation at constant tax rates in France (Percentage change of the first semester of 2014 compared to the first semester of 2013)

|  | Actual<br>inflation | Inflation at<br>constant<br>tax rates | Difference |
|--|---------------------|---------------------------------------|------------|
| Food and non-alcoholic beverages                 | -0,72               | -0,74                                 | -0,02      |
| Alcoholic beverages and tobacco                  | 4,65                | 4,18                                  | -0,47      |
| Clothing and footwear                            | -0,20               | -0,52                                 | -0,32      |
| Housing, water, electricity and fuels            | 2,15                | 1,47                                  | -0,68      |
| Furnishings, household equipment and maintenance | 0,15                | 0,06                                  | -0,09      |
| Health   | 0,09                | -0,15                                 | -0,24      |
| Transport  | 0,42                | -0,29                                 | -0,71      |
| Communications                                   | 1,12                | 0,82                                  | -0,30      |
| Recreation, entertainment and culture            | -0,51               | -1,07                                 | -0,56      |
| Education  | 2,63                | 2,63                                  | 0,00       |
| Hotels, cafés, restaurants                       | 2,86                | 0,58                                  | -2,29      |
| Other goods and services                         | 0,81                | 0,60                                  | -0,21      |
| с. <u>Б</u> . н.                                 |                     |                                       |            |

Source: Eurostat

Chart 12

#### French inflation developments

(Percentage change compared to the corresponding month of the previous year) (2012 to 2014)



# 7.3 The increase in the VAT rate in Luxembourg from 2015 onwards

## 7.3.1 Background information

In the declaration on the economic, social and financial situation in April 2014, the government announced its intention to increase some VAT rates. From January 2015 the VAT rates will increase in general by 2 percentage points: the standard VAT rate will increase from 15% to 17%, and intermediate rates will increase respectively from 12% to 14% and from 6% to 8%. However the super-reduced rate will remain unchanged at 3%. Furthermore, the new standard rate of 17% will be extended to all real estate investments, except those made for main residence purposes, for which the super-reduced 3% rate will remain<sup>18</sup>.

#### Frame 2 Theoretical impact of the VAT increase on affected products In case of full and immediate repercus-Example: sion, the prices of the products affected 100.00€ by the VAT increase would rise by 1.74% Pre-tax price: (products subject to the standard rate) Former VAT rate: 15% and 1.89% (products subject to the re-Price inclusive taxes: 115.00 € duced rate). New VAT rate: 17% 117.00€ Price inclusive taxes 117.00 / 115.00 Difference. = 1 74%

The increase in the different VAT rates impacts the inflation rate. According to STATEC<sup>19</sup> forecasts, the national consumer price index (CPI) should increase to 2.2% in 2015 (1.4% without VAT increase), while the underlying inflation would pass from 1.5% to 2.2%. As almost half of the basket is not affected by the increase in the different VAT rates (goods and services not subject to VAT or subject to the super-reduced rate), the "mechanical" impact would be only about 1 percentage point.

<sup>18</sup> Measures communicated in April 2014 in the "Déclaration du gouvernement sur la situation économique, sociale et financière du pays": http://www.gouvernement. lu/3642384/09-edn-fr, pending the draft law for more details.

<sup>19</sup> Note de conjoncture 01/2014

#### Table 9 Effects on inflation of the changes in VAT rates in January 2015 (pending the draft law for more details)

| VAT rates                            | Main items   | Mechanical<br>impact on<br>concerned<br>prices | Weight in CPI<br>(in 2014) | Mechanical<br>impact on total<br>inflation<br>(col. 3 * col. 4) |
|--------------------------------------|--|--|----------------------------|---|
| Standard<br>15% to 17%               | Manufactured goods, tobacco, alcohol, etc.   | 1,74%  | 46%                        | + 0,800 pp  |
| Intermediate / parking<br>12% to 14% | Certain wines, solid mineral fuels, mineral oils   | 1,79%  | 3%                         | + 0,054 pp  |
| Reduced<br>6% to 8%                  | Hairdressing, natural gas, electricity, firewood   | 1,89%  | 6%                         | +0,113 pp   |
| Super-reduced<br>3%                  | Food, non-alcoholic beverages, children's clothing,<br>water services, hotel and restaurant sector | -  | 24%                        | -   |
| Total                                |  | 1,76%  | 0,55                       | + 0,967 pp  |

Note: approximately 21% of expenses relate to free VAT-free products.





This theoretical impact suggests that consumer expenses and pre-tax prices fixed by companies will remain unaffected. Nevertheless it should be considered as a maximum whereas the actual impact will most probably be lower.



The price adjustment could be progressive and spread out over several months. The final hypothesis adopted in the STATEC central scenario consists in a repercussion of the VAT increase:

- at a rate of 100% on prices of petroleum products (system of maximum prices),
- but only of 75% on the underlying inflation.

Moreover this partial repercussion would be spread over several months, but the main part would be concentrated on the month of January 2015 (50%). The impact of the VAT increase would so be limited to 0.8%. In case of a full repercussion of the VAT increase, the inflation would be 2.5% in 2015.

It is to noteworthy that these projections only consider the increase of two percentage points in the different VAT rates, and not the change of some goods and services from one VAT rate to another one. The projected change in the VAT rate in the housing sector (change from super-reduced rate to standard rate, thus an increase from 3% to 17%, for secondary residences) is thus not integrated. The rent for houses and apartments (positions 04.01.01.01.01 and 04.01.01.01.02 in the CPI) is not subject to VAT, it is therefore not possible to calculate the mechanical impact of this VAT increase affecting first and foremost the owners of residential properties and not the tenants. As at this stage there are no studies analysing the degree of transmission of this increase to rents, the calculation of the theoretical impact is not possible.

The projected increase in the rate, from 3% to 17% for alcoholic beverages in restaurants and cafés will probably have repercussions on the HORECA sector (*hotels, restaurants, cafés*), but as the weight of the position "wine, beer, other alcoholic beverages" in the CPI (position 11.01.01.02.01) represents only 0.52%, the mechanical impact on the inflation rate will be 0.0007 percentage point.

# 7.3.2 Recalculation of the 4-border study results

In June 2014 the *Observatoire de la formation des prix* (Observatory of price formation) published a new version of its "étude 4 frontières" (4-border study)<sup>20</sup>, that compares the prices of strictly identical products in a sample of food superstores within the Greater Region. The main objective of this trans-border price comparison, commissioned to the Nielsen company, was to determine if the price level of strictly identical products sold in food superstores in Luxembourg (territorial commercial offer) is competitive compared to the Greater Region.

Nielsen measured the consumer prices (inclusive of taxes) in different food superstores of the Greater Region. Nielsen database contains over 100,000 different products measured in 21 stores in Luxembourg and close to the borders. The products are split into 5 sections and 98 product families.

The results of this study at country level show that Germany has the lowest average price in the Greater Region, with a detention index of 92.7 (average of the Greater Region = 100). This index has increased by 0.3% compared to the last study published in 2012. Luxembourg was the most expensive country in this last edition, but managed to improve its position and is now ahead of Belgium with an index of 102.0 (which means that Luxembourg is on average 2% more expensive than the Greater Region). France managed to improve its result since the 2012 edition and is on average 4.2% cheaper than the average of the Greater Region.

Luxembourg is the most competitive country in the *liquids* section, but the most expensive one in the *grocery* and *fresh produce* sections. Germany has the lowest prices in the *home and personal care (HPC)* and *non-food* sections, while the prices of fresh produce are more favourable in France.

By deducting the German price data (in order to avoid problems linked to the difference in the methodology of data collection), each country improves its detention index. However Luxembourg improves more than the other two countries, as it shares more identical products with Germany than Belgium and France.

This study also allows comparing each country to another "in pairs", per couple. These comparisons have the advantage that only products common to the two countries in question are taken into account. Lux-embourg and Belgium share significantly more products (6,379) than Luxembourg and France (2,717) or Luxembourg and Germany (2,604 identical products). Luxembourg's advantage compared to Belgium's grows in this analysis. The vast majority (61%) of products show a price difference of maximum 10%. 2/3 of common products between France and Luxembourg are less expensive abroad and 75% of identical products are cheaper in Germany.

 http://www.odc.public.lu/ publications/rapports\_ofp/ rapport\_OFP\_007\_nielsen\_2014.pdf

| Table 10 Summary table: main indices                               |            |         |        |         |  |  |  |  |
|--|------------|---------|--------|---------|--|--|--|--|
|  | Luxembourg | Belgium | France | Germany |  |  |  |  |
| Detention index (base 100 = average<br>Greater Region)             | 102,0      | 102,3   | 95,8   | 92,7    |  |  |  |  |
| Alternative detention index<br>(base 100 = average Greater Region) | 100,5      | 101,7   | 94,8   | -       |  |  |  |  |
| Index per pair<br>(base 100 = Luxembourg)                          | -          | 102,2   | 95,2   | 90,1    |  |  |  |  |

Source: "Étude 4 frontières" 2014 edition of the Observatoire de la formation des prix

The prices measured by Nielsen give us the possibility to make simulations in case of an increase in the VAT rate. First, we have determined the rate currently in force for each of the 98 product families. Then we have recalculated the prices inclusive of taxes with the new VAT rates that are brought into force on 1 January 2015. Given the fact that the 4-border study analyses the food sector in the first place, the impact of an increase in the VAT rate is limited on these results. The food sector is subject to the super-reduced rate of 3%, which will remain unchanged.

Two hypotheses are considered in our simulations:

- 1. The first hypothesis is based on a full transmission of the VAT increase onto the end price;
- 2. The second hypothesis is based on a partial transmission of 75% of the VAT increase onto the end price, the rest being absorbed by the margin. According to numerous studies and examples in the past, this scenario is more realistic.

| Table 11 Example of calculation           |                           |                |                |   |   |   |  |  |
|---|---------------------------|----------------|----------------|---|---|---|--|--|
| Section                                   | Name of<br>the<br>product | VAT in<br>2013 | VAT in<br>2015 | Lux.<br>price in<br>2013<br>(incl. of<br>taxes) | Lux.<br>simulated<br>price in 2015<br>(hypothesis<br>1) | Lux.<br>simulated<br>price in 2015<br>(hypothesis<br>2) |  |  |
| Grocery                                   | xxx                       | 3%             | 3%             | 4,33€   | 4,33€   | 4,33€   |  |  |
| Liquids                                   | xxx                       | 3%             | 3%             | 1,74 €  | 1,74 €  | 1,74 €  |  |  |
| Liquids                                   | xxx                       | 15%            | 17%            | 26,99€  | 27,46€  | 27,34€  |  |  |
| HPC                                       | xxx                       | 15%            | 17%            | 11,64€  | 11,84 €   | 11,79€  |  |  |
| Fresh produce                             | xxx                       | 3%             | 3%             | 1,77€   | 1,77 €  | 1,77€   |  |  |
| Non-food                                  | xxx                       | 15%            | 17%            | 9,47€   | 9,63€   | 9,59€   |  |  |
| Source. "Étude / frontières" 201/ edition |                           |                |                |   |   |   |  |  |

#### 7.3.2.1 Detention index

The detention index analyses all available products in at least 2 countries; the countries are compared to a "Greater Region" average. The simulation of the detention index under hypothesis 1 makes Luxembourg's index increase by 0.7 point and overtakes Belgium. Luxembourg is on average 2.7% more expensive than the Greater Region average for the analysed products. A partial transmission (hypothesis 2) would result in a 0.6-point increase in the index compared to 2013 results.



Hypothesis 2: partial transmission of 75% of the VAT increase on the end price

The analysis of the 5 departments shows the impact of the increase in the VAT rate: the index of the *grocery* and *fresh produce* sections does not change, as the products in these sections are subject to the super-reduced rate of 3%. By contrast the indices of the *HPC (home and personal care)* and *non-food* sections increase by 1.7 point (under hypothesis 1) and 1.3 point (under hypothesis 2) respectively. The impact on the *liquids* section is less important as non-alcoholic beverages are subject to the super-reduced rate and the increase in the rate only impacts alcoholic beverages.



Hypothesis 2: partial transmission of 75% of the VAT increase on the end price

#### 7.3.2.2 Indices per pair

Instead of making price comparisons to the Greater Region average, the Nielsen database also allows to compare the countries "in pairs", i.e. among each other, for example: DE/LU, FR/LU, BE/LU. Comparisons in pairs have the advantage that only products common to the two countries in question are taken into account. Luxembourg and Belgium have 6,379 common products, Luxembourg and France share 2,717 products, and Germany has 2,604 products also available in Luxembourg.

Following the results of the 4-border study, Luxembourg has an advantage of 2.2% over Belgium. Luxembourg is more competitive in the 5 sections. France and Germany are on average less expensive than Luxembourg (4.8% and 9.9% respectively), and these two countries are more competitive in all sections except the *liquids* one.



By simulating a full transmission of the VAT increase on the end price, the advantage of Luxembourg compared to Belgium declines to 1.4% (1.6% under hypothesis 2). Luxembourg also stays more competitive than Belgium in all sections under hypothesis 1. The advantage of Germany grows in the HPC section and rises to 24.4% under hypothesis 1.



#### 7.4 Conclusion

The increase in the VAT rate in Luxembourg in 2015 will certainly impact inflation and thus also the sliding wage scale. Without a modification of the indexation mechanism, the impact on the sliding wage scale should be identical to the one on the consumer price. However, according to the STATEC<sup>21</sup> forecasts, the impact on inflation in 2015 would be 0.9 percentage point against 0.2 percentage point on the sliding wage scale. In 2016 it is the opposite: the impact on the sliding wage scale rises by +1.1 percentage point while the impact on inflation tends towards 0.

"The main reason for this is that without the VAT increase, wage indexation would have been triggered in the second guarter of 2015, while with the VAT increase it will occur in the first guarter. Additional inflation, generated by the VAT increase, has thus nearly no impact on the sliding scale, taken in annual average. In contrast, because of the earlier application of indexation in 2016 due to the VAT increase, the impact is experienced much more then. The monthly pace of index-related portions results in opposite effects anew in 2017. In the end, over the whole period 2015-2018, the total impact on prices (sum of impacts on inflation rates, year by year) equals the one on the sliding scale without a modulation of the mechanism."

However, the actual impact of the increase in the VAT rate on inflation is difficult to estimate, as the reaction of companies can differ according to their competitive position. Some companies could chose to lower pre-tax prices in order to limit a possible decline in demand. Other companies could opt for a progressive adjustment spread over several months. The examples of rate adjustments in Germany (2007), the Netherlands (2012) and France (2014) show how difficult it can be to assess ex post the impact of the VAT modification.

According to several studies<sup>22</sup>, the time gap between the announcement and the new rates entering into force does generally play a significant role: if this gap is wider, consumers and business people have the possibility to adapt their behaviour. Consumers have the possibility to anticipate their purchases, especially of lasting and more expensive goods such as cars, furniture and household goods. Producers and traders may use this time gap between the announcement and the introduction of the new VAT rates to smooth prices in order to avoid a too "abrupt" jump in the end price. Thus, it is possible to note an increase in prices several months before the introduction of the new VAT rates, but also several months after the entry into force.

<sup>&</sup>lt;sup>21</sup> Note de conjoncture 01/2014

For example : Bundesbank (2006), "Anhebung der Mehrwertsteuer und mögliche Vorzieheffekte", Monatsbericht, May 2006.

This time gap was significant in Germany (announcement of the increase in December 2005 and introduction in January 2007), but rather short in the Netherlands with only 6 months. According to the "double differences" method calculation, the impact of the Dutch VAT increase of 2% was even more significant than the impact in Germany (3% of the VAT increase). However, it is noteworthy to mention that Germany reduced the contributions of unemployment insurance at the same time, which could have had a beneficial impact on labour cost and would thus have reduced pre-tax prices of national products.

| Tabl | e 12 |
|------|------|
|------|------|

| Summary table: rising inflation as a result of an adjustment of the VAT rate |   |   |                        |                         |                         |                        |  |  |
|--|---|---|------------------------|-------------------------|-------------------------|------------------------|--|--|
| Countries  | VAT increase  | Impact of VAT increase (" <i>double differences</i> " method) |                        | Rise in infla           | Time gap<br>between the |                        |  |  |
|  | VAT Increase  | on monthly<br>inflation                                       | on annual<br>inflation | on monthly<br>inflation | on annual<br>inflation  | and the implementation |  |  |
| Germany<br>2007  | 3%<br>(16% to 19%)  | 0.30  | 0.52                   | 0.3 / 3% = 0,1          | 0.52 / 3% =<br>0.17     | 13 months              |  |  |
| Netherlands<br>2012  | 2%<br>(19% to 21%)  | 0.65  | 0.63                   | 0.65 / 2% =<br>0.325    | 0.63 / 2% =<br>0.315    | 6 months               |  |  |
| France<br>2014   | 0,4% (19,6% to 20%)<br>intermediate rate:<br>3% (7% to 10%) | 0.21  | 0.05                   | 0.21/0.4% =<br>0.525    | 0.05 / 0.4% =<br>0.125  | 11 months              |  |  |

# 7.5 Bibliography

#### BESSON, ERIC (2007)

"TVA sociale", Secrétariat d'État chargé de la prospective et de l'évaluation des politiques publiques Bundesbank (2006), "Anhebung der Mehrwertsteuer und mögliche Vorzieheffekte", *Monatsbericht*, May 2006

#### **BUNDESBANK (2008)**

"Preis- und Mengenwirkungen der Mehrwertsteueranhebung zum 1. Januar 2007", *Monatsbericht*, April 2008

#### **CARARE AND DANNINGER (2008)**

"Inflation Smoothing and the Modest Effect of VAT in Germany", *IMF Working Paper 175* 

#### CARBONNIER (2009)

"Différence des ajustements de prix à des hausses ou baisses de taux de TVA : un examen empirique à partir des réformes françaises de 1995 et 2000", Économie et Statistique, N° 413, P.3-20

#### GAUTIER ET LALLIARD (2014)

"How do VAT changes affect inflation in France?", Banque de France. *Quarterly Selection of Articles*. No. 32

#### LEVY D., LEE D., CHEN H., KAUFFMAN R., AND BERGEN M.

"Price Points and Price Rigidity", *Review of Economics and Statistics*, vol. 93(4), p. 1417-1431

#### MARINI, PHILIPPE

"L'expérience danoise : une réussite bien réelle qui mérite attention", http://www.senat.fr/rap/r04-052/ r04-05233.html: Rapport d'information N°52 du Sénat, 2004

#### MINISTRY OF THE ECONOMY (2014)

"Étude 4 Frontières, Édition 2014. Analyse comparative des prix de produits identiques dans les grandes surfaces alimentaires au sein de la Grande Région". Rapport de l'Observatoire de la formation des prix

#### MINISTRY OF ECONOMY, FINANCE AND EMPLOYMENT (2007)

"Étude sur la possibilité d'affecter une partie de la TVA au financement de la protection sociale en contrepartie d'une baisse des charges sociales pesant sur le travail"

STABILITY PROGRAMME OF THE NETHERLANDS April 2012 Update

# 8 Economic studies

# Summary of the report "Firm's dynamics, nation's competitiveness"

Luxembourg's modern economy developed in several stages. The first stage relates to the development of the steel industry, from the 19th century to the biggest industrial crisis of the 1970s. The second stage began with the development of the financial centre in the early 1980s, sometimes called "the second industrial revolution".

For the last 30 years, Luxembourg's economy has been characterised by a sustained growth, a low unemployment rate, a current account surplus, and substantial budget surpluses. This financial windfall has allowed a structural change in the economy, moving from a manufacturing economy to a service-based industry. However, this second stage appears to peter out. A first noticeable economic slowdown occurred in 2000-2001 with the bursting of the "new economy" bubble.

The 2008 financial crisis and the subsequent recession caused another dramatic slowdown in growth and a major inflection in the potential growth path.

Although the crisis did not have an immediate impact on the industry, it has since had a profound impact on its long-term path, thus accelerating the process of production factors reallocation through the death of less productive businesses or the reduction of their activities. Whilst the majority of analyses favour the macroeconomic aspect, this paper highlights the microeconomic analysis, dynamics underlying structures, undertaken by companies.

Countries do not export, companies do! Therefore Luxembourg's competitiveness needs also to be analysed through the competitiveness of its companies. "The competitiveness of a company represents its longterm performance, i.e. its capacity to sustainably sell and provide goods and services, to grow and remain profitable in a competitive market. A so-called competitive company scores above the average." According to Porter (1985), the competitiveness of a company depends on its ability to produce more goods or services with fewer inputs than its competitors. Thus it depends on its own productivity, which is determined by the "entrepreneurship", i.e. its ability to innovate and access new markets. The 18 contributions in this *Cahier économique* use the data that are mainly collected under the aegis of the STATEC and primarily from companies:

- Répertoire des entreprises (Business register);
- Structural Business Survey (SBS);
- Community innovation survey (CIS);
- Yearly survey on the use of Information and Communication Technology (ICT);
- COMEXT, foreign trade database;
- Continuing Vocational Training Survey (CVTS);
- Global Entrepreneurship Monitoring (GEM).

The intensive use of individual data sources, their fusion and the creation of a panel, provide new insights as well as a precise and nuanced overview of the productive fabric of Luxembourg. This overview is organised in four parts:

The first part, called *Competitiveness and specialisation in a small open economy*, starts with the analysis of the performance of goods exports and the productivity of industrial enterprises. By extending the analysis to all sectors of activity, it is shown that growth is supported by technical progress;

The second part includes contributions on *Non-cost competitiveness*. Two complementary contributions review the impact on productivity of both lifelong learning and dissemination of information and innovation technology, taken as contributing elements in explaining the development of the total factor productivity;

The third part, called *Innovation capacities*, is appreciated through a very important indicator: the types of patent applications for inventions. The standardization and the use by companies are also explored in relation to innovative activity. Determinants of innovation and its impact on a company's performance are addressed in a specific contribution. The impact on employment is explored in the last contribution of this part. A panel analysis shows that the effects innovation has on employment are not necessarily positive;

The fourth part, called *Entrepreneurial capacities*, examines the entrepreneurship, through the international GEM database and through the link between job creation and creation of new businesses. Each of the four previous chapters ends with a contribution that was already published in the Competitiveness Report but which is a useful complement to the addressed topics. However, the fifth and final part, *Companies in the front line of sustainable development*, addresses brand new subjects: social innovation, green innovation, and social responsibility of companies.

Even if taken into account in the studies presented in this report, the analyses of service branches – financial ones among others – remain partial. Besides, by adopting the companies' perspective, the thorny problem of that bridge between micro- and macroeconomics, between partial and general balance remains. In this context, it is even more important to increase knowledge and understanding of the mechanisms that might be at work in Luxembourg's economy and to identify strengths and weaknesses of the productive fabric. The work could only be achieved with the ample support of the *Observatoire de la compétivité* (Ministry of the Economy).

9 Conference: "Income inequality from a global perspective"
 by Branko Milanovic

The Observatoire de la compétitivité has always emphasized the importance of the social dimension of its activity and of the studies it undertakes or commissions. For a number of years, the Observatoire organises a public conference in partnership with the Luxembourg Income Study (LIS), a world-famous database that researchers and international organisations use to examine problems linked to income distribution. Janet Gornick, Professor at the City University of New York and director of the LIS, has recently explained the potential of the Luxembourg Income Study to the United Nations.<sup>1</sup>

On the occasion of the summer school, which is open to PhD students and researchers, a lecturer traditionally addresses a wider audience on the current issues relating to inequality. Renowned speakers included for example Paul Krugman (with support from the Weicker foundation) and Thomas Piketty. This year it was Branko Milanovic's turn to address a public of non-experts.<sup>2</sup>

Global inequality is becoming an important issue as each one tends more and more to compare oneself to other ones in our global village. Knowing how other people live and where they are in the income pyramid of their country has an impact on how we perceive our own position in the social hierarchy of our country. Regional and national comparisons are of course more relevant than those on a global level, but Branko Milanovic bets this will change.

The lecturer differentiates three different concepts of global inequality (see chart below). The first concept of inequality is the one between nations, measured by the average income obtained through surveys or by the GDP per capita without any weighting by the population size. The second concept integrates the population size in order to avoid comparisons China with Luxembourg. According to the author: "China and Luxembourg have the same importance, because we do not take population sizes into account. Every country counts the same, somewhat like in the UN General Assembly". The third concept of inequality is the most promising one as it is based not on countries but rather on the individuals living in the different countries analysed and whose income differs from the average of the country of residence.

Measured with the first concept, inequality in the world has increased since the 1980s, while according to the second concept that takes into account the population size, particularly of emerging countries showing a strong economic growth such as China and India, inequality has decreased significantly during the same period! The third concept of inequality sheds interesting light, even if unfortunately the individual data covers a shorter period. However, it appears that inequality would tend to decline. With the exception of the poorest 5%, large parts of middle classes in emerging countries have seen a steep increase in their income between 1988 and 2011. That applies even more to the super-rich 5% in these countries. Inequality between countries is much higher in emerging countries compared to the USA and particularly to Europe.

- http://www.social-europe. eu/2014/10/inequalityexplained/
- <sup>2</sup> http://en.wikipedia.org/ wiki/Branko\_Milanovic

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Branko Milanovic also addressed issues of political philosophy. He presented the results of a new experiment demonstrating that if we break down income inequality at global level with the Theil inequality index, it leads to a little-known result. Actually social categories are not the most important factor in explaining inequality, but rather the individual's place of residence. It is the privilege of citizenship (the author speaks of "annuity"). Being born in a rich geographical region – Luxembourg rather than India – is the main underlying factor of income. This is more a lucky accident rather than an individual's merit.

If we want globalisation to produce many winners, that would be evenly distributed, it is necessary to reduce inequalities in the rich countries where they tend to increase, on one hand, and to speed up growth of disadvantaged countries while allowing a heavier immigration to rich countries, on the other hand. Immigration, as well as redistributing wealth from rich countries to disadvantaged countries, is one of those strategies that is viewed rather critically by public opinion in our countries, particularly since the economic and financial crisis<sup>3</sup>, which exacerbated the consequences of globalisation.



http://elibrary.worldbank. org/doi/pdf/10.1596/1813-9450-6259 10 Appendix Competitiveness Scoreboard Definitions

## A Macroeconomic performance

A stable macroeconomic environment is a guarantee for high economic performance. The principal role of the State in establishing this type of environment is to guarantee superior and stable levels of economic growth and employment. An economic policy is adequate when it encourages companies to invest in the short and medium term and, if productivity and economic growth are stimulated, over the long term. An unstable economic environment dissuades private investment and limits economic growth, thus restricting well-being of a country's population. A stable macroeconomic setting is a necessary condition for good productivity trends, and consequently for competitiveness. Macroeconomic performance indicators are the key indicators for determining the role of economic policy with relation to the competitiveness of a nation.

#### A1 Gross National Income per inhabitant

Gross National Income (GNI) is the Gross Domestic Product (GDP) plus net receipts of primary incomes, less income paid out. The level of GDP per inhabitant is often absorbed into a standard of living indicator. However, in the case of Luxembourg, which is largely open to crossborder flows of factors and corresponding incomes, this notion leads to biased comparisons. For this reason, it is preferable to base comparisons on GNI per inhabitant, which take into account the remuneration of labour and capital of all others. Comparisons are made in PPS to account for the different pricing between countries. The principal role of the State is to increase the well-being of the population. GNI is one measure of well-being and is used in comparisons over time and among countries.

#### A2 Real growth rate of GDP

GDP is a measure of economic activity. It is defined as the sum of added values, meaning the value of all goods and services produced from which are deducted the value of goods and services used to create them. Growth rates are calculated at constant prices because this way it is possible to identify high volume movements and thus obtain an indication of real growth. Calculating yearly rates of GDP growth at constant prices is intended to allow comparisons of economic development dynamics both over time and between different sized economies.

#### A3 Growth in domestic employment

National employment represents the labour force used by companies established in Luxembourg to produce their range of goods and services. As such, it includes cross-border workers' production and excludes that of residents who work abroad. This indicator reflects utilization of labour. National employment includes all persons working on Luxembourg territory regardless of country of residence. Its growth rate reflects the capacity of a country to utilize additional resource to meet increases in the demand of goods and services. GDP potential of a country can be impacted if there is a structural increase in employment, which can reflect an economy's gains in competitiveness.

#### A4 Unemployment rate

The unemployment rate is the percentage of unemployed persons with relation to the entire labour force. The labour force is comprised of employed and unemployed persons. Unemployed persons are "those persons aged between 15 and 64 who, during a reference week had no employment, who were available to start work as a salaried or unsalaried employee within the next two weeks and had actively sought employment through specific steps to find a salaried or unsalaried position within four weeks ending at the end of the reference week. It also includes those who had no job but who had found one to start later, meaning within a period of no greater than three months." Social consequences of high unemployment aside, the rate of unemployment is a measure of unutilized labour potential of a country. A distinction is commonly drawn between two major categories of unemployment. The first arises from a deficiency of overall demand and the second is a result of features in the way the labour market functions. While the first type of unemployment may reduced by recovery in the economy, the second is due to structural factors, such as inadequate skills of the workforce or the cost of labour. The unemployment rate is an important measure of the efficiency of the labour market, and is telling of the adequacy of supply to the demand for work.

#### A5 Inflation rate

The Harmonized Consumer Price Index (HCPI) was conceived as a means of international comparison of inflation in consumer prices. Inflation reflects tensions between supply and demand. Inflation can have its origins in salaries that reflect the tensions between supply and demand on the labour market, but it is often imported. This imported component is an extremely important aspect because Luxembourg has a very open economy. Thus imported inflation can have an impact on consumer prices, either directly via the importing of consumer goods or indirectly via the production chain. In the area of competitiveness, all inflationary trends have a repercussion on the terms of trade.

#### A6 Public balance

The requirement or capacity for financing, i.e. a deficit or surplus in public administrations, is the difference between income and expenditures of public administrations. The public administration sector includes sub segments of the central administration, the administrations of Federated States, local municipality administrations and social security administrations. For purposes of international comparisons, public balances are expressed with relation to GDP at market prices. Successive deficits have a significant impact on public debt and therefore on a nation's budgetary margin of manoeuvre.

#### A7 Public debt

The public sector includes sub segments of the central administration, the administrations of Federated States, local municipality administrations and social security administrations. GDP used as the denominator is gross domestic product at market prices. Debt is evaluated at nominal face value and debt in foreign currency is converted into the national currency using end of year commercial exchange rates. National data for the public sector is consolidated among sub segments. Base data are in the national currency, converted into Euros by using the end of year exchange rate for the euro. The debt ratio gives an estimate of public debt as a whole with relation to gross domestic product, as well as debt servicing capacity and the repayment capacity of public administrations. This indicator plays an important role in the area of competitiveness since it determines the budgetary margin of manoeuvre of the State in its operations.

#### A8 Gross fixed capital formation

In the European System of Accounts SEC 95, gross fixed capital formation is equal to acquisitions less sales of fixed assets by resident producers over a reference period, augmented by capital gains of nonproduced assets arising from production activities of production or institutional entities. Public investments are used to create, enlarge and modernize infrastructure necessary to growth. High quality public infrastructure promotes growth and productivity of companies and bolsters their competitive positions.

#### A9 Terms of trade

The terms of trade indicator relates the export price index of a country to its import price index. Terms of trade improve over time from T>100 if an economy exports a lesser quantity of merchandise to procure the same quantity of imported goods—in other words, a like quantity of exported goods can procure a larger quantity of imported goods. In the opposite case, terms of trade deteriorate to T<100.

#### A10 Real effective exchange rate

Calculations of the real effective exchange rate use a weighting system based on a double weighting principle that accounts for relative market share held by a given country's competitors on shared markets, including the domestic market of the given country, as well as the significance of these markets to that given country. A decrease in the real effective exchange rate indicates an improvement in a country's competitive position. Real effective exchange rates are chain indices with the base year as 1995. Percent change in the index is calculated by comparing changes in the index based on consumer prices in a given country, expressed in US dollars at the market exchange rate, to a weighted average of changes in indices of competitor countries, also expressed in US dollars, using the weighting matrix for the current year. Real effective exchange rate indices are then calculated from an initial period by cumulating percentages of change. This produces a group of real effective exchange rate indices based on mobile weightings. The base year used for these calculations is 1995. A drop in REER indicates that domestic goods and services have become more competitive in relation to foreign goods and services, while an increase indicates that they are less competitive.

#### A11 Diversification

The entropy indicator used here refers to the level of an economy's diversification through its weight of diverse branches in gross added value. The branches are those in the NACE-10 classification system as follows: Agriculture, forestry and fishing; Manufacturing (except Construction); Construction; Wholesale and retail trade, transportation, accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Administrative and support service activities; Public administration, defence, compulsory social security, education, human health and social work activities; Arts, entertainment and recreation; Other services activities; Activities of households and of extraterritorial organisations and bodies. Where distribution is uniform, the entropy coefficient has a maximum value of 1, whereas if everything is concentrated on one point, the entropy coefficient has a value of 0. The closer a value nears 0, the less diversified is the economy. The more an economy is diversified, meaning the lower its dependence on a specific sector, the more sheltered it is from asymmetrical shock. Thus, all things else being equal, the advantage of a diversified economy is that it reduces vulnerability to specific sector-related shocks that could put the entire macroeconomic system's stability at risk.

#### A12 FDI inflows and outflows

Foreign direct investment (FDI) designates those investments by a resident entity of a given economy, a direct investor, made with the objective of acquiring a lasting stake in a company that is established in another economy. FDI flows are the sum of the following elements: capital contributions by the direct investor through purchases of stock, shares, capital increases or company start-ups, loans between the direct investor and the company targeted by the direct investment and income re-invested to or from abroad. While direct investment inflows can create new jobs. investment outflows eliminate them, especially in the case of relocations to take advantage of lower production costs. Yet these flows can indicate the expertise of Luxembourg's companies. The net balance of jobs lost or created cannot be determined in such a simplistic manner. One must take account of the indirect repercussions of FDI on employment, especially via international exchanges. The complementary nature between FDI and international exchanges that has come to light through certain studies foreshadows indirect impacts on jobs. FDI inflows and outflows can impact Luxembourg imports of finished products originating with a foreign subsidy or from a third country or company, and exert an impact on Luxembourg exports of primary or intermediate goods to a foreign subsidiary or a third country or company. Implications on domestic employment or on the economy as a whole must then be evaluated. However, Luxembourg must be considered from the perspective of an economy that acts as a platform for international financial intermediation services. FDI statistics for Luxembourg show that the essential feature of its economy is that surplus funds are collected from non-resident entities, which are then distributed, to non-resident entities in deficit or that are seeking financing. In other words, Luxembourg's FDI inflows are reinvested abroad, with the greater majority passing through specialized financial institutions such as holding companies or SOPARFI, financial auxiliaries or other financial intermediaries (see BCL, 2004). This choice place for Luxembourg among the international FDI flows is immediately apparent through the preponderance of SPE transactions. In addition, the FDI flows in terms of SPE are part of multinational corporations' strategic plans that aim to optimally utilize the differences between countries in the areas of financial infrastructure, institutional vehicles and fiscal regimes. As a result, FDI statistics for Luxembourg must be approached with care when compared to international statistics. EURO-STAT calculated a "Market integration" indicator that measures the intensity of direct foreign investments by taking the average of direct foreign investment inflows and outflows divided by GDP, then multiplied by 100.

# **B** Employment

Employment is a determinant of the efficiency of a socio-economic system and therefore can be considered an important indicator for competitiveness. Some indicators from the Employment category are already present in the Macroeconomic Performance category. Indeed, employment and unemployment are macroeconomic indicators. However, under-utilization of human resources, especially in the long term, is not only a formula for unfavourable economic consequences but can also sap the vitality of social cohesion, for example, by increasing the risk of poverty. This category of indicators is particularly important in view of the high rate of unemployment in Europe and the structural difficulties of European countries in achieving full employment. A growing part of unemployment is arising from structural problems in the labour market, such as inadequate qualifications for jobs or long periods of inactivity.

#### B1 B2 B3 Employment rate (T, H, F)

The employment rate is defined as the relationship between the population with a job and the entire working age population of persons between the ages of 15-64. Since this is a national concept, it takes into account only the resident population. The employment rate is an important indicator for measuring the gap between the performances of an economy in relation to its potential. It provides a good explanation for the growth differential between one country and another. A rising employment rate is a key factor in achieving improvements in standards of living. In the same way, an increase in the employment rate means new job creation, vitality within the economy and flexibility in its labour market. Furthermore, the employment rate is an important factor in maintaining social protection systems in the long term. This indicator has been integrated into the Lisbon strategy (target of 70% in 2010 and an employment rate of 60% for women). Since then, in the Europe 2020 strategy, the age range of 20-64 is considered in order to reduce potential conflicts between employment policies and education policies. The Luxembourg target is 73% by 2020 (71.5% by 2015).

#### B4 B5 B6 Employment rate of persons aged 55-64 (T, H, F)

The rate of employment of persons aged 55-64 is obtained by comparing the number of persons employed in that age group to the overall population of people of this segment. The working population of this age group includes persons who, during a reference week, performed work for remuneration or profit for at least one hour, or who did not work but had a job from which they were temporarily absent. A high employment rate of persons aged 55-64 is an important factor of competitiveness in many domains. Notably, it is a determinant for the viability of general pension insurance schemes in the long term, especially given the aging of Europe's population. According to the Lisbon Strategy, the objective is to achieve an employment rate of 50% among persons aged 55-64 by 2010.

#### **B7** Unemployment rate of persons under 25

The unemployment rate of persons under 25, unadjusted for seasonal variations, represents the percentage of unemployed persons between the ages of 15 and 24 with relation to the active reference population, this being the total number of persons with a job and the number of unemployed persons in this age range. During the Luxembourg Employment Summit of November 1997, from which emerged the European employment strategy, the EU decided that each young European should have the opportunity to work, to complete a training program or retrain for a new job before being unemployed for a period of six months. In addition, it was stated that young people should learn and develop a culture of entrepreneurship and develop the ability to adapt more rapidly to changing realities in the labour market. The unemployment rate of persons under 25 is a means of evaluating the results of efforts undertaken to date in achieving the objectives of the 1997 Summit. It is among young people that unemployment, and chiefly longterm unemployment, can produce harmful consequences that can cause them to be excluded from the labour market permanently, thus depriving the country of human resources.

#### B8 Long-term unemployment rate

EUROSTAT deems that a long-term unemployed person is one who has been without work for more that twelve months, is at least fifteen years old, does not live in a collective household, has not been employed for two weeks following the reference period, is available to begin work in the next two weeks and is actively seeking a job, meaning that the person has actively sought work over the four previous weeks or is not seeking work because he or she has found it and will begin to work later. Social consequence of high unemployment rates aside, the unemployment rate is a measure of unutilized labour potential of a country. Long-term unemployment depends above all on structural factors, such as inadequate skills of the workforce or the cost of labour. In addition, long-term inactivity not only gives rise to unfavourable economic consequences but it risks weakening social cohesion.

#### B9 Persons holding a part-time job

The definition of persons with jobs designates those persons who, during a reference week, performed work for remuneration or profit during at least one hour, or who did not work but had a job from which they were temporarily absent. Family workers are included under this heading. A distinction is drawn between full time and part time work based on spontaneous responses of persons surveyed. It is impossible to make a more precise distinction between full and part time work because of differences in working hours among Member States and the professional sectors. The choice of whether work is part time may be decided on the initiative of an employer or an employee. Part time work is supposed to render work schedules more flexible. Working time will be more flexible if it varies as a function of company requirements and the wishes of workers. Improving flexibility of working hours can contribute greatly to lowering unemployment and, more generally, to improving the employment rate. Nevertheless, when workers are obliged to take part time work it may be considered an indicator of under-utilization of available resources.

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### C Productivity and labor costs

The cost of the factors of production, especially the cost of labour, is a key component of nation competitiveness. The cost competitiveness component is the one most readily cited in comparisons of national economies because of its size and simplicity. Nevertheless, costs should not be considered separate from productivity. Increasing domestic productivity is one of the areas in which economic policies can influence the macroeconomic competitiveness of a country by stimulating economic growth in the medium and long term.

#### C1 Trends in total factor productivity

Total factor productivity (TFP) is defined as the overall efficiency with which the factors of production, work and capital, are transformed into products. Changes in this indicator are measured over time by the average annual rate of change. An increase in TFP can spark increased competitiveness and may be interpreted in two ways; either in terms of an increase in production for a given utilization of factors, or in terms of lowered costs for a given production operation. A drop in TFP does indicate a loss of competitiveness.

#### C2 Trends in apparent work productivity

The average annual rate of change in apparent work productivity links changes in volumes of gross added value production of a given year for the preceding year with changes over the same period in the number of hours worked. Changes in the productivity of work measure the change of production per worker over successive units of time. When progress is achieved in this area, it results either from more intensive use of capital, the introduction of technology or an improvement in an entity's work plan. Productivity is an essential factor in standard of living as evinced through GNI per inhabitant, and by cost competitiveness through its influence on unit labour costs. Changes in labour productivity provide a standard of measurement for evaluating possible changes in the cost of labour. Increases in the apparent productivity of work can bring on an improvement in competitiveness, while a drop in this indicator could result in a loss of competitiveness.

#### C3 Productivity per hour worked as a percentage of US figures

This indicator measures the hourly productivity of work with relation to the levels achieved in the United States, which is the benchmark having a nominal value of 100. The differences among countries in the area of hourly productivity reflect existing structural differences such as part time work, standard number of hours worked weekly and the number of paid holidays per year. Over recent years, the United States has been considered the benchmark for numerous macroeconomic indicators in view of the high performance that has been achieved in numerous domains. Nonetheless, this indicator should be compared using like conditions in terms of employment and unemployment rates. Indeed, by eliminating the least productive workers from the labour market, hourly productivity will increase. The United States has an employment rate much higher Europe's leaders—who moreover have high unemployment rates shorter work hours—thus avoiding losing the benefit of economies of scale.

#### C4 Changes in unit labour costs

The unit labour cost (ULC) represents the cost of labour per unit of added value produced. It is determined by the relationship between payroll coasts and added value at market prices. It should be noted that the indicator for unit labour costs includes two different aspects of competitiveness to be distinguished between: cost of wages and apparent work productivity. Thus, an increase in ULC can result in higher wages or a drop in productivity. In order to evaluate cost competitiveness, it is not sufficient to compare salaries and payroll deductions; changes in these elements must be monitored over time. Thus comparing increases in labour costs over time provides a supplementary indication of changes in the competitive position of an economy. If changes in wages are not compensated by a change in levels of productivity, unit labour costs rise, causing competitiveness to fall.

#### C5 Costs/Revenue ratio in the banking sector (removed from Competitiveness Scoreboard)

This indicator is defined as the relationship between total costs incurred in the banking sector—to include personnel costs, administrative costs and depreciation—and banking income, including income from interest charges, commissions and financial transactions. Taxes on banking sector operations are included in this ratio that is also linked to consolidated revenue. This indicator gives information about the relationship between expenses and income in the banking sector, i.e. operating expenses as a percentage of operating income. It is useful to monitor this ratio over time in order to analyze profitability of the banking sector. This is especially the case for Luxembourg's economy, which is dominated by the banking sector. Thus, this sector indicator can be considered as a competitiveness indicator for the Luxembourg economy.

## **D** Market operations

The purpose of this category is to illustrate the potential rigidities and constraints that could still exist in some markets. Indeed, many opportunities remain to be exploited in various domains of the economy that can make companies more competitive, especially involving markets for intermediate consumer products, that thus directly influence cost competitiveness of companies. Studies on the determinants of productivity growth underscore the role of market operations. Improvements in the way markets function generally lead to increases in the quality of goods and services, to economic growth and to competitiveness and job creation. In this respect, implementing the Lisbon agenda is of primordial importance. In fact, it is a means of liberating the full potential of growth and job creation.

# D1 Percentage of full-time workers on minimum wage (removed from Competitiveness Scoreboard)

The minimum wage in effect is the social minimum monthly wage for labour and it is based on legal figures published monthly on the national level. Minimum wages apply to the majority of full-time salaries throughout each nation's territorial holdings. Other minimum wages may be applicable to certain categories that take into account a recipient's age, seniority, skill set and physical/mental capabilities or the economic situation of the company. The minimum wage is a gross sum, meaning the amount paid before deducting income tax and social charges. These deductions vary from country to country. Comparisons based on net wages can change the relative position of a country, depending on what family situation is considered. A rather high portion of employment at the minimum wage level in a country may indicate a weakness in the system with relation to its objectives of redistribution to low productivity employees—redistribution is effective when it is targeted—in may also infer that disadvantages outweigh advantages.

#### D2 Price of electricity for industrial users

This indicator provides information on electricity prices invoiced to industrial end users as follows: annual usage of 2,000 MWh, maximum power of 500 kW and annual load of 4,000 hours. Prices are in Euros, ex-VAT, per 100 kW and are applicable as from 1 January of each year. Production costs are a competitive factor par excellence for all companies. Energy consumption is one of the intermediary consumption items used by companies in their production processes. Electricity used by companies in their manufacturing processes is entered as a cost factor in final prices for their goods or services. All other things being equal, a reduction in electricity prices will improve competitiveness, while price increases will lower it.

#### D3 Price of gas for industrial users

This indicator provides information on gas prices as invoiced to industrial end users as follows: annual usage of 41,860 GJ and a load charge of 200 days or 1,600 hours. Prices are in Euros, ex-VAT, per GJ and are applicable as from 1 January of each year. Together with electricity prices, gas prices are a second basic variable that have a significant impact on costs of industrial companies. Natural gas used by companies in their manufacturing processes is entered as a cost factor in final prices for their goods or services. All other things being equal, a reduction in gas prices will improve competitiveness, while price increases will lower it.

#### D4 Market share of the primary operator in the cellular telephone market

This indicator measures market share of the main mobile telephone operator with relation to the total number of subscribers. The objective of this indicator is to determine to what degree the process of liberalization has advanced in the mobile telecommunications market and how extensive competition is in this market. A dominating position by the primary telephony operator can put a brake on the spread of new communications technologies, its involvement in the new economy and achieving gains in productivity. In the same manner, there could be an impact on the price of services offered, which could also have an impact on companies' production costs.

#### D5 (removed from Competitiveness Scoreboard)

#### D6 Composite basket of fixed and cellular telecommunications

The composite basket of fixed and mobile telecommunications contains two individual indicators calculated by the OECD: the "Composite OECD basket of telephone charges for professional subscribers, excluding VAT, in USD" and the "OECD basket of mobile telephone charges for large-scale users, VAT included, in USD". The composition of the baskets is regularly adjusted to reflect the changing means of communication. The first indicator is calculated to compare professional rates in different countries and includes local calls, international calls and calls to mobile networks. The second indicator provides a breakdown for mobile communications at different times of the day and over the entire week, for a total of 900 calls per month. The indicator also shows them by destinations: calls to fixed lines, calls to other subscribers using the same network and calls to users on other mobile networks. Several short text message services and 2 GB of data transfer are also included for each subscriber. Surveys were carried out comparing several mobile networks in every country, with the lowest cost option selected as the most appropriate usage method. Prices of telecommunications services that are used by companies in their manufacturing or services processes are cost factors in the end user price for their products and services. This cost competitiveness indicator has arowing importance with relation to costs of other intermediate consumption items, especially for companies operating in the services sector.

#### D7 Broad band internet access rates in US \$ PPP/MB

Many applications in the information society are dependent on highspeed data transfer. A market that is receptive to broadband connectivity promotes the dissemination of information, and allows both consumers and businesses (especially SMEs) to benefit from an increase in the supply of services. Prices are in USD (excl. VAT).

#### D8 Basket of domestic royalties for 2Mbit leased lines

This indicator presents annual prices for a basket of domestic fees charged for 2Mbit leased lines with 100 circuits, broken down on a distance basis. Prices are expressed in USD, excluding tax. Leased or private lines are key factor in business to business electronic trade. They can be used by large companies that need to send large volumes of data at rates lower than those of public switched telephone networks. These companies can also better manage their telecommunications equipment and traffic on these types of lines. This is therefore an important price competitiveness indicator that has repercussions on production costs of companies.
#### D9 Value of public contracts using open procedure procurement

Data on public contracts are based on the information contained in bid tenders and procurement notices published in Supplement S to the Official Journal of the European Union. The numerator for this indicator is the value of public contracts awarded using the open procedure. For each of the sectors "Works", "Supplies" and "Services" the number of tender bids published is multiplied by an average based in general on the gamut of prices provided in the awards notices for public contracts published in the Official journal for the year concerned. The denominator in the equation is GDP. "Public contracts" is one of the areas of the domestic market where liberalization has not yet taken root as extensively as had been hoped. Improving the functioning of public contracts cannot only potentially lead to increases in the quality of public services, economic growth, competitiveness and job creations, but could also spark an increase in transparency. An increase in competition via the open procedure can be beneficial from the competitiveness of local companies and can also assist these in taking advantage of public contracts in other European regions. It should be noted that in Luxembourg, public contracts awarded are often lower in value than the thresholds set in the Official Journal.

#### D10 Total State aid excluding horizontal objectives

The numerator in this equation is the total of all State aid to specific sectors such as agriculture, fishing, manufacturing, coal, non-rail transportation and other services, as well as Stat aid granted on an ad hoc basis to individual companies, for example in the event of a bail out or restructuring. These types of aid are deemed potentially the most likely to distort the free play of competition. The denominator is GDP. A State subsidy is a form of state intervention that is used to promote a set economic activity. The granting of state aid can be perceived as favouritism for certain sectors or economic activities and distorts competition through discrimination among the companies that receive aid. It is appropriate to keep in mind the distinction between State aid and general economic support measures such as employment or training. From the perspective of competitiveness, a large portion of State aid to companies leaves the way open to conclude that the economy is working on less than perfect levels within the domestic market

#### D11 Market share of the former primary operator in the fixed telephone market (removed from Competitiveness Scoreboard)

The former primary operator is the company operating on the market just prior to liberalization of telecommunications markets. This operator's share in the market corresponds to income generated by retail sales in the market throughout the entire marketplace, including internet connections. In fixed telephony, the operator's market share is calculated by means of telecommunications minutes this operator controls as a part of all connection minutes. The objective of this indicator is to determine to what degree the process of liberalization has advanced in the fixed and local telecommunications market and how extensive competition is in this market. A dominating position by the former primary telephony operator can put a brake on the spread of new communications technologies, its involvement in the new economy and achieving gains in productivity. In the same manner, there could be an impact on the price of services offered, which could also have an impact on companies' production costs.

# E Institutional and regulatory framework

The institutional and regulatory framework within which economic activities are carried out affects the way in which resources are distributed, investments decisions are guided and creativity and innovation are stimulated. Among the framework conditions brought to the forefront is taxation. On one hand, this affects investment and on the other hand, it affects consumption. The regulatory framework also influences the proper operation of markets for goods, services, capital and labour. The regulatory quality of these markets influences allocation of resources and productivity. The institutional framework also contributes to the stability and security of decisions taken by economic agents. The more stable the institutional framework is the more consequences of economic decisions are quantifiable.

# E1 Corporate taxes

Corporate taxes are direct taxes calculated on the basis of net income of companies. This basis is set with relation to what is considered taxable. An advantageous tax policy in the area of corporate taxation can stimulate investment in the private sector. For example, low tax rates result in better margins for companies, which can in turn incite them to reinvest profits. Foreign investors are also attracted to establishing operations in countries with a favourable tax regime.

#### E2 Taxes on physical persons

Income tax on physical persons is a direct tax calculated on income earned by households. This tax is progressive, meaning that the rate of taxation increases parallel to income. Taxable income includes income from transferable securities, real estate income, professional income and income from miscellaneous sources. An advantageous physical persons income tax scheme can stimulate demand. For example, low withholding tax rates give households more net disposable income that they can use for consumer goods.

## E3 VAT rate

The value added tax (VAT) is an indirect tax on consumer goods. VAT is collected by companies that invoice their customers for a VAT amount as an integral part of the price for products and services. The difference between VAT rates in various countries can benefit companies and consumers, because all other things being equal, the final price paid for a product or service will be lower in a country that uses lower VAT rates. Lower prices also increase purchasing power. This influences a consumer's choice to spend income in one country rather than in another, especially in border regions. A company's choice of location can also be influenced by a favourable VAT rate for cross-border commercial transactions. This is the case in the domain of electronic commerce where the principle of country of origin applies.

## E4 E5 Tax wedge (unmarried, no children; married, two children, one wage-earner)

The tax wedge measures the rate of social security and tax contributions that bear on labour input through the difference between total employer costs and employees' net salary. This indicator is defined as income taxes plus employer and employee social contributions as a percentage of labour costs, less benefits paid, by family category and salary.

#### E6 Administration efficiency index

This aggregate indicator gathers information on the quality of public services and the bureaucracy, the skill level of government service and its independence with relation to political pressure, as well as on the degree of credibility of governmental policies. A high index level denotes a high degree of efficiency in a government. The institutional framework exerts a strong influence on companies, so a stable and consistent institutional framework imparts confidence to companies in engaging in long term investments. An efficient administration is an important determinant of economic growth.

## E7 Rule of law index

This aggregate index measures the efficiency and predictability of a country's legal system as well as the perceptions prevalent concerning the degree of personal security in the country. A high index score denotes a high degree of observance for the law. A predictable legal system is an important determinant of economic growth.

## E8 Regulation guality index

This aggregate indicator measures prevalence of unfavourable policies such as price controls, inadequate supervision of the financial sector, or the perception of charges levied through excessive regulations in areas like foreign trade and business development. A high index ranking denotes high quality regulatory structures. Proper market operation plays a fundamental role in increasing productivity. Markets that operate under competitive pressure are among the most innovative and dynamic. Competition is reflected in the lowering of prices and a large choice of products for consumers. The State plays an important role in ensuring the proper functioning of markets.

#### E9 Degree of sophistication of online public services

This indicator measures the degree of sophistication of basic public services that can be accessed on line. These public services are divided into two categories, for individuals and companies, and some twenty sub-categories. Services extended to individuals should include information about income taxes, job searches, social security benefits, personal documentation, registering vehicles, construction permits, declarations to the police, public libraries, birth and marriage certificates, enrolment in universities, moving announcements and health services. Companies should be able to receive services in the areas of social security contributions, corporate taxes, VAT, registering start ups, providing national statistics data, customs declarations, environmental permits and public procurement. There is a five-level assessment grille. Stage A0, 0-24% indicates that a site is non-existent or useless on the practical level, Stage A1, 25-49%, offers a purely informational site, Stage A2, 50-74%, indicates a one-way information flow, Stage A3, 75-99%, for a bilateral interactive site and Stage A4 at 100% indicating a fully interactive site with no supplementary off-line interaction required. Electronic administration is a means for public administrations to improve its efficiency in providing public services. Through information and communications technologies, public administrations can both reduce operating costs considerably and improve the guality of its services.

## E10 Public services fully available online

This indicator measures the percentage of public services that are fully available online with relation to all services analyzed in CAD 09 above. It is comprised of two sub-categories, the first containing the number of number of public services that are completely unavailable online, i.e. the first four Stages A0-A3 mentioned in CAD 09, and the second containing those public services that are fully available on line, or the last Stage A4. The aggregate indicator of public services fully available online is then calculated by means of a ratio between the number of public services fully available online and the total of public services online that were analyzed. Having public services entirely available online allows administrations to both optimize their operating costs and increase the quality of their services. In addition, these services also make it possible for companies and individuals to benefit from the information society and to render their interaction time with public administrations more efficient.

# E11 Public sector payroll costs

# (removed form Competitiveness Scoreboard)

This indicator represents labour costs in the public sector as a percentage of domestic GDP. According to the OECD, the concept of public sector varies depending on country. The public sector is defined on the basis of employees paid using public funds, either directly by the Government or on the basis of Government allocated budgets to departments or agencies.

# F Entrepreneurship

Developing entrepreneurialism is currently a major preoccupation of the social, political and economic agenda in many countries. Indeed, empirical data has shown that a significant relationship exists between entrepreneurial activities and productivity and growth in an economy. Analyses of company policies should therefore be carried out along the lines of a continuous analysis of competitiveness. Both the European Commission and the OECD believe that entrepreneurial activities are fundamental for the proper functioning of market economies and that these make up one of the key components in generating, applying and disseminating new ideas. Neither heightened levels of knowledge nor a functioning domestic market can alone provide the environment for exploiting the full potential for innovation capacities and driving competitiveness and economic growth. From these entrepreneurial activities emanate new economic activities, producing new products and services that require investment, thus constituting a motor for job creation.

# F1 Propensity for entrepreneurialism

This indicator was derived from a qualitative public opinion survey on professional status, for which the key sampling question was: "If you could choose from among a variety of professions, would you prefer to be a salaried employee or a self-employed worker?" This indicator provides us with information of the attitudes of people regarding entrepreneurial activities. The propensity of people for Entrepreneurship reflects attitudes shaped by tradition, the image of a CEO and economic opportunity as well as the way that the advantages of working as a selfemployed contractor are perceived.

#### F2 Self-employed jobs as a percentage of total employment

This indicator records self-employed jobs as a percentage of the workforce in all economic activities. Self-employed workers are persons who are sole proprietors or co-proprietors of companies that have no legal personality in which they work, except for companies without a legal personality that are classified as quasi-corporate enterprises. Self-employed persons are classified as such if they do not simultaneously hold a salaried job as their principal source of income, which would classify them as "employees". Self-employed persons also include the following categories of persons: unsalaried family workers, persons who work at home and persons who engage individually or collectively in production activities exclusively for own final consumption or capital formation. A high proportion of self-employed persons in a work force can constitute an important determinant for the generation, application and dissemination of new ideas.

# F3 Net change in the number of companies

The net change in the number of companies is calculated by taking the number of start-ups les the number of companies winding up with relation to the overall population of companies. A positive figure indicates that start-ups in a given year outnumber wind-ups, and therefore the total number of companies increases. This type of increase can be the source of optimized reallocation of resources and a supplementary increase in jobs.

# F4 Volatility among companies

The volatility rate among companies adds the start-up rate of companies to the rate of companies winding up their affairs in relation to the overall population of companies. A high rate of volatility in a given year indicates that the population of companies in a country is subject to significant fluctuations and therefore to a constant turnover of employees. If many companies are formed and many go out of business, there is a high degree of renewal among the global population of companies. A high degree of renewal of the fabric of companies can signify a certain extent of flexibility in the economy of a country and can indicate a high level of destructive creation, which results in reallocation of resources to more competitive sectors. A dynamic population of companies, reflected by a high volatility level, is a feature of economic activities linked to clusters.

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# G Education and training

Changes in economic and social conditions have progressively conferred a foremost role to education in the success of individuals and nations. While it has been firmly established that developing human capital must be the focal point of an effective struggle against unemployment and low salaries, there is conclusive proof that this development is also a determining factor in economic growth. Knowledge and expertise are the raw materials for a knowledge-based economy and they play a fundamental role in engendering and maintaining knowledge. The concepts present in the new or knowledge economy are difficult to precisely define, but they underscore the fact that the overall dynamic of an economy resides more and more in knowledge and learning skills. Education, or in a more all-encompassing manner, training, is a key dimension of the crucial factor that immaterial investment has become for the level of competitiveness of a company or a country. For training programs to be adequately linked, skills must be developed and maintained up to date. It is necessary to both mobilize all available human resources and increase their potential by stimulating creativity and ensuring that skills are renewed and improved.

## G1 Annual cost per student in public educational facilities

Costs per student at public educational facilities assess amounts spent per student by central, regional and municipal governments, private households, religious institutions and companies. These include personnel costs, costs for equipment and other expenditures. In order to perform well, schools must be able to count on qualified and high quality teachers, proper establishments, updated equipment and motivated students who are pre-disposed to learning. Annual costs per student therefore comprise a representative indicator of the effort expended to train students under proper conditions. The effectiveness of the use of resources, in particular in terms of academic results and educational attainment, must provide further information on the resources allocated.

# G2 Portion of the population aged 25–64 with a secondary education

This indicator shows the percentage of the adult population between the ages of 25 and 64 that completed secondary school. It aims to measure the portion of the population that has the minimum qualifications necessary for taking an active part in social and economic life. To take advantage of the opportunities available through globalization and new technologies, companies need skilled employees that are capable of initiating and managing new ideas and that know how to adapt to new production methods and management practices. Skills acquired during secondary education cycles are high factors of productivity and facilitate learning and adaptation to new market requirements.

# G3 Portion of the population aged 25-34 with a university education (removed from Competitiveness Scoreboard)

The ratio of persons that have earned a degree shows the current rate that advanced knowledge is produced by each country's educational system. Countries with the highest rate of university degrees have great potential for comprising and maintaining a highly gualified working population. Statistics on how much education persons have gives an insight to how much advanced knowledge a population possesses. The ratio of university degrees in a working population is an important indicator of innovation potential of the labour market. The requirement for higher levels of qualification on the labour market, the increase in unemployment rates over recent years and higher expectations on the part of both individuals and society have resulted in more young people earning at least one university degree. This evolution indicates an across the board increase in the number of high level skills in the adult population. It should be noted that the rate of university degrees depends both on the access rate to this level of studies and the increase of qualifications sought on the labour market.

# G4 Percentage of human resources in scientific and technological fields (HRST) in the labour force

Human resources in science and technology are defined according to the Canberra Manual (OECD and Eurostat, 1995) as persons having graduated at the tertiary level of education, or persons employed in an S&T occupation without having obtained such degrees, for which a high qualification is normally required and the innovation potential is high. Data relating to scientific and technological human resources that is reported here concern professionals and technicians as defined in the International Standard Classification of Occupations (ISCO 88) or "Technicians and Associate Professionals". A high percentage of human resources in scientific and technological fields results in increasing the creation and dissemination of knowledge and innovation in technologies.

# G5 Life-long learning

Life-long learning refers to persons aged between 25 and 64 who stated that they were enrolled in an educational program or training course during the four weeks immediately preceding the survey. The denominator here is total population of the same age group, excluding all who did not respond to the "Training or educational program" question of the survey. Data collected relates to all the forms of training or education, regardless of whether they were pertinent to a current or future job held by the respondent. Continuing education is essential if the population is to acquire or maintain skills in such areas as information technologies, technological knowledge, entrepreneurialism or even certain social skills. Updating and continued development of skills and knowledge are factors of growth and productivity. They make it possible to strengthen the dynamic innovation processes of a company. Life-long learning may be considered not only as an essential course for ensuring long-term employability but also as a short-term option for training gualified personnel in areas where skills are required.

#### G6 Secondary school dropouts

Young people who drop out of school early are persons aged 18-24 that meet two conditions. They are persons whose highest level of education reached was the lower cycle of secondary school and who declare not being enrolled in any learning or training program during the four weeks preceding the survey. The denominator here is total population of the same age group, excluding all who did not respond to the "Level of learning or training achieved" and "Educational or training program enrolled in" questions of the survey. A high percentage of young people who leave school early is worrisome, because this harms their capacity to adapt to structural changes and to integrate into society. In order to participate in the knowledge society, one must possess a minimum knowledge base. In consequence, young people without any certificate or diploma will have fewer chances of efficiently deriving benefits from life-long learning programs. They risk becoming cast-offs in today's society, which is moreover becoming increasingly competitive. For this reason, it is essential to decrease the number of young people leaving school early if full employment and subsequent social cohesion is to be achieved.

# G7 Percentage of foreign nationals in scientific and technological fields (removed from Competitiveness Scoreboard)

This indicator shows the percentage of foreign national human resources in scientific and technological fields. This proportion is determined using Major Groups 2 (Scientific and Intellectual Professionals) and 3 (Technicians and Associate Professionals) of the International Standard Classification of Occupations, ISCO-88. Over recent years, international mobility and highly qualified labour has come under the increasing attention of public policy makers and the media. Foreign skills are suitable for filling vacant positions. This labour base should allow host countries to catch up on lagging progress and pursue their development by means of this contribution of human capital. Nevertheless, major differences between countries may become apparent. Luxembourg is concerned in terms of percentages of human resources in scientific and technological fields because of the size of its banking sector, the tightness of its labour market and the presence of numerous European institutions.

# G8 Percentage of highly qualified workers (ICT) in total employment figures (removed from Competitiveness Scoreboard)

In general, only several sections of the ISCO-88 nomenclature refer to highly skilled workers in the area of ICT since the correlation of nomenclature with the United States has not yet been formally established. Some that may be cited include IT specialists such as systems designers and analysts, computer operators and other computer equipment operators including computer assistants, computer equipment technicians and industrial robot technicians, and optic or electronic technicians such as photographers, imagery equipment technicians, radio, television and telecommunications emissions equipment technicians, medical equipment technicians, etc. The role played by highly gualified labour in the performance of a company, a sector or a country is an established fact and is recognized by a number of observers. Activities related to these persons' knowledge, transmission, production, interpretation and utilization are highly important in the very functioning of economic activity and the structure of employment. In order to maintain and improve a company's well-being it is imperative to continue along this path, ensuring that the large number of highly qualified workers is regenerated in every field.

# H Knowledge economy

In recent years, there has been upheaval in the industrial landscape of the developed world. Free trade principles have transformed telecommunications, the spectacular development of the Internet and the progressive accessing of companies and individuals to the communications network are telling of one unique and uniform phenomenon, the advent of the information age. The success of the information society is an essential element for achieving the Lisbon objective of making the European Union the most competitive and vital economy in the world by 2010. Knowledge is the base ingredient of the innovation business. Innovation is principally the result of complex and interactive processes, through which companies access complementary knowledge originating with other organizations and institutions. In addition, innovation is often supported by new managerial and organizational methods based on ICT and on investment in new equipment and new skills. Innovation therefore constitutes one of the principle drivers of economic growth in the long term. The decisive impact of technology on industrial performance and on international competitiveness signifies that this continuous improvement of the innovation process is essential in order to achieve gains in productivity, job creation, economic growth and standards of well-being.

## H1 Internal R & D expenditure

The internal R & D expenditure, DIRD, guantifies R & D expenditures carried out within a statistical unit and within a nation's borders during a given year. As such, it includes all R & D related work performed in each organization within a country's borders. It includes R & D expenditures financed by other countries but does not account for payments in exchange for work performed abroad or outside of an organization, as in the case of sub-contracted work. According to the Frascati manual methodological reference, "Experimental R & D encompasses creative work undertaken in a systematic manner that is expected to increase the sum of knowledge, including the knowledge of men, culture and society and the use of this store of knowledge for new applications". R & D activities are characterized by massive transfers of resources between units, organizations and sectors that it is important to observe. R & D expenditures by companies are an ex-ante indicator of their propensity for innovation. A high propensity for innovation is a factor of competitiveness through its improvement of productive process, i.e. cost competitiveness as well as through the introduction of new or improved products that will win new markets. According to the Europe 2020 strategy, the Luxembourg target is from 2.3 to 2.6% by 2020.

## H2 Public R & D budget credits

Public R & D budget credits are all R & D credits entered in the budgets of all governments. They correspond to R & D budget allocations by central or federal administrations. Unless otherwise indicated, they include operating expenses and cost of equipment. They include not only R & D financed by public funds that is carried out in public institutions, but also that financed by public administrations in the private business sector, private non-profit organizations and higher education institutions, as well as R & D done abroad, meaning in international organizations whose activities are solely or principally dedicated to R & D. In summary, the credits cover R & D financed by the State but carried out in all sectors, including abroad and in international organizations. The Governments is a key investor in R & D and maintains a major role in upholding the scientific and technological acumen of a country. Its action consists in financing research in public institutions and not for profit research in the private sector. This indicator is used to concisely take into consideration policies conducted or to be conducted in the area of scientific research. Public budgetary credits can be considered a State-originated support measure for R & D activities and serve to specify what priorities governments place on public financing. It is an indicator of long-term public commitment.

#### H3 Portion of public research financed by the private sector

Public research is an important complement to the R & D effort of the private sector. It generally covers areas where short-term profitability is not assured and in which private investment cannot be justified. Public research expenditures have inherent external influences of a significant nature, so a substantial public R & D effort will stimulate transfers of technology and innovation to the private sector. To the extent that work of government laboratories jibes with market requirements, these entities offer a potential for ideas and discoveries that companies can profit from in a concrete manner. How closely these R & D installations function with industry is traditionally measured by the proportion of the contribution of companies to financing research carried out in the State DIRDET sector. R & D performed in public laboratories contributes to increased knowledge and can result in major industrial advances.

## H4 Percentage of sales allocated to the introduction of new products on the market (removed from Competitiveness Scoreboard)

This indicator measures the portion of sales allocated to new or significantly improved products that are new to the market. The portion of sales of new or significantly improved products is an important indicator of the success of innovation. While patent applications are proof of the intensity of research and innovation efforts, conversion of discoveries to marketable units is far from automatic. Although innovation is often cited as an important element in increasing competitiveness, the lion's share of revenue of the great majority of companies is derived from products that have undergone no or only slight modifications. Companies that introduce a relatively high number of new products can do so because of the rapid rate of development in the markets in which they operate. Companies that derive a high portion of revenue from new products are probably those that are the most flexible in adapting their manufacturing processes to changing requirements, or those that concentrate their attention on changing demand of consumers. The lack of innovation and new products is reflected over time by a lowering of market share.

# H5 Number of researchers per 1,000 employed persons (public and private sectors taken together)

Researchers, from the perspective of the OECD, may be defined as professionals engaged in the design and creation of new knowledge, products, processes, methods and systems that are directly associated with the management of projects. Titles and categories may vary from one research institution to another, but the work undertaken by such laboratory personnel is not fundamentally different. Changes in numbers of researchers in an economy are closely linked with its capacity for research and efforts in innovation. This indicator measures the percentage of researchers is expressed in terms of R & D full-time equivalents (FTE), meaning that a person that works one half the time of a full-time worker is counted as a half person working full time. The indicator refers to teams working over the course of one year. FTE data give an indication of the researchers that shows the pool of researchers in jobs.

# H6 Scientific publications per million inhabitants (removed from Competitiveness Scoreboard)

The count of scientific research articles is based on scientific and technical articles in around 5,000 major scientific and technical journals published the world over. Articles are counted in fractions when they authored by two persons from different countries. In this case, an article is worth one-half an article for each of the countries involved. In-depth fundamental scientific research is essential in developed economies, both as a source of research and expertise and as a testing ground for scientific and technical personnel of the future. Fundamental science is consequently a key resource for shoring up innovations, which is the foundation for creating wealth and new jobs. Scientific publications are the principal vehicles for disseminating results of research activities and are one of the forms through which the work of researchers can be validated. The ratio of publication volumes to a given population is therefore an indicator of the vitality and performance of scientific research in a given country.

#### H7 H8 Number of patent applications (OEB) and patents awarded (USPTO) per million inhabitants

Patents are the means of protecting intellectual property of a discovery that has commercial potential. In an economy that is based on innovation, the number of patents awarded may be considered an index of the robustness of R & D work and of the country's overall technological innovation potential, which is a key element of competitiveness. The two indicators used in this category provide information both on patent applications submitted to the European Patent Office (EPO) and on patents awarded by the U.S. Patent and Trademark Office (USPTO). With regard to applications submitted to EPO, that data refers to applications registered directly under the European Patent Convention or to applications registered under the Patent Cooperation Treaty in the area of patents that designate the EPO. Patent applications are counted according to the year in which they were registered at EPO and are distributed according the International Patent Classification system (IPC). Fractional units are used in the event of shared patents or of patents in several IPC categories to avoid double counting. With patents awarded by the USPTO, data refers to patents awarded as opposed to applications submitted, as deemed by EPO patent data. Data are registered according the year of publication as opposed to the year in which the patent was actually registered, as considered by EPO data. Patents are broken down according to country of inventor, using the fractional method where several inventors from different countries are involved.

#### H9 Use of broad band internet by companies

The indicator used here states an estimate of the number of companies in member countries that are connected to and use broad band connections. Broad band service or connections are used for transmitting significant volumes of data. According to EUROSTAT the definition of broad band involves the xDSL technology, with its ADSL and SDSL types of subscriber lines, or services that provide speeds in excess of 2Mbits, which allows more rapid data transmission than telephone lines. Internet and electronic business linked practices are strongly associated with the new economy. They allow companies to carry out information searches rapidly, monitor the competition, carry out financial transactions, perform targeted marketing operation, broaden the customer base, etc. These new business practices are at the centre of a genuine revolution in the business world. Individual and business users must have an offer of broad band access to the Internet if they are to develop new applications and take part in economic activities.

#### H10 Investment in public communications as a percentage of GFCF

The International Telecommunications Union, (ITU) defines the public telecommunications sector as the infrastructure and telecommunications services available to the general public through this infrastructure. This includes telecommunications networks for telephone, telex, telegraph and data services that are made up of exchanges between which transmission circuits connect domestic subscribers with each other and subscribers abroad. Since everyone can access the network. the term 'public' denotes the provisions for accessing the network rather than ownership of the network. The public telecommunications sector does not include private networks, which are not automatically connected to the public network or to which admission is subject to certain restrictions. The public telecommunications sector also excludes manufacturing of equipment for telecommunications or broadcasting use. The internet, electronic trade and requesting internet access at prices allowing for permanent connections play a primary role in changes to telecommunications policies. The potential contribution of telecommunications to economic growth in the light of developing electronic commerce is appearing increasingly important with the passage of time.

#### H11 Percentage of households that have Internet access at home

Information and Communications Technologies provide a massive flow of information. Use of internet by households illustrates the access private individuals enjoy to the multiple potential offered by ICT and reflects, after a fashion, the entry of civilians into the new economy. In the future, these consumers will regularly use the internet to take advantage of goods and services available through it. Simultaneously, the existence of a network like internet is in itself a creator of products of a new type, online products, which engender new needs. Even noncommercial uses of the medium by households can result in indirect effects on their consumption through changes in their habits and lifestyles.

## H12 Number of cell phones per 100 inhabitants

This indicator shows the access per 100 inhabitants to telecommunications. These include subscribers to cell phone networks. In the past, landline penetration provided a reasonable indication of the number of basic telecommunications connections that were available to consumers. Now, the use of landlines gives flawed information about the development of a network. To evaluate the overall telecommunications penetration throughout the OECD zone it is increasingly necessary to account for the development of mobile transmission networks.

#### H13 Percentage of households that have broad band Internet access

Broad band internet access used as a reference includes xDSL, ADSL, SDSL and other all connections that offer bands over 2Mbit/s. The degree of use of internet services, the quality of the use and the functionalities of online services depend on band width available. For this reason there is growing interest in arraying broad band access networks and the rate of spreading of broad band access technologies. It is important to provide broad band internet access if new applications and their associated economic activities are to be developed.

# H14 Number of secure web servers

Servers are computers that host content of the worldwide web, in other words, web sites. A secure server is a server that has secure socket layer software, which protects information during business transactions carried out over the internet. In order to complete purchases and sales on the internet and other networks, electronic business infrastructure requires secure paths. Secure servers make up some of the infrastructure used to carry out secure electronic transactions. They support available content intended for sales and other business uses. As such they can be considered indicators of access to electronic commerce and of the offer of this type of service, in other words an indicator of supply and demand of commercial content on line. This indicator is furnished via the SSL survey carried out by Netcraft and published by the OECD. The number of secure servers is in ratio to the population of the country, per 100,000 inhabitants.

## H15 Percentage of total employment in medium or high technology sectors

The percentage of employment in medium-high and high technology manufacturing sectors is an indicator of the part of the manufacturing economy based on continuous innovation through creative and inventive activities. The indicator used takes into account the percentage of jobs in high and medium-high technology sectors as a part of all jobs. The high and medium-high technologies sectors are defined as those sectors requiring a relatively high degree of R & D intensity. They included a certain number of sectors including aircraft and aerospace construction, the pharmaceutical industry, manufacturing of office and computer equipment, electronics and communication and scientific instruments for high technology. Medium-high technology includes the manufacture of machines, electrical equipment, the automobile industry, the chemical industry—except for the pharmaceutical industry, the manufacture of other transportation equipment and the manufacture of non-electrical machinery and equipment.

# I Social cohesion

There are numerous dimensions to the degree of competitiveness displayed by an economy, of which social cohesion is one of the pillars. Social cohesion is an important feature because it provides underlying social stability by fostering a feeling of security and belonging and because it can improve the development potential of a country. In addition to the quantitative and monetary aspects of competitiveness, a country's capacity for growth depends largely on the motivation of its human capital, which requires a proper working environment and a feeling of strong cohesion that is itself dependent on the efficient functioning of the country's social system. Competitiveness should not be considered as an end in itself, but rather one of several ways to achieve the shared objective of well-being in the population.

# I1 Gini coefficient

The Gini coefficient measures inequality of household incomes. The values of the coefficient move from 0, representing full equality, to 1 for the maximum degree of inequality. Moreover, full equality of incomes can be damaging to the efficiency of an economy, because if no private benefits exist and differences among salaries are minimal, individuals are not motivated to perform better at work or to take up an entrepreneurial path. In contrast, excessive disparities tend to exert a negative effect on individuals' lives. Very inequitable differences in income can have repercussions on certain essential factors of economic growth such as the political stability of a country, educational levels of labour, or adherence to certain rules of conduct on the part of economic agents. All of these factors have the effect of slowing the economy and putting the brakes on growth.

# 12 At risk of poverty rate after social transfers

The 'At risk of poverty rate after social transfers' measures the proportion of persons whose equivalised disposable income is below the 'at risk of poverty line,' which is set at 60% of the median equivalised disposable income of a country, after social transfers. A high rate in this indicator reveals inefficiency in the social protection system that could have damaging repercussions throughout the economy. As an example, the impact of poverty can be such as to hobble education levels or contribute to crime, which in turn increases the level of social instability in a country, thus causing its development potential to shrink.

# 13 At persistent risk of poverty rate

The 'At persistent risk of poverty rate' measures the proportion of persons whose equivalised disposable income is below the 'at risk of poverty line' during the current year and has been for at least two of the previous three years. Persistent poverty can indicate inefficiency in the social protection system that could have damaging repercussions throughout the economy. As an example, the impact of poverty can be such as to hobble education levels or contribute to crime, which in turn increases the level of social instability in a country, thus causing its development potential to shrink.

#### 14 Life expectancy of a child less than one year old

The life expectancy indicator measures the number of years that a child younger than one year can expect to live assuming, at each age of its life, its chances of survival were consistent with those prevalent in its corresponding age group at the year of its birth. Changes in this indicator reflect the onset of changes in the general state of health of a country's population, living conditions and the quality of health care. Because of this, life expectancy may be considered as an overall indicator of social cohesion that takes into account all the measures implemented to ensure a high degree of social cohesion.

# 15 Wage gap between men and women

The wage gap between men and women is the gap in average gross hourly wages between male and female employees as a percentage of the average gross hourly wage of male employees. The survey population includes all salaried workers between the ages of 16 and 64 who work a minimum of 15 hours per week. The wage gap between women and men may discourage women from entering the labour market, thus depriving the economy of human capital. This inequality in the breakdown of incomes goes against the principle of equal opportunities, which is an important factor in maintaining social cohesion.

# 16 Serious work accidents

# (removed from Competitiveness Scoreboard)

This index shows changes in the rate of serious accidents at work since 1998. The rate of occurrence is the number of non-fatal work accidents involving more than three working days of absence in the survey population. A work accident is an "event of short duration occurring during the course of a professional activity that causes physical or psychological harm to a person". Included in this figure are accidents occurring away from a company's premises during a victim's working hours, even those caused by third parties or severe poisoning. Excluded from this figure are accidents occurring on the way to and from work, solely medical causes and occupational illnesses. A high rate of serious work accidents can indicate improper working conditions, which can hinder the productivity of employees.

# J Environment

Another requirement for making an economy more competitive is that all economic agents commit to progress in the area of improving the environment, in line with a framework supporting sustainable development. It is important to promote growth while simultaneously guaranteeing a viable economic, social and ecological environment for future generations. The fundamental concept used to evaluate environmental performance is eco-efficiency or environmental productivity of industry. Eco-efficiency is the relationship between economic production and environmental pressures—expressed in terms of pollutants releases or resources consumed—that result from such production. It also furnishes information on the efforts expended by companies to promote productivity while operating in a manner intended to respect the environment.

# J1 J2 Number of ISO 14001 and 90001 certificates per million inhabitants

The indicators of ISO 14001 and 90001 certification give us information on the involvement of companies in environmentally responsible activities. ISO standard 14001 is an international standard for managing the environment. ISO standard 90001 is the environmental management and audit system. In order to render European data comparable, the data have been weighted by number of inhabitants of each Member state, in light of the lack of statistics relative to the number of companies.

# J3 Total greenhouse gas emissions (Kyoto)

The Kyoto protocol sets limits of greenhouse gas emissions for countries that signed the international agreement. As a part of this protocol, Europe accepted a reduction of 8% in its greenhouse gas emissions using 1990 as a base year with a benchmark figure of 100 in 2008-2012. Emissions of six greenhouse gases specified in the protocol are weighted by overall warming potential and added together to give total CO2 emissions. Total emissions appear in indices with the year 1990 as the benchmark. The fact that the Kyoto protocol compels nations to reduce guotas of greenhouse gas emissions risks harming the costcompetitiveness situation of European companies with relation to other competitor countries that are not subject to limits, through increased labour costs. These costs could cause some companies to no longer be profitable, thus leading to loss of jobs. This indicator is also an important factor in the choice of policies intended to achieve targeted objectives and the objectives subscribed to in the Kyoto protocol. According to the Lisbon strategy, the EU has agreed to reduce greenhouse gas emissions by 8% below base year 1990 levels in 2008-2012.

# J4 Percentage of renewable energy sources

The share of renewable energy is the ratio between electricity produced from renewable energy sources and gross national consumption of electricity figured over a calendar year. This indicator measures the contribution of electricity produced from renewable energy sources in national electricity consumption. Electricity produced using renewable sources includes that produced by hydraulic plants, exclusive of pumping, wind energy, solar energy, geothermic energy and gases derived from biomass waste. Gross domestic consumption of electricity includes total gross domestic production of electricity generated by fuels, including self generation and also including imports of electricity, less exports of electricity. This indicator measures the will of an economy to commit itself to a sustainable development program with environmental concerns to the forefront.

#### J5 Volume of municipal waste collected per person per year

This indicator shows the quantity of waste generated. It includes waste collected by or for municipal authorities that are subsequently eliminated by the waste management system for these entities. The greater part of these waste flows comes from households, although it also includes similar waste sources such as from stores, offices and public institutions. In areas not benefiting from where no municipal waste management system exists, estimates of waste quantities have been made. The quantity generated is expressed in kg per inhabitant per year.

# J6 Energy intensity of the economy

Energy intensity of the economy is the ratio between gross domestic consumption of energy and the gross domestic product calculated over a given calendar year. This indicator measures the consumption of energy in an economy and its overall energy efficiency. Gross domestic consumption of energy is calculated as the sum of gross domestic consumption of five energy types, including coal, electricity, oil, natural gas and renewable energy sources. GDP figures are considered at like prices to avoid the effect of inflation, and the base year used is 1995. The rate of energy intensity is the result of dividing gross domestic consumption by GDP. Since gross domestic consumption is measured in kilograms of oil equivalent and GDP in millions of Euros, this rate is measured in kilograms of oil equivalent per thousand Euros. Energy intensity reflects the degree of dependence an economy has with relation to the energy factor as well as the productivity of this factor and its efficiency of use. A high energy intensity score shows that an economy is more vulnerable to an increase in energy prices. Energy intensity is also an important factor in selecting policies intended to achieve objective commitments in the Kyoto framework.

#### J7 Modal split in transportation choice – percentage of car users as transportation method

The modal split in transportation methods of travellers is defined as the ratio between domestic passenger traffic and GDP at like prices of 1995. The unit used is passenger kilometre to represent the transport of one passenger over the distance of one kilometre. The indicator covers transportation in automobiles, buses, cars and trains. All data must be based on movements within national borders, regardless of nationality of a vehicle. However, the collection of data in not harmonized for countries within the EU. In accordance with the strategy of sustainable development, the share of movements by transportation mode must be reduced if we are to efficiently and ecologically master the problem of mobility. Moreover, this type of re-balancing will contribute to the diminishing of CO2 released into the air through road traffic.

#### New Objectives and Indicators for the Europe 2020 Strategy

| EU2020-1  | Employment rate by gender, age group 20-64                  |
|-----------|---|
| EU2020-2  | Gross domestic expenditure on R&D (GERD)                    |
| EU2020-3  | Greenhouse gas emissions, base year 1990                    |
| EU2020-4  | Share of renewable energy in gross final energy consumption |
| EU2020-5  | Primary energy consumption (Mtoe)                           |
| EU2020-6  | Early leavers from education and training by gender         |
| EU2020-7  | Tertiary educational attainment by gender, age group 30-34  |
| EU2020-8  | Population at risk of poverty or exclusion                  |
| EU2020-9  | Persons living in households with very low work intensity   |
| EU2020-10 | Persons at risk of poverty after social transfers           |
| EU2020-11 | Severely materially deprived persons                        |
|           |   |

Source: http://epp.eurostat.ec.europa.eu/portal/page/portal/europe\_2020\_indicators/ headline\_indicators