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2011 COMPETITIVENESS REPORT

Taking competitiveness seriously

MINISTÈRE DE L'ÉCONOMIE
ET DU COMMERCE EXTÉRIEUR
Observatoire de la compétitivité

2011 COMPETITIVENESS REPORT

Taking competitiveness seriously

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 Economy and Foreign Trade or by experts of associated institutions.

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2011 Competitiveness report

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Preface

Over the last three years European Union Member States, including Luxembourg, have been faced with a financial, economic and social crisis that has had unprecedented world-wide repercussions and has nullified years of economic and social progress. Countries throughout the world have focused on managing the short-term consequences of this crisis. The political concerns and the media have tended to focus primarily on the management of budget balances and sovereign debt, and it is therefore not surprising that structural policies which have a lasting impact upon growth potential and job creation, like the European strategy Europe 2020, unveiled in June 2010 by the European Council, have gone mostly unnoticed. And wrongly so!

In fact, it was through the "Euro Plus Pact", meaning the reinforced coordination of economic policies for competitiveness and convergence which was adopted in March 2011 by the European Council, that competitiveness came back into public debate in Europe, after having been overlooked for far too long. This Pact identifies competitiveness as a priority for a sustainable recovery out of this crisis.

Luxembourg must go through a transformation period in order to overcome the consequences of this crisis, the structural weaknesses of the country and the intensifying of global challenges. However, confronting these challenges is not just a question of cost cutting, since competitiveness relies as much on non-cost related factors as it does on cost related elements. Special focus must therefore be placed on stimulating innovation, creativity, responsiveness, and increasing the range of export goods because these factors are the foundation for a sustainable and long-term growth and job creation strategy, allowing the economy to increase its productivity. Productivity is in fact a key element of competitiveness and of potential growth. But, even if Luxembourg's productivity is among the highest in level in the world, the same cannot be said for the evolution of Luxembourg's productivity over time. Through its national strategic plan "Luxembourg 2020", which was submitted to the European Commission in April 2011 within the framework of the 10 year strategy "Europe 2020", Luxembourg subscribes completely to the priorities and objectives of "smart, sustainable and inclusive growth". It is also with these in mind that in April 2010 I submitted around sixty proposals to the Tripartite Coordination Committee, to maintain and develop Luxembourg's competitiveness and general attractiveness to current economic players and potential foreign and domestic investors in the market. Most of these measures have either been adopted or are currently in the final preparation stages.

Where do we stand today in terms of our economy's competitiveness? When speaking of competitiveness it is clear that not everyone is talking about the same thing. In the broad sense, the concept of competitiveness focuses on long term structural sustainability, taking into account a wide range of economic, social and environmental indicators. In the discussions that concern us at present, the government, as well as certain social partners are often referring to this interpretation of "competitiveness". In contrast, companies legitimately concentrate on short-term cost competitiveness. Competitiveness in its broader sense has not deteriorated, which is reassuring.

It must be acknowledged that Luxembourg's economy is showing certain weaknesses, particularly in terms of cost-competitiveness. The rankings offered by certain large international institutions that measure competitiveness can invite criticism since they depend on a subjective selection of the parameters being measured. Despite this, economic policy makers should closely monitor these rankings because other economic actors keep a close eye on them and any drop in these types of indicators is detrimental to the attractiveness of a country as an investment destination. Like in previous years, the *Observatoire de la Compétitivité* has, within the framework of the 2011 Competitiveness Report, given a helpful overview of all the dimensions of competitiveness of Luxembourg's economy.

I believe that the progress made in implementing our economic policy should be submitted to follow-up and analysis processes that are based on an economic analysis that is both quantitative and qualitative. Parliament, the government and the social partners all require this kind of reliable, objective and official structural data in order to determine what reform policies to embark on and to be able to evaluate their impact.

Wishing you a good read

Jeannot KRECKÉ
Minister of the Economy and Foreign Trade

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1 The Observatoire de la Compétitivité: 2010-2011

1.1 Role and Missions of the *Observatoire*

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 economic well-being.

As such, it is a tool for documenting, observing and analysing change in the competitive situation of the country. It is a monitoring unit, responsible for leading a constructive debate between all the social partners.

The principal goals of the *Observatoire de la Compétitivité* are as follows:

- Collect, analyse and compare existing data on the national, regional and international levels that relates to economic competitiveness;
- Direct selected and processed information to appropriate entities that is helpful to making strategic decisions;
- Conduct or contract studies and research on competitiveness and its determinants, etc.;
- Contribute to the deliberations and analyses of international organizations dealing with competitiveness (EU Council, the OECD, etc.);
- Coordinate the work and drafting of the National Reform Programme for Luxembourg within the framework of the European strategy for growth and job creation (the Lisbon Strategy and the Europe 2020 strategy).

Frame 1
Excerpt of the 2009-2014 government programme[1]

"1. Promote the competitiveness of Luxembourg's economy

A. Competitiveness. Implementing an operational Competitiveness Scoreboard.

The Government's permanent monitoring tool to track competitiveness and its related indicators is the *Observatoire de la Compétitivité*. The *Observatoire* will monitor competitiveness in Luxembourg's economy and regularly inform the Government and the social partners, especially the Tripartite Coordination Committee, about changes in competitiveness.

Competitiveness is measured by integrating social, ecological and economic criteria in accordance with the principle of sustainable development. For this purpose, various qualitative and quantitative indicators are intended to provide information about the competitiveness of the country's economy. Collaboration between the *Observatoire* and the Luxembourg Central Statistics and Economic Analysis Office (STATEC) is therefore particularly important to ensure the quality of the factors forming the basis of these measures.

The economic indicators used in the Grand Duchy Regulation dated 4 April 1985, in application of article 21, paragraph 6 of the amended law dated 24 December 1977 that authorises the Government to implement measures intended to stimulate economic growth and maintain full employment, will be replaced by the Competitiveness Scoreboard, following consultations with the social partners represented in the Tripartite Coordination Committee.

This Grand Duchy Regulation includes several indicators that date from prior to the introduction of the euro and also from before the shift of Luxembourg's economy to a service oriented economy. These indicators did not take into account changes in assembling and processing statistics that have occurred in step with advances in information technologies. The new Scoreboard to be put into place will integrate short-term indicators that allow for rapid reaction to changes in the economy that are often subject to international occurrences, while also emphasizing long-term structural indicators. It will ensure compatibility with sustainable development indicators.

Along with the High Council for Sustainable Development (CSDD) and the Economic and Social Committee (CES), the *Observatoire de la Compétitivité* is developing a composite indicator for well-being above and beyond the standard per capita GDP indicator, intended to measure progress in society and well-being in the long term. This indicator, which takes into account international developments in the area, is being implemented based on official statistics and databases provided by STATEC. (...)"

[1] For more details: http://www.gouvernement.lu/gouvernement/programme-2009/programme-2009/07-ecocomex/index.html

1.2 Moving from the Lisbon Strategy to the Europe 2020 Strategy

The Ministry of the Economy and Foreign Trade is the Luxembourg ministry responsible for coordinating the implementation of the European Strategy for Growth and job creation on the national level. In the autumn of 2005, the *Observatoire de la Compétitivité* was instructed to draw up a National Plan for Innovation and Full Employment[2], which was subsequently submitted to the European Commission as part of the renewed Lisbon strategy. To optimise governmental coordination, ensure that consultation procedures are carried out and to guarantee assimilation of reforms nationally, an ad hoc structure was set up at the inter-ministerial level in 2005. Coordination of this structure is handled by the *Observatoire de la Compétitivité* of the Ministry of the Economy and Foreign Trade. This network brings together Lisbon Strategy coordinators within the ministerial departments and administrations concerned. The Luxembourg Government submitted implementation reports to the European Commission over ensuing years, until the Lisbon strategy ended, in 2010.

Frame 2
Excerpt of the 2009-2014 government programme

"b. Competitiveness and the Lisbon Strategy: coordination at the national level

Economic policy must contribute to maintaining a high level of competitiveness in order to increase growth and job creation, ensure stability of prices and maintain positive trends in the areas of foreign trade and public finances. This is particularly important during periods of structural crisis. Therefore, competitiveness is a constant in Luxembourg economic policy considerations. The Government analyses and models the interaction between competitiveness indicators, especially those in the Competitiveness Scoreboard, in order to evaluate the effectiveness of reforms implemented in its national reform program."

At the end of 2009, the European Commission began to define a new strategy for the next ten years: The "Europe 2020 Strategy"[3]. Based on European Commission proposals, the June 2010 European Council has actioned this new strategy, the governance of which will take place at three integrated levels:

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

[2] For more details : http://www.odc.public.lu/publications/pnr/index.html

[3] For more details: http://ec.europa.eu/eu2020/index_fr.htm

In November 2010 each EU Member State had to submit a national reform programme draft (NRP) developed within the framework of the Europe 2020 Strategy. In November 2010 Luxembourg submitted its NRP draft to the Commission and the Cabinet adopted a final draft on the 29th of April 2011 which was then submitted to the European Commission, along with the SGP 2011-2014. In July 2011 the EU Council issued certain recommendations per country for Luxembourg, based on the NRP and the SGP, in view of the 2012 budget proposal discussions at the national level[4].

1.3 Events and publications in 2010-2011

The goal of the *Observatoire de la Compétitivité* is to keep both economic policy players and the general public informed on competitiveness issues. To achieve this, the *Observatoire* uses several communication methods, such as setting up public colloquia, conference events and publishing analytical documents relating to competitiveness. All information concerning events organized by the *Observatoire de la Compétitivité*, as well as its publications, can be downloaded from the Internet site http://www.odc.public.lu

1.3.1 Colloquia and Conferences

The communication strategy of the *Observatoire de la Compétitivité* goes hand in hand with its "competitiveness watch" mission and has the purpose of launching public discussions on the main themes that characterise the competitiveness of the Luxembourg economy and the Lisbon/Europe 2020 Strategy. Setting up public events is a part of this responsibility.

The *"Jounées de l'Economie 2011"*[5]

On the 15th and 16th February 2011 the cross-border economic forum *"Les Journées de l'Economie"* gathered close to 300 people at the Chamber of Commerce of the Grand Duchy of Luxembourg. The purpose of this 6th edition of this forum, the proceeds of which went to the "Jonk Entrepreneuren" association, was to provide a summary of the five previous editions and to ponder upon the topics of competitiveness and growth as a problem shared by all the regions comprised in the "Greater Region". Numerous entrepreneurs, political agents and economists shared their clear and well documented perceptions of competitiveness in Luxembourg and the Greater Region. Two lines of reflection were engaged throughout these two sessions.

[4] The European Semester and Europe 2020 Strategy will be looked at in more detail in Chapter 6 European Semester: monitoring macroeconomic imbalances

[5] For more details: http://www.odc.public.lu/actualites/2011/02/Journees_economie_2011/index.html

Colloquia "Luxembourg 2020"[6]

The three colloquia entitled *"En Route vers Lisbonne"*, which were held in 2004, 2006 and 2008 were so successful that a fourth event was organized under the name "Luxembourg 2020". This new edition became all the more important once the Lisbon process was accomplished and the Europe 2020 Strategy was launched. It placed a particular focus on exploring and presenting works relating to the measuring of well-being and the impact of the crisis on growth and potential growth. More precisely, works which aimed at analysing or evaluating the consequences of the crisis on endogenous factors of growth (such as research, education, infrastructure, etc.), company access to finance and on public decision-making.

The "How much is enough?" Conference[7]

On the 27th and 28th of May 2011 the Luxembourg Institute for European and International Studies, in partnership with STATEC and the *Observatoire de la Compétitivité*, organized a conference on Robert and Edward Skidelsky's manuscript entitled "How much is enough?". The purpose of this conference was to host an exchange on opinions about the main principles of this work.

1.3.2 "Perspectives de Politique Economique" (Economic policy perspectives)

"Perspectives de Politique Economique" is a publication by the *Observatoire de la Compétitivité* that contains the results of studies and/or research projects commissioned from Academic researchers and consultants as well as other documents, written by members of the Ministry of the Economy and Foreign Trade's *Observatoire de la Compétitivité*. The publication's objective is also to give an account of talks, seminars or conferences which the Ministry of the Economy and Foreign Trade organises on economic policy issues. Finally, the publication aims at identifying the policy options which are available, evaluating the effectiveness of certain measures and fostering public debate on economic policy[8].

1.3.3 Newsletter: *La Lettre de l'Observatoire de la Compétitivité*

Unlike the "Perspectives de Politique Economique", which endeavours to analyse certain scientific questions in detail, the Letter from the *Observatoire de la Compétitivité* has the purpose of providing the public with information about the work that goes on at the heart of the *Observatoire de la Compétitivité* itself. This publication is aimed at economic players as well as the wider public[9].

6 For more details: http://www.odc.public.lu/actualites/2010/12/colloque_Luxembourg_2020/index.html

7 For more details: http://www.odc.public.lu/actualites/2011/05/IEIS_2011/index.html

8 All the figures from "Perspectives de Politique Economique" can be downloaded from http://www.odc.public.lu/publications/perspectives/index.html

9 The Letters from the *Observatoire de la Compétitivité* can be downloaded from http://www.odc.public.lu/publications/lettre_observatoire/index.html

1.3.4 The *Observatoire de la Compétitivité* online

Since 2005, the *Observatoire de la Compétitivité* has been online at http://www.odc.public.lu, a website which gathers all the information and every publication regarding Luxembourg's economic competitiveness and the Lisbon Strategy. This site also contains news about Luxembourg's competitiveness according to foreign publications. It is a helpful communication platform for all of those involved in implementing the Lisbon Strategy in Luxembourg and providing data from the Competitiveness Scoreboard. The site also provides information about future events and publications. Documents relating to conferences and seminars can also be downloaded from the site, free of charge.

1.4 A brief guide to the 2011 Competitiveness Report

In fulfilling its observatory role, the *Observatoire de la Compétitivité* keeps a close eye on Luxembourg's ranking within the different general indicator charts.

Chapter 2. Benchmarks and comparative competitiveness analysis gives an account of Luxembourg's competitive performance according to international indicator charts (IMD, WEF, etc.) as well as some lesser known charts.

Chapter 3. The Competitiveness Scoreboard allows us to analyse the evolution of Luxembourg's competitiveness in comparison with other European Union Member States on a yearly basis, according to criteria which have been specifically defined for Luxembourg. The elaboration of an aggregate competitiveness chart based on this Competitive Scoreboard provides an overview of Luxembourg's relative competitiveness.

Chapter 4. Price and cost competitiveness in Luxembourg presents the evolution of foreign competitiveness in Luxembourg's economy, namely through the "real effective exchange rate" (REER), which traces the evolution of price and cost competitiveness by analysing the relation between domestic prices and costs on one hand and foreign prices and costs on the other.

Chapter 5. The European semester and the Europe 2020 Strategy aims on the one hand to present a general overview of the European semester and, on the other hand, to present the Europe 2020 strategy's structural section's (thematic coordination) priorities and objectives, both on a European and a Luxembourgish level.

Chapter 6. European Semester: monitoring macroeconomic imbalances shows the work made at the EU level towards setting up a Europe 2020 strategy macroeconomic Scoreboard and the work made towards a regulation draft that includes a new procedure pertaining to excessive macroeconomic imbalances (Excessive Imbalance Procedure, EIP), which had already been suggested last year, within the framework of the 2011 Competitiveness Report.

Chapter 7. Creating an *Observatoire de la formation des prix* in Luxembourg provides an update on the progress made following the two-party discussions with trade unions and company delegates that prompted the government to create an observatory for price generation that would operate within the existing *Observatoire de la Compétitivité* and be followed by the consumer's committee *(Conseil de la consommation)*.

Chapter 8. Measuring well-being aims at providing an update on the "GDProsperity" project that is taking place at the national level. This project allows for a better understanding of how sustainable development and quality of life can be added to material wealth in the measuring of a society's well-being. Additionally, this chapter also engages a project that was launched by the OCDE in 2009 about the measurement of society's progress within its Member States in order to improve our knowledge about the state, the evolution and the defining features of well-being. This Compendium, which was published in the first semester of 2011 presents the indicators that will feature in the final document "How's Life?", to be presented in October 2011.

Finally, the results from studies commissioned by the *Observatoire de la Compétitivité* within the framework of the research convention between the Public Research Centre Henri Tudor, STATEC and the *Observatoire de la Compétitivité* or commissioned to external consultants will be presented in **Chapter 9. Thematical Studies**. These are "How do Singapore and Luxembourg comparatively compete in a global world? Is small still beautiful in the 21st century?", "Some specificities of Luxembourg's exports", "A review of Total Factor Productivity of Luxembourg", "Typology of patent applicants in Luxembourg" and "Evaluation of the Luxembourg 2020 reform plan with the LSM model".

2 Benchmarks and comparative competitiveness analysis

2.1 Introduction

The word "competitiveness" is probably one of the most used and most misused in modern economic sciences. The Brussels based think tank BRUEGEL[10] has recently looked in more detail at often erroneous public and political debates on the topic of territorial competitiveness. *"What's at stake: on both sides of the Atlantic, a fierce debate on competitiveness is taking place. Although the European debate about the 'Pact for Competitiveness' is broader and more centred on internal governance issues than the American debate on 'Winning the Future', in both regions policymakers seem to assume that their countries will be able to export their way out of trouble. Too bad there have been new signs of life on Mars"*[11].

The media has also been engrossed in this topic for a long time. This debate about territorial competitiveness is re-launched on a regular basis by the publishing and broadcasting of competitiveness charts. From September 2008, the "crisis ranking" of the countries which have been worst affected by the weakening of growth potentials and by the frailty of public accounts (budget deficits and public debt) had began to take central stage. And since 2010 it is sovereign debt and the solvency status of nations, along with the stability of financial institutions[12] that take up the lion's share of media attention.

It is important for governments to bring public deficits and public debt under control but this must not be the one and only purpose of economic policy. The shortfall in the current accounts that were caused by the drifting of production costs in certain countries reminds us of how important cost-competitiveness is. The level of debt does not diminish sufficiently unless growth rates pick up. The policy of supply and structural questions are still vital to increase growth and employment sustainably in the long run, especially within the context of a global economy that is increasingly integrated and in which competition between production locations is constantly increasing. The notion of territorial competitiveness is itself an outcome of this ever changing world and it is supposed to measure how different regions are preparing their long-term "sustainable development". To do this it is necessary on the one hand to permanently monitor developments around the world, and on the other to monitor one's own situation.

Benchmarks and comparative analysis of countries allow for a comparison of best practices with a view to learning from them and improving our own performance within a targeted domain. Unlike individual indicators, these composite benchmarks allow us to group several of these isolated indicators in a single figure[13], aggregating a variety of characteristics. These composite indicators also provide an approximate, global image of territorial competitiveness.

[10] BRUEGEL, The Competitiveness Debate(s), Bruegel Economic Blogs Review, Brussels, 26 Feb-4 Mar 2011

[11] For a poignant description of how the word "competitiveness" has been misused in public and political discussions, look up: THE WALL STREET JOURNAL, That old competitiveness, 1992

[12] As an example, peruse the ranking of banking institutions made by Global Finance: http://www.gfmag.com/

[13] For more details about composite indicators, see the site: Joint Research Center from the European Commission: http://composite-indicators.jrc.ec.europa.eu/

Competitiveness benchmarks continue to represent an important up to date topic, because they provide helpful information to both public authorities and company executives, namely about the potential for sustainable growth and the level of volatility or risk that a country can expect in the medium to long term[14]. These benchmarks are also helpful in terms of an increased understanding of economic growth key factors, and to explain why certain countries are faring better than others in an increasingly globalised environment. There are therefore two main aims for this comparative analysis: to emphasize and continuously draw attention to structural economy issues, and to identify the barriers to the increasing of competitiveness and provide statistic and quantitative data upon which to base the discussion about strategy options.

The aim of this chapter is to provide a descriptive overview of the main results of international benchmarks published since the latest edition of the Competitiveness Report, in 2010[15].

2.2 Luxembourg's ranking

Within the context of the debate about the factors of territorial competitiveness, the most well-known yearly benchmarks and ranking publications are those of the World economic forum (WEF), those of the International Institute for Management Development (IMD), those of the Heritage Foundation and those of the European Commission. Alongside these four sources, there is a multitude of other reports[16].

2.2.1 The World economic forum, IMD, Heritage foundation and Commission

a. *Growth Competitiveness Index (2011-2012)*

The World economic forum (WEF) published its 2010-2012 comparative study of competitiveness of countries around the world[17], entitled the "Global competitiveness report" that evaluates the world economies' potential to attain sustainable growth in the medium to long term. This study measures the competitiveness level of 142 countries throughout the world, based on around one hundred indicators. These indicators are split into three fundamental "pillars" of growth and competitiveness: the basic requirements of competitiveness (through the sub-categories: institutions, infrastructure, macroeconomic environment, health and primary education), efficiency enhancers (through the sub-categories: higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size) and innovation and sophistication factors (through the sub-categories: business sophistication and innovation). The study takes into account the fact that countries are not at the same level of development.

[14] Cf. VARTIA P. NIKINMAA T., What do competitiveness comparisons tell us?, The Finnish economy and society 404, pp. 74-79. For additional information : http://www.etla.fi/eng/index.php

[15] A list of Luxembourg's ranking can be found on the internet page of the Observatoire de la Compétitivité on the following link: http://www.odc.public.lu/indicateurs/benchmarks_internationaux/index.html Cf. Chapter 2.2.2

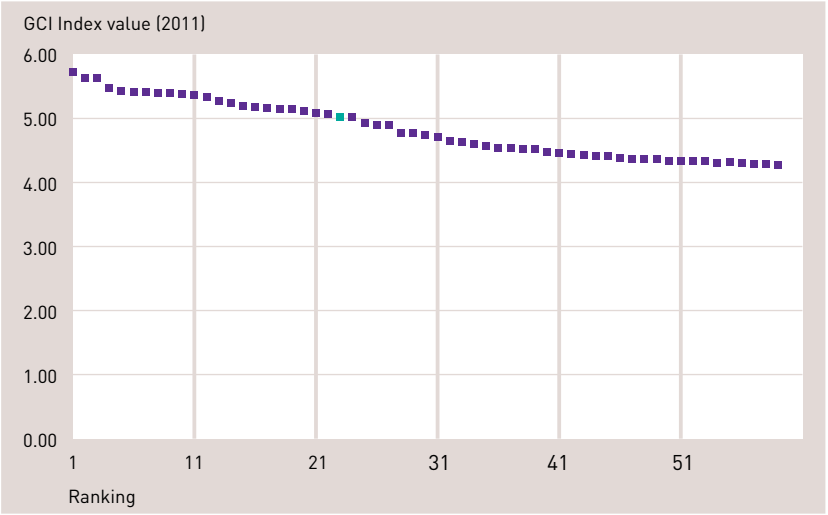
[16] For additional information: http://www.odc.public.lu/indicateurs/benchmarks_internationaux/index.html

[17] For additional information: http://www.weforum.org/en/initiatives/gcp/index.htm

The composite index entitled "Growth Competitiveness Index" (GCI) is a calculation based on a mix of statistic data and the results of surveys, namely the yearly executive opinion survey made by the WEF in collaboration with its network of partner institutes.

In this new edition of the study, the world ranking is led by Switzerland, followed by Singapore and Sweden. All in all there are seven European countries amongst this edition's top ten. Luxembourg comes in at 23rd in the world ranking dropping 3 places in relation to the previous year's report. Germany comes in 6th dropping 1 place in relation to the previous year's report, France comes in 18th, dropping 3 places, and Belgium comes in 15th, climbing 4 places in relation to the previous year's report. With a GCI index of 5.03, Luxembourg is close to Malaysia (5.08; 21st), Israel (5.07; 22nd) and Korea (5.02; 24th).

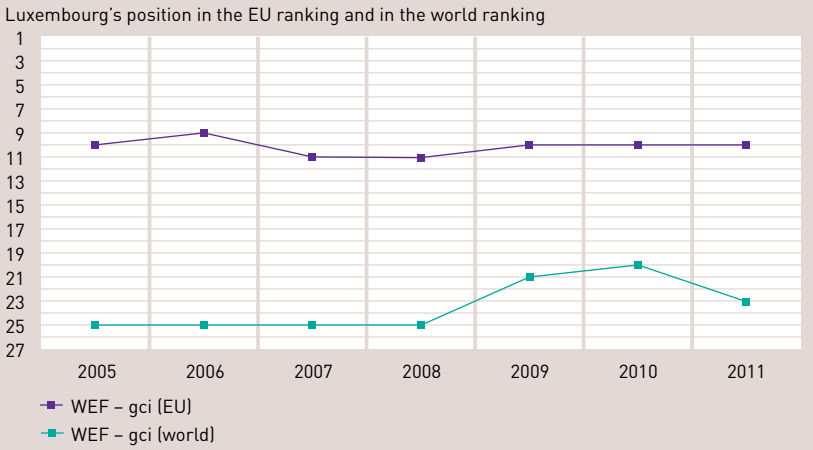
Figure 1
Index value and ranking



Source: WEF

The ranking of the 27 EU countries is led by Sweden, Finland and Germany. Luxembourg has come in 10th place for the last two years. Whilst Luxembourg's position in the world ranking went through an improvement period between in 2009 and 2010, followed by a drop in 2011, in the EU-27 ranking Luxembourg's position remained relatively stable since 2008.

Figure 2
Luxembourg's evolution in the EU ranking and in the world ranking



Source: WEF
Observation: The charts depicting the ranking evolution of countries over time should be interpreted with caution. There might have been changes in the method for calculating the indices without having updated the calculation for all the years featured in the chart.

In terms of the ranking for the three fundamental pillars:

- Luxembourg is in 6th place with regards to the fundamental demands of competitiveness: within this pillar, Luxembourg comes in 8th in terms of institutions, 21st in terms of infrastructure, 15th in terms of macroeconomic environment and 25th in terms of health and primary education;

- Luxembourg is in the 23rd position in terms of efficiency enhancers: within this pillar, the country comes in 40th in higher education and training[18], 2nd in goods market efficiency, 41st in labour market efficiency[19], 8th in financial market development, 9th in technological development and 96th in terms of market size[20];

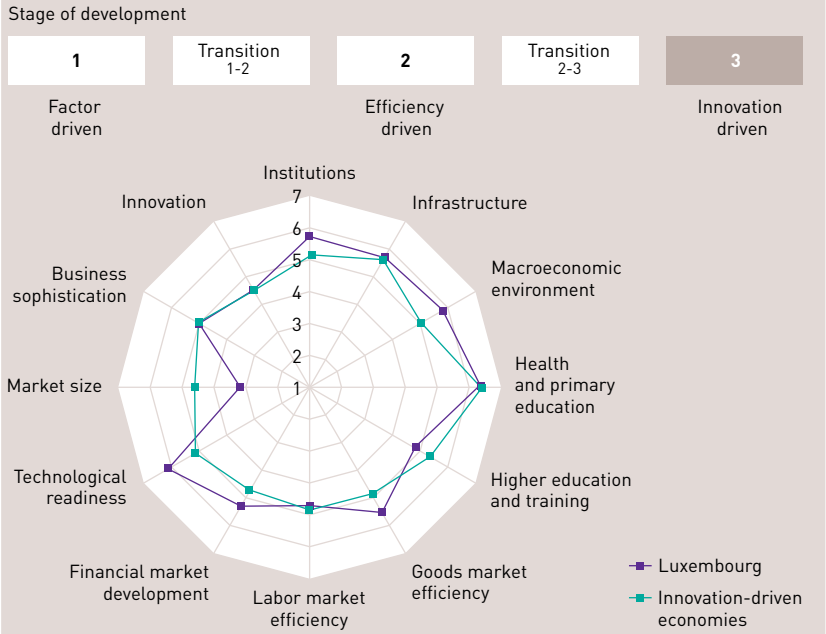
- Luxembourg is ranked 20th for the innovation and sophistication factors: within that pillar, Luxembourg is 21st in the level of business sophistication and 21st in innovation.

[18] The WEF analysis does not take into account the fact that many Luxembourg residents attend their higher education abroad (the national average is higher than the 10% indicated in the WEF report). The country's poor placement in this category must therefore be seen as approximate.

[19] Overall, the WEF indicates that Luxembourg's poorest performances are this labour market efficiency pillar, with one third of the country's rankings being higher than the 100th position. The country ranking is particularly unfavourable in terms of flexibility of wage determination (110th), rigidity of employment (131st) and the recruitment and hiring and firing practices) (108th).

[20] The size of Luxembourg's domestic market is obviously limited (111th), but the fact that Luxembourg is fully integrated in the EU's domestic market must not be forgotten.

Figure 3
Luxembourg's position according to the GCI (2011-2012)

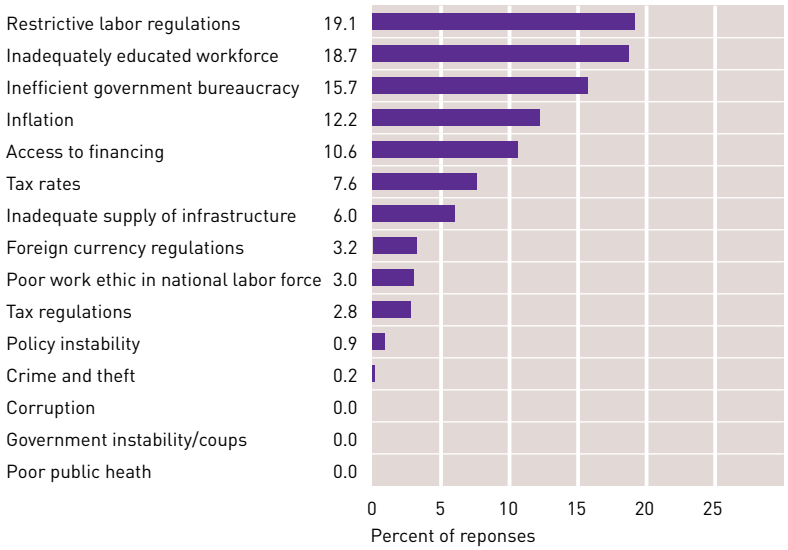


Source: WEF

Frame 1
Results from the study made in Luxembourg (WEF poll)

One yearly opinion survey is made in each country targeting company executives in order to identify the main factors which hamper national competitiveness. The 2011-2012 Luxembourg edition shows that restrictive labour regulations, a work force which is often not adequately educated or trained, as well as administrative charges (bureaucracy) are the three difficulties which are mentioned the most often.

The most problematic factors for doing business



Source: WEF
Observation: The persons poled were asked to select the 5 most problematic factors in doing business in their country from a list of 15. They were also asked to rank them from 1 (the most problematic) to 5. This graph shows the weighted responses.

b. Global Competitiveness Index (2011)

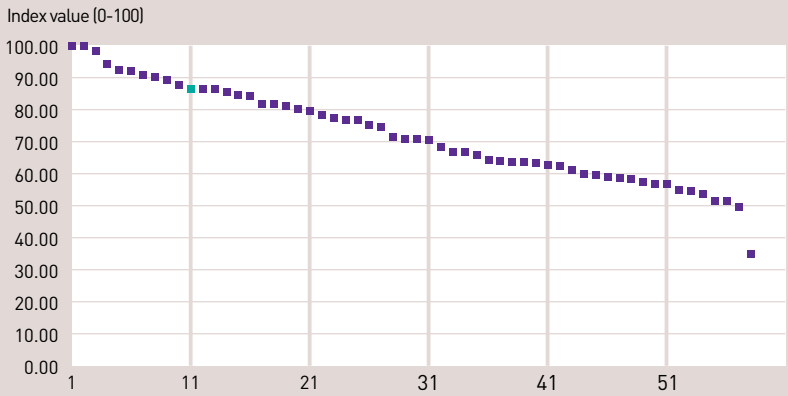
In its yearly report on competitiveness[21], the International Institute for Management Development (IMD) analyses countries' capacity to create and maintain an environment that can sustain the competitiveness of companies. The creation of wealth is supposed to happen at the level of companies which operate in the domestic environment, an environment which in turn either facilitates or hampers competitiveness. In this new edition, 59 countries are analysed according to more than 300 criteria. The analysis is based on quantitative indicators (about 2/3 of the total weight) and on the results of a yearly survey. Like in previous years, the IMD ranking is based on four types of indicators: economic performances, government efficiency, the business environment and the quality of the infrastructure.

[21] For additional details: http://www.imd.ch/research/publications/wcy/index.cfm

According to the 2011 edition, Luxembourg comes in 11th amongst the 59 economies that were analysed throughout the world. Luxembourg's has therefore kept the same position within the ranking as in the last edition. Hong Kong, the Unites States and Singapore lead this 2011 edition's ranking. Germany comes in 10th, Belgium 23rd and France 29th. Within the EU, Luxembourg occupies the 3rd position, after Sweden (4th in the world ranking) and Germany (10th in the world ranking).

With an index of 86.5 in the IMD study, Luxembourg comes very close to its two immediate followers in the ranking (Denmark 86.4-12th and Norway 86.3-13th), whilst the distance with Germany, that precedes Luxembourg, is greater (Germany 87.8-10th).

Figure 4
Luxembourg's index value and ranking position



Source: IMD

Luxembourg's ranking has slightly improved in relation to the previous edition in the "Economic performance" category, where it's gone from 11th in 2010 to 9th in 2011. Back in 2009 Luxembourg was still in 4th position. Within this category Luxembourg's position improved mainly in the sub-category of international investment. Within the category Government efficiency, Luxembourg has lost 3 places and went from 12th in 2010 to 15th in 2011. It's mostly in the "Public finance" category that Luxembourg's ranking has deteriorated. In the "Business environment" category Luxembourg has also lost 3 positions, going from 6th to 9th. Luxembourg ranking in this edition has improved in the sub-category Labour market but lost some ground in two other categories (management practices and values). Finally, in the "infrastructure" category, Luxembourg has lost one place and dropped to 22nd. Luxembourg slightly improved in the Basic infrastructure sub-category.

IMD's recommendations for Luxembourg in 2011 are that it look at the expenses related to an ageing population so that it can insure that public finances can remain viable in the long run, to improve the level of training and education of the local workforce, to increase cost-competitiveness by changing the automatic indexation of salaries, to implement a sustainable tax consolidation whilst maintaining the level of investment and, finally, to improve the R&D network.

In this 2011 edition of its yearly report on competitiveness, IMD has also calculated a new index that measures the gap between the public sector and the private sector in terms of efficiency. In many countries, public spending has reached record levels since the beginning of the economic and financial crisis, 47% of GDP on average, for the most advanced economies. Public sector efficiency will therefore become a key factor of competitiveness in years to come, according to the IMD. Luxembourg is showing a gap of 6 positions between the two rankings, showing the private sector to be more efficient than the public sector.

Table 1
Efficiency gap between the public sector and the private sector (Countries with at least 6 position gaps between the two rankings)

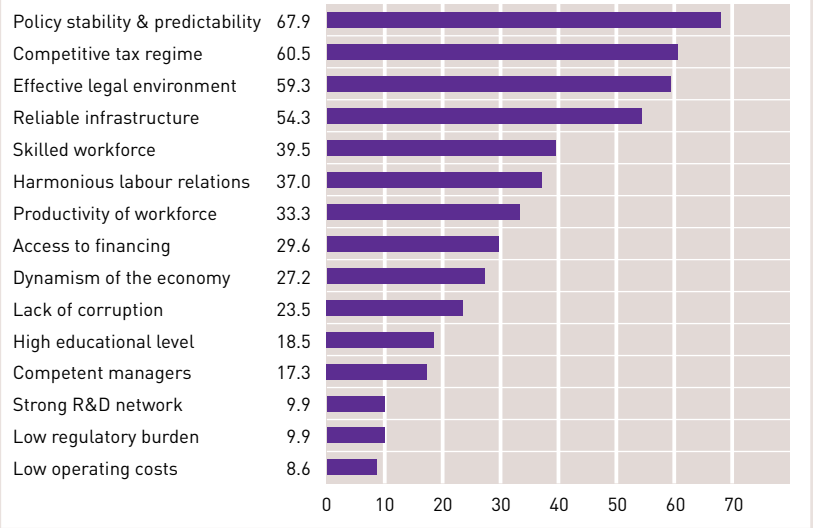
Country	Governement Efficiency	Business Efficiency	Difference
Brazil	55	29	-26
Japan	50	27	-23
Belgium	39	23	-16
Ireland	30	18	-12
USA	19	10	-9
China	33	25	-8
Colombia	45	37	-8
Germany	24	16	-8
Austria	27	20	-7
Denmark	13	6	-7
India	29	22	-7
Taiwan	10	3	-7
Argentina	57	51	-6
Iceland	40	34	-6
Luxembourg	**15**	**9**	**-6**
Philippines	37	31	-6

Source: IMD

Frame 2
Luxembourg's main attractiveness factors (IMD poll)

The people who participated in IMD's yearly poll were asked to pick five factors from a list of fifteen, the ones they perceived as the key factors of attractiveness for the domestic economy in Luxembourg.

The four most mentioned factors were policy stability and predictability, a competitive taxation regime, an effective legal environment and reliable infrastructure.



Source: IMD

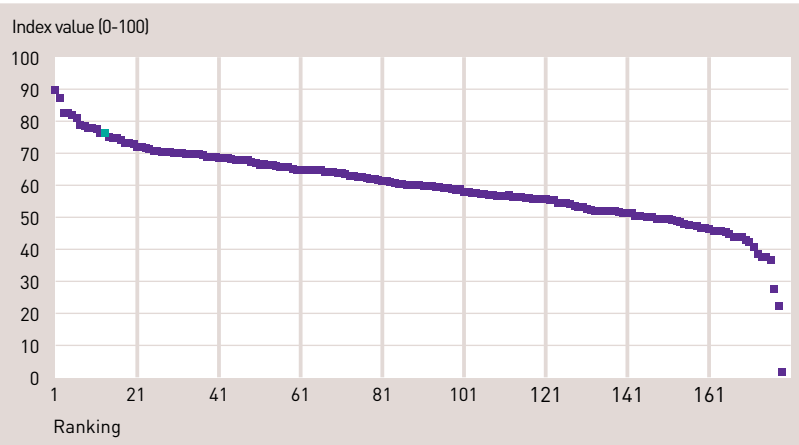
c. Index of Economic Freedom (2011)

For the last fifteen years the American think tank Heritage Foundation has analysed[22] a significant number of countries according to their economy's level of "openness" in line with the Anglo-Saxon economic freedom approach. The 2011 edition includes 183 countries. Economic freedom is supposed to favour productivity and therefore growth too, by encouraging the entrepreneurship, thus creating value added. The more "open" the economy, the fewer barriers to free trade, the better placed the country will be in this ranking. "Economic freedom" herein is defined through a series of ten categories, such as the absence of the government's ability to coerce or constrain production, supply or consumption of any goods and services beyond what is necessary to uphold the citizen's freedom. The more "open" the economy (the closer to 100 its index score), the fewer barriers there are to free trade, the better ranked the country will be in this index.

[22] For additional details: http://www.heritage.org/Index/

Like in 2010, the 2011 world ranking is led by Hong Kong, Singapore and Australia. Luxembourg comes in 13th in the world amongst the 183 included countries, and improves its economic freedom a little in relation to 2010, when it was still placed 14th in the ranking. Germany comes in 23rd, Belgium 32nd and France 64th. Inside the Euro zone, Luxembourg comes in 2nd after Ireland and 4th in Europe after Switzerland, Ireland and Denmark. On a European regional level, Luxembourg is behind Denmark by 2.4 index points (Denmark: 3rd – 78.6 index) and 1 index point ahead of Estonia, who is 5th in the ranking with an index of 75.2.

Figure 5
Luxembourg's Index value and position within world ranking



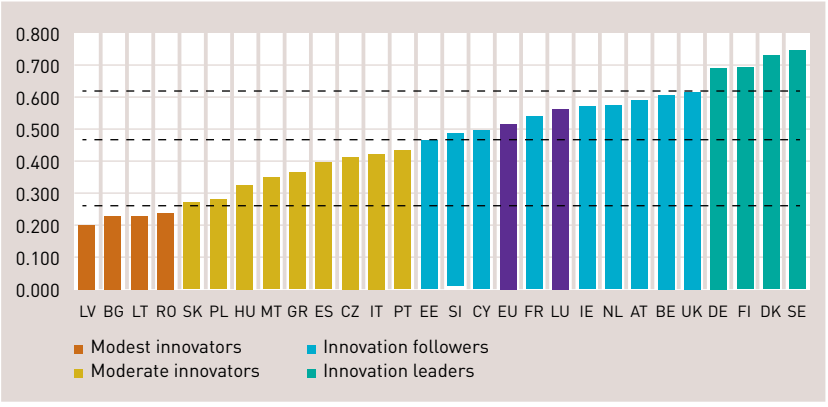
Source: Heritage Foundation

According to this report, Luxembourg's economy displays a weak performance in terms of fiscal freedom, public spending and labour market flexibility. The income tax rate remains high, and the corporate tax rate remains quite weak. Public spending represents close to 40% of GDP. The government takes on progressive reforms to improve the management of public finances. The recent measures taken to support and stimulate the banking sector have resulted in an increase in budget deficit. The taxation regime needs reforms in order to rebalance the government's high budget deficit so that the increasing costs related to an ageing population can be met and to keep the country financially viable.

d. European innovation union scoreboard (2011)

Since 2001, the European Commission has published the "European innovation scoreboard" (EIS)[23] on a yearly basis. This was developed within the framework of the Lisbon Strategy[24], with the intent of providing policy makers with a comparative tool for Member State performance in terms of innovation. After the launch of the Europe 2020[25] ten year strategy, a new scoreboard was published by the European Commission, entitled "European innovation union scoreboard". This new scoreboard, which was first published in February 2011, replaces its predecessor EIS. The aim of this new statistic instrument is to provide a tool for monitoring the implementation of the Europe 2020 Strategy, and more specifically, the pilot initiative regarding innovation. It provides all the interested parties with a comparative scoreboard for innovation performance across the 27 EU Member States, as well as an analysis of strengths and weaknesses of national research and innovation systems. The old EIS indicators were replaced by a new range of statistic indicators which are factored into a composite indicator: the "Summary innovation index" (SII). In the 2010 edition, the ranking of EU Member States was led by Sweden, followed by Denmark and Finland. Luxembourg comes in 10th[26]. Germany comes in 4th, Belgium comes in 6th and France comes in 11th.

Figure 6
EU Member States' innovation performance



Source: European Commission

With a 0.565 index, Luxembourg is quite close to Ireland's index (ranked 9th) and France (ranked 11th). However, Luxembourg should make some significant effort to catch up with Germany or Finland (ranked 4th and 3rd).

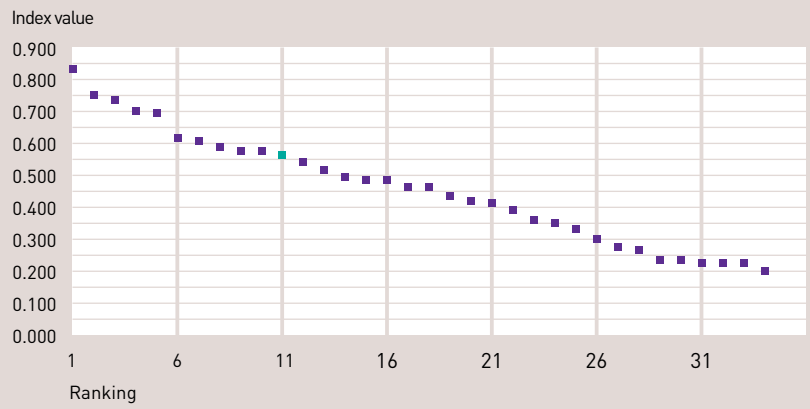
[23] For additional information: http://www.eis.eu/

[24] For additional information: http://ec.europa.eu/growthandjobs/index_fr.htm et

[25] For additional information: http://ec.europa.eu/eu2020/index_en.htm

[26] In the world ranking, which includes countries that are not part of the EU, Luxembourg is ranked 11th.

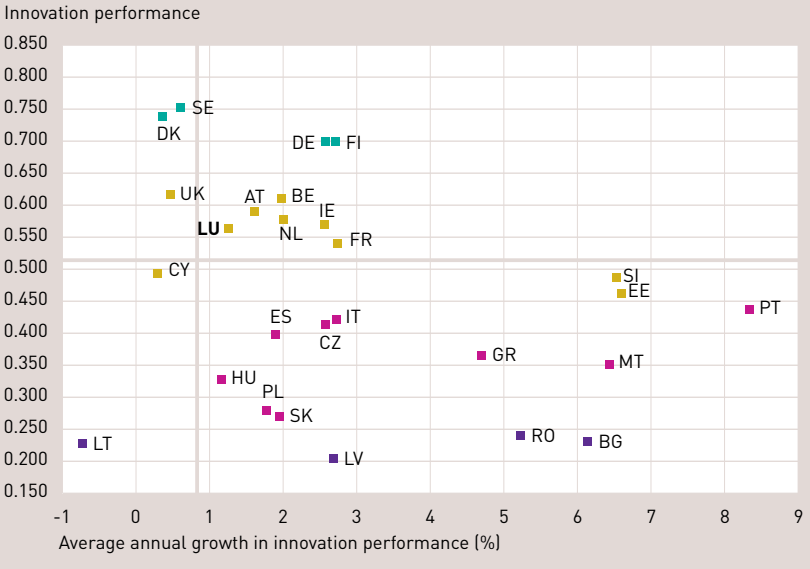
Figure 7
Luxembourg's SII index value and world ranking
(Including countries which are not EU Member States)



Source : Commission européenne

Luxembourg is amongst the so-called "innovation followers", a category of countries who display a better performance than the EU-27 average but who are not performing well enough to be amongst the "innovation leaders", who display performances at least +20% higher than the EU-27 average. The study analyses the level of performance but also the evolution of this performance over the years. Luxembourg displays slightly higher growth than the EU-27 average (moderate growth).

Figure 8
Convergence in innovation performance



Source: European Commission

The study observes that Luxembourg's research system is an open system that seeks excellence, is attractive, and it also notes that the effects of innovation on companies' activities represent one of the country's strengths. However, the study also notes that Luxembourg displays certain weaknesses, namely in the Firm investments category and in Linkages & Entrepreneurship. Finally, the study observes that there is significant growth in Luxembourg in terms of indicators such as international co-publications, the most cited publications, patent application and Community trademarks. A strong decline is observed for Non-R&D innovation expenditure, Community designs and Sales of new products.

e. Ranking comparison and correlation analysis

The rankings from the four major composite indicators that include Luxembourg and Luxembourg's evolution in relation to the previous editions[27] are illustrated in the following table.

Table 2
Four major ratings (reports published in 2011)

	N°	World Economic Forum	IMD	Heritage Foundation	European Commission
		GCI	**GCI**	**Economic freedom**	**SII**
+	1.	Switzerland	Hong Kong	Hong Kong	Switzerland
	2.	Singapore	United States	Singapore	Sweden
	3.	Sweden	Singapore	Australia	Denmark
	4.	Finland	Sweden	New Zealand	Finland
	5.	United States	Switzerland	Switzerland	**Germany**
	6.	**Germany**	Taiwan	Canada	United Kingdom
	7.	**Netherlands**	Canada	Ireland	**Belgium**
	8.	Denmark	Qatar	Denmark	Austria
	9.	Japan	Australia	United States	**Netherlands**
	10.	United Kingdom	**Germany**	Bahreïn	Ireland
	11.	Hong Kong	**Luxembourg (0)**	Chile	**Luxembourg (-3)**
	12.	Canada	Denmark	Mauritius	**France**
	13.	Taiwan	Norway	**Luxembourg (+1)**	Cyprus
	14.	Qatar	**Netherlands**	Estonia	Iceland
	15.	**Belgium**	Finland	**Netherlands**	Slovenia
	16.	Norway	Malaysia	United States	Estonia
	17.	Saudi Arabia	Israel	Finland	Norway
	18.	**France**	Austria	Cyprus	Portugal
	19.	Austria	China	Macao	Italy
	20.	Australia	United Kingdom	Japan	Czech Republic
	21.	Malaysia	New Zealand	Austria	Spain
	22.	Israel	Korea	Sweden	Greece
	23.	**Luxembourg (-3)**	**Belgium**	**Germany**	Malta
	24.	Korea	Iceland	Lithuania	Hungary
-	25.	New Zealand	Chile	Taiwan	Croatia

Observations: The figures in brackets describe Luxembourg's evolution since the previous year. A plus sign signifies a rise in the ranking and a minus sign signifies a drop in the ranking since last year. A zero (0) means that Luxembourg's position within the ranking remained the same. Luxembourg's neighbouring countries (Germany, France and Belgium) as well as the Netherlands (as a Member State of Benelux) are in green when they are better placed than Luxembourg and in red when Luxembourg is better placed than them. The SII Index from previous years has been replaced by the European innovation union scoreboard in this present 2011 Competitiveness report. The most recent ranking comparison (between this year and last year) has been based on a recalculation of previous years according to the new European innovation union scoreboard.

[27] The yearly evolution of countries within the rankings should be perused with some caution because there may have been method changes in calculating the indices over the years that were not applied to all of the years.

It includes the twenty-five best placed countries. In comparison with the 2010 Report, where Luxembourg had climbed one position in the four indices in relation to 2009, in this present 2011 edition Luxembourg keeps its position in one index (IMD), climbs one position in one index (Economic freedom) and drops three positions in the two remaining indices (the GCI and the SII).

If out of this world ranking top 25 we only pick out the European countries and compile an alternative European ranking[28] this way, we get the following results. We note, for instance, that Luxembourg would be ranked 12th in the European WEF index (10th within EU countries), 4th in the IMD index (3rd within EU countries) and 4th in the Heritage Foundation's index (3rd within EU countries)[29].

Table 3
European ranking for the main indicators of competitiveness and growth

N°	World Economic Forum	IMD	Heritage Foundation	European Commission
1	Switzerland	Sweden	Switzerland	Switzerland
2	Sweden	Switzerland	Ireland	Sweden
3	Finland	Germany	Denmark	Denmark
4	Germany	**Luxembourg (0)**	**Luxembourg (+1)**	Finland
5	Netherlands	Denmark	Estonia	Germany
6	Denmark	Norway	Netherlands	United Kingdom
7	United Kingdom	Netherlands	United Kingdom	Belgium
8	Belgium	Finland	Finland	Austria
9	Norway	Austria	Cyprus	Netherlands
10	France	United Kingdom	Austria	Ireland
11	Austria	Belgium	Sweden	**Luxembourg (-3)**
12	**Luxembourg (0)**	Ireland	Germany	France

Source: The *Observatoire de la Compétitivité*
Observations: The figures in brackets describe Luxembourg's evolution since the previous year. A plus sign signifies a rise in the ranking and a minus sign signifies a drop in the ranking since last year. A zero (0) means that Luxembourg's position within the ranking remained the same.

[28] All things remaining equal, with no index re-calculations.

[29] The European Commission ranking does not change, because only European countries are considered and precede Luxembourg.

The analysis of the correlation between these four indices also turns out to be interesting. Kendall's coefficient lends itself to this kind of analysis. In fact, it measures the level of agreement between different institution's rankings (four, in this case). This correlation has been calculated for the 24 EU countries included in each of these four rankings[30]. Kendall's coefficient has a value of 0 (when there is no correlation between the rankings) and 1 (when the rankings and judges correlate perfectly). A strong correlation between the rankings made by these four major institutes had been observed in previous year's reports. In the present 2011 edition, Kendall's coefficient has a value of 0.83. There is therefore, like in previous years, a correlation between the rankings made by the different institutes[31]. So, even if the four institutes claimed to calculate different composite indicators, the rankings are, in general, strongly correlated.

Table 4
Rectified Ranking of EU Member States included in the studies

		WEF	IMD	HF	CE
1	Germany	3	2	10	4
2	Austria	9	7	8	7
3	Belgium	7	9	14	6
4	Bulgaria	22	23	17	24
5	Denmark	5	4	2	2
6	Spain	13	15	13	17
7	Estonia	12	13	4	13
8	Finland	2	6	7	3
9	France	8	11	19	11
10	Greece	24	24	24	18
11	Hungary	19	19	16	19
12	Ireland	11	10	1	9
13	Italy	16	17	23	15
14	Lithuania	16	18	11	23
15	**Luxembourg**	**10**	**3**	**3**	**10**
16	Netherlands	4	5	5	8
17	Poland	15	14	21	20
18	Portugal	18	16	22	14
19	Slovak Republic	21	20	15	21
20	Czech Republic	14	12	12	16
21	Romania	23	21	18	22
22	United Kingdom	6	8	6	5
23	Slovenia	20	22	20	12
24	Sweden	1	1	9	1

Source: *Observatoire de la Compétitivité*

[30] EU-27 countries excluding Cyprus, Malta and Lithuania Observation: This is not the same list of countries that was used in previous year's Competitiveness Reports. In this 2011 edition only EU Member States are taken into account.

[31] 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 and 0.84 in 2010. The ability to compare this year's results with previous editions is limited. On one hand, the list of countries used in this 2011 edition (only EU Member States) and on the other, the SII index calculated by the European Commission was taken from the European Innovation Union Scoreboard (EIU) from 2011 and not from the European Innovation Scoreboard (EIS).

2.2.2 Other composite indicators and ranking

In addition to the four composite indicators reviewed in the previous chapter, there are a multitude of other composite indices, competitiveness rankings or competitiveness factors that are published. A part of these indices and rankings will be looked at in this chapter: tax environment, e-economy, sustainable growth, purchasing power, cost and quality of life.

a. General indicators of competitiveness factors

a.1 Euro Monitor

The German company ALLIANZ publishes a yearly study on each of the Euro zone countries' capacity to develop sustainable growth at the national level, without macroeconomic imbalances, in order to contribute to the stability of the Euro zone as a whole[32]. The study is based on a scoreboard which is made of fifteen quantitative indicators, split into four categories: public finances sustainability; the competitiveness and the internal demand; employment, productivity and resource use effectiveness; private debt and foreign debt. The final score given to each country ranges from 1 to 10: for each indicator, a score ranging from 1 to 4 is given to bad performances, a score between 5 and 7 to average performances and a score between 8 and 10 to good performances. According to the authors of the study, a good performance in the four categories is vital in order for a country to warrant the trust of the financial markets and in order to secure a certain level of prosperity for its citizens.

In the most recent report for which detailed data is available, published in October 2010, Luxembourg performed well in terms of Public finances sustainability (1st place with a 7.0 score), with the exception of the indicator for expenses related to demographic ageing, in which the country came into the second-to-last position. In terms of competitiveness and domestic demand, Luxembourg was 6th in the global ranking (a 7.3 score). In general, Luxembourg has displayed good performances, but the 2010 study also noted that Luxembourg could have done better in terms of unit labour costs, for which Luxembourg comes in 14th position (with a 3.0 score). For the employment, productivity and resource use effectiveness section Luxembourg comes in 4th position (6.0 score) in 2010. Luxembourg displayed fairly good performances in this category, with the exception of the labour productivity per employee evolution (2.0 score). For the private debt and foreign debt category, Luxembourg does not feature in the global ranking of the study, lacking the availability of sufficient national data.

[32] For additional information: http://www.lisboncouncil.net/publication/publication/62-the-2010-euro-monitor.html

According to ALLIANZ's first estimations, made in April 2011, for the current year, Germany is leading the global ranking once again (global score of 7.8), followed by Luxembourg (7.5) and Austria (7.3). Luxembourg is therefore in the same position as in the year 2010[33].

Table 5
The Euro Monitor 2011 ranking

Rank 2011	EWU Member States	Monitor Rating 2011	Rank 2010	Monitor Rating 2010	Rank 2005	Monitor Rating 2005
1	Germany	7.8	1	7.7	7	7.0
2	**Luxembourg**	**7.5**	**2**	**7.3**	**1**	**8.5**
3	Austria	7.3	3	7.3	4	7.4
4	Netherlands	7.2	4	7.2	6	7.1
5	Belgium	6.2	5	6.0	10	6.4
6	Finland	6.1	6	5.9	5	7.4
7	Slovakia	6.1	6	5.9	10	6.4
8	France	5.9	8	5.7	8	6.9
9	Estonia	5.7	12	5.3	10	6.4
10	Malta	5.6	11	5.4	16	5.0
11	Slovenia	5.6	9	5.6	3	7.8
12	Italy	5.1	13	4.9	14	6.0
13	Cyprus	5.1	10	5.5	9	6.5
14	Spain	4.6	15	4.1	13	6.2
15	Portugal	4.3	14	4.2	17	4.9
16	Ireland	3.5	16	3.6	2	8.3
17	Greece	2.5	17	2.5	15	5.1

Source: ALLIANZ

a.2 Doing business 2011

The World Bank has published its 2011 edition of the annual report entitled "Doing Business", a comparative international study of regulations affecting economic activity[34]. It is based on nine indicators measuring the time required to comply with administrative requirements, as well as the financials costs related to creation and management of a company, trading across borders, tax system, resolving insolvency, etc. This is the 8th edition since the project's launch in 2003. This new edition includes 183 economies throughout the world. The study is based on case studies and measures the impact of regulation on small companies throughout their life cycle. The following underlying data is used: An analysis of current regulation as well as quantitative measurements of the complexity a company is subject to in order to comply with it (time and cost).

[33] ALLIANZ, Euro Monitor 2011, The Newsline - economic research & corporate development, 19.04.2011

For additional details: https://www.allianz.com/de/economic_research/publikationen/the_newsline/euro_raum/em190411.html

[34] For additional information: http://www.doingbusiness.org/

The main goal of this World Bank study is to provide countries with a measurement tool that allows them to devise effective regulations which are accessible to all and easy to comply with. The study illustrates the opportunities and the difficulties that an entrepreneur will encounter in a given country, in order to create and manage a small company whilst complying with current national regulations. However, this study does not measure every facet of the domestic business environment: for instance, the macroeconomic environment, the quality of the infrastructure, the level of training of the workforce, and the financial system, are not taken into account within the framework of this study.

In the 2011 edition, Luxembourg is placed 45th in the world ranking and drops three positions in relation to the previous year's edition. The world ranking is led by Singapore, followed by Hong Kong and New Zealand. Germany comes in 22nd, Belgium 25th, and France 26th. Amongst the 30 OECD member countries, Luxembourg is in 24th position. Within the nine analysis categories, Luxembourg's position diverges. It comes in 77th position in terms of starting a business, 42nd in terms of construction permits, 129th in terms of registering property, 116th in terms of getting credit, 120th in terms of protecting investors, 15th in paying taxes, 32nd in trading across borders, 1st in enforcing contracts and, finally, 45th in terms of resolving insolvency.

a.3 KOF Index of Globalization

The domestic goods, capital and labour markets are becoming increasingly integrated due to globalisation. The reduction of trade barriers, technologic advancements and a drop in transportation and communication costs are the main driving forces behind this phenomenon. A tightening of direct international ties is being implemented on a long-term basis. Given the increased visibility of globalisation to the general public (following company dislocations, etc.) and because of the inescapable need for countries to adapt to this new "world order", the EHT in Zurich has created a composite index in 2002 called the "KOF Index of Globalization"[35].

This composite index measures the economic, social and political dimensions of the globalization for 186 countries, and is based on 23 variables split into the 3 dimensions (the underlying data dates from 2008). The economic dimension measures the flow of goods, services and capital, as well as the information and perceptions bound to trade exchanges. It equally measures the extent to which a country puts limits on capital flow and trade exchanges. The social dimension measures the broadcasting of ideas, information, images and persons, etc. The political dimension fleshes out the distribution and broadcasting of government policies like, for example, the number of embassies in a country, the importance of being affiliated with international organizations, etc.

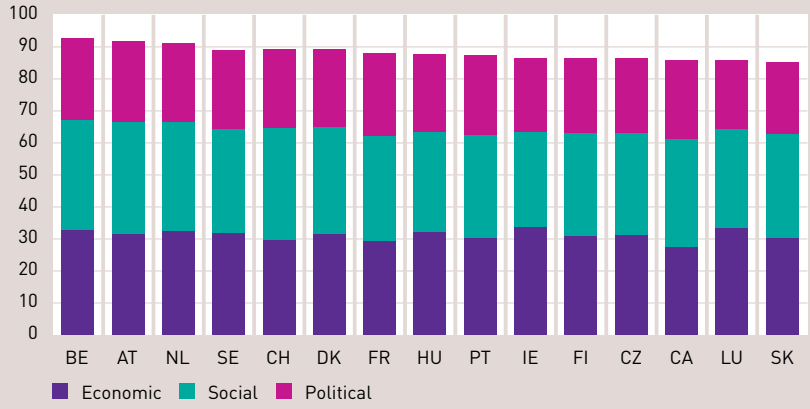
[35] For additional details: http://globalization.kof.ethz.ch/

Warwick University also does its own globalisation index. This index measures the economic, social and political dimensions of globalisation, based on variables which are split into these three dimensions. The economic dimension measures the flow of goods and services as well as direct foreign investments. The social dimension measures the proportion of foreigners within the total resident population, the number of tourists or even the volume of communication with abroad. The political dimension focuses for example on the number of embassies in a country, the importance of being affiliated to international organizations, etc. Luxembourg however, does not feature in the global, total calculated index, but only in the two sub-indicators related to the economic and political dimensions.

For additional information: http://www2.warwick.ac.uk/fac/soc/csgr/index/

Luxembourg is ranked 14th most globalised country in this 2011 edition. Like in 2010's edition, the ranking is led by Belgium, followed by Austria and the Netherlands.

Figure 9
The 15 most globalised countries in the world

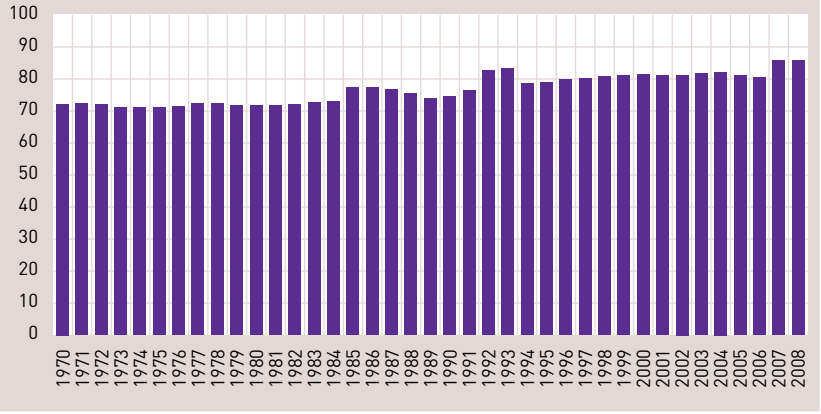


Source: ETH (March 2011)
Observation: Scale goes from 0 (minimal globalisation) to 100 (maximum)

In terms of economic globalisation, Luxembourg is in 2nd place, after Singapore and in front of Ireland. Social globalisation is led by Switzerland, ahead of Austria and Belgium. Finally, in terms of political globalisation, France is in the lead, ahead of Italy and Belgium. Luxembourg is ranked 58th.

According to this study, Luxembourg's globalisation level has increased considerably between 1970 and 2008, going from a global index of 72.1 to 85.6. The economic globalisation level has increased relatively slowly, going from an index of 91.6 to 93.1 but social globalisation (from 60.0 to 81.1) and political globalisation (from 62.4 to 81.6) have increased substantially.

Figure 10
Luxembourg's globalisation index evolution (1970-2008)



Source: ETH (March 2011)

a.4 International property rights index 2011

In 2011, the Property Rights Alliance (PRA) published a new edition of its composite indicator, the "International property rights index"[36]. This composite indicator has the purpose of measuring the level of property rights throughout the world. This report analyses the legal and political environment as well as physical and intellectual property right protection inside of the countries. In total, the global composite index is based on ten indicators, grouped into those three sub-categories. Amongst these indicators one can find namely the independence of the judicial authority, political stability, the corruption level, patent protection, etc. These underlined indicators are both quantitative and qualitative in nature.

In this fifth edition of the study, Finland, along with Sweden and Singapore are in the three top places amongst the 129 countries which were analysed. Luxembourg comes in fourth, with an 8.2 out of 10 score, the same as Switzerland, Norway and New Zealand. From a European perspective, Luxembourg comes in 3rd place.

[36] For additional details: http://www.internationalpropertyrightsindex.org/

Figure 11
The IPRI 2011 ranking TOP20

Source: PRA

Concerning the legal and political environment, Luxembourg is in 5th place (along with Norway and Switzerland). The ranking is led by Finland, New Zealand and Sweden. In terms of physical property rights protection, Luxembourg is 6th (along with Hong Kong and Saudi Arabia). This ranking is led by Finland, Norway and Singapore. Finally, concerning intellectual property rights protection, Luxembourg comes in 4th (along with Denmark, Singapore and Switzerland). This last ranking is led by Finland, Sweden and the United States.

Figure 12
Luxembourg's yearly evolution in the IPRI study (2007-2011)

Source: PRA

a.5 e-intensity index

Towards the end of 2010, the consultancy company Boston Consulting Group (BCG) published a composite index analysing the weight and importance of the internet on trade and society, within a group of OECD countries[37]. The composite index is based on three indicator categories: the framework conditions (access, infrastructures, etc.), spending (company and consumer volume of spending on the internet) and activity (company, government and consumer active usage of the internet). The first category weights 50% of the total, whereas the second and third weight 25% each.

The global ranking is led by Denmark, followed by South Korea and Japan. Luxembourg is in 11th place, along with the United States, amongst the 28 OECD countries, with a score of 109, thereby having a performance that is 9% above the (geometric) mean for the countries included in the index.

[37] For additional details: http://www.bcg.com/documents/file62983.pdf

Table 6
e-intensity index (2010)

Rank	Country	Score
1	Denmark	140
2	South Korea	139
3	Japan	138
4	Sweden	134
5	Netherlands	129
6	United Kingdom	128
7	Norway	125
8	Finland	124
9	Germany	120
10	Iceland	111
11	United States	109
12	**Luxembourg**	**109**
13	Australia	108
14	France	105
15	Austria	103
16	Belgium	102
17	Switzerland	101
18	Ireland	99
19	New Zealand	95
20	Canada	91
21	Spain	86
22	Czech republic	83
23	Portugal	80
24	Hungary	76
25	Slovak Republic	70
26	Poland	65
27	Italy	63
28	Greece	54

Source: BCG
Observation: 100 = geometric mean of countries included

Concerning the first category, related to framework conditions, Luxembourg takes 13th place. This category is led by South Korea, leading Japan and Sweden at the top. In the second category, related to spending, Luxembourg is 9th. In this category, the United Kingdom, Denmark and the United States take the top three places. Finally, in the third category, relating to activity, Luxembourg is in 19th place. This final category is led by Norway, Denmark and the Netherlands.

a.6 ict development index

After the 2009 edition, the International Telecommunication Union (ITU) has published the second edition of its study "measuring information society"[38]. This 2011 study includes two measuring instruments, the ICT development index (IDI) and the ICT price basket (IPB), the purpose of which is to compare the development of the information society in 152 countries across the world.

[38] For additional details: http://www.itu.int/ITU-D/ict/publications/idi/2011/index.html

Table 7
TIC (IDI) development index TOP 20

Countries	Ranking 2010	IDI 2010	Ranking 2008	IDI 2008
Korea (Rep)	1	8.40	1	7.80
Sweden	2	8.23	2	7.53
Iceland	3	8.06	7	7.12
Denmark	4	7.97	3	7.46
Finland	5	7.87	12	6.92
Hong Kong, China	6	7.79	6	7.14
Luxembourg	**7**	**7.78**	**4**	**7.34**
Switzerland	8	7.67	9	7.06
Netherlands	9	7.61	5	7.30
United Kingdom	10	7.60	10	7.03
Norway	11	7.60	8	7.12
New Zealand	12	7.43	16	6.65
Japan	13	7.42	11	7.01
Australia	14	7.36	14	6.78
Germany	15	7.27	13	6.87
Austria	16	7.17	21	6.41
United States	17	7.09	17	6.55
France	18	7.09	18	6.48
Singapore	19	7.08	15	6.71
Israel	20	6.87	23	6.20

Source: ITU (2011)

The fist composite index, the IDI index, is built out of 11 basic indicators split into three sub-categories: access, skills and TIC usage. Namely, it contains indicators like the household computer rate of usage or even the rate of penetration of high-speed internet, etc. The world ranking is led by Korea, followed by Sweden and Iceland. Luxembourg comes in 7th place in this world ranking, and has therefore dropped three places in relation to the report's previous edition. Germany comes in 15th place, France in 18th place and Belgium in 22nd place. The EU-27 ranking is led by Sweden, Denmark and Finland, and Luxembourg comes in 4th place. In terms of the ranking for each of the three sub-categories:

- Luxembourg comes in 3rd place in the "access" sub-category, and has lost 1 place in relation to the previous edition. This ranking is led by Hong-Kong and Iceland. Germany comes in 6th place, France in 14th place and Belgium in 19th place.

- Luxembourg is also in 3rd place in the "usage" sub-category, and has lost 1 place in relation to the previous edition. This ranking is led by Korea, ahead of Sweden. France comes in 18th place; Germany comes in 20th place, and Belgium in 24th place.

- Finally, in the "skills" sub-category, Luxembourg comes in 87th place and has dropped 5 places in relation to the previous edition. This relatively bad ranking can nonetheless be explained by the fact that one of the three indicators looked at by ITU in this sub-category, does not seem to take Luxembourg's national specificity into account. In effect, the ITU seems to only include the people enrolled in higher education institutions in Luxembourg itself, when looking at the "tertiary enrolment rate". Now, it must be known that, in particular because of Luxembourg's limited size, a large part of Luxemburgish students pursue their tertiary studies abroad (especially in neighbouring countries), and this ITU indicator therefore largely under-estimates the country's capabilities (8.6% in 2010). This rate is too weak and this indicator should also factor in the students abroad. If ITU had taken the country's national specificity into account, Luxembourg would have scored higher, therefore attaining a higher place in the ranking as well.

TIC services should be accessible so that everyone can use them. The ITU therefore calculates a second composite index, the TIC price basket (IPB), an index based on the price of land-line services, the price of mobile telephone services and the price of fixed broadband services, that allows the monitoring of the cost evolution of TIC services in 165 countries throughout the world. This ranking is led by Monaco, Macao and Liechtenstein. Luxembourg is in 7th place, Germany in 20th place, Belgium in 24th place and France in 29th place.

b. Attractiveness and tax competitiveness indicators

b.1 Paying taxes 2011

The World Bank, the International Finance Corporation and PwC have published the 5th yearly edition of the report "Paying Taxes", a study that aims to measure the complexity of taxation for companies throughout 183 countries in the world[39]. The study is based on a case study of a SME, and the ranking is based on three indicators: the actual total tax burden on companies (total tax rate, meaning the total tax amount payable by companies as a percentage of gross revenue), the time required for companies to comply with all their taxation requirements, and finally, the number of payments to be made. The study claims to measure the complexity of the tax regime for companies through these three indicators. One of the main points of this study is to say that the taxation of companies is but a share of the total tax burden borne by a company, and that the rate of nominal taxation on companies alone is a relatively imperfect indicator in terms of determining the actual tax burden.

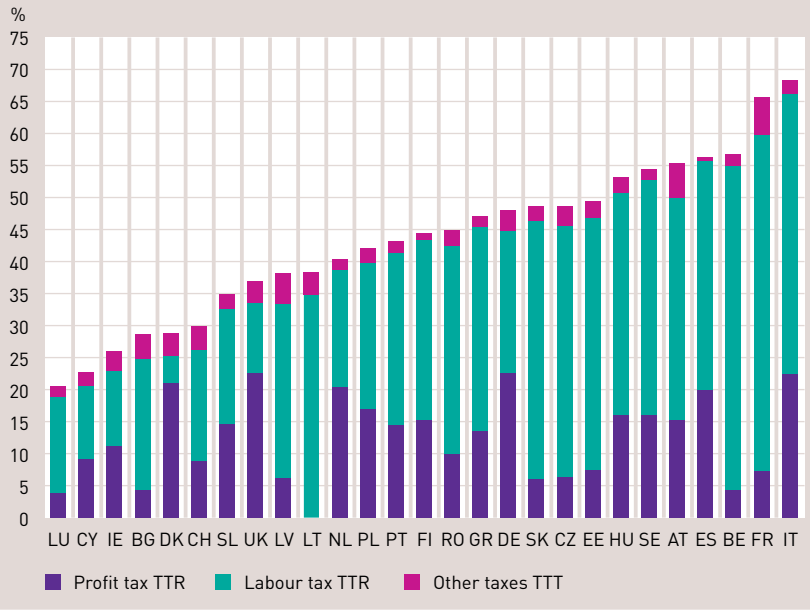
[39] For additional details: http://www.doingbusiness.org/reports/thematic-reports/paying-taxes/

In terms of the number of payments to be made by companies in order to comply with taxation requirements, Luxembourg is ranked 80th with 22 payments. Belgium is ranked 35th (11 payments), France is ranked 9th (7 payments) and Germany is ranked 53rd (16 payments).

Concerning the time needed to comply with taxation requirements, Luxembourg is ranked 6th in the world, with 59 hours on average. Belgium is ranked 50th (156 hours), France is ranked 36th (132 hours) and Germany is ranked 84th (215 hours). Within the EU, Luxembourg is ranked 1st for this category.

Concerning the total tax rate (TTR), Luxembourg is in 18th place with a 21.1% rate and it is actually ranked 1st within the EU. Germany is ranked 128th (48.2%), Belgium 151st (57.0%) and France 163rd (65.8%)

Figure 13
Ranking of European countries according to the Total Tax rate (TTR)



Source: World Bank

Finally, in terms of the world ranking for the three indicators listed above, for the "Ease of paying taxes index" Luxembourg is ranked 15th in the world. Germany is ranked 88th, Belgium 70th, and France 55th. Within the EU, Luxembourg takes 2nd place, behind Ireland.

b.2 Total tax contribution

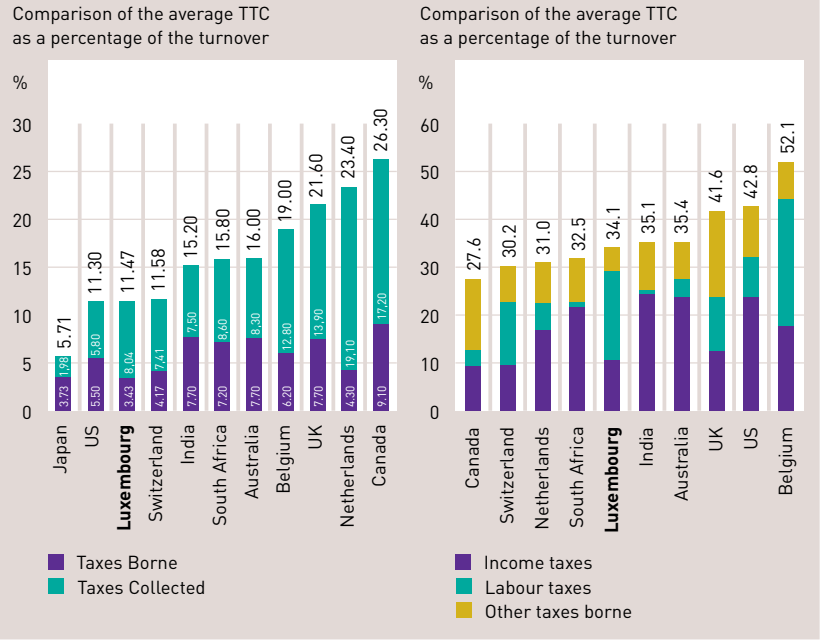
PwC Luxembourg has published a new survey on the tax contribution of Luxembourgish companies, named "Total Tax Contribution" (TTC)[40]. This survey allows us to estimate the average tax burden of Luxemburgish companies and to rank Luxembourg on the international level in terms of company taxation. In Luxembourg, the survey was made using a sample of 56 companies from several merged sectors of activity (based on 2008 data) and is intended to be repeated each year. This survey has already been published in other countries, like the United Kingdom, Belgium, Switzerland, the Netherlands, the United States, Japan, Canada, Australia, South Africa and India.

In accordance with the TTC method, the calculation for the total contribution of companies is based on a preliminary census of all the tax and contributions paid by them. It stands out in the TTC survey that a Luxembourgish company is subject to 31 taxes out of which 18 are taxes borne and 13 are taxes collected (on behalf of the State). According to the results, it seems that the bulk of the survey participants were, on average, subject to 5.5 taxes borne and 3.8 taxes collected, which places Luxembourg in a relatively good position in relation to the other countries where the same survey took place (Luxembourg is on average the country with the least taxes borne and comes second on the average number of taxes collected).

The bulk of borne and collected taxes of participating companies corresponds on average to 11.47% of their turnover (TTC indicator). This figure puts Luxembourg in second place in the ranking, behind the United States. But this ranking does not give an account of the final tax borne by Luxembourgish companies; its purpose is rather to make a yearly comparison over the bulk of all the borne and collected taxes. However, another indicator in this survey, the "Total Tax Rate" (TTR), provides a clearer picture on the tax rate paid by companies in relation to their gross profits. According to the survey, Luxembourgish entities pay on average 34.1% tax on their profits. In comparison with the rate of other participating countries, Luxembourg's rate is average, after Switzerland (30.2%) and the Netherlands (31%), but ahead of the United Kingdom (41.6%) and Belgium (52.1%).

[40] For additional detail: http://www.pwc.com/lu/en/ttc/index.jhtml

Figure 14
Country rankings according to TTC and TTR indices by PwC



Source: PwC (May 2011)

These indicators provide further information with regards to nominal tax rates for company revenues, which are often used in international comparisons that analyse company taxation levels, but which don't provide information about the actual taxation rates borne by companies.

c. Indicators for financial sector attractiveness and competitiveness

c.1 Global Financial Centres Index

The Z/Yen consultancy bureau has published the tenth edition[41] of its six-monthly competitiveness index, covering 75 financial centres around the world, named the "Global financial centres index". In a world that is increasingly globalised and interdependent through the use of information technology and communications, financial centres face fiercer competition than other sectors. Actually, financial services are at the heart of the world economy, acting as international trade and foreign investment facilitators.

[41] For additional details: http://www.zyen.com/long-finance/global-financial-centres-index-gfci.html

The study evaluating the financial centres competitiveness is based on two types of sources. On one hand, the study resorts to quantitative factors (for example, the cost of office space), and on the other hand it resorts to an appreciation barometer, taken from online surveys targeting professionals within the sector. Competitiveness, as it is defined in this study, is made out of five indicator categories: human resources (education/training, flexibility, etc.), the business environment (tax regime, regulation, etc.), market access (safe system, clustering, etc.), infrastructure (cost and availability of office space, etc.) and the global factors of competitiveness (perception of cities as pleasant places to live in, etc.)

Table 8
European financial centres TOP-20 (September 2011)

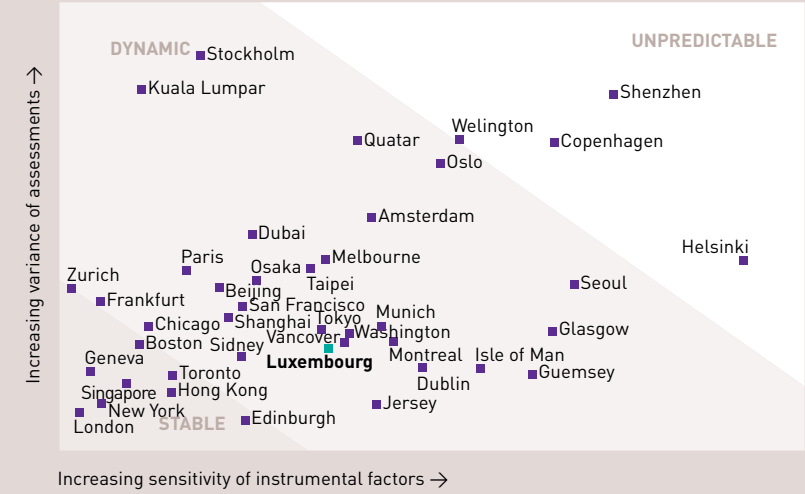
	GFCI 10 rank
London	1
Zurich	8
Geneva	13
Frankfurt	16
Munich	22
Paris	24
Stockholm	28
Luxembourg	**29**
Edinburgh	32
Glasgow	33
Copenhagen	34
Amsterdam	35
Oslo	37
Helsinki	39
Vienna	42
Dublin	43
Brussels	44
Madrid	48
Milan	50
Prague	51

Source: Z/YEN

London, New York and Hong Kong are again the top three in this new edition of the study. Luxembourg is in 29th place in the world ranking and drops eight places in relation to the previous six-monthly GFCI 9 (March 2011). On a European scale, Luxembourg is in 8th place. London (1st in the world ranking), Zurich (8th), Geneva (13th), Frankfurt (16th), Munich (22nd), Paris (24th) and Stockholm (28th) are ahead of Luxembourg in the ranking. In general many European financial centres have dropped in the world ranking due to the sovereign debt crisis and the Euro crisis that are currently shaking the European continent.

In this GFCI 10 edition, Luxembourg is regarded as a "global and specialised" financial centre, whereas in the previous edition it was still considered to be "transnational and specialised". Finally, the study also provides an analysis of the different financial centres' volatility, based on expert evaluations and on the level of sensitivity about the instrumental factors of competitiveness. Within this framework, Luxembourg is seen as a "dynamic" financial centre, somewhere between the financial centres considered to be "stable" and those considered to be "uncertain", meaning it has the potential to evolve in either direction.

Figure 15
Evaluation variance and sensitivity to instrumental factors



Source: Z/Yen

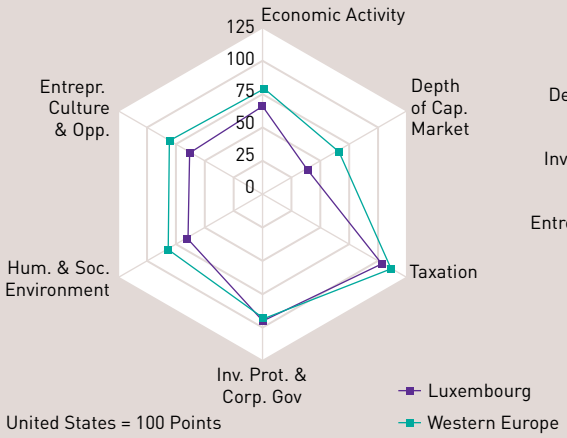
c.2 Global venture capital and private equity country attractiveness index

Over the last few years, the venture capital and private equity industry has rapidly become internationalized. In fact the funds are increasingly raised in an international way and are then sold worldwide. It is therefore not surprising that many countries make considerable efforts to attract this industry, which is able to foster innovation, entrepreneurial spirit, economic growth and, thus, the well-being of the population living on a given national territory. To this end, in 2011 the IESE School of commerce published a second report (after the 2009 one), the aim of which is to measure a country's attractiveness for venture capital investors and private equity[42]. A composite index named "Venture capital and private equity country attractiveness index" (VCPE) is generated, based on socio-economic parameters, in order to compare the attractiveness of a country from an institutional investor's point of view. This analysis is based on 300 indicators, split into six categories: economic activity, capital market depth, taxation, investor protection and company governance, human and social environment, corporate culture and opportunities. The report includes 80 countries in all.

[42] For additional details: http://blog.iese.edu/vcpeindex/

Figure 16
Luxembourg's position within the VCPE ranking

Key Factors Performance

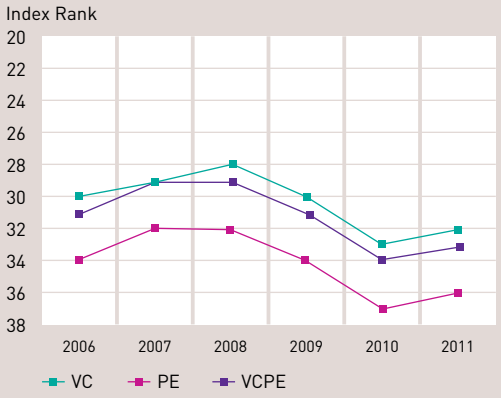


United States = 100 Points

VCPE-Ranking

	2007 Rank	Value	2011 Rank	Quartile 4th 1st
VCPE Ranking	**29**	**59,3**	**33**	↓
Economic Activity	43	67,8	59	↓
Depth of Cap. Market	43	38,3	46	↓
Taxation	23	103,8	29	↓
Inv. Prot. & Corp. Gov.	17	93,8	15	↑
Hum. & Soc. Env.	33	66,6	27	↑
Entrepr. Culture & Opp.	25	64,1	26	↓

Separate VC and PE Indices



Comparison within Peer Group

	2007 Rank	Value	2011 Rank	Quartile 4th 1st
France	17	79,6	14	↑
Belgium	18	76,8	15	↑
Austria	23	71,7	22	↑
Spain	20	69,1	23	↓
Ireland	14	67,7	24	↓
Portugal	38	60,4	31	↑
Italy	32	59,6	32	→
Luxembourg	**29**	**59,3**	**33**	↓
Greece	39	47,9	44	↓

Source: IESE
Observation: United States = 100

The United States are first in the global ranking with a considerable lead. The United Kingdom and Canada come 2nd and 3rd. Luxembourg is in 33rd place in the 2011 global ranking and stays behind many other European countries, amongst which, its neighbouring countries: the Netherlands (9th), Germany (10th), France (14th) and Belgium (15th). Luxembourg has dropped four places in relation to the report's previous edition, which was in 2009. For institutional investors, Luxembourg has a VCPE index of 59.3, seen as around 40% less attractive than the United States (100 index).

d. Indicators of sustainable growth

d.1 European green city index 2011

The Economist Intelligence Unit has published[43] a composite index called European Green City Index, commissioned by the Siemens Corporation. This index classifies around thirty major European cities in a variety of countries with regard to their ecological performances and their resource usage. The study is based on a series of 30 indicators, both quantitative and qualitative, split into eight categories: greenhouse gas emissions, energy, housing, transportation, water, waste management and the use of surfaces, air quality and environmental governance. This study is supposed to contribute to determining and targeting the major challenges with which European cities will be faced in the coming years, in terms of sustainable development and quality of life. Luxembourg did not feature in the study's original version and it was the Luxembourgish subsidiary of Siemens that later requested that EIU elaborate a new "theoretical" index including Luxembourg as its 31st city.

In this study, the global ranking is led by Copenhagen, followed by Stockholm and Oslo. Luxembourg City is in 6th place in the global ranking, amongst the 31 cities included. Amsterdam is 5th, Brussels is 9th and Paris is 10th.

Concerning different categories, Luxembourg City is in 8th place in terms of "greenhouse gas emissions", "air quality" and "transportation". Concerning the "waste management and the use of surfaces" category, the Luxembourgish capital city is in 2nd place, for the "energy" and "water" categories in 5th place and, finally, in the "housing" category, Luxembourg City is in 9th position.

d.2 Sustainable governance indicators

In 2011 the Bertelsmann Foundation published a second edition (after 2009) of its study on the OECD[44] countries' capacity for reform. The environment, democracy, the economy, the labour market, the education and health systems and immigration are amongst the fields which are analysed. The results of this analysis are grouped into two composite indices named "sustainable governance indicators" (SGI), generated from around 150 underlying basic indicators. The first, called the "status index", measures a country's needs for reform, and the second one, called the "management index", measures the State's capacity for reform. According to the Foundation, this study is different from other international benchmarks. Indeed, a country's capacity for reform is analysed here, which is generally not the case in other studies, and also, a country's need for reform is analysed from an economic standpoint but also including other dimensions like education, the environment, social affairs and security.

[43] For additional details: http://www.siemens.com/entry/cc/de/greencityindex.htm

[44] For additional details: http://www.sgi-network.org/

Table 9
Countries' ranking according to the SGI

Policy Performance													Executive Accountability		
	Quality of Democracy			Reform need				Reform capacity					Executive Capacity		
		Status Index		Ranking				Ranking					Management Index		
				SGI 2011	SGI 2009*	differ-ence	trend	trend	differ-ence	SGI 2009*	SGI 2011				
7.91	9.38	8.65	Sweden	1	2	1	↑	↑	2	3	1	Sweden	8.29	8.39	8.19
7.85	9.43	8.64	Norway	2	1	-1	↓	↓	-1	1	2	Norway	8.20	8.03	8.37
7.67	9.37	8.52	Finland	3	4	1	↑	↓	-1	2	3	Denmark	7.90	8.29	7.52
7.80	9.22	8.51	New Zealand	4	3	-1	↓	/	0	4	4	Finland	7.79	8.38	7.20
7.63	9.05	8.34	Denmark	5	5	0	/	/	0	5	5	New Zealand	7.72	8.18	7.25
7.59	8.66	8.12	Switzerland	6	8	2	↑	↑	1	7	6	Australia	7.71	7.81	7.61
7.27	8.52	7.89	Canada	7	6	-1	↓	↑	2	9	7	USA	7.24	7.78	6.70
6.77	8.76	7.77	Germany	8	11	3	↑	↓	-2	6	8	Iceland	7.23	7.09	7.37
7.04	8.46	7.75	Australia	9	13	4	↑	↑	1	10	9	Luxembourg	7.05	6.60	7.51
6.88	8.41	7.65	Iceland	10	10	0	/	↓	-3	7	10	Canada	7.04	8.01	6.07
6.76	8.50	7.63	Netherlands	11	7	-4	↓	↑	2	13	11	Germany	6.84	6.72	6.97
7.22	7.97	7.60	Luxembourg	12	12	0	/	↓	-2	10	12	Netherlands	6.84	7.04	6.64
6.38	8.60	7.49	USA	13	17	4	↑	↑	1	14	13	United Kingdom	6.82	7.40	6.24
6.11	8.64	7.37	Ireland	14	9	-5	↓	↑	2	16	14	Switzerland	6.79	7.34	6.23
6.78	7.66	7.22	United Kingdom	15	15	0	/	↑	6	21	15	Japan	6.41	6.39	6.42
6.45	7.89	7.17	Belgium	16	16	0	/	↓	-1	15	16	Austria	6.39	6.17	6.60
6.33	7.40	6.86	Austria	17	14	-3	↓	↓	-5	12	17	Ireland	6.33	6.26	6.40
6.15	7.42	6.78	Czech Republik	18	19	1	↑	/	-	-	18	Chile	6.15	6.56	5.74
6.16	7.32	6.74	France	19	18	-1	↓	↑	6	25	19	Turkey	6.07	6.43	5.72
5.63	7.54	6.59	Portugal	20	20	0	/	↑	3	23	20	Spain	6.03	6.22	5.84

Source: Bertelsmann-Stiftung

The two rankings are led by Scandinavian countries: Sweden, Finland and Norway take the top three spots in the status index. Luxembourg comes in 12th place, like in the previous edition. Germany is better placed than Luxembourg (8th) whilst Belgium (16th) and France (19th) are placed lower in the ranking. Luxembourg comes in 9th place in the management index, ahead of its neighbouring countries: Germany (11th), Belgium (21st), and France (25th).

e. Purchasing power and cost of living indicators

Purchasing power, cost of living or even standard of living are important factors in the debate about territorial attractiveness and competitiveness. It is therefore not surprising that such rankings of countries and cities, based on composite indices, are periodically published.

e.1 Internal purchasing power

In 2011 the Swiss bank UBS published an updated version of its study "Prices and salaries", a purchasing power comparison of 73 cities in the world[45]. This study is based on a basket of 122 goods and services, weighted according to consumption habits in continental Europe, as well as 122 questions about salaries, deductions from wages and the working hours of fifteen different professions. Zurich is used as the reference city (index base 100).

[45] For additional details: http://www.ubs.com/1/f/wealthmanagement/wealth_management_research/prices_earnings.html

Concerning the index calculated by UBS for prices (rentals excluded), Oslo is considered to be the most expensive city in the world, followed by Zurich and Geneva. Luxembourg comes in 13th place in the world (74.1 index) in this classification of urban expensiveness and the 6th within EU cities. If the calculation also includes data for rents, Oslo, Geneva and Zurich are considered to be the most expensive cities in the world. Luxembourg is in 17th place in the world ranking (73.1) and 7th most expensive city within the EU.

As far as the index for gross salaries is concerned, Zurich, Geneva and Copenhagen are the three cities in which salaries are deemed to be the highest in the world. Luxembourg comes in 8th place (66.2) in the world ranking, and 3rd within the European Union. Regarding net salaries, meaning the salaries after the tax and national insurance deductions, the ranking is led by Zurich, Geneva and Sydney. Luxembourg is placed 4th in this ranking (72.3) and it is even 1st within the European Union.

Finally, in terms of the index for gross purchasing power, meaning the ratio between salaries and prices (excluding rent), Copenhagen, Zurich and Geneva are the cities of the world in which the gross purchasing power is the highest. In this ranking, Luxembourg takes the 10th place in the world and the 3rd place within the EU. Finally, in terms of net purchasing power (net hourly pay), Zurich, Sydney and Luxembourg are the three cities in which net purchasing power is the highest throughout the world.

Table 10
Net purchasing power (net hourly pay, LU=100 base) world TOP20

Rank	City	Score
1	Zurich	102.7
2	Sydney	101.7
3	**Luxembourg**	**100.0**
4	Miami	97.4
5	Los Angeles	97.3
6	Dublin	94.5
7	Geneva	93.5
8	New York	92.9
9	Chicago	89.4
10	Nicosia	87.1
11	Montreal	82.9
12	Berlin	82.6
13	Brussels	81.8
14	Helsinki	80.4
15	Toronto	79.9
16	London	78.9
17	Copenhagen	78.7
18	Amsterdam	78.2
19	Frankfurt	78.1
20	Munich	77.5

Source: UBS (2011)
Calculations: *Observatoire de la Compétitivité*

Purchasing power in Zurich is higher than in Luxembourg by 2.7% and Luxembourg's is higher than that of nearby cities like Brussels for instance (18.2%), Amsterdam (21.8%) or even Frankfurt (21.9%).

Since Luxembourg only takes 8th and 13th place in the rankings for salaries and prices, this emphasizes that having a high (low) salary level does not necessarily translate into high (low) purchasing power. This is also subject to the goods and services basket for the city in question

e.2 Cost of living index (Mercer)

In 2011 the company MERCER published an updated version of its study on the cost of living, measuring the living cost for expatriates in cities throughout the world[46]. This edition includes 214 cities in 6 continents and measures the cost of around 200 goods and services, including housing, transport, etc.

Like in 2010, in the 2011 edition of the survey Luanda (Angola), Tokyo (Japan) and Ndjamena (Chad) are the three cities in which the cost of living is the highest. In Europe, the most expensive cities are Moscow (4th), Geneva (5th), Zurich (7th), Oslo (15th) and Bern (16th). In the 2011 edition of the study, Luxembourg is 72nd in the world ranking, whilst in the 2010 edition Luxembourg was in 55th place and in 2009 it was in 39th place (out of 143 cities surveyed at that time). Over the last few years, Luxembourg has become less expensive for expatriates in relation to other towns throughout the world.

e.3 Cost of living Index (Eca International)

ECA INTERNATIONAL periodically publishes studies on the cost of living for expatriates throughout the world[47]. The last edition of their study came out in June 2011. Generated from an average basket of consumption goods and services that are commonly purchased by expatriates, this study compares the price levels of 400 cities and places in the world, 78 of which in Europe. This data is used by Human Resources professionals to calculate the cost of living bonuses that they offer their expatriated staff. ECA defines and compares the cost of living level according to an average basket consumer goods and services. These articles were chosen because they represent the goods and services that are typically purchased by consumers. Amongst these products there is the "food" category, the "basics" category (alcohol and tobacco, sundries and services) and the "general" category (clothing, electrical goods, and restaurant meals). The cost of living Index therefore reflects everyday expenses but some other costs like housing, services (electricity, gas, and water), the purchase of a vehicle and school fees are not taken into account by this survey.

[46] For additional details: http://www.mercer.com/costofliving

[47] For additional details: http://www.eca-international.com/news/press_releases/7358/

Luxembourg is in 21st place in Europe. The three most expensive cities in Europe are Oslo, Stavanger and Zurich. As an example, the cities that are close to Luxembourg (geographically) like Paris (11th), Brussels (16th) and Strasbourg (18th) are considered to be more expensive than Luxembourg. In the world ranking Tokyo (Japan), Oslo (Norway) and Nagoya (Japan) are the most expensive cities. Luxembourg takes 52nd place in this world ranking.

f. Standard of living indicators

f.1 Quality of life index

In 2010 the organization International Living had published a yearly index on standards of living[48]. It is an index that is supposed to measure standards of living in different countries throughout the world. It's generated from nine indicator categories: the cost of living, culture, the economy, the environment, freedom, health, the infrastructure, security and climate. Luxembourg was in 6th place in that 2010 edition, amongst 194 countries included, with a final score of 78 out of 100. France, Australia and Switzerland took the top three places in the ranking.

In December 2010, International Living published a new edition of this yearly index of standards of living[49]. Luxembourg dropped drastically in the ranking into 55th place in 2011, with a final score of 63 out of 100. The other 2010 Top 10 countries also changed places, but not as severely as Luxembourg.

Table 11
The 10 most pleasant countries to live in 2010 and their ranking in 2011

Rank 2010	Rank 2011	Country
1	4	France
2	11	Australia
3	27	Switzerland
4	7	Germany
5	2	New Zealand
6	**55**	**Luxembourg**
7	1	United States
8	4	Belgium
9	27	Canada
10	11	Italy

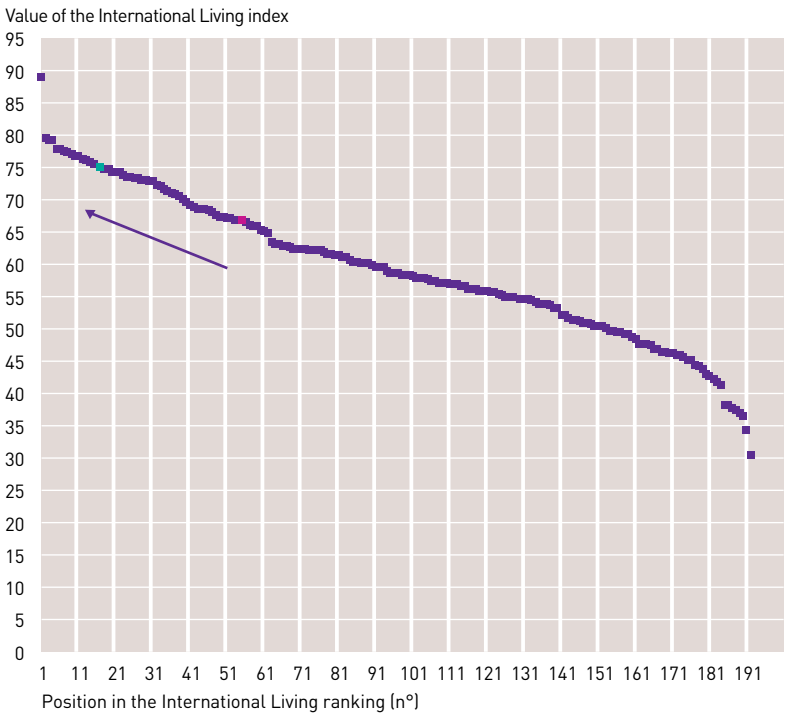
Source: International living

[48] For additional details: http://internationalliving.com/2010/02/quality-of-life-2010/

[49] For additional details: http://internationalliving.com/2010/12/quality-of-life-2011/

Frame 3
In search of explanations for Luxembourg's drop in the final ranking in 2011

Can one conclude that between 2010 and 2011 there was a spectacular drop in Luxembourg's standard of living that explains this dramatic drop in the ranking? International living announced changes in methodology between the two editions of the index, which surely may have an impact on the final ranking but should not cause such a huge difference in an index that *in fine* is supposed to measure a structural phenomenon: standard of living. Taking a closer look at the final index's sub-category data, one notices that in 2011 Luxembourg is given the worst possible score in the index for "cost of living" (index 0), and the best performing country in this sub-category is given an index of 100 (with a 20% weight in the final index). Now, in the older 2010 edition index, Luxembourg still scored 44 out of 100 for this "cost of living" sub-category. As an example, Luxembourg's neighbouring countries which are generally close to Luxembourg in terms of prices and costs were given far more favourable scores in this sub-category: France (58), Belgium (65), Germany (50) and the Netherlands (52).



Source: International Living
Calculations: *Observatoire de la Compétitivité*

Putting forward the hypothesis that a mistake might have been made in this sub-category scoring and that Luxembourg might have kept the same score as in 2010, meaning 44 out of 100, then Luxembourg would have had a final score of 75 out of 100 (final re-calculated index, green tab) instead of the score Luxembourg was given (red tab). This example illustrates why country rankings should always be seen with a degree of scepticism and tells us that yearly ranking variations, especially big variations, should be analysed more closely.

2.3 Luxembourg's evolution over a series of rankings

It is possible to analyse Luxembourg's evolution within the major periodically published comparative competitive rankings, over the years[50]. Since the last edition of the Competitiveness Report (2010), meaning the reports which were published between the autumn of 2010 and the autumn of 2011, Luxembourg evolved in the following way: Luxembourg is placed 23rd and has dropped 3 places in the WEF global ranking, Luxembourg stayed in 11th place in the IMD world ranking, it gained one place (+1) in the Heritage Foundation's ranking and it lost 3 places in the European Commission's European ranking.

Figure 17
Luxembourg's ranking evolution (2005-2011)

Observation: The time axis (horizontal) refers to the year of publication of the reports

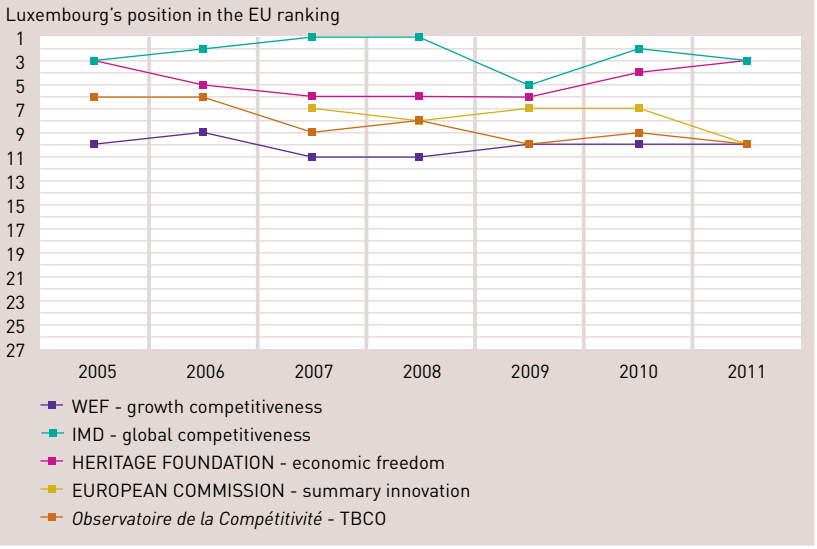
Taking only the EU-27 countries into account instead of looking at the world rankings, one notices:

- In general, Luxembourg's position since last year remained stable across these four indices. Luxembourg kept the same position within the WEF index (10th since 2009), lost one place in the IMD index between 2010 and 2011 (3rd), climbed one place in the Heritage Foundation index between 2010 and 2011 (3rd) and, finally, lost three places in the European Commission index between 2010 and 2011 (10th). We also note that, on the EU level, Luxembourg is amongst the ten best performing nations in these four indices in 2011 and since 2009.

[50] The temporal series that resume the evolution of countries' rankings in the different benchmarks should be consulted with a certain amount of caution. Methodology changes might have taken place in calculating these indices without the re-calculation of all of the years, or even, the number of countries or cities included in the studies might have changed over the years.

- In the TBCO ranking calculated by the *Observatoire de la Compétitivité*[51], Luxembourg also displays a relatively stable position since 2009 in the heart of the EU-27 countries (10th place). Nevertheless, the country seems to be losing speed since 2005, when it was still 6th within the EU-27.

Figure 18
Luxembourg's evolution in relation to the other EU Member States (2005-2011)



Observation: The time axis (horizontal) refers to the year of publication of the reports

2.4 Conclusions

As we've shown throughout this chapter, as well as in the Competitive Reports from previous years, many studies dedicated to countries' "relative competitiveness" are published each year; this relative competitiveness is still named comparative competitiveness of territories, whether on a national, regional level or even on the level of cities. Even if the world financial crisis has caused the political and economic debate to focus primarily on short-term anti-cyclical measures to support the economy, on the prescribed measures to exit the crisis (public balance and national debt) and also on countries experiencing finance difficulties in the financial markets rather than on structural questions, still, in a general way, the interest in these types of studies tends to increase with the added phenomenon of globalisation. In fact, the hope that these composite competitiveness and sustainable growth indicators might help to explain and to predict the future economic development of a country, largely explains the amount of attention that is bestowed upon them.

[51] See Chapter 3 from the 2011 Competitiveness Report.

There is no doubt that the ranking of a country is the element which attracts the most media attention in each report. But the interpretation of the results of these reports and benchmarks goes far beyond. When accessing these composite indices one should not lose sight of their intrinsic limitations: the relativity of the rankings, the selection of underlying data, the differences in the calculation methods of different benchmarks, as well as the inherent methodology weaknesses of such a relative comparative exercise. In reality, these indices tell a far more complex story than the apparent simplicity they display at a glance.

First, a ranking evolution in one direction or in the other does not necessarily mean that Luxembourg's performances have truly improved or worsened during the past year! In fact, a "ranking evolution" can also be caused by the fact that other countries might have experienced the economic and financial crisis[52] and the current turbulence in the financial markets more or less severely than Luxembourg. It is of primordial importance to take this relativity into account, in competitiveness comparisons.

Secondly, concerning the underlying data, it is useful to note that there is a time gap between many underlying statistics which are used and between the publishing times of composite indices. The composite indicators mentioned and analysed in this 2011 Competitiveness Report often use underlying indicators from 2009 or 2010. This implies that the benchmarks and rankings in these reports should not be considered as short-term forecasting instruments or as a short-term measurement of (relative) resistance to a crisis.

Thirdly, in spite of the charm aroused by their visible simplicity, several indices contain considerable methodological differences. Even if they attempt to measure the same phenomenon, meaning "competitiveness", differences appear in the definition of what is being measured itself: whilst the WEF tries to measure the countries' capacity to generate sustainable economic growth, the IMD analyses the countries' capacity in creating and maintaining a supportive environment for company competitiveness because the creation of wealth is supposed to happen at the entrepreneurial level, within a national environment that either facilitates or hampers their competitiveness. As we have noticed, Luxembourg's rankings strongly vary between one ranking and the next, according to the method that was used. In fact, whilst Luxembourg is ranked by the IMD's most recent report as being in 11th place amongst the 59 countries included, it is only 23rd amongst the 142 countries that were analysed by the WEF in the latest edition of its report.

[52] The data that is available to the public for the different benchmarks often does not allow a more detailed analysis of this problem.

Fourth, we often reproach the different research works over methodology weaknesses. These are most apparent in three domains, like the quality of the used sources, the choice of underlying data and the calculation method of the composite indicator. For analysing and interpreting the results of different composite indices, as well as countries' rankings, we would have to first make a critical evaluation of the methods that were used: the quality of primary and secondary data sources, the potential ideological assumption, the calculation method of the synthesised index and the weighting of the different basic indicators. As an example, the basic indicators used within the framework of benchmarks often reveal themselves to be inadequate to the specificity of the Luxembourgish economy. The best known example of this is the famous "GDP per capita" which, amongst other things, does not take into account the important flow of cross-border workers in Luxembourg, and which consequently greatly underestimates Luxembourg's performances in comparison with other countries. Additionally, we can note that the different international organisations change their methods on a periodic basis, which can also have a more than negligible effect on countries' rankings.

Fifth, the selection of countries included in each report has an impact on the ability to make direct comparisons between them. For example, in their most recent editions, the WEF compares 142 countries, the IMD compares only 59 and the Heritage Foundation compares 179 countries, which obviously has an influence on the countries' relative position within different rankings. For instance, we could include only the countries belonging to the European Union in order to get a better comparison between their rankings. Luxembourg's position would be as follows: Luxembourg would climb from 23rd to 10th place in the WEF ranking, from 11th to 3rd in the IMD ranking and from 13th to 3rd place in the Heritage Foundation's ranking.

Sixth, as illustrated through different examples within this Competitiveness Report, there are groups of countries in many rankings within which the individual country performances are relatively similar (almost identical index scores). All things being equal, a marginal rise (or fall) on the national composite index could provoke a significant rise (or drop) in the index ranking. The ranking itself should therefore not be consulted in an isolated fashion, taking just the values of the composite ranking, because significant ranking differences could be concealing very marginal level differences in composite indices.

In view of the different weaknesses outlined above, what should one make of these rankings and aggregate indices and, above all, how should one interpret them?

Even if the methodology of composite indicators and rankings arouses some reservation, they provide nevertheless a useful calibration and deserve to be closely monitored. On the one hand, their echo in the media gives them a not insignificant impact on a country's brand image and can influence the investors' perception of the country, especially foreign investors who usually have limited information. On the other hand, these composite indicators which summarise complexities down to a figure are useful communication tools and favour political debate. One must nevertheless avoid caving into the syndrome of ranking for ranking's sake.

These different rankings, composite indicators and others certainly provide helpful information about a country's competitiveness situation, but they are not an end in themselves. One must not lose sight of the fact that the global information that is supplied in this type of report is also often too general to be useable for every specific type of activity and project. These composite indicators should be aimed at focusing one's attention and they prompt a stricter and more critical analysis. There is, in fact, no single recipe for increasing competitiveness. Different policies can be compared and monitored, but each country must adapt them to its own socio-economic environment and its own national specificities. Competitiveness strategies succeed when they find the balance between the economic imperatives imposed by the world markets and the social cohesion of a country, born out of history, out of value systems and tradition.

To this end, in 2003 the Tripartite Coordination Committee identified the need for an enlarged indicator board, in order to better grasp Luxembourg's competitiveness through indicators that take better account of the country's national specificity. The Committee entrusted Professor Lionel Fontagné from the University of Paris I (Sorbonne) the task of elaborating proposals on this topic. The "Fontagné Report"[53] proposes a scoreboard (November 2004), and the *Observatoire de la Compétitivité* periodically updates the data and comments upon the competitive situation's evolution.

[53] FONTAGNÉ L., Compétitivité du Luxembourg : une paille dans l'acier, Report for the Ministry of Economy and Foreign Foreign Trade, Luxembourg, November 2004, pp.102-120

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3 The 2011 Competitiveness Scoreboard

3.1 The Competitiveness Scoreboard's methodology

The *Observatoire de la Compétitivité*'s main mission is to collect and analyse statistical data and to inform the public, the social partners and the government about the evolution of competitiveness in Luxembourg. One of the analysis instruments is the Fontagné Report's Scoreboard that is made out of 81 indicators, which are chosen in collaboration with the social partners and yearly updated by the *Observatoire*. The 2011 Scoreboard results show once again how important it is to make allowances by following two complementary methods to analyse the Scoreboard. The first method aims at comparing Luxembourg with its immediate neighbours and with the EU's average, whereas the second method provides a composite and understandable ranking of EU Member States according to their degree of competitiveness.

Table 1[54]
The Lisbon indicators and the national indicators

National indicators			
Macroeconomic performance		**Lisbon indicators**	Education & Training
Productivity & Labour costs		1. GDP per inhabitant in PPS 2. Labour productivity 3. Employment rate	Employment
Knowledge Economy		4. Employment rate of older workers 5. Youth education level (20-24) 6. Expenditure on R&D	- Part-time job - Etc.
- Number of patents - ICT Investments - Etc.	←	7. Comparative price levels 8. Business investment 9. At-risk-poverty rate 10. Long-term unemployment rate 11. Dispersion of regional employment	→ Institutional & Regulatory Framework
Markets Operations		12. Greenhouse gas emissions 13. Energy intensity of the economy 14. Volume of freight transport	Social Cohesion
Environment			Entrepreneurship

Source: *Observatoire de la Compétitivité*

Last year, the calculation methods for the composite indicator were analysed in detail by an external audit in the European Commission's Joint Research Centre in Ispra, a staple of excellence in terms of composite indicators. In its 2010 Report, the *Observatoire* has published and discussed the audit's recommendations, which are applied in the 2011 Report's calculations.

In the 2011 Report, the *Observatoire de la Compétitivité* notes that there are new indicators pertaining to the EU 2020 Strategy. As a reminder, the Competitiveness Scoreboard only takes the expired Lisbon Strategy indicators into account. Most of the data dates back to 2010 or to previous years.

[54] The Scoreboard is composed by 79 indicators, sub-grouped into 10 categories. Four original indicators from the Fontagné Report's Scoreboard were excluded because they no longer exist.

Table 2
The Competitiveness Scoreboard[56]

Category 1: Macroeconomic performance (12 indicators)

- A1: Gross National Income per capita (PPS) (2008)
- A2: Real growth rate of GDP (2008)
- A3: Growth in domestic employment
- A4: Unemployment rate as a percentage (2008)
- A5: Inflation rate as a percentage (2008)
- A6: Public balance as a % of GDP (2008)
- A7: Public debt as a % of GDP (2008)
- A8: Gross fixed capital formation of the public administration (2008)
- A9: Terms of trade (2008)
- A10: Real effective exchange rate (1995=100) (2008)
- A11: Diversification – entropy coefficient (2008)
- A12: FDI inflows and outflows (2007)

Category 2: Employment (9 indicators)

- B1: Employment rate (Total) (2008)
- B2: Employment rate (Men) (2008)
- B3: Employment rate (Women) (2008)
- B4: Employment rate of persons aged 55-64 (total) (2008)
- B5: Employment rate of persons aged 55-64 (Men) (2008)
- B6: Employment rate of persons aged 55-64 (Women) (2008)
- B7: Unemployment rate of persons under 25 (2008)
- B8: Long-term unemployment rate as a % (2008)
- B9: Persons holding a part-time job (2008)

Category 3: Productivity and Labour costs (5 indicators)

- C1: Trends in total factor productivity (2008)
- C2: Trends in apparent work productivity (2008)
- C3: Productivity per hour worked as a percentage of U.S. figures (2008)
- C4: Changes in unit labour costs (2008)
- C5: Costs / Revenue ratio in the banking sector (2006)

Category 4: Market Operations (11 indicators)

- Percentage of full time workers on minimum national wage[55]

- D2: Price of electricity (ex-VAT) – industrial users (2008)
- D3: Gas prices (ex- VAT) - industrial users (2008)
- D4: Market share of the primary operator in cellular telephones (2006)

- D5: Composite basket of fixed and cellular communications (ex-VAT) (2004)
- D6: Compositer basket of cellular telephone royalties (ex-VAT) (2006)

- D7: Broad band Internet access rates (2007)
- D8: Basket of domestic royalties for 2Mbits leased lines (ex-VAT) (2006)
- D9: Public markets –(2007)
- D10: Total of State aid as a % of GDP (excluding horizontal objectives) (2007)

- Market share of primary operator in the fixed telephony market[56]*

Category 5: Institutional and Regulatory Framework (10 indicators)

- E1: Corporate taxes (2008)
- E2: Taxes on physical persons (2007)
- E3: Standard VAT rate (2009)
- E4: Tax wedge: Single, without children (2008)
- E5: Tax wedge: Married, with 2 children, one wage-earner (2008)
- E6: Administration efficiency index (2008)
- E7: Rule of law index (2008)
- E8: Regulatory quality index (2008)
- E9: Degree of sophistication of online public services (2007)
- E10: Public services full available on line (2007)

- Public sector wage costs*

Category 6: Entrepreneurship (4 indicators)

- F1: Propensity for entrepreneurship (2007)
- F2: Self-employed jobs as a percentage of total employment (2008)
- F3: Net change in the number of companies (start-up rate minus windup rate (2005)
- F4: Volatility amongst companies (start-up rate plus windup rate (2005)

[55] "Eurostat would like to inform countries that the table 'Full-time workers on the minimum wage' has been deleted on Eurostat's website as the methodological concept needs to be developed."

[56] The indicators signalled in light grey couldn't be updated for several years and are therefore not taken into account for the analysis of the Scoreboard nor for the calculation of the composite indicator.

[57] The indicators signalled with an asterisk have not been updated.

Table 2
Continued

Category 7: Education & Training (6 indicators)
G1: Annual cost per student in public educational facilities (2006) G2: Portion of the population aged 25 to 64 with at least a secondary education (2008)
G3: Portion of the population aged 25 to 34 with a university education*[58]
G4: Percentage of human resources in scientific and technological fields as a % of total employment (2007) G5: Lifelong learning (participation of adults in training and teaching programmes) (2008) G6: Secondary school dropouts
Percentage of foreign nationals in S&T human resources* Percentage of highly qualified workers (ICT) in total employment figures*
Category 8: Knowledge economy (15 indicators)
H1: Internal R&D expenditure (2007) H2: Public R&D budget credits (2007) H3: Portion of public research financed by the private sector (2007)
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 (2007) H6: Scientific publications per million inhabitants (2005) H7: Number of USPTO patents per million inhabitants (2008) H8: Number of OEB patents per million inhabitants (2006) H9: Company usage of internet (broadband) (2008) H10: Investment in public telecommunications as a percentage of gross fixed capital formation (2005) H11: Percentage of households that have Internet access at home (2008) H12: Number of fixed or cell phones per 100 inhabitants (2005) H13: Percentage of households that have broad band Internet access (2008) H14: Number of secure web servers per 100,000 inhabitants (2006) H15: Percentage of total employment in medium or high technology sectors (2007)
Category 9: Social Cohesion (6 indicators)
I1: Gini coefficient (2007) I2: At-risk of poverty rate after social transfers (2007) I3: At persistent risk of poverty rate (2004) I4: Life expectancy at birth (2007) I5: Wage gap between men and women (2006) I6: Serious work accidents (2005)
Category 10: Environment (7 indicators)
J1: Number of ISO 14001 certifications (2007) J2: Number of ISO 9001 certifications (2007) J3: Total greenhouse gas emissions (2007) J4: Percentage of renewable energy (2007) J5: Volume of municipal waste generated (2007) J6: Energy intensity of the economy (2007) J7: Modal split in transportation choice – percentage of car users as transportation method (2007)

Source: Fontagné (2004)

[58] These indicators are not available for Luxembourg.

The 81 indicators used to measure competitiveness in Luxembourg are analysed in detail according to two vantage points. First, Luxembourg's position in relation to the EU average is highlighted.

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

Secondly, Luxembourg's performances are analysed over time, meaning by making comparisons between the most recent data and that from previous years. In this way, the use of arrows will indicate in which direction each indicator has changed (an improvement or degradation).

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

In addition to the comparison with the European average, Luxembourg is also compared to the best and to the worst of the countries of EU-X. As a reminder, following acronyms are used:

Table 3
Acronyms

DE	Germany	**FR**	France	**NL**	Netherlands
AT	Austria	**GR**	Greece	**PO**	Poland
BE	Belgium	**HU**	Hungary	**PT**	Portugal
BU	Bulgaria	**IE**	Ireland	**SK**	Slovak Republic
CY	Cyprus	**IT**	Italy	**CZ**	Czech Republic
DK	Denmark	**LV**	Latvia	**RO**	Romania
EE	Estonia	**LT**	Lithuania	**SL**	Slovenia
ES	Spain	**LU**	Luxembourg	**SE**	Sweden
FI	Finland	**MT**	Malta	**UK**	United Kingdom

Source: Eurostat

3.2 The components of the Scoreboard

The indicators for the 10 categories are analysed in this sub-chapter. The colours red, green and orange indicate Luxembourg's position in relation to the EU's average. In general, it can be said that between the year 2000 and 2007 the number of green indicators gradually increased and the number of red indicators gradually diminished. In 2008, this tendency was reversed and the number of green indicators diminished to 23 and the number of orange indicators increased to 20. In 2010 the number of green indicators increased to 32 and the number of red indicators diminished to 13. Can we infer that the competitive position has improved?

Table 4
Comparison of competitiveness indicators 2000-2010

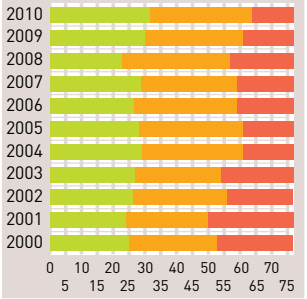
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Macroeconomic performance		7	7	7	6	7	7	7	6	6	8	8
		1	1	2	3	2	2	1	3	3	2	2
		2	2	1	1	1	1	2	1	1	0	0
Employment		2	2	2	2	1	2	1	1	1	1	2
		3	3	3	4	5	4	5	5	5	7	7
		4	4	4	3	3	3	3	3	3	1	0
Productivity and Labour costs		3	1	1	1	2	3	3	4	1	1	3
		2	1	2	1	3	2	1	1	1	1	2
		0	3	2	3	0	0	1	0	3	3	0
Market operations		2	2	4	5	5	5	5	5	3	4	4
		4	4	4	3	4	4	3	3	3	2	1
		3	3	1	1	0	0	1	1	3	3	4
Institutional and Regulatory Framework		5	5	6	6	6	5	5	5	5	5	5
		3	3	2	2	3	3	3	3	4	4	4
		2	2	2	2	1	2	2	2	1	1	1
Entrepreneur-ship		1	2	0	0	0	0	0	1	1	1	1
		2	1	3	2	2	2	3	1	2	2	2
		1	1	1	2	2	2	1	2	1	1	1
Education and Training		0	0	0	1	1	0	0	0	0	3	3
		3	3	5	2	4	5	5	4	5	2	2
		2	2	0	2	0	0	0	1	0	0	0
Knowledge Economy		5	5	5	5	6	6	6	6	5	6	5
		4	4	4	4	3	4	4	4	5	5	6
		6	6	6	6	6	5	5	5	5	4	4
Social Cohesion		0	0	1	1	1	0	0	1	1	1	1
		5	5	4	4	4	5	5	4	4	4	4
		0	0	0	0	0	0	0	0	0	0	0
Environment		0	0	0	0	0	0	0	0	0	0	0
		1	1	1	2	2	2	2	2	2	2	2
		4	4	4	3	3	3	3	3	3	3	3
Total		25	24	26	27	29	28	27	29	23	30	32
		28	26	30	27	32	33	32	30	34	31	32
		24	27	21	23	16	16	18	18	20	16	13
Total indicators[59]		77	77	77	77	77	77	77	77	77	77	77

Source: *Observatoire de la Compétitivité*

[59] Three indicators ("Serious Work Accidents", "Terms of Trade" and "Real Effective Exchange Rate") are measures of Luxembourg 's performance over time using a base index rate of 100. It is not useful to attempt a comparison with the EU average. Therefore, the total number of indicators is in fact 78.)

The table above leads us to conclude that the economic situation has improved in relation to the EU's average. This assertion must however be tempered, due to the fact that other Member States experience the effects of the financial and economic crisis more severely than Luxembourg. Even if the notion of competitiveness is relative, it is essential to make an analysis of Luxembourg's indicators evolution in relation to the previous year. Indeed, over the 81 indicators, 17 have deteriorated and 42 have remained constant for Luxembourg. With regards to these last indicators, it must be noted that for 2009 many indicators have not been updated and therefore the evolution in relation to 2008 could not be observed. Amongst the 17 indicators that have deteriorated, 10 belong to the A category, Macroeconomic performances, and 4 to the C category, Productivity and Labour costs.

Scoreboard of Competitiveness



The detailed analysis of each indicator category, presented in sections 3.2.1 – 3.2.10 of this chapter, will allow us to put this first assertion into perspective by going into the detail of negative indicators evolutions in different categories.

Table 5
Changes in LU indicators with respect to the previous year

		2004	2005	2006	2007	2008	2009	2010
A Macroeconomic performance (12)	↑	5	5	2	8	3	4	7
	=	2	0	0	1	0	0	0
	↓	5	7	10	3	9	8	5
B Employment (9)	↑	5	7	4	6	4	9	5
	=	1	1	1	0	0	0	1
	↓	3	1	4	3	5	0	3
C Productivity and Labour costs (5)	↑	3	4	3	4	1	1	4
	=	0	0	0	0	0	0	0
	↓	2	1	2	1	4	4	1
D Market Operations (9)	↑	7	5	5	5	5	3	5
	=	0	0	0	0	0	0	0
	↓	2	4	4	4	4	5	3
E Institutional and Regulatory Framework (10)	↑	3	3	7	5	4	6	3
	=	3	2	1	2	3	2	2
	↓	4	5	2	3	3	2	5
F Entrepreneurship (4)	↑	1	1	2	2	3	3	4
	=	0	0	1	0	0	0	0
	↓	3	3	1	2	1	1	0
G Education and Training (5)	↑	4	3	0	4	3	4	4
	=	0	1	0	0	0	0	0
	↓	1	1	5	1	2	1	1
H Knowledge Economy (14)	↑	9	9	9	9	6	9	5
	=	2	1	1	1	2	1	1
	↓	4	5	5	5	7	5	7
I Social Cohesion (6)	↑	3	2	1	3	4	0	0
	=	1	3	2	1	1	3	3
	↓	2	1	3	2	1	3	3
J Environment (7)	↑	4	5	5	5	5	5	5
	=	0	0	0	0	0	0	0
	↓	3	2	2	2	2	2	2
Total (81)	↑	43	46	35	39	29	22	42
	=	6	7	11	13	17	42	7
	↓	32	28	35	29	35	17	30

Source: *Observatoire de la Compétitivité*

3.2.1 Macroeconomic performances

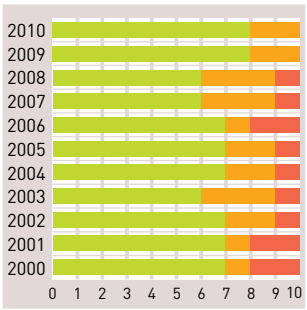
Table 6
Category A: Macroeconomic performance

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
A1	Gross National Income per capita at market prices PPS (2010)	↑	194	100	120	109	120	BU 42	LU
A2	Real growth rate of GDP as a % (2009)	↑	2.7	1.9	3.7	1.5	2.3	GR -3.5	SE 5.6
A3	Growth in domestic employment as a % (2009)	↑	1.5	-0.5	0.5	0.2	0.7	BU -5.9	MT 2
A4	Unemployment rate as a % (2009)	↑	6.04	9.7	7.1	9.8	8.30	AT 4.4	ES 20.10
A5	Inflation rate as a % (2009)	↓	2.3	2.10	1.2	1.70	2.30	IR -1.60	RO 6.10
A6	Public balance as a % of GDP (2009)	↓	-1.7	-6.4	-3.3	-7	-4.10	IR 32.4	EE 0.10
A7	Public debt as a % of GDP (2009)	↓	18.4	80	83.2	81.7	96.8	EE 6.6	GR 142.8
A8	Gross fixed capital formation as % of GDP (2009)	↑	4.05	2.68	1.56	3.06	1.66	AT 1.16	PO 5.58
A9	Terms of trade (2010)	↓	108.04	-	100.82	100.343	98.504	FIN 88.395	RO 135.987
A10	Real effective exchange rate (2000 =100) (2008)	↓	103.20	103.8	100.3	100.7	103.3	UK 89	SK 125.7
A11	Diversification – Entropy coefficient (2009)	↑	0.665	0.811	0.802	0.776	0.784	LU	RO 0.888
A12	Market integration (2009)	↑	394.7	2.10	1.5	3.9	-7.4	BE	LU

*Inflation rate LU: IPCN, others IPCH; harmonised unemployment rate EUROSTAT/BIT LU:Adem; **EU-15

In the category "Macroeconomic performance", Luxembourg is very well placed in relation to the EU's average. Indeed, out of 10 indicators, 8 are green. However, looking at the tendency over time, Luxembourg improved its performances for 6 indicators and for 6 others its performances have worsened. Two indicators are orange, within the EU-27's average. These are the Inflation rate and the Entropy coefficient.

Macroeconomic performances



Concerning the growth in domestic employment rate that is 1.5% for 2010, it must be highlighted that even if it is green, this rate still failed to reach the 4.8% level of 2008. According to STATEC[60], the growth in domestic employment rate is still far too weak to impact unemployment significantly.

The official unemployment rate is 4.6% in 2010 and has increased in relation to the previous year. In terms of cost-competitiveness, we note that Luxembourg sees its position deteriorate in relation to the previous year for the real effective exchange rate as well as for the terms of trade.

As a consequence of the crisis[61], public debt has worsened for the majority of the EU Member States. This deterioration of public debt may have repercussions on competitiveness: on the one hand, it can trigger a new recession. On the other, a high level of public debt provokes a significant hike in interest rates, blocking private investment. And finally, when there is high public debt, governments are often pressured to raise taxes, which can also put a brake on the economic activity. Important investments in Research & Development and education are not undertaken. From now on it is important that economic governance and especially budget monitoring be fortified within the framework of the "European semester" (See Chapter 6).

[60] Note de conjoncture 2/2011

[61] WEF Competitiviness report 2011

3.2.2 Employment

Table 7
Category B: Employment

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
B1	Employment rate, as a % (2010)	→	65.2	64.2	71.1	64	62	HU 55.4	NL 74.7
B2	Employment rate - Men (2010)	↓	73.1	70.1	76	68.3	67.4	LT 56.8	NL 80
B3	Employment rate – Women (2010)	↑	57.2	58.2	66.1	59.9	56.5	MT 39.2	DK 71.1
B4	Employment rate of persons aged 55-64, as a % (2010)	↑	39.6	46.3	57.7	39.7	37.3	MT 30.2	SE 70.5
B5	Employment rate of persons aged 55-64 (Women) (2010)	↑	47.7	54.6	65	42.1	45.6	HU 39.6	SE 74.2
B6	Employment rate of persons aged 55-64 (Men) (2010)	↑	31.3	38.6	50.5	37.5	29.2	MT 13	SE 66.7
B7	Unemployment rate of persons under 25, as a % (2010)	↑	16.1	20.9	9.9	23.3	22.4	NL 8.7	ES 41.6
B8	Long-term unemployment rate as a % (2010)	↓	1.3	3.8	3.2	3.9	4.1	AT 1.10	SK 9.2
B9	Persons holding a part-time job as a % (2010)	↓	17.9	19.2	26.2	17.8	24	BU 2.4	NL 48.9

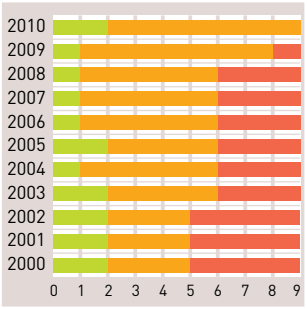
In terms of employment, Luxembourg was able to improve its performances for 5 out of 9 indicators whilst 4 performance indicators have remained constant or have worsened.

Within the framework of the EU 2020 Strategy, the government took certain measures to reach the national goal of a 73% employment rate in 2020. We note that from 2009 to 2010 the employment rate in Luxembourg stayed constant at 65.2%, whilst in most Member States, the employment rate deteriorated from 2009 to 2010, with the exception of Germany and Malta. In Luxembourg, the employment rate of women and of workers aged between 54 and 55 has increased, even if Luxembourg still trails behind the EU-27 performance. In order to increase the employment rate of women, it is essential to emphasize measures that favour the conciliation of professional and family life. Within this context, the discussions concerning parental leave are taking place between the social partners.[62]

Even if the unemployment rate of young persons aged between 15 and 24 is at a worrying level, it has constantly diminished in Luxembourg since 2008. The Minister of Labour and Employment[63] has recently reiterated that youth unemployment is a European problem. The Ministry of Labour and Employment plans to tackle the problem by improving the way young people are supported. "In doing so, it is a question of avoiding that the young people are pushed from a service to another one without receiving any real assistance". In the current employment policy, the reform of the ADEM also plays an important role. It is even part of the Luxembourg's measures within the framework of the "Pact for the Euro", adopted by the heads of State and of government on the 11th of March 2011.

Let us remember that the Ministry of Labour and Employment has decided to set up an employment market observatory, with the aim of analysing and understanding the employment market's evolution in Luxembourg and within the Greater Region.

Employment



62 Grand-Duchy of Luxembourg's National Reform Programme within the framework of the Europe 2020 Strategy, European Semester, April 2011

63 http://www.gouvernement.lu/salle_presse/actualite/2011/06-juin/30-adem/index.html

3.2.3 Productivity and Labour Costs

Table 8
Category C: Productivity and Labour costs

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
C1	Trends in total factor productivity (2010)	↑	1.44	1.46*	2.66	0.86	1.27	GR -3.1	SE 4.06
C2	Trends in apparent work productivity (2010)	↑	0.8	2.22	2.98	1.45	1.47	GR -2.48	EE 7.69
C3	Productivity per hour worked as a percentage of U.S. figures (2010)	↓	90.64	56.94	75.33	87.49	87.87	RO 14.58	LU
C4	Changes in unit labour costs (2010)	↑	1.7	0.9	-0.88	0.81	-0.41	LV -12.36	PO 8.88
C5	Costs/Revenue ratio in the banking sector (2010)	↑	42.94	57.35**	65.19	60.56	54.19	EE 29.55	BU 73.2

*UE-15 ; **UE-25

In this category we observe a general improvement, as 3 out of 5 indicators have improved in relation to the previous year. Thus, the Grand Duchy of Luxembourg is above the performances of the EU-15, in terms of the evolution of total factor productivity.

The indicator for trends in apparent work productivity illustrates that Luxembourg does not surpass the EU-27 performance, even if it comes out of the red.

The indicator for the changes in unit labour costs also shows an improvement, but Luxembourg remains in the red. During the crisis, the nominal unit labour cost[64] increased because of apparent productivity, which diminished without any repercussions on the volume of work.

Productivity and Labour Costs

[64] Note de conjoncture 2/2011

3.2.4 Market operations

Table 9
Category D: Market operations

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
D2	Price of electricity (ex-VAT) –industrial users, in € per 100 kWh (2009)	↑	0.0956	0.0919	0.0921	0.0687	0.0943	EE 0.0573	MT 0.18
D3	Price of gas (ex-VAT) – industrial users, in € per GJ (2010)	↑	10.13	7.7637	8.98	8.95	7.64	RO 4.1150	SL 10.8766
D4	Market share of the primary operator in cellular telephones, as a % (2009)	↑	53	38	37	41	44	UK 21	CY 82
D5	OECD basket of mobile telephone rates for businesses, ex-VAT – Total in USD (2004)	↑	795	1380	1214	1150	1256	DK 731	PO 2613
D6	OECD basket of mobile telephone rates for large consumers, VAT included – Total in USD (2008)	↓	448.69	652.27**	941.31	829.57	886.98	FI 327.09	ES 1191.5
D7	Broadband internet access rates in USD PPP/MB (VAT included) (2009)	↑	16.51	36.74**	19.17	27.91	22.07	UK 13.16	SE 98.80
D8	Basket of domestic royalties for 2Mbits leased lines (ex-VAT) (2010)	↓	11844	210763**	15697	24767	18163	DK 4515	HO 3067549
D9	Value of public tenders using open procedure procurement, as a % of GDP (2008)	↑	1.50	3.6	1.4	3.8	4	DE	BU 12.2
D10	Total state aid for horizontal objectives as a % of GDP (2008)	↓	7.83	2.24	2.68	1.37	5.63	EE 0.29	IR 20.20

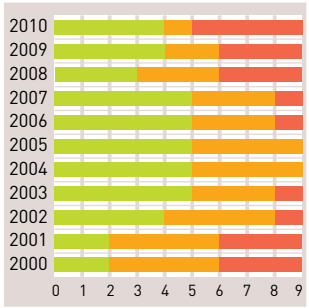
*EU-15; **OECD

In the field of market operations, Luxembourg displays a positive evolution coming out of this category, since 6 out of 10 indicators have improved.

However, it must be noted that the indicator pertaining to gas prices for industrial users is in the red, which burdens Luxembourg's companies with higher energy fees than companies in the EU-27 average, making them less competitive.

Although still in the red, Luxembourg has managed to improve the indicators relating to the market share of the primary operator in cellular telephones as well as the value of public tenders using open procedure procurement, as a % of GDP. The former is essential, considering the opening of the market as an opening to competition, which provides consumers with the possibility to choose between different providers. The second also includes the opening of the market characteristic, emphasizing the transparency, the effectiveness and the efficiency of public services, factors that become more central.

Market operations



3.2.5 Institutional and Regulatory Framework

Table 10
Category E: Institutional and Regulatory Framework

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
E1	Corporate tax rate, as a % (2010)	→	28.59	23.2	30.18	34.43	33.99	BU 10	MT 35
E2	Income tax rate, as a % (2010)	↓	39	37.46*	47.5	45.8	53.7	BU 15	SE 56.4
E3	Standard VAT rate, as a % (2010)	→	15	20	19	19.6	21	LU	SE 25
E4	Tax wedge – Single, without children, as a % (2010)	↓	34.01	41.35**	49.05	49.27	55.37	IR 29.35	BE
E5	Tax wedge – Married, with 2 children, one wage-earner (2010)	↓	11.22	30.92**	32.6	42.05	39.61	LU	FR
E6	Administration efficiency index (2009)	↑	1.76	1.16	1.48	1.44	1.48	RO -0.13	DK 2.19
E7	Rule of law index (2009)	↑	1.83	1.18	1.63	1.43	1.37	BU -0.05	FI 1.94
E8	Regulation quality index (2009)	↓	1.64	1.24	1.47	1.19	1.27	RO 0.62	DK 1.82
E9	Degree of sophistication of online public services, as a % (2010)	↑	87	90	99	94	92	GR 70	PT 100
E10	Full online availability of public services, as a % (2010)	↑	72	82	95	85	79	GR 48	SE 100

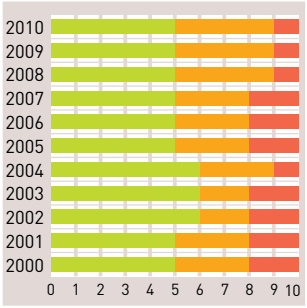
*EU-25; **OECD

This category is important since it illustrates Luxembourg's competitiveness at the institutional and regulatory level, for both companies and residents.

We observe some deterioration of income tax rate, of the tax wedge – single, without children, and also of the tax wedge – married, with 2 children, one wage-earner, even if it is still the best rate amongst EU-27 countries. However, the corporate tax rate, and standard VAT rate have remained constant through the crisis, supporting the country's competitiveness for companies.

The last two indicators translate two fundamental pillars of government policy, including the protection of social solidarity as well as the preservation of the Grand Duchy's competitiveness.

Institutional and Regulatory Framework



3.2.6 Entrepreneurship

Table 25
Category F: Entrepreneurship

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
F1	Propensity for entrepreneurialism, as a % (2009)	↑	44	45.1	40.8	50.8	30	SK 25.6	CY 66.3
F2	Self-employed as a % of total employment (2009)	↑	5.65	16.08	10.89	9.54	16.25	SE 5.52	GR 35.17
F3	Net change in number of companies, as a % (2007)	↑	2.67	1.86**	-0.07	3.07	1.71	CZ -3.56	RO 6.88
F4	Volatility among companies, as a % (2007)	↓	18.09	20.64**	18.19	17.21	12.19	CY 5.52	LT 43.52

* EU-15; **EU-25

In terms of entrepreneurship, the Grand Duchy sees an improvement of its performances over time. However, only one out of four indicators is green, meaning above the EU-25 average. This indicator emphasizes the fact that the rate at which companies are being closed down is lower than the rate at which new companies are being created.

Entrepreneurship

It's important to note that entrepreneurship goes beyond company start-ups and also encompasses success, for which to materialize other ingredients are necessary, such as the detection or creation of business opportunities, generation of added value and also innovation. Throughout the respective different stages, the government offers its support by different financial and administrative means, so as to make it easier to create and develop a company. Nevertheless, creating a company entails certain risks that need to be pre-empted in order to avoid bad results, such as bankruptcy.

Within this context, in 2010 Luxembourg's number of bankruptcies increased by 30% in relation to 2009, whilst Germany succeeded to reduce its increase to 2.5%, France to 5% and in Belgium they increased by 2.5%[65]. According to Creditreform Luxembourg, the number of bankruptcies varies depending on company size and sector of activity. Indeed, it would be important to analyse the reasons for bankruptcy in order to create a counterweight for this situation.

The indicator dealing with self-employment illustrates Luxembourg's position, which is lower than the EU-27 average. The Grand Duchy is in second-to-last place, after Denmark and before Sweden.

[65] PaperJam: http://www.paperjam.lu/communique_de_presse/fr/taux-record-des-faillites-au-luxembourg

3.2.7 Education and Training

Table 12
Category G: Education and Training

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
G1	Annual cost per student in public educational facilities, in PPS (2009)	→	**13054**	6288	6459	7630	8705	RO 2566	LU
G2	Population achieving at least the second cycle of secondary education, as a % (2010)	↑	**77.7**	72.7	85.8	70.8	70.5	MT 28.7	LT 92
G4	Human resources in scientific and technological fields, as a % of total employment (2009)	↑	**55.3**	40.1	44.8	43.2	48.2	PT 23.5	LU
G5	Lifelong learning (participation of adults in training and teaching programmes), as a % of the population aged between 25-64 (2010)	→	**13.4**	9.1	7.7	5	7.2	BU 1.2	DK 32.8
G6	Secondary school dropouts, as a % (2008)	↑	**7.1**	14.1	11.9	12.8	11.9	SK 4.7	MT 36.9

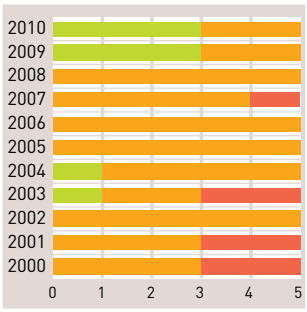
This category has a positive balance, since three indicators have improved and two have remained constant in relation to the previous year. However, what is most remarkable is that three out of five indicators surpass the average of the 27 EU Member States.

In relation to the indicator for human resources in science and technology, Luxembourg takes first place, but the rate is biased, given that it refers to total employment, also including non-resident workers.

The last indicator relates to one of the government's and the EU's priorities. So, in the Europe 2020 Strategy and in the Luxembourg's National Reform Programme, this indicator is included as part of the goals to reach. Actually, Luxembourg has committed to keeping the rate of early school leaving under 10%, which means that the government will continue to reinforce the respective initiatives to support the completion of its goals.

Luxembourg's position with regards to the second-to-last indicator confirms the results that were presented by the ELLI Index (European Lifelong Learning Index)[66]. In its yearly report, Luxembourg comes in fourth place and Denmark in first place. This is a fundamental indicator in reducing long-term unemployment.

Education and Training



[65] http://www.elli.org/fileadmin/user_upload/About_ELLI/Documents/ELLI_EU_eng_final.pdf

3.2.8 Knowledge Economy

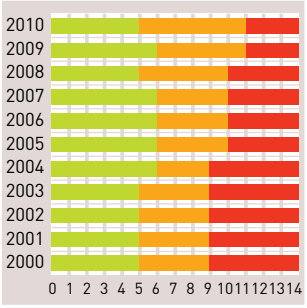
Table 13
Category H: Knowledge Economy

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
H1	Internal R&D expenditure Lisbon, as a % of GDP (2009)	↑	**1.68**	2.01	2.82	2.21	1.96	CY 0.46	FI 3.96
H2	Public R&D budget credits, as a % of GDP (2009)	↑	**18.2**	33.9	28.4	38.9	22.2	LU	CY 64.1
H3	Portion of public research financed by the private sector, as a % of GDP (2008)	↓	**76**	54.7	67.3	50.7	61.4	CY 17.8	LU
H5	Number of researchers per 1,000 employed persons, public and private sectors taken together (2009)	↑	**6.8**	7.37*	7.7	8.9	8.4	RO 2.1	FI 16.6
H6	Scientific publications per million inhabitants (2005)	↓	**127**	477	535	482	653	RO 41	SE 1109
H7	Number of USPTO patents per million inhabitants (2010)	↓	**61.19**	60.55	151.22	68.6	75.34	RO 0.75	FI 213.13
H8	Number of OEB patents per million inhabitants (2008)	↓	**238.14**	119.5	298.69	133.74	139.03	CZ 1.66	SE 318.89
H9	Use of broadband connections by companies, as a % (2009)	↑	**92**	88	91	96	95	RO 56	MT 99
H10	Investment in public telecommunications, as a percentage of GFCF (2009)	↓	**1.54**	1.66*	1.16	1.33	1.91	AT 0.76	PT 2.75
H11	Percentage of households that have internet access at home (2009)	↑	**90**	70	82	74	73	BU 33	NL 91
H12	Number of cell phones per 100 inhabitants (2009)	↑	**240.52**	167.10*	200.4	164.2	184.08	SK 132.27	EE 253.25
H13	Percentage of households that have broadband Internet access (2010)	↓	**78**	88	91	91	96	RO 54	MT 98
H14	Number of secure web servers per 100,000 inhabitants (2010)	↑	**149.48**	25.05*	86.09	30.86	50.44	GR 12.46	NL 229.99
H15	Percentage of total employment in medium or high technology sectors (2008)	↓	**0.91**	6.69	10.89	6.07	6.25	CY 0.87	CZ 11.64

*OECD

In the Knowledge Economy category we can say that Luxembourg is within the EU average, having 6 orange indicators, 5 in red and 4 in green.

Knowledge Economy



This category is persistently essential, even after the replacement by the Europe 2020 Strategy and Luxembourg 2020 of the Lisbon Strategy, since knowledge is still a priority for the EU Member States for maintaining and developing national as well as European competitiveness.

According to Bruno Amable and Philippe Askenazy the knowledge economy is part of "intangible investments (R&D, education and health) that has grown in relation to tangible investments (physical capitals, material resources...)"[67]. This tendency has repercussions on the will to protect the acquired innovation, in particular intellectual property.

In the Grand Duchy's case, where the services sector is predominant, it is also necessary to innovate in order to pursue the objective of economic diversification. To this aim, Luxembourg has intensified its level of investment in the ICT domain, which is considered fundamental in order to realise a knowledge economy.

In order for the knowledge economy to have positive results, all the connected players must be involved, so the B2B and B2C relations must be improved.

The knowledge economy supports the transformation of production, consumption and organization structures, amongst others[68].

Regarding indicators related to applications for patents, statistics are analysed in detail in the thematic studies chapter.

[67] Bruno Amable et Phillippe, http://www.jourdan.ens.fr/~amable/unesco%20final.pdf

[68] Idem

3.2.9 Social Cohesion

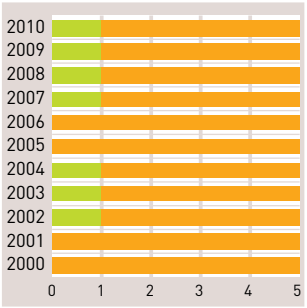
Table 14
Category I: Social Cohesion

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
I1	Gini coefficient (2009)	↓	**29.2**	30.4	29.1	29.80	26.4	SL 22.7	LV 36.1
I2	At-risk of poverty rate after social transfers, as a % (2009)	↓	**14.9**	16.3	15.5	12.9	14.6	CZ 8.6	RO 22.4
I3	At persistent risk of poverty rate, as a % (2009)	↓	**8.8**	9	7.2	7	9.2	DK 4.9	PT 15
I4	Life expectancy at birth in numbers of years (2008)	→	**80.7**	79.4	80.5	81.5	80.05	LT 73.5	SW 81.6
I5	Gender pay gap, as a % of gross hourly wages of male employees (2009)	→	**14.7**	21.7	26.3	16.2	13.8	SL 10.3	EE 30.5
I6	Serious accidents at work, using a base year index of 1998=100 (2006)	↓	**78**	76	66	82	60	GR 55	EE 120

*EU-25

It must be immediately noticed that, in general, the data presented here is from 2009, a time when the situation worsened due to the 2008 economic and financial crisis. Hence, Luxembourg did not manage to improve any of the indicators, except two that remained the same as in the previous year. Indeed, four indicators are still orange and the indicator measuring the gender pay gap as a percentage of men's gross hourly pay remains green.

Social Cohesion



In this category, social cohesion is strongly connected to material well-being. The Grand Duchy saw its "at-risk of poverty rate after social transfers" and its "at persistent risk of poverty rate" deteriorate, however this does not correspond to a drop in social benefit payments, but rather a consequence of the crisis which worsened some homes' socio-economic situation, especially single parent homes.

It is necessary to continue supporting initiatives that look at reinforcing social cohesion, since this is also a country's attractiveness factor for companies as well as for residents. The project *PIBien-être* will surely enrich the indicators in order for a more detailed analysis of the components of Luxembourg's well-being situation to take place.

3.2.10 Environment

Table 15
Category J: Environment

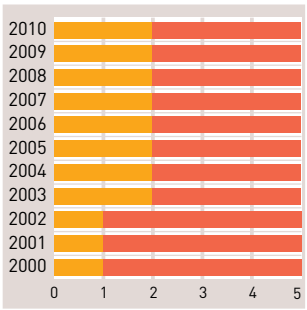
Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
J1	Number of ISO 9001certifications per million inhabitants (2008)	↑	**503.48**	806.23	588.46	371.75	458.95	LV 220.65	IT 1977.34
J2	Number of ISO 14001certifications per million inhabitants (2008)	↑	**102.33**	143.6	69.52	54.30	68.73	MT 19.40	SE 485.74
J3	Total greenhouse gas emissions (base index 1990=100) (2009)	↑	**89**	87	75	92	85	EE 40	ES 127
J4	Percentage of renewable energy (2008)	↑	**4.1**	16.7	15.4	14.4	5.3	MT 0.0	AT 62
J5	Volume of municipal waste generated in kg per person, per year (2009)	↓	**701**	524	581	543	493	CZ 306	DEK 802
J6	Energy intensity in kg of oil equivalent per thousands of euros (2009)	↑	**158.93**	165.2	150.55	164.33	205.69	DK 106.7	BU 842.54
J7	Breakdown by passenger transportation method – Percentage of car users in passenger kilometres (pkm) (2008)	↑	**91.8**	93.5	93.1	92.3	96.4	SK 61.8	LT 129.3

In terms of environment, Luxembourg was able to improve its performances in 6 out of 7 indicators, even though red and orange still dominate this category. The indicators relating to "volume of municipal waste generated in kg per person" has worsened for 5 consecutive years.

The indicator relating to the total greenhouse emissions has improved. In the EU 2020 Strategy Luxembourg has the objective of reducing greenhouse gas emissions by 20% in relation to 2005 by 2020. This ambitious objective requires an enormous effort in the next few years. Technologic changes have gone in favour of these objectives from 1994-1998, by moving the steel Industry from traditional blast furnaces to electric steelworks. In 2002, the construction of a power plant of cogeneration of type gas-vapour increased the greenhouse gas emissions. Additionally, fuel tourism, which has a positive effect on the State budget, has a negative effect on the Kyoto balance.

The government[68] has published its National Plan for Sustainable Development (PNDD: *Plan National pour un Développement Durable*) in which 18 qualitative objectives are defined as necessary in the long run, for Luxembourg's sustainable development. This plan brings ecology, economy and social issues together, and improves the standard of living of the present and future generations. The goal is to insure a type of development that respects the natural resources, biodiversity, and that supports economic effectiveness without losing sight of the social goals of development, namely the fight against poverty, against inequalities, against exclusion and the search for fairness, all this without compromising the development of future generations, meaning our children and grand-children.

Environment



[68] PNDD Luxembourg, Ein nachhaltiges Luxemburg für mehr Lebensqualität, 26 November 2010

3.3 Competitiveness composite indicator – General Result

For 2010, Luxembourg is in 10th place, a slight drop from 2009. Scandinavian countries and the Netherlands remain at the top of the ranking over the years. Concerning Luxembourg's neighbouring countries, Germany goes from 11th place in 2009 to 6th in 2010, overtaking Luxembourg, Belgium climbs from 17th to 16th. France reaches the 13th place in 2010, after having been 12th for 3 consecutive years. Since the Fontagné Report in 2004, Luxembourg's general position has slightly deteriorated.

Frame
Methodology

Concerning the applied methodology for the calculation of the composite indicator, we take the recommendations made in last year's audit (2010 Competitiveness Report, Perspectives économiques N° 16) into account.

For certain indicators there are some absurd values. For example, for Luxembourg there are two indicators in the Scoreboard in which the performance is dramatically worse than other countries'. These are well known indicators, namely direct foreign investment (A12) and expenditure on education (G1). Given that these indicators threaten to influence the results too much, the "extreme" values are dealt with by replacing them with the same value as the closest scoring country.

In order to fix 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 has performed similarly for other indicators.

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

$$y_{ij}^{t} = \frac{x_{ij}^{t} - \min_j x_{ij}^{t}}{\max_j x_{ij}^{t} - \min_j x_{ij}^{t}}$$

The composite index C for each category k (k=1,...,10) at the time t is calculated by an average of sub-indicators of the relevant category in the following 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 on 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 composite indicator CI is achieved by using a simple arithmetic mean of its composite indicators, which means that the 10 categories are weighted the same.

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

Table 16
TBCO composite indicator's general ranking

	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Germany	6	11	8	11	10	14	14	15	12	9	9
Austria	7	6	6	7	7	8	7	8	8	8	7
Belgium	17	16	19	15	15	15	11	13	16	20	16
Bulgaria	16	21	18	21	26	16	18	17	22	26	22
Cyprus	18	14	13	16	20	21	21	26	23	22	21
Denmark	2	2	4	4	2	2	3	4	2	2	2
Spain	23	15	15	18	18	19	16	16	18	16	20
Estonia	9	7	11	9	8	9	10	6	6	10	14
Finland	3	5	3	2	3	3	2	2	3	3	3
France	13	12	12	12	13	12	12	12	15	12	11
Greece	27	23	25	24	23	27	26	20	26	21	25
Hungary	24	25	22	27	24	24	24	21	17	17	18
Ireland	12	13	17	10	6	7	8	7	4	6	5
Italy	15	19	20	20	22	22	22	23	24	25	24
Latvia	21	27	27	17	16	18	19	19	10	18	13
Lithuania	20	24	14	13	14	13	15	9	11	7	10
Luxembourg	**10**	**9**	**10**	**8**	**9**	**6**	**6**	**10**	**9**	**11**	**8**
Malta	26	26	26	22	21	20	27	24	20	23	19
Netherlands	4	3	2	3	4	4	5	5	7	5	6
Poland	19	17	21	23	25	26	25	27	27	27	26
Portugal	22	18	24	26	27	25	23	25	25	24	23
Romania	25	22	23	25	19	23	17	18	13	13	17
United Kingdom	5	4	5	5	5	5	4	3	5	4	4
Slovak Republic	14	20	16	19	17	17	20	22	19	15	27
Czech Republic	11	8	9	14	12	11	13	14	21	14	12
Slovenia	8	10	7	6	11	10	9	11	14	19	15
Sweden	1	1	1	1	1	1	1	1	1	1	1

Source: *Observatoire de la Compétitivité*

Why has Luxembourg's position within the general ranking deteriorated in relation to 2009?

From a methodological point of view, it's important to remember that this ranking is constructed relatively, meaning that Luxembourg's ranking also depends on the other countries' performances. Even if Luxembourg's performances are bad, it's possible that other countries' performances have deteriorated a lot more, so that Luxembourg's relative position is better in the end. The ranking tells us nothing about the absolute performances of Luxembourg.

In other words, an improvement in a country's ranking may be caused by the deterioration of another country's performance, which is why the *Observatoire de la Compétitivité* always recommends that the interpretation of the ranking should be made when completed with the information provided by the Scoreboard, meaning, the basic indicators.

Slovenia and Germany do indeed surpass Luxembourg by climbing two places and five places respectively. However, the Czech Republic loses 3 places in the ranking and is behind Luxembourg. Finally, Luxembourg drops one place in this general ranking.

We can observe by analysing the results at the category level that the ranking of Luxembourg climbed two places for the B category (Employment). By looking in more detail at the employment rate, we note that it has dropped in most Member States, which may explained by the fact that during the crisis many employees were dismissed. In Luxembourg the impact on the rate of employment was smaller since many cross-border employees were dismissed. For the C category (Productivity and Labour costs), Luxembourg occupies the 14th position and climbed 9 places in relation to 2009. Also, for the Social cohesion category, Luxembourg loses one place and is 11th in 2010. In the D category, Luxembourg loses 4 places in relation to 2009.

Table 17
The 2010 composite indicator by category

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

Note: Cat.A Macroeconomic performance, Cat. B Employment, Cat.C Productivity and Labour costs, Cat. D Market Operations, Cat. E Institutional and Regulatory Frameworks, Cat. F Entrepreneurship, Cat. G Education and Training, Cat.H Knowledge Economy, Cat. I Social Cohesion, Cat. J Environment
Source: *Observatoire de la Compétitivité*

The table below provides the difference in ranking between 2009 and 2010 per country, meaning the places lost (minus sign) or gained (plus sign) in the ranking by each Member State for each category. The comparison between one year and the other allows us to identify which categories are for the most part made out of cyclical indicators. The ranking of these categories varies a lot from one year to the next. We can see major variations in the rankings for categories A (Macroeconomic performance), B (Employment) and C (Productivity and Labour costs).

As far as the other categories go, we can see small variations. These categories are mainly made out of structural indicators. In order to visualise the presence of cyclical and structural categories, the table cells are coloured in red and green, according to whether the variation in ranking is bigger or smaller than 3 places, respectively. In light grey are the Member State rankings which have not changed.

Luxembourg can justify its lead in the Macroeconomic performance category. This good performance is mainly due to indicators such as the Gross National Revenue per capita, public debt, public deficit, and the direct foreign investments. Even if these indicators have deteriorated in Luxembourg, in comparison with other Member States, they are still at a favourable level. In terms of Productivity and Labour costs, Luxembourg climbed 11 places in relation to 2009.

Table 18
The difference in ranking by category between 2009 and 2010

	Cat A	Cat B	Cat C	Cat D	Cat E	Cat F	CAT G	Cat H	Cat I	Cat J
Germany	2	1	15	1	3	0	-2	1	0	0
Austria	0	0	-9	-3	2	0	1	2	0	0
Belgium	4	6	-7	-4	-2	0	-2	0	0	0
Bulgaria	-7	-3	10	2	3	0	1	-2	0	0
Cyprus	-3	-2	-14	2	-8	0	0	0	1	0
Denmark	-2	-1	2	0	1	0	0	0	0	0
Spain	-1	-3	-20	-4	-1	0	0	1	0	0
Estonia	2	-6	14	-2	-1	0	0	-2	0	0
Finland	2	0	21	-2	1	0	0	0	-1	0
France	0	4	-10	-1	-3	1	-1	2	0	0
Greece	-2	1	-6	1	0	0	1	0	0	0
Hungary	5	0	-5	-1	-3	0	0	-2	1	0
Ireland	-3	-1	1	-4	0	0	2	1	1	0
Italy	1	1	-2	5	2	0	0	2	0	0
Latvia	1	-3	3	0	12	0	0	0	1	0
Lithuania	1	-8	18	-4	-3	0	0	0	-1	0
Luxembourg	**0**	**2**	**11**	**-4**	**1**	**0**	**0**	**0**	**-1**	**0**
Malta	0	5	-13	2	-11	0	0	0	0	0
Netherlands	0	0	-2	4	5	0	-1	0	-1	0
Poland	1	3	-17	-1	0	0	1	0	-1	0
Portugal	-3	0	-12	4	1	-1	0	0	0	0
Romania	0	1	-5	-1	1	0	-1	0	0	0
United Kingdom	-1	1	0	0	-1	0	-1	-2	-1	0
Slovak Republic	3	-1	8	11	-2	0	1	2	0	0
Czech Republic	-1	0	-2	0	-1	0	1	0	2	0
Slovenia	0	2	9	6	2	0	0	-2	0	0
Sweden	1	1	12	-7	2	0	0	-1	0	0

Note: Cat.A Macroeconomic performance, Cat. B Employment, Cat.C Productivity and Labour costs, Cat. D Market Operations, Cat. E Institutional and Regulatory Frameworks, Cat. F Entrepreneurship, Cat. G Education and Training, Cat.H Knowledge Economy, Cat. I Social Cohesion, Cat. J Environment
Source: *Observatoire de la Compétitivité*

3.4 The new EU 2020 Strategy indicators and their impact upon the scoreboard and the composite indicator ranking

In chapter 5 of this Report, the indicators from the EU 2020 Strategy are discussed in detail. The impact of those indicators on the Scoreboard and on the rankings of the composite indicator is still to be analysed.

In the EU 2020 Strategy indicators list, we re-encounter some indicators which we've already analysed within the framework of the Lisbon Strategy. These are the following: the economy's energy intensity, the rate of early school leavers, the persons at risk of poverty after social benefit transfers, and the gross domestic expenditure on Research and Development. Other indicators are added to these well-known indicators, namely in the domain of social cohesion, an important pillar of the EU 2020 Strategy. These are: people at risk of poverty or social exclusion, people living in households with very low work intensity, and severely materially deprived people.

Then some indicators from the EU 2020 Strategy are similar but can be distinguished by a detail in the definition of the TBCO indicators. For example, in the scoreboard the rate of employment is analysed for the age group 15-64 whereas in the EU 2020 Strategy it's the 20-64 age group that is taken into account. The same observation can be made for the indicator concerning persons with tertiary educational attainment aged between 20-24 per gender of the scoreboard. The EU 2020 Strategy advocates the use of the 30-34 age group having graduated from higher education. Given that these indicators are strongly correlated, we have replaced the TBCO indicators with the similar indicators from the EU 2020 Strategy in our impact simulation. For the indicator concerning the greenhouse gas emissions, the base year for the EU 2020 Strategy is Kyoto whereas for the TBCO indicator it is 1990. The table below summarises the comparison.

Table
Comparison between the indicators from the EU 2020 Strategy and those from TBCO

EU 2020 Strategy	Added, replaces or identical	TBCO indicator
Rate of employment for the 20-64 age group	replaces the indicator	Rate of employment for the 16-64 age group
Domestic expenditure on Research and Development	is identical to	Domestic expenditure on Research and Development
Greenhouse gas emissions base year 1990	replaces the indicator	Greenhouse gas emissions Kyoto baseline year
Portion of renewable energy in the final gross energy consumption	replaces the indicator	Portion of renewable energy
Economy's energy intensity	is identical to	Economy's energy intensity
Young people that dropped out of education and training prematurely	is identical to	Young people that dropped out of education and training prematurely
Persons aged 30-34 per gender having graduated from higher education	replaces the indicator	Persons aged 20-24 who have reached a superior secondary education level
Population at risk of poverty or exclusion	is added	
People living in homes with very week work intensity	is added	
Persons in a serious material deprivation situation	is added	
Persons at risk of poverty after social benefit transfers	is identical to	Persons at risk of poverty after social benefit transfers

In the table below the indicators from the EU 2020 Strategy are analysed according to the principles of the Competitiveness Scoreboard, meaning Luxembourg's performance in relation to the EU's average and the evolution of Luxembourg's performance over time are displayed. We observe that, out of 11 indicators, 5 indicators are green, 5 indicators are orange and 1 indicator is red. However, amongst the 5 indicators in green, Luxembourg only improved its performance on one, in relation to last year. The performances for the other 4 indicators have deteriorated. For 4 orange indicators and for one red indicator Luxembourg did improve in relation to last year. In general, it can be said that for certain indicators Luxembourg is well placed, with 5 indicators being green, given however that the tendency over time is unfavourable in relation to the EU's average. With regard to the red and orange indicators, Luxembourg must continue to progress towards the national objectives. Chapter 5 of this Report analyses the national objectives in more detail.

Table
The EU Strategy indicators

Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
Employment rate of the 20-64 age group (2010)	↑	**70.7**	68,6	74,9	69.2	67,6	MT 59.9	SE 78.7
Domestic expenditure on Research and Development, as a % (2009)	↑	**1.68**	2.01	2.82	2.21	1.96	CY 0.46	FI 3.96
Greenhouse gas emissions base year 1990 (2009)	↑	**91**	83	74	92	87	LV 40	CY 178
Portion of renewable energy in the final gross consumption of energy (2008)	↑	**2.1**	10.3	9.1	11	3.3	MT 0.2	SE 44.4
The economy's energy intensity (2009)	↑	**151.93**	165.2	150.55	164.33	205.69	DE 106.7	BU 842.54
Young people having dropped out of education and training prematurely (2010)	↑	**7.1**	14.1	11.9	12.8	11.9	SK 4.7	MT 36.9
Level of higher education per gender for the 30-34 age group, as a % (2010)	↓	**46.1**	33.6	29.8	43.5	44.4	RO 18.1	IR 49.9
Population at risk of poverty or exclusion, as a % (2009)	↓	**17.8**	23.1	20	18.4	20.2	CZ 14	BU 46.2
Persons living in homes with a very weak work intensity, as a %(2009)	↓	**6.3**	9	10.8	8.3	12.3	CY 4	IR 19.8
Persons in a serious material deprivation situation, as a % (2009)	↓	**1.1**	8.1	5.4	5.6	5.2	LU	BU 41.9
Persons at risk of poverty after social benefit transfers, as a % (2009)	↓	**14.9**	16.3	15.5	12.9	14.6	CZ 8.6	LV 25.7

Source: EUROSTAT

The ranking supplied by the composite indicator varies when the indicator basket is changed. Thus, in the B category (Employment), Luxembourg was able to improve its position, climbing from 10th place in the original TBCO to 9th place in the TBCO bis, which takes new indicators into account. In the J category (Environment), we make the opposite observation; Luxembourg's position deteriorates in the TBCO bis ranking. In the G category (Education), Luxembourg jumps from 15th place to 8th place depending on whether we use the TBCO indicators or the TBCO bis indicators. The added indicators in the Social cohesion category have a sizeable impact on the ranking for that category. Luxembourg goes from 6th place with the TBCO bis to 11th place with the TBCO. In the general ranking, Luxembourg improves its performance by two places, from 10th in the TBCO to 8th in the TBCO bis.

Table
The composite indicator ranking including the EU 2020 indicators: TBCO bis

	Général	Cat A	Cat B	Cat C	Cat D	Cat E	Cat F	CAT G	Cat H	Cat I	Cat J
Germany	7	7	4	8	17	15	22	15	3	13	14
Austria	9	6	7	20	9	8	20	18	8	5	12
Belgium	14	14	15	11	21	24	23	11	7	11	18
Bulgaria	20	21	18	16	1	21	4	20	25	25	24
Cyprus	16	5	5	24	24	14	12	14	22	14	27
Denmark	2	10	3	7	2	6	21	1	2	4	20
Spain	22	23	25	21	23	17	16	22	15	17	4
Estonia	6	19	16	5	3	5	11	5	11	23	6
Finland	3	3	8	6	13	7	15	2	1	9	9
France	13	11	13	13	11	22	13	13	9	7	16
Greece	26	27	20	27	12	27	1	23	19	19	21
Hungary	24	18	27	23	22	26	26	21	16	15	5
Ireland	12	20	14	1	27	1	5	10	14	22	23
Italy	17	15	24	18	7	23	9	24	18	16	3
Latvia	23	26	22	3	20	9	17	16	21	27	13
Lithuania	18	25	21	4	19	18	3	7	26	24	17
Luxembourg	**8**	**1**	**9**	**14**	**26**	**2**	**18**	**8**	**6**	**6**	**25**
Malta	27	12	23	26	25	16	19	27	13	10	26
Netherlands	4	4	2	10	10	4	7	4	5	12	15
Poland	21	9	19	22	6	20	10	12	24	20	22
Portugal	19	22	11	19	5	10	14	26	12	21	19
Romania	25	24	17	25	8	25	2	25	27	26	10
United Kingdom	5	16	6	12	4	3	8	6	10	18	11
Slovak Republic	15	17	26	9	14	19	25	19	23	8	7
Czech Republic	11	8	10	17	16	13	24	17	17	3	2
Slovenia	10	13	12	15	18	11	6	9	20	2	8
Sweden	1	2	1	2	15	12	27	3	4	1	1

Source: *Observatoire de la Compétitivité*

Table
Luxembourg's ranking in 2010 according to TBCO

Luxembourg	**10**	**1**	**10**	**14**	**26**	**2**	**18**	**15**	**6**	**11**	**24**

Source: *Observatoire de la Compétitivité*

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4 Price and Cost Competitiveness – Economy Costs in Luxembourg

4.1 Introduction

The real effective exchange rate (REER) allows an analysis of the price competitiveness and the cost competitiveness of the Luxembourgish economy by making a correlation between, on one side, domestic prices and costs and on the other, foreign prices and costs expressed in euro. So a hike in this rate is equivalent to a loss of competitiveness in Luxembourg.

In analysing the REER in Luxembourg for the 1995 to 2012 period, we can observe a deterioration of competitiveness with, at the end, an acceleration in the loss of price competitiveness in relation to our main economic partners. We also observe a deterioration in cost competitiveness in Luxembourg for the same period. In both cases, the global evolution is impacted mainly by the evolution in the indicators for the services sector.

The trends of all the series analysed since many years clearly indicate that we are in a deterioration slope in terms of our external competitiveness and that it is important to remain vigilant even if Luxembourg's performances, powered by a financial sector, which produces high added value services, have been excellent. The analysis of trends is also more instructive than methodology discussions concerning small variations within the same trend.

4.2 Analysis of the external competitiveness by the *Observatoire de la Compétitivité*

Since 2006, the *Observatoire de la Compétitivité* has published a detailed report on external competitiveness on a regular basis, with the cost version or the price version of Luxembourgish companies. This analysis is based on the real effective exchange rate (REER), which allows an evaluation of the competitive position of a country in relation to its main commercial partners by comparing the relative prices, costs and effective exchange rates between them.

The analysis of external competitiveness has become even more important given the evolutions at the European level, or the consequences of the economic and financial crisis that caused EU Member States, namely those in the Eurozone, to decide upon reforms of different existing processes of economic policy and budgetary surveillance and coordination, as well as structural reforms at the heart of the European Semester, aimed at increasing the level of governance and avoiding future crisis by organising a systematic monitoring of possible harmful imbalances in the EU and in particular in the Eurozone[70].

[70] Also see chapter 5 *infra*.

There is thus henceforth a legislative package within which there are two new regulations that are aimed specifically at revealing and correcting the Union's, the Eurozone's and the countries' macroeconomic imbalances (whether they are domestic or external in nature). The aim is to extending the European Union's economic surveillance role to the surveillance and correction of macroeconomic imbalances. The **"preventive arm"** of such elements, which will be discussed in more detail in chapter 6, includes a regular risk and imbalance evaluation based on an **indicators scoreboard** and caters for deeper per country analysis, if still needed, after the scoreboard analysis.

It's in Luxembourg's best interest to continue to closely monitor its own external competitiveness. Indeed, the new tool of preventive control of imbalances risk, the Excessive Imbalances Scoreboard (EIP) monitors the economic variables in detail, releasing each time a single defined alert. It is not surprising that, at the heart of this scoreboard we find key variables for all price and cost competitiveness analysis, namely the REER[71] and the nominal unit labour cost[72] next to budget variables, a balance measure of current balance current-account indicators of public and private debt and the evolution of real estate prices.

In this chapter devoted to price and cost competitiveness in Luxembourg, it is worth remembering that whilst Luxembourg is fairly well placed on a number of EIP indicators, namely in terms of budget and also even very well placed in terms of current-account, when making an ex post analysis of the scoreboard over the last decade, Luxembourg is in the warning zone on key competitiveness variables for several years. So, the unit labour cost in Luxembourg has increased more than the alert threshold set at 5% from 2001 to 2003 and between 2009 and 2010 and the REER[73] deflated by the harmonized inflation (HICP) and calculated with data from 35 commercial partner nations has exceeded the alert threshold of percentage variation over 3 years in 2004 and in 2005.

A regular analysis of these competitiveness variables has therefore become even more pertinent and the *Observatoire de la Compétitivité* will continue to monitor the cost and price competitiveness in detail, even if the analysis and general definition of the economy's competitiveness in Luxembourg is obviously larger and includes many non-price dimensions of competitiveness as presented by the *Observatoire*'s scoreboard. Finally, let us also note that the REER analysis in the Competitiveness Report is more detailed than, for example, that made in the EU scoreboard, since it allows for a distinction between the competitiveness evolution in the service sector and in the industrial sector.

[71] For additional methodology details also see section 8.2.1 below and chapter 6 *infra*.

[72] Also see chapter 6 *infra*.

[73] The REER used to analyse the external price competitiveness of Luxembourg in this chapter is based on the deflator of value added (compare below in 8.2.1.b). The European Commission has meanwhile chosen to deflate the REER by the harmonized index of consumer prices (HICP), a choice that may seem less relevant to measure the price competitiveness of firms, while the HICP is calculated to capture the inflation experienced by consumers but which is justified at EU level and that over the period analyzed is not penalizing for Luxembourg on the EIP scoreboard. On this subject see also the detailed discussion in Section 8.4 below.

4.2.1 Luxembourg's real effective exchange rate (REER)

The real effective exchange rate is an important variable for competitiveness because a drop or depreciation in the exchange rate improves a country's competitiveness by making its products cheaper abroad and making the products from its foreign competitors more expensive in the domestic market.

Since a bilateral real exchange rate cannot reflect the competitive position of a country in relation to all of its main economic partners, a weighted average (by the weight of each partner in Luxembourg's exports) called the "nominal effective exchange rate" should be analysed. Depending on whether one deflates the nominal effective exchange rate by an indicator of price or cost, it provides a measure of "price competitiveness" or "cost competitiveness", the real effective exchange rate for price or for costs. The REER allows a comparison at the macroeconomic level of domestic and foreign prices expressed in a common currency[74], and thus provides a measure of competitiveness.

For Luxembourg, member of the Eurozone, with fixed exchange rates, the adjustment mechanism by the differential competitiveness is based primarily on market forces acting in a stabilizing way for marked price and cost differentials. In particular, if a country has a lower than average inflation, it becomes more competitive in relation to its partners in the monetary area.

For the deflation of the real effective exchange rate in terms of prices, we compare the prices of domestic goods and services with those of its main competitor countries, knowing that here the "prices" are the implicit prices of value added. In terms of costs, we compare the domestic unit labour costs, that is to say the cost of labour per unit of value added produced to those that are borne by the economic partner countries.

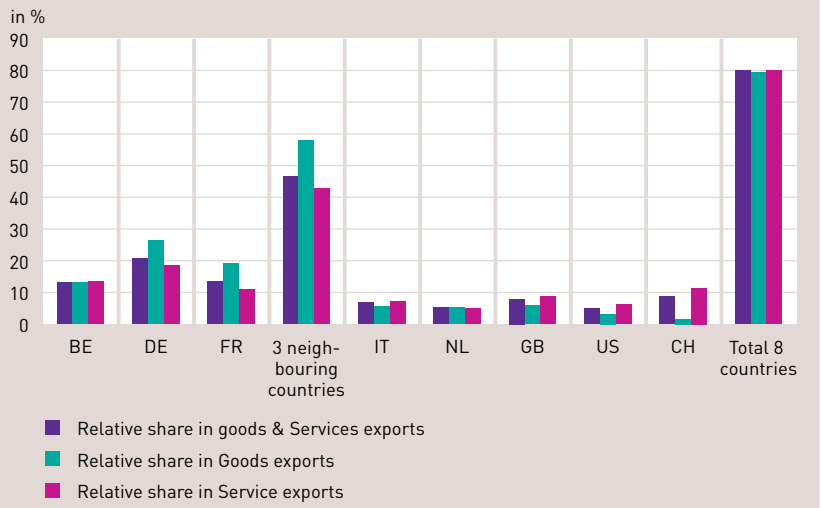
4.2.1.a Weightings

The real effective exchange rate is constructed from the currencies of major partners trading with Luxembourg (Belgium, Germany, France, Italy, Netherlands, USA, United Kingdom and Switzerland). A weighting is assigned to each bilateral exchange rate (for those countries outside the Eurozone, Eurozone countries have an exchange rate equal to unity, of course) that reflects the average relative importance of that country in the trade structure of Luxembourg.

Obviously, a different weighting structure should be applied to the total economy, the service sector and for industry. This reflects a different geographical breakdown of trade in goods and services. The weights used in calculating the real effective exchange rate - reflecting the relative average importance of main partner countries in Luxembourg's exports - are adjusted each year for the REER calculation, so as to take changes in the geographical structure of exports into account.

[74] Also see BULDORINI L., MAKYDAKIS S., THIMANN C., The effective exchange rates of the euro, Occasional paper series N°2, BCE, Frankfurt, February 2002

Figure
REER weights (relative average importance in Luxembourg's Foreign Trade)



Source: STATEC, *Observatoire de la Compétitivité*

The different weights used to construct the real effective exchange rates are derived from Foreign Trade Statistics for Luxembourg, published regularly by the STATEC[75]. The figure above outlines the "relative importance" of each of our eight major trading partners for Luxembourg's foreign trade or the average portion of each of these countries in Luxembourg's total exports of goods, services and total exports, knowing that in total these eight countries account for 80% of exports in Luxembourg.

It is clear that the weights differ slightly depending on whether one considers exports of goods, weights used for the Industry REER, exports of services, weights used for the services REER or exports of goods and services, weights used for total economy REER. One can also observe that around 50% of our exports go to our three neighbouring countries and that around 60% of exports go to the Eurozone, this rate amounts to 70% for services. This highlights what has been said before, that for Luxembourg, the adjustment mechanism by the competitiveness differential is primarily based on market forces acting in a stabilizing way towards marked price and cost differentials.

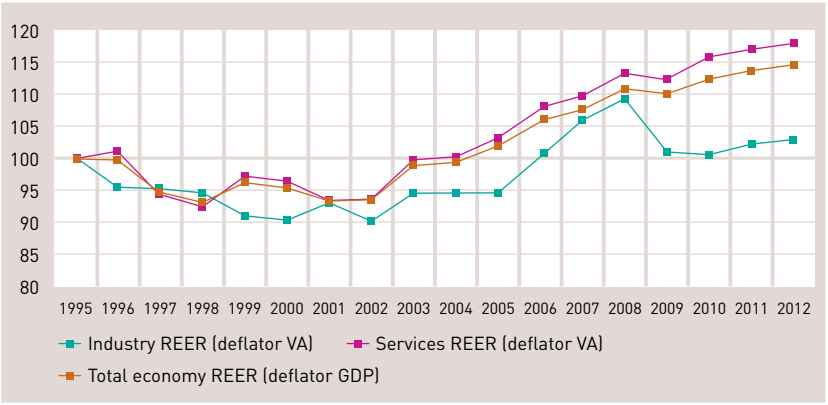
[75] www.statec.lu

4.2.1.b The real effective exchange rate from the price perspective

The real effective exchange rate from the price perspective measures the ratio between on the one hand, domestic prices and on the other the foreign prices in euros. Under the concept of "price" are the implicit prices of value added. Foreign prices (by sector) are obtained by multiplying the price index of value added (by sector) by the weighted exchange rate. Involved in calculating the latter are the nominal exchange rates of the currencies of countries outside the Eurozone ($, £ and CHF), weighted by the relative average importance of the respective country in Luxembourg's exports.

The figure below shows the evolution of the price competitiveness measured by the REER from the price perspective, by showing the relationship between, on one hand, domestic prices and on the other, foreign prices expressed in euro. Thus, a decrease in the REER (downward curve) is to be regarded as an improvement in price competitiveness of Luxembourg (domestic prices moving more slowly than foreign prices expressed in euro): in contrast, an increased REER (upward curve) is equivalent to a decline in competitiveness. The data at the base of the REER calculations come from the AMECO database of the European Commission, DG ECFI[76]; the 2011 and 2012 data are projections.

Figure
Real effective exchange rate-indicator of price competitiveness of Luxembourg



Source: AMECO, STATEC, *Observatoire de la Compétitivité*

Note that the REER of the Luxembourg economy increased significantly between the beginning and the end of the analysis period, influenced in particular by a sharp increase in the REER since 2003. The trend of the price competitiveness of Luxembourg is downward (REER ascending or rising curve) and this trend is essentially influenced by the service sector[77].

For the full analysis period 1995-2012 the trend of the Industry REER curve is only slightly upward since the price competitiveness of the industry, after improving from the start of the observation period until the middle, deteriorated sharply between 2005 and 2008 to decline again during the economic crisis and to stabilize in 2010, a stabilization which, according to the forecasts, seems to experience a slight deterioration until 2012.

[76] Note that the AMECO data come in fact from National Statistics Offices and is submitted after verification by Eurostat. AMECO Base see: http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm

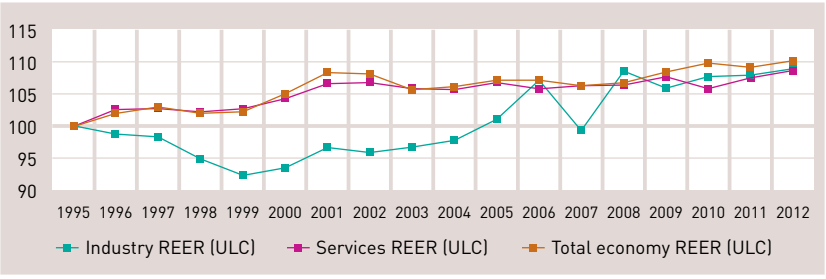
[77] See also *« Prix compétitivité et indexation : implications pour le Grand-Duché »*, Fontagné L. in the 2008 Competitiveness Report, Perspectives de Politique Economique, Ministry of Economy and Foreign Trade, Vol. 11, October 2008

4.2.1.c The real effective exchange rate from the cost perspective

For the costs version of REER, we compare the domestic nominal unit labour costs, or the cost of labour per unit of value added, to that faced by the economic partner countries. However, the unit labour costs indicator (ULC) comprises two different aspects of competitiveness: wage costs and productivity. Although the evolution of labour costs can therefore explain a loss of competitiveness as measured by the real effective exchange rate, cost version, the evolution of productivity also contributes to it[78].

By observing the REER-cost curves in the figure below, there is a continuing deterioration of the situation of cost competitiveness for the Luxembourg economy (rising curve). The evolution of the REER for all of the Luxembourg economy from a cost perspective is strongly coupled to the service sector, the flagship of the Luxembourg economy. Indeed, the service sector shows a very marked and continued deterioration in competitiveness from 1995 to 2009 and even in forecast until 2012.

Figure
Real effective exchange rate - indicator of cost competitiveness of Luxembourg



Source: AMECO, STATEC, *Observatoire de la Compétitivité*

For industries, the finding in the beginning of the period is less sharp because the cost competitiveness there was even temporarily improved. However, there was a rapid deterioration in cost competitiveness of the industry between 2002 and 2008 (with one exception between 2006 and 2007). At the end of the period there seems to be stabilization, although these are still just forecasts.

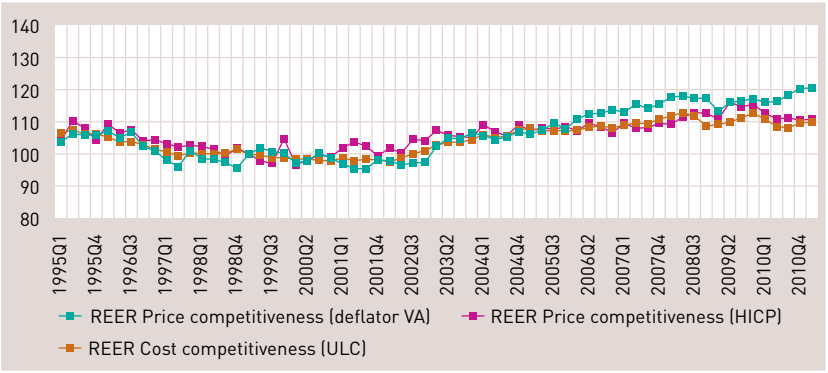
[78] For a detailed discussion on productivity by industry see DUBROCARD A., GOMES FERREIRA I. and PERONI C., Productivité et compétitivité au Luxembourg: une comparaison par pays et par branches, May 2010, Ministry of Economy and Foreign Trade, May 2010 and LuxKlems report: update 2011 "Productivity & the crisis" infra.

4.3 A quarterly analysis

The detailed analysis of the price and cost competitiveness of Luxembourg, distinguishing between the total economy, industry and services is done for purposes of data that are still in yearly analysis. However, when quarterly data are available at the level of the national economies we should analyse the evolution of Luxembourg's price and cost competitiveness also on a quarterly basis.

The figure below shows the price and cost versions of REER for Luxembourg. These are quarterly series from the European Central Bank's[79] databases, which calculate the REER taking into account 35 countries and by deflating by the deflator of value added and nominal unit labour costs.

Figure
Real effective exchange rate - price and cost competitiveness indicators for Luxembourg (quarterly version)



Source: BCE, *Observatoire de la Compétitivité*

We see that quarterly competitiveness indicators confirm the changes seen in the yearly frequency and show a loss of external competitiveness of Luxembourg, in particular since 2003. These results are consistent with those reported by other international bodies including the Organization for Economic Cooperation and Development[80] (OECD), the International Monetary Fund[81] (IMF) and the Central Bank of Luxembourg who presented an update of its competitiveness indicators in June 2011 in its annual report[82].

[79] http://www.ecb.eu

[80] http://www.oecd.org

[81] http://www.imf.org

[82] http://www.bcl.lu/fr/publications/rapports_annuels/2010

Remember, the REER used to analyse the price competitiveness outside of Luxembourg in this chapter was based on the deflator of value added. In the EIP scoreboard, the European Commission chose to deflate the REER by the harmonized index of consumer prices (HICP) a choice that may seem less relevant to measure the price competitiveness of firms while the HICP is calculated to capture the inflation experienced by consumers but which is justified at EU level and on the long run. In addition, the HICP includes a distortion in relation to the index used at national level (NCPI) due to consumption (mainly energy) of cross-border population in Luxembourg. However, it appears clearly in the figure above that an analysis based on the HICP is more favourable than penalizing to Luxembourg over the last period observed than the analysis based on the GDP deflator, which shows a greater loss of competitiveness as described also by CSL[83] in its recent publication.

More than a single value or even more than a single curve, the analysis of the external competitiveness of Luxembourg should take into account the trends of many years and which all indicate a loss of competitiveness of Luxembourg.

4.4 Conclusion

Even if the definition of competitiveness used in Luxembourg is large, price and cost competitiveness are critical determinants of the ability of companies in Luxembourg to export their goods and services: the evolution of prices and wages in Luxembourg affects the external competitiveness of Luxembourg's companies and the real effective exchange rate (REER) assesses the country's competitive position in relation to its main trading partners by comparing relative changes in prices, costs and exchange rates amongst those same partners themselves.

The price competitiveness of the Luxembourg economy experienced a marked deterioration over the analysed period 1995 to 2012 and this trend is essentially influenced by the service sector. Cost competitiveness also experienced a steady deterioration. For the two external competitiveness indicators, the global evolution is mainly driven by changes in the indicators for the service sector, being the industry evolution less clear. This result is also confirmed by the new scoreboard's ex post analysis for the period 2001-2010, monitoring the excessive imbalances within the Eurozone and by quarterly analysis.

Beyond the methodological discussions on the nature of deflators and the uncertainties on some statistics subject to revisions, it should be noted that the trends (rather than the magnitude) of all the analysed series illustrate clearly that we are on a slope of deterioration of our competitiveness and that it is important to remain extremely vigilant about the loss of external competitiveness registered in Luxembourg.

[83] In its recent publication *« Inflation, modulations de l'index et compétitivité »*, CSL (2011).

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Reinforcing economic policy coordination, COM(2010) 250 final, Brussels, May 2010

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5 The European semester and the Europe 2020 Strategy

5.1 The "European Semester"

Since the ten-year strategy for Growth and Jobs (called "Lisbon Strategy") has expired in 2010, the European Council set up in 2010 the foundations for a new European economic governance. From 2011 it takes place in an integrated and parallel way at two levels within the "European semester" (first half of each year). This new governance is structured in the pillars:

- Macroeconomic surveillance and thematic coordination under the aegis of the Europe 2020 Strategy, which replaces the Lisbon Strategy;
- Coordination of fiscal policies under the Stability and Growth Pact (SGP).

Figure 1
The new European economic governance under the European Semester

Source: European Commission

In March 2011, the Heads of State and Government further strengthened this coordination by launching the "Euro plus pact"[84], the main objectives of which are to promote competitiveness, to stimulate employment, to better contribute to the sustainability of public finances and strengthen financial stability. The participating Member States, including Luxembourg, will agree each year to a series of concrete actions to be implemented within twelve months. These commitments will also be reflected in the National Reform Programmes (NRP) developed as part of Europe 2020 Strategy and in the stability programs developed under the SGP that Member States shall present each year during the European Semester.

[84] For additional details: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/fr/ec/120305.pdf

This chapter is limited to a descriptive analysis of quantitative objectives and monitoring indicators used in the context of thematic coordination (coordination of structural policies) in the Europe 2020 Strategy. The system of indicators provided in the context of macroe-conomic surveillance whose purpose is to better enable to detect any macroeconomic imbalances[85] in the future, being also part of the Europe 2020 Strategy, is reviewed in another chapter of this Competitiveness Report[86].

5.2 From the Lisbon Strategy to the Europe 2020 Strategy

5.2.1 Implementation of the Europe 2020 Strategy

The Europe 2020 Strategy[87], which is a central element of the response of the European Union (EU) to the global economic crisis, was designed to update and replace the Lisbon Strategy[88] launched in March 2000 and renewed in 2005 as a European strategy for growth and jobs. The new strategy involves greater coordination of economic policies and focuses on key areas where action must be taken to boost the potential of a sustainable and inclusive growth and competitiveness in Europe. Indeed, given the economic crisis and the challenges of restoring public finances, demographic ageing, growing inequalities and climate change, a new approach was indispensable. The way out of the crisis was considered to be the point of entry into a social market economy, an economy greener and smarter, in which prosperity is the result of capacity to innovate, the better usage of resources, and where knowledge will be key.

[85] For additional details: http://ec.europa.eu/economy_finance/articles/eu_economic_situation/pdf/com2010_527fr.pdf

[86] For more details see the chapter on the European Semester and macroeconomic surveillance

[87] For additional information: http://ec.europa.eu/eu2020/index_fr.htm

[88] For additional information: http://ec.europa.eu/archives/growthandjobs_2009/

In early 2010, the Commission made proposals to implement this new Europe 2020 Strategy[89]. In March 2010, the European Council, on the basis of a communication from the Commission, discussed and approved the main elements, including key objectives that will guide its implementation as well as provisions to improve its monitoring. The European Council agreed on a series of elements[90]. The June European Council[91] finally completed the development of the new Europe 2020 Strategy. The European Council confirmed five major EU objectives in particular, which are shared objectives guiding the action of Member States and the EU in terms of promoting employment, improving the conditions for innovation and R&D, achieving the objectives in the fields of climate change and energy, improving the levels of education and social inclusion, particularly by reducing poverty[92] :

"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 gases 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 drop-out 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. This 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 objectives on the basis of the most appropriate indicators, taking into account their national circumstances and priorities."

89 EUROPEAN COMMISSION, EUROPE 2020, A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final, Brussels, 3.3.2010

90 EUROPEAN COUNCIL, Conclusions, Brussels, March 2010

For additional information: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/fr/ec/113602.pdf

91 EUROPEAN COUNCIL, Conclusions, Brussels, June 2010

For additional information: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/fr/ec/115348.pdf

92 In Luxembourg, a policy debate on the Europe 2020 Strategy took place in early June 2010 at the Chamber of Deputies before the final adoption of Europe 2020 by the European Council

For additional information: http://www.odc.public.lu/actualites/2010/06/europe_2020/index.html

5.2.2 First NRP draft submission (2010)

Each Member State has subsequently had to translate the five European objectives into national targets[93] as part of a temporary and transitional NRP draft, submitted to the Commission in late 2010. Luxembourg submitted its NRP draft in November 2010[94].

Frame 1

Analysis of the challenge posed by the 2020 national targets set by Member States in their November 2010 NRP drafts

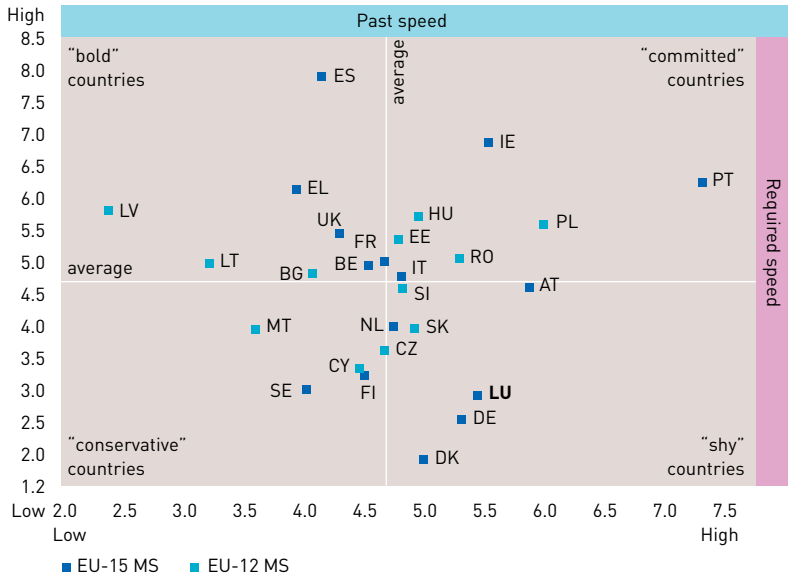
In early 2011 the consulting firm European House-Ambrosetti[95] made an analysis of the ambition that the Member States of the EU have displayed in setting their (preliminary) national targets Europe 2020 at the end of 2010: Employment, R&D, energy, education and social inclusion. This analysis is based on both past performance of the Member States (between 2005-2009) and the ambition of national targets for 2020 compared with the latest national data available, that is to say, the annual growth required per target in relation to the base year, in order to achieve the desired value fixed for 2020. For each national objective, the performance of a Member State is compared to the best (score 10) and the worst (score 0) pupil in the class[96]. This methodology also ultimately allows us to aggregate the results by objective to generate an overall ranking of Member States according to their past performance and overall ambition[97].

Luxembourg is among the countries with the best performances between 2005-2009 (5th rank after Portugal, Poland, Austria and Ireland) concerning growth for the different objectives, but is also among the countries with the lowest ambitions for 2020 judged from the level reached (25th place, ahead of Germany and Denmark). In calculating the global challenge posed by national targets for 2020 based in part on past performance and in part on the difference between the 2020 target and the current situation, Luxembourg is also very low (25th place), again followed by Germany and Denmark. Note that this analysis to measure the level of ambition in 2020, considers only the quantitative discrepancy between the 2020 objective and the present situation of a country in order to determine the need for growth and therefore the challenge and ambition, and does not really take the differences in level between the countries into account.

This methodology makes it possible to group EU Member States into four categories. Luxembourg is listed among the "shy" countries, certainly with good past performances, but with a low ambition for 2020.

Figure 2

Comparison of past performance and national targets for 2020 (provisional)



Source: European House – Ambrosetti (2011)

93 Except for the greenhouse gas emissions and renewable energy for which there are already binding national targets

94 For additional information: http://www.odc.public.lu/actualites/2010/11/PNR_Luxembourg_2020/index.html

95 For additional details: http://www.ambrosetti.eu/en

96 For additional details: http://www.observatoryoneurope.eu/

97 Weights used: Employment (20%), R&D (20%), Energy (20%), Education (20%) and Inclusion (20%)

5.2.3 Launch of the first European Semester (January 2011)

In January 2011, the first European Semester was launched within the framework of the new economic governance following the publication by the Commission of the annual growth survey[98], whose priorities have been validated by the European Council in March 2011[99]. In March 2011, the Member States of the Eurozone[100] have also committed to implement the Euro plus pact to strengthen the economic pillar of the monetary union, and to give a new quality to the coordination of economic policies, to improve competitiveness and thereby to achieve a higher level of convergence. This pact focuses primarily on matters of domestic jurisdiction and which are crucial to enhancing competitiveness and avoiding detrimental imbalances. To ensure the necessary political impetus, each year Member States shall agree on a series of concrete actions to be implemented within twelve months. The choice of specific policy measures to be implemented remains the responsibility of each country, but this choice will be guided in particular by examining the elements mentioned above. These commitments must be reflected in the yearly NRP and SGP, which are assessed by the Commission, the Council and the Eurogroup within the framework of the European Semester.

[98] European Commission, Annual Growth Survey: advancing the EU's comprehensive response to the crisis COM/2011/0011 final, Brussels, January 12, 2011

[99] These include measures to: increase the attractiveness of work; help the unemployed re-enter the job market; fight against poverty and promote social inclusion; invest in education and training; balance security and flexibility; reform the pension system; attract private capital to finance growth; stimulate research and innovation, providing access to energy at affordable cost and strengthen policies put in place in energy efficiency.

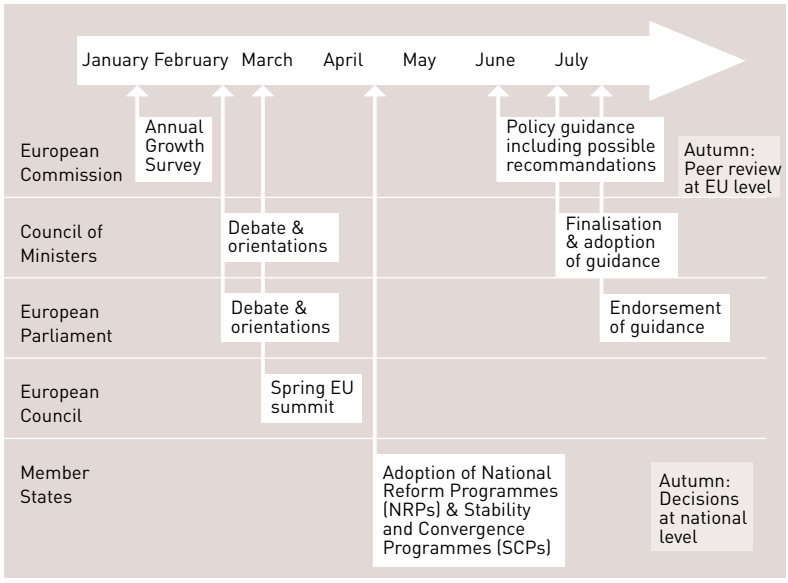
[100] Pact which was also joined by Bulgaria, Denmark, Latvia, Lithuania, Poland and Romania (European Council Conclusions, 24 and March 25, 2011). For additional details: http://www.european-council.europa.eu

Frame 2
What is the "European Semester"?

The monitoring of the strategy is an integral part of the "European Semester", an annual cycle of economic policy coordination and budgetary Member States.

The first full cycle of the European Semester began in 2011.

Figure 3
European Semester calendar and steps (January – July)



Source: European Commission

The European Semester, to be held annually, break down in the following steps:
January: the Commission presents its annual growth survey, which reports on the achieved progress and sets directions for the coming year;
February-March: the European Council provides advice to Member States and the EU;
April: Member States submit their NRPs and SGPs that take the recommendations into account;
June-July: on the basis of the NRPs and SGPs submitted, the Commission submits proposals for country-specific recommendations to be sent to Member States.

Then the Council discusses and adopts the opinions and recommendations by country. The Commission may also issue warnings if the policy recommendations are not implemented on time. It can also provide incentives and sanctions for macroeconomic imbalances and excessive budgets.

In the second part of the year, Member States finalize their national budgets taking into account the recommendations by country. In the following year's annual growth survey, the Commission assesses how Member States have taken into account the recommendations that were addressed to them.

In early 2011, much debate took place at the launch of the European Semester to discuss the European strategy in the coming years in response to the present challenges[101]. In Luxembourg, a second policy debate was held in the Chamber of Deputies[102] and the social partners and civil society[103] were consulted and submitted their own comments to the government on the NRP draft.

[101] For example, the Europe 2020 summit organized by the think thank "the Lisbon council".

For further details: http://www.lisboncouncil.net/news-a-events/254-president-barroso-keynotes-the-europe-2020-summit.html

[102] For additional details: http://www.odc.public.lu/actualites/2011/03/debat_europe_2020/index.html

The various parliamentary committees involved in the Europe 2020 Strategy and the European Semester as a whole have also expressed their views to government.

[103] During the first half of 2011 consultations were held with social partners and civil society about the different national goals that were set as part of the Luxembourg 2020 strategy, and many comments and statements were subsequently communicated to the government.

5.2.4 Final NRP submission (April 2011)

In April 2011, based on the draft NRP of November 2010 and comments received during the consultation procedure, Luxembourg sent its finalized NRP to the Commission[104]. Alongside a macroeconomic scenario and a section dedicated to macroeconomic monitoring, the NRP has also approved the national targets for 2020, by indicating as well the methodological limitations of some indicators and targets for Luxembourg, and proposing measures that should help to achieve these national objectives. The national objectives that have been approved by Luxembourg[105] are:

- A national target of employment rate of 73% in 2020 for people aged 20 to 64. The goal for 2015 is about 71.5%;

- An overall target of R&D intensity ranging from 2.3% to 2.6% of GDP for 2020. As sub-goals for 2020, the government has set an interval of 1.5% to 1.9% for the private sector and 0.7% to 0.8% for the public sector. The interim overall objective targeted for 2015 is 2%. In the November 2010 draft NRP, a provisional overall goal of 2.6% had been set for 2020, but a process of consultation with relevant stakeholders in the sector[106], and simulations based on past data series[107], showed the difficulty for the private sector to achieve the objectives of private R&D initially selected. These private R&D targets have therefore been reset;

- In its first EEAP (Directive 2006/32/EC), Luxembourg has set a national indicative target for energy efficiency enduse of 10.38% by 2016. In parallel, Luxembourg has determined that it could analyse the feasibility of an extension of the national indicative target set (Directive 2006/32/EC) until 2020, which would amount to 4 additional percentage points for the period 2016 to 2020, leading to an overall target of 13% in 2020. Note that the national target will remain largely influenced by the choice of the reference period and the energy accounting chosen (primary energy vs. final energy)[108].

- A national goal of sustaining the early school leavers below 10% in 2020, knowing that if until 2015 the dropout rate has stabilized below 10% that goal will be adapted (measuring instrument: national survey on school dropout), and a national goal to increase the proportion of people aged 30 to 34 years who graduated from higher education or achieved an equivalent level of education to 40% (this indicator should be applied to the resident population).

- The national target for poverty and inclusion that was originally in the Luxembourg draft NRP in November 2010 was removed from the final version of the NRP. Luxembourg does not therefore take on quantitative targets in terms of national poverty and inclusion based on key indicators of the Europe 2020 Strategy.

[104] NRP Luxembourg 2020, Luxembourg, April 2011

For additional details: http://www.odc.public.lu/actualites/2011/04/PNR_Luxembourg_2020/index.html

[105] For a list of national targets in April 2011 by the other EU Member States: http://ec.europa.eu/europe2020/pdf/targets_en.pdf

[106] For additional details: http://www.odc.public.lu/actualites/2011/02/consultation_rdi_europe2020/index.html

[107] STATEC, Regards sur les dépenses privées de R&D au Luxembourg, n°14/2011, Luxembourg, 5th of May 2011

For additional details: http://www.statistiques.public.lu/catalogue-publications/regards/2011/PDF-14-2011.pdf

[108] For greenhouse gas emissions and renewable energy, binding national targets have already existed before the launch of the Europe 2020 Strategy.

Table 1
Comparison of European goals / Luxembourg national goals

		European objective for 2020	National objective for 2020
PRIORITY 1 "intelligent"	**Objective 1**	*"(...) raising combined public and private investment levels in this sector to 3% of GDP"*	**2,3 to 2,6% interval** (2,0 % for 2015)
	Objective 2	*"(...) reduce school drop-out rates to less than 10%"*	**Sustainably less than 10%***
		"(...) increasing the share of 30-34 years old having completed tertiary or equivalent education to at least 40%"	**40%***
PRIORITY 2 "sustainable"	**Objective 3**	*"(...) reducing greenhouse gas emissions by 20% compared to 1990 levels (...)"*	**-20%****
		"(...) increasing the share of renewables in final energy consumption to 20"	**11%**** (average 2015/2016 5,45%)
		" (...) moving towards a 20% increase in energy efficiency"	**13%**** (10,38% for 2016)
PRIORITY 3 "inclusive"	**Objective 4**	*"(...) raise to 75% the employment rate for women and men aged 20-64"*	**73%** (71,5% for 2015)
	Objective 5	*"(...) lift at least 20 million people out of the risk of poverty and exclusion"*	/

Source: EUROPEAN COUNCIL (June 2010) and NRP "Luxembourg 2020" (April 2011)
Observation: * National surveys will be used as measuring instruments for both goals as the one calculated by Eurostat from the survey "Labour forces" is not sufficiently representative for Luxembourg since it includes graduates who work in Luxembourg and are residents, and can neither capture those who were Luxembourg university trained and working abroad or the cross-border workers. We must therefore ensure to produce statistics that distinguish those who attended schools in Luxembourg in order to measure the quality of national education system (national resident population) and learn about the ability of the Luxembourg school system to train young people, rather than it being a reflection of the post-secondary qualification needs of our workforce.
** For greenhouse gas emissions and renewable energy, binding national targets already existed before the launch of the Europe 2020 Strategy.
*** Feasibility study of an extension of the national indicative target until 2020 set for 2016 (Directive 2006/32/EC)

5.2.5 Country-specific recommendations (July 2011)

The European Commission has subsequently analysed the NRPs and SGPs provided by Member States. On June 7th, 2011, the publication of the Commission recommendations by country[109], including those of Luxembourg, is a further step in European economic governance. These recommendations rest on a deeper assessment of fiscal consolidation (SGP) plans of each Member State and the measures adopted to stimulate growth and create jobs (NRP). In early July 2011 the Council adopted the finalized recommendations by country[110], which also closed the first European Semester. In this context, the recommendations addressed to Luxembourg (2011-2012) are:

"(1) Take advantage of the improving cyclical conditions, strengthen the fiscal effort and use unexpected additional revenue in order to further reduce the headline deficit and reach the medium-term objective in 2012.

(2) Propose and implement a broad pension reform to ensure the long-term sustainability of the pension system, starting with measures that will increase the participation rate of older workers, in particular by discouraging early retirement. With a view to raising the effective retirement age, measures such as a link between the statutory retirement age and life expectancy, could be considered.

(3) Take steps to reform, in consultation with social partners and in accordance with national practices, the system of wage bargaining and wage indexation, to ensure that wage growth better reflects developments in labour productivity and competitiveness.

(4) Take steps to reduce youth unemployment by reinforcing training and education measures aimed at better matching young people's qualifications to labour demand."[111]

At the end of this first round of the "European semester" in 2011, a debate took place on July 14th at the Luxembourg Chamber of Deputies to launch the first "national semester", as the government wished to hear the opinions of members of Parliament about the conclusions of the EU and in particular on the four recommendations that were addressed to Luxembourg[112].

[109] For additional information: http://ec.europa.eu/europe2020/tools/monitoring/recommendations_2011/index_fr.htm

[110] For additional information: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/fr/ecofin/123613.pdf

[111] For additional information: http://register.consilium.europa.eu/pdf/fr/11/st11/st11321-re02.fr11.pdf

[112] For a summary of the debates: http://www.europaforum.public.lu/fr/actualites/2011/07/chd-semestre-europeen/index.html

5.3 Thematic Coordination: priorities, objectives and indicators

The new governance of the Europe 2020 Strategy within the framework of the European Semester, whose main objectives and monitoring indicators are included, will not alone create growth, jobs and prosperity in Europe. This is the "substance" of the strategy, namely its tools, such as a deepening of the internal market, which will determine the future growth and job creation, as also noted by the think tank "The Lisbon council" in its Europe 2020 action plan, published in March 2011: "One cannot fight economic decline with process. It can only be fought - and won - with action and commitment"[113].

The Europe 2020 Strategy will nevertheless ensure major emphasis on the quantitative objectives set by the European Council and on indicators to focus political attention and the public through measurable and "hard" information. Indeed, implementing policies without measurable goals, and without monitoring indicators, is not the way forward because the assessment then rests on subjectivity[114]. 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. As noted by the European Policy Centre (EPC), "The first step in designing the new strategy should be to re-examine how objectives and indicators are set. This might strike some as a technical issue, but the reality is that we cannot achieve what we cannot measure. Credible indicators and objectives must be the foundation for the new European strategy[115]." Wim Kok, coordinator of the high level Group that wrote the report to relaunch the Lisbon Strategy[116] (2004), shared this view: "One of the best ways to compel countries into action is by naming and shaming, but that has been, and continues to be, highly controversial in many Member States. On balance, one must conclude that the Member States have until now not demonstrated a real ability or political appetite to monitor their own performance"[117].

For a successful monitoring through objectives and indicators, past experience shows that the system that is set up must satisfy certain initial conditions. In fact, it is not enough:

- To base the monitoring on single territorial rankings based on a list of indicators which was selected during painstaking negotiations and based on a compromise (and therefore likely to make everyone happy);
- To discuss the objectives and indicators amongst experts only, without providing a sufficient involvement from the general public;
- To be limited to ex ante indicators (input) measuring the resources invested, without using indicators measuring ex post performance and efficiency of resources used (output).

[113] THE LISBON COUNCIL, An action plan for Europe 2020 – strategic advice for the post-crisis world, Brussels, May 2011, p.2

For additional details: http://www.lisboncouncil.net/component/downloads/?id=470

[114] LISBON COUNCIL, Innovating Indicators: Choosing the Right Targets for EU 2020, Brussels, issue 04/2009

[115] EUROPEAN POLICY CENTRE, Europe 2020: delivering well-being for future Europeans, in Challenge Europe, March 2010, p.67

[116] "Kok report" - Facing the challenge, november 2004

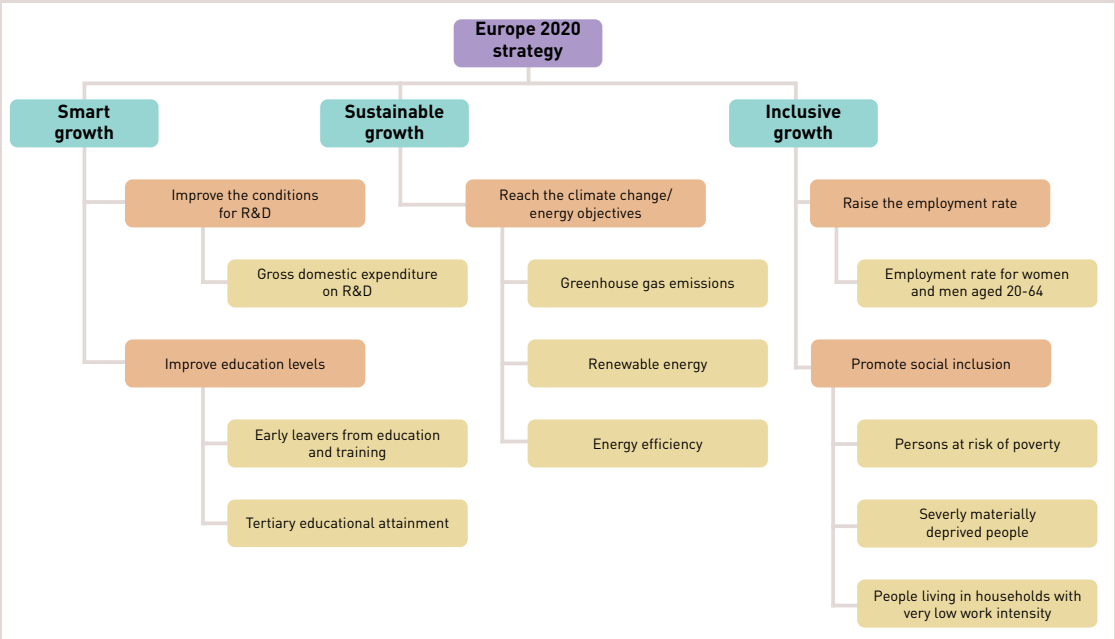
For additional details: http://ec.europa.eu/information_society/tl/essentials/reports/kok/index_en.htm

[117] THE LISBON COUNCIL, An action plan for Europe 2020 – strategic advice for the post-crisis world, Brussels, March 2011, p.5

The thematic coordination component of the Europe 2020 Strategy (coordination of structural policies) rests on three priorities, five goals and ten key monitoring indicators[118]:

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

Figure 4
Priorities, objectives and indicators of "thematic coordination" Europe 2020



Observation: Outline drafted by the *Observatoire de la Compétitivité* based on the communication from the European Commission (March 2010) and the conclusions of the European Council (June 2010)

[118] This chapter is limited to a descriptive analysis of quantitative targets and monitoring indicators used in the context of thematic coordination (coordination of structural policies) in the Europe 2020 Strategy. The system of indicators provided in the context of macroeconomic surveillance, also part of Europe 2020, is reviewed in another chapter of the Competitiveness Report.

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

Given the diversity of Member States within the EU, and their varying levels of economic development, applying the same objectives and criteria to all Member States, as had originally been made in the context of the Lisbon Agenda, has not proven to be the right approach. In the Europe 2020 Strategy, the major European objectives no longer apply uniformly to all Member States. This is because European objectives have to be broken down into national objectives by Member States, according to the starting points and national specificities of each Member State in dialogue with the European Commission. Each country will have to ultimately meet its own national commitments in 2020. European objectives can only be achieved if, on one hand the amount of national objectives will lead to the fulfilment of European objectives and on the other hand, the first condition satisfied, if each Member State honours 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 because they may cause the failure of major European objectives, and therefore also the efforts of those countries that have fulfilled their commitments. The EU statistical office, Eurostat, periodically publishes these indicators for each Member State[119].

[119] Last data update – 14th of October 2011.

For additional details: http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators

In the future, these new 2020 Europe indicators will replace the Lisbon structural indicators used in the *Observatoire de la Compétitivité* scoreboard.

5.4 Thematic Coordination: the monitoring indicators

In the pages that follow the monitoring indicators for the Europe 2020 Strategy will be presented in more detail[120], as well as the main results for Luxembourg[121] through an overview description of performance figures and a comparison with neighbouring countries and the best and the worst performers in the EU[122]. For more details about the measures themselves implemented in Luxembourg, on the one hand to explain the evolution of indicators in detail and also to allow Luxembourg to achieve its objectives, see the Luxembourg NRP (April 2011)[123].

A. 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 target of spending 3% of GDP on R&D was set by the European Council in Barcelona in March 2002. This was one of two key objectives in the old Lisbon Strategy. The logic underlying the setting of this goal was that knowledge-based 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 U.S. and 3% in Japan). For the Europe 2020 Strategy, it was proposed that this target of 3% be kept has 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 policy in favour of R&D.

For this indicator, the EU-27 as a whole achieved a rate of 2.01% in 2009. At Member State level Finland, with 3.96% (2009), has the highest R&D to GDP ratio. Cyprus and Latvia show the lowest rate in 2009, with 0.46% of GDP. Germany is at 2.82%, 1.96% in Belgium and France at 2.21%. In Luxembourg, the rate is at 1.68% and remained almost constant since 2000 (1.65%)[124].

It remains to note that in Luxembourg, spending on R&D is mainly from the private sector. Indeed, in 2009 about three-quarters of R&D was performed by the private sector. A recent STATEC analysis shows that the effort put into R&D tends to decrease in the private sector in both volume and intensity. Indeed, R&D expenditure, relative to sales, tends to decrease in all branches of activity and company sizes considered in these investigations. Most of the R&D efforts are made by a very small number of large companies and only one in five companies is engaged in R&D in Luxembourg[125].

[120] EUROSTAT, Statistics for policymaking: Europe 2020, Brussels, 10-11.03.2011

For additional details: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics_policymaking_europe_2020/introduction

[121] According to statistics available on Eurostat website when finishing the present manuscript, i.e. on 22 August 2011.

[122] Eurostat provides comments relating to the quality of statistics for the different Member States on its website (broken down in the series, forecasting, uncertain data, etc.) that will not be repeated here.

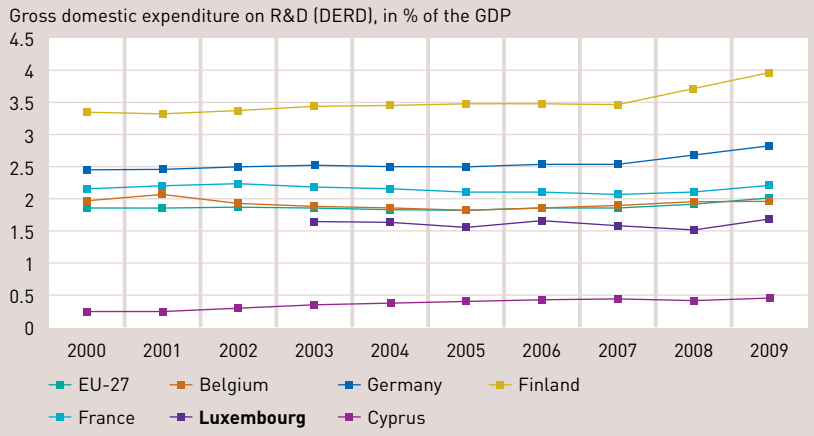
[123] GOVERNMENT OF THE GRAND DUCHY OF LUXEMBOURG, Programme national de réforme Luxembourg 2020, Luxembourg, April 2011

[124] The first data available for Luxembourg is for the year 2000.

[125] STATEC, Regards sur les dépenses privées de R&D au Luxembourg, n°14/2011, Luxembourg, 5th of May 2011

For additional details: http://www.statistiques.public.lu/catalogue-publications/regards/2011/PDF-14-2011.pdf

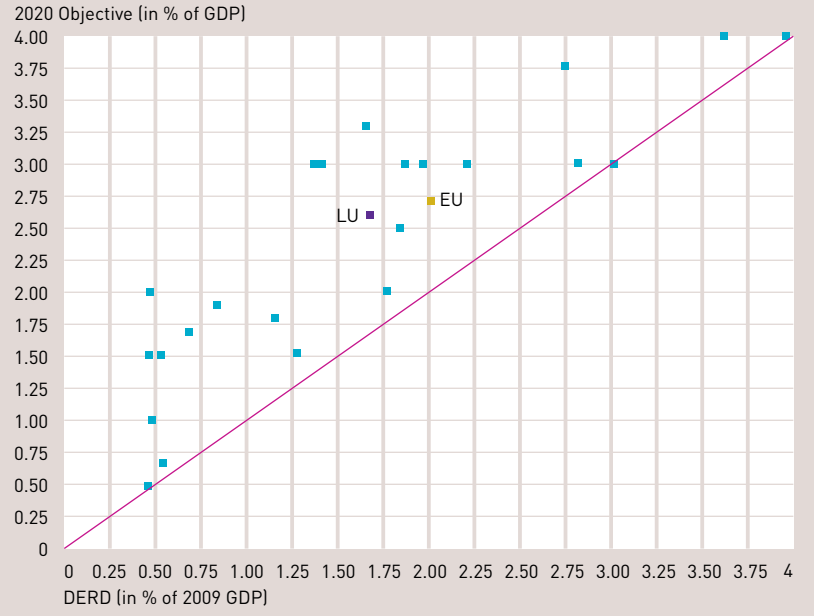
Figure 5
Gross domestic expenditure on R&D (DERD)[126]



Source: Eurostat

The EU target is to achieve a rate of 3% of GDP in 2020. Luxembourg has set a target of spending on R&D in the range of 2.3 to 2.6% of GDP by 2020, with a share of 1.5 to 1.9% for the private sector and 0.7 to 0.8% of GDP for the public sector. Luxembourg still needs to make great additional efforts in R&D in the coming years to achieve its overall goal (an additional investment of between 0.62 - 0.92% of GDP compared with 2009, according to the lower or higher retention of the national target.

Figure 6
Situation in 2009 and 2020 objective (in % of GDP)



Source: Eurostat, European Commission
Observations: Except for Greece (objective to be reworded), Czech Republic (target for the public sector only), United Kingdom (no objective).
If a Member State has set a goal range, the upper bound was used for the purpose of graphic representation.
The value for the EU is an estimate of the 2020 objective based on the national Member States objectives (it is not the Europe 2020 goal fixed by the European Council).

[126] 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.

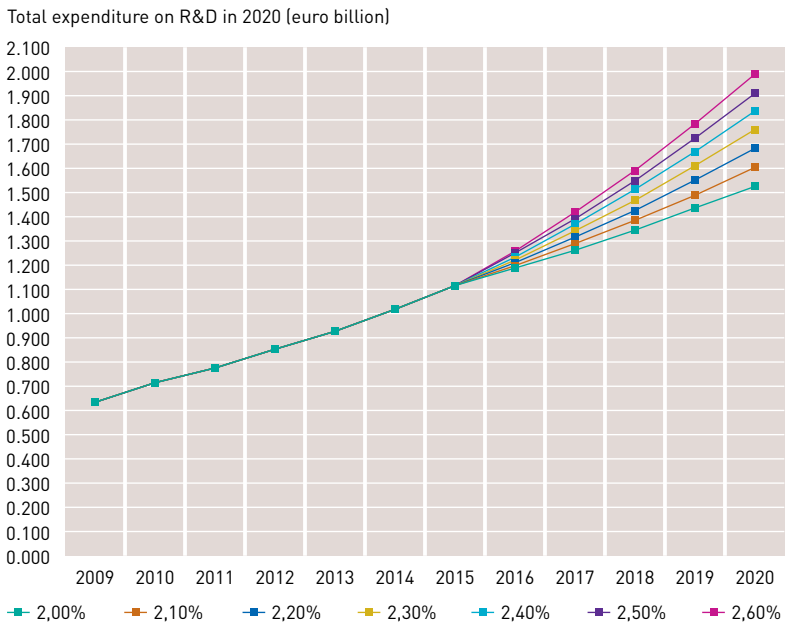
Frame 3
Financial impact of a national target of R&D as a % of GDP in 2020 (€ billion)

Based on the available data on R&D (Eurostat, NRP), and underlying assumptions used in the SGP 2011-2014 about the evolution of nominal GDP over the next years and an estimated annual growth of 6.5% from 2015 until 2020, it is possible to perform simulations on the financial impact of the objectives, expressed in % of GDP in 2020.

For example, a national target of 2.6% of GDP in 2020, with an interim target of 2.0% in 2015, would generate total spending of 1.98 bn euros in 2020, divided into 1, 39 bn (70%) for the private sector and 0.59 bn (30%) to the public sector. Compared to 2009, this would mean an increase of 213% of total expenditure (2009: 0.635 bn), of 197% for the private sector (2009: 0.468 bn) and 256% (2009: 0.166 bn) for the public sector. In this context it is important to note that the additional annual funding requirement is both due to a relative increase in the rate to achieve the objective in 2020 (increase from 1.68% in 2009 to 2.6% in 2020), and partly also because of "offsetting" the annual increase of GDP.

The figure below provides a summary of total expenditure on R&D for a set of 2020 goals from 2.0% to 2.6% (upper limit of the interval order in NRP Luxembourg 2020) depending on the assumptions outlined above. An interim target of 2.0%, identical for all scenarios considered in the context of this simulation, is used for the year 2015.

Figure 7
Simulation of the gross domestic expenditure on R&D for a national goal between 2.0% and 2.6% in 2020



Data: Statec, Eurostat, NRP Calculations: *Observatoire de la Compétitivité*

Frame 3
Continuation

The table below provides a sensitivity analysis of what the impact of a change in estimates for annual growth between the period 2015-2020 would be on the gross domestic expenditure on R&D compared to a series of national objectives set for 2020. For example, an increase in the estimated annual growth of GDP from 6.5% to 7.0% in value would result in an increase in the financing requirement of around 50 million euros for a national target of 2.3% in 2020.

Table 2
Simulation of the gross domestic expenditure on R&D based on the estimated annual growth of GDP between 2015-2020 and the national target set for 2020

Average annual growth of GDP in value 2015-2020	R&D Objective in % of GDP (2020)														
1.986 €	**1.60%**	**1.70%**	**1.80%**	**1.90%**	**2.00%**	**2.10%**	**2.20%**	**2.30%**	**2.40%**	**2.50%**	**2.60%**	**2.70%**	**2.80%**	**2.90%**	**3.00%**
0.0%	0.836	0.889	0.941	0.993	1.046	1.098	1.150	1.202	1.255	1.307	1.359	1.412	1.464	1.516	1.568
0.5%	0.862	0.916	0.970	1.023	1.077	1.131	1.185	1.239	1.239	1.347	1.401	1.454	1.508	1.562	1.616
1.0%	0.888	0.943	0.999	1.054	1.110	1.165	1.221	1.276	1.332	1.387	1.443	1.498	1.554	1.609	1.665
1.5%	0.915	0.972	1.029	1.086	1.143	1.200	1.258	1.315	1.372	1.429	1.486	1.543	1.601	1.658	1.715
2.0%	0.942	1.001	1.060	1.119	1.178	1.236	1.295	1.354	1.413	1.472	1.531	1.590	1.649	1.707	1.766
2.5%	0.970	1.031	1.091	0.152	1.213	1.273	1.334	1.394	1.455	1.516	1.576	1.637	1.698	1.758	1.819
3.0%	0.999	1.061	1.124	1.186	1.249	1.311	1.373	1.436	1.498	1.561	1.623	1.685	1.748	1.810	7.873
3.5%	1.028	1.093	1.157	1.221	1.285	1.350	1.414	1.478	1.542	1.607	1.671	1.735	1.799	1.864	1.928
4.0%	1.058	1.125	1.191	1.257	1.323	1.389	1.455	1.521	1.588	1.654	1.720	1.786	1.852	1.918	1.985
4.5%	1.089	1.157	1.225	1.294	1.362	1.430	1.498	1.566	1.634	1.702	1.770	4.838	1.906	1.974	2.042
5.0%	1.121	1.191	1.261	1.331	1.401	1.471	1.541	1.611	1.681	1.752	1.822	1.892	1.962	2.032	2.102
5.5%	1.153	1.225	1.298	1.370	1.441	1.514	1.586	1.658	1.730	1.802	1.874	1.946	2.18	2.090	2.163
6.0%	1.187	1.261	1.335	1409	1.483	1.557	1.632	1.706	1.780	1.854	1.928	2.002	2.076	2.151	2.225
6.5%	1.221	1.297	1.373	1.449	1.526	1.602	1.678	1.755	1.831	1.907	1.983	2.060	2.16	2.212	2.289
7.0%	1.255	1.334	1.412	1.491	1.569	1.648	1.726	1.805	1.883	1.961	2.040	2.118	2.197	2.275	2.354
7.5%	1.891	1.372	1.452	1.533	1.614	1.694	1.775	1.856	1.936	2.017	2.098	2.178	2.259	2.340	2.421
8.0%	1.327	1.410	1.493	1.576	1.659	1.742	1.825	1.908	1.991	2.074	2.157	2.240	2.323	2.406	2.489
8.5%	1.365	1.450	1.535	1.621	1.706	1.791	1.876	1.962	2.047	2.132	2.218	2.303	2.388	2.474	2.559
9.0%	1.403	1.491	1.578	1.666	1.754	1.841	1.929	2.017	2.104	2.192	2.280	2.367	2.455	2.543	2.630

Calculations: *Observatoire de la Compétitivité*

a.2 Improving education levels

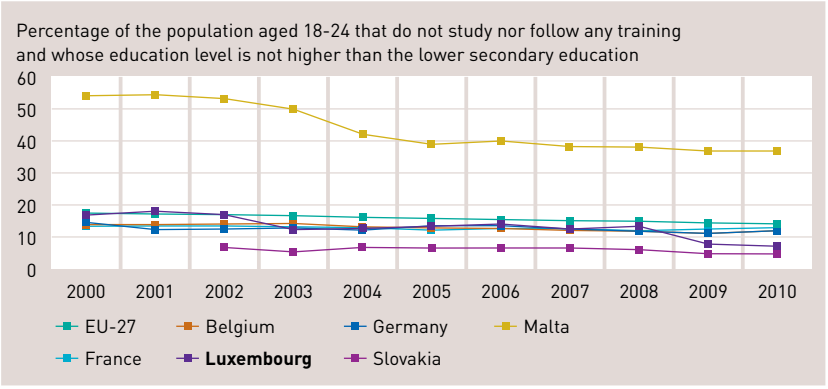
Investment in human resources, along with that in R&D, is essential for the development of knowledge and new technologies. The aim of the Europe 2020 Strategy being a smart and inclusive growth, two objectives are set for education and training.

In general, the evolution of these two indicators is determined by the demographic and social changes, as well as by policy and institutional reforms, and should thus not be influenced by cyclical fluctuations.

a.2.1 Early school leavers

Within the EU-27 Slovakia has the lowest dropout rate with 4.7% in 2010. Malta has the highest rate with 36.9%. Germany and Belgium are at 11.9% and France 12.8%. In Luxembourg, the overall dropout rate is at 7.1% and the rate is estimated to be higher amongst men than amongst women.

Figure 8
Persons who dropped out of education and training prematurely[130]



Source: Eurostat

In Luxembourg, the statistics resulting from the investigation of the labour force used by Eurostat to calculate this indicator for dropping out are subject to annual variations that are due to the limited size of the sample. The Ministry of Education and Vocational Training (MENFP) has since 2005 set up a national survey of school dropping out[131]. The diverse origin of students following major migration to Luxembourg and the multilingualism of the school career in Luxembourgish schools (teaching provided in German and French) may have a positive impact on the dropout rate.

130 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.

131 Ministère de l'Education nationale et de la Formation professionnelle, L'Enseignement luxembourgeois en chiffres - Le décrochage scolaire au Luxembourg : Parcours et caractéristiques des jeunes en rupture scolaire. Causes du décrochage année scolaire 2008/2009, Luxembourg, 2011

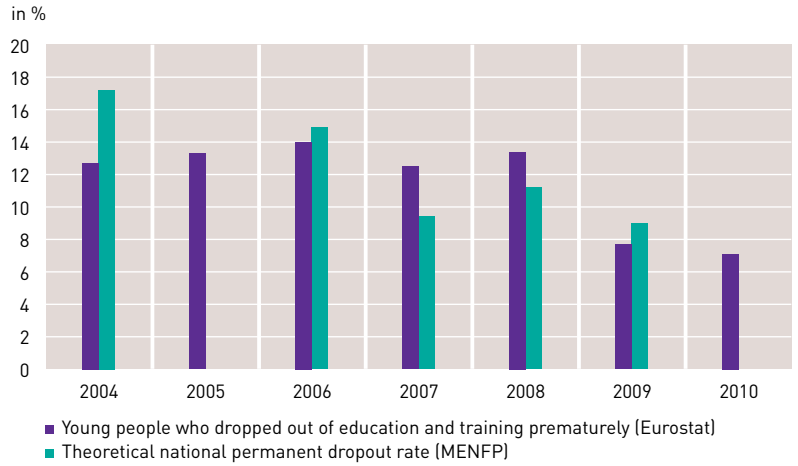
Source: http://www.men.public.lu/publications/etudes_statistiques/etudes_nationales/110203_decrochage08_09/110207_decrocheurs_08_09.pdf

Frame 4
Comparing statistics from Eurostat and from MENFP

Table 3
Statistics on the school dropout rate according to a national study on school dropping out (national figures)

Study (n°)	School year	Dropout rate
1	2003/2004	17.2%
2	2005/2006	14.9%
3	2006/2007	9.4%
4	2007/2008	11.2%
5	2008/2009	9.0%

Source: MENFP
Definitions : The notion of "dropout" applies to young people who left school permanently without qualifications and who joined the job market, benefiting by a professional integration measure or not having a specific occupation. It also includes young people who, after an initial dropout, have re-enrolled in a school, then dropped out again during the same period of observation, and for whose current situation there is no additional information.



Observation: National dropout rate - 2004/2005 not available; 2009/2010 not available

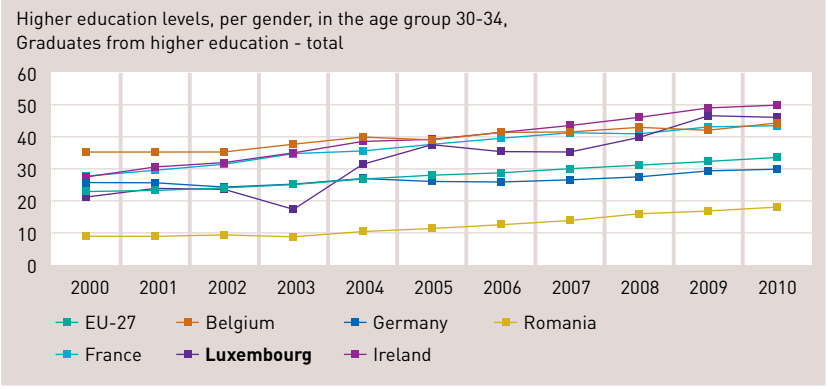
The objective of the EU is a dropout rate of less than 10% in 2020. Luxembourg adhered to this EU objective and has set a national goal to maintain a sustainable school dropout rate below 10%, and decided that until 2015 if the dropout rate has stabilized below 10%, the national target will be adjusted[132]. At present, Luxembourg has already achieved its target and this according to both the Eurostat indicator (2010: 7.1%) and the MENFP indicator (2008/2009: 9.0%).

[132] Measuring instrument: national survey on school dropping out by MENFP

a.2.2 Tertiary educational attainment

In 2010 Ireland had the highest rate of higher education graduation in the EU with 49.9%. Romania has the lowest rate with 18.1%. Germany is at 29.8%, Belgium 44.4%, and France at 43.5%. In Luxembourg, the rate is at 46.1% and the proportion of male graduates from higher education is slightly lower than that of women.

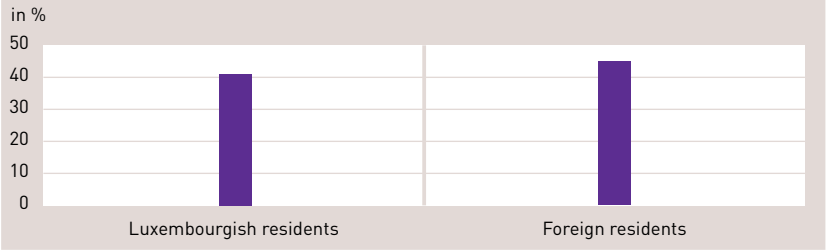
Figure 9
Higher education levels in the age group 30-34 years[133]



Source: Eurostat

This indicator, derived from the labour force survey, is not fully representative for Luxembourg since it includes foreign graduates who work in Luxembourg and are residents, and can neither capture Luxembourg's graduates working abroad nor the cross-border workers. The actual rate among Luxembourg domestic residents is at a level lower than that of foreign residents. For this purpose, it will be necessary in the future to follow statistics that distinguish those who attended schools in Luxembourg, in order to measure the quality of national education system.

Figure 10
Percentage of higher education graduates among Luxembourg residents aged 30 to 34 (2010)



Source: STATEC, Survey of Labour Force 2010
Observation: The indicator concerning Luxembourg graduates provides information about the capacity of the national school system to train young people capable of successfully completing a postsecondary education. However, this indicator's ability to measure the national school system also has its limits. It does not take into account foreign residents going through the Luxembourg school system, or nationals who have completed their studies abroad.

[133] 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.

The overall objective of the EU is at a level of 40% for 2020. Luxembourg adheres to this EU target of 40% for higher education graduation rates, but decided to take into account Luxembourgish citizens, which provides better information on the capacity of the national school system to train young people fit to complete successful post-secondary education, rather than it reflecting the needs of the labour market. At this time, Luxembourg has thus already achieved the 2020 Europe Strategy objective[134], according to the Eurostat indicator calculated from the total resident population as compared to the single population of Luxembourg nationals[135].

B. Sustainable growth

b.1 Reaching the climate change and energy objectives

In order to reach the climate change and energy objectives that were set at the European Council in March 2007 were kept as part of the Europe 2020 Strategy. The objectives of reducing greenhouse gas emissions and increasing the share of renewable energy in the total energy consumption are legally binding[136].

b.1.1 Greenhouse gas emissions

Within the EU-27, Cyprus currently has the highest level of CO_2 emissions in relation to its starting position in 2009, a level of 178 compared to its starting position 100 in 1990. Latvia has the lowest level of emissions with a level of 40 in 2009 compared to its starting position. Germany is at a level of 74, Belgium 87 and France 92. Luxembourg displays an index of 91, down since 2005 (103).

In Luxembourg in 2009, GHG emissions have been reduced by nearly 9% in relation to the base year 1990. But these emissions have experienced various trends since the base year:

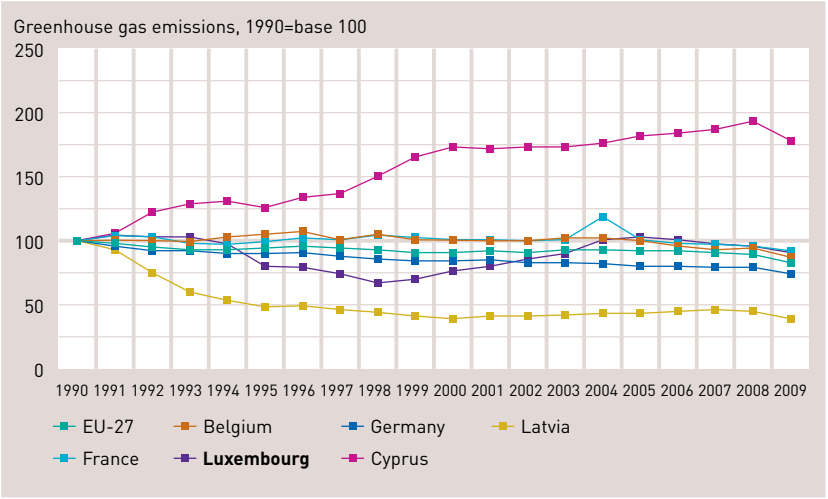
- Relatively stable from 1990 to 1993;
- A sharp decline from 1994 to 1998, reaching a lowest level - 33% in relation to 1990 – in 1998
- A steady increase from 1999 to 2005;
- Stabilization from 2005 to 2006;
- A reduction in 2007, accentuated by the effects of financial and economic crisis in 2009.

[134] The percentage of higher education graduates among people aged 25 to 64 living in Luxembourg is, however, only 28% for Luxembourgers and 41% for foreign residents. For this part of the population the results are lower than those aged 30-34 (Indicator Europe 2020).

[135] For more statistics on higher education in Luxembourg: http://www.gouvernement.lu/salle_presse/actualite/ 2011/09-septembre/07-biltgen/dossier.pdf

[136] See the European Directive 2006/32/EC. The reduction in energy consumption is a policy objective endorsed by the Member States in their Energy efficiency action plan.

Figure 11
Total greenhouse gas emissions, 1990=base 100[137]



Source: Eurostat

These phases are explained by the effect of some technological changes, exacerbated in a small country. This is especially true in the steel industry transition, from traditional blast furnaces to electric steelworks, which explains the sharp drop in emissions from 1994 to 1998. The building of a cogeneration-type gas-steam plant in 2002 led to an increase in annual emissions of 0.8 to 1 million tonnes of CO_2 per year. However, the steady increase in emissions since 1998 - and the stabilization and the reduction in recent years - is the result of the steady increase in fuel sales, nearly three-quarters of which is sold to non-residents: cross-border workers increased by more than 8% on average annually since 1990 and, at present, represent almost 30% of the country's resident population; road transit traffic, Luxembourg being situated on one of the main axes for freight transport and tourism in Europe, the "fuel tourism". All of this is also bolstered by cheaper prices of road fuel in Luxembourg than in neighbouring countries[138].

The EU has set a target level of 80 to reach by 2020 (-20% in relation to the base year). Luxembourg shares this objective and has therefore also set a goal of -20% for 2020 in relation to 2005, and therefore faces a huge challenge in the years to come.

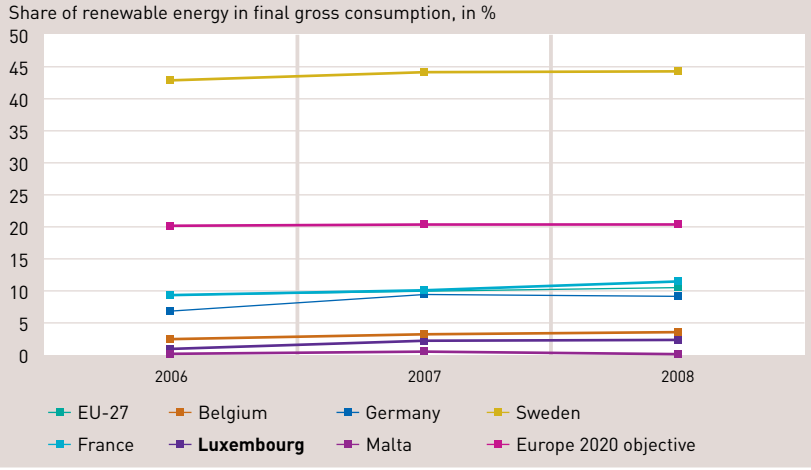
[137] Definition: This indicator shows trends in total man-made emissions of the "Kyoto basket" of greenhouse gases. It presents annual total emissions in relation to 1990 emissions The "Kyoto basket" of greenhouse gases includes: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and the so-called F-gases (hydro fluorocarbons, per fluorocarbons and sulphur hexafluoride (SF6)). These gases are aggregated into a single unit using gas-specific global warming potential (GWP) factors. The aggregated greenhouse gas emissions are expressed in units of CO_2 equivalents. The indicator does not include emissions and removals related to land use, land-use change and forestry (LULUCF); nor does it include emissions from international aviation and international maritime transport. CO_2 emissions from biomass with energy recovery are reported as a Memorandum item according to UNFCCC Guidelines and not included in national greenhouse gas totals. The EU as a whole is committed to achieving at least a 20% reduction of its greenhouse gas emissions by 2020 compared to 1990. This objective implies: - a 21% reduction in emissions from sectors covered by the EU ETS (emission trading scheme) compared to 2005 by 2020; - a reduction of 10 % in emissions for sectors outside the EU ETS. To achieve this 10% overall target each Member State has agreed country-specific greenhouse gas emission limits for 2020 compared to 2005 (Council Decision 2009/406/EC). Data Source: European Environment Agency

[138] GOVERNMENT OF THE GRAND DUCHY OF LUXEMBOURG, National Reform Programme 2020 Luxembourg, Luxembourg, April 2011

b.1.2 Share of renewables in gross final energy consumption

Within the EU-27, Sweden has the highest proportion of renewable energy, with a rate of 44.4% in 2008. Malta has the lowest rate (0.2%). Germany is at 9.1%, France 11% and Belgium 3.3%. In Luxembourg, the rate rose from 0.9% in 2006 to 2.1% in 2008.

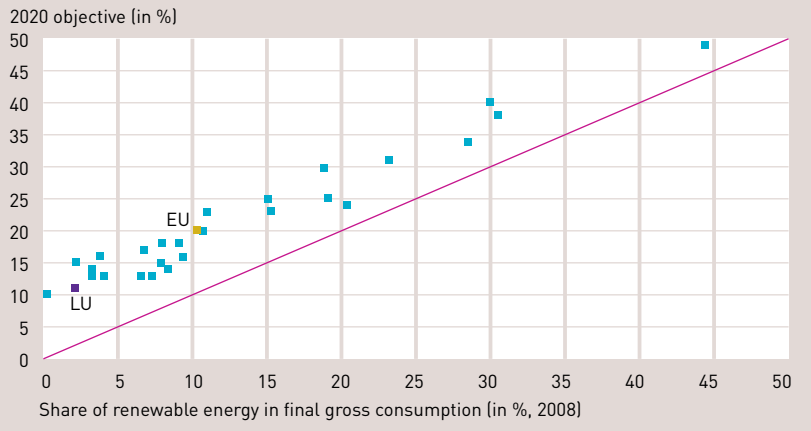
Figure 12
Share of renewable energy in gross final consumption[139]



Source: Eurostat

The EU has set a target percentage of renewable energy of 20% by 2020. Within this framework, Luxembourg has set an overall target of 11% of renewable energy in final energy consumption by 2020, with an interim target of 5.45% on average in 2015/2016. Luxembourg will have to face an important challenge in the coming years to reach its 2020 target of 11% (+8.9% compared to the situation in 2008).

Figure 13
Renewable energy - Situation in 2008 and 2020 objective (in %)



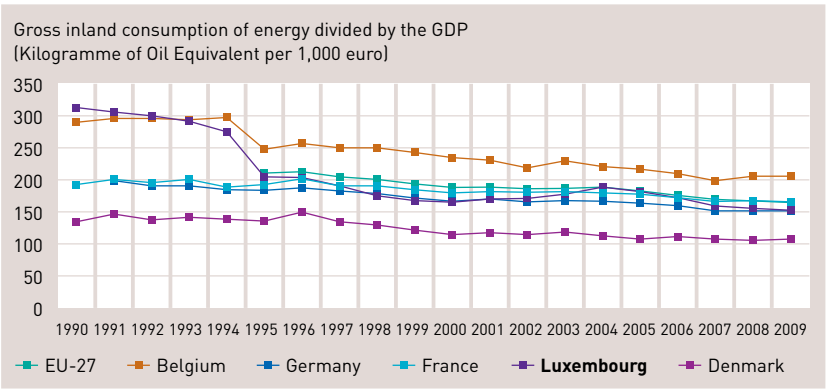
Source: Eurostat, European Commission
Observation: The score for the EU is an estimate of the 2020 objective based on the objectives of national Member States (this is not the Europe 2020 Strategy target set by the European Council).

[139] 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

b.1.3 Energy efficiency

In order to enable comparisons between Member States, Eurostat currently still uses a proxy indicator for energy savings for which the indicator is still being developed: energy intensity, meaning the amount of energy needed to create €1,000 worth of wealth. Within the EU-27 Bulgaria has the highest energy intensity (and therefore the lowest energy efficiency), with a ratio of 842.54 kgoe to €1,000 of GDP in 2009. Denmark has the lowest intensity, with a level of 106.7. Germany has a level of 150.5, Belgium 205.6, and France 164.3. Luxembourg is at a level of 151.9 in 2009, down since 2005 (following a period of rising recorded between 2000 and 2005).

Figure 14
Energy intensity of the economy[141]



Source: Eurostat

The EU has set a goal of increasing the energy efficiency of 20% by 2020. Luxembourg, in its first Energy Efficiency Action Plan, has set a national indicative target for energy efficiency in final energy usage of 10.38% by 2016[142]. In parallel, Luxembourg has stipulated to have the ability to analyse the feasibility of an extension of the national indicative target until 2020, which would amount to four additional percentage points for the period from 2016 to 2020, leading to an overall target of 13% in 2020. Note that this national objective will be largely influenced by the choice of the reference period and the energy accounting taken into account (primary energy vs. final energy).

The European Commission, in a synthetic table of national objectives that Member States submitted in April 2011[143], extrapolated the national goals (expressed in %) into an indicator for reducing energy consumption in Mtoe (Million Tonnes of Oil Equivalent), in order to be able to calculate the total volume of energy use that the EU has reduced by 2020 (sum of the national goals of its Member States). This indicator does not allow comparisons between Member States because it does not take into account the size of the country. According to calculations by the European Commission, the national goal established by the NRP in Luxembourg (April 2011) would amount to a reduction in energy consumption of 0.20 Mtoe in 2020.

[141] Definition: This indicator is the ratio between the gross inland consumption of energy and the gross domestic product (GDP) for a given calendar year. It measures the energy consumption of an economy and its overall energy efficiency. The gross inland consumption of energy is calculated as the sum of the gross inland consumption of five energy types: coal, electricity, oil, natural gas and renewable energy sources. The GDP figures are taken at chain linked volumes with reference year 2000. The energy intensity ratio is determined by dividing the gross inland consumption by the GDP. Since gross inland consumption is measured in kgoe (kilogram of oil equivalent) and GDP in 1,000 EUR, this ratio is measured in kgoe per 1,000 EUR.

[142] 2011: thorough analysis and evaluation in the context of the establishment of the second EEAP.

[143] For additional details: http://ec.europa.eu/europe2020/pdf/targets_en.pdf

C. Inclusive Growth

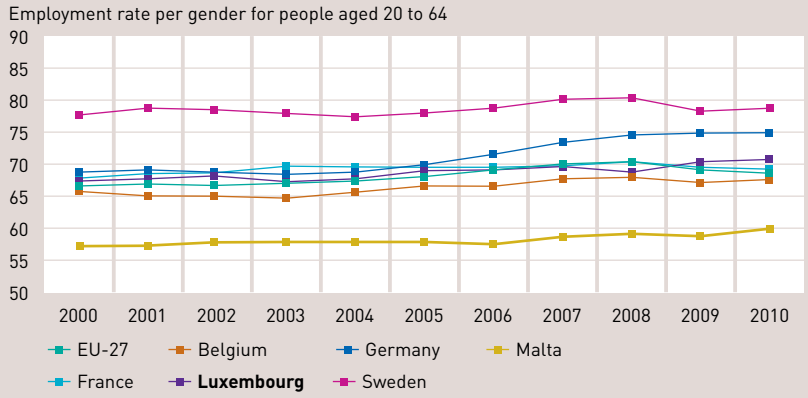
c.1 Promoting employment

In the Lisbon Strategy (2000-2010) there was already a target related to employment policies: the employment rate. The new Europe 2020 Strategy target shows two major changes in relation to the previous objective of the Lisbon Strategy. Firstly the age range considered (20-64 years for 2020 instead of 15-64 years for 2010) so as to reduce potential conflicts between employment policies and education and training policies, and secondly, the target reference value increases (75% for 2020 instead of 70% for 2010).

Changes in the employment rate depend on many uncertainties that must be taken into account in setting objectives for the Europe 2020 Strategy. Indeed, the indicator of the employment rate is a very cyclical indicator. The actual exit date of the crisis will play a key role in the evolution of this indicator.

In 2010, Sweden has the highest overall employment rate with 78.7%. Malta has the lowest employment rate with 59.9%. Germany has 74.9%, Belgium 67.6% and France 69.2%. In Luxembourg, the total employment rate is at 70.7% and has risen since 2000 when it was still 67.4%.

Figure 15
Employment rate for people aged 20 to 64[144]



Source: Eurostat

This total employment rate indicator, an average calculated over the whole of the resident labour force, "hides" somewhat significant differences in rates by class of worker observed. If one conducts a more detailed segmentation of the employment rate, for example per gender or age of the worker, we can see that the employment rate fluctuates significantly. Indeed, while the overall employment rate is 70.7% in 2010, the male is close to 80% while the female is close to 62%[145]. A review of the employment rate of workers per age also reveals major differences, and this especially for young and older workers:

[144] 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 population 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.

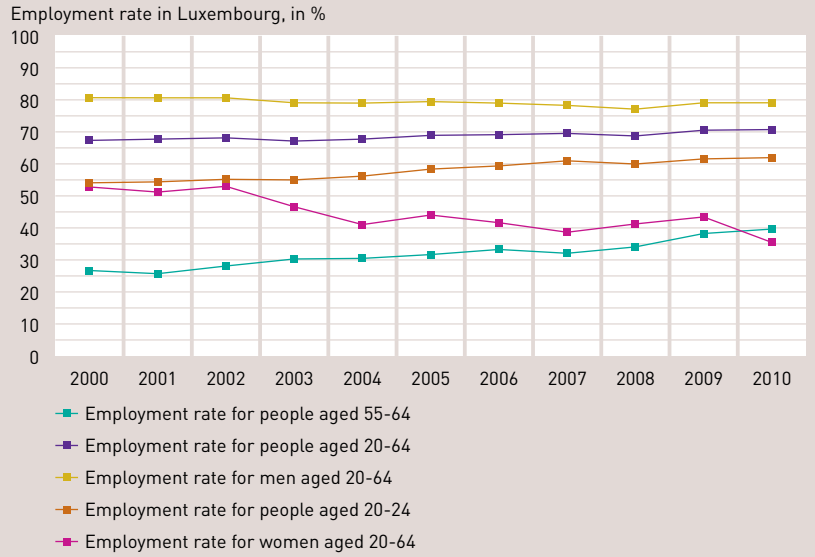
[145] For a report on gender situation on the job market: CEPS INSTEAD, Les femmes et les hommes sur le marché de l'emploi – actualisation 2010, Luxembourg, 2011.

For additional details: http://www.ceps.lu/pdf/3/art1650.pdf

- The youth employment rate is low (for young people between 15-19 years it is close to 7% and for those between 20 and 24 years old, it's close to 35% in 2010)[146];

- The employment rate of older workers is also relatively low (for seniors between 55 and 59 years old it's about 56% and for those aged between 60 and 64 it's only close to 20% in 2010)[147].

Figure 16
Employment rate in Luxembourg for different categories of workers (in %)



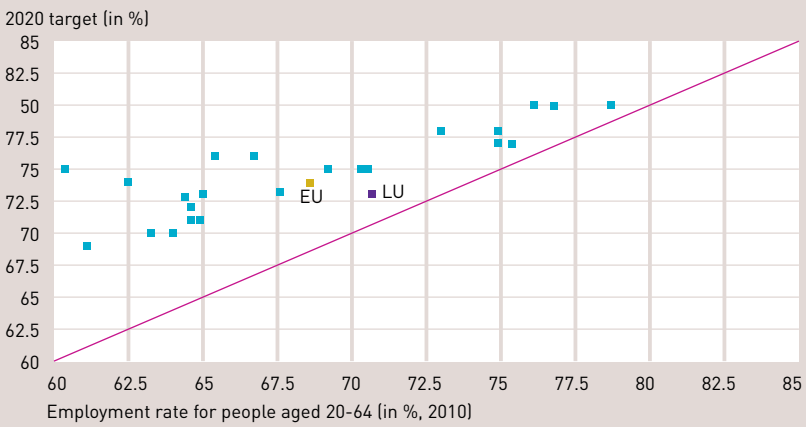
Source: Eurostat

The EU objective is to achieve an overall employment rate of 75% by 2020. Luxembourg has set a national target rate of 73% of total employment in 2020 with a total rate of 71.5% in 2015 as an interim target. Currently, Luxembourg has a total employment rate of 70.7% (2010), and should thus make an additional effort of 2.3 pp in the next ten years.

[146] In Luxembourg, the unemployment rate of the under 25s is 15.6% in 2010, which is a rate more than four times higher than for example the unemployment rate for persons aged 25 to 54. Reducing youth unemployment is one of four recommendations to Luxembourg in the European Semester (2011).

[147] Increasing the participation rate of older workers is one of four recommendations to Luxembourg in the European Semester (2011).

Figure 17
Employment - Situation in 2010 and 2020 target (in %)



Source: Eurostat, European Commission
Observations: Except the United Kingdom (no target);
Where a Member State has set a target range; the upper bound was used for graphing purposes.
The value for the EU is an estimate of the 2020 target based on the national Member States' objectives (this is not the Europe 2020 Strategy target set by the European Council)

Even if a higher employment rate generally allows increasing the supply of domestic labour, boosting growth and alleviating social spending and public spending, one must put these statements into perspective for the case of Luxembourg. In Luxembourg labour supply consists of three components: the native offer, the cross-border offer and the immigrant offer. But cross-border workers are not taken into account by the concept of employment rate. The latter is a purely national concept of residence. Domestic employment includes more than 40% of cross-border workers, and about half of new jobs created in the recent past have been occupied by cross-border workers. As noted by the Economic and Social Council (ESC), this indicator is "not representative in Luxembourg at the macroeconomic reality and lends itself even less to a macroeconomic employment target, on which an employment policy should be defined"[148]. However, the employment rate for youth, women and the elderly is useful for understanding the use of human resources in the economy.

c.2 Reducing poverty

The target that was originally proposed by the European Commission for social inclusion was the reduction of poverty by twenty million people who were finding themselves in risk of poverty. In order to meet the objective of the Europe 2020 Strategy to promote inclusive growth, the European Council of March 2010, had nevertheless asked the Commission to work further on social inclusion indicators, and more particularly on including non-monetary indicators too.

[148] ESC, *Deuxième avis sur les Grandes Orientations des Politiques Economiques des Etats membres et de la Communauté* (GOPE), Luxembourg, 2003.

For additional details: http://www.ces.public.lu/fr/avis/index.html

In June 2010, the European Council decided to ensure that twenty million people at least no longer be at risk of poverty and exclusion, and defined this population as the number of people who are threatened by poverty and exclusion according to three indicators, Member States being free to set their national objectives based on the indicators they consider most appropriate among these:

- At-risk-of-poverty rate: people living on less than 60% of the national median income. The risk-of-poverty rate indicator is the key indicator that can measure and monitor poverty in the EU. It is a relative measure of poverty, related to income distribution, which takes into account all sources of income, including market revenues and social transfers. It reflects the role of both labour 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 out of the nine defined situations of deprivation[149]. The material deprivation rate is a non-monetary measure of poverty, which also reflects the different levels of prosperity and quality of life in the EU since it is based on a single EU threshold.

- People living in jobless households: this population is defined relative to zero or very low work intensity over the 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 the welfare system's capacity to improve efficiency and effectiveness because of constraints on public finances. Note that the monetary indicators of poverty, as the poverty rate or the rate of material deprivation, are significantly limited. They do not take into account the many non-monetary utilities that are available to citizens[150]. In Luxembourg, among others things, we can mention service vouchers that are not taken into account in this context.

In making a quantitative analysis of these three indicators of poverty and exclusion, the following conclusions are reached:

- In 2010, 14.5% of people were at risk of poverty after social transfers in Luxembourg (2000: 12%). In Belgium the rate was 14.6% in 2010, Germany 15.6% and 12.9% in France (2009). Within the EU-27 (2009), Czech Republic had the lowest rate (8.6%) and Latvia the highest (25.7%).

[149] 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

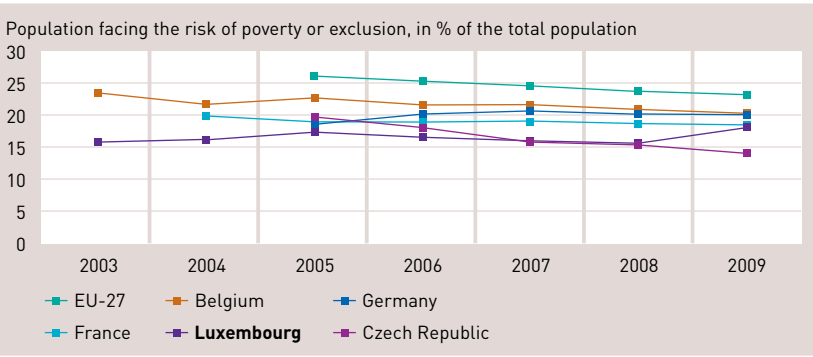
[150] In this context, see in particular the OECD publication on poverty: OECD, *Croissance et inégalités: Distribution des revenus et pauvreté dans les pays de l'OCDE*, OECD Editions, Paris, October 2010

- In Luxembourg in 2010, 0.5% of people were facing a severe material deprivation[151], which is the lowest rate in the whole EU-27. In Belgium this rate was 5.9%, in Germany 4.5% and 5.6% in France (2009). Within the EU-27 (2009), it is Bulgaria that displays the highest rate of severe material deprivation (41.9%).

- 5.5% of people living in Luxembourg in 2010 lived in households with very low work intensity (2003: 6.1%). In Belgium this rate was 12.6%, 11.1% in Germany and 8.3% in France (2009). Within the EU-27 (2009), this rate is the lowest in Cyprus (4%) and the highest in Ireland (19.8%).

For a more comprehensive view of people experiencing poverty and exclusion, Eurostat has developed an indicator that better quantifies the percentage of the population facing the risk of poverty or exclusion, by combining the three individual indicators mentioned above[152]. In analysing this indicator, we see that the Czech Republic has the lowest at risk of poverty or exclusion in the EU in 2009 (latest year for which data is currently available for all Member States), with a rate of 14%. Bulgaria has the highest proportion, with a rate of 46.2%. In 2010, Germany is at 19.7%, 20.8% in Belgium and France at 18.4% (2009). In Luxembourg, the rate is 17.1%.

Figure 18
Percentage of the total population facing the risk of poverty or exclusion



Source: Eurostat
Observation: 2010 not available for some Member States

[151] For information on other economic difficulties of households in Luxembourg: STATEC, *Regards sur les difficultés économiques des ménages*, n° 15/2011, Luxembourg, May 2011

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6 European Semester - Surveillance of macroeconomic imbalances

In the chapter "Toward a Short Term Scoreboard" of the 2010 Competitiveness Report[153], the *Observatoire* discussed how we might consider building an intelligent scoreboard in the short-term to detect macroeconomic imbalances.

Under the governance of economic policy, the European Commission, along with the Member States has developed a similar scoreboard to detect macroeconomic imbalances. In the 2010 Report, a brief overview of the work was presented. This chapter reviews in detail the European decisions taken during the year 2010 so far.

6.1 The European Semester

The recent economic crisis has highlighted the interdependence of the Member States' economies and the vulnerability of economies within the Eurozone. Mechanisms for coordination of economic policy proved to be inadequate after the economic and financial crisis. Budgetary discipline, the competitiveness gaps and imbalances in the private sector are issues that affect the European economy. From now on, it is important to strengthen and coordinate economic policy within the EU and the Eurozone. This has been done in 2008 by the European Commission in its report "EMU @ 10: successes and challenges after 10 years of Economic and Monetary Union".[154]

Although the instruments and methods of existing coordination have enabled the EU to assemble its recovery efforts and to weather a storm that no Member State could have done by itself, the European Commission still proposed to further strengthen the coordination of economic policy. In its communication of the 12th of May 2010 "Reinforcing Economic Policy Coordination", the European Commission has highlighted a persistent accumulation of macroeconomic imbalances in the Eurozone, which can destabilize the cohesiveness of the Eurozone and the operation of the European monetary union. It proposes to extend economic surveillance beyond the budgetary dimension in order to meet the challenge of other macroeconomic imbalances, according to Article 136 of the EC Treaty[155]. It is planned to use the instruments provided by the Treaty and to supplement these instruments as needed. The European Semester was born. And it proposes a three-pillar approach (Figure below) to strengthen coordination of economic policies using preventive and corrective sets of measures:

1) Structural reforms within the framework of the EU 2020 Strategy,

2) Budgetary policies under the Stability and Growth Pact,

3) Macroeconomic surveillance.

[153] 2010 Competitiveness Report, chapter 4 "Toward a Short Term Scoreboard"

[154] Commission Communication on "EMU@10: successes and challenges after 10 years of Economic and Monetary Union"- 7 May 2008 – IP /08/716

[155] EC Treaty of 25/03/57 as consolidated after the Lisbon Treaty 25th of March 1997 Treaty on the Functioning of the European Union: Article 136: "

1. In order to ensure the proper functioning of economic and monetary union, and in accordance with the relevant provisions of the Treaties, the Council shall, in accordance with the relevant procedure from among those referred to in Articles 121 and 126, with the exception of the procedure set out in Article 126(14), adopt measures specific to those Member States whose currency is the euro:

(a) to strengthen the coordination and surveillance of their budgetary discipline;

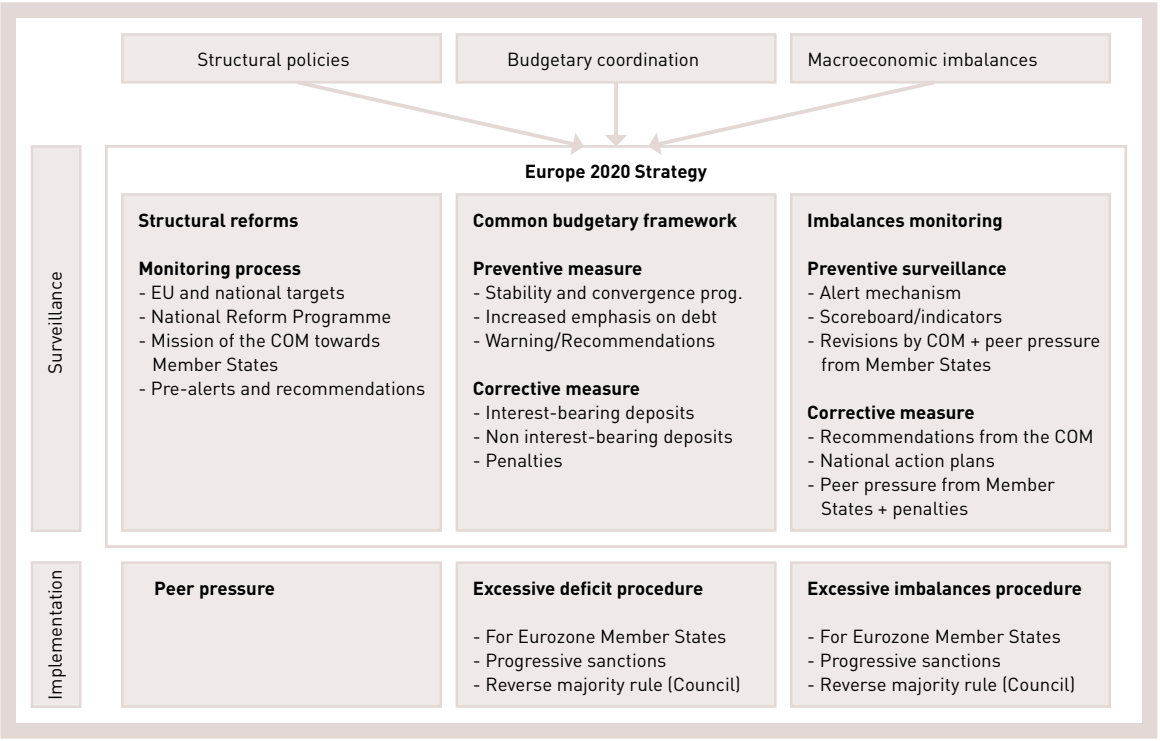
(b) to set out economic policy guidelines for them, while ensuring that they are compatible with those adopted for the whole of the Union and are kept under surveillance.

2. For those measures set out in paragraph 1, only members of the Council representing Member States whose currency is the euro shall take part in the vote.

A qualified majority of the said members shall be defined in accordance with Article 238(3)(a).

The advantage of the European Semester is that it allows an ex-ante coordination of fiscal policy by aligning the submission and discussion of the Stability and Growth Pact and the National Reform Programme in order to assess the general economic situation and synchronization with national budget cycles. Thus, the Council and European Council recommendations based on evaluations of the European Commission support Member States more effectively and at the appropriate time, and thus allow a better implementation of reforms at the national level.

Figure 1
European Semester: Integrated Economic Surveillance/Governance



Source: European Commission, DG ECFIN

6.2 The third pillar: "Macroeconomic monitoring" - a new instrument

The present chapter analyses the macroeconomic imbalances indicator scoreboard as part of the third pillar, namely macroeconomic monitoring. Note that the first pillar of the European Semester has been discussed in Chapter 5 "The European semester and the Europe 2020 Strategy"

Based on the Communication from the European Commission in May, the European Council of the 17th of June 2010 decided to establish a European stabilization mechanism and invited the European Commission and the Taskforce Van Rompuy to quickly develop these guidelines whilst also making them operational.

On June 30th 2010, the European Commission in its communication "Enhancing Economic Policy Coordination for Stability, growth and jobs - Tools for Stronger EU Economic Governance" developed in greater detail its ideas about the governance of economic policy. The Commission proposes to develop a new structured mechanism for the detection and correction of macroeconomic imbalances, including for the differences in competitiveness. To better detect imbalances, the Commission will establish a scoreboard composed by economic and financial indicators.

On the 29th of September 2010, the European Commission proposed a legislative package of six texts called "six-pack". The legislative package has four objectives:

First, the rules of the Stability and Growth Pact (SGP) will be strengthened. These aim to limit budget deficits and government debt, through a much stronger early stage monitoring. Greater emphasis will be given to debt reduction (and not just the deficit) and to sustainable growth.

Second, new macroeconomic imbalance controls will be established across the EU, such as bubbles location and growing differences in competitiveness between Member States.

Thirdly, standards are established to ensure the proper and independent compilation of statistics, since these data are critical to develop sound budgetary policies and monitor budgets.

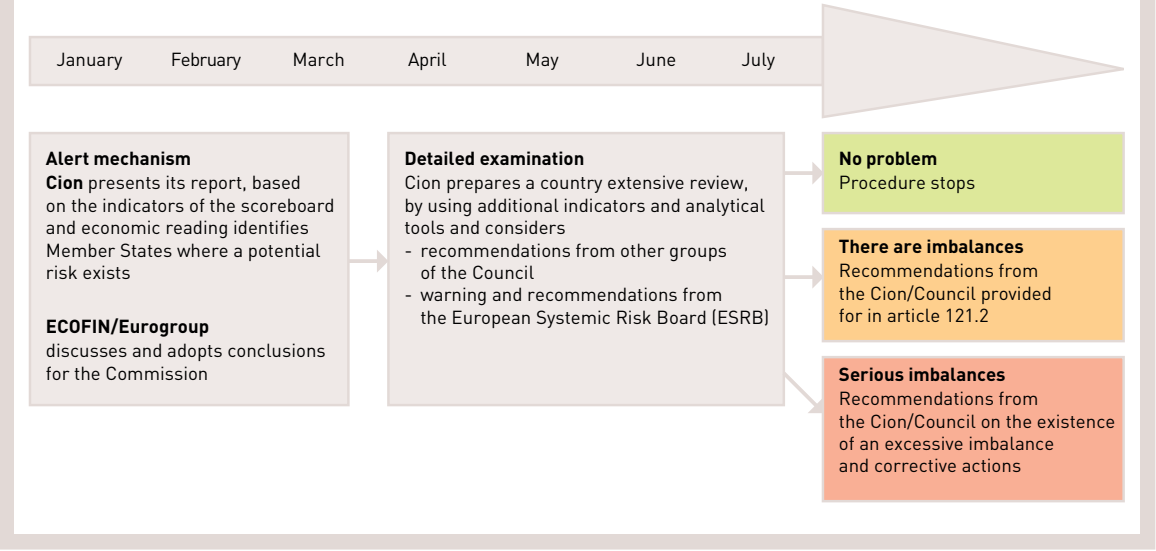
Finally, the transparency in decision-making and the accountability of decision-makers will be strengthened.

The European Commission addresses the surveillance of macroeconomic imbalances and the building of an EIP scoreboard in the proposal:

- Proposal for a regulation of the European Parliament and of the Council on the prevention and correction of macroeconomic imbalances (COM (2010)525final)

- Proposal for a regulation of the European Parliament and of the Council on enforcement measures to correct excessive macroeconomic imbalances in the euro area (COM (2010)527final)

Figure 2
Preventive measure of the macroeconomic imbalance procedures



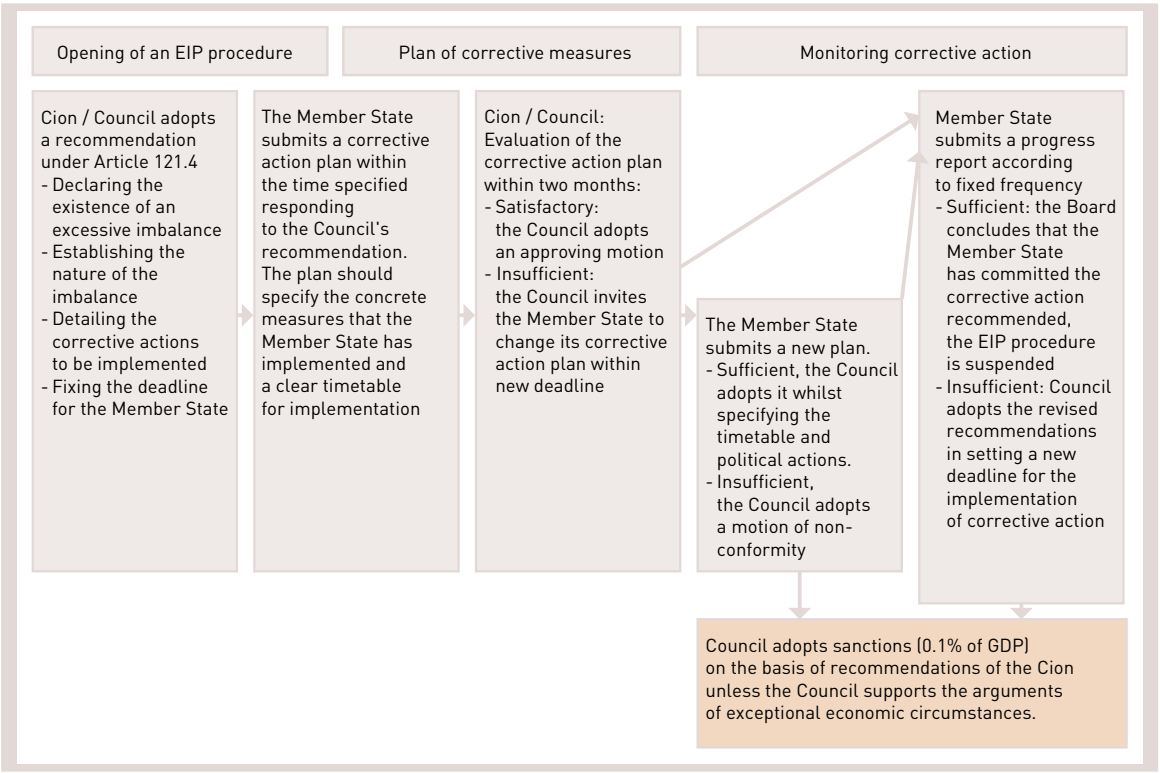
Source: European Commission, DG ECFIN

The excessive imbalances procedure includes a preventive and a corrective arm.

The scoreboard, which includes ten economic indicators, is published periodically by the European Commission as a preventive measure (Figure above). A mechanism for alert thresholds identifies a potential risk. The Commission will conduct in-depth country analysis by using other indicators and analytical instruments to assess the existence of a macroeconomic imbalance. After this extensive review, there may be three situations. First, the examination can lead to the conclusion there is no problem and the procedure stops. Secondly, it can lead to the conclusion that an imbalance does exist and the Council makes recommendations to the country concerned on how to address imbalances. Thirdly, if the imbalances are seen as serious, the corrective arm of the mechanism will be triggered and the Member State will be placed in a "situation of excessive imbalances" (Figure below). In this case, the Member State submits a corrective action plan to the Council specifying a set of concrete measures and a detailed timetable.

The European Commission and the Council evaluate the corrective action plan. The plan is either sufficient, which would lead to the issuing of regular progress reports from the Member State to ECOFIN and the Eurogroup or, the plan is insufficient and the Member State is requested to amend its action plan. If, after changing the plan, the measures are still insufficient, the Council adopts sanctions on the basis of European Commission recommendations, unless the Council supports the arguments of the exceptional economic circumstances with a reverse qualified majority.

Figure 3
The corrective measure of the mechanism



Source: European Commission

Thus, the fundamental objective of the "excessive imbalance procedure" at European level is to provide a solid platform for better surveillance, prevention and correction of imbalances[156]. The ECOFIN Council of the 15th of March 2011 has reached an agreement on a general approach to a regulation to monitor and correct macroeconomic imbalances. The "Six-Pack" Package on economic governance was approved[157] at the European Parliament on Wednesday, September 28th. This package includes the proposed regulations to establish a monitoring procedure, to monitor and correct macroeconomic imbalances, and the excessive imbalances procedure (EIP). The law will take effect by late 2011, which is to say in time for the next European Semester.

Attention now turns to the operational and analytical implementation challenges of EIP. The list of indicators that make up the scoreboard is yet to be finalised and validated.

[156] European Commission, Surveillance on macroeconomic imbalances under the excessive imbalances procedure (EIP): Possible work streams for the EPC in the first half of 2011, Note for the attention of the Economic Policy Committee, ECFIN/B1/ARES SN (2011)69586

[157] http://www.europarl.europa.eu/fr/headlines/content/20110916FCS26869/11/html/Nouvelles-mesures-sur-la-gouvernance-%C3%A9conomique-le-Parlement-donne-son-feu-vert

6.3 The EIP scoreboard

From the outset it is impossible to select "one size fits all" indicators in the sense that 9 indicators cannot reflect both the economic specificity of each Member State, and the methodological problems in statistics the 27 Member States face, one truth can hide the other. Thus, it is now very important to complete the scoreboard with a detailed macroeconomic analysis[158].

The scoreboard is based on four principles. First, the choice of indicators focuses on the most relevant dimensions of macroeconomic imbalances, loss of competitiveness and the proper functioning of the Eurozone.

Secondly, the scoreboard (indicators and thresholds) must provide an effective flagging device for the loss of competitiveness and potentially harmful imbalances at an early stage of their emergence.

Thirdly, we should consider the scoreboard's important communication role. The choice of indicators will send a clear message to decision-makers and stakeholders on the types of macroeconomic developments that could be a source of doubt and that therefore need an increased level of surveillance at the European level.

Fourth, the indicators should be of high statistical quality in terms of speed and comparability between Member States.

[158] Economic Policy Committee, Draft Report, The design of the scoreboard for the surveillance of macroeconomic imbalances

6.4 EIP scoreboard detailed analysis from Luxembourg's perspective

At the moment when this 2011 Report was finalised, an agreement had not been found with regards to the list of indicators. However, it is possible to give a provisional list of indicators. The discussion on the inclusion of an indicator for the unemployment rate, the financial sector and the productivity is not yet complete.

The provisional scoreboard consists of temporary external and internal indicators.

Table 1
Proposed indicators and indicative thresholds

	External imbalances and competitiveness				
Indicator	3 year average of **current account balance** as a % of GDP	**Net International Investment Position** as a % of GDP	% change (3 years) of **Real Effective Exchange Rate**, HICP deflators relative to 35 industrial countries (a)	% change (5 years) in **export market shares**	% change (3 years) in **nominal unit labour cost** (b)
Data source	Balance of Payments statistics EUROSTAT	Balance of Payments statistics EUROSTAT	DG ECFIN indicator data base on Price and Cost competitiveness	Balance of Payments statistics EUROSTAT	EUROSTAT
Indicative thresholds	*+6 /-4%*	*-35%* Lower quartile	*+/-5% for € A* *+/-11% non € A* Lower and Upper Quartiles of EA -/+ s.d.of EA	*-6%* Lower quartile	*+9% € A* *+12% non € A* Upper Quartile € A +3%
Period for calculating thresholds	1970-2007	First available year (mid 1990s) -2007	1995-2007	1995-2007	1995-2007
Additional indicators to be used in economic reading	Net lending/ borrowing vis-à-vis ROW (CA+KA) as % of GDP	Net External Debt as % GDP	REER vis-à-vis rest of the euro area	Export market shares, based on volumes of goods; Labour productivity: Trend TFP growth	Nominal ULCs (changes over 1, 5, 10 years); Effective ULC relative to the rest of the euro-area

Table 1
Continued

Internal imbalances						
Indicator	Y-o-Y % change in **deflated house prices** (c)	**private sector credit flow** as % of GDP (d), (e)	% change of **total financial liabilities of the total financial sector (S12)**, non-consolidated dats	**private sector debt** as % of GDP (d), (e)	**general government debt** as % of GDP (f)	3 year average of **unemploment rate**
Data source	Harmonised house price index by EUROSTAT, completed with ECB, OECD and BIS data	Transactions ASA, EUROSTAT for annual data and QSA, ECB for quarterly data	EUROSTAT	Balance Sheet ASA, EUROSTAT for annual data and QSA, ECB for quarterly data	EUROSTAT (EDP - treaty definition)	EUROSTAT LFS data
Indicative thresholds	*+6%* Upper quartile	*+15%* Upper Quartile	19%	*160%* Upper Quartile	*+60%*	+10%
Period for calculating thresholds	First year available-2007	1995-2007	1991-2007	1994-2007		1994-2007
Additional indicators to be used in economic reading	Real house price changes (cumulated over 3 years): Nominal house price index Value-added in residential construction	Change in private debt	Level of total financial liabilities of the whole financial sector; Change in the share of core (deposits) in total liabilities; Debt over equity ratio	Private sector debt based on consolidated data		

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 close to the HICP in methology;
(b) ratio of nominal compensation per employee to real GDP per person employed 1999 = 100;
(c) deflated by the consumption deflator of EUROSTAT;
(d) private sector is defined as non-financial corporations and households; non-profit institutions serving households;
(e) sum of Loans, and Securities other than shares of Households and non-financial corporations; liabilities, non-consolidated:
(f) the sustainability of public finances will *not* be assessed in the context of the EIP given that this issue is already covered by the SGP. However this indicator is part of the scoreboard because public indebtedness contributes to total indebtedness of the country and therefore to the overall vulnerability of the country.

For Luxembourg the provisional scoreboard provides the following figures. The light grey boxes indicate that Luxembourg has exceeded the threshold for the indicator.

Table
Luxembourg's results

Luxembourg	Threshold	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Current account balance as a % of GDP (3 year backward moving average)	+/-4%			10.5	9.3	10.2	10.5	11.3	10.7	8.6	7.4
Net international investment position as a % of GDP	-35%			110.8	139.3	114.3	127.2	132.8	95.5	78.5	82.9
Real effective exchange rate (deflator (HICP/consumer prices) relative to 35 other industrialized countries)	+/-5%	-1.5	0.1	4.5	5.8	6.6	4	3.3	4	4	1.9
Market share of exports (volume/value)	-6%								28.3	17.4	14.9
Nominal unit labour costs	9%	9.99	11.63	10.39	4.84	4.73	4.54	4.96	8.4	14.27	13.41
Price of Housing	6%	3.3	10.4	9.6	8.8	11.8	8.6	8.4	7.9		
Flow of credit from the private sector	15%										
Private sector debt	160%										
Public debt as a % of GDP	60%	6	6	6	6	6	6	7	7	14	15

Source: European Commission

In the scoreboard above, Luxembourg exceeds the thresholds for 4 out of 9 indicators. This does not mean that Luxembourg enters a procedure for macroeconomic imbalances. This scoreboard will be followed by a thorough economic analysis taking into account other economic indicators as well as studies conducted in these areas. Obviously it is also a case of considering the economic specificity of the Member States.

Let us take the example of the current account balance, which is a complex economic indicator. Initially, like with any balance, including that for individuals, it takes account of inputs and outputs, revenues and payments. It is therefore composed of different balances. In a more specific way, it indicates the balance of goods and service flows as well as the flows of investment income between a country and the rest of the world. In more concrete terms, the current account balance has three essential components: 1) the trade balance (exports minus imports) of goods and services (transport, tourism, management), 2) the balance of investment income (e.g. interest, dividends) and 3) the balance of current transfers (e.g. inheritance and immigrants' capital – what they send abroad and what they bring into a country). This is another indicator of the commercial health of a country in relation to its trading partners. When the current account balance is negative, the country is living above its means as it consumes and invests more than it produces wealth.

Conversely, when the balance is positive, the country produces more wealth than it consumes. Generally, a positive current account balance allows a country to repay its debt or even to lend to other countries. By contrast, a negative balance must be offset by borrowing from external agents or even by selling assets owned outside the country. A high deficit indicates that the economy is borrowing and usually it imports more than it exports. This may be a sign of an imbalance and a source of vulnerability, if, for example, the volume of borrowing is unsustainable. In turn, a high current account surplus may document weaknesses in domestic demand or domestic policy settings that could be an imbalance. The return flow of the position of the net international investment position is such an indicator, so each deficit or surplus is evaluated in conjunction with the level of outstanding foreign debt/ credit in the economy.

In Luxembourg, it is noteworthy that the surplus current account is mainly due to financial services. According to STATEC[159], the positive balance on transactions in products with the rest of the world - cleared exclusively by the international trade in services - more than offsets the deficit caused by the remuneration of production factors (labour and capital) so that the current account continues to generate a surplus. The goods-only trade balance[160] recording the difference between exports and imports not including services is at a structural deficit in Luxembourg, which is mainly due to the small size of the Luxembourg economy, which makes it more dependent on supplies from abroad, including energy products and goods.

Another indicator for which Luxembourg has exceeded the threshold is the real effective exchange rate based on the HICP deflator. The real effective exchange rate is analysed in detail by the *Observatoire de la Compétitivité*[161]. The real effective exchange rate allows a comparison of domestic and foreign prices expressed in a common currency at the macroeconomic level and thus provides a measure of competitiveness. A lower REER (price version) is regarded as an improvement in Luxembourg's price competitiveness (domestic prices evolve less rapidly than foreign prices expressed in euros); an increase in the REER is considered as a loss of competitiveness.

[159] STATEC Bulletin No. 3-2010, La balance courante au Luxembourg en 2009

[160] STATEC Bulletin No. 3-2010, La balance courante au Luxembourg en 2009

[161] Price competitiveness has been discussed in detail in the *Observatoire de la Compétitivité* 2006, 2007, 2008, 2009 et 2010 Competitiveness Reports

In terms of prices, we compare the prices of domestic goods and services with those of major competitors. Luxembourg is a member of a monetary Union (Eurozone) where exchange rates are fixed between member countries. Luxembourg's main competitors are also part of the same monetary union. Therefore, the adjustment mechanism by the competitiveness differential is primarily based on market forces acting in one direction against marked stabilizing inflation differentials. In particular, if within a monetary union a country has a lower than average inflation, it becomes more competitive in relation to other countries. Conversely, a country with a higher inflation will become less competitive. Over time, this phenomenon will tend to increase demand in the country with a "favourable" inflation differential and reduce it in others. This process will thus become the competitiveness adjustment process between the main economies of a currency area like the Eurozone.

The nominal unit labour cost indicator, which is also a part of the Competitiveness Scoreboard, is often used to identify price competitiveness as it provides a direct link between costs and productivity. The ULC measures the average labour cost per unit of production. A rise in labour costs is an increased reward for the contribution of labour to a production unit. Therefore, this corresponds to an increase in labour costs higher than the increase of labour productivity, which can potentially be a threat to the economic competitiveness of cost, if other costs are not adjusted (cost of capital).

We distinguish between nominal ULC and real ULC. The real ULC is deflated by prices. In Luxembourg's Competitiveness Scoreboard the nominal ULC which is referred to is the one that better reflects Luxembourg's economic situation since most companies are price-takers in the competition situation.

6.5 Conclusion

The EIP Scoreboard is being finalized. The ECOFIN Council will soon adopt the detail of the Scoreboard. Nationally, the scoreboard should therefore be strictly followed. This scoreboard can be supplemented by a Luxembourg specific scoreboard.

In the 2009 government program[162] it was stated that economic indicators entered in the Grand Duchy Regulation of the 4th of April 1985, adopted under Article 21, paragraph 6 of the amended law of the 24th of December 1977 authorizing the Government to take measures to stimulate economic growth and maintain full employment date "...from before the introduction of the euro or prior to the transformation of the Luxembourg economy into a services-based economy and do not take into account the changes in collecting and processing statistical data using information technology". This reform proposal has been iterated within the 65 proposals of the Minister of Economy and Foreign Trade in order to improve national competitiveness in the Tripartite Coordination Committee of Tuesday, April 20th, 2010.

The nine indicators of the Grand Duchy Regulation of the 5th of April 1985 implementing Article 21, § 6 of the law of the 24th of December 1977 are the divergence of the rate of inflation, the real effective exchange rate, changes in exports and imports of goods, the terms of trade, labour cost per unit produced, prices of industrial production, the indicators for the main economic sectors, changes in unemployment and partial unemployment, and changes in purchasing power of wage earners.

The European Scoreboard certainly provides a good operational basis to analyse macroeconomic imbalances. However, the scoreboard does not reflect the labour market or inflation, which are treated indirectly. Thus, a discussion with social partners is needed in order to eventually complete the scoreboard and replace the nine indicators of the Grand Duchy Regulation of 5th April 1985. From a statistical point of view, collaboration is needed to complete the procedure.

[162] Source: http://www.gouvernement.lu/gouvernement/programme-2009/programme-2009/07-ecocomex/index.html

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7 Creating an Observatory of price formation in Luxembourg

In the context of bipartite discussions with trade union and employer delegations at the end of 2010 on the changes in the social and economic situation, public finances and on the package of measures adopted by the Government to address the consequences of the financial and economic crisis, the Government decided to establish an «Observatory of price formation» (OPF) integrated into the *Observatoire de la Compétitivité* of the Ministry of Economy and Foreign Trade, and whose work would be followed by the Consumer Council.

Luxembourg follows in this way the model of Belgium, France, Spain and Italy in terms of ongoing monitoring of consumer prices.

7.1 International experiences in price monitoring

7.1.1 Observatoire des prix (Belgium)[163]

In March 2008 the Belgian Government decided to install a Price observatory, in particular to monitor the evolution of purchasing power. This observatory "will examine the evolution of the different components of final consumer prices (including energy prices). Where appropriate, the Government will take the necessary measures. This instrument of independent advice at the Government disposal will allow it also to obtain a better insight into and necessary information about the proper functioning or distortion of competition on the Belgian market."

The Price observatory is integrated into the National Accounts Institute (NAI), which consists of representatives from three major institutions: the Directorate General Statistics and Economic Information, the National Bank of Belgium and the Federal Planning Bureau. With the collaboration of these institutions but under its own responsibility, it establishes the national accounts statistics and economic forecasts.

The scope of work consists of:

- three quarterly reports;
- an annual report (incorporating also a price analysis of last quarter);
- thematic reports on important topics in the field of prices that the NAI examines on its own initiative;
- Random analysis at the request of the relevant ministers (for the economy, consumer protection, SMEs and self-employed).

[163] http://statbel.fgov.be/fr/statistiques/organisation/icn/prix/

7.1.2 Observatoire de la formation des prix et des marges des produits alimentaires (France)[164]

In 2008, the French Government created a first observation structure for food prices under the responsibility of the Directorate General for Competition, Consumers and Repression of Fraud (DGCCRF) of the Ministry of Economy, Finance and Industry and the Directorate General for agricultural, food and territories policies (DGPAAT) of the Ministry of Agriculture, Food, Fisheries, Rural and Regional Development.

This rather informal monitoring tool was confined to reconstructing the valuation of agricultural product downstream. In October 2010, a new "Observatory of the formation of prices and margins in food products" replaced the old system and its functions are now defined by the law of modernization of agriculture and fisheries (LMAP) of July 2010:

"The mission of the Observatory for the formation of prices and margins in food products, under the authority of the Minister for Food and the Minister for Consumer Affairs, is to inform economic actors and public authorities on prices and margins formation over the transactions within the supply chain of food products, be it products of agriculture, fisheries or aquaculture.

The Observatory analyses the necessary data to perform its duties, collected from FranceAgriMer and the public statistics service.

It studies the production costs at the stage of agricultural production, processing costs and distribution costs throughout the marketing chain for agricultural products. It presents an annual report to Parliament."

The Observatory aims to produce objective and shared information on price developments in the food industries, from agricultural production to retail, with a special emphasis on the differences in price developments upstream and downstream. The Observatory for the formation of prices and margins in food products takes the form of an "administrative advisory committee." It is by no means a new service of the Ministry of Agriculture, Food, Fisheries, Rural Affairs and Regional Planning or FranceAgriMer.

The structure relies on FranceAgriMer to collect the necessary data, to process and analyse them, to conduct or commission studies, to produce reports on these studies and to ensure the dissemination of results. It is anticipated that a steering committee, chaired by the President of the Observatory of the pricing and margins in food products and involving representatives of various professional branches, consumers and relevant departments of the State, provides orientation and monitoring.

[164] http://www.economie.gouv.fr/dgccrf/concurrence/Observatoire-des-prix-et-des-marges

7.1.3 Observatorio de Precios de los Alimentos (Spain)[165]

The Observatory for food prices is an advisory body under the Ministry of Environment and Rural and Marine Affairs through the Directorate General of the industrial and food markets. The main objective of the Observatory is to improve the transparency and efficiency of the marketing process by detecting possible situations of imbalance along the food marketing chain.

The functions of the Observatory of food prices are as follows:

- To establish a system for monitoring the final price generation of food;
- To analyse the basic structure of prices and factors which are responsible for its evolution;
- To make reports and explanatory studies;
- To encourage dialogue and communication between the production sector, retail trade and consumer representatives;
- To develop proposals for action and recommendations to the various economic actors involved.

The Observatory for food prices is designed as a public entity that represents the General Administration of the State, regional and local governments and the public company Mercasa[166], which provides information on prices and margins of fresh food products. Mercasa develops a wide range of activities designed to improve transparency, competition and efficiency in the food chain, especially for the wholesale market.

The observatory may also seek advice from external bodies and institutions, which can help them better understand certain topics, because of their experience and knowledge.

[165] http://www.marm.es/en/alimentacion/servicios/observatorio-de-precios-de-los-alimentos/default.aspx

[166] http://www.mercasa.es/

7.1.4 Osservatorio Prezzi e Tariffe (Italy)[167]

The Observatory for prices and tariffs is a new service for information, transparency and consumer advice that was created by the Ministry of Economic Development, the Directorate General for the market, competition, consumer, technical supervision and regulations, in collaboration with Ministries of State, central and peripheral, with ISTAT, Unioncamere, consumer associations and social partners.

The Observatory is a reference point for both consumers and merchants seeking information on the variability of prices of goods and services and on inflation dynamics.

The Observatory is based on Eurostat data, the National Statistics Institute (ISTAT), the Institute of Food Services for the agricultural market (ISMEA) and the *Infomercati* Consortium, which was created as a complement market system for food products. All companies that sell products designed especially for food are invited to attend the consortium.

The *Infomercati* Consortium's mission is:

- To create a connection, information and communication system across the national food markets;
- To manage and distribute information collected in order to ensure transparency in the prices of food products;
- To liaise with agencies to collect and disseminate information on trends in international markets.

The Observatory for prices and tariffs regularly monitors a basket of goods and services. This basket is sufficiently representative according to number of observations, of the structure of products and geographical coverage. For each product we find the average price taking into account the minimum and maximum number of consumer groups and different geographical areas.

[167] http://osservaprezzi.sviluppoeconomico.gov.it/

7.2 Towards an Observatoire de la formation des prix in Luxembourg

The economic policy of our country is based on competition and confidence in the market system, based on the observation that a well functioning market is beneficial to all actors of economic life. The law of the 17th of May 2004 on competition stipulates that prices of goods, products and services are freely determined by competition (Art. 2. on free pricing), and this law has reversed the principle of State supervision on price to solemnly implement the principle of free pricing[168]. The system has only a few rare exceptions[169].

Thus, exceptions aside, the State has not only lost the power to fix prices, but it has also lost other functions in relation to pricing policy, namely price monitoring and control. The Competition Council is now more devoted to the competitive analysis of markets. Voluntary agreements, without enforcement provisions, may be signed with activity sectors (e.g. Fair price Charter).

So the Observatory of price formation, which is integrated in the *Observatoire de la Compétitivité* of the Ministry of Economy and Foreign Trade (MEFT), is a mere instrument for informal analysis.

7.2.1 Organisation of the Observatory of price formation (OPF)

Within the MEFT, three levels are involved in the work of the OFP:

- a political level in charge of the broad guidelines of analysis (the Minister having Economy in its functions);
- an execution level in charge of the work;
- a level of expertise and coordination (MEFT officials in charge of consumer affairs, competition, competitiveness - STATEC agents in charge of prices).

[168] The law of 2004 has merely revoked the law of 1983 concerning the Prices Office.

[169] The exceptions are:

a. specific sectors, including two specifically enumerated in the law of 2004 (oil prices and pharmaceuticals)

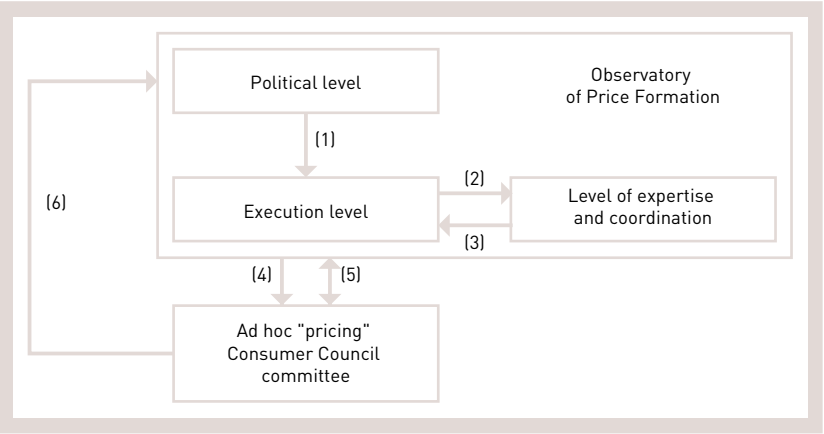
b. in general, these exceptions, justified by considerations of sector policy, are provided in sector laws;

c. the Government may, for reasons of cyclical market malfunction in one or more sectors of activity following a crisis situation, exceptional circumstances or clearly abnormal market situation "implement" Grand-Duchy regulations which "adopt temporary measures against the excessive increases or decreases of prices". These conditions are not all met in the current situation (Article 2, paragraph 2);

d. lack of competition (e.g. captive customer base - cf. taxis), article 2, paragraph 3).

7.2.2 Monitoring the work of the OPF

Figure 1
Schematic illustration



Explanations:
(1) Broad analysis guidelines and validation of testing proposals made by the ad hoc "price formation" committee of the Consumer Council;
(2) Submission of analysis and observation projects;
(3) Validation of analysis and observation results;
(4) Sending the validated report to members of the "price formation" committee of the Consumer Council;
(5) Request for explanations and, if necessary, additional analysis;
(6) Communication of report or notice, and of any recommendation concerning the topics to be analysed, from the ad hoc "price formation" committee of the Consumer Council.

7.2.3 Missions of the OPF

The OPF is a tool for observing the formation of prices in order to provide greater transparency on the evolution of consumer prices and its components. This counselling instrument that is at the Government's disposal allows it to obtain a better insight into and necessary information about the analysed areas.

The main mission of the OPF is to analyse statistical data to provide elements of information on the mechanisms of consumer price formation in Luxembourg. Its observation work and analysis will be limited to the formation of consumer prices (industrial prices, business to business etc. will therefore not directly be monitored). For this purpose the OPF conducts or commissions the necessary studies for its activity and analyses the resulting information, monitors the work done by external organizations including Luxembourg in their fields of analysis, produces summary reports and provides regular dissemination of its work.

7.3 The first analysis carried out by the Observatory of Price Formation

7.3.1 Inflation analysis for the period January to September 2011

Table 1
National Index of consumer prices (NICP)[170]
(as a % of change compared to the previous year)

	ICPN	Underlying inflation	Petroleum products	Other goods and services	Non-durable goods	Semi-durable goods	Durable goods	Services
Weighting			7,6%	92,4%	32,1%	8,7%	17,5%	41,7%
January	3,17	2,15	15,47	2,18	5,78	-4,01	1,30	3,29
February	3,56	2,37	18,68	2,39	6,48	0,69	1,02	2,98
March	3,72	2,42	20,11	2,43	6,54	-0,10	1,26	3,39
April	3,73	2,50	18,54	2,54	6,30	0,59	1,53	3,33
May	3,59	2,64	15,13	2,65	5,59	0,84	1,53	3,51
June	3,52	2,42	16,51	2,48	5,50	0,44	1,55	3,48
July	2,91	1,82	15,38	1,89	5,46	-4,41	1,59	2,87
August	3,26	2,14	16,89	2,17	5,52	0,96	1,49	2,72
September	3,34	2,11	17,98	2,17	5,71	0,99	1,75	2,64
January - September 2010	2,18	1,26	14,58	1,28	3,96	0,32	0,87	1,71
January - September 2011	3,42	2,28	17,19	2,32	5,88	-0,45	1,45	3,13

Source: STATEC, Calculations: *Observatoire de la formation des prix*

Inflation in Luxembourg rose more sharply during the first 9 months of the year than during the same period in 2010. Average inflation reached 3.42% and even 3.73% in April, the highest level since September 2008. In the third quarter of 2011, the situation improved somewhat, mainly due to the sales in July and oil prices, which were trending down for 3 consecutive months (May-July).

The underlying inflation, which excludes oil prices and other prices that form in international markets, has reached 2.28% on average.

Nondurable goods increased by 5.88% during the analysed period, which, apart from energy prices (gas, liquid fuels, diesel, petrol), water supply (24%) and coffee (12%), contributed most to this increase.

Durable goods increased by 1.45%, including jewellery, which, with a 20% increase, experienced the greatest variation in this category. This increase is due to soaring gold prices on the international markets (60% since January 2010).

Semi-durable goods, including clothing and footwear, have remained constant compared to 2010.

[170] Définitions:

Underlying inflation:
subset of the general index (NICP), which excludes oil prices and other prices that form on the international markets. The following series are excluded: town gas and natural gas, liquefied gas, liquid fuels, fuels, diesel, gasoline, lubricants and additives, potatoes, coffee, tea and herbal tea, cocoa and chocolate powder, solid fuels, thermal energy, flowers cutting.

Nondurable goods:
goods that disappear after the first use (food, beverages, petroleum, etc.)

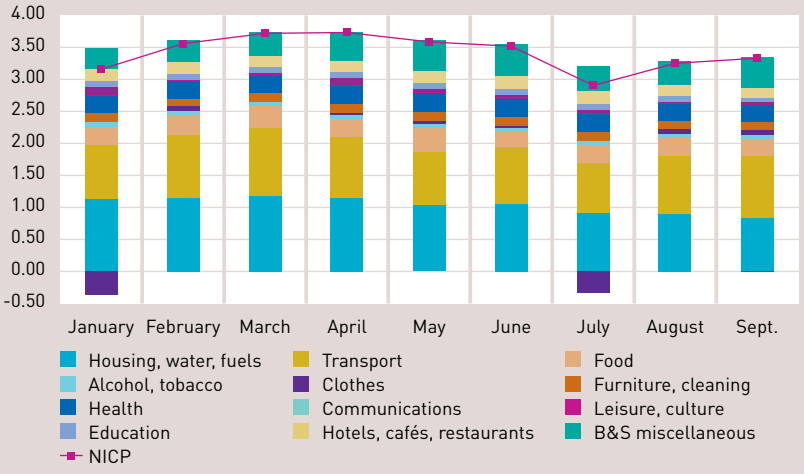
Semi-durable goods:
goods that do not disappear immediately but must be replaced after a certain time (clothes, tires, small electronics, games, toys, sports equipment, etc.)

Durable goods:
goods that can be used for purposes of consumption repeatedly or continuously over a period of one year or more (cars, furniture, refrigerators, other major appliances, etc.)

Services:
medical services, rent, transportation, childcare, travel, financial services

In the services category, medical, paramedical and dental bills grew most strongly in the last year, but the recovery of waste water and postal services have also contributed to the increase in service prices. So the increase of 3.13% is mainly due to legislative changes (reform of health and adoption of the EU Directive on Food and the resumption of drinking water).

Graph 1
Monthly contribution to inflation



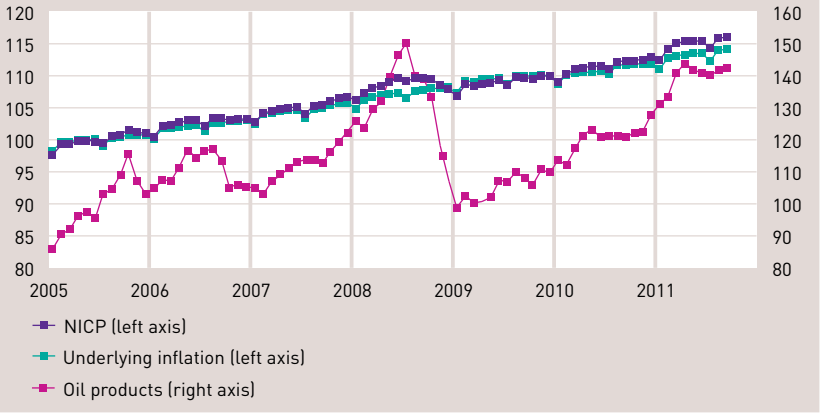
Source: STATEC, Calculations: Observatory of Price Formation

Inflation in Luxembourg was 3.42% during the first three quarters of 2011. The fields "Transport" (0.92 points) and "Housing, water, electricity and fuels" (1.04 point) contributed with more than half of total inflation. This surge in prices in these two fields is due to international higher oil prices and energy prices, but also because of the adoption of the EU Directive on drinking water supply which caused a major increase for consumers in Luxembourg.

The health sector has increased by 11% following new legislation came into being on healt[171]. But as the health sector has a relatively low weighting in the index basket (2.41% of all goods and services), this change is responsible for only 0.28 point in inflation.

[171] Law of 17 December 2010 on the reform of health care and amending: 1. the Code of Social Security, 2. the amended law of 28 August 1998 on hospitals: http://www.legilux.public.lu/leg/a/archives/2010/0242/a242.pdf

Graph 2
Recent developments in the NICP, the underlying inflation and prices of oil products (2005 to September 2011)



Source: STATEC, Calculations: Observatory of Price Formation

Outside the months of January and July (months traditionally devoted to sales), the underlying inflation is rising steadily for several years. The difference between total inflation and core inflation has widened during the first half of 2011 due to oil prices which increased from 121 to 144 basis points in nine months (100 in 2005). We could already see a similar trend in 2008 when oil prices rose 25 points in six months before dropping sharply in the second half of the year.

In its first semi-annual report (scheduled for early 2012), the Observatory will further analyse Luxembourg's inflation in the second half of 2011 and compare the situation of our country with our neighbouring countries.

7.3.2 European Food Prices Monitoring Tool

The food chain is a major contributor to the European economy, the sectors of agriculture, of food industry and of distribution account for 6% of the value added of the European Union (EU) and 12% of employment in the EU. These sectors have a direct impact on all European citizens, since food represents on average 16% of household expenditure.

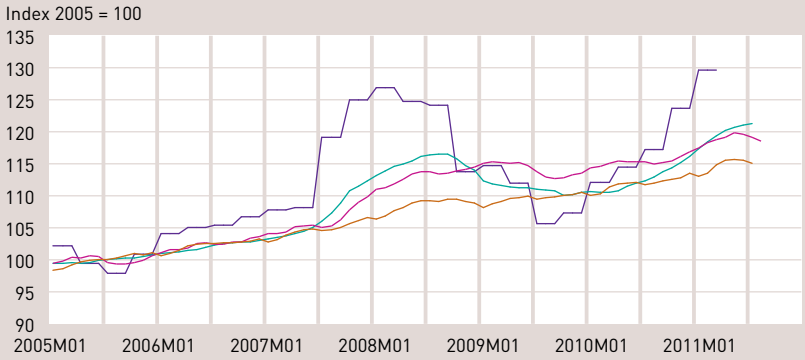
In 2009 the European Commission published a Communication called "A better functioning food supply chain in Europe"[172]. The European Commission has identified significant tensions in contractual relations between actors in the food supply chain, arising from the diversity of actors in the chain and differences in bargaining power. The Commission also highlighted the lack of price transparency along the food supply chain and the increased volatility in agricultural prices. It is in this context that the Commission has asked Eurostat to make available information on the functioning of the food chain[173].

[173] For additional details: http://ec.europa.eu/economy_finance/articles/structural_reforms/article16028_en.htm

[173] For additional details: http://epp.eurostat.ec.europa.eu/portal/page/portal/hicp/methodology/prices_data_for_market_monitoring

The main objective of this monitoring tool called the "European Food Prices Monitoring Tool" is to gather available data on price developments across the supply chain, by comparing the change in prices of agricultural products, those of the food industry and relevant changes in prices of some consumer goods. It is impossible to give a complete description of all the supply chains for all products across Europe; therefore we limit ourselves to a summary of parts of the chain for a complete selection of products.

Graph 3
Price evolution of the food chain in Europe (EU 27) (2005-2011)[174]



Source: Eurostat, Calculations: Observatory of Price Formation

Between mid-2007 and mid-2008, prices of basic agricultural products have risen sharply and consequently the producer prices of food and consumer prices have also begun to increase but more slowly. This can be explained by the fact that basic agricultural products often represent a small percentage of total production costs of food (e.g. the cost of wheat is on average less than 10% of the final consumer price of bread), and by the fact that in the most competitive markets, the sectors of the food production and distribution have absorbed part of the price increase.

Since September 2009, prices of basic agricultural products fell to similar levels to 2006 while consumer prices have remained fairly constant. This decrease was not fully transmitted to production prices, which has raised concerns about the functioning of the food chain. These fluctuations have hurt agricultural producers and do not allow consumers to benefit from fair conditions.

Based on the tool "European Food Prices Monitoring Tool", the Observatory of price formation will further analyse the European food chain with a comparison of national data in its first semi-annual report, which is planned for early 2012.

[174] Definitions:

The price index of basic agricultural products is based on the sale of agricultural products. The index includes the value of output sold to traders and the value of direct sales by farmers and includes taxes other than deductible VAT.

The index of producer prices describes the evolution of intermediate steps between the production of agricultural products and the final purchase by the consumer.

The price index of food consumption measures the change in final prices that consumers must pay at the store.

8 Measuring Well-being

8.1 The progress of the *PIBien-être* project in Luxembourg

8.1.1 The main events

Since the release in October 2010 of the latest *Observatoire de la Compétitivité* report, a number of presentations and lectures of the *PIBien-être* project were held:

- *PIBien-être* project presentation to the "Caritas and Diakonia" diocesan commission's working group on welfare and values in Luxembourg, on October 6th 2010.
- Presentation of the *PIBien-être* project and its initial findings at the Eurostat working group meeting on indicators of sustainable development (sustainable development indicators: SDI), on October 14th and 15th 2010.
- Workshop n° 2 "Towards sustainable development in Luxembourg", on October 29th 2010.
- Workshop n° 3 "Towards a better assessment of quality of life" on November 11th 2010.
- Presentation of the *PIBien-être* project and its initial findings at the conference "Luxembourg 2020", on December 7th to the 9th 2010.
- Presentation and discussion of *PIBien-être* at the STATEC economic seminar "WellBeBe: Towards theoretically sound and democratically legitimate indicators of well-being in Belgium" with Prof. Dr. Tom Bauler, on January 25th 2011.
- Conference for delivery of the *PIBien-être* project's technical report, on March 9th 2011.
- Presentation of the *PIBien-être* project and its research topics to the High Council of Research and Innovation (CSIR - *Conseil Supérieur de la Recherche et de l'Innovation*), April 6th 2011.
- Presentation of the *PIBien-être* project and of its main results and the project's future at the conference "How much is enough?" with Prof. Skidelsky, on May 27th, 2011.

8.1.2 The *"PIBien-être"* project technical report[175]

Throughout the three *PIBien-être* workshops and conferences, questions were raised, discussed both about the future model of society and about the indicators to be adopted. The technical report is aimed at proposing indicators, themes and modes of action to meet the different expectations. However, it does not address the more political aspect related to the model of society.

The report summarizes and highlights the main findings of each of the three workshops. It also sheds light on them with the latest available scientific contributions and data. This work was also completed by a calibration ("benchmark") of the indicators within the various nations which have already questioned this issue. It also includes in its conclusion a list of questions and topics that should/could be addressed by the CES and the CSDD. The appendices of the report incorporate the reports of the workshops and lectures by Mr. Le Clézio and Mr. Viveret. Finally, to help answer the question of the choice of indicators for referral, it includes a structured grid of proposed indicators.

The report's purpose is to define and clarify the structure and content of an information system, based largely on existing data, which achieves a synthetic and general view of the situation of Luxembourg, beyond the mere observation of three key indicators of public statistics (GDP, unemployment rate, inflation rate). Its possible implementation is expected to produce a statistical tool that would satisfy all stakeholders in the public debate. This tool will also necessarily evolve over time in order to adapt to the new objectives that society wants to attain.

8.1.3 The *"PIBien-être"* project follow-ups

The work done after the finalization and submission of the technical report on March 9th 2011, consisted, firstly, of integrating criticisms/remarks made during and after the delivery conference but also of translating the technical report into English to ensure its dissemination to stakeholders (OECD, European Commission, Eurostat, etc.) and secondly, to undertake extensive research on the 101 indicators identified by the technical report, in order to produce a "technical notice" on them and a prototype brochure on some of these indicators. It was, indeed, essential to conduct further investigation on the indicators and to implement a comprehensive inventory of their qualities, their faults, but also their potential substitutes. The work was done so that once finalized, discussions of relevant institutions could start immediately, based on a comprehensive report. In addition, a conference is being organized with the OECD (and its "Better Life Index")[176] and the British Statistics Institute (who certainly knows the most publicized post-Stiglitz experience), and during which a first draft of *PIBien-être* indicators will be presented.

[175] French version of the Report: http://www.ces.public.lu/fr/actualites/2011/03/conf-restitution/rapport-technique-v2.pdf

English version of the Report: http://www.ces.public.lu/fr/actualites/2011/03/conf-restitution/rapport-technique-anglais.pdf

[176] For additional details, see sub-chapter 8.2

Work on NPSD2 and *PIBien-être* common indicators
The work consisted in completing the work of the Ministry of Sustainable Development and Infrastructure (MSDI) on potential NPSD (National Plan for Sustainable Development) indicators and submitting proposals for adding or changing indicators. Following this, two meetings were held with the MSDI, then with the *Observatoire de la Compétitivité*, to develop synergies between different projects (selected indicators and consistent presentations, etc.). In addition, many NPSD2-*PIBien-être* bilateral meetings were held with all other ministries, to submit their proposals for indicators of both projects and to inform them, if any, of the existence of alternative or more representative indicators.

CSRI and Skidelsky
Following the delivery conference, an interview was held with the Higher Committee for Research and Innovation (HCRI) to submit the *PIBien-être* draft and identify key "search areas" relevant to the topic.

In addition, during a conference organized by the IEIS (also announced at the delivery conference), and dealing with the subject "How much is enough?" with Prof. Skidelsky father and son, a *PIBien-être* project presentation was performed and a number of contacts were made with academics from across Europe for further work (including Prof. Brand, German *PIBien-être* expert, soon to be the guest of the ESC and CSDD).

Time-budget
To overcome the lack of "subjective" statistics, a credit application has been filed to support a Time Use Survey. This is likely to be the subject of a future statistics regulation, the production of such an investigation is particularly interesting because it would measure the amount of time spent in different activities (allowing to measure the time devoted to social relations, leisure, etc.), and question individuals about their feelings *vis-à-vis* each other in order to move a little closer to the feeling of individual satisfaction.

Research work on indicators and presentation brochure
After identifying the various potential indicators for a well-being score-board (technical report, p.70-74), the work involved for each of them was to observe the different available sources, to retain the best data series, to analyse the relevance of the data and finally to search all existing alternatives. The goal was, given the obvious gaps in some areas, to identify indicators already available and those that can be used as temporary substitutes ("second best" indicators).

Subsequently, a "presentation model" of forty indicators was established. A list of indicators has been temporarily set for broadcast in the future OECD conference in Luxembourg (see below).

Conference with the OECD and English Statistics
A conference is being organized with the OECD and the English "*PIBien-être* program" officials (UK's Happiness Index) by the end of the year. This should follow the event "Two years after the Stiglitz-Sen-Fitoussi report: what measures for well-being and sustainability?" held on October 12th 2011 in Paris and co-hosted by France and the OECD, and where the *PIBien-être* project was presented.

8.1.4 The *PIBien-être* project internationally

The Luxembourgish *PIBien-être* project also arises as an example for other economic and social councils. Luxembourg has thus insisted on bringing its knowledge and expertise into the sub-working group of the International Association of Economic and Social Councils and Similar Institutions (AICESIS) on the measure of progress, development and well-being. Also, in this context, a report on the measure of societal progress at international level has been achieved.

8.1.5 Bibliography of books and reports published on the theme

In Luxembourg

- "Sozialalmanach 2011/Schwerpunkt: Leben in Luxemburg 2020", Caritas
- "Pas de cohésion sociale sans compétitivité et vice-versa!", La lettre de l'Observatoire de la Compétitivité no. 12 / March 2011
- "Satisfaction in life conditions and well-being" by MM. Paul Dickes and Carlo Klein. Working Paper from CEPS/Instead no. 2011-03.

From OECD

- "Beyond GDP and back: what is the value-added by additional components of welfare measurement?" by Sonja. C. Kassenboehmer and Christoph M. Schmidt from the Centre for Economic Policy Research (CEPR)
- "Alternative Measures of Well-Being" by Romina Boarini, Asa Johansson and Marco Mira from Ercole, OECD social, employment and migration working papers no. 33
- "The UK's measuring national well-being programme", OECD / June 8, 2011
- "Guidelines on Measuring Subjective Well-Being", OECD / May 24, 2011
- "OECD Better Live Initiative 'Compendium of OECD Well-Being Indicators'"

Other reports

- "Evaluer la performance économique, le bien-être et la soutenabilité", Report from the Conseil d'Analyse Economique (CAE) and the German Council of Economic Experts
- "Prospérité sans croissance" by Tim Jackson
- "Summary of the report on measuring sustainable Development" of the United Nations Economic and Social Council, published on March 21, 2011

8.2 OECD: Better Life Index - The Compendium of indicators for well-being

In 2009, the OECD initiated a project concerning the measuring of societal progress of Member States. This has also prompted several countries to adopt the concept at national level to better understand the status, trends and characteristics of the welfare of their society. The Compendium prepared by the OECD, published in the first half of 2011, presents selected current indicators which will form the final report "How's Life?" to be presented in October 2011.

As noted in the 2010 Competitiveness Report, the Gross Domestic Product (GDP) per capita and the Gross National Income (GNI) per capita "were not designed to measure well-being or quality of life of a company or country, but to measure the production of goods and services"[177].

This chapter lists the indicators proposed by the OECD in this context and aims to assess the positioning of Luxembourg. In its 2009 program, the government has committed to identify indicators that go beyond the material analysis and that fit the characteristics of Luxembourg. Indeed, the Compendium does not intend to replace the analysis of Member States, but aims to encourage Member States to go beyond GDP/GNI per capita.

The proposed framework is similar to that established nationally by the CSDD (Conseil supérieur du Développement durable), the CES *(Conseil économique et social)* and the ODC *(Observatoire de la Compétitivité)* in their Technical Report on the *PIBien-être* project[178]. The Compendium composed by the OECD is organized into two categories: the first refers to material living conditions (in monetary/material terms) and the second to the quality of life, including for each of them related indicators categories. The Compendium proposes eleven indicators; they are experimental and evolving and can be substituted or adapted depending on the perceived changes over time.

Thus, this second part of Chapter 8 of the 2011 Competitiveness Report aims at analysing the indicators used by the OECD and to indicate the position of Luxembourg in relation to other Member countries. The indicators proposed by the CSDD, the CES and the ODC in the Technical Report are more numerous and adapted to the domestic situation, which facilitates more detailed analysis of the economic well-being and the quality of life in Luxembourgish society.

[177] 2010 Competitiveness Report, "Looking to smart, sustainable and inclusive growth", chapter 8, p.179

[178] For additional details: http://www.ces.public.lu/fr/actualites/2011/03/conf-restitution/rapport-technique-v2.pdf

Indicator analysis

1. Material indicators
The OECD divided this category into three different parts in order to evaluate it: income and wealth, jobs and earnings, and housing. These three divisions form the category for material indicators.

1.1 - The first part establishes indicators related to a country and its people's income and wealth. Income and wealth remain important in the analytical framework relating to the well-being of individuals and of society, because the income allows the purchase of goods and services offered by the market in order to meet the specific needs of each individual. In this sense, the OECD chose two indicators:

- Available average net income per capita, in USD
- Net financial wealth, in USD

These indicators were also included in the *PIBien-être* project's Technical Report to measure living standards nationally. However, it is preferable to use the median disposable income, because it eliminates the extremes.[179]

According to the OECD[180], Luxembourg is ranked first for both indicators. For the first indicator the amount is 44,212 USD. This represents the annual income that a household has after taxes. This amount includes salaries, profits of self-employed professionals, the income from private ownership (dividends, interest or rent), and social transfers, both in cash or in kind[181]. For the second indicator, the household income in Luxembourg amounts to 200,792 USD.

Luxembourg is not represented in the Figure of the Compendium, but data are available on the website of the Better Life Index in the section for Luxembourg[182]. For the second indicator, Luxembourg ranks first with 200,792 USD and the United States second, reaching a total of 98,440 USD.

[179] The average wage is the sum of wages of the population divided by the population.

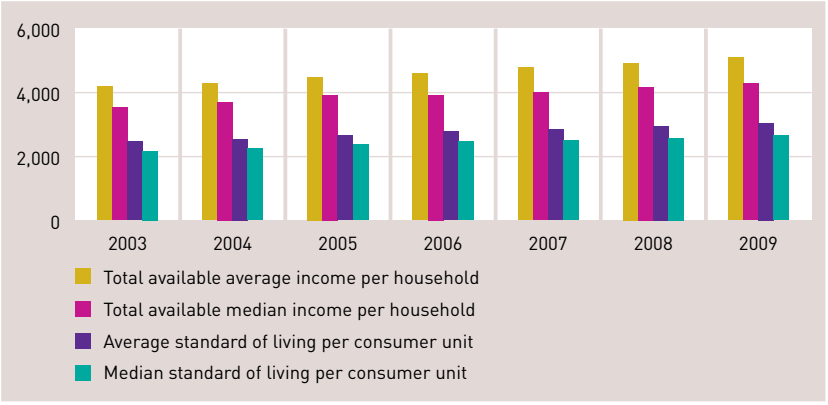
The median wage is the wage that divides the population into two categories: 50% of the population earns more than the median and 50% of the population earns less.

[180] OECD, http://www.oecdbetterlifeindex.org/#/11111111111

[181] Idem

[182] OECD, http://www.oecdbetterlifeindex.org/topics/income/

Figure 1
Monthly disposable income and living standards (in EUR) 2003 - 2009 in Luxembourg



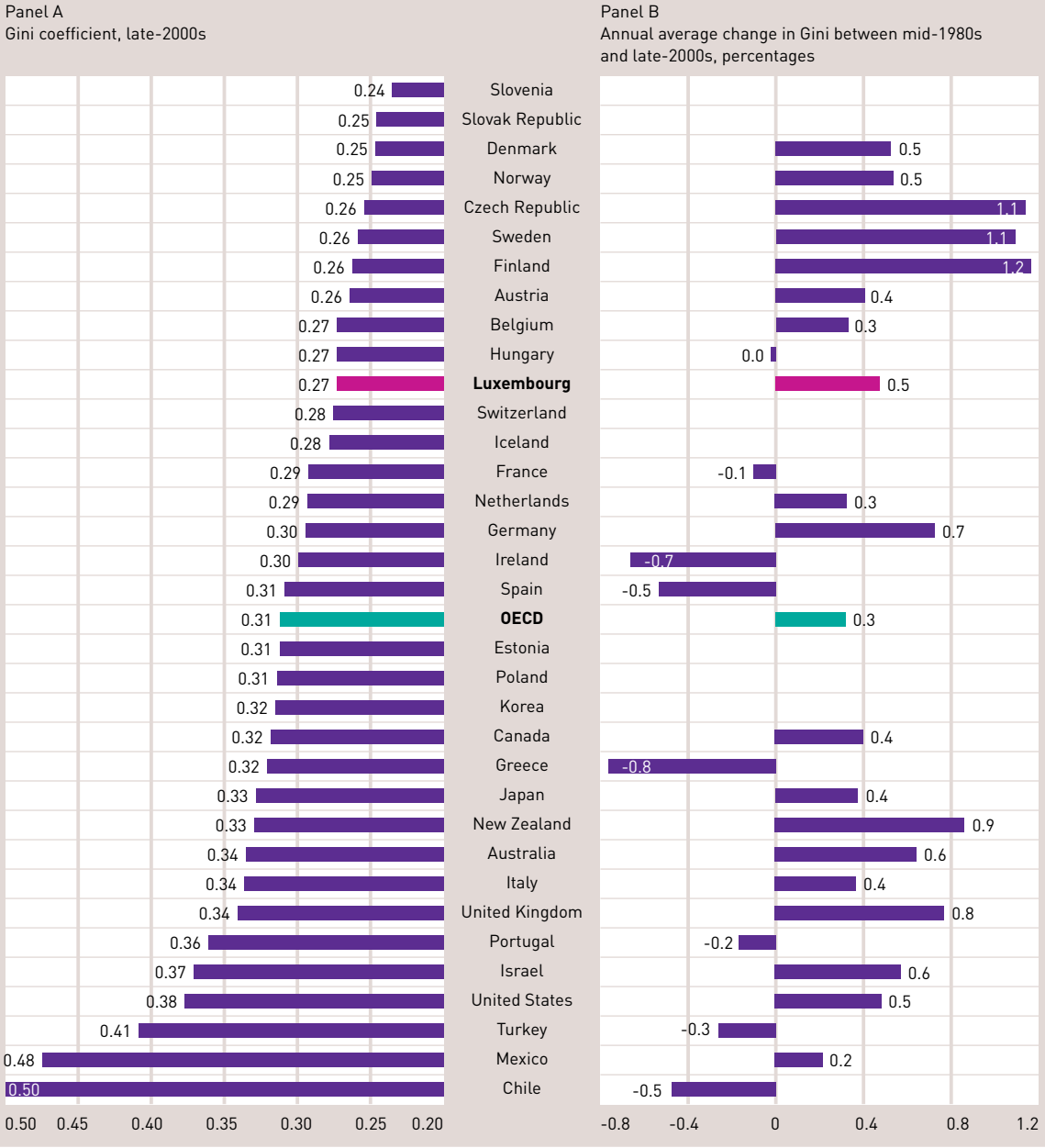
Source: STATEC

The OECD highlights the limitations of these two indicators, which do not take into account a society's distribution of earnings. Indeed, it would be important to add another indicator such as the *Gini coefficient*. This ndicator measures income inequality. The coefficient values vary between 0 (in case of perfect equality) to 1 (in case of maximum inequality). According to STATEC, social cohesion [...] "creates a 'society of equals' promoting a virtuous cycle between social peace and political stability, economic growth and welfare"[183].

The Figure below illustrates the position of the Grand Duchy if we introduce the "Gini coefficient" indicator. Luxembourg takes the 9th place sharing its position with Belgium and Hungary. Moreover, between 1980 and late 2000, Luxembourg has experienced increasing inequalities in income (panel B).

[183] Statec, *Rapport Travail et Cohésion sociale*, n°109: http://www.statistiques.public.lu/catalogue-publications/cahiers-economiques/2009/PDF-Cahier-109-2009.pdf

Figure 2
Income inequality has been rising[184]



[184] OECD, Society at a Glance 2011: OECD Social Indicators, http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/society-at-a-glance-2011_soc_glance-2011-en

1.2 - The second part considers two indicators that are related to the field of employment:

- Employment rate for 15 to 64 years old
- Long-term unemployment rate

Employment is for most people the main source of income. The OECD and the *Observatoire de la Compétitivité* note that beyond being a source of monetary support, employment is essential to the development of professional knowledge and skills; it promotes the exchange at the social level and represents a medium that also influences personal satisfaction.[185]

For the first indicator, Luxembourg is positioned slightly above the OECD average. Yet it is remarkable that, according to the OECD, since 1995 the Grand Duchy has increased by over 8%. The rate of long-term unemployment is useful in analysing social inclusion/exclusion. According to the figure presented by the OECD, Luxembourg is at a favourable position, yet it is important to mention that since 1995 the rate of long-term unemployment has continued to increase to 1.3% in 2010[186].

1.3 - The last portion of indicators belonging to the category of material living conditions includes the following:

- Number of rooms per person
- Homes that do not have basic amenities (indoor shower and toilet flushing)

Luxembourg is above the OECD average. For the first indicator, Luxembourg has 1.9 room per person and for the second 0.8% of people living under such conditions.

The indicators proposed by the OECD are more suited to analyse the conditions of buildings/houses, while Luxembourg, given the property price situation, offers indicators in the Technical Report on the *PIBien-être* project that seek to identify the evolution of the purchase or rental price of housing.

The Figure below shows the relative ranking in the index of consumer prices (HICP) for housing[187], it should be noted that the index is based on rents. In this sense, for the month of August of 2011, Luxembourg had an index of 129.41, the EU-27 126.57 and the Eurozone (17 Member States) an index of 121.76.

Compared to its neighbouring countries, Luxembourg ranks second after Belgium, that displays an index of 130.85 and Germany which has the best result obtaining an index of 116.9.

185 2010 Competitiveness Report, "Looking to smart, sustainable and inclusive growth", p.177

186 According to Eurostat, Luxembourg has a rate of long-term unemployment of 1.28% in 2010: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=fr&pcode=tgs00053&plugin=1

187 Eurostat, http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=fr&pcode=teicp040&plugin=1

"Harmonised Consumer Price Indices (HICPs) are designed to compare the inflation in consumer prices. They are used in the assessment of inflation convergence as required by Article 121 of the Treaty of Amsterdam and by the European Central Bank (ECB), for monitoring price stability within the framework of the monetary policy. The ECB defines price stability as a function of the annual rate of change of the HICP in the Eurozone.

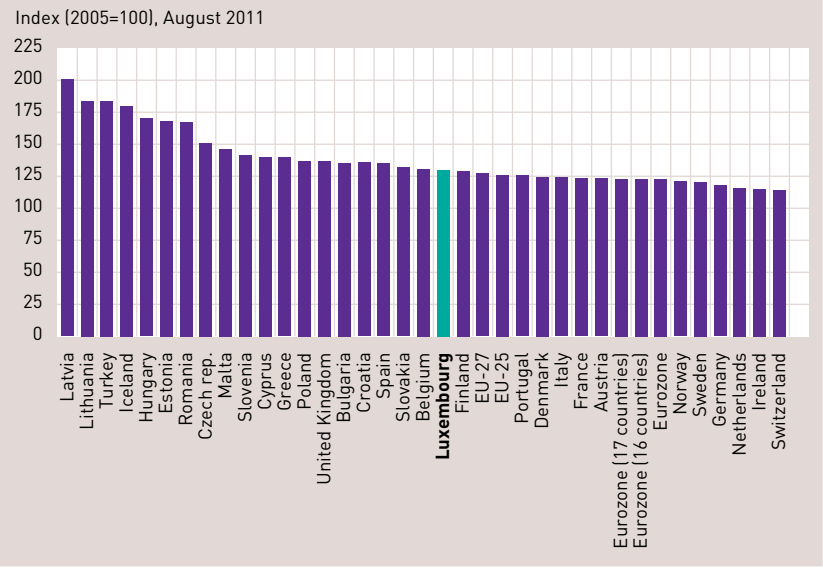
HICPs are compiled on the basis of mandatory harmonized standards for all Member States. The HICPs are Laspeyres type price indices calculated as annual chain indices enabling changes in the weight each year.

The common classification for the price indices of consumer prices is the Classification of Individual Consumption According to Purpose (COICOP). A version of this classification (COICOP/HICP) was adapted for the HICPs. Sub-indices published by Eurostat are based on this classification.

HICPs are produced and published using a common index reference period (2005=100). Growth rates are calculated from the published indices.

Indices, as well as changes in growth rate in relation to the previous month (M/M-1) and compared to the same month the previous year (M/M-12), are not adjusted for calendar effects or seasonal variations."

Figure 3
HICP-COICOP housing, water, electricity, gas and other kinds of fuel



Source: Eurostat

2. Indicators for quality of life

The second category refers to the quality of life. It analyses indicators that go beyond the monetary or material fields and takes into account, among other things, of the health status, the balance between private and professional life, training and competence, social connections, governance and civic commitment, environmental quality, personal safety and personal well-being, and even the subjective well-being.

2.1 - For this category the first theme includes the health status. According to the WHO, and as defined at the International Health Conference in New York in 1946, "health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.[188]

In this sense, the OECD and Luxembourg's *PIBien-être* project propose two indicators:

- Life expectancy at birth
- Personal health analysis between "good" and "very good"

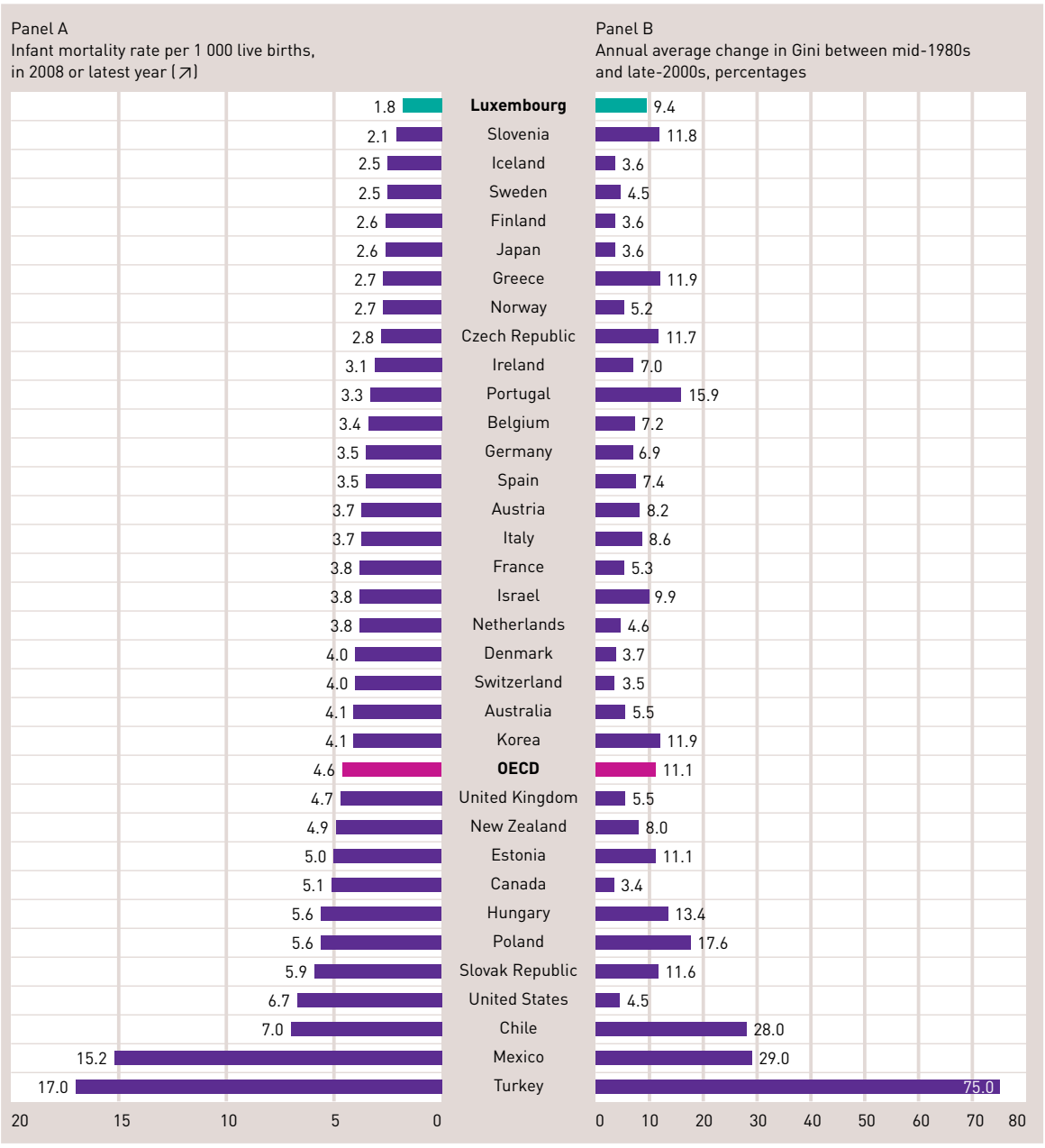
The first indicator is one of the most used in the analysis of health. According to the World Health Organization (WHO), life expectancy in Luxembourg in 2009 is 81 years[189]. The second indicator is rather subjective. But it would be interesting to have this indicator by age group and to introduce an indicator to verify the residents' level of satisfaction with the health system.

[188] World Health Organization: http://www.who.int/suggestions/faq/fr/

[189] WHO, http://apps.who.int/ghodata/?vid=710

In addition, the indicator for infant mortality remains important and it would be useful to introduce it in the Compendium, as it adapts to countries' different situations, whether they are developed, developing or under-developed. It is a key indicator for the initiatives agreed by WHO. In this context, a Figure summarizing the related data of OECD countries follows hereby. According to this Figure Luxembourg takes first place.

Figure 4
Infant mortality has declined in OECD countries[190]



[190] OECD, Society at a Glance 2011: OECD Social Indicators, http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/society-at-a-glance-2011_soc_glance-2011-en

2.2 - The second issue relating to the quality of life refers to the balance between private and professional life. The balance between work and leisure is important, since an imbalance can create troubles in the professional and private or social domains[191]. Moreover, it forms an important basis in the analysis of equal opportunities for gender and age[192].

Thus, the OECD proposes three indicators:

- Percentage of employees working over 50 hours per week
- Hours devoted to leisure activities (socializing with friends or family members) and personal care (meals, sleep) for the population aged 25 to 64
- Employment rate for women with children (women employment rate, aged 25 to 49 and employment rate of mothers with a child that is between 6-14 years old)

In terms of the first indicator, the Grand Duchy is above the OECD average, which means that the population manages to reconcile privacy with professional life.

However, analysing the results of the two other indicators, we see that Luxembourg does not differ from the average. According to the second indicator, the Grand Duchy shows an average of 15.57 hours of leisure. The third indicator shows that only 57% of women are in paid employment. However, this percentage is 67% for women aged between 25 and 49.

These three measures could be introduced in the Luxembourgish *PIBien-être* Technical Report, because they represented important information for the analysis of changes on the resident population as well as for assessing equal opportunities.

2.3 - With regards to education, the OECD suggests two indicators:

- Percentage of adults (aged 15 to 64) with at least upper secondary degree
- PISA test results on the subject of reading

For both indicators, the Grand Duchy is positioned below the OECD average. In addition, the first indicator is also important in achieving the objective of social cohesion. With economic development the level of education increases[193]. Furthermore, it is shown that an individual's income is, among others, intrinsically linked to the educational level[194]. Finally, by analysing the table published by STATEC, we find that the majority of the unemployed have a lower educational level.[195]

[191] CEPS, http://www.ceps.lu/pdf/3/art1539.pdf

[192] CEPS, http://www.ceps.lu/pdf/3/art1605.pdf

[193] OECD mentions States such as Brazil and Indonesia, among others

[194] For additional details: Standard of Living according to the characteristics of the household's reference person (in EUR) 2003-2009

http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=2115&sCS_ChosenLang=fr

[195] STATEC, http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx

This is confirmed in an OECD report published in September 2011, which showed that in 2009 "the unemployment rate of graduates has remained constant at 4.4% on average across all OECD countries, while among those who have not completed high school, the unemployment rate reached 11.5% against 8.7% in 2008".[196]

For the first indicator, the Grand Duchy has a rate of 68% and for the second, it displays a result of 472 points out of 600.

2.4 - The following section discusses social relations. These include the analysis of the lives of individuals to identify the sources of well-being for individuals or for a society.

In this sense, the OECD presents two indicators about social relations:

- Percentage of people who meet at least once a week with friends or family members during one year.
- Percentage of people who can use a friend or family member if needed. (social support network)

Luxembourg has performed better than the EU average[197]. Thus, in the Grand Duchy about 65% of the population is regularly socialized. However, the rate of socialization is higher for family gatherings than for meeting with friends.

For the second indicator, Luxembourg ranks well with a rate of 95%. The OECD notes that the latter depends on other characteristics such as educational level and socioeconomic status. Therefore, 90% of the population having attained the level of secondary school and tertiary say they can count on the support of someone in his entourage when necessary, while only 72% of people who have reached the level of primary education state the same trend[198].

2.5 - The next topic aims to analyse the balance and decision system in a society as well as the socio-political well-being of individuals. The commitment and participation of civil society and of ordinary citizens in public affairs is the foundation of the democratic system. In this way, the decision hierarchy softens by opening the participation in discussions of common interest to the public.

[196] Report presented by the Secretary General of the OECD Angel Gurria, September 13th, 2011

[197] The OECD has taken the only EU countries, since data from other countries were not similar and thus not comparable

[198] OECD Better life index: Compendium of OECD well-being indicators

To measure this dimension, the OECD proposes the following indicators:

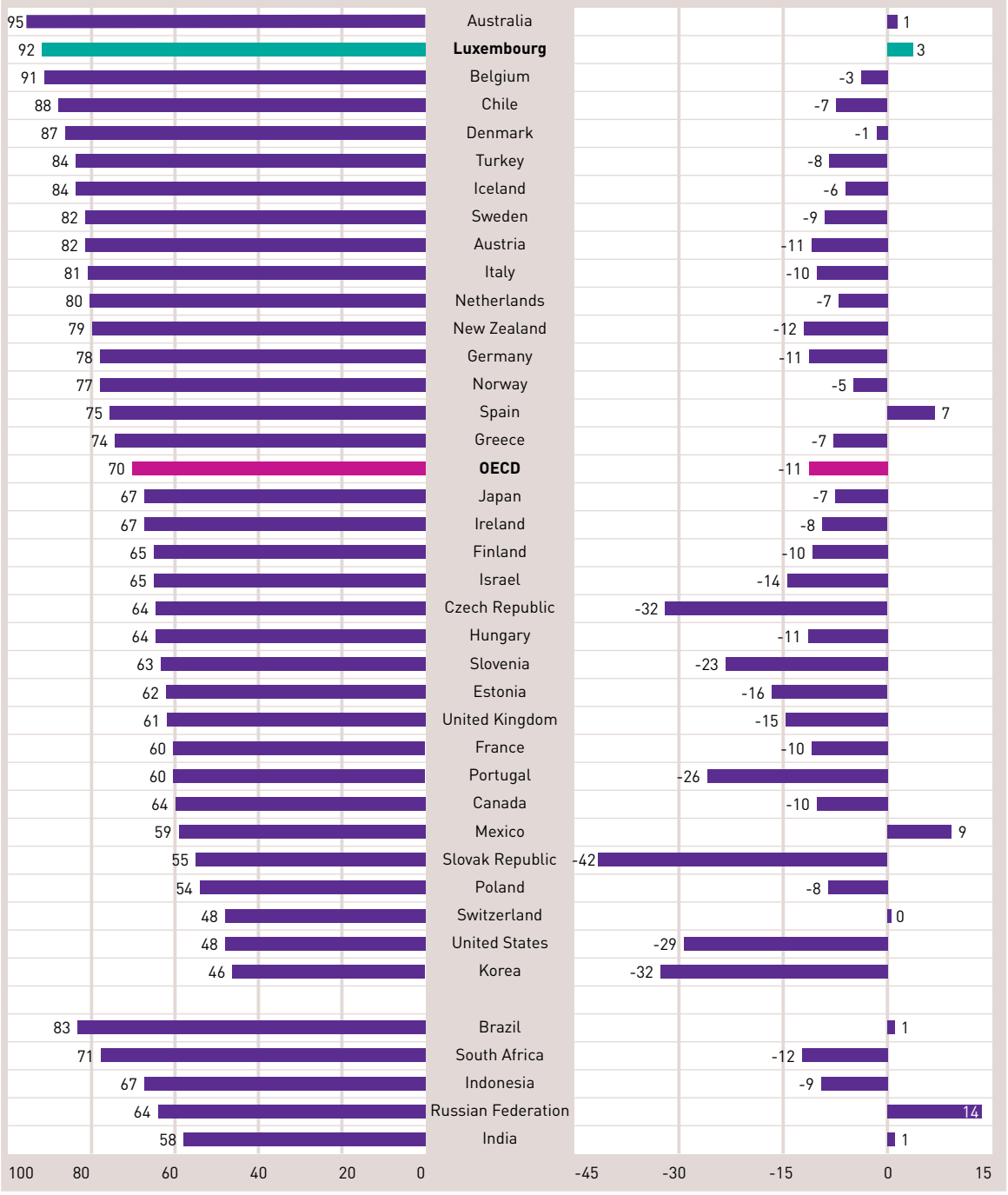
- Percentage of voters who have reached voting age
- Rate of registered voters in the population
- Index on public participation in policy decisions

For the first two selected indicators, Luxembourg achieved results below the OECD average. However, it should be noted that these indicators do not take into account the existing differences between the institutional systems of the countries analysed. According to the OECD, in 2004 only 57% of voters went to the polls in Luxembourg. This rate is correct if one takes Luxembourg total resident population. Yet it must be emphasized that this result is not adapted to Luxembourg's voting system which takes into account the nationality and the civil and political rights. Thus, the chosen indicator does not take into consideration that the population of Luxembourg is composed of about 43% of immigrants who, despite being 18 years old or older, cannot vote in legislative elections[199] (but can participate in local elections after living more than 5 years in the Grand Duchy). Thus, in 2004 (parliamentary elections), we have 217,683 people registered (18 years old, Luxembourg nationality and enjoying civil and political rights) out of which 200,092 voted[200], so the rate is actually 92%. Note that the OECD confirms the rate of 92% in its *Society at a Glance*[201] report published in 2011 where Panel B was taken from in the illustration below, which highlights a growing trend in voter participation since the eighties.

[200] STATEC, http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=633&IF_Language=fra&MainTheme=3&FldrName=7&RFPath=106

[201] OECD, Society at a Glance 2011: OECD Social Indicators, http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/society-at-a-glance-2011_soc_glance-2011-en

Figure 5
Voting rates are generally falling[202]



Source: OECD

[202] OECD, Society at a Glance 2011: OECD Social Indicators, http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/society-at-a-glance-2011_soc_glance-2011-en

Regarding the third indicator, the Grand Duchy has an index of 6, positioning itself better than its three neighbours. This indicator is interesting because it refers to political decisions made through the decisions coming from the civilian population. However, it must be emphasized, and as the OECD has also mentioned, due to existing differences between the national institutional systems of each country, the viability of this indicator is limited.

2.6 - The qualitative aspect of the natural environment is an essential pillar in the analysis of well-being of a population given its links to human health and biodiversity[203].

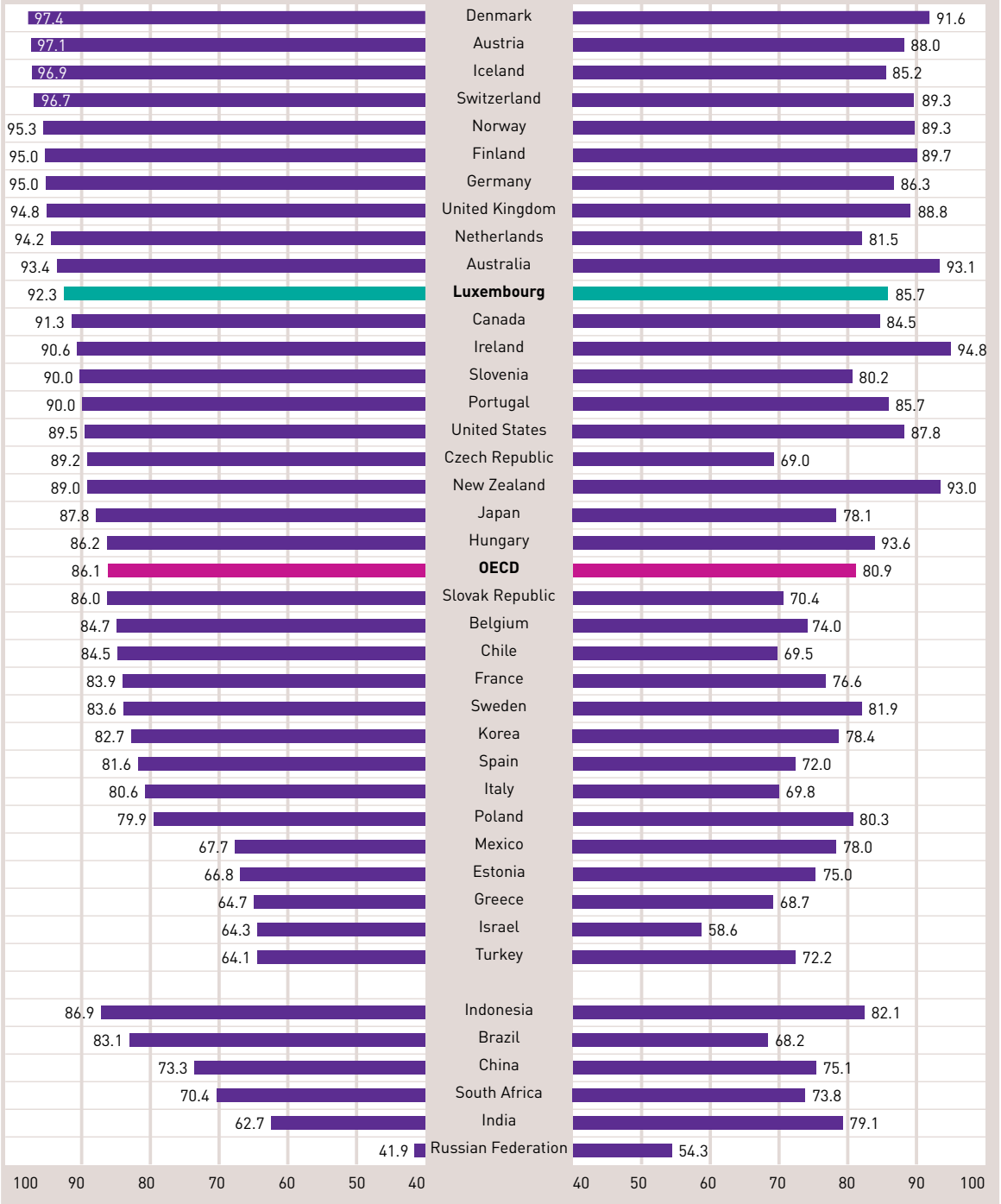
In this sense, the OECD indicator intends to measure the concentration of PM10[204] in micrograms per cubic meter in order to analyse the air pollution. In the Figure, we observe that Luxembourg has made significant progress since 1990, ranking among the best in 2008, with about 13 micrograms per cubic meter. It must be emphasized that this statistic counts the residential areas that encompass more than 100,000 inhabitants. For Luxembourg and in order to gage the level of satisfaction of the population, the *PIBien-être* project will introduce indicators from the OECD publication called **Society at a Glance** 2011.

These indicators are the population satisfaction with regards to air and water quality. However, we must highlight that the quality perceived by the people does not necessarily equate to the quality measured objectively by laboratories.

[203] UNO, http://www.unac.org/fr/link_learn/monitoring/susdev_unep_mec_cbd.asp

[204] For further details: http://donnees.banquemondiale.org/indicateur/EN.ATM.PM10.MC.M3/countries/1W-LU?display=default

Figure 6
Nordic countries are the most satisfied with their water and air quality[205]



Source: OECD

[205] OECD, Society at a Glance 2011: OECD Social Indicators, http://www.keepeek.com/Digital-Asset-Management/oecd/social-issues-migration-health/society-at-a-glance-2011_soc_glance-2011-en

2.7 - The OECD defines personal safety as a core element of the welfare of an individual or a society. Thus, a crime is one of the potential obstacles to individual and human freedom as well as freedom from fear[206]. In addition, it would be useful to differentiate between "perceived insecurity" and "genuine insecurity."

In the Compendium, the two indicators presented relate to:

- Intentional homicides
- Victimization/reported assault

For the first indicator, Luxembourg had a rate of 1.5% homicides per 100,000 people. For the second it has a rate of 4.3% reflecting the part of the population who alleges having been assaulted during the past 12 months. This indicator is often related with the evolution of the socio-economic situation of a country. According to the OECD, emerging countries like Brazil, South Africa and India have high crime rates.

2.8 - As a final indicator the OECD proposes the indicator related to the satisfaction of an individual with his life (on a scale of 0 to 10). According to this indicator, Luxembourg exceeds the OECD average by achieving a score of 7.1 out of 10. The better positioned countries are Denmark, Canada and Norway. According to the OECD, 59% of the population of the OECD expresses satisfaction at the time of the survey.

Conclusion

In conclusion, the *Observatoire de la Compétitivité* calculated a composite index in order to establish the classification of Luxembourg in relation to other OECD Member States.

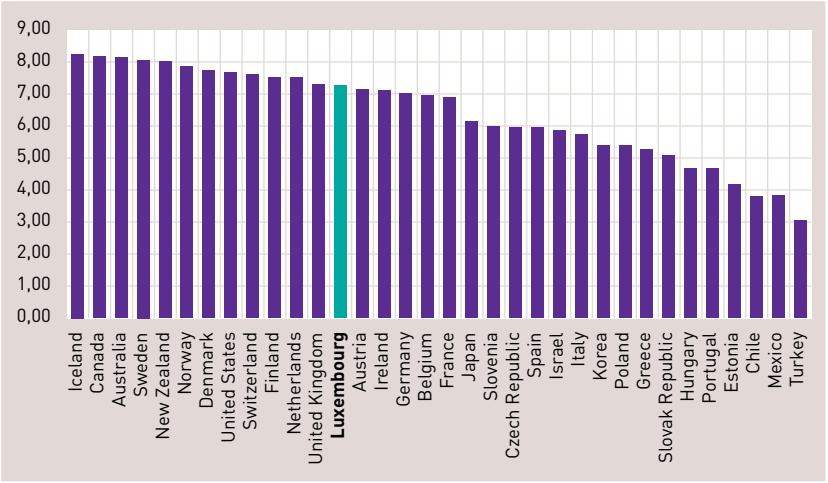
First, the same methodology was adopted in the analysis of Luxembourg's results as for the Competitiveness Report Scoreboard. So, if the value of Luxembourg is 20% (or more) higher than the OECD average, the Grand Duchy has positioned itself in green. Between 20% and -20%, amongst the OECD average, in orange and finally red if the value falls below - 20% of the OECD average.

It is found that out of 22 indicators of the Compendium, Luxembourg has 7 green, 14 orange and 1 red. Therefore, Luxembourg is in the OECD average.

Secondly, the indicators listed in the Compendium were summarized by a composite indicator using the same method of calculation as for the composite indicator of the *Observatoire de la Compétitivité*. Luxembourg is then in 13th place among 34 countries above its neighbouring countries (Germany 16th, Belgium 17th and France 18th).

[206] Stems from the concept of human security

Figure
Overall ranking of Luxembourg in relation to OECD Member Countries



Source: Calculations - *Observatoire de la Compétitivité*, Data: OECD

In fact, the composite index underlines that Luxembourg leads the world rankings in terms of GDP/GNI per capita, yet dropped some positions when other indicators related to quality of life are taken into account. Luxembourg lost its first position and thus can no longer stand out from the OECD average. This result confirms the need to systematize and refine the analysis beyond the measure of GDP/GNI per capita.

9 Thematic studies

9.1 How do Singapore and Luxembourg comparatively compete in a global world? Is small still beautiful in the 21st century?

Looking through a "macroscope", Singapore and Luxembourg seem to be very far apart. One is a landlocked country nested in the middle of Europe, a constitutional monarchy whose independence was recognized internationally in 1867; the other one is an island country opened to the South China Sea who gained sovereignty as the Republic of Singapore on August 1965. Even if narrowing in the recent years, social models and family values that have shaped the fabric and the development of the two societies still differ slightly.

However, using a "microscope" allows discovering that there are more commonalities between the 2 countries than one can expect from this initial and global look.

The two countries are small, both in terms of territory and population, particularly by the standards of their respective environments. Luxembourg records a population of 500 000 inhabitants (0.1% of the total population of the EU) on a territory that is 2586 sq. km; the population of Singapore is ten time larger (5 Mio – 0.083 % of the total population of the ASEAN) on a territory of only 710 sq. km[207]. They both host a large proportion of foreigners (46 % in Luxembourg and 36 % in Singapore) that gives the countries a multi-cultural and lively atmosphere. Different cultures and languages are mixed and interconnected. Life expectancy is very comparable: 79.9 years in Luxembourg and 80.7 years in Singapore.

They both cooperate closely with their neighbors: Luxembourg has embarked since 1952 (CECA treaty) into a deep economic and political regional integration process and Singapore is a founding member of the ASEAN that was established in 1967 (Bangkok Declaration). The two countries are politically very open to the world.

Within their respective regional communities, they both are the richest in terms of GDP per capita[208]. The GDP per capita of Luxembourg is almost three times the one of Germany, 8 times the one of Poland and 13 times the one of Romania[209] ; the GDP per capita of Singapore is 5 times the one of Malaysia, 10 times the one of China and 30 times the one of Vietnam.

They both have a very high Human Development index (0.852 for Luxembourg – ranked 24th – and 0.846 for Singapore – ranked 27th – in 2011) even if inequalities are higher in Singapore than in Luxembourg[210] as the 10% richest households takes a higher share of income and the 10% poorest households takes a lower share of income, as shown in the table below.

[207] This makes the population density of Singapore – 7100 – one of the highest of the world. By comparison, the population density of Luxembourg is 197.9 (Statec, December 31, 2010)

[208] In nominal terms

[209] The GDP per capita indicator is not suited for Luxembourg because about 40% of the workforce in Luxembourg is made by cross-border workers from Belgium, France and Germany. These commuters are taken into account in the GDP, but not in the denominator which takes only into account national residents. Therefore this indicator overvalues Luxembourg's performance. The Gross national income per capita should be used for Luxembourg in international comparisons. In this regard, consult chapter 3. of this Competitiveness report 2011: macroeconomic performances

[2010] In 2009, the Gini coefficient in Luxembourg and Singapore were respectively of 30.8 and 42.5. By comparison, the Gini coefficients for Indonesia and Thailand were respectively at 37.6 and 42.5, the one for India at 36.8 and the one for Norway at 25.8 (source: Human Development report 2011 – UNDP)

Table 1

	Luxembourg	Singapore
Percentage of households income going to the lowest 10 % households	3.5	1.9
Percentage of households income going to the highest 10 % households	23.8	32.8

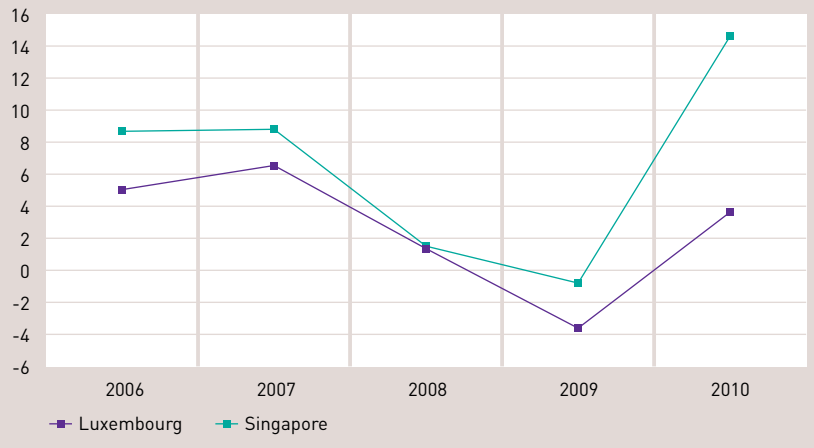
Source: UNDP

Gender inequality is lower in Singapore (0.255 against 0.318 in Luxembourg) this being mainly due to a very low rate of adolescent fertility . The Gender inequality index of Luxembourg is high compared to other European countries (0.174 in the Netherland and 0.236 in Belgium) and the one of Singapore very low compared to other ASEAN countries (0.499 in Malaysia and 0.586 in Thailand).

Both countries have low unemployment rates: the unemployment rate was 4.1% in Luxembourg (June 2011) and 2.6% (March 2011) in Singapore. For Luxembourg, it compares favorably to its neighbors of the European Union (4.1% in the Netherland, 6.9% In Denmark, 10.8% in Bulgaria, 14.5% in Ireland or 20.5% in Spain) but has been in the rise recently; for Singapore, the rate has been very stable in the last 10 years and stands in the average of the region[212].

The two countries were similarly affected by the global crisis of 2008/2009 and both registered negative growth rates in 2009. If growth rates followed a similar pattern in the two countries, the performance of Singapore has been more dynamic in the last few years as it shows in the graph below[213].

Graph 1
Real economic growth rate (%)



Source: World bank

[212] Comparisons of employment and unemployment statistics are not easy as norms can vary from one country to the other. Adjustments are not necessarily possible in all cases. The data used here thus comes from different sources and may not be directly comparable. Data mentioned here are extracted from the ILO Laborsta data base

[213] Growth rates in the ASEAN have been in average higher that the ones in Europe in the last few years. Therefore, the performance of Singapore even if higher that the one of Luxembourg, remains in its regional average

They both have a market-based economy mainly driven by a strong service sector. More than 45% of the Luxembourg GDP is generated by the banking and insurance sectors. Singapore is a leading financial center but relies also extensively on exports and refining imported goods. The two economies are very opened, where external trade is a key sector for growth; Singapore is one of the five busiest ports in the world; Luxembourg recently invested in air cargo activities.

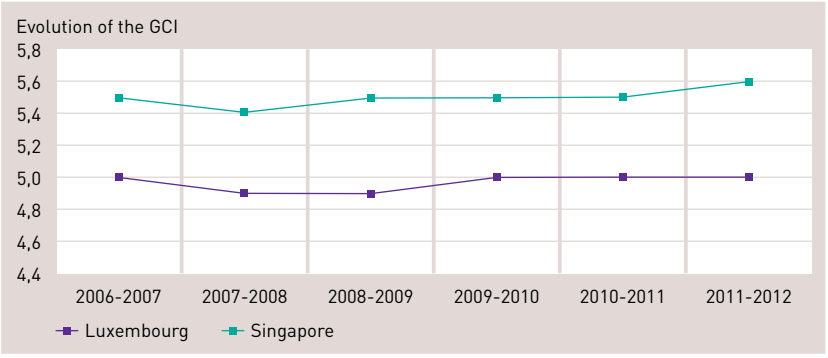
The service sector contributes to the GDP of Luxembourg by 78% and to the GDP of Singapore by 68%; it employs more than 75% of the working population in Luxembourg and more than 65% in Singapore.

Looking at these numerous similarities should lead to the conclusion that the respective performances of the two countries in the world competition should also be very similar. While this is almost the case[214], Singapore however overrates Luxembourg in most of the dimensions that constitute competitiveness and that are regularly assessed through the analysis of key socio-economic indicators and of results from surveys of entrepreneurs around the world[215].

Is this the result of one or several factors? Can they be identified? Can they provide lessons that are useful for Luxembourg or for Singapore?

In the ranking of the World Economic Forum, both countries are categorized as innovation-driven economies[216], this position being shared with only 30 other countries. The levels of the Global competitiveness Index (GCI) of Luxembourg and Singapore remained pretty stable since 2006 and quite close to each other (around 5.5 for Singapore and 5.0 for Luxembourg on a scale culminating at 7.0), even if their respective rankings may have changed slightly over the period.

Graph 2
Evolution of the GCI



Source: WEF – 2011-2012

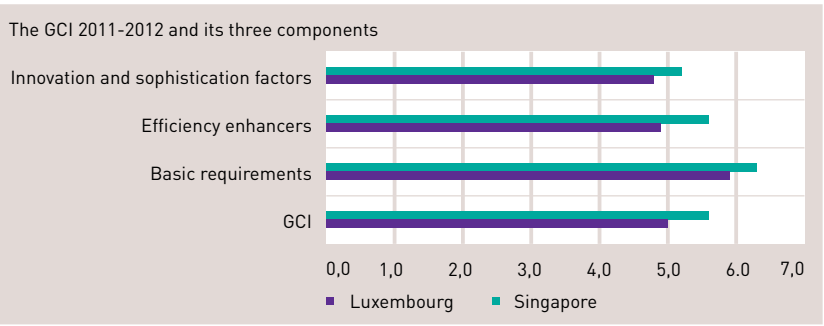
[214] In the two latest competitiveness rankings by the World Economic Forum, Singapore has always been 1st or 2nd while Luxembourg remained 11th. The ranking concerns 139 countries and being 11th is still a very good performance

[215] The most known of these surveys are the ones carried out annually by the World Economic Forum (Global Competitiveness index) and the IMD International (World Competitiveness yearbook)

[216] This means that on the 12 pillars/dimensions that constitute competitiveness and that are each estimated individually on a 1 to 7 scale, the two countries have received marks that were over 3 for all of them

The CGI defines 12 different but interrelated pillars that constitute the level of competitiveness of a country. The ranking addresses strengths and weaknesses for the details of these 12 pillars.

Graph 3
The GCI 2011-2012 and its three components



Source: WEF – 2011-2012

Singapore records higher marks than Luxembourg on 10 (11 in the latest 2011-2012 WEF report) of these pillars but the differences are at the highest for 3 of them, all in the category of "efficiency enhancers"[217]:

- Market size (pillar number 10). Large market sizes allow firms to realize economy of scale. However, in the case of small countries, the international markets come as a substitute for limited domestic market. In both the cases of Singapore and Luxembourg who have trade agreements with their close neighbors and have developed close economic cooperation with them, market largely goes beyond the country boundaries[218]. However, Luxembourg is ranked lower than Singapore in both domestic and international markets, even if the ratios of imports and exports to the Gross Domestic Products are very comparable between the two countries.

- Labor market efficiency (pillar number 7). Flexibility and efficiency of labor market is expected to lead to the best allocation of human resources in the economy. In addition, it is important to ensure that incentives are adjusted to capacities and pay to productivity. Practices for the determination of wages, processes for hiring and firing personnel and a low flexibility of employment make Luxembourg rank in the last 30 countries of the 139 surveyed for the GCI. This is very far from Singapore which is ranked in the 3 first countries. It is clear that behind these rough data, there are different societal choices that have been made by each country and, in the case of Luxembourg, these choices are strongly anchored in the country social fabric.

- Higher education and training (pillar number 5). A well educated work force and the constant upgrading of its skills are necessary conditions to ensure the supply of adequate and adaptable resources on the labor market, thus contributing to innovation and development. The quality of the education system in Singapore is rated better than in Luxembourg while the rate of enrollment in tertiary education remains extremely low in Luxembourg[219].

[217] In the methodological approach followed by the WEF, the analysis of the pillars of competitiveness is anchored to the theory of stages of development of economies, moving from a factor-driven state to an efficiency-driven one and eventually to an innovation-driven one. Efficiency enhancers correspond to the key pillars of an economy-driven economy

[218] In the specific case of Luxembourg, this transpires first through the "Grande region" and the cooperation that has been developed with Belgium (UEBL) and the Netherlands (BENELUX) as well as through the development of the European Integration

[219] The WEF takes into consideration for tertiary enrolment only the Luxembourg students enrolled at national level, even though a lot of Luxembourg residents pursue their tertiary studies in Belgium, France, Germany and elsewhere. Therefore the overall tertiary enrolment rate is much higher (5.02 Tertiary education enrollment, gross %* (10,0%)

The indicator on tertiary education used in the framework of the Europe 2020 strategy shows a rate of 46,1% for Luxembourg in 2010 (Tertiary educational attainment by gender, age group 30-34). This rate includes foreign residents, The rate for national residents only is also slightly above 40%

http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators

In the reverse, Luxembourg has recorded higher marks than Singapore between 2007 and 2010[220] on the following pillars:

- Technological readiness (pillar number 9). Firms operating in a country that has adopted existing technologies, in particular in the area of information and communication, have access to advanced products and have the ability to use them. Both Luxembourg and Singapore rank in the first 25 countries but with a slight advantage for Luxembourg in particular for what concerns internet bandwidth, the number of internet users and the number of subscriptions to broadband internet. Luxembourg gets here the return of important efforts and investments in this area. The marks that the country received for this pillar constantly increased since 2006.

- Macroeconomic environment (pillar number 3). The underpinning logic of the pillar is that it is difficult for an economy to grow on a sustainable way unless the macroeconomic environment is stable. This covers the size of the budget deficit and of the debt, the level of inflation and of the interest rate. The favorable situation that Luxembourg has achieved on limiting public and external debts as well as on maintaining inflation at a low rate is certainly a guarantee for stability and for a very good credit rating even if the national saving rate remains low.

In the 2011 ranking realized by IMD international, Singapore is ranked 3rd and Luxembourg 11[221]. Again, Singapore overrates Luxembourg for most of the criteria that have been chosen by IMD International in its annual survey of executives. The difference is particularly noticeable in 4 main areas, two of them being common with the results of the WEF analysis[222] :

- Labor market regulations and unemployment legislation. The IMD survey confirms that the business executives find that there is far more flexibility in Singapore than in Luxembourg for hiring and firing personnel and adjusting the work force to market demand and changes. Unemployment legislation is sought to be to protective and not providing real incentives to seriously look for work,

[220] In the latest WFC report 2011-2012, the advantage of Luxembourg is narrowed and reduced to one single pillar ("macroeconomic environment").

[221] Compared to 2010, Singapore was downgraded from a 1st rank while the ranking for Luxembourg stayed unchanged.

[222] IMD ranking goes on a scale from 0 to 10.

Table 2

	2010	2011
Labor regulations		
Labor regulations (hiring/firing practices, minimum wages, etc.) do not hinder business activities		
Luxembourg	4,63	4,23
Singapore	7,45	7,05
Unemployment legislation		
Unemployment legislation provides an incentive to look for work		
Luxembourg	4,54	4,48
Singapore	7,41	7,14

Source: IMD Competitiveness report 2011

- Education and the labor force. The difference between the two countries seems to emerge particularly from the way science is taught in schools, this having an immediate impact on the availability of engineers on the local labor market. Skilled labor in sought to be less available in Luxembourg than in Singapore,

Table 3

	2010	2011
Skilled labor		
Skilled labor is readily available		
Luxembourg	5,64	5,31
Singapore	6,41	6,46
Qualified engineers		
Qualified engineers are available in your labor market		
Luxembourg	6,51	6,17
Singapore	7,67	7,48
Science in schools		
Science in schools is sufficiently emphasized		
Luxembourg	5,43	4,85
Singapore	8,58	8,01

Source: IMD Competitiveness report 2011

- Efficiency of the Government and the bureaucracy. Differences are also marked on the trust of the business executives in the capacity of Governments and bureaucracies to adapt to changes and to effectively implement policies. The regulatory framework in Luxembourg is sought to provide less encouragement to enterprises in their efforts to be competitive,

Table 4

	2010	2011
Legal and regulatory framework		
The legal and regulatory framework encourages the competitiveness of enterprises		
Luxembourg	5,76	6,23
Singapore	7,67	7,70
Adaptability of government policy		
Adaptability of government policy to changes in the economy is high		
Luxembourg	5,91	6,36
Singapore	8,30	8,04
Government decisions		
Government decisions are effectively implemented		
Luxembourg	5,94	6,35
Singapore	8,28	8,50

Source: IMD Competitiveness report 2011

- Research and Development. There is a perception from the business community that the regulatory framework in Luxembourg is less supportive to the development of research and to the application of technology. It is also noted that the transfer of knowledge between university and companies is higher in Singapore. The R&D total expenditures in Singapore represent 2.27% of the GDP and only 1.68% in Luxembourg[123].

Table 5

	2010	2011
Scientific research legislation		
Laws relating to scientific research do encourage innovation		
Luxembourg	6,61	6,91
Singapore	7,82	7,79
Knowledge transfer		
Knowledge transfer is highly developed between companies and universities		
Luxembourg	5,28	5,83
Singapore	6,89	6,87
Development and application of technology		
Development and application of technology are supported by the legal environment		
Luxembourg	7,12	7,20
Singapore	8,33	7,93

Source: IMD Competitiveness report 2011

Luxembourg is praised by the world executives for its quality of life and the concerns that the managers and business leaders have regarding social responsibility, health, safety and environmental issues.

[123] INDdata-2009

Table 6

	2010	2011
Social responsibility		
Social responsibility of business leaders is high		
Luxembourg	7,01	6,85
Singapore	6,08	6,17
Health, safety & environmental concerns		
Health, safety & environmental concerns are adequately addressed by management		
Luxembourg	7,19	7,56
Singapore	6,63	6,99
Quality of life		
Quality of life is high		
Luxembourg	9,24	9,09
Singapore	8,23	8,04

Source: IMD Competitiveness report 2011

When surveyed (WEF), business people cite the following most problematic factors for doing business in Luxembourg and in Singapore:

Table 7

	Luxembourg	Singapore
1st problematic factor	Restrictive labor regulations	Inflation
2nd problematic factor	Inefficient government bureaucracy	Restrictive labor regulations
3rd problematic factor	Inadequately educated workforce	Inadequately educated workforce
4th problematic factor	Inflation	Poor ethic in national labor force

Source: World Economic forum – Competitiveness report 2011-2012

The perspectives from the business community on the two countries are again very similar, Singapore being singled out for its inflation rate (around 2.8 % in 2010)[224] and Luxembourg for the inefficiency of its government bureaucracy.

Despite these commonalities, Singapore ranks 2nd on the Heritage index of economic freedom, Luxembourg being only 13th. Three factors can explain this difference in ranking[225]: Luxembourg receives lower grades for labor freedom (44.1 against 98.0 for Singapore)[226], Government spending (58.5 against 91.3)[227] and fiscal freedom (66.7 against 91.1)[228].

Again, a competitive disadvantage of Luxembourg compared to Singapore seems to be rooted in the rigidity of its labor market and, in a lesser extend, to the relative strength and efficiency of its public spending and administration.

On the same index, Luxembourg is better ranked than Singapore for freedom on investment (95.0 against 75.0 – no restriction -) and financial freedom (80.0 against 60.0 – extend of government regulations and state interventions in banks) this reflecting a very open legislation and very limited interventions of the state in these areas.

[224] In 2010, the inflation rate of Luxembourg was 2,3 %

[225] Each factor of the index is rated between 0-100.

[226] Six quantitative factors are equally weighted, with each counted as one-sixth of the labor freedom component: Ratio of minimum wage to the average value added per worker, hindrance to hiring additional workers, Rigidity of hours, Difficulty of firing redundant employees, Legally mandated notice period, and Mandatory severance pay.

[227] This component considers the level of government expenditures as a percentage of GDP. Government expenditures, including consumption and transfers, account for the entire score.

[228] 12 Fiscal freedom is calculated on the basis of the top tax rate on individual income, the top tax rate on corporate income, and total tax revenue as a percentage of GDP.

Table 8

	World Rank	2011 Overall Score	Labor Freedom	Gov't Spending	Fiscal Freedom	Invest-ment Freedom	Financial Freedom
Luxembourg	13	76,2	44,1	58,5	66,7	95,0	80,0
Singapore	2	87,2	98,0	91,3	91,1	75,0	60,0

Source: Heritage index of economic freedom – 2010

Looking at the World Bank governance indicators[229] also shows similar patterns between the two countries for most of the components. The two countries score very high and similarly for four of the indicators: the effectiveness of the government (in particular the quality of the public services, its independence from the politicians, the quality of policy formulation and credibility – for Luxembourg this is a very different perception than the one of the business sector as reflected in the WEF Global Competitiveness Index or the IMD competitiveness report), the quality of the regulatory framework (ability to formulate and implement sound policies), the rule of law and the control of corruption.

Regarding the first indicator (voice and accountability), Singapore is rated far below Luxembourg this reflecting differences in the perception of freedom of expression, freedom of association, free media and the ability to participate in selecting government. The score of Singapore for this indicator decreased dramatically in 2005 and has remained since at a very low level, comparable to the ones of Kenya, Nicaragua, Lebanon or Thailand.

Table 9

	2005	2006	2007	2008	2009
Voice and accountability					
LUXEMBOURG	96	98	99	98	98
SINGAPORE	52	36	34	35	35
Political stability					
LUXEMBOURG	95	99	100	100	96
SINGAPORE	85	93	88	97	90
Government Effectiveness					
LUXEMBOURG	96	92	92	94	96
SINGAPORE	99	99	100	100	100
Regulatory Quality					
LUXEMBOURG	99	97	97	96	96
SINGAPORE	100	98	100	100	100
Rule of law					
LUXEMBOURG	97	95	96	97	98
SINGAPORE	96	92	92	93	92
Control of Corruption					
LUXEMBOURG	93	94	95	96	95
SINGAPORE	98	98	98	99	99

Source: WGI project – 2010

[229] Worldwide Governance indicators (WGI) project – 2010.

After this very quick exploratory tour of the available comparative analyses of competitiveness between the two countries, some of the determinants of the advantages of Singapore over Luxembourg became quite clearer. This is particularly true for those who are related to the perception that the business community and the company leaders have on the opportunities that the two countries can offer to them.

Broadly, there are four main identifiable areas where a deeper investigation could help in explaining the evidences that are behind the perceptions. They are deeply rooted in the social and cultural fabric of both countries thus making the required changes long and difficult to make.

- The first area is the way the administration works and the level of its efficiency at providing the services and at giving the incentives that the business community needs to develop its activities. The regulatory framework must be conducive to easing the doing of business and to attracting investment while it also must be adaptable and responsive to changes in the economy. In this area, the Government and the bureaucracy of Luxembourg are perceived as not playing an effective role: doubts exist on the capacity of the government to implement its decisions and policies and on the ability of the bureaucracy to accompany business creation and development. The government in Singapore, on the other hand, is seen as giving the right signals to businesses and as providing them with the incentives that they expect. The issue of taxes (personal and corporate) as well as more generally of public spending[230] (its volume and its allocation) should also be explored more thoroughly. Attitudes towards business and toward globalization as well as issues linked to national culture and the value system will certainly help assessing the opportunities that can be taken in the future,

- The organization of the labor market is, without doubt, another key factor explaining the differences in competitiveness between the two countries. The business executives finger the rigidities of the labor regulations in Luxembourg that hamper the quick and adequate adaptability of the labor market to changing business opportunities. They perceive the creation of firms as being more difficult in Luxembourg this limiting the opening of new job opportunities. However, social protection is an important part of the fabric of the Luxembourg society and contributes for a large part to a higher quality of life. Business leaders and executives also note that the need for economic and social reforms is less understood in Luxembourg than in Singapore. Deeper investigation will be necessary to identify what really are the aspects of labor flexibility that can be explored and developed without jeopardizing the national consensus around social welfare. Particular attention will have also to be paid to the mechanisms (public and private) that help and accompany the creation of businesses,

[230] General Government Expenditures in 2010 represented 44% of the GDP in Luxembourg and only 15% in Singapore

- The most surprising difference that transpires from this initial look at the two countries is linked to the respective education levels, the teaching of science in school and the adequacy of the work force to the market demand both in terms of its quality, of its permanent training/re-training and of its flexibility. Skilled labor doesn't seem to be as available in Luxembourg as it is in Singapore. Educational assessments (for reading, for mathematics and sciences) are far better ranked in Singapore than in Luxembourg[231] and the students in Singapore read and study more at home. The latest survey realized by the OECD in the framework of the Programme for International Student Assessment (PISA) will provide details on the relevant factors that explain the different performances of the two countries in this area. Regarding the adequacy and availability of the needed human resources for business, the issue must be looked at with in mind the close environment of the two countries and the composition of their respective work forces. Both countries rely heavily on foreign workers and their reservoir of human resources goes far beyond their national boundaries.

- The last area that seems to feed the difference of competitiveness between the two countries is Research & Development. While both countries have mobilized non negligible public resources in R&D activities and support, the results obtained are more effective in Singapore which attract more researchers and where the transfer of know-how between universities and businesses is more developed. The scientific research legislation in Singapore is sought to encourage more innovation than the one of Luxembourg. An analysis of the amounts allocated to R&D activities, their origin (public and private funding), the modalities for their release (competition, partnership) and their destinations (beneficiary structures, themes and kind of projects supported) will help in better visualizing the factors that most favor competitiveness in this area.

These various areas will be the principle objects of a study that will be conducted in the last quarter of 2011. The study will build on the structure of the annual Competitiveness Report, using data mainly provided by the Department of Statistics of Singapore and STATEC, but coming also from other comparative international sources. Its results will be shared and discussed with a panel of personalities from both the Governments of Singapore and Luxembourg and from the business sector and academics. The objective of the study and of the panel discussion is to learn from the respective experiences of the two countries and to identify policy issues that should be debated in Luxembourg in order to make the country a more efficient competitor in the future.

[231] The latest OECD-PISA survey 2009 shows that the performance of the students in Singapore is above the OECD average while the performance of the Luxembourg students is below this average, the difference being the highest for mathematics

9.2 Some specificities of Luxembourg's exports

Faced with a radically changing global economy, it is useful to identify some specificities of Luxembourg's exports, trying to answer the following questions: Why is such an important part of production exported? Which goods and services are exported? Where are they exported to? Who are the exporters of Luxembourg? What determines the direction of their exports? How do exporters position themselves on the world market? What determines the evolution of market share?

In recent years STATEC has conducted a number of studies and analysis (listed at end of text) that were designed to answer these questions. The purpose of this paper is to summarize the results of these investigations.

9.2.1 A small economy forced to open up

Since the beginning of the industrialization of the Luxembourgish economy, exporting is a prerequisite for many companies in Luxembourg. Indeed, in order to benefit from economies of scale and to exceed the limits of national demand, many companies have always opted for export.

After the Second World War and within the framework of production diversification policies, a number of companies have based themselves in Luxembourg whose strategy was to export (almost) all of their production in other European countries.

Given these two developments, the process of globalization has not placed the resident companies in a challenging position with regards to economic openness, as it has in other countries (even in Europe) in strategic terms, with the trade-off between guidance on the domestic market or the export market. Since the opening at this level is a fact, even a pre-requisite, to a large number of companies production is automatically export-oriented. The export option is thus inherent in most economic activities of Luxembourg - not only in the field of industrial production, but also in many service activities.

A measure of economy openness is the calculation of the value of exports of goods or services or the amount of goods and services per person employed. The table below provides the data for 2007, in which Luxembourg has a leading position.

Table 1
Exports of goods and services per person employed in 2007

Country	Amount (1000$)
Luxembourg	**254.3**
Belgium	116.0
Ireland	99.3
Netherlands	74.2
Denmark	57.0
Austria	53.9
Sweden	51.6
Finland	44.3
Germany	38.5
European Union (27)	30.6
Japan	13.0
United States	10.9

Source: WTO; author's calculations

In order to trace more facets of the globalization process - beyond the single dimension of trade - several international organizations have promoted globalization indicators, three of which seem to emerge more significantly:

A. T. Kearney/Foreign Policy Globalization Index
http://www.atkearney.com/

KOF Index of Globalisation
http://globalization.kof.ethz.ch/

CSGR Globalisation Index
http://www2.warwick.ac.uk/fac/soc/csgr/index/

Differing in their composition, their weight and their partial and composite methods of calculation, all three are nevertheless focused on several sub-variants (economic, social, political and/or cultural) and distinguish sub-indicators. Unfortunately, Luxembourg is not included in the sample of TA Kearney/Foreign Policy Globalization Index. Moreover, for the other two indicators, Luxembourg is not considered for all areas. Yet, for the economic component – which concerns us here – they have included data for Luxembourg for a number of years.

Table 2
Economic globalization indicators

	Luxembourg's ranking						
Index	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
CSGR Globalisation Index		1	1	1			
KOF Globalisation Index	1	1	2	2	1	2	2

Source: WTO; author's calculations

Being in first place in the CSGR Globalisation Index or alternating with Singapore in the KOF Globalization Index, Luxembourg is showing a very good integration into the globalization process. Moreover, in the KOF Globalization Index for 2009 Luxembourg is in the first position[232] for Social Globalisation, just ahead of Switzerland.

In the CSGR Globalisation Index Luxembourg is not included in the Overall Index, and for the economic indicator Luxembourg is only taken for the years 2004 to 2006 and is placed first place every time[233].

This track record on openness and this good positioning in the globalization indicators do not however exempt Luxembourg's economic actors from facing many globalization process challenges and having to adapt to profound changes in international economic relations. Thus, firms have to cope with increasingly fierce competition from a growing number of companies, as they must continue to integrate into new organizations of production processes implemented by large multinational companies. To remain competitive, they also have to incorporate technological developments by adapting their product lines and production processes.

9.2.2 The predominance of service exports

On the global and European levels, goods exports represent nearly four-fifths of total exports of goods and services, against just over a fifth for services. In Luxembourg the situation is completely reversed: services dominate with about 80% and goods cover less than 20% of total exports of goods and services.

Figure 1
Share of goods and services in total exports

Source: WTO and STATEC; author's calculations

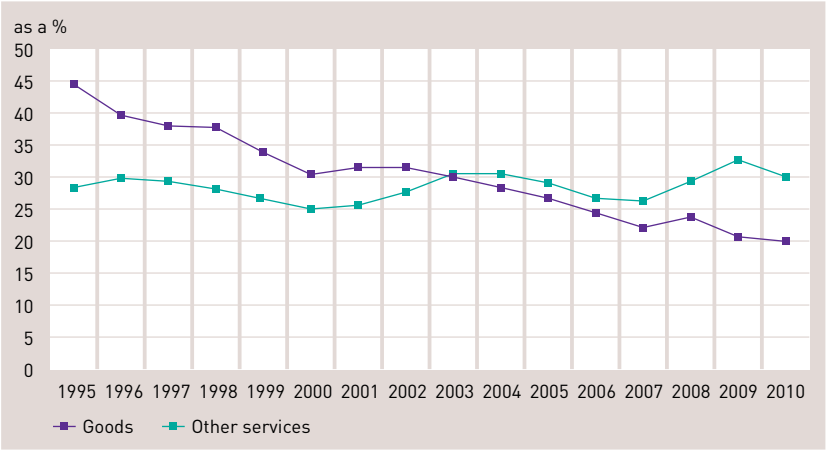
[232] Due to a very low position (105th) in the sub-indicator Political Globalization, Luxembourg is "only" 9th out of 156 countries studied in 2009 for the synthesis indicator. This ranking is poor mainly due to the small size of the country, given that absolute data is what is considered (number of embassies abroad, number of officers in UN peacekeeping missions). Small countries are necessarily less engaged in absolute numbers.

[233] For the Policy indicator, the positions vary between 103rd and 113th for the same reasons as for the other indicator (see note 232).

These results are obviously due to the major role of the financial sector and specialization in asset management. The fees earned by the managers are recorded as exports of financial services, the sum of which amounted in recent years to some 32 billion euros, or about half of total exports of goods and services. But even if we exclude financial services, other services exports in 2010 totalled 19 billion euros, an amount much larger than exports of goods (12.7 billion euros).

It was during the last fifteen years that the product structure of exports has deeply changed in Luxembourg. By the mid-90s all services continued to exceed the value of exports of goods and since 2003 the export value of non-financial services is regularly higher than exports of goods.

Figure 2
Share of goods and non-financial services in total exports of Luxembourg



Source: BCL - STATEC

It is important to note that this relative decline of exports of goods did not result in an absolute decline. Over the past four decades goods exports rose in volume and in annual average to 3.5%. The relative decline is explained solely by a much more dynamic expansion of exports of services (8.4% during the same period).

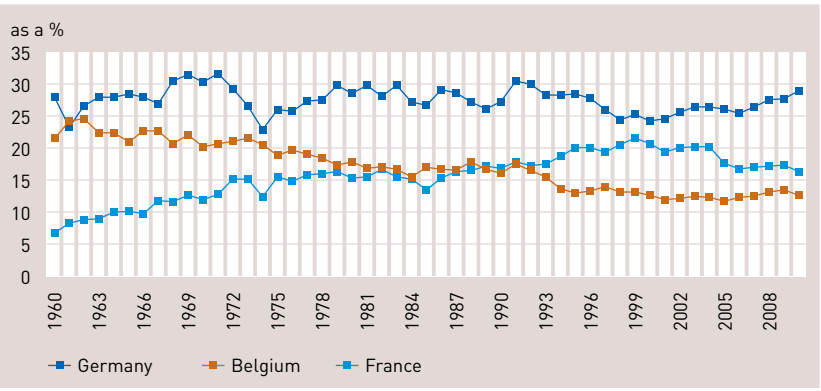
Despite the continuous improvement of the apparent labour productivity in industry, manufacturing employment increased again in recent years and it is therefore far from a wide-spread de-industrialization situation, even if the increase is very modest with only 5% over 15 years. This small change can be explained, however, especially by the absolute decline in employment in the steel industry (- 1.7 thousand people). By contrast, other industries have increased by 3,500 persons in the same period, an increase of almost 1% annually. The impressive expansion of services in the Luxembourg economy, especially in exports, is not the result of an absolute decline in industrial activity, but only that of a relative effect due to significantly higher growth of service activities. This dynamic development was particularly evident in financial services, transport and communications and business services.

9.2.3 Concentration on neighbouring countries

For both goods and services, Luxembourg exports are largely oriented towards neighbouring countries. Germany is by far the main destination (while Belgium remains the main supplier for goods). France follows in second place, ahead of Belgium.

For exports of goods this situation has not changed much in recent decades. Not since the mid-70s did we see Belgium in a more favourable position still, with a relative share of about 20%, against only 12% in 2010. Since then, the Belgian market is experiencing a relative decline in relation to exports from Luxembourg, despite the maintenance of a privileged trade relationship marked by the Belgium-Luxembourg Economic Union (BLEU).

Figure 3
Share of neighbouring countries in the exports of goods from Luxembourg (1960-2010)



Source: STATEC

Overall the three neighbouring countries in 2010 absorbed 54% of goods exports, 36% of services exports, 29% of exports of financial services and 46% of exports of non-financial services. Even for most other major countries of export destination positions have not changed much.

In terms of dynamism should however be noted that some exporters of Luxembourg were able to seize opportunities in (new) emerging markets both in Asia and in Eastern Europe. So, exports to Asia grew strongly. Since 2003 they exceed those towards the U.S., the first destination outside of Europe. The countries of Eastern Europe also rose significantly. Poland is by far the leading destination for this region.

For the BRICS[236] countries, there has been a tremendous surge over the past decade, doubling in their relative share between 2002 and 2010. Among them China absorbs the bulk of exports (nearly 40%). One of the export features to the BRICS is that the sum of goods and non-financial services account for over 85% of the total (reflecting a rather small role of financial services).

The geographical breakdown of the "top 10" destinations is slightly different for the export of services, because of special relations with certain financial centres (UK, Switzerland, etc.). Nevertheless even for non-financial services exports a country like the United Kingdom also occupies a prominent place.

9.2.4 The dynamic role of major subsidiaries of foreign industrial firms

One feature of the Luxembourg economy is that almost all industrial companies are export-oriented either by their nature or to benefit from economies of scale because they almost do not produce for the national market. Moreover, almost all these companies are foreign-owned and object of foreign direct investment (FDI). In analysis (Schuller et al. 2010a and 2010b) crossing the origin of capital and destination of goods exports, it appears that subsidiaries of foreign companies in Luxembourg export 94% of industrial merchandise. The ten largest exporters of goods in Luxembourg are all industrial companies subject of FDI. Of the top 20 companies, 18 are the object of FDI.

Table 3
Breakdown by company size (in terms of employment) 2006

Size of companies	Number of companies	% of companies	Number of employees	% of employment	Amount of exports (in million €)	% of exports
1-20	15	17.9	159	0.7	53.1	0.7
21-50	12	14.3	457	1.9	427.5	5.4
51-100	22	26.2	1,549	6.4	689.8	8.7
101-200	14	16.7	2,101	8.7	468.9	5.9
201-500	11	13.1	3,347	13.8	1,194.7	15.1
>500	10	11.9	16,643	68.6	5,082.5	64.2
Total	**84**	**100**	**24256**	**100**	**7916.5**	**100**

Source: STATEC

[234] Brazil, Russia, India, China, South Africa

In 2006 (reference year of the Schuller et al. 2010b study), over 26% of companies had between 51 and 100 employees, representing 6% of total employment and nearly 9% of total exports, while in terms of export value, 64% of total exports came from companies with more than 500 employees, representing 69% of total employment and only 12% of the total number of companies analysed.

FDI industrial exports are mainly intended to neighbouring countries and the EU internal market and are not primarily oriented towards the country of capital's origin. This can be read as a characteristic of a small open economy, which is obliged to favour its attraction factors for FDI in its territory and its access to neighbouring markets. Given the very small domestic market, any company required to reach a certain critical mass should turn largely towards exports. Foreign affiliates located in Luxembourg, "export platform FDI", are also highly oriented towards exports to the three neighbouring countries and the European market. Notwithstanding this aspect, the geographic positioning of Luxembourg also favours such a policy of proximity.

Many analysed companies also export - but less - to other destinations, so most companies have a multitude of destination countries, which contrasts with the reality observed in most other countries. Moreover, the range of products also seems wider than the average in other countries. The average number of products exported per firm is relatively high (17 products) and one third of companies export between 6 and 10 products, while "only" 23% of firms export less than three products. Furthermore, the correlation between firm size and the number of exported products is very low: large companies can export a very small range of products, while smaller companies can offer a relatively wide range.

However, Luxembourg also has the predominance of certain large companies, like most other countries. For the entire industry the degree of concentration is even among the highest in the EU. Only at the level of foreign subsidiaries, do we note a certain degree of dispersion.

9.2.5 Export behaviour of resident companies

For exports of both goods and services, Mangerotti et al. (2010 and 2011) noted a high concentration: 10% of companies are responsible for 94% of the total export value. Moreover, there is a negative relationship between the number of exporters and the number of destinations for export: 62% of companies export services to a single country (against 38% for goods) and only 3.2% of firms have customers for services in over ten different countries, against 9% for goods.

Some trends which were observed for other countries (Mayer et al., 2007), namely concentration by firm on certain big players and the fact that large firms export more and further afield are also confirmed for companies based in Luxembourg (and Mangerotti al. (2010 and 2011) and Schuller et al. (2010a and 2010b)).

Unlike most other industrialized countries, there is a serious commitment of most domestic enterprises to export and a relatively stable population of exporters over time. Moreover, most firms considered export to a larger number of destination countries (even if done in varying degrees) and offer a relatively larger product range than that observed in other European countries (Mayer et al., 2007).

The results obtained (Mangerotti et al. (2011) from simple gravity models show that aggregate exports increase with GDP per capita and population size of the partner countries - mainly through the increased average value of exported services by company. In addition, more resident firms export on average more products with higher values toward the major developed countries.

The impact of institutional factors on exports was also examined in the same study. It follows from this that for all the services discussed more firms are exporting more products to countries with similar regulations. However, barriers to trade and investment reduce the number of exporting firms. This calls for a deepening of the domestic market.

9.2.6 Market share: decline for goods and expansion for services

On the entire first decade of the new millennium, total exports experienced an improvement in market share (Höck et al., 2010). Luxembourg is thus one of the few industrialized countries that experienced an expansion of its relative share. This evolution is mainly due to the significant expansion of financial service businesses whose market share rose from 11.5% in 2002 to 15% in 2007.

Even for non-financial services there is an improvement, but from a level below 0.5% in 2002 to 0.7% in 2008. In contrast, exports of goods saw a slowdown in 2009 to 0.12%, against 0.15% in 2002, despite an average annual increase of 3.5% in value and 1.4% in volume during the first decade of this millennium. This evolution is similar to that of other industrialized countries and is due to the strong export growth in emerging countries that have experienced a significant improvement in market share (resulting in a relative decline in other countries - for a rapidly expanding world trade).

9.2.7 The determining factors of market share changes

From a recent study (Höck et al., 2011) – it transpires that by applying the CMSA (Constant Market Share Analysis) and decomposing the changes in market shares into the product structure effects, the geographical structure effects and the mixed structure effects - most of the improvement is generated by the mixed structure effects. One of the key dimensions of this mixed component is competitiveness that seems favourable for most product groups, with the notable exception of manufactured metal products, plastic products and rubber articles.

The effects of products as a whole also have a positive impact. This is however mainly due to the high specialization in the main sectors, which are the financial and steel sectors. Excluding finance, we note that the effects of products are neutral which means that the average growth rate of exports in each category keeps pace with global demand.

The geographical effects are rather negative in all constellations (totally, disregarding financial services or considering only certain groups of products). This is because exporters from Luxembourg are insufficiently oriented towards emerging markets. Although exports to these economies have boomed very dynamically, their weight remain very low due to the predominant orientation towards neighbouring or even European markets.

9.2.8 Conclusions

A common feature of most empirical studies summarized in this contribution is the approach of exports by firm in order to take account of firm heterogeneity. This is relatively new in the scientific field of international economics and contrasts with all previous analysis that have always relied on the assumption of homogeneity between economic actors - at least at the country level.

Furthermore, these studies have tried to consider exports of both goods and services. This concern is important to analyse the situation of Luxembourg where services represent over 80% of total exports, against just 22% at the global and European level.

This overview of the various studies should help to clarify some aspects of the specificity of Luxembourg's exports, namely:

- A concentration by company on some major players, in comparison with most other industrialized countries;
- A broad involvement of most companies in exports, in contrast to the reality of most other countries;
- A relatively stable population of exporters over time;
- A wide range of products exported by firm;
- A multitude of destinations by exporting firm, even if neighbouring countries are paramount for many companies;
- A very important role played by a wide range of non-financial services;
- An improved market share for the various services exports;
- A decline in market share for goods, in relation to most other industrialized countries;
- A negative effect of geographic trends in market share, because of the still relatively low weight of emerging markets.

A better understanding of the behaviour and performance of exporting firms in light of their heterogeneity should support the thinking and decision-making process of economic and political leaders in this field.

However, if the attractiveness of Luxembourg should continue to be determined by its geographical situation, by favouring "export platform FDI" that guide their exports to neighbouring or European markets, it would be difficult to cope with the negative impact of the geographical effect that seems to have a particular effect on market share changes. The fact that the product effects and the mixed effect - especially considering the competitiveness - are positive is certainly a motivating index for the export activity.

This overview is far from exhausting the complexity of export activities, and further investigations should be considered to complete the review of economic performance for exports. A data fusion of foreign trade and FDI surveys with those from the structural survey should allow to study the productivity, profitability and other variables of exporting companies. Moreover, establishing the relation of the export activities with the import activities should allow us to specify the behaviour of the two types of flows. In this context, it may be necessary to analyse the import content of exports. However, these future studies presuppose the implementation of complex databases and are therefore reliant on significant resources.

9.2.9 References

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9.3 A review of Total Factor Productivity of Luxembourg

Productivity *("productive efficiency")* compares outputs against inputs used in producing those outputs (Farrell, 1957)[5]. Increases in productivity reflect an economy's ability to expand output by using inputs more efficiently, thus fostering general economic welfare. Productivity can be measured in various ways. This report presents synthesis indicators from the LuxKlems database. It focuses on two widely used measures of productivity: labour productivity and Total Factor Productivity.

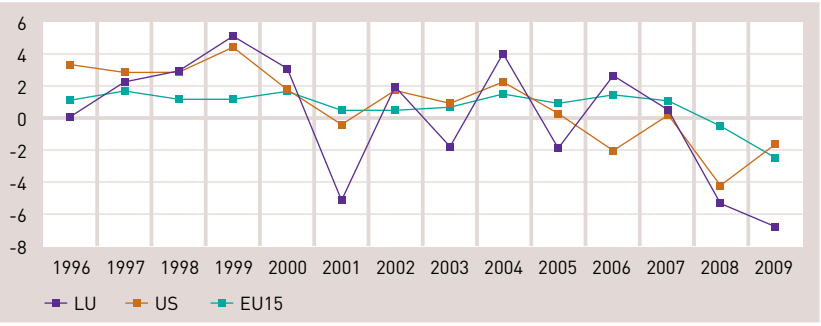
Labour productivity measures the amount of output produced by a worker. It is a determinant of a country's cost and price competitiveness. Increases in productivity permit to compensate workers with higher real wages without generating higher prices and business costs. Its main drivers are capital intensity and Total Factor Productivity (TFP). Capital intensity summarises the contribution of two inputs to production, namely capital equipment and labour. TFP, often regarded as an engine of economic growth, measures the amount of knowledge present in the economy and how well countries manage their inputs. Therefore, the evolution of productivity reflects both a country's economic conditions and its long-term structural changes. This is why productivity is often the focus of attention of economists and policy-makers.

Figure 1 depicts the evolution of labour productivity for the US, Europe and Luxembourg from 1995 to 2009. One can notice the narrowing of the EU-US gap and the slow-down in US productivity since 2000. This is often referred to, in the political and economic debate, as the "race to the bottom" (OECD, 2010)[10]. One can also see the large fall in productivity that emerged from the financial crisis and consequent recession of 2007-2009. Clearly, the evolution of productivity provides a link and a perspective to analyse the effect of the recent financial crisis on the real economy.

The LuxKlems project provides data on output and inputs' use, productivity, efficiency gains and technical change for Luxembourg, at both industry- and national economy-level. These are compared against data for member states of the European Union and the US. To compute measures of productivity, LuxKlems uses a non-parametric deterministic frontier approach, known as Data Envelopment Analysis --- DEA (Charnes et al., 1978)[1]. This gives Malmquist indices of productivity, interpreted as measures of TFP. The DEA method evaluates the performance of each economic unit (industries/firms) against an efficient frontier, which identifies the best-practice technology using combinations of observed inputs and outputs. The method is non-parametric in the sense that productivity measures are computed by using only the available data, while making minimal economic assumptions. (For example, perfect competition is not postulated.) Furthermore, the DEA method allows us to take into account different sources of TFP growth and, in particular, to disentagle the effect of efficiency changes (how well production units use their inputs) from the effect of "pure" technical progress. Productivity indices are computed using data sourced from Statec's National Accounts and the Economy and Finance database produced by Eurostat.

This report gives a synthesis of the main results from the last performed update to the LuxKlems database. Accounts of previous versions of the database were given in the reports by DiMaria and Ciccone (2008) [3] and Dubrocard et al. (2010) [4].

Figure 1
Labour productivity in the EU15 area, US, and Luxembourg



Sources: author's calculations from Eurostat and Statec data.

9.3.1 International comparison

Labour productivity is an important determinant of an economy's price and cost-competitiveness. Another important measure of productivity, Total Factor Productivity (TFP), contains information on technical progress, a main driver of economic growth and contributor to overall competitiveness. In this light, it is interesting to compare Luxembourg's productivity performance to those of other countries and the DEA frontier approach provides an ideal framework to do so.[235] Therefore, this section analyses Luxembourg's labour productivity and its components at aggregate (national) level against a group of european countries (EU15) and the US over the period 1995-2009.[236]

Here, labour productivity growth is measured by the rate of growth of real Gross Domestic Product (GDP) per worker. TFP indices are computed using a frontier approach that compares output, measured by GDP, to inputs, namely labour and capital stock. These indices give the best practice EU-US production frontier; individual countries are compared to this efficient frontier.[237] The frontier method allow us to decompose labour productivity growth in (1) the change in capital stock per worker (capital intensity); (2) the change in Total Factor Productivity (TFP), which, in turn, decomposes into efficiency changes and technological changes.[238]

Table 1 gives *(average) yearly* growth rates of output, inputs, and productivity from 1995 to 2009. Overall, this was a period of remarkable economic expansion for Luxembourg. Real GDP grew at a rate of 3.6% per year, more than double the EU15 average. Employment increased at about the same rate, well above the european average, while the stock of capital grew by nearly 4% yearly. The recession marked an end to this long expansion, with a sharp fall in output (-5% in 2008 and -7% in 2009) and a severe contraction in employment creation.[239]

[235] On the relation between price dynamics/unit costs and labour productivity one can see the 2010 edition of the *Bilan de la Compétitivité* (2010), chapter 6 and 7

[236] The EU15 group comprises the following EU member states: Austria, Belgium, Denmark, France, Finland, Germany, Greece, Italy, Luxembourg, Netherlands, Spain, Portugal, United Kingdom, Sweden. European averages, denoted as EU15, are given by Eurostat aggregates when available

[237] In a production frontier setting, the change in technology represents movements of the frontier, whereas efficiency changes correspond to movements towards/away from a given frontier; capital deepening describes movements along the frontier (the so-called scale effect)

[238] This decomposition was first proposed by Kumar and Russell (2002) [7], who concluded that capital deepening was the driving force of economic growth, and has been often used in studies of productivity trends since then

Table 1
GDP, inputs & productivity: average annual growth (%) 1995-2009

Countries	GDP	Capital (K)	Labour (L)	Y/L	K/L	TFP	Technical progress	Efficiency gains
AT	1.91	0.86	3.86	1.04	2.97	0.63	0.42	0.21
BE	1.39	0.99	2.60	0.40	1.59	0.15	0.38	-0.23
DE	1.85	0.49	3.99	1.35	3.48	0.35	-0.09	0.45
DK	0.97	0.63	3.54	0.34	2.89	-1.23	-1.20	-0.03
ES	2.09	2.50	5.26	-0.40	2.69	-1.20	0.00	-1.19
FI	2.63	1.28	3.00	1.33	1.69	0.62	-0.04	0.66
FR	1.81	0.85	3.91	0.95	3.03	0.52	0.41	0.11
GR	0.81	1.00	2.80	-0.20	1.77	-1.40	-1.59	0.19
IR	3.71	2.94	6.89	0.75	3.84	-1.65	-1.46	-0.19
IT	0.04	0.92	3.47	-0.87	2.52	-1.80	-0.32	-1.48
LU	**3.63**	**3.57**	**3.89**	**0.06**	**0.31**	**0.03**	**0.03**	**0.00**
NL	1.99	1.35	3.40	0.63	2.02	0.13	0.21	-0.08
PT	1.22	0.73	5.99	0.49	5.22	-4.44	-2.62	-1.86
SE	1.81	0.57	2.71	1.23	2.12	0.24	-1.03	1.28
UK	1.28	0.83	3.23	0.45	2.38	-1.83	-2.20	0.37
US	1.63	0.78	3.55	0.84	2.75	0.07	0.04	0.02
EU15	1.74	0.98		0.75				

Legend: Figures represent period averages of yearly percentage changes. Y/L denotes labour productivity; K/L capital intensity; TFP Total Factor Productivity.
Sources: author's calculations from Eurostat and Statec data European averages, denoted as EU15, are given by Eurostat aggregates when available.

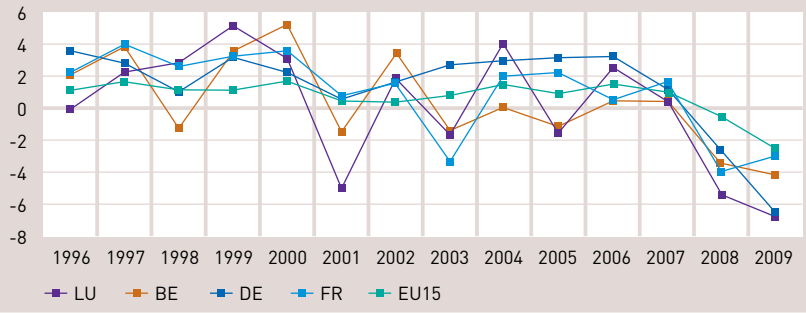
In spite of the good overall macroeconomic performance, Luxembourg's productivity record was disappointing. Luxembourg featured on the efficient frontier for the entire period analysed, meaning that the country made a fully efficient use of inputs (last column in the table). This is certainly a positive feature, but it also means that improvements in the country's competitiveness can be achieved solely through a sustained rate of technical progress. Technical progress, however, stagnated which resulted in nearly-zero TFP growth. Capital deepening was also modest (Luxembourg, however, has the highest capitalisation among this group of countries). As a result, labour productivity remained substantially stable over the period 1995-2009, in an international environment characterised by general productivity slow-down. Labour productivity growth was weak in all countries. Its growth rate was barely higher than 1% in 4 countries (Sweden, Finland, Austria and Germany), while it was negative in Italy, Spain and Greece. In contrast, rates of capital accumulation were high, mainly reflecting low rates of employment growth. This suggests that, overall, poor TFP performance was the likely source of the low productivity growth. In particular, poor --- or even negative --- efficiency gains and technical progress contributed to this outcome.

The data presented above, however, are period averages which, as such, mask shifts in trend and cycles that may occur during the period analysed. Figures 2--4 present time series of labour productivity, TFP and technical progress for Luxembourg and neighbouring countries. One observes that labour productivity deteriorated in the years post-2000, and became more volatile, with the possible exception of Germany. Its pattern followed closely the one of TFP.

[239] Employment, however, grew at positive rates during 2008 and 2009, indicating some labour hoarding. This term refers to the failure of employment to adjust to the economic downturns, due to firms facing costly hiring process and shortages of firm-specific skills and, as a result, choosing to retain staff even if demand for products/services is insufficient to achieve a full use of resources. One can see, for example, the excellent discussion in Felices (2003)[6] and references therein.

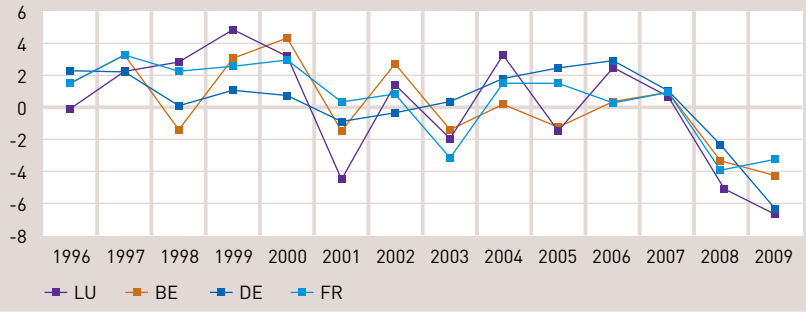
The data show two important features of TFP evolution: 1) TFP figures were highly volatile in the last decade; 2) the productivity slowdown started well before the crisis in the countries considered. Figure 3 shows that the pattern of TFP growth in Luxembourg changed considerably before and after 2000. In the latter period, the variation in the data increased and overall performance worsened. (One can notice the two negative picks that occurred in correspondence of the 2001 and 2007-2009 crisis.) Belgium and France had similar productivity patterns. In contrast, German TFP performance, sustained by some efficiency gains, was less volatile. Finallly, figure 4 shows that Luxembourg's TFP performance of Luxembourg was driven by technical progress, and that this was more volatile than in neighbouring countries.[240]

Figure 2
Labour productivity in the EU15 area, Luxembourg and neighbouring countries: yearly growth (%) 1995-2009



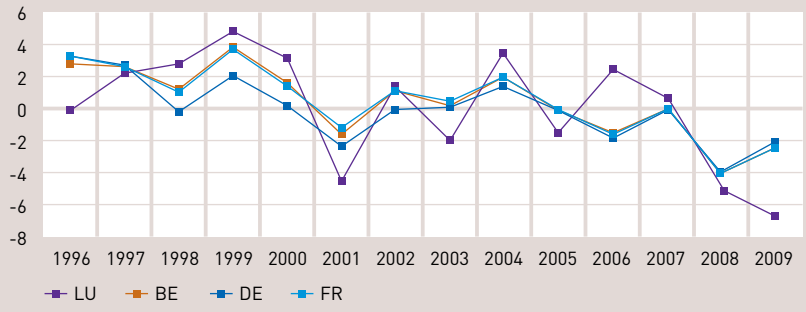
Sources: author's calculations from Eurostat and Statec data

Figure 3
Total Factor Productivity: yearly growth (%) 1995-2009



Sources: author's calculations from Eurostat and Statec data

Figure 4
Technical progress: yearly growth (%) 1995-2009



Sources: author's calculations from Eurostat and Statec data

[240] Detailed tables with yearly figures are available in Peroni (2011) [11].

In summary, the TFP figures above show a deterioration of countries' performances which started well before the crisis. The LuxKlems data, and in particular the poor technological change figures seem to indicate that a deterioration in the abilities of countries to innovate and adopt new technologies is a cause of poor productivity growth.[241] Another interesting feature of this analysis is that TFP data identify two group of countries in the EU: one sustained positive, albeit modest, rates of TFP growth; another was characterised by negative TFP growth. Interestingly, this latter group includes the countries currently experiencing the sovereign debt crisis (with the exception of Denmark), possibly indicating long term structural problems in those economies and the presence of convergence "clubs" in the EU.[242]

This analysis has been conducted at a high level of aggregation, but industry level analysis and sectoral patterns are equally important in explaining aggregate productivity. Thus, the next section looks in detail at the Luxembourgish economy, for which industry-level data are available.

9.3.2 Productivity in Luxembourg at industry level

The evolution of Luxembourg economy over the past 3 decades has been characterised by rapid economic growth, low unemployment and relatively low inflation. During this time, Luxembourg has overtaken the US as the country with the highest level of GDP per capita in the OECD group of countries. This rapid growth has not been uniform across industries, and is linked to the expansion of services - primarily the financial sector - and the decline of traditional heavy-industries. In recent years, however, Luxembourg's economic growth has been increasingly volatile. This feature is explained by the size and degree of specialisation of the economy, which makes it especially exposed to international economic conditions.

In this context, it is important to look at productivity changes in the industries of Luxembourg. This helps to better understand the aggregate evolution of productivity and the impact of the crisis on the economy, because different economic activities contribute to aggregate outcomes in different ways, reflecting their specific characteristics and relative weight on the total economy. Moreover, productivity changes reflect not only economic cycles, but also long-term shifts in an economy. This becomes clearer at industry-level.[243]

The LuxKlems database includes indices of productivity, efficiency and technical gains for each service and manufacturing industry. Service and manufacturing are analysed separately, and production frontiers are constructed for each group of industry using data from the National Accounts division at Statec. Each industry is compared to the relevant frontier and its perfomance evaluated by comparing gross output to three inputs: number of employees, capital stock, and intermediate inputs (energy, raw materials, and services). Data are published at the 2-digit level.

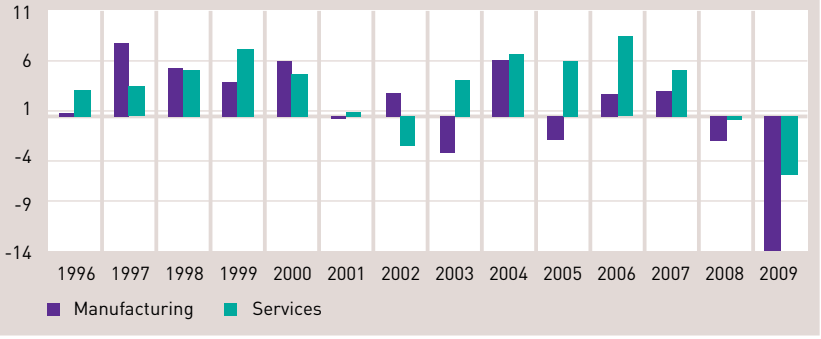
[241] Usually, the evolution of TFP is linked to the economic cycle, institutional and regulatory environments and ability to innovate. Regarding the first explanatory factor, it is often pointed out that TFP has hardly followed economic cycles in recent years. Many commentators cite rising business regulations as one of the causes of the productivity slowdown. This is supported by several studies suggesting that poor productivity growth may be partly explained by different degrees and intensity in the implementation of economic liberalisation programmes (Scarpetta et al., 2002 [13], Nicoletti and Scarpetta, 2003 [8]). The positive impact of indicators of innovation on TFP has been largely documented in the economic literature. One can see Peroni and Ferreira (2011) [12] and references therein.

[242] The presence of convergence clubs in the EU and technical progress performance as a source of divergence has been previously documented in Fare et al. (2006)

[243] Separate frontiers are computed to better reflect the structure of the Luxembourgish economy. This takes into account the different weights of manufacturing and services on output and employment and their different structures. Luxembourg's services are rather fragmented whereas manufacturing industries are often dominated by few big firms. The method used to compute the indices is discussed in detail in DiMaria and Ciccone [2].

Figure 5 compares annual labour productivity growth in manufacturing against service industries from 1995 to 2009. The 2001-2003 recession ended the sustained productivity growth of the second half of the 90s. While services have rapidly recovered afterwards, manufacturing appears to have been struggling since then. Thus, one can observe the decline of manufacturing *vis-a-vis* the growth of the services in disaggregated productivity measures. The most recent recession has hit harshly both sectors of the economy, although the fall in the productivity of manufacturing more than doubled its counterpart.

Figure 5
Luxembourg's labour productivity growth in manufacturing and service industries: yearly changes (1995-2009)



Sources: author's calculations from Eurostat and Statec data

9.3.2.1 Services

Service industries account for two third of the Luxembourgish economy. Thus, it is interesting to investigate the productivity performance of services and how this was affected by the crisis.

The service industries featured sustained input and output growth (Table 2). The expansion of output was striking in the financial sector and internet and communication technologies (ICT)-related activitities. It was also high in those activities related to the financial sector, such as business and IT services. In contrast, productivity performances were less clearcut.[244]

Postal and telecommunications services' labour productivity grew by nearly 13% per year, reflecting the expansion of on-line services and satellite communications. (Luxembourg is home of world leaders companies in satellite communications and in the provision of on-line services.) This industry has also the highest rate of TFP growth, driven by technical progress (3.2% yearly). The wholesale and retail industries' labour productivity also grew at sustained rates, respectively 7.2% and 6%. By contrast, labour productivity declined in other activities (transports, tourism industry, real estate among others).

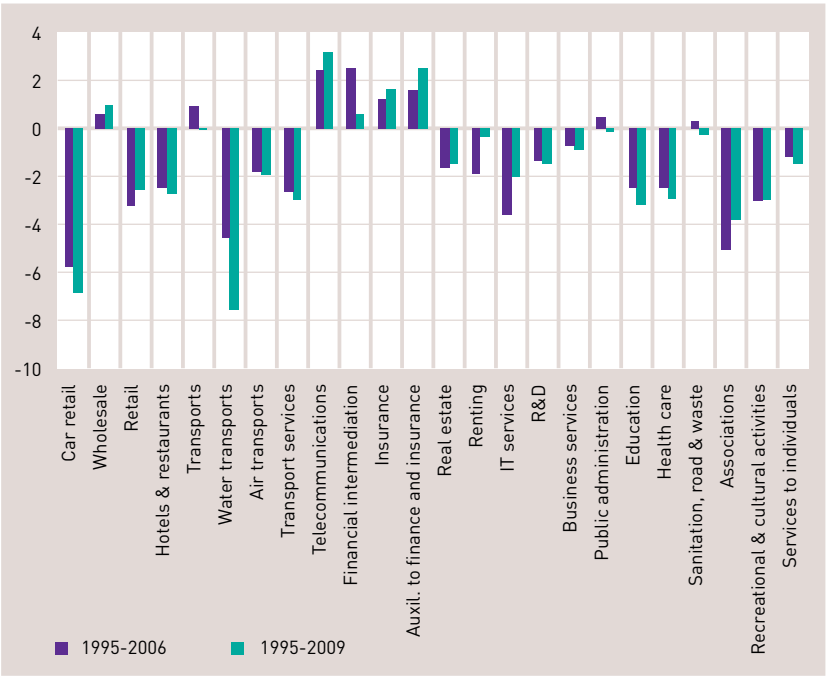
[244] In 2009 the financial industries accounted for about 50% of total output and 15% of employment in services

In the financial sector, output growth outpaced the increase in employment. Labour productivity grew by 4% per year in financial intermediation and 5.4% in auxiliaries to financial intermediation (it declined by -1% in the insurances).

Services' TFP performance was disappointing, a result mainly generated by negative technical progress.[245]

The financial sector confirmed its prominence with an efficient use of inputs and positive rates of technical progress, resulting in an average yearly increase of TFP by 0.6%, 1.6, and 2.5% in, respectively, financial intermediation, insurance and in the auxiliary activities. In particular, the auxiliary activities and insurances positioned themselves on the efficient frontier, whereas financial intermediation realised some efficiency gains. (Postal and TC services were also on the frontier, together with real estate, renting and business services.) Figure 6, which compares average growth in TFP between the period 1995-2006 and 1995-2009, shows that TFP growth in financial intermediation fell dramatically as an effect of the recent crisis. In contrast, other financial industries and the Postal & CT industries' productivity grew steadily also during the years 2007-2009.

Figure 6
TFP growth rates in services: period averages comparison



Sources: author's calculations from Eurostat and Statec data

[245] A negative rate of technical progress corresponds to a lowering of the best-practice frontier. This result is not uncommon in the literature on productivity in service industries (Grifell-Tatjell and Lovell, 1996). Its interpretation is unclear and in the literature several explanations have been advanced, such as exogenous cost and demand shocks and changes in the institutional environment. On this issue, one can also see DiMaria and Ciccone (2008), page 28, and references therein.

Table 2
Services: output, inputs & productivity average annual growth (%) 1995-2009

Industries	Output	Labour (L)	Capital (K)	Y/L	K/L	TFP	Technical progress	Efficiency gains
Car retail	-0.27	3.42	6.59	-3.57	3.06	-6.88	-2.12	-4.86
Wholesale	9.33	1.94	6.26	7.25	4.24	0.95	-0.71	1.67
Retail	7.53	1.70	5.97	5.73	4.21	-2.60	-1.99	-0.62
Hotels & rest.	0.93	2.59	6.90	-1.62	4.19	-2.77	-1.91	-0.88
Transports	5.45	4.68	3.90	0.74	-0.74	-0.07	-0.96	0.90
Water transports	0.90	9.38	23.98	-7.75	13.35	-7.57	0.99	-8.47
Air transports	5.70	5.67	9.02	0.03	3.17	-1.99	1.24	-3.19
Transport services	3.77	5.88	8.15	-1.98	2.15	-2.98	-0.86	-2.13
Postal & TC	16.19	3.09	8.57	12.70	5.32	3.18	3.18	0.00
Financial intermediation	7.82	3.43	3.34	4.25	-0.09	0.62	0.50	0.11
Insurance	5.87	6.97	3.68	-1.03	-3.07	1.63	1.63	0.00
Auxil. to finance and insurance	15.06	9.14	8.26	5.42	-0.81	2.49	2.49	0.00
Real estate	3.89	5.53	2.97	-1.56	-2.43	-1.49	-1.49	0.00
Renting	7.62	5.76	20.15	1.76	13.61	-0.36	-0.36	0.00
IT services	14.55	18.21	15.55	-3.09	-2.25	-2.04	0.59	-2.61
R&D	-2.56	4.88	2.19	-7.09	-2.56	-1.52	-1.76	0.25
Business services	9.46	7.23	8.54	2.08	1.22	-0.89	-0.89	0.00
Public administration	3.39	3.22	4.19	0.17	0.95	-0.19	0.82	-1.01
Education	3.62	3.38	5.62	0.23	2.17	-3.20	-3.20	0.00
Health care	6.42	5.23	12.46	1.13	6.87	-2.95	-2.94	-0.01
Sanitation, road & waste	1.87	3.74	1.87	-1.81	-1.80	-0.25	1.62	-1.84
Associations	3.06	2.99	10.29	0.07	7.09	-3.80	-2.72	-1.12
Recreational & cultural	-3.54	4.25	6.02	-7.47	1.70	-3.00	-0.81	-2.21
Services to individuals	3.32	3.38	4.96	-0.06	1.53	-1.51	-3.03	1.57

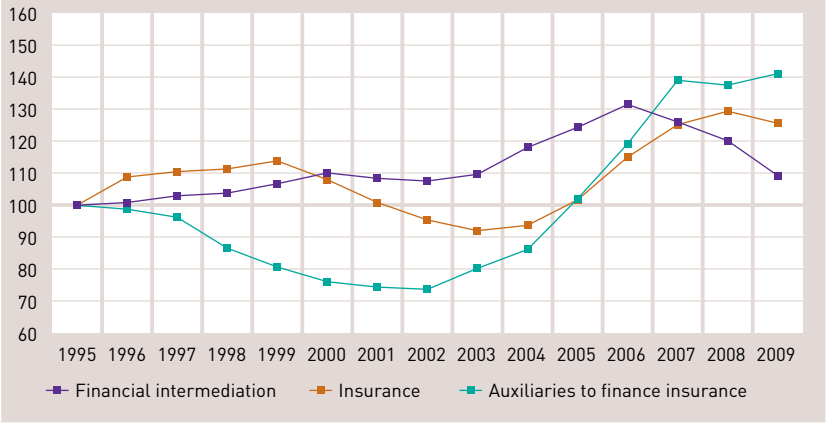
Legend: Figures represent period averages of yearly percentage changes. Y denotes gross output, L labour and K the capital stock. Y/L denotes labour productivity; K/L capital intensity; TFP Total Factor Productivity.
Sources: author's calculations from Eurostat and Statec data.

Let us give a closer look at the evolution of productivity in the fnancial industries. Figure 7 depicts the evolution over time of the TFP for the group of activities involved in the provision of financial services.[246] All financial services were hit harshly by the stock exchange crisis of 2001-2003. After a period of recovery, productivity declined again in correspondence of the recent crisis. Despite these common trends, one can observe marked differences in the response of each group of activities to the recessions. This shows the increasing relevance of the activities auxiliaries to financial intermediation and insurance. Indeed, the auxiliaries' TFP has steadily improved since 2002. This industry has recovered faster than others from the 2001-2003 recession, and has constantly outperformed the other financial activities in terms of TFP growth since then. TFP in the auxiliaries activities fell slightly in 2008, but was already recovering in 2009. Technical progress was the main driver of such changes, although the traditional activities also suffered some efficiency losses in recent years. Thus, the increasing importance of new forms of financial services, with high innovation content, is apparent in productivity data.[247]

[246] The index is set to 100 in 1995

[247] A classification of the innovation content of the activities auxiliary to financial intermediation is available in O'Mahony and Van Ark (2003) [9]. These authors document similar developments in US productivity trends.

Figure 7
TFP indices for the financial sector



Sources: author's calculations from Eurostat and Statec data

9.3.2.2 Manufacturing

Tables 3 summarises the evolution of output, inputs and labour productivity in Luxembourg's manufacturing from 1995 to 2009. The high variability in the data, due to size effects, makes it difficult to discern clear patterns in the evolution of the variables.[248] However, a few general tendencies are as follows: 1) the deterioration of the TFP performance, due to both negative technical progress and efficiency losses, and 2) the continued decline of Luxembourg's traditional heavy industry. (These industries are characterised by modest rise, or even decline, in output and inputs. TFP growth is also modest.)

Output and inputs data varied greatly over industries, growing at positive rates in some while declining in others. Productivity performances were even poorer. Labour productivity grew at rates faster than 5% in the manufacturing of wood product, transport equipment, and production and distribution of electricity & gas. It fell in fabricated metals, recycling, textiles, and food products. TFP declined in half of the Luxembourgish industries. This decline was driven by either negative rates of technical progress or efficiency losses. At the end of the period, only a few industries were in a (slightly) better position than they were in 1995, namely manufacturing of wood products, paper & printing, fabricated metals and recycling. The public utilities (electricity & gas, water), construction, and the manufacturing of textiles made an efficient use of inputs.

In construction, an important industry often used as an indicator of economic health, output and inputs increased at sustained rates.[249] Productivity performance was poorer, as labour productivity grew by 1.3% per year, and TFP increased by a modest 0.6%, due to technical gains. (This industry is placed on the best practice frontier.) In particular, productivity indicators for this industry deteriorated substantially after the 2001-2003 recession. Since then, TFP often recorded yearly negative growth rates (it fell by nearly 6% in 2009).

248 Luxembourg's manufacturing are often dominated by few big firms

249 Construction accounts for about 10% of total employment and about 6% of value added of Luxembourg

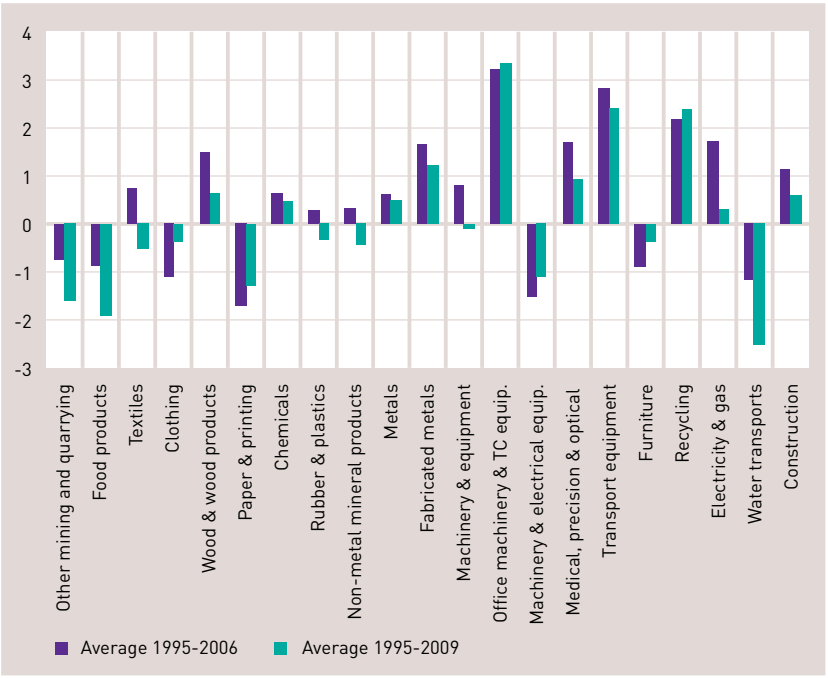
Table 3
Manufacturing output, inputs & productivity: average annual growth (%) 1995-2009

Industries	Output	Labour (L)	Capital (K)	Y/L	K/L	TFP	Technical progress	Efficiency gains
Other mining and quarrying	1.51	0.21	2.73	1.30	2.51	-1.60	0.41	-2.00
Food products	1.15	1.38	2.11	-0.23	0.72	-1.91	0.22	-2.13
Textiles	2.36	2.55	0.48	-0.19	-2.03	-0.53	-0.53	0.00
Clothing	-6.42	-7.17	-4.89	0.81	2.46	-0.38	-0.38	0.00
Wood & wood products	11.31	5.06	7.23	5.95	2.06	0.65	-0.46	1.12
Paper & printing	4.33	1.55	6.79	2.74	5.16	-1.28	-0.03	-1.25
Chemicals	0.26	-3.06	-0.45	3.42	2.70	0.48	-0.90	1.39
Rubber & plastics	0.84	0.77	1.01	0.07	0.24	-0.34	0.09	-0.43
Non-metal mineral products	0.43	-0.72	3.50	1.16	4.26	-0.43	0.65	-1.07
Metals	-0.29	-2.91	0.10	2.70	3.10	0.50	-0.70	1.21
Fabricated metals	-1.84	1.62	0.09	-3.41	-1.50	1.22	2.09	-0.85
Machinery & equipment	1.40	0.85	3.28	0.54	2.41	-0.11	1.38	-1.47
Office machinery & TC equipment	34.46	23.92	15.87	8.50	-6.49	3.35	0.63	2.71
Machinery & electrical equipment	3.85	0.60	3.24	3.23	2.63	-1.11	-0.18	-0.94
Medical, precision & optical instr.	7.31	3.66	4.48	3.52	0.79	0.92	1.57	-0.64
Transport equipment	11.42	5.94	3.56	5.17	-2.24	2.40	1.17	1.21
Furniture	-3.32	-3.79	2.65	0.49	6.69	-0.38	1.83	-2.17
Recycling	1.94	2.93	5.48	-0.97	2.48	2.39	1.06	1.31
Electricity & gas	7.55	1.90	4.72	5.54	2.76	0.30	0.30	0.00
Water	0.91	-0.13	3.13	1.04	3.26	-2.52	-2.26	-0.26
Construction	4.66	3.28	2.66	1.33	-0.60	0.61	0.61	0.00

Sources: author's calculations from Statec data

The productivity of manufacturing declined during both the recessions of the last decade, but the fall subsequent to the recent financial crisis was dramatic. To assess the effect of the financial crisis on this group of industries, figure 8 compares average TFP growth rates for the period 1995-2009 to those recorded for the years 1995-2006. Clearly, the crisis caused a deterioration in TFP performance for all industries, with the exception of a few activities, namely wood products, paper & printing, clothing, recycling, and furniture. This deterioration was particularly evident in the traditional heavy industry (manufacturing of metals, equipements).

Figure 8
TFP growth rates: period averages comparison



Sources: author's calculations from Eurostat and Statec data

9.3.3 Conclusions

This report gave an account of the evolution of the LuxKlems productivity measures for Luxembourg from 1995 to 2009. The focus was on labour productivity and its main drivers, namely capital deepening and Total Factor Productivity (TFP). The analysis used production frontier methods, which allowed us to decompose the sources of TFP into technical changes and efficiency changes, and to compare Luxembourg's overall perfromance with those of other countries.

Main results can be summarised as follows:

- Overall, there was a deterioration in labour productivity, whose growth was weak or negative in most of the country analysed. The source of this poor performance was poor TFP performance *vis-a-vis* sustained rates of capital accumulation. Both technical regress and efficiency losses appear to have contributed to this outcome. While the dramatic fall in productivity measures was generalised during the recent financial crisis, the slowdown in productivity started well before the crisis. The 2001-2003 recession started the decline in productivity, which became concurrently more volatile.

- Luxembourg featured on the efficient frontier for the entire period, but TFP stagnated due to a deterioration in the country's technical progress performance. The recessions of 2001-03 and 2007-09 prompted a large fall in Luxembourg's labour productivity and TFP, due to the country's high exposure to external conditions. The source of this fall can be traced to the decline in output and the concurrent sustained growth of employment, pointing to a labour-hoarding phenomenon, and to the deterioration in the ability of the country to innovate at a sustainable rate.

- The analysis of productivity by industry helped to reveal features that were hidden in aggregate data. Structural shifts in Luxembourg's economy affected productivity trends in many industries. The most important was clearly the continued decline in goods-producing industries in the face of sustained growth in services. The latter was led by the telecommunication and financial services. Among financial industries, the activities auxiliaries to financial intermediation and insurance were the most dynamic. Other developments affected specific industries, and there were large differences in efficiency and technological progress across industries.

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9.4 Typology of patent applicants in Luxembourg

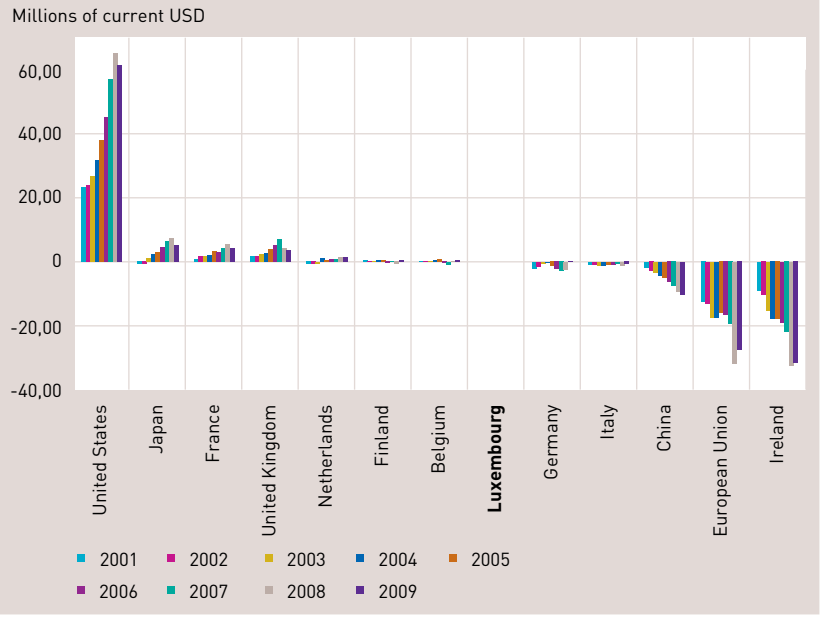
This contribution was carried out as part of a joint project between the Observatoire de la Compétitivité in Luxembourg, STATEC (National Institute of Statistics and Economic Studies - Luxembourg) and the Public Research Centre Henri Tudor. It aims at establishing models of intellectual property management for companies in Luxembourg from a study of Luxembourgish units, which have filed at least one patent application between 2000 and 2009. The analysis is performed at the applicant company and organizations level. An "applicant" is defined as any natural or legal person who files a patent application[250].

In the knowledge economy, the growth of firms, like that of nations, depends increasingly on the innovation capacity of private and public actors. According to the World Bank (2008), technology diffusion has significant positive cumulative effects on the overall efficiency of the economy. Diffusion of technology in the economy increases the absorption capacity of a country and its ability to attract new technologies that, in turn, spread better and improves overall efficiency. Thus, the ability to innovate and the means to promote it become a key issue in structural policy. A performance measurement used to account for the competitiveness of countries in this regard is the balance of the technology balance of payments. "Royalty and license fees (wich) are payments and receipts between residents and non-residents for the authorized use of intangible, non-produced, nonfinancial assets and proprietary rights (such as patents, copyrights...)"[251] are available for all countries on the site of the World Bank. The amounts paid and received by a small number of countries selected were extracted for the period of 2001 to 2009.

[250] An application may be filed by several applicants at a time. The applicant whose name appears first in the application shall be deemed the owner of the application and is used to build the intellectual property statistics referred to in the study.

[251] World Bank http://donnees.banque mondiale.org/indicateur/ BM.GSR.ROYL.CD)

Balance of the Technology Balance of Payments (Incomes - Payments)



Source: World Bank Royalty and license fees, payments (BoP, current USD); receipts (BoP, current USD)

The balance of the technology balance of payments is positive on the whole period from 2001 to 2009 in the United States, Japan and the UK. It is very high and exceeds $ 60 billion since 2007 in the United States. It is small, stable and near zero, that is balanced, in Luxembourg. Finally, it is negative for the European Union on the whole period and the deficit exceeds 40 billion since 2007. This balance is largely due to Ireland where subsidiaries of foreign companies - including IT groups from the U.S. - work primarily under license for their parent company. On the other hand, the disappointing results of Germany result most probably from different practices and less systematic management of intellectual property (Rémi Lallement in Guellec et ali, 2010). Thus, the means to increase the innovative capacity and its visibility in the countries include the management of intellectual property. According to the Office of the World Intellectual Property Organization (WIPO)[252], the term "intellectual property" means creative works such as inventions, literary and artistic works, and symbols, names, images, designs and models used in trade. Intellectual property covers two types of tools: industrial property including patents, on the one hand, and the copyright on the other. Among the management tools of intellectual property, patents are one of the mechanisms to define and enforce property rights over intellectual creations[253].

[252] WIPO is a specialized United Nations agency with the goal of fostering innovation and creativity for economic, social and cultural development of all countries through a balanced and effective international system of intellectual property. At its inception in 1967, it was responsible for promoting the protection of intellectual property throughout the world through cooperation among states and in collaboration with other international organizations. (WIPO, 2010)

[253] Such a mechanism is needed because knowledge production is characterized by zero marginal costs.

The patent is an intellectual property issued by the national or regional offices (e.g. the European Patent Office - EPO) to protect a new invention involving an inventive step and industrial applicability. A patent gives its holder a series of exclusive rights for a limited time (usually 20 years), during which the holder can commercially exploit his invention. In return, the applicant is required to disclose his invention to the public, so as to enable others skilled in the art to reproduce it (WIPO, 2010). Therefore, the patent gives its holder a temporary monopoly to guarantee a profit to the producers of knowledge and is an incentive mechanism. Hall (1998) "explores the explosion of patents" in the United States. The analysis of patent series taken from the U.S. patents database (USPTO) revealed that a trend break occurred in 1986 in the use of such intellectual property protection. In some technology areas, the break leading to a sharp increase in filings of patent applications is accompanied by a less than proportional increase in R&D, particularly in electrical and computer fields. The author argues that progress in R&D management only partly contributes to explain this acceleration. Another explanation is to consider that for new companies in the market, especially in complex industries such as electronics, patents have become an important signal of viability for companies whose assets are mostly intangible. Ten years later, Foray (2009) finds the same trends operating in Europe. Thus, "the patent appears to be a mechanism which, beyond its function of exclusion/protection, is a potential supplier of information on innovation activities and a tool for improving their coordination." The author identifies two major trends at work.

The first corresponds to a sharp increase in the number of patents, especially in new technology areas. It results from a strong growth of the applications coupled with a stable grant proportion.

The fact that these increasingly complex patents, given the increased number of claims, broke into scientific research is a second major trend.

Foray (2009) stresses that strategic behaviour has become dominant in many industries. Indeed, the patent creates a transferable right and can therefore be sold. In this way, a set of patents is a portfolio of intangible assets which should be managed as such and there is a "separation between invention and the assets which allow its economic implementation" (Guellec and Aghion 2010). According to the report on "markets of patents in the knowledge economy", this separation makes the assets more liquid and therefore improves the flow of technology. When technology traffic is facilitated, productivity gains are spread more quickly in the economy but also into inventive activities. The deepening of the division of labour, the facilitated access to sources of knowledge, particularly through so-called "open" innovation modes combined with new modes of research funding in fact lead to new business models for the production of innovation and organization of R&D.

Three major fields of inquiry intersect the research undertaken over the past fifteen years in the U.S. and more recently in Europe:

1. Are patent applications relevant indicators for R&D and a good proxy of their results in terms of innovation?[254] Let us recall that according to the innovation survey conducted in 2007[255] in Luxembourg, only 50% of innovative firms rely on formal methods of protection of their intellectual property.

2. What is the value of patents? If patents are intangible assets, in order to manage them we must have valuation methods able to assign a potential value to a set of intangible assets, part of which will never be exploited or even exploitable; Foray (2009) estimates at least one third of the patent portfolio will never be the object of license. Therefore, many studies aim to provide methods to identify the characteristics of patents which actually contribute to new and radical innovations.

3. Finally, recent research focuses specifically on conditions and institutions that can optimally balance the costs and benefits of incentive mechanisms for the company as a whole. The transformation of the legal and institutional context, the establishment of a European patent and means of control entrusted to patent offices (Van Pottelsberghe 2010) or the developing of efficient patent marketplaces are some of the institutional tools considered and frequently studied in the recent period (Hargreaves 2011).

However, the solutions - irrespective of the difficulties in their implementation - can have ambiguous effects. Guellec et al. consider that the patent funds (pool) are both a powerful tool to efficiently allocate investment in R&D and, at the same time, help to erect barriers to entry. So, companies and business sectors can source income and countries can use it in an offensive or "techno-protectionist" way.

[254] See C H DI Maria (2007) for a discussion of limitations of patents as a proxy indicator of innovation

[255] Community Innovation Survey 2004-2006

The ambition of this work is to contribute to the knowledge of the mechanisms operating in Luxembourg through the refined definition of indicators for the strategy of intellectual property applicants in Luxembourg. The profiling of intellectual property depositors in Luxembourg is useful in identifying the trends at work at the international level that apply to the Luxembourg context. This work is all the more useful for coming in a legislative and regulatory environment which has undergone major changes in recent years. Indeed, some new laws have been enacted:

- The law of the 22nd of December 2006 revoking the law of the 31st of July 1929 on the taxation of holding companies,
- The Grand Duchy Regulation of the 21st of December 2007 implementing Article 50bis, paragraph 6 of the amended Law of the 4th of December 1967 on income tax,
- The law of the 5th of June 2009, for the purpose of promoting research, development and innovation,
- The law of the 26th of October 2010 on the reorganization of the Chamber of Commerce.

These new laws and regulations are too recent to measure any impact in this study; how-ever, the reading of the results now presented must be done with these factors in mind.

A patent application may be accepted or rejected after a long time, sometimes several years, and a patent which is obtained may be used or not. Finally, it can be used for direct production by the patent holder or to allow production against payment of royalties. The availability and completeness of patent applications make them an essential source of information. Widely used in international studies, this factor is still considered as a good proxy for measuring the innovation capacity of countries and activity sectors.

9.4.1 Method and data

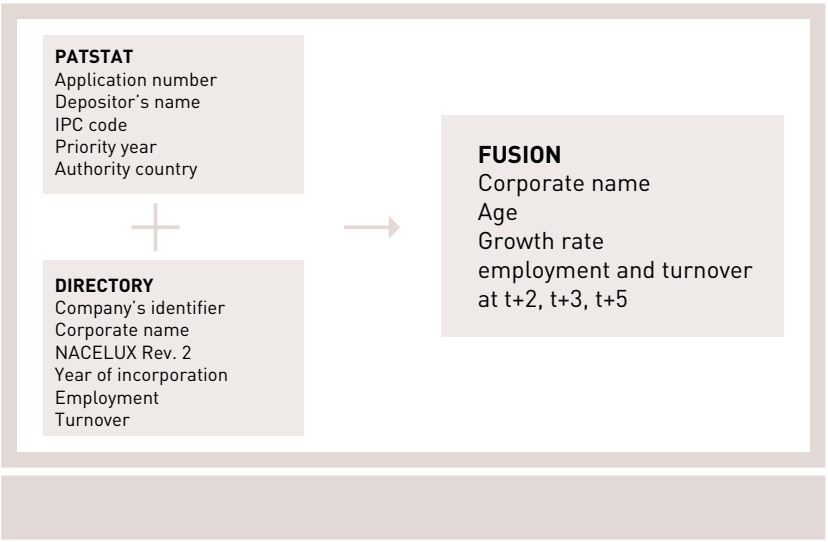
Most often, studies relating to patents are based exclusively on data sets from the management of patent applications. The main contribution of the implementation process is based on constructing an original database combining information from two sources: first, an extraction of patent applications from the database EPO Worldwide Patent Statistical Database (PATSTAT) filed by Luxembourg entities, and, secondly, an extraction containing certain economic characteristics of the applicant listed in the Directory of companies held by STATEC. The database formed is used to define a profile of depositors relying in particular on a bibliometric[256] analysis tool highlighting certain aspects of actors' behaviour.

[256] Bibliometric is defined as the application of statistical and mathematical methods on sets of references (Rostaing, 1996)

This type of methods - which were first used to measure scientific activity[257] - is also applied to the measurement of technical activity using patent documents as an information source. These works usually respond to requests from national evaluation institutes. They aim to compare countries with each other (Rostaing, 1996). Since the development of the technology watch - they are also used to position companies in relation to their competitors. They allow us to follow the evolution of patent applications, partnerships and territorial scope of their intellectual protections. The indicators used in this publication are national microeconomic indicators, supplementary to Eurostat, WIPO or EPO's patent indicators.

The illustration below summarizes the data used for this study:

Fusion of patents and economic data extracted from PATSTAT and STATEC databases



After extracting data from the patents database PATSTAT, it is a question of merging the patent data with the economic characteristics of the applicant[258]. Two types of tools are then mobilized to perform the analysis of the corpus: firstly, the STATA econometric tool used to merge the patents and economic data and to automate the generation of graphics, and secondly, the MatheoAnalyser tool used to perform bibliometric analysis of patents that help to highlight the strategies of patent applications deployed by applicants in Luxembourg.

The corpus analysed in this study consists of all Luxembourg units which have filed at least one patent application during the period 2000 to 2009. For this period, there were 366 applicant units in Luxembourg.

[257] The first works date back to Cole and Eales who in 1917 studied the scientific production in anatomy, (Cole & Eales, 1917)

[258] From the partial results obtained using automatic recognition tools, a correlation table was developed to perform data fusion for patents and economic data. It contains 1054 variants of names corresponding at the end to 366 names of companies linked to a unique identification number.

Frame 1
The PATSTAT database

The PATSTAT database is a database developed by the EPO and distributed to governmental, intergovernmental and academic institutions. The first version of the PATSTAT database was published in 2005 and has since been updated twice a year in April and September. It has 18 tables linked by common identifiers. This study was conducted over the period 2000-2009 with patent data extracted from the PATSTAT of October 2009.

The selected patents correspond to patents from Luxembourg depositors. For a legal person, the applicant is defined and identified by the address of the headquarters of the company holding the right at the filing date, while for an individual, this is the address of his home[259]. These criteria generate a corpus of 5,681 patent applications. These patent counts by country of residence of the applicant provide information about the "ownership" or control of the invention (that is to say the number of patents held by residents of each country). They are used to report upon business performances of a country in terms of innovation. However, it is important to recall here that the applicant is not necessarily the inventor, who can be located either in Luxembourg or in another country[260]. Patents held in the corpus are described along three main criteria: the priority year, their INPADOC family[261] and their referenced IPC[262] codes in the applications:

- The base year chosen for the analysis of patent data of this study is the **priority year**. The priority date is the date of the first filing of a patent application made anywhere in the world (usually from the patent office of the applicant's country), to protect an invention. The priority date is used to determine the novelty of the invention (OECD, 2009). Therefore, it is one of the most significant dates and is the closest date to the date of invention (OECD, 2009). Priority years for selected patents are between 2000 and 2009. However, as the deadline for publication of applications is about 18 months, the applications extracted from the PATSTAT in 2009 are not comprehensive applications filed for the years 2008 and 2009. We should therefore be cautious in the use and interpretation of results for the end of period. In the remainder of the document, the evolution graphics are based on data for the years 2000 to 2007 only, while other statistics and indicators are calculated over the entire database.
- With regard to the corpus at hand, patents can also be distinguished according to their I**NPADOC family**. This categorization allows us to discern the number of inventions protected by Luxembourg depositors (which is different from the number of patent applications made by Luxembourg applicants).
- Finally, patents are characterized by the **IPC codes** referred to in patent applications. They describe the technology area of the proposed innovation. The version of the IPC nomenclature used as reference in this study is that of the 1st of January 2006.

[259] The location selection of the applicant is made in the PATSTAT database specifying the country code "LU" in the interrogation field "PERSON_CTRY_CODE"

[260] The analysis of inventors having their official address in Luxembourg is another approach that will become useful later

[261] Set of related patent applications filed in one or more countries to protect the same invention or a similar invention

[262] ICP: International Classification of Patents - Patent Classification System recognized internationally which subdivides technology into sections, classes, subclasses and groups based on technical elements contained in patent applications (Office World Intellectual Property 2010)

Frame 2
Companies according to the directory

The data extracted from the PATSTAT for patents have been supplemented by descriptive information about the companies involved. This data come from the Business Directory published by the National Institute for Statistics and Economic Studies (STATEC) that lists, in a comprehensive manner, the different types of economic units engaged in economic activities contributing to gross domestic product. The types of units usually distinguished in the national Company Directories are: business, legal units, local units, business groups. For Luxembourg, the database includes about thirty tables, and updates from various sources, mainly administrative. It provides a unique identifier for each unit and assigns a code of economic activity according to the NACELUX Rev. 2 nomenclature, according to the core activity. It also contains information relating to their status in a given year (on/off for missing entities), the legal form and evolution of their activities in terms of employment or turnover. Thus, for business filers in Luxembourg which we are dealing with, the Directory also collects the following information: date of incorporation[263], business code, employment and turnover as well as a unique identifier[264].

- The **date of incorporation** is the year of creation of the legal form; it should not be confused with the birth year of the company that could be earlier but with a different status. However, in the absence of a birth year, this is the best proxy giving, in most cases, a good idea of the antiquity of the structure. Particular attention was paid to "young companies", i.e. structures that are less than five years old at the time of filing the patent application. This definition implies that this may be a unit that may have been created to carry or use future patents and whose date of application filing is prior to the date of creation.
- The **activity code** assigned by STATEC describes the core business of the unit. The new NACELUX Rev.2 code[265] being deployed currently in the databases was collected as recorded in July 2010
- Data for employment and gross sales are also available. Not publishable as it is for privacy reasons[266], it was assigned a size class.

[263] The incorporation year is the year in which the company has been created and registered in the competent authority's registrar, meaning the year in which the minutes of association were signed and deposed in the *Administration de l'enregistrement et des domaines*, the competent authority in Luxembourg.

[264] The units are identified by their standardized name and a company number that uniquely identifies the company in question.

[265] The complete nomenclature is available on http://www.statistiques.public.lu

[266] Additional variables were constructed: the growth rate of employment two, three and five years after the priority date and the growth rate of sales two, three and five years after the priority date.

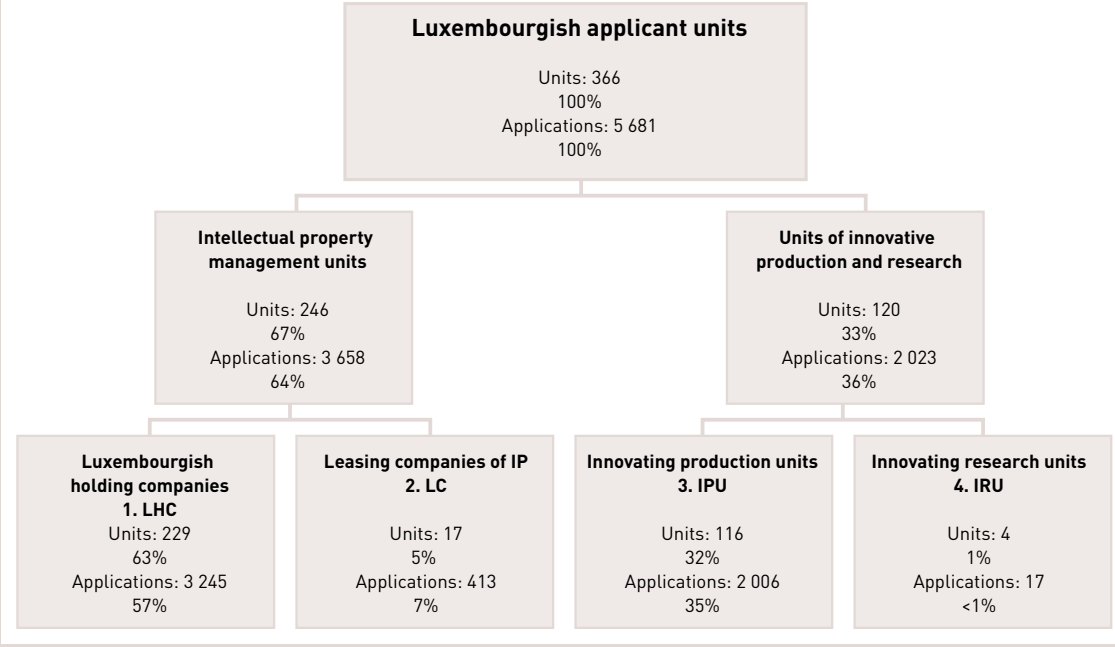
9.4.2 Categorizing applicant business units

The applicant units in the corpus are analysed according to their activity[267] within the framework of the NACELUX classification as provided by the Business Directory (STATEC, 2008). It is clear that the applicant units in Luxembourg fall into two distinct categories of unequal importance:

- On one side, the units that "produce" innovation from their investment in R&D and possibly manage the intellectual property of their own results, these are the **units of innovative production and research**,
- On the other, the units that "manage" and protect intellectual property for others, usually other units of the same group, these are **the intellectual property management units**.

The intellectual property management units fall into two categories of legal forms: holding companies and leasing companies. Among the units of innovative production and search, there are research units specialized in innovative R&D and corresponding to the "academic and research sector" and innovative production units i.e. companies from different sectors of economic activity that produce innovation in support of their main activity (whether industrial or service).

Categorization of filling units in Luxembourg



Source: authors

[267] Firms for which NACE is not available have not been taken into account

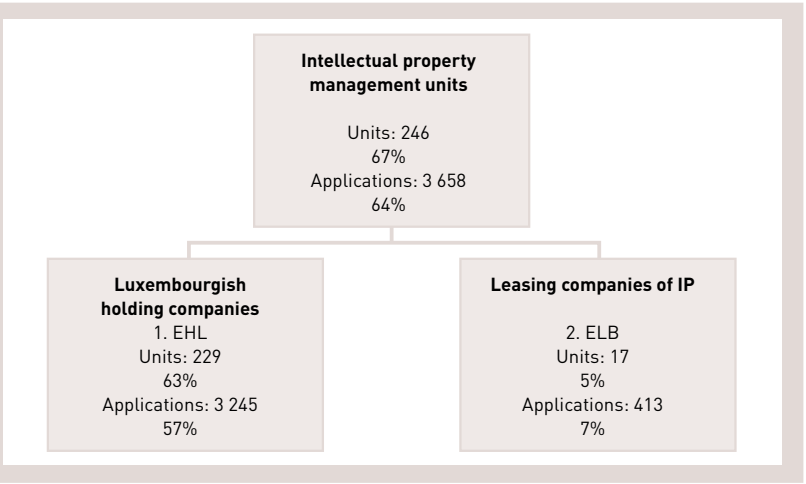
1. The group of holding companies in Luxembourg (LHC) corresponds to the units referenced in classes 64.20 "Activities of holding companies", 64.30, corresponding to "Investment funds and financial entities" and 70.10, corresponding to "Activities of head offices" of NACELUX. Holding companies are the largest group among the applicant units, accounting for 62% of the corpus studied and 57% of filings.

2. Companies leasing intellectual property (LC) include all companies whose business is categorized in the NACELUX 77.40 class. This class corresponds to the sector "Leasing of intellectual property and similar products, except copyrighted works". Despite its very specific goal, this category includes 5% of all applicant units and 7% of applications throughout the period. With holding companies, the category of "intellectual property management units" represents 69% of filling units on the database.

3. The group of innovating research units (IRU) is dedicated to the academic sector and research referenced in 85.42 "Higher Education" and in classes 72.19 "Research and experimental development of natural sciences" and 72.11 "Research-development in biotechnology". This group represents only 1% of Luxembourg applicant units between 2000 and 2009 and 0.3% of patent filings.

4. The innovating production units (IPU) are composed of units present in the database that are not referenced in classes 64.20, 64.30, 70.10, 77.40, 72.11, 72.19, 85.42 of NACELUX. Rev.2. Although defined by "what they are not", these units are in fact all Luxembourg companies that innovate and involve patents to protect their intellectual property. This group is the second most important. It represents 32% of identified applicant units in the period 2000 to 2009 and 35% of filings.

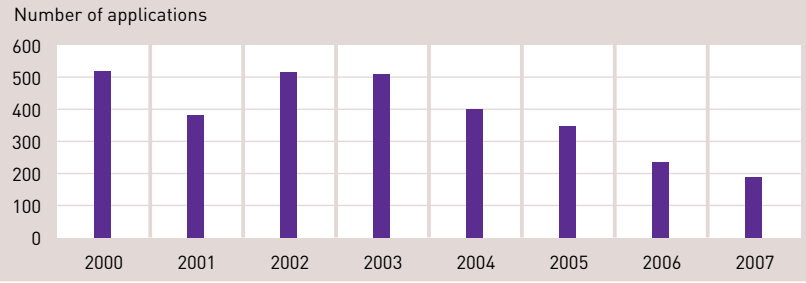
Two thirds of applicants are Intellectual Property management units



Source: authors

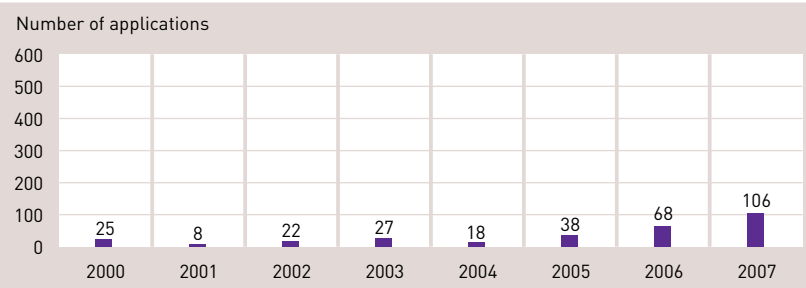
The 229 holding companies active in the field of intellectual property over all or part of the study period have filed 3,245 patent applications representing 99.6% of applications from the units of intellectual property management and 57% of all of the corpus' applications.

Changes in the number of patent applications filings
Luxembourgish holding companies



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Changes in the number of patent applications filings
Intellectual property leasing companies



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Filings tend to decrease for this category since 2004. The causes of this trend are mainly the decline observed in the two most important depositing players. Indeed, the applications are very concentrated in this group, as half of the deposits (47%) came from only two units (EUROCELTIC and MOLTECH INVENT). The activity slowdown of the two main actors could not be offset by the strong momentum seen in a small number of fast growing holding business - but still small in volume - nor by the sharp increase in holding filers.

The number of applicant companies which are under 5 years old grew by 66% between 2007 and 2008 when Article 50bis was introduced. Finally, this slowdown is obviously exacerbated by the reclassification of a certain number of units following the abolition of Holdings 1929 which became effective on December 31st, 2010. Six units have seen their activities redefined and fall within the scope of the branch "Leasing of intellectual property and similar products, except copyrighted works" (77.40). The importance of this group is growing since 2005 and even if it represents only 7% of all patents in the corpus analysed, this equates to an increase of 324% between 2000 and 2007. A phenomenon all the more remarkable for being the opposite of what we can see at the European level. This finding, however, must be qualified because most of the applications (70%) are due to three companies.

The group of Luxembourgish holding companies as well as that of Intellectual property Leasing companies consists of structures of varying age. Many companies include dates of patent application prior to the date of incorporation of the unit which is indicative of the specialization of these units as a tool for ad-hoc capital management for international groups (patent applications existed before the establishment of the ad-hoc management structure of the applications granted).

The authority country[268] analysis shows that the holding companies are particularly involved in the management of Europe's intellectual property belonging to groups of which they are a part.

Evolution of Luxembourgish filling holding companies by country of authority

	EP	US	DE	CA	AT	CN	IB	NO	MX	BR	KR	DK
2000	102	62	116	48	54	12	21	14	3	9		9
2002	107	58	75	48	41	19	19	15	27	10		17
2003	109	64	67	38	38	29	20	16	13	24		25
2004	102	49	30	32	29	25	12	8	20	15		14
2001	93	54	44	18	24	18	2	12	7	15		8
2005	71	41	18	23	14	23	10	21	14	16	27	9
2006	71	33	14	13	6	16	8	17	13	2	18	1
2007	67	17	9	16	3	4	10	10	8		18	4
2008	50	12	1	3		4	16	2			17	
2009	2	4					1	1			7	

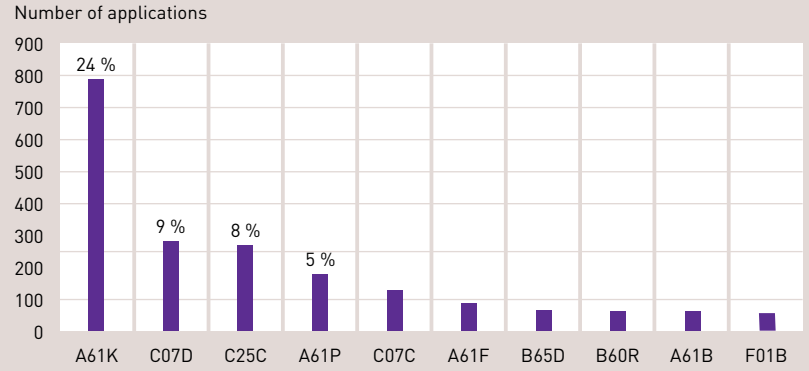
Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

The markets targeted by the holdings relate to the U.S. or Canada for just under 20% of applications (633 applications in columns US and CA on a total of 3,245). If the European way[269] and North America remain paramount for leasing companies, the latter must be highlighted for the growing emphasis granted to Asian countries as countries of authority.

[268] Country where the patent application is first filed before eventually being extended to others countries. (OECD, 2009)

[269] The European patent is obtained for all contracting countries of the European Patent Convention - EPC by making a single deposit with the European Patent Office - EPO. This is known as the European way, which confers the same legal rights and is subject to the same rules as national patents granted by national patent offices.

Patent applications according to subclasses of Luxembourg's IPC holding companies (LHC)



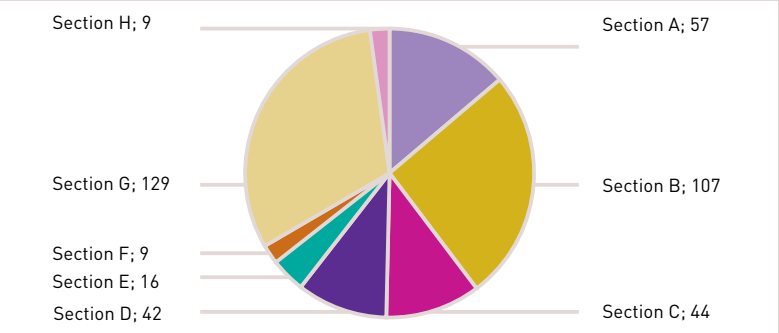
A61K	Preparations for medical, dental or toilet purposes
C07D	Heterocyclic compounds in organic chemistry
C25C	Processes for the electrolytic production, recovery or refining of metals; apparatus therefore
A61P	Therapeutic activity of chemical compounds or medicinal preparations
C07C	Acyclic or carboxylic compounds
A61F	Filters implantable into blood vessels, prostheses and orthopaedic devices, care or contraception; mongering; treatment or protection of eyes or ears; bandages, dressings or absorbent pads; first- aid kits
B65D	Containers for storage or transport of articles or materials, e.g. bags, barrels, bottles, cans, cartons, jars, tanks, hoppers or forwarding containers; accessories, closures therefore; packaging; packages
B60R	Vehicles, vehicle fittings or vehicle parts, not otherwise provided for
A61B	Diagnosis, surgery, identification
F01B	Machines or engines, in general or of positive displacement type, e.g. steam engines

Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Over the whole period, patent applications are predominantly in Section A "Human Necessities" which is the section of the majority of filings in 2007.

Section C "Chemistry, metallurgy," however, is experiencing a drastic decline. Whilst it held 39% of applications in 2000, it represents only 16% in 2007. This reflects the sharp slowdown in the activity of MOLTECH INVENT, already reported, plus the disappearance of two actors during the period. By contrast, in section A, the patent applications filed by EURO-CELTIC remain stable in this category and four new players are emerging during the period in pharmaceuticals (25% of applications are for "preparations for medical, dental or toilet purposes").

Patent applications by intellectual property leasing companies (LC) according to the sections of the IPC

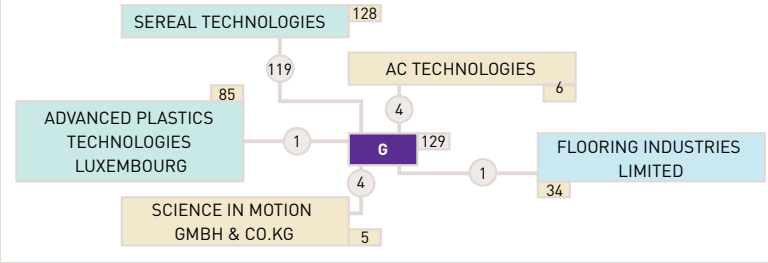


SECTION A – Human necessities
SECTION B – Performing operations; Transporting
SECTION C – Chemistry. Metallurgy
SECTION D – Textiles. Paper
SECTION E – Fixed constructions
SECTION F – Mechanical Engineering; Lighting; Heating; Weapons; Blasting
SECTION G – Physics
SECTION H – Electricity

Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

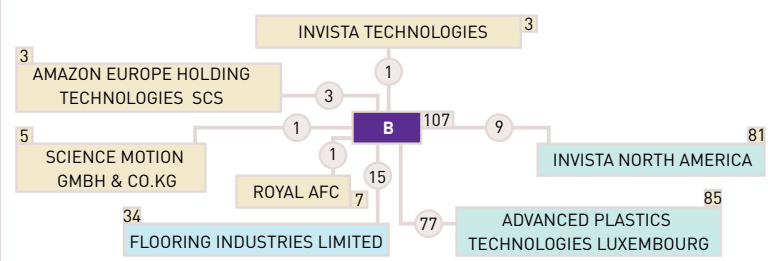
While in 2005, the favourite sections for young holding companies of less than 5 years of age were identical to those of other holding companies, by the end of the period they differ significantly. Applications under sections G "Physics" and H "Electricity" have more than doubled and together they represent 20% of applications in 2007. This phenomenon is also evident in the group of leasing companies where, however, one company (SEREAL TECHNOLOGIES) is responsible for 93% of applications under section G and more specifically "Holographic processes or apparatus" and "Optical elements, systems or apparatus." But the bulk comes from Section B "Performing Operations; Transporting" which is the technology area most frequently cited in the patent applications issued by holding companies younger than 5 years old and the second chosen field for intellectual property leasing companies. For young holding companies this relates specifically to the subsection "Vehicles, vehicle fittings or vehicle parts, not otherwise provided for" from a single company SMR Patents whose parent company is the world leader in the manufacture of mirrors for the automotive industry. This actor illustrates remarkably well the group deployment of an offensive and defensive policy of the intellectual property portfolio management through its Luxembourg subsidiary.

Intellectual property leasing companies - according to the sections of the International Patent Classification (IPC)



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Key Players in section B of the IPC, between 2000 and 2009

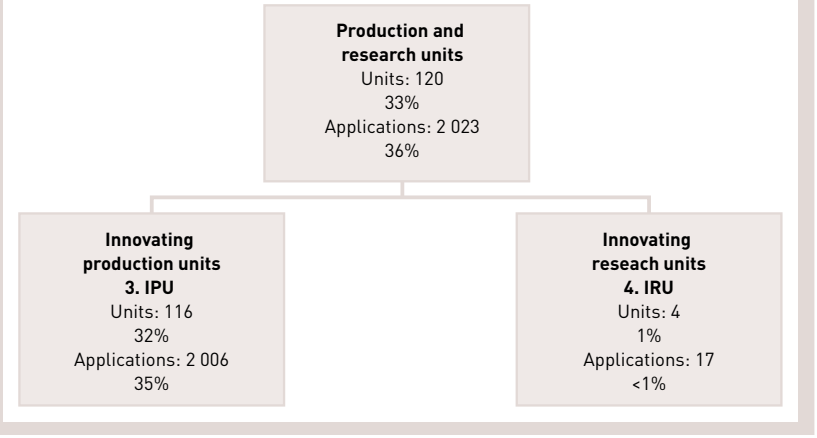


Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

As for holding companies, major industry players from the branch 77.40, the most reactive in terms of intellectual property, report each on one different technical field, revealing an intellectual property management profile focused on a specific area of activity. They group the intellectual property activities of a company or set of companies in the same area of activity but located elsewhere in the world.

9.4.3 Innovating research and production units

One third of the business units do actually produce innovation

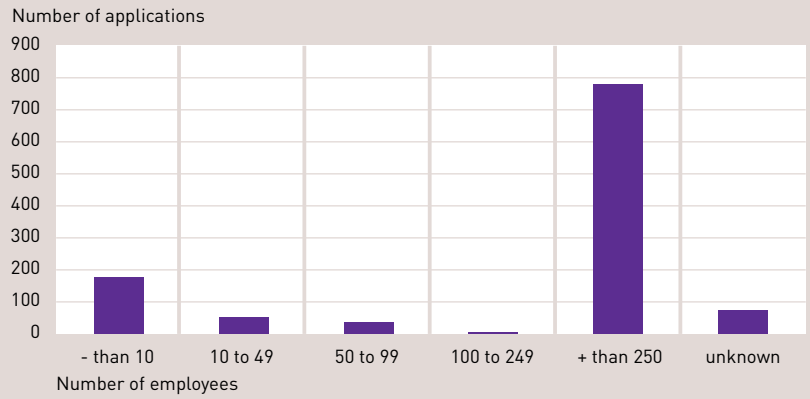


Source: authors

The category of "Research Units" brings together institutions active in the sectors 72.19 and 85.42 of NACELUX. Rev.2. These units correspond mostly to public research centres which have existed for 16 to 20 years and involving a significant number of employees. The employment and turnover growth rates are positive and tend to grow significantly over the study period. Between 2000 and 2009, 17 patent applications were filed by four actors from the academic and research sector (i.e. 0.3% of all applications included in the analysed corpus). These applications primarily target the technical areas of measurement, medical technology, pharmaceuticals and biotechnology. Actors protect themselves by targeting mainly the European market. Given the low weight of this category, the results presented now apply only to innovating production units (IPU).

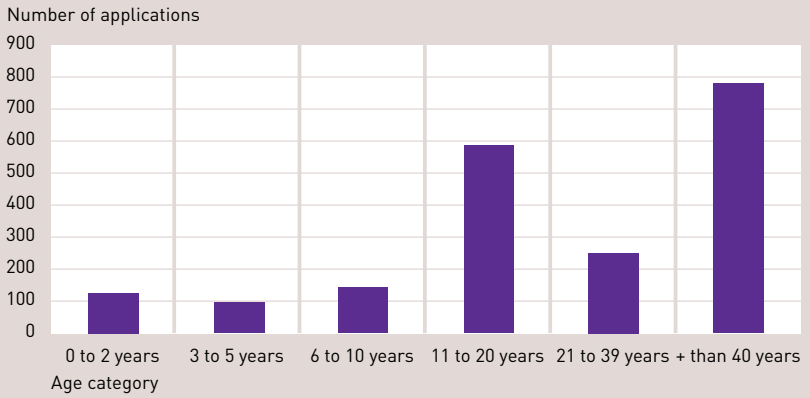
Historically, patents are tools primarily for the protection of products and industrial processes. Therefore, and consubstantially to the method of study of intellectual property protection, innovating production units are mostly industry-owned. These are, in most cases, large companies or companies belonging to large groups. The EU survey on innovation led to similar observations and confirmed that access to the protection of intellectual property is more difficult for SMEs in Luxembourg. This predominance of large industrial enterprises has resulted in a relatively modest proportion of young firms (14%).

Characterization of innovating production units ... by size



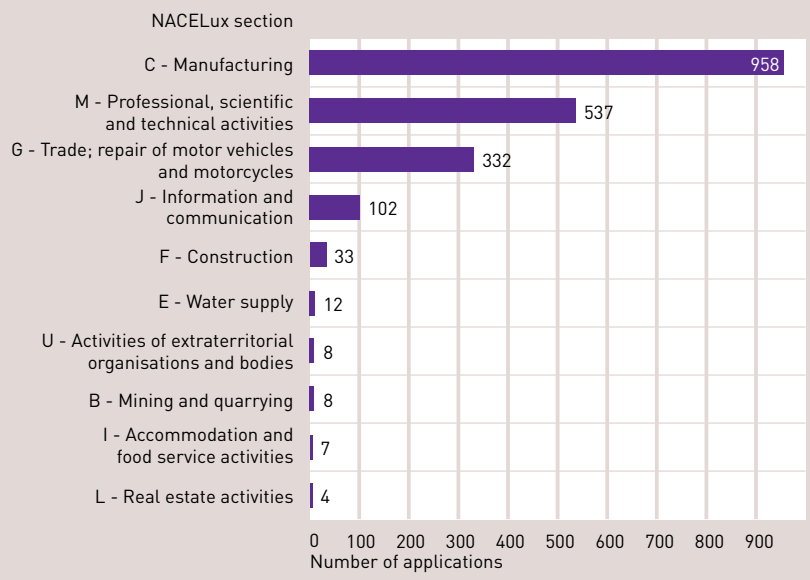
Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Characterization of innovating production units ... by age



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

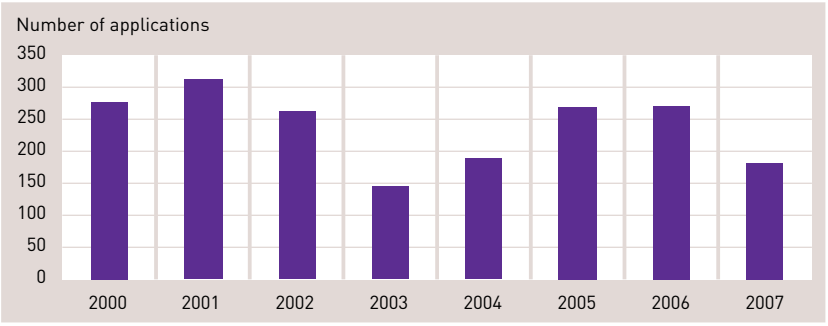
Characterization of innovating production units ... by NACELUX Rev.2. activity code to a position



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Patent applications from innovating production units are characterized by a more uneven evolution than that faced by intellectual property management units. Substantial declines are recorded in the years of crisis or immediately following a crisis. The number of applications decreases significantly in 2002 and 2003 after the Internet bubble burst and again in 2007. On the other hand, there does not seem to be any strong structural trend or an increase or decrease in the number of filings.

A change in the number of applications more closely linked to economic conditions...

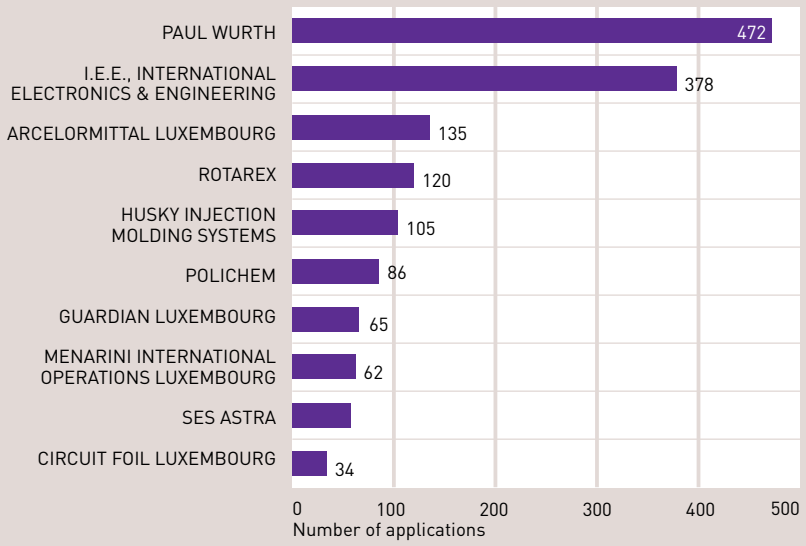


Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Three applicants clearly dominate the landscape of innovating production units: the company PAUL WURTH that recorded 472 applications between 2000 and 2009, IEE INTERNATIONAL ELECTRONICS & ENGINEERING with 378 applications and ARCELORMITTAL LUXEMBOURG with 135 applications. Together they account for almost half (49%) of all applications by Innovating production units over the period considered. Then come: ROTAREX (120 applications), HUSKY INJECTION MOLDING SYSTEMS (105 applications) and POLICHEM (86 applications). The Group ARCELORMITTAL LUXEMBOURG is also well placed in this classification. If we refer to the first bibliometric study conducted in 2005[270], we find the same top-ranked companies: PAUL WURTH and IEE INTERNATIONAL ELECTRONICS & ENGINEERING. Together with ARCELORMITTAL LUXEMBOURG, they contribute significantly to the overall reductions recorded in 2003 and 2007.

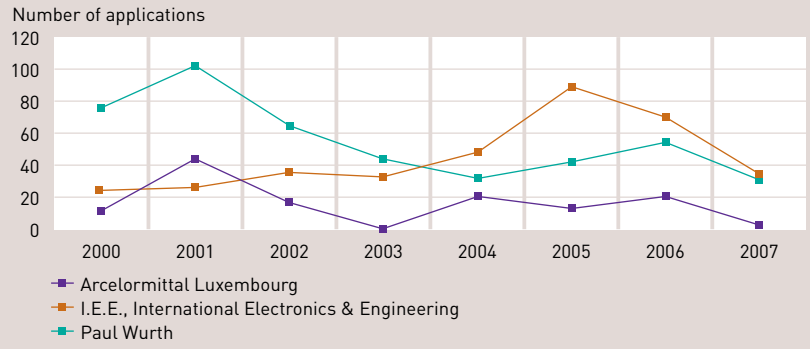
[270] Public Research Centre Henri Tudor, 2005

Characterization of innovating production units
... mainly from a small number of players...



Source: EPO Worldwide Patent Statistical Database - October 2009 STATEC Business Directory

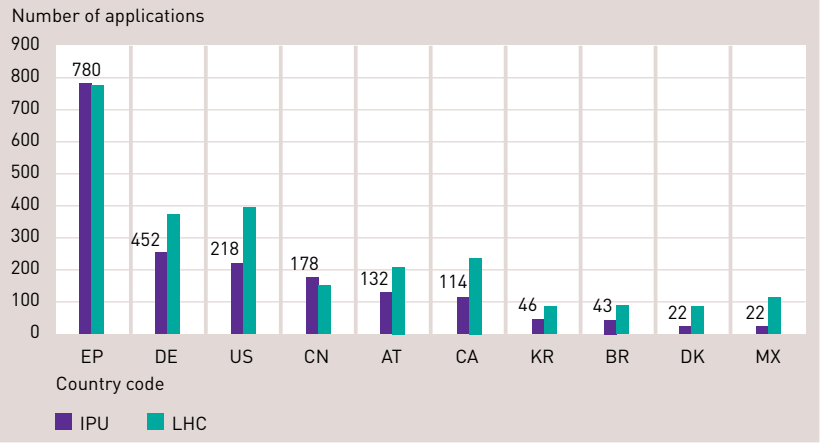
Characterization of innovating production units
... trends which contribute significantly to the overall development of the category



Source: EPO Worldwide Patent Statistical Database - October 2009 STATEC Business Directory

As for holding companies, the European way is the favoured way of application by innovating production units. The authority country ranking is quite similar between these two groups. However, the Asian continent totals 14% of deposits made by the production units between 2000 and 2009. In 2006 and 2007 the number of applications filed in China was greater than the number of applications filed in Germany and the United States. Thus, the growing importance of Asian countries including China and Korea as authority countries cited in patents filed by innovative production units is even greater than for holding companies.

Top-10 authority countries of patent applications for IPU and the comparison with LHC, between 2000 and 2009

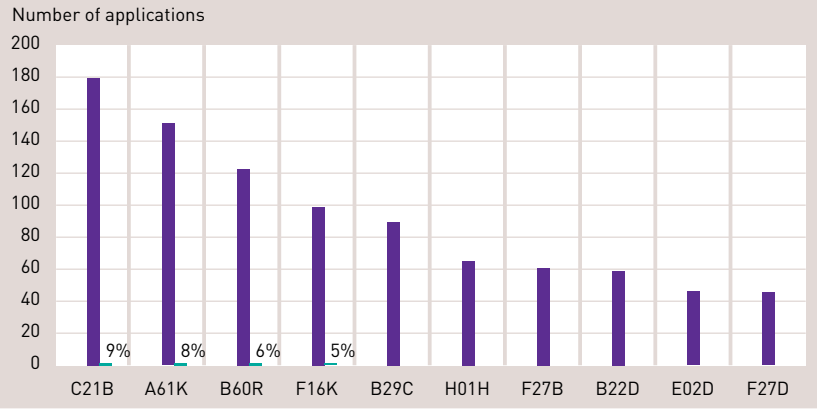


EP: European Patent Office
CA: Canada
DE: Germany
KR: Korean Republic
US: United States
BR: Brazil
CN: China
DK: Denmark
AT: Austria
MX: Mexico

Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

The observation of the main areas of technology invested by patent applications filed between 2000 and 2009 by the innovating production units or Luxembourg holding companies according to the IPC sections shows that differences exist in their preferred areas of technology. 31% (i.e. 618 applications) of patent applications filed by the innovating production units is from Section B "Performing operations". This section is the most represented in deposits while for Luxembourg holding companies, this category was ranked as the third largest used section (14% of applications). Let us recall that for the latter, section A "Human necessities" is in fact largely dominant, representing 41% of applications filed by the holding companies against only 12% of production units. Section C "Chemistry and Metallurgy" is ranked second out of sections used in patent applications of innovating production units and of Luxembourgish holding companies.

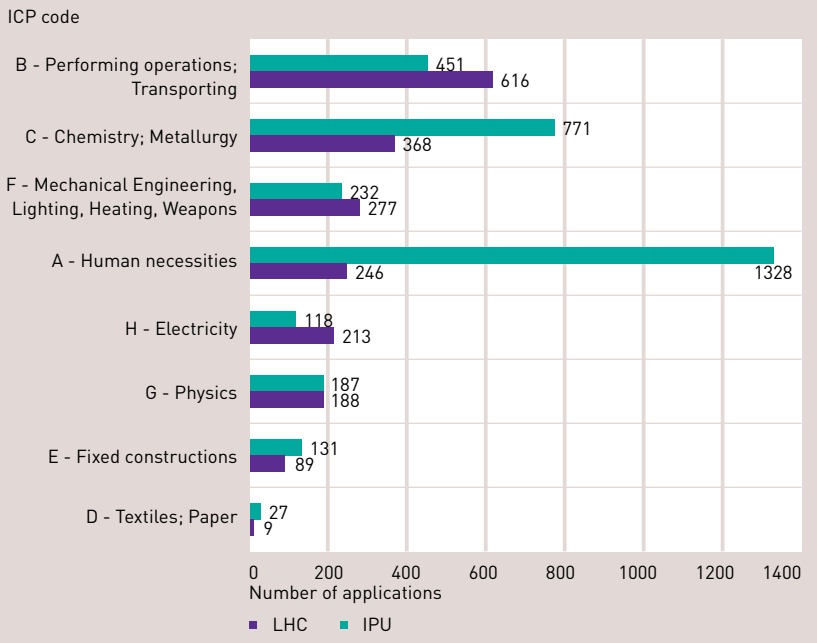
Patent applications of innovative production units according to subclasses of the IPC



C21B Manufacture of iron or steel
A61K Preparations for medical, dental or toilet purposes
B60R Vehicles, vehicle fittings or vehicle parts, not otherwise provided for
F16K Valves, taps, actuating-floats; devices for venting or aerating
B29C Shaping or joining of plastics; shaping of substances in a plastic state in general, after-treatment of the shaped products, e.g. repairing
H01H Electric switches; relays, selectors, protective devices
F27B Furnaces, kilns, ovens, or retorts in general; open sintering or like apparatus;
B22D Casting of metals; casting of other substances by the same processes or devices
E02D Foundations, excavations, embankments, underground or underwater structures
F27D Details or accessories of furnaces, kilns, ovens, or retorts, in so far as they are of kinds occurring in more than one kind of furnace

Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Technological choices that differ from those covered by the holding companies



Source: EPO Worldwide Patent Statistical Database - October 2009 - STATEC Business Directory

Finally, when looking at the respective areas invested in by production units and research units, the low specialization of innovation from a few actors from different fields is confirmed. The technology areas that are protected are the metallurgical and pharmaceutical industries as well as transport for the production units and analysis of biological materials, pharmaceuticals and medical technologies for the research units. Due to the low similarity between these areas, knowledge transfers and synergies between research units and production units are probably limited..

9.4.5 Conclusion

The separation between production and the use of innovations and asset management derived from the invention is clearly marked in Luxembourg. This leads to distinguish two groups of depositors: the first consists of units dedicated to the management of intellectual property and the other consists of production and research. The "Management middlemen" profiles of the first group represent 67% of patent active companies with a significant change in units dedicated to the leasing of intellectual property. However, they remain few in number compared to Luxembourg holding companies, which constitute the bulk. The business units that produce and use innovation represent a third of the units and are responsible for 36% of filings. In this group, the research units, which are very limited in number, play a marginal role in patent filings.

The economic crisis has an impact on the number of patent applications in the two main categories; however, other causes are operating in the stronger and more regular downward trend, which is expressed in the categories dedicated to intellectual property management. In particular, the legislative environment undergoing radical transformation induces changes in the legal status of these entities, if not in their strategies.

Beyond the findings drawn from this overview of applicants in Luxembourg, the impact of propensity to patent on companies performance should be confirmed by models of causal relationships, which remain difficult to implement. In particular, if the growth rates of filling units in the years following their filings are remarkably fast, there is no indication that this is linked to the filing of applications nor can we guess the meaning of this possible link. In order to go further, the database should be completed with information relating to units that do not file patent applications while having information on their innovation activities where they exist.

However, this study has already allowed us to propose a set of indicators. In order to assess the impact of national and international support measures as included in the law of the 5th of June 2009, it is necessary to select ten relevant indicators and monitor them annually. Luxembourg's intellectual property actors could follow the evolution of legal filling units, know the holders of new intellectual property projects better and identify new areas of technology of interest to depositors.

The indicators presented in this study reflect the performance of Luxembourg's filling innovative companies. It would be interesting to supplement them with an analysis of the inventiveness of local laboratories and Luxembourgish labour (OECD, 2009), referring in this case not longer to the location of the applicant but the location of the inventor to better showcase the local private and public research.

Finally, another important limitation of this work is the shortcut through the assimilation between patents and innovation capacity. This has already been reported, if the patent indicators are favourable for a characterization of Luxembourgish depositors, this characterization is limited to patentable technical areas. Thus, many companies that have a strong impact on the economy of Luxembourg but who cannot patent inventions are excluded from this study. This includes companies involved in the financial industry and other services. A further study on brands would update the studies initiated in 1999 by Allegrezza and Guarda-Rauchs by relying on the work begun in Paris in 2009 by the Working Group of the OECD dedicated to brands and it would also intensify collaborations with Benelux researchers and experts from the Benelux Office of intellectual property.

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9.5 Evaluation of the Luxembourg 2020 reform plan with the LSM model

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9.5.1 Short summary

Luxembourg has published a detailed and promising reform plan in the context of the Europe 2020 Strategy. A number of measures in this reform plan, or the expected consequences of these reforms, can be introduced in a stochastic general equilibrium model like the one available to the Grand Duchy of Luxembourg called LSM ("Luxembourg Structural Model").

Some model parameters can be modified for this purpose, or sequences of shocks imposed on LSM. The interest of such an exercise, conducted in this chapter, is to identify the macroeconomic impacts of microeconomic structural reforms in an analysis framework that has a theoretical base.

9.5.2 Introduction

Recovery from the crisis in European countries can only be done in a coordinated manner. Moreover, even the countries which are the least directly affected by the economic and financial crisis are indirectly affected through the difficulties of their neighbours, particularly within the Eurozone. It is in Luxembourg interest that the strategy, launched by the European Council in the first half of 2010, known as the Europe 2020 Strategy, by reference to the medium-term horizon effects being expected, be successful.

Each country must adapt this EU Strategy [271] into a set of objectives and practical measures taken at national level, and Luxembourg has produced its National Reform Programme (NRP), following consultations between the Government and social partners, in several steps. In the first half of 2010 a first set of measures to restore the cost competitiveness of the country and to release growth, and in the fall of 2010 a more comprehensive plan was presented, like other European countries did, giving an overall consistency to many economic policy and structural measures. This plan was then subject to extensive consultation, including the national representatives.

[271] See European Commission (2010)

The general line of this package is cost control, innovation, employability and participation in the labour market, reducing poverty, financial stability and major macroeconomic equilibriums and the environment. It is finally about adapting the theme of **"smart, sustainable and inclusive growth"** into five major goals set at the European Council of June 2010, that each Member State shall address, taking into account national conditions. The corresponding document was published in April 2011 (Government of the Grand Duchy of Luxembourg, 2011).

It is difficult to model such a set of measures with sufficient detail, taking into account interactions, reactions of agents, and their expectations. This chapter has a more modest goal. It offers a general equilibrium simulation (i.e. taking into account the interactions) of a set of key measures, taken individually or jointly and focuses on the results of their implementation on the macroeconomic variables of interest.

The first experiment focuses on a temporary or permanent decline in real wage costs, as discussed in the section on macroeconomic surveillance of the 2020 Luxembourg reference document. The target in this document is that "the development of labour costs and wage-setting mechanisms are employment-friendly"[272]. The temporary suspension (until October 2011 instead of May 2011 if indexing had been preserved) of the automatic indexation of wages decided by the Government in September 2010 was along these lines. This measure was completed with a review of the situation with the possibility to extend the transitional arrangement in 2012. From a technical perspective, we look at the decline in real wages resulting from a parameter change of unions behaviour from the wage bargaining towards hiring. This new parameter is calibrated to achieve a 1% decrease in labour costs.

The second experiment concerned the labour supply, the first of the European goals identified at the June 2010 European Council. Let us recall the EU goal: "75% employment rate of women and men aged 20-64 years, through greater participation of young people, older workers and unskilled workers, as well as better integration of legal migrants among other means". The transposition in Luxembourg of this goal[273] is to reach an employment rate of 73% in 2020 and 71.5% in 2015. The idea here is to increase the employment rate of the resident labour force, with the relevant policy targeting particularly young people entering the labour market and older workers.

[272] Grand-Duchy of Luxembourg Government (2011), p.9

[273] Op. cit. p.15

The difficulty of course is that this differentiation by age is not present in LSM and it is assumed simply to model a policy that increases the activity rate, knowing that such a policy influences particularly both ends of the age structure of the workforce. The action already mentioned on the labour cost goes in this direction, for a given labour supply (as in LSM). But the decline mentioned above passed through the channel of real wages. Another channel, that of productivity, can be examined. In order to act on the employment of residents, this effect must be differentiated between resident and non-resident labour in favour of the first of these two categories. Productivity gains should be more important to residents, all else equal. For simplicity we will consider an increase in productivity of the only resident workforce resulting for example from an improvement of the education system for initial training or continuing education, or from any other policy for employability.

The third experiment concerns more specifically the accumulation of human capital, whether with basic or advanced training. Here we find the fourth European goal, consisting of "improving education levels, particularly by focusing on reducing the dropout rate to less than 10%, and taking up to at least 40% the number of people aged 30 to 34 years who graduated from secondary education or achieved an equivalent level of education." These quantified targets are set identically in the strategy of Luxembourg, but the one relating to secondary education is shown in relation to the resident population[274]. Insofar as such policies carry costs and involve investment in infrastructure or more generally in public investment, we are redeploying a portion of public spending on consumption or operating transfers to these investments. The operation is instantaneously neutral on public finances, but can improve revenue in the long term if it raises the potential rate of growth of the economy. To give a lower bound of the expected gains of such redeployment, however, we calibrate this policy without considering these effects *ab initio*.

The final policy concerns the expenditure on Research and Development (R&D) and more generally on policies creating the conditions for stimulating research and innovation by reference to the second European goal. At the European level, it is to "improve the conditions of research and development (R&D), particularly in order to increase the cumulative level of public and private investment in this sector to 3% of GDP; the Commission will develop an indicator on the intensity of R&D and innovation." The rate used for Luxembourg is lower due to national characteristics (in the range of 2.3% to 2.6%), but the goal remains the same and should be obtained in favour of a set of measures likely to strengthen the link between research, higher education and innovation[275]. These policies are summarized by a growth of labour productivity and of total factor productivity. This means that gains in labour productivity are not achieved by capital intensification, but by a more efficient use of production factors. But we know that technical progress also depends on the variety of goods and services that companies can use to produce intermediate consumption. A wider variety of supplies actually means better tailored intermediate supplies and business services to the specific needs of each downstream firm, and greater competition among suppliers. Another possible interpretation is that R&D efforts result in the emergence of new varieties.

[274] Op. cit. pp.28 et 30

[275] Op. cit. p.20

Finally we insist that this work is based on a model. This model is used to guide thinking, to understand the logical links between causalities, to identify and understand unexpected impacts, taking into account all interactions within the economy. Like a road map, a model is simplistic. The price of a gain in understanding is a loss in information. A map does not represent the landscape the same way that LSM gives a schematic representation of the economic and social reality of Luxembourg. But just as a map is essential to avoid getting lost on the way, a model is essential to understand the complex implications of new policies to be implemented as part of the new European strategy for growth. Two implications are brought to light in this exercise.

First, it is crucial to take into consideration the microeconomic behaviour of the agents and the way of functioning of markets. In particular the expected reactions from the labour market can have consequences that can eventually move us away from the objective. We also show that the combination of different structural policies should be preferred. So there is a clear economic rationale to engage in a program of structural reforms for Luxembourg.

From the perspective of the political agenda, such combined reforms are probably the only one acceptable to the population in a difficult economic environment, negatively affecting businesses, their employees and the public finances. The consensus is all the more necessary as such structural reforms will have a longer-term impact than the political agenda. So we see these results as encouraging to the renewal of negotiations between social partners and the government on the basis of a rigorous economic reasoning. This is especially necessary when the measures taken will have long-term effects and can only be assessed in a time frame that is longer than the political agenda.

The rest of the chapter is organized as follows. Section 2 presents the LSM model in a non-technical way. Section 3 then presents the different policy simulations carried out and discusses the results. Two important dimensions will be highlighted on this occasion. The first concerns the difference between temporary and permanent policies in place. Of course, even transitional policies can have lasting effects. The second distinction concerns the time span considered for the effects of the implemented policies: short or long-term. The last section concludes.

9.5.3 Mechanisms and assumptions of the Luxembourg Structural Model (LSM)

First recall that the simulation results presented below are based on a very particular type of macroeconomic model, and this from two perspectives. LSM belongs to the Dynamic Stochastic General Equilibrium, or DSGE, a model category which incorporates the latest developments. The second characteristic of the LSM is to have been developed specifically for a small open economy, belonging to a monetary union with a strong specialization in services, with persistent deficits of competition in the domestic market and that is equipped with a specific labour market (role of social partners, labour market segmentation, and cross-border commuters). The choice of these assumptions is dictated by the work already done on Luxembourg and its competitiveness, as well as successive versions of presentations to economic experts in the Grand Duchy and to social partners alike. More technically, the calibration of the model (the choice of basic parameters) has aimed to reproduce the macroeconomic equilibrium of the economy of Luxembourg. It is therefore a model with a strong theoretical content, reproducing the functioning of the economy of Luxembourg from the choice of a set of behavioural parameters. Such a strategy is different from the econometric estimation of the major macroeconomic relationships, or from the construction of a general equilibrium model based on the observed flows between agents. Such instruments do exist in Luxembourg, and therefore the LSM provides further insight into the results of work done with them. A full description of LSM is given in an issue of "Perspectives de Politique Economique" (Fontagné L., Maffezoli M. and M. Marcellino, 2009) and in a recent scientific article (Deak, Fontagné, Maffezzoli and Marcellino, 2010) to which the interested reader may refer.

There are four types of agents in the LSM model: households, businesses, government and unions. Households have a finite lifetime, each period consisting of a set of overlapping generations with different characteristics. Each household maximizes a utility function on an inter-temporal basis conditioned by a certain budget constraint. This optimization determines the expenditure on consumer goods (durable and nondurable) and the demand for assets. Individual decisions of households are then aggregated to obtain the aggregate consumption and the asset demand. Household incomes come first from work, that is to say the wage. Employees delegate to trade unions, which negotiate with companies to improve their salary bargaining power. Households also receive income transfers from the government and unemployment benefits if the outcome of negotiations on the labour market is unfavourable. Households pay taxes. Finally households hold capital in companies through a financial intermediary. Decisions of companies are guided by the profitability of their investments.

Government revenue comes from taxation of labour income (burden on households and businesses), taxation of capital and consumption. Public spending is related to unemployment benefits, other social transfers to the resident population and non-resident workers, public consumption, and finally public investment. This last category of government expenditure has a positive effect on total factor productivity, that is to say, it improves both the efficiency of labour and capital. The state budget is not balanced in each period: the successive surpluses and deficits, combined with changes in interest rates, determine the dynamics of sovereign debt, which is funded by public bonds.

There are two types of businesses operating in the sector of intermediate goods and services and that of final goods and services. Downstream production occurs in conditions of perfect competition. As we have already seen, the greater variety of intermediate consumption (domestic or imported) is a source of efficiency in this sector. The final output can be differentiated without cost for purposes of consumption or investment. Being a general equilibrium model, conditions such as equality between the demand for intermediate goods and services by downstream firms and the supply of these goods and services upstream must be respected. It's the same for the final offer and demand for consumer goods and investment by households, businesses, government and the rest of the world.

Upstream producers of intermediate goods and services produce in monopolistic competition by combining capital to two types of work, resident and non-resident. This choice of modelling aims at accounting for the segmentation of the Luxembourg labour market between resident workers and cross-border workers. The evolution of total factor productivity is partly exogenous, as it represents technical progress. But it is also changing endogenously, based on public investment. Companies optimize their demand for capital to maximize their profit based on the production techniques available, the cost of capital and wages. The cost of capital is the result of supply and demand for capital at the macroeconomic level. The wage level is the result of negotiations initiated by the upstream companies and the trade unions representing the employees. Finally let us mention that there are three types of intermediate goods and services upstream: exchangeable and produced in Luxembourg, imported, non-exchangeable. Luxembourg producers downstream therefore use both local varieties and imported varieties; the first may or may not be rivalled in the world market. Some companies specialize in trading and are satisfied importing foreign intermediate varieties by making a margin. The economy is modelled as open to the rest of the world, and the current account, the real exchange rate and net foreign assets evolve endogenously.

The LSM model is fully calibrated. This choice is partly due to the insufficient availability of quarterly data and partly to the complexity of the model. But the chosen parameters can reproduce the major macroeconomic balances of Luxembourg. The details of this calibration are given in the article already mentioned (Deak, Fontagné, Maffezzoli and Marcellino, 2010) to which the interested reader may refer.

As this brief presentation showed, a model stems from a set of simplification choices on the one hand, and features concerning the subject issue on the other. The choice to focus on the functioning of the labour market, on the technical progress, on budget and current account balances, on the forces of competition, and on the decision-making in an inter-temporal perspective, makes the LSM model particularly well suited to current economic conditions and to the analysis of expected consequences of the new directions of European structural policies. However, the results of our simulations should be interpreted in qualitative rather than quantitative terms. This is why we report later in this chapter signs of changes in variables of interest (their direction and magnitude), rather than exact values (which we hold available to interested readers). What is ultimately important to the policymaker and the social partners is the logical sequence of expected effects of a shock given through economic policy. Thanks to its structure being centred on a small number of agents whose decisions are based on meticulously described microeconomic behaviour (households, businesses, unions); LSM provides an innovative and essential perspective to understanding the challenges of implementing new European structural policy guidelines in Luxembourg.

9.5.4 Policy impacts of the 2020 agenda

In this section we report simulation results of the 2020 agenda carried with the LSM model. The effects of different economic policies on the variables of interest are reported in terms of deviation, in percentage, relative to the reference trajectory of the economy of Luxembourg in the absence of such policies. By convention we use the notation +, + + and + + + for variations from 0 to 0.5%, 0.5% to 1% and 1% respectively. The ratings -, --, --- have a similar interpretation for the negative changes. We are interested in both variations of short and long term (up to 20 years even if the LSM provides longer-term outcomes) in response to simulated economic policy shocks. Details of these simulations are available upon request.

a) A decrease in labour costs in Luxembourg

As we have already explained, a decrease in labour costs in Luxembourg can be achieved through wage moderation or increased productivity. The temporary stalling of the indexation of nominal wages is in line with the first effect. It should result in an increase in labour demand, hence employment and therefore the distribution of wages. We can also analyse this measure in light of developments in price competitiveness in recent years (except 2010)[276], as a bulwark against further deterioration[277]. Such action favours employment at the expense of wages, and increases the probability of finding a job, or of finding a new job from an unemployment situation. Its effect on consumption will be different at the individual level (for employees with a job) and at the macroeconomic level. For the Luxembourg economy as a whole, it is possible that the increase in employment outweighs the effect of wage moderation and will result ultimately in an increase in payroll and thus in private consumption and production. LSM is used to represent the magnitudes of these different channels and therefore to know the direction of the net effect of such a measure.

In order to achieve this simulation we change the preference of the trade unions between wages and jobs to the point where real wages fell by 1% (this figure was chosen to facilitate the results reading and is not in itself, of course, an economic policy objective). The impact of the 1% decline in real wages on different macroeconomic variables of interest is given in Table 1. Panel A focuses on a temporary policy (the one that was chosen here for two years by hypothesis), and panel B to a permanent policy.

The results of our simulations show that employment reacts as expected, for both residents and non-residents, to lower labour costs. Payroll increases and with it consumption, which responds to the matter raised in the previous paragraph. Profits increase, in turn, bringing with them investments. Net exports (exports minus imports) of Luxembourg decline, due to stronger internal absorption. The previous developments have a positive impact on government revenue and therefore on the budget, especially as the costs of unemployment benefits are reduced. The government investment expenditure increases, ultimately resulting in improved productivity and therefore potential growth.

The comparison of the effects of a temporary implementation of this mechanism versus a permanent implementation shows that profits are higher when implementation is permanent but are still present in case a temporary measure. The sacrifices made by the employees in the legal framework chosen are not in vain.

Ultimately, this is good policy for employment and aggregate consumption and for growth.

[276] See Ministry of Economy and Foreign Trade (2011), Chapter 6 and the Ministry of Economy and Foreign Trade (2010), Chapter 4. See also European Commission (2010), Section III.9

[277] The Central Bank of Luxembourg predicts that the improvement observed in 2010 will be only transitory, further deterioration is expected in 2011 (Central Bank of Luxembourg, 2011, chapter 1), p.16

b) Increasing employability

Luxembourg's situation in terms of unemployment rate is enviable, compared to what is seen in its European neighbours, even though there has been deterioration in recent years. However, the specificity of the labour market, characterized by a very strong presence of non-resident employees, makes such a comparison hazardous. It is not excluded that some adjustments to the Luxembourg labour market, during the low part of the cycle, is carried over the border areas and so into other countries. Conversely, during cyclical upswings, we observe that a significant portion of job creation is of benefit to non-residents. Thus Luxembourg must rely more on structural policies that promote employability than on the economic cycle to improve the performance of the labour market for residents. Under the LSM model, such policies (such as improved performance of the education system) result in a relative improvement in employee productivity of resident in comparison with non-resident employees.

Table 2 shows the impact of increased productivity of resident employees, that of non-residents staying at its reference level. The first effect of this increased productivity is naturally higher wages for residents. Due to the particular functioning of the labour market (wage bargaining is delegated to trade unions), the salaries increase also for non-residents, productivity unchanged. The relative cost of a class of employees compared to the other causes a rise in the employment of residents and a drop for non-residents. The negative impact on non-residents depends on the degree of substitutability between the two categories of employees[278]. It also depends on the very restrictive assumption made about their productivity. Insofar as the 2020 Strategy is a European Strategy, we can assume that the productivity of non-residents will also increase. Anyway residents' income increases as well as consumption and production. The investment is in turn driven by production increase.

c) Redeployment of public spending towards investment

With the crisis, public spending has supported growth in the short term but this is a problem in the long term. If the exclusion effect of private spending (including investment) by government spending is not a concern during the low phase of the cycle (and low interest rates), all the more during a deep crisis, the same cannot be said for the long run. The partial redeployment of public spending towards investment, infrastructure, education and more generally the public goods necessary for growth, may raise potential growth and participate in solving many problems of our economies. This question deserves consideration, even if it is less pronounced in Luxembourg than in many of its neighbours (although the long-term issues are not absent). In fact, we probably have the most promising policies within the 2020 Strategy, particularly in the current context with the pessimism surrounding growth in the Eurozone.

[278] See Allegrezza and Guarda-Rauchs (1997), Guarda (2000), Pieretti (2002), and Guarda-Dimaria Rauchs (2006)

Table 3 presents the results in the case of a reallocation of public consumption spending to investment spending with social transfers and budget unchanged. The increase in investment spending increases total factor productivity and thus supports growth. The increase in productivity goes partly in wages, which is favourable to income (employment declined very moderately and payroll increases in the end) and consumption. Another part of the productivity gains goes in profits, which are distributed or used in income for investment. The state revenues are increasing due to the increase of potential growth, and a deterioration in net exports is observed. The process is self-sustaining (revenue increases are partly reinvested in public investment, the emergence of new varieties strengthens the Total Factor Productivity) so that the results are similar whether one makes the assumption of a temporary or a permanent redeployment of public spending.

However this structural policy does not have only positive effects, as employment declines, albeit moderately. We will see in the following experiment that this can be fixed by combining the policy examined here with lower labour costs that were already mentioned.

d) Knowledge society and lowering labour costs

The reorientation of public spending towards investment expenditure relates also to spending on R&D, even if this is not strictly speaking an investment, from an accounting perspective (funding for laboratory research is largely an operating expense). More research, and especially more effective research, is at the heart of the 2020 Strategy. Rather than examining public investment spending in general, we wish here to focus on that with a direct impact on R&D. Let us analyse the impact of a policy for improving the performance of research, so that the varieties available in the economy increase by 1%. This is done with a constant budget dedicated to research, so this is about making it more efficient (better organization, better incentives given to researchers, etc...). The result of this policy is studied in Table 4. More variety means not only varieties of intermediate goods and services better tailored to the specific needs of each company, but also greater competition in the market for goods and services, at the expense of margins but for the benefit of customers.

To understand the consequences of this policy, a detour into the functioning of the labour market is necessary. Trade unions and companies negotiate the sharing of profits, and reducing profits has a negative impact on real wages. In return, since labour costs drop, employment and payroll increase with it.

The production of additional varieties requires capital to equip newly hired employees. The investment increases and the total consumption decreases slightly. Initially declining profits and declining consumption reduces tax revenues, a disappearing phenomenon by the second year to make way for an improvement in public finances. Conducive to innovation, this policy brings less growth than is generally hoped. The reason is related to the functioning of the labour market. We illustrate this mechanism in Table 5 that focuses on the effect of a permanent 1% increase in Total Factor Productivity. Wages and profits increase. However, labour demand and hence employment decline, despite the increase in productivity. GDP growth comes largely from the increase in consumption driven by wages (payroll distributed does not drop). Unemployment benefit costs rise at the expense of public finances, but less than the revenue. The effect is therefore in favour of balanced public finances in the end. But the increased efficiency in the use of factors of production is not accompanied by the expected increase in employment.

Our last simulation combines a permanent increase of 1% of the total factor productivity with a 1% decrease in labour costs. This policy results in an increased distribution of income in a context of employment growth. The strong increase in payroll and benefits is favourable for consumption, investment and ultimately to government revenue. The reduced expenditure on unemployment benefits strengthens this positive effect on public spending whilst releasing new resources for state investment expenditures supporting future growth. Ultimately, the only negative effect is for net exports due to increased internal absorption.

9.5.5 Conclusion

This demonstrates the interest of using a micro-founded macroeconomic model for ex-ante analysis of impacts to be expected from a program of structural reforms such as the 2020 Strategy.

The first important result of this exercise is that taking into account the behaviour of microeconomic agents (households, businesses, unions) and their interaction on all markets (markets for goods and services, financial market, labour market, etc.) is important to realize fully the impact of such measures. In particular the expected reactions of the labour market have a chain of implications that may eventually deviate considerably from the original objective, as we have seen with isolated innovation policy lines.

The second result is that given these reactions and interactions, the combination of different structural policies should be preferred. In particular, the cost of wage moderation, in terms of purchasing power, when implemented alone, may be acceptable only very temporary. Conversely, a policy oriented towards innovation and productivity will have very beneficial effects on the purchasing power of wages, but will be offset by an increase in unemployment if it is implemented on its own. We have shown that the combination of these two policies allowed to gain in terms of employment, growth and purchasing power. So there is a strong economic logic to encourage a set of structural reforms in Luxembourg, which should produce by their combination the desirable effects expected from it.

We believe that such a combination of policies is the only one that could be successful, and the only one acceptable by the people in a difficult economic environment, negatively affecting businesses, their employees and the public finances. Beyond the technical aspects of the simulations, this chapter constitutes an encouragement to the renewal of negotiations between social partners and government on the basis of a comprehensive economic thinking. This is especially necessary when the measures taken must have long-term effects and can only be assessed in a time frame longer than the political agenda.

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Table 1-A
Impact of a permanent 1% decline in real wages

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+++	+++	+++	+++	+++	+++	+++
Consumption	+++	+++	+++	+++	+++	+++	+++
Investment	++	++	++	+++	+++	+++	+++
Net exports	---	---	---	---	---	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	+++	+++	+++	+++	+++	+++	+++
Employment of non-residents	+++	+++	+++	+++	+++	+++	+++
Profits	+++	+++	+++	+++	+++	+++	+++
Salaries of non-residents	--	--	--	--	--	--	-
Salaries of residents	---	---	---	--	--	--	--
Payroll, non-residents	+++	+++	+++	+++	+++	+++	+++
Payroll, residents	+++	+++	+++	+++	+++	+++	+++
Global Productivity of Factors	+	+	+	+	+	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 1-B
Impact of a temporary decrease of 1% in real wage

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+++	+++	+	+	+	+	+
Consumption	+	+	+	+	+	+	+
Investment	+	+	+	+	+	+	+
Net exports	---	---	-	-	-	-	-
Government deficit	---	---	+++	+++	+++	+++	+++
Employment of residents	+++	+++	-	-	-	-	-
Employment of non-residents	+++	+++	-	-	-	-	-
Profits	+++	+++	+	+	+	+	+
Salaries of non-residents	--	--	+	+	+	+	+
Salaries of residents	---	---	+	+	+	+	+
Payroll, non-residents	+++	+++	+	+	+	+	+
Payroll, residents	+++	+++	+	+	+	+	+
Global Productivity of Factors	+	+	+	+	+	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 2
Impact of a permanent 1% increase in productivity of residents

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+	+	+	+	+	+	+
Consumption	++	++	++	++	++	++	++
Investment	+	+	+	+	+	+	+
Net exports	---	---	---	---	---	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	+	+	+	+	+	-	-
Employment of non-residents	--	--	--	--	--	--	--
Profits	++	++	++	++	++	++	+++
Salaries of non-residents	+	+	+	+	+	+	++
Salaries of residents	++	++	++	++	++	++	++
Payroll, non-residents	+	+	+	+	+	+	+
Payroll, residents	-	-	-	-	-	-	-
Global Productivity of Factors	+	+	+	+	+	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 3-A
Impact of a permanent increase (1% of GDP) in public investment, with a constant budget

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+	+	+	+	+	+	+
Consumption	+	+	+	+	+	+	+
Investment	+	+	+	+	+	+	+
Net exports	-	-	-	--	--	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	-	-	-	-	-	-	-
Employment of non-residents	-	-	-	-	-	-	-
Profits	+	+	+	+	+	+	++
Salaries of non-residents	+	+	+	+	+	+	+
Salaries of residents	+	+	+	+	+	+	+
Payroll, non-residents	+	+	+	+	+	+	+
Payroll, residents	+	+	+	+	+	+	+
Global Productivity of Factors	+	+	+	+	+	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 3-B
Impact of a permanent increase (1% of GDP) in public investment, with a constant budget

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+	+	+	+	+	+	+
Consumption	+	+	+	+	+	+	+
Investment	+	+	+	+	+	+	+
Net exports	-	-	-	--	--	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	-	-	-	-	-	-	-
Employment of non-residents	-	-	-	-	-	-	-
Profits	+	+	+	+	+	+	++
Salaries of non-residents	+	+	+	+	+	+	+
Salaries of residents	+	+	+	+	+	+	+
Payroll, non-residents	+	+	+	+	+	+	+
Payroll, residents	+	+	+	+	+	+	+
Global Productivity of Factors	+	+	+	+	+	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 4
Impact of a permanent 1% increase in the number of varieties

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+	+	+	+	+	+	+
Consumption	-	-	-	-	-	-	-
Investment	+	+	+	+	+	+	+
Net exports	+++	+++	+++	+++	+++	+++	+++
Government deficit	+++	---	---	---	---	---	---
Employment of residents	++	++	++	++	++	+	+
Employment of non-residents	++	++	++	++	++	+	+
Profits	--	--	--	--	--	--	--
Salaries of non-residents	-	-	-	-	-	-	-
Salaries of residents	-	-	-	-	-	-	-
Payroll, non-residents	+	+	+	+	+	+	+
Payroll, residents	+	+	+	+	+	+	+
Global Productivity of Factors	-	-	-	-	-	+	+

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively, and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 5
Impact of a permanent increase of 1% of Total Factor Productivity

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	++	+++	+++	+++	+++	+++	+++
Consumption	+++	+++	+++	+++	+++	+++	+++
Investment	+	+	+	+	+	+	++
Net exports	---	---	---	---	---	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	--	--	--	--	--	--	--
Employment of non-residents	--	--	--	--	--	--	--
Profits	+++	+++	+++	+++	+++	+++	+++
Salaries of non-residents	+++	+++	+++	+++	+++	+++	+++
Salaries of residents	+++	+++	+++	+++	+++	+++	+++
Payroll, non-residents	++	++	++	++	++	++	++
Payroll, residents	++	++	++	++	++	++	++
Global Productivity of Factors	+++	+++	+++	+++	+++	+++	+++

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively,
and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

Table 6
Impact of a permanent increase of 1% of Total Factor Productivity combined with a 1% decrease in labour costs

Variable	1 year	2 years	3 years	4 years	5 years	10 years	20 years
Gross Domestic Product	+++	+++	+++	+++	+++	+++	+++
Consumption	+++	+++	+++	+++	+++	+++	+++
Investment	+++	+++	+++	+++	+++	+++	+++
Net exports	---	---	---	---	---	---	---
Government deficit	---	---	---	---	---	---	---
Employment of residents	+++	+++	+++	+++	+++	+++	+++
Employment of non-residents	+++	+++	+++	+++	+++	+++	+++
Profits	+++	+++	+++	+++	+++	+++	+++
Salaries of non-residents	+	+	+	+	+	++	++
Salaries of residents	+	+	+	+	+	++	++
Payroll, non-residents	+++	+++	+++	+++	+++	+++	+++
Payroll, residents	+++	+++	+++	+++	+++	+++	+++
Global Productivity of Factors	+++	+++	+++	+++	+++	+++	+++

Note: +, ++ and +++ for variations from 0 to 0.5%, 0.5% to 1% and more than 1%, respectively,
and -, --, --- similarly for negative variations.
Source: LSM, authors' calculations

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 cross-border 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[LISBON]

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 in the labour force 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 non-produced 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-6 classification system as follows: Agriculture, Forestry and Fishing; Industry, including energy; Construction; Trade, Auto Repair, HORECA, Transportation and Communication; Financial activities, Business services, Real estate rentals and Other activities and services. 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. EUROSTAT 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) LISBON

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. For these reasons, the EU has set the objective of achieving 70% employment by 2010 as part of its Lisbon Strategy. The objective for female employment in 2010 is 60%.

B4 B5 B6 Employment rate of persons aged 55-64 (T, H, F) LISBON

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 long-term 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 LISBON

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 in the labour force 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

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.

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

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

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 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 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 150 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 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 growing 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

This indicator lists the lowest price DSL subscription available in September 2002 and compares it to the lowest cost subscription available in November 2004, in USD with tax included. Many applications in the information society depend on high speed data transfer systems. A market that is receptive to the offer of broad band connections promotes the spread of information and simultaneously allows consumers and companies, especially PME, to take advantage of increased online services.

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 (not included in the TBCO)

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 quality 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 quality 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 (not included in TBCO)

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 self-employed contractor are perceived.

F2 Self-employed jobs as a percentage of total employment

This indicator records self-employed jobs as a percentage of labour 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.

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. How efficiently resources are used must be evaluated in terms of academic results and levels of education attained.

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

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 qualified 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 qualified 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 (not included in the TBCO)

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 (not included in the TBCO)

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 qualified 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 LISBON

The internal R & D expenditure, DIRD, quantifies 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 Lisbon Strategy, the objective to be met in internal R & D expenditures is 3% by 2010.

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

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 in a working economy. Through this indicator, the number 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 research programs in a country and is different from the count of researchers that shows the pool of researchers in jobs.

H6 Scientific publications per million inhabitants

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 non-commercial 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.

I2 At risk of poverty rate after social transfers LISBON

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.

I3 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.

I4 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.

I5 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.

I6 Serious work accidents

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 and the 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) LISBON

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 quotas of greenhouse gas emissions risks harming the cost-competitiveness 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 LISBON

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 renewables in gross final energy consumption (indicator to measure the share of renewable energy in the final consumption of energy, which is under development)
EU2020-5	Energy intensity of the economy (proxy indicator for Energy savings, which is under development)
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