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2010 COMPETITIVENESS REPORT

Looking to smart, sustainable and inclusive growth

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

2010 COMPETITIVENESS REPORT

Looking to smart,
sustainable and inclusive growth

The "Perspectives de Politique Économique" series includes reports, studies, research results or summarys 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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2010 Competitiveness Report

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Preface

The recent economic and financial crisis has had unprecedented worldwide repercussions and has nullified years of economic and social progress. The immediate priority for many countries throughout the world is therefore to emerge from it successfully. In the interim, the world is changing rapidly and long-term challenges, such as globalisation are intensifying. Over the last few years, the shift in production capacities and of markets has caused a new multi-polar world to emerge, accompanied by a different power and wealth environment. Western economies are coming up progressively more against emerging economies, which have been increasing their weight in the world economy for some years.

Luxembourg must enter a period of transformation in order to overcome the consequences of this crisis, the structural weaknesses of the country and the intensifying challenges on the global level. However, confronting these challenges does not come down solely to reducing costs. We must concentrate on innovation, productivity, quality and reactivity. These are the foundations of both the Lisbon Strategy and its successor, the Europe 2020 strategy, to which Luxembourg fully subscribes through its national «Luxembourg 2020» plan. The LU 2020 strategy constitutes a new stage in economic policy governance, in as much as budget policy, through the Stability and Growth Pact, will hinge more closely on the national reform programme to achieve smart, sustainable and inclusive growth.

Along these lines, I submitted sixty five different proposals to the Tripartite Coordination Committee last April to ensure, maintain, develop and market the competitiveness and general attractiveness of Luxembourg to current economic players and potential foreign and local investors on the market. These are intended to contribute to keeping and creating jobs, to generate the financial resources required by the government to carry out projects benefitting the public and to ensure financing of the social protection system. The competitive position of Luxembourg in upcoming months and years will depend heavily on the implementation of this type of economic policy.

The recent agreements reached within the Tripartite Coordination Committee have resulted in a pragmatic solution for preserving social peace while helping us prevent a surge in labour costs and inflationary pressure.

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 brings into play elements of long-term structural sustainability that take into account a wide range of economic, social and environmental indicators. In the discussions that concern us at present, the government and some of the social partners resort generally to this interpretation of the term «competitiveness». In contrast, companies very rightly concentrate on cost competitiveness. While it may be true that Luxembourg has progressed in terms of competitiveness in the broad sense, it must still be acknowledged that it is losing ground in the area of cost competitiveness. The rankings offered by certain large international institutions that measure competitiveness in the broad sense are objectively courting criticism since they depend on a subjective selection of the parameters being measured. Despite this, economic policy makers study them closely. Any drop in these types of indicators is detrimental to the attractiveness of a country as an investment destination.

I have therefore requested the *Observatoire de la Compétitivité* to deepen its analysis to all the dimensions of competitiveness, especially with regard to the short term.

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

Jeannot KRECKÉ
Minister of the Economy and Foreign Trade

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1 The *Observatoire de la Compétitivité*: 2009-2010

1.1 Role and Missions of the *Observatoire de la Compétitivité*

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 analyzing 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, analyze 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 useful to arriving at 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 such as the EU Council, the OECD, etc. on competitiveness.
- Coordinate the work and drafting of the National Reform Programme for Luxembourg within the framework of the European strategy for growth and jobs, 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 do 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 see: 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 Jobs 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, the ad hoc "Lisbon Network" 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. The second tri-annual cycle of 2008-2010 ended in 2010, along with the Lisbon strategy. Its successor is the Europe 2020 strategy[3].

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 employment, ensure stability of prices and maintain positive trends in the areas of foreign trade and public finances.

This becomes particularly important during periods of structural crisis. Thus, competitiveness is a constant in Luxembourg economic policy considerations. The Government analyzes and models the relationships between competitiveness indicators, especially those in the Competitiveness Scoreboard, to evaluate the effectiveness of reforms implemented as part of its national reform program."

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

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

1.3 Events and publications in 2009-2010

One objective of the *Observatoire de la Compétitivité* is to keep both economic policy players and the general public informed on the subject of competitiveness. To achieve this, the Observatoire uses several communication methods, such as setting up public colloquia and 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 serves to launch public deliberations on the main themes that characterise the competitiveness of the Luxembourg economy and the Lisbon/Europe 2020 Strategy. Setting up public events is an integral part of this responsibility.

Morning debates: The 2009 Competitiveness Report[4]

The *Observatoire de la Compétitivité* updated its statistical database at the "Morning Competitiveness Debate", set up in November 2009 and bringing together representatives of the social partners for a critical forum on the 2009 Competitiveness Report. This made it possible to respond to a certain number of critiques that had been formulated concerning changes in unit labor costs.

Seminar on the LSM (Luxembourg Structural Model): Overview and practical applications. What has the crisis changed? How do we prime the post-crisis period? »[5]

In November, the *Observatoire de la Compétitivité* organised a seminar entitled, "Seminar on the LSM (Luxembourg Structural Model): Overview and practical applications. What has the crisis changed? How do we prime the post-crisis period?".

During this seminar, the *Observatoire de la Compétitivité* presented its new LSM structural model of the Luxembourg economy prepared by professors Lionel Fontagné and Massimiliano Marcellino. The LSM model is used to produce simulations and understand the complex direct and indirect consequences of structural policies and the actions of the social partners, then to help the active forces in the Luxembourg economy to better pinpoint the measures most likely to prepare the economy for exiting from the current crisis.

4 For more details see: http://www.odc.public.lu/actualites/2009/11/Matinee_debat09/index.html

5 For more details see: http://www.odc.public.lu/actualites/2009/11/LSM/index.html

Professors Fontagné and Marcellino explained the functioning and the purposes of this tool and then presented the results of the initial simulations concerning the impact of various economic policy measures on the Luxembourg economy. Different economic policy measures intended to mitigate the negative impacts of the economic crisis were simulated, such as those dealing with social transfers, unemployment benefits, payroll contributions and the extent of competition on different markets.

Luxembourg Economy Days 2010[6]

The Luxembourg Economy Days 2010, set up by the Ministry of the Economy and Foreign Trade, the Chamber of Commerce and the FEDIL Business Federation, in collaboration with PricewaterhouseCoopers, took place in February, 2010. This Economy Days cross-border economic forum drew over 350 people to the Chamber of Commerce.

Luxembourg and the Greater Region:
A vision at the service of economic development

Many companies gave an informed and documented perspective of their impression of the positive economic, scientific, human and cultural features of the Greater Region. Two avenues of approach were highlighted.

Sixty-two percent of the persons questioned in the room felt that developing the economic sphere of the Greater Region should be considered an important priority by policy makers. (The question asked was: "To what extent is it important for policy makers to concentrate on developing the European Economic Area?" The sampling was non representative).

The Greater Region has essential assets. These include innovative entrepreneurs, renowned scientific institutions, mainly outside of the Grand Duchy and shared specific skills in the areas of materials, mining and forestry. There are synergies to be discovered in key sectors of economic development. What is required, is to work with what exists on the 65,000 square kilometres of land in the areas of health, logistics, research, eco-technologies and above all within the numerous clusters existing for some years now.

To promote synergies, people have to meet and exchange views. It is fundamentally necessary to develop the infrastructures, both in the areas of transportation and training, to meet the daily requirements of entrepreneurs and major corporations.

One of these priorities must be research. The Greater Region has a pool of 25,000 researchers, the equivalent of the number available in Boston. Public research centres in the Greater Region should collaborate more closely with each other and the private sector on closely related themes.

[6] For more details see: http://www.odc.public.lu/actualites/2010/02/Journees_economie_2010/index.html

A powerful strategic fit could be achieved by implementing a joint clustering policy operating within a network in the Greater Region, which would likely result in more effective action as well. For example, a cluster concentrating on health issues operates in all regions of the Greater Region. The same is true with regard to materials and eco-technology sectors. Of the persons present at the conference, 39% deemed the joint cluster policy a very important path for policy makers to embark upon in order to facilitate development of the Greater Region. (The question asked was: "What priority action should policy makers implement to facilitate the development of the Greater Region? The list of possible responses, with respondents' choices: A promotion policy (22%); Financing tools (20%); An international research and training structure (19%); A joint cluster policy 39%); The sampling was non representative).

One point brought up repeatedly cantered on the difficulty of "exporting" activities beyond national borders because of enduring national regulatory barriers. The reality of the single market must be perfected and, from this perspective, the Greater Region area may prove to be an area for testing and wide-scale exploitation of the possibilities offered by developing freedom of movement of persons, capital, goods and services and, more and more, of knowledge.

Luxembourg and the Greater Region's strategic location in the heart of Europe and its multi-lingual populations make them naturally attractive to international corporations.

An image deficit for the entire zone was mentioned. It is difficult to use the Greater Region's renown in discussions, as this is not extensive outside of our borders. Thirty eight percent of those present believe that Luxembourg should be used as motor to augment this and 37% feel that a joint branding effort should be developed. (The question asked was: "In your opinion, how should an attractive image be developed for Luxembourg and the Greater Region?" Another choice of response was: Set up an economic development forum, favoured by 22% of respondents. The sampling was non representative). The concept of the Greater Region as a useful tool for promoting development was favoured by 76% of those present, with 35% fully approving the idea and 41% partially approving it.

Growth can only occur by attracting new international companies and talent. This process could have better structure and more development.

One major change that has occurred is the use of the opportunities of the financial centre for setting up and financing companies. It is clear that Luxembourg has the resources to play a major role as a platform for financing projects. The region could become a genuine laboratory for developing new technologies through a significant flagship project and pilot initiatives. According the majority of participants in the Economy Days meetings, interaction between the finance, scientific and entrepreneurial sectors is the cornerstone of a new model. The entire Greater Region would benefit from this.

The clearly defined ambition of the forum participants is to incorporate the strengths of the Greater Region into a major federating project involving public and private players in order to give it the resources for becoming a major economic zone in Europe.

1. The *Observatoire de la Compétitivité*: 2009-2010

Lastly, let us not forget that development and promotion of the Greater Region cannot be accomplished without implementing a high quality inter-regional governance vehicle that will organise local public and private players optimally into networks that link them together.

Analysis of the economic crisis

Mr Patrick Artus, economist and co-author, together with Olivier Pastré, of " Emerging from the Crisis: What you have not been told and what to expect", analysed the economic crisis. He stated that the crisis we are experiencing is not a financial crisis. The financial crisis is no more than a consequence of a deeper crisis in the real economy. Currently, public policies being implemented seem to be generally reassuring, but the true structural problems now being confronted are levels of household indebtedness, a need for reindustrialisation in Europe and the U.S., a surge in raw materials prices expected over the next four to five years, etc. According to Mr Artus, these problems can be corrected only through cooperation. It is especially necessary to agree on exchange rate and worldwide raw materials distribution policies.

Presentation of the 2010 OECD Report on the economic situation and policies of Luxembourg[7]

Every two years, the OECD publishes a report on the economic situation and the policies pursued by each of its member countries. The *Observatoire de la Compétitivité* of the Ministry of the Economy and Foreign Trade assisted the OECD in preparing the report and in setting up the technical and political working groups required for it. The study concentrated on the economic situation and public policies that could improve economic performance in the long term. The responsibility for the study's content resides with the OECD secretariat.

The 2010 OECD study concentrated on the labour market. Mr Bob Ford, Deputy Director of Country Studies Branch at the OECD, presented the 2010 report. The report contains four chapters, dedicated to the macro-economic situation, structural reforms, the labour market and the financial centre of the country.

The report confirms that Luxembourg's competitive situation has worsened in terms of unit labor costs. The OECD recommends indexing wages on core inflation rather than using the current sliding scale of salaries system, which means using a price index purged of the volatile commodities such as energy products. Next, according to the OECD, the budget must be cleaned up to re-establish public finances. In addition, the report recommends a reform of public administrations management and of the civil service and also favours stronger competition on the commodities market and a more vigorous competition policy.

[7] For more details see: http://www.odc.public.lu/actualites/2010/05/Rapport_OCDE_2010/index.html

With regard to employment and labour policy, the OECD recommends increasing incentives to work by a progressive decrease in the replacement rates of unemployment and the reform of the ADEM, the public employment administration. It is true that it a progressive decrease in the replacement rates of unemployment and the generosity of social payments is very necessary. The OECD recommends an improving the minimum wage structure by implementing an independent counsel for the minimum wage. Lastly, it is inevitable that the pension system be reformed in Luxembourg.

1.3.2 Economic Policy Perspectives

Through its publication Economic Policy Perspectives, the *Observatoire de la Compétitivité* makes public the results of studies and/or sponsored research of university or contracting researchers, as well as the working documents drafted by members of the *Observatoire de la Compétitivité* of the Ministry of Economy and Foreign Trade. This publication also aims to disseminate reports on presentations, seminars and conferences that the Ministry of the Economy and Foreign Trade has held on economic policy themes. Lastly, the publication hopes to illuminate possible policy options, evaluate the effectiveness of certain measures, thus nourishing public debate on economic policy.[8]

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

While the mission of "Economic Policy Perspectives" is to provide detailed analyses of certain scientific issues, the *Observatoire de la Compétitivité* newsletter seeks to inform the general public about the work being done within the unit itself. This publication addresses both the economic actors and a wider audience.[9]

1.3.4 The *Observatoire de la Compétitivité* web site

The *Observatoire de la Compétitivité* has maintained a web site at http://www.odc.public.lu since 2005, which carries information and publications concerning the competitiveness of the Luxembourg economy and the Lisbon/Europe 2020 Strategy. The site provides information about the competitiveness of the Luxembourg economy in foreign publications. It serves as a platform for communications to all the actors involved in implementing the Lisbon Strategy/Europe 2020 in Luxembourg and it makes available information in the Competitiveness Scoreboard. The site lists upcoming events and publications. Documents concerning conferences and seminars, as well as publications can be downloaded free of charge from the site.

[8] All issues of *"Perspectives de Politique Economique"* can be downloaded from this Internet site: http://www.odc.public.lu/publications/perspectives/index.html.

[9] The *"Lettres de l'Observatoire de la Compétitivité"* can be downloaded from this site: http://www.odc.public.lu/publications/lettre_observatoire/index.html.

1.4 An Outline of the 2010 Competitiveness Report

As part of its monitoring mission, the *Observatoire de la Compétitivité* closely follows the rankings of Luxembourg in the various composite indicators of competitiveness. **Chapter 2. Benchmarks and Analysis of Comparative Competitiveness** discusses the performance of Luxembourg according to international competitiveness composite indicators such as IMD and WEF, etc., and examines some ranking systems that are lesser known to the general public.

In Chapter 3. The Competitiveness Scoreboard: 2010 provides an annual analysis of Luxembourg's competitiveness vis-à-vis the other Member states of the European Union according to criteria established specifically for Luxembourg. Calculating a composite competitiveness index based on this Scoreboard gives a good idea of the relative competitiveness of Luxembourg.

Chapter 4. Toward a ShortTerm Scoreboard illustrates the problematic faced in setting up a short term scoreboard in order to replace the economic indicators in the Grand Duchy regulation dated 4 April, 1985, in application of article 21, paragraph 6 of the amended law dated 24 December, 1977, which authorises the government to implement measures intended to stimulate economic growth and to maintain full employment.

Chapter 5. A look at the Indicators for the Europe 2020 Strategy. The purpose of this chapter is to highlight the priorities, objectives and indicators of the new European strategy for growth and jobs, the Europe 2020 strategy. It will also position Luxembourg with relation to the different indicators used as part of the Europe 2020 strategy.

Chapter 6. Luxembourg's cost and price competitiveness, outlines changes in the real effective exchange rate (REER), from the perspective of prices and costs, a key measure of the external competitiveness of Luxembourg's economy. The REER follows changes in price and cost competitiveness through an analysis of the relationship between domestic prices and costs with regard to an international level.

Chapter 7. Impacts of Wage Indexation, a brief look at recent studies has the purpose of reviewing the studies on wage indexing in Luxembourg to highlight their most useful conclusions.

The purpose of **Chapter 8. The GDProsperity project** is to describe the limits of these indicators as a tool for measuring national wealth. Indeed, these are still the essential indicators for measuring the increase in production of goods and services in a country and as such constitute useful economic indicators; however, they are limited for evaluating sustainable development and quality of life, two essential items for measuring well-being.

2 Benchmarks and an Analysis of Comparative Competitiveness

2.1 Introduction

The concept of competitiveness is very likely the most widely used and abused term in modern economic sciences. Many public and private institutions allocate considerable resources every year to research in this area. The media has taken up the issue, putting it on the front line of public debate. Indeed, the debate on territorial competitiveness is regularly revived through the publication and transmission to the media of comparative competitiveness rankings. While from the beginning of the decade through to 2007, the determinants of international competitiveness were generally at the centre of economic policy discussions, with the inflation and purchasing power issues nearly monopolising public debate from the end of 2007 up until the autumn of 2008. The presence of prices at the centre of discussions lasted only a short time and were replaced as from September, 2008 by "crisis" economic rankings of:

- Countries the hardest hit by the economic slowdown and the weakening of growth perspectives
- Countries the hardest hit in terms of the public deficit and public debt, where repayment of the public debt inflicts an increasingly heavy burden on the nation's budget
- Countries that financial rating agencies such as S & P, Fitch and Moody's have assigned solvency risk, the so-called Greek syndrome.

Acting on public expenditures and financing is naturally desirable but cannot be the sole concentration of economic policy. Reducing, or even eliminating deficits will not suffice to significantly lower the level of debt. Therefore, although the structural competitiveness issue currently seems to have lost importance in the economic policy debate, the supply policy and structural issues are nonetheless still essential in the long term to ensure sustainable growth and jobs. This is especially true in a world that is becoming increasingly globalised and integrated, characterised by accelerating competition between production sites. Territorial competitiveness is itself the result of this ever-changing world, and is expected to evaluate how territories are preparing their economic futures in the long term.

What factors present the competitive edge for different territories? What are the strengths and weaknesses of a given territory? Comparative analyses of countries through benchmarks are instruments that provide elements of responses to these questions. These benchmarks provide a comparison with best practices, from which lessons can be draw so as to improve one's own performance in a targeted area.

Composite benchmarks are used to group several indicators within a single value[10] that are compared to individual indicators to summarise a variety of features. These composite indicators furnish an estimate, or an overall image, of territorial competitiveness.

Competitiveness benchmarks are therefore still a subject of prime importance[11] because they provide useful information for governments and heads of corporations in determining the structural development potential or, inversely, levels of volatility and consequently of risk, that countries can expect to face in the medium and long term[12]. These benchmarks also constitute an aid to better understanding the key factors behind economic growth and explaining why some countries do better than others in an increasingly globalised environment. These comparative analyses thus have two major objectives: First, to continuously underscore and recall the importance of structural economy issues, and second, to identify barriers to increases in competitiveness in order to discuss strategies[13] to adopt on the basis of quantitative and statistical data.

The objective of this chapter is to provide a summarisation as well as a descriptive analysis of the principal international benchmarks that rank Luxembourg and which were published since the previous Competitiveness Report of September, 2009.

[10] For more details on composite indicators, see the Joint Research Center sire of the European Commission: http://composite-indicators.jrc.ec.europa.eu/

[11] See parliamentary question n°658 of Jean Colombera (19 May, 2010) on international studies. For more details see: http://www.chd.lu

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

[13] As an example, the annual discussions at La Baule http://www.labaulewic.org/-Ernst-Young-Survey-.html

2.2 Luxembourg's Rankings

In the debate over the determinants of territorial competitiveness, the best-known benchmarks and rankings remain those of the World Economic Forum (WEF) and the International Institute for Management Development (IMD), the Heritage Foundation and the European Commission. In addition to these, a multitude of others exist that are less known by the general public.[14]

2.2.1 The best-known composite indicators and rankings...

a. The Growth Competitiveness Index (2010-2011)[15]

The World Economic Forum (WEF) has published the 2010-2011 edition of its Global Competitiveness Report, whose purpose is to evaluate the potential of world economies to attain sustained growth in the medium and long term. The study measures the competitiveness of 139 countries throughout the world through 110 indicators. These indicators are split into three fundamental growth and competitiveness "pillars": The fundamental requirements in the area of competitiveness, through the sub-categories public institutions, infrastructure, macroeconomic stability and health and primary education; efficiency enhancers, made up of higher education and training, goods and labour market efficiency, financial market sophistication, technological readiness and market size; determinants of innovation and sophistication, through assessments of levels of business sophistication and degrees of innovation. The study takes into account the fact that countries do not share a like level of economic development and that the relative importance of different competitiveness factors is a function of conditions at the outset.

The composite Growth Competitiveness Index (GCI) that ranks countries is based on a combination of statistical data and survey results, and notably an annual survey of business executives, carried out by the WEF together with its network of institutional partners.

In this new version of the study, Switzerland leads the world rankings, followed by Sweden and Singapore. The countries that were ranked amongst the top ten last year are the same, although the order of this ranking has changed somewhat. In all, six European countries are ranked in the top ten of this edition, and twelve in the top twenty. Luxembourg is twentieth in the world ranking and consequently has improved by one position with respect to the preceding report. Germany holds the fifth position, moving up two ranks with respect to last year, and France moved up one slot to fifteenth, while Belgium slid back one to nineteenth. The EU-27 rankings are lead by Sweden, Germany and Finland, with Luxembourg in tenth place.

[14] See Chapter 2.2.2... alongside a multitude of other rankings and indices.
For more information see : http://www.odc.public.lu/indicateurs/benchmarks_internationaux/index.html

[15] For more information see: http://www.weforum.org/en/initiatives/gcp/index.htm

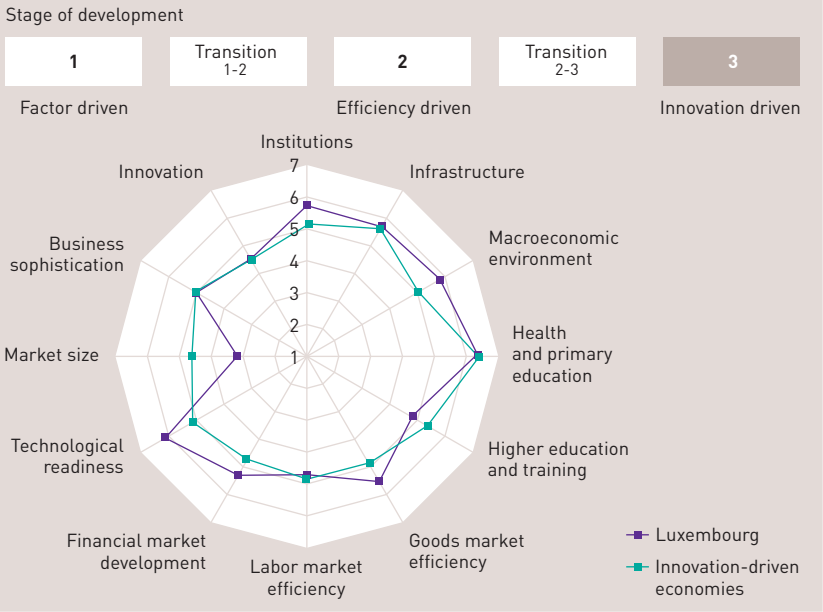
Regarding the ranking for the three basic pillars:

- Luxembourg is tenth in fundamental competitiveness requirements. Within this pillar, the country holds the ninth rank for institutions, 19th in infrastructure, ninth for its macroeconomic environment and 27th in health and primary education.

- Luxembourg is ranked 20th in efficiency enhancers. Within this pillar, the country is ranked 41st in higher education and training, third in goods market efficiency, 37th in labour market efficiency, sixth in financial markets sophistication, second in technological readiness and 89th in market size.

- Luxembourg is ranked 19th in determinants of innovation and sophistication. Within this pillar, the country ranks 18th in levels of business sophistication and 16th in innovation.

Figure 1
Position of Luxembourg according to the GCI (2010-2011)



Source: World Economic Forum

An annual survey is conducted in each country among company executives regarding the major difficulties encountered in developing business activities in a given country. This survey identifies the main factors blocking competitiveness.

With regard to survey results in Luxembourg, the inflexibility of the Labour Code, the administrative workload produced by the bureaucracy and a work force that too often displays inadequate levels of education and training are the difficulties most often named. Difficulties in obtaining financing also seem to be a source of worry for business leaders in Luxembourg.

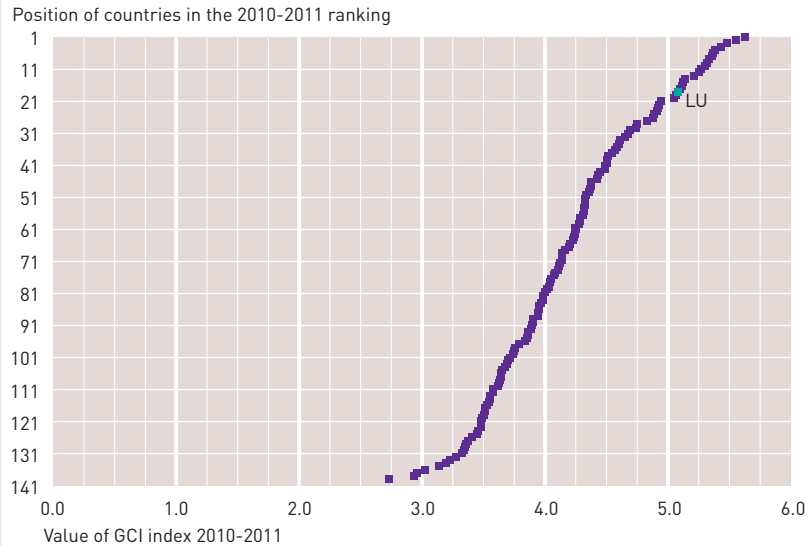
Figure 2
Principal impediments to developing business affairs in Luxembourg (2010-2011)

Source: World Economic Forum
Remarks: The persons interviewed were asked to select the 5 most problematic factors from a list of 15 factors affecting doing business in their country and to rate them on a scale of one to five, with one presenting the most difficulties. The bars in this graph show the responses weighted according to their ranking.

Frame 3
Comparative analysis between index values and the ranking

When consulting international benchmarks, it is useful to combine an analysis of the ranking with an analysis of index values. Differences in values of the indices between two countries, although at times insignificant, may nevertheless have a major impact on the final ranking. Luxembourg's index of 5.05 is very close to Austria's of 5.09 and Belgium's of 5.07.

Figure 3
CGCI index value by country and position by country in the WEF ranking for 2010



Source: World Economic Forum

Frame 4
Various sector and themed indices produced by WEF

In addition to its yearly Global Competitiveness Index publication, WEF also performs periodic sector and themed analyses in the area of competitiveness[16]. Among the sectors analyzed are Tourism, Information and Communications Technologies (ICT), International Business and the implementation of the Lisbon Strategy in the various Member States of the EU.

The WEF also publishes a periodic index that focuses on competitiveness in countries in terms of dynamics in the use of Information and Communications Technology (ICT). In the 2009-2010 edition, the report covers 133 countries, based on 68 underlying indicators. The Network Readiness Index (NRI) characterizes the way in which countries are prepared for using ICT, examined through three dimensions: the business environment, the institutional environment and infrastructures. The index measures the motivation of individuals, companies and the public sector to use ICT and the most recent use made of these technologies. Sweden, Singapore and Denmark head the rankings in this edition. Luxembourg is in 17th place in the global rankings, ranked four positions higher with respect to the previous year and seven positions in all compared with the 2007-2008 edition. France holds the 18th position, Germany is 14th and Belgium is 22nd in the global rankings. Upon closer inspection of the three NRI dimensions, Luxembourg is in the 13th rank in the sub-category for business environment, institutional environment and for infrastructures for developing ITC, it holds the 20th slot for the sub-category of willingness to use ITC and in 23rd position for the most recent ITC use.

The World Economic Forum also publishes an update of its analysis of the international business sector and of Global Enabling Trade Index (GETI). In 2010, this index measured the ability of 125 countries to promote international trade, by considering factors with an impact on trade relations, including market access, efficiency of customs administration, fluidity of transportation and communications infrastructures and the business environment. Singapore headed the rankings, followed by Hong Kong and Denmark. Luxembourg occupies the 9th slot in this world index, moving up four positions compared to last year. In Europe, Luxembourg was outranked by Denmark, Sweden, Switzerland and Norway. Germany was ranked 13th with France and Belgium occupying the 20th and 24th positions respectively. Luxembourg is particularly well positioned in terms of the quality of its communications and transportation infrastructure, in which it is ranked third. Luxembourg also holds a good rank because of its stable environment and favourable regulatory framework. Luxembourg's performance is less positive and more volatile in customs procedures. While these procedures are generally efficient, they come at a high price, causing Luxembourg to receive a relatively weak ranking in the customs department index.

[16] For more information see: http://www.weforum.org/en/initiatives/gcp/index.htm

b. Global Competitiveness Index (2010)[17]

The *International Institute for Management Development* (IMD) produces an annual competitiveness report in which it analyses the capacity of countries to establish and maintain an environment that supports competitiveness in companies. It is supposed that creating wealth is done at the level of companies that operate in a domestic environment that either facilitates or impedes competitiveness. In this year's edition, 58 nations are evaluated using over 300 criteria[18]. The analysis is based on both quantitative indicators, accounting for around 2/3 of total weighting, and the results of an annual opinion survey. As in previous years, the IMD bases its analysis for the rankings on four indicator series: economic performance, government efficiency, business efficiency and infrastructure.

According to the 2010 report, Luxembourg is ranked 11th in the list of the 58 economies analysed. Luxembourg moved up one position compared with the previous year's ranking. Singapore, Hong-Kong and the United States lead in the rankings for the 2010 edition. Two Scandinavian countries, which generally rank in the top ten, have dropped precipitously; Denmark fell from the 5th to the 13th slot and Finland went from 9th to 19th place. France improved from the 28th to the 24th spot, while Belgium dropped from 22nd to 25th and Germany from 13th to 16th.

With regard to economic performance, Luxembourg fell from 4th place in 2009 to 11th in 2010, thus falling seven positions with relation to the previous year. In the realm of public administration efficiency, IMD notes an improvement in the performance of Luxembourg. Luxembourg rose in the rankings from 16th in 2008 to 12th in 2010. Positive factors are confidence in the country's financial markets and strong social cohesion, while flexibility in the labour market and administration of public finances in the medium term are perceived as structural weaknesses. Regarding the business environment indicator, Luxembourg has progressed from the 15th position in 2009 to 6th place in 2010. One of the weaknesses assigned to this category was fluctuation of unit labour costs in industry. Lastly, the infrastructures indicator is the category in which Luxembourg again registered the weakest performance ratings. Here Luxembourg dropped from 17th to 21st in 2010. The weakness in this category is due mainly to basic infrastructure, high broadband internet fees and the low rates of enrolment of the population in secondary school. Favourable elements include patents, linguistic skills, broadband internet, R&D personnel and the developing university system.

[17] For more details see: http://www.imd.ch/research/publications/wcy/index.cfm

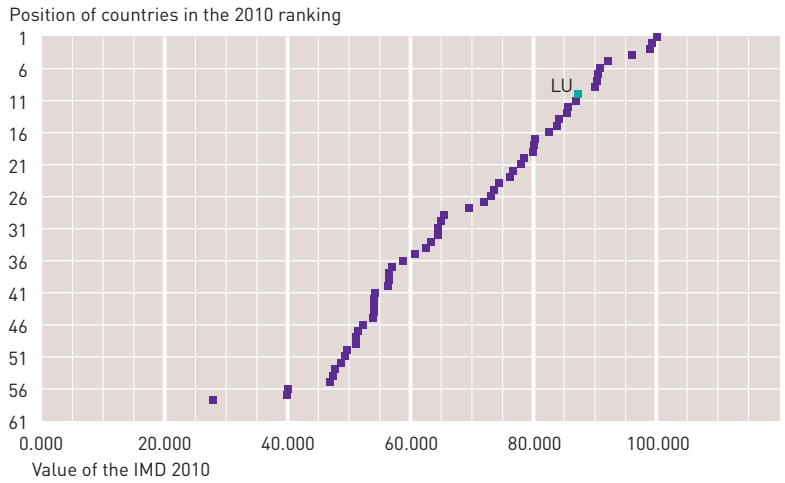
[18] In its 2010 edition, IMD also calculated another index, the "Debt stress test". Luxembourg, however, is not amongst the countries analysed by IMD.

Frame 5
Comparative analysis between index values and the ranking

When consulting international benchmarks, it is useful to combing an analysis of a ranking with an analysis of index values. Differences in values of the indices between two or several countries, although at times minimal, may nevertheless have a major impact on the final ranking.

Looking at IMD's Global Competitiveness Index, it is clear that for different country groups a slight increase in the index can mean a significant leap in the rankings, especially with positions 6 to 10, and vice versus. Luxembourg has an index score of 86.867, which is relatively close to Malaysia in 10th place with a rating of 87.228; but as is shown on the graph, there is a larger difference with Norway, ranked 9th at 89.987.

Figure 4
GCI index value by country and position by country in the IMD ranking for 2010



Source: IMD

c. Index of Economic Freedom (2010)[19]

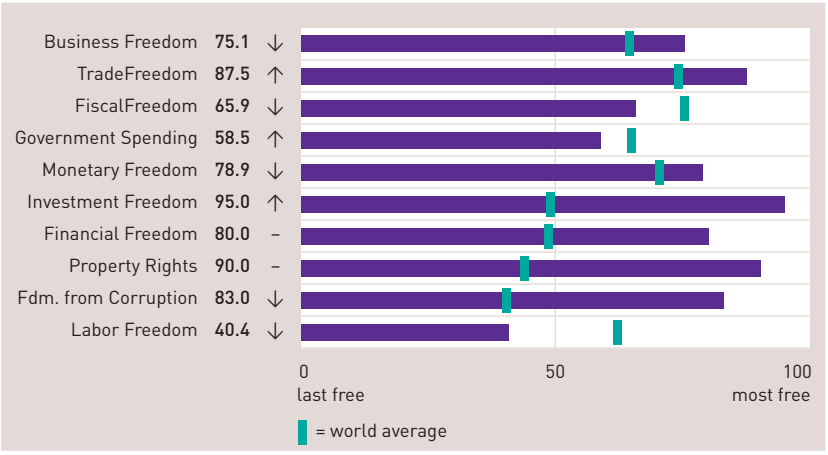
The Heritage Foundation is a think tank that has been analysing a large number of countries for fifteen years according to their degree of economic openness, using the Anglo-Saxon free enterprise approach to economics. The 2010 version of the report analyzes 183 countries. Economic liberalism favours productivity, and therefore growth, by encouraging corporate spirit and consequently the creation of added value. The more open the economy, the fewer barriers exist to free trade and the higher a nation's rank in the index.

For some years now, this report has ranked Luxembourg's economy in the top twenty of the world's most open economies. In the 2010 report, Luxembourg's rank improved slightly to 14th, moving up one slot compared to the preceding report. Belgium came in 30th, Germany 23th and France 64th, all far behind Luxembourg in the world rankings. Luxembourg ranked 5th in the European regional rankings. Ireland (5th in world ranking), Switzerland (6th) and Denmark (9th) lead in this European regional ranking.

The report gave Luxembourg good scores for a favourable business environment, high levels of protection for private property, investments, trade and financial businesses.

Its performance was deemed less good in the tax system, where income tax rates are relatively high, relatively high public expenditures as a percentage of GDP and flexibility in the labour market.

Figure 5
Luxembourg's position (2010)



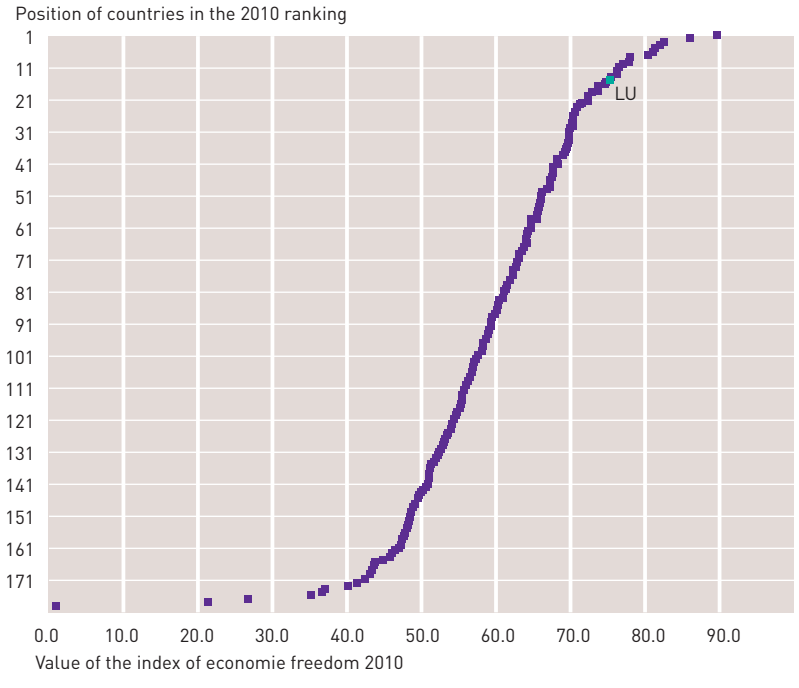
Source: Heritage Foundation

[19] For more details see: http://www.heritage.org/Index/

Frame 6
Comparative analysis between index values and the ranking

When consulting international benchmarks, it is useful to combing an analysis of the ranking with an analysis of index values. Differences in values of the indices between two or several countries, although at times minimal, may nevertheless have a major impact on the final ranking. Looking at Index of economic freedom, it is clear that for different country groups a slight increase in the index can mean a relatively significant leap in the rankings. Luxembourg, in 14th place, has an index score of 75.4, which is relatively close to Bahrain in 13th place with a rating of 76.3 and Mauritius in 12th place with a rating of 76.3, but the Netherlands are hard on Luxembourg's heels in 15th place with a rating of 75.0.

Figure 6
The Index of economic freedom value and position by country in the ranking for 2010



Source: Heritage Foundation

d. Summary innovation index (2009)[20]

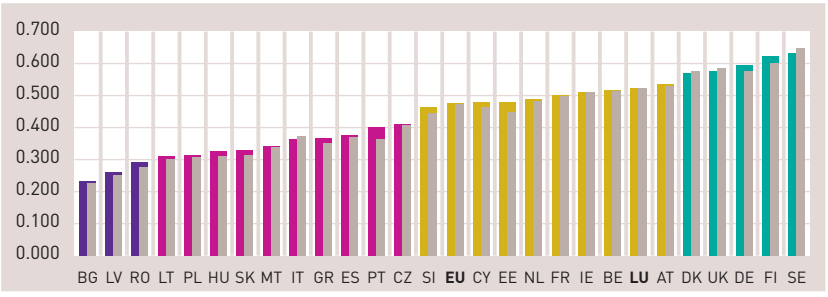
Since 2001, the European Commission has been publishing its "European Innovation Scoreboard" annually. This is an instrument that was developed as part of the Lisbon Strategy[21] in order to provide political chiefs a tool for comparing performance of Member states in the area of innovation. In early 2010, the European Commission published its ninth edition of this report, which includes an aggregate indicator called the Summary Innovation Index (SII) that reviews members' performance in innovation[22]. Twenty-nine indicators used to calculate the SII index have been classified into three major categories to better capture the various aspects of the innovation process.

20 For more information see: http://www.eis.eu/

21 For more details see: http://ec.europa.eu/growthandjobs/index_fr.htm and http://ec.europa.eu/eu2020/index_en.htm

22 See also, Ministry of the Economy and Foreign Trade, STATEC, Luxinnovation, Innovation and research activities in the Grand Duchy of Luxembourg - *État des lieux et pistes de réflexion*, Economic Policy Perspectives,°5, November, 2005 http://www.odc.public.lu/publications/perspectives/index.html

Figure 7
The SII-2009 for EU Member States

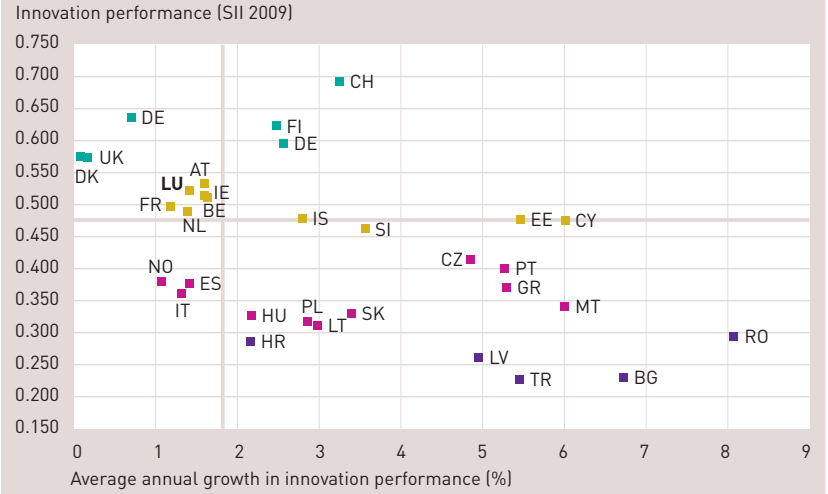


Source: European Commission

In the 2010 version, Luxembourg occupies the 8th position of the thirty-three countries analysed in Europe in the area of innovation, moving up one position compared to the previous edition. Switzerland, Sweden and Finland hold the first three slots in this European ranking.

In addition to measuring innovation performance, it is also useful to analyse performance over time. The various countries covered in the study were spread out into four categories following a cluster analysis carried out on the basis of SII scores covering a period of five years. The categories are the Innovation leaders, Innovation followers, Moderate innovators and Catching-up countries.

Figure 8
Convergence in innovative performance

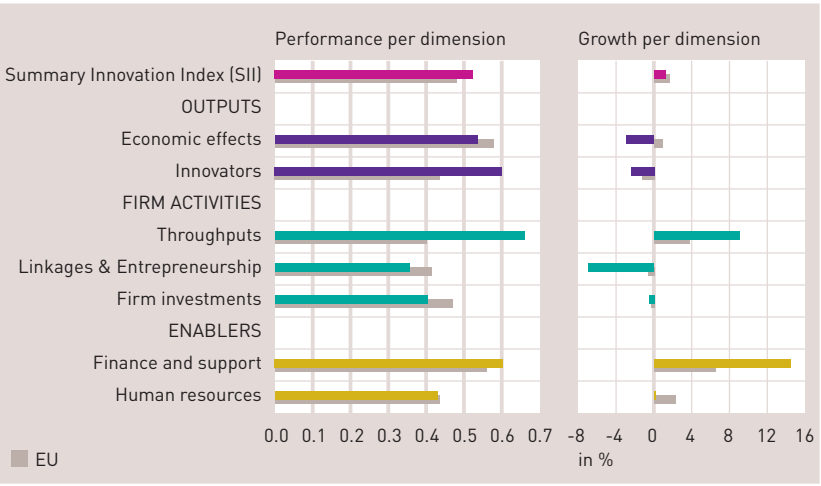


Source: European Commission

Luxembourg is in the second category of countries, the Innovation followers, whose performance levels exceed or near the average for the EU-27 in the area of innovation, but are lower than those of the Innovation leaders. Luxembourg has registered a slight improvement within this category over time. So Luxembourg's performance is deemed better that the EU-27 average, but its growth is slightly inferior to average growth of innovation performance in the EU-27.

Luxembourg posts good results with relation to its average performance in the area of finance and support measures and also in results from the innovation process, however the country shows relative weakness in human resources, private investment and corporate spirit. From a temporal perspective, over the five last years, good performance in the categories of finance and support measures, as well as in the innovation process, have been the primary factors behind growth in the area of innovation. In contrast, performance in the areas of corporate spirit, innovators and economic impacts have deteriorated.

Figure 9
Luxembourg's performance in the different SII sub-categories



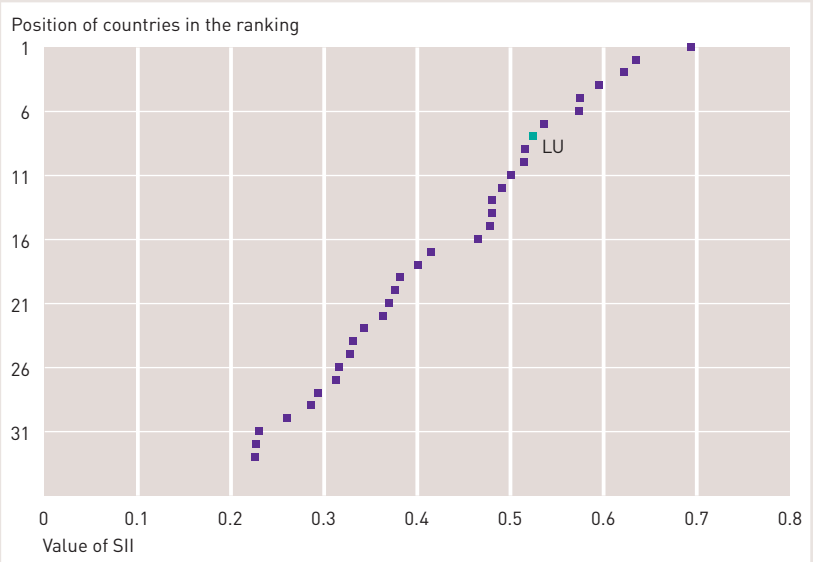
Source: European Commission

Frame 7
Comparative analysis between index values and the ranking

When consulting international benchmarks, it is useful to combing an analysis of the ranking with an analysis of index values. Differences in values of the indices between two or several countries, although at times minimal, may nevertheless have a major impact on the final ranking.

Looking at Summary Innovation Index, it is clear that for different country groups a slight increase in the index can mean a relatively significant leap in the rankings. Luxembourg, in 8th place, has an index score of 0.525, close to Austria in 7th place with a rating of 0.536, but Belgium with a 0.516 rating in 9th place, and Ireland, with 0.515 and in 10th place, are hard on Luxembourg's heels.

Figure 10
SII value and position by country in the ranking for 2010



Source: European Commission

e. Correlation of rankings

The table below shows rankings of four major composite indices, among which Luxembourg appears, and the changes in Luxembourg's rankings with relation to the previous editions[23].

Table 1
Update of rankings according to the four major composite indices since publication of the 2009 Competitiveness Report

	N°	World Economic Forum	IMD	Heritage Foundation	European Commission
		GCI	**GCI**	**Economic freedom**	**SII**
		2010	**2010**	**2010**	**2009**
+	1.	Switzerland	Singapore	Hong Kong	Switzerland
	2.	Sweden	Hong Kong	Singapore	Sweden
	3.	Singapore	United States	Australia	Finland
	4.	United States	Switzerland	New Zealand	**Germany**
	5.	**Germany**	Australia	Ireland	United Kingdom
	6.	Japan	Sweden	Switzerland	Denmark
	7.	Finland	Canada	Canada	Austria
	8.	**Netherlands**	Taiwan	United States	**Luxembourg (+1)**
	9.	Denmark	Norway	Denmark	**Belgium**
	10.	Canada	Malaysia	Chile	Ireland
	11.	Hong Kong	**Luxembourg (+1)**	United Kingdom	**France**
	12.	United Kingdom	**Netherlands**	Mauritius	**Netherlands**
	13.	Taiwan	Denmark	Bahrain	Estonia
	14.	Norway	Austria	**Luxembourg (+1)**	Iceland
	15.	**France**	Qatar	**Netherlands**	Cyprus
	16.	Australia	**Germany**	Estonia	Slovenia
	17.	Qatar	Israel	Finland	Czech Republic
	18.	Austria	China	Iceland	Portugal
	19.	**Belgium**	Finland	Japan	Norway
	20.	**Luxembourg (+1)**	New Zealand	Macao	Spain
	21.	Saudi Arabia	Ireland	Sweden	Greece
	22.	Korea	United Kingdom	Austria	Italy
	23.	New Zealand	Korea	**Germany**	Malta
	24.	Israel	**France**	Cyprus	Slovakia
-	25.	United Arab Emirates	**Belgium**	Saint Lucia	Hungary

Remarks: Figures in parentheses indicate change in Luxembourg's ranking compared to last year. A plus sign or a minus sign indicates a favourable or unfavourable change, while 0 indicates no change in ranking.

Luxembourg's neighbouring countries, Germany, Belgium and France, as well as the Netherlands as a Benelux nation, are shown in green where their ranking exceeds Luxembourg, and red where it is ranked lower than Luxembourg.

[23] Temporal series of ranks should be consulted with some retrospect, because over the years methodological changes in calculating indices can occur without rankings for all years being recalculated

The table represents the 25 top-ranked countries. Compared to the 2009 report, in which it was observed that Luxembourg's position remained stable within a ranking, it fell by two rankings and it improved in one indicator with relation to the 2008 edition, Luxembourg has improved in the 2010 report by one rank in four of the indicators with relation to 2009. If only the European countries are considered among the top 25 in world rankings to form an alternative European ranking[24], the following result is obtained. This ranking shows Luxembourg in 12th place in the WEF European ranking, in 4th place in the IMD ranking and in 5th place in the Heritage Foundation ranking[25].

Table 2
European ranking in the principal composite competitiveness and growth indicators

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

Source: *Observatoire de la Compétitivité*

It is also interesting to analyse the correlation between these four rankings. The Kendall coefficient is ideal for this type of analysis. It measures the degree of agreement between several rankings, in this case four rankings. A correlation was calculated in the 2010 Competitiveness Report on 26 countries for which the four rankings were available[26]. The Kendall coefficient takes a value between 0, when there is no relationship between the rankings, and 1, when there is full agreement between rankings and judges.

[24] All things otherwise being equal, without this re-calculation of indices.

[25] Rankings of the European Commission have not changed, because only European countries are considered and they are ahead of Luxembourg.

[26] The same list of countries used in the 2009 Competitiveness Report.

Table 3
Rectified Rankings for a Series of Countries Included in the Four Studies (2010)

		WEF	IMD	HF	CE
1	Germany	3	8	11	4
2	Austria	10	7	10	7
3	Belgium	11	13	13	9
4	Croatia	25	26	26	25
5	Denmark	6	6	3	6
6	Spain	17	17	16	18
7	Estonia	14	16	7	13
8	Finland	4	9	8	3
9	France	9	12	21	11
10	Greece	26	22	24	19
11	Hungary	22	20	18	22
12	Ireland	13	10	1	10
13	Italy	21	19	25	20
14	Lithuania	20	21	12	24
15	**Luxembourg**	**12**	**4**	**5**	**8**
16	Norway	8	3	17	17
17	Netherlands	5	5	6	12
18	Poland	16	15	23	23
19	Portugal	19	18	20	16
20	Slovakia	23	24	15	21
21	Czech Republic	15	14	14	15
22	United Kingdom	7	11	4	5
23	Slovenia	18	25	19	14
24	Sweden	2	2	9	2
25	Switzerland	1	1	2	1
26	Turkey	24	23	22	26

Source: *Observatoire de la Compétitivité*

In the 2006, 2007 and 2009 reports, a strong correlation existed between the rankings of the four major institutes used at the time. In the 2010 edition, the Kendall coefficient registers 0.84, illustrating that the same correlation between rankings of different institutes can be found as in previous years[27]. Therefore, even though the four institutes claim to have come up with different composite indicators, overall the rankings are strongly correlated.

[27] The Kendall coefficient for the same countries (27) was 0.86 for 2006, 0.83 for 2007, 0.86 for 2008 and 0.87 for 2009. Direct comparability of results from 2007, 2008, 2009 and 2010 with those of 2006 should nonetheless be put in perspective because one ranking was replaced by another as from 2007.

2.2.2 … A Multitude of Other Rankings and Indices

In addition to the four major composite indices reviewed in the previous chapter, there are a multitude of other indices and rankings less well known that are regularly published and commented on in the press. This chapter summarises several of these indices and rankings that are less aired in the press and less well known to the public.

a. *Länderindex*[28]

The German research institute *Zentrum für Europäische Wirtschaftsforschung* (ZEW) and a consulting office called Calculus Consult published a third edition of their investment site attractiveness index in 2010, the *Länderindex*, for the *Stiftung Familienunternehmen*[29] foundation. This comparative index has been published every two years since 2006. It ranks 18 OECD countries according to their degree of attractiveness on the basis of five sub-indices, comprising taxes, labour costs, productivity and human capital, regulations, capacity for financing and public infrastructure. Factors impacting family-owned businesses with sales exceeding 100 million Euros are the main elements considered in this study. This edition uses underlying figures dating from 2008.

The first three slots in the overall rankings remained the same as the previous year's study. The rankings are headed by Denmark, followed by the United Kingdom and Switzerland. Luxembourg is classed 4th in the overall rankings, moving up one slot with relation to the previous report.

Table 4
The Top 10 of the *Länderindex*

Rank	Country
1	Denmark
2	United Kingdom
3	Switzerland
4	**Luxembourg**
5	Finland
6	United States
7	Sweden
8	Ireland
9	Netherlands
10	Slovakia

Source: *Stiftung Familienunternehmen*

[28] For more details see: http://www.familienunternehmen.de

[29] Because the determinants that work in favour of long-term attractiveness of an investment site can be temporarily demoted to the second class by short-term consequences of cyclical shocks, as with the impacts of the current economic and financial crisis, in the 2010 edition the authors came up with a second "crisis index" the Krisen-index. This index shows to what degree of attractiveness of a country can be affected by these cyclical shocks. Countries that are ranked highly in the first index may have much lower rankings in the second index, which measure the post-crisis attractiveness of a country for investors, such as the United Kingdom, which fell from second position in the first ranking to eleventh in the second ranking. This ranking measuring resilience to the crisis is headed by Denmark, followed by Finland, then Switzerland. Because of a lack of available data, Luxembourg was not included in the second ranking.

Luxembourg is ranked third in the "Taxes" sub-category, as in the previous year, largely because of its attractive tax regulations for businesses on the domestic and cross-border level, for corporate succession issues and for the simplicity of the national tax system. Luxembourg occupies the fifth place in the sub-index "Cost of work, productivity and human capital", rising one rank since the last edition. The Grand Duchy is in eighth place in the "Regulations" sub-index, dropping two slots. The country moved up two positions to twelfth place in the sub-category "Financing capacity". Lastly, in the sub category "Public infrastructure", Luxembourg moved up five positions to first place. This is a result of improvements in all areas analysed in the area of infrastructure except for transportation, and particularly in ITC infrastructure and in perceptions of legal certainty.

b. EU - *Standortranking*[30] (Site ranking)

In December, 2009, a company called Contor published a study for the German publication Manager Magazin of the regions with the best development perspectives within the European Union. The study was based on 25 determinants. The study concentrates on demography, levels of training of the population, technology, standard of living and the labour market.

In the 2010 rankings, Luxembourg was in first place, making it the region with the best potential in the view of this ranking. Luxembourg's ranking remains the same with relation to the 2007 version of the study, when the country was also ranked first.

Table 5
The Top 10 of EU Standortstudie

Rank	Region
1	**Luxembourg**
2	Munich, Landkreis (district)
3	Ingolstadt, Kreisfreie Stadt (independant city)
4	Warsaw, Miasto
5	Munich, Kreisfreie Stadt (independant city)
6	Pieriga
7	Hauts-de-Seine
8	Regensburg, Kreisfreie Stadt (independant city)
9	Starnberg
10	Trnavsky kraj

Source: Contor
Remarks: Level: NUTS-3

c. European economic sustainability index[31]

The European think tank *European Policy Centre* (EPC) published a new composite index in 2010 entitled the *European Economic Sustainability Index*. The purpose of this index is to measure sustainability of European economies in the short, medium and long term. According to EPC, the markets, the press and politicians currently appear to be concentrating too much on the short term, that is on deficits, the economic slowdown and debt, while the true challenges in the medium and long term that are "hidden" behind these elements get little attention.

30 For more details see: http://www.manager-magazin.de/unternehmen/artikel/0,2828,667547,00.html

31 For more details see: http://www.epc.eu/documents/uploads/pub_1127_eesi.pdf

Yet the capacity of European countries to manage long-term challenges such as competitiveness will determine in the long run whether or not their economies are sustainable. The principal objective of this composite indicator is therefore to highlight in which areas economic sustainability of European countries could be realised.

The composite index that is calculated to measure sustainability of economies is based on six equally weighted indicator domains: public deficit/surplus, public debt levels, GDP growth, competitiveness, governance and corruption and lastly the future cost of ageing. These indicators were chosen to reflect a balance between short-, medium- and long-term economic sustainability.

The 2010 rankings are led by Sweden, followed by Denmark and Estonia. Luxembourg is ranked 6th, tied with Germany, and is in the domain of countries deemed as having strong sustainability. Belgium occupies the 13th slot and France is 15th. This ranking was also recalculated for 2007, where Luxembourg was ranked 7th.

Table 6
European economic sustainability index (2010)

Rank	Country	Group
1	Sweden	Top
2	Denmark	Top
3	Estonia	Top
4	Finland	Top
5	Netherlands	High
6	Germany	High
	Luxembourg	**High**
8	Austria	High
9	United Kingdom	Midfield
10	Czech Republic	Midfield
11	Slovakia	Midfield
12	Poland	Midfield
13	Belgium	Midfield
14	Bulgaria	Midfield
15	France	Midfield
16	Ireland	In danger
17	Slovenia	In danger
18	Cyprus	In danger
19	Lithuania	In danger
20	Malta	In danger
21	Hungary	In danger
22	Rumania	In danger
23	Latvia	In danger
24	Spain	In danger
25	Portugal	Unsustainable
26	Italy	Unsustainable
27	Greece	Unsustainable

Source: EPC

A closer analysis of indicator results reveals that positions of different countries vary within the six domains. Thus, Luxembourg performs well, even very well, in five of the six domains. Nonetheless, Luxembourg scored lowest in the rankings in the cost of ageing area.

There is also an analysis comprised of a change in weightings of different indicator domains in the report. If more weight is given to the long-term indicators such as "Competitiveness / Corruption", with less weight on the short term "Deficit / Growth", Luxembourg would rank 7th, dropping one spot compared to equal weights across the domains.

However, adding weight to short-term domains like GDP growth and deficits brings Luxembourg up two slots. Lastly, completely removing the long-term categories of the ranking puts Luxembourg in 2nd place behind Estonia and ahead of Bulgaria.

d. Global Financial Centres Index[32]

The consulting firm Z/Yen has published the eighth edition of its half-yearly competitiveness index on 75 financial centres throughout the world, the Global Financial Centres Index. In an increasingly globalized and interdependent world, due to information and communications technologies, financial centres are facing stiffer competition than other sectors. Financial services are at the heart of the world economy, acting as facilitators for international trade and investments abroad.

The study is based on two types of sources for evaluating competitiveness of financial centres. First, determining factors derived from quantitative data, such as the cost of office space and second, a barometer of perceptions obtained through online surveys with professionals in the industry. As defined in this study, competitiveness is comprised of five separate domains, i.e. "People", dealing with training, flexibility, etc. "Business Environment", dealing with taxes, regulations, etc., "Market Access", involving securitization, clustering, etc., "Infrastructure", concerning cost and availability of office space, etc. and "General Competitiveness", which involves the perception of cities as agreeable places to live, etc.

London, New York and Hong Kong top the rankings in the September, 2010 edition. Luxembourg is in the 20th spot, dropping two positions compared to the previous half-yearly ranking of March, 2010, the 7th edition, and even four more ranks with relation to the 6th edition published in September, 2009. In Europe, Luxembourg then ranked 6th, behind the following other financial centres: London (first in world rankings), Zurich (8th), Geneva (9th), Frankfurt (11th) and Paris (18th).

[32] For more details see: http://www.zyen.com/index.php?option=com_content&view=article&id=23&Itemid=29

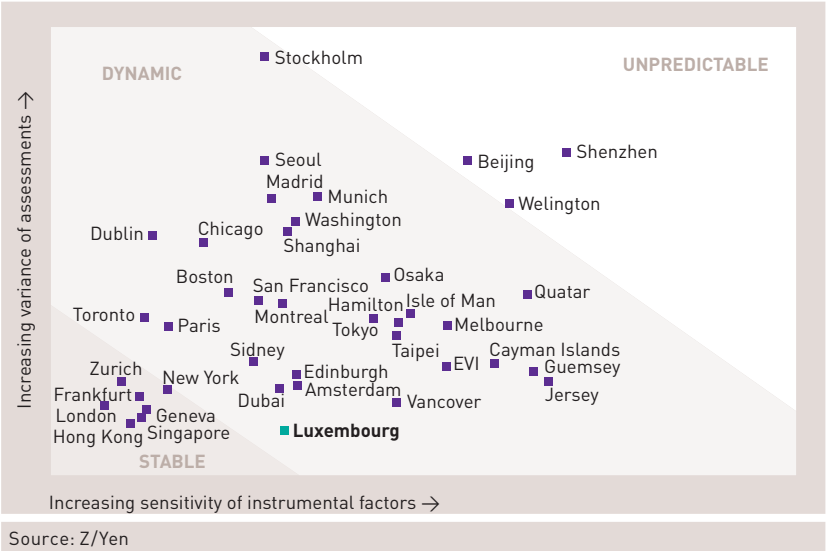
Table 7
The Global Financial Centres Index 8 (September 2010)

Rank	City
1	London
2	New York
3	Hong Kong
4	Singapore
5	Tokyo
6	Shanghai
7	Chicago
8	Zurich
9	Geneva
10	Sydney
11	Frankfurt
12	Toronto
13	Boston
14	Shenzhen
15	San Francisco
16	Beijing
17	Washington
18	Paris
19	Taipei
20	**Luxembourg**

Source: Z/Yen

The study also includes an analysis of the volatility of the various centres, both with regard to experts' evaluations and to sensitivity of the instrumental factors of competitiveness.

Figure 11
Variance of Assessments versus Sensitivity to Instrumental Factors



Source: Z/Yen

Luxembourg is considered a dynamic financial centre, situated between the centres considered "stable" and those deemed "unpredictable", meaning that it is a centre with the potential to move in either direction. Still, Luxembourg is relatively near the border of financial centres considered "stable", meaning they have low sensitivity to changes in the instrumental factors of competitiveness and a lower variance in the assessments provided by the online survey carried out amongst financial sector professionals.

e. Global venture capital and private equity country attractiveness index[33]

Over the past few years, the venture capital and private equity industry has internationalised rapidly. Funds are being raised internationally more and more, and are invested on a global level. Therefore, it is not surprising that many countries are expending considerable effort to attract an industry capable of encouraging innovation, entrepreneurship, economic growth and well-being of the population domestically. To this end, the IESE business school published a report at the end of 2009 that measures the attractiveness of a country for venture capital and private equity investors. A composite index entitled the Venture Capital and Private Equity Country Attractiveness Index (VCPE) was set up on the basis of socio-economic parameters so as to compare the attractiveness of a country from the point of view of an institutional investor. The analysis is based on six categories of indicators: Economic activity, size and liquidity of capital markets, taxation, investor protection and corporate governance, the human and social environment, and entrepreneurial culture and opportunities. The analysis includes 66 countries.

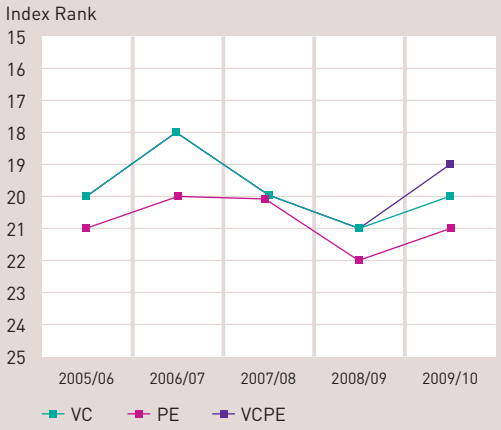
[33] For more details see: http://vcpeindex.iese.us/

Figure 12
Luxembourg's position in the VCPE ranking

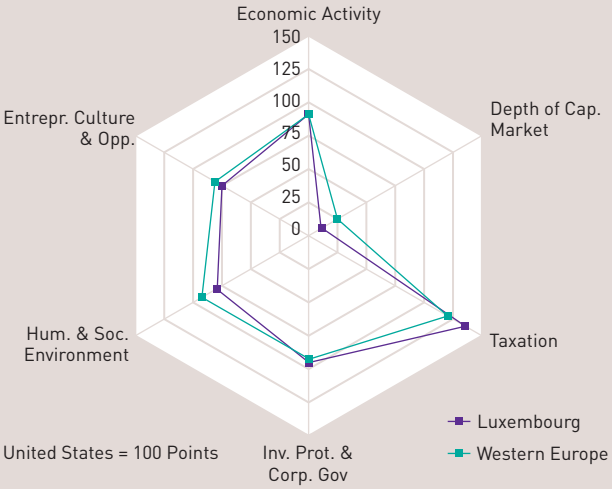
VCPE-Ranking

	2005/06 Rank	2009/10 Value	2009/10 Rank	Quartile 4th–1st
VCPE Ranking	**24**	**54,6**	**24**	→ X
Economic Activity	5	92,4	12	↓ X
Depth of Cap. Market	40	10,1	42	↓ X
Taxation	12	136,4	11	↑ X
Inv. Prot. & Corp. Gov.	13	94,7	13	→ X
Hum. & Soc. Env.	34	81,1	22	↑ X
Entrepr. Culture & Opp.	20	74,6	20	→ X

Separate VC and PE Indices



Key Factors Performance



Comparison within Peer Group

	2005/06 Rank	2009/10 Value	2009/10 Rank	Quartile 4th–1st
Norway	11	66.3	14	↓ X
Finland	12	65.9	15	↓ X
France	17	65.2	16	↑ X
Belgium	19	61.1	17	↑ X
Austria	20	58.6	19	↑ X
Ireland	16	58.3	21	↓ X
Luxembourg	24	54.6	24	→ X
Portugal	28	49.5	27	↑ X
Greece	44	40.7	39	↑ X

Source: IESE
Remarks: The United States has the base mark of 100.

The United States heads the global rankings with a considerable lead. Canada and the United Kingdom are in 2nd and 3rd place respectively. Luxembourg is in 24th place in this world ranking, behind a large number of other European countries, including: United Kingdom (3.), Switzerland (8.), the Netherlands (9.), Germany (10.), Sweden (11.), Denmark (12.), Norway (14.), Finland (15.), France (16.), Belgium (17.), Austria (19.), Spain (20.) and Ireland (21).

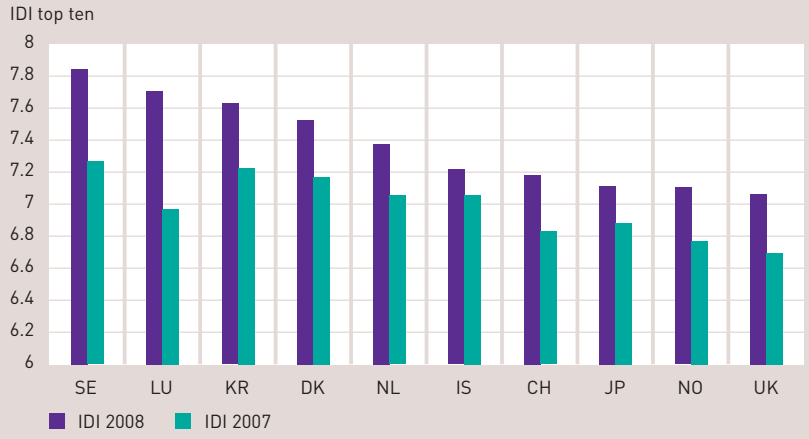
Luxembourg is considered 45% less attractive than the United States by institutional investors. Luxembourg is highly attractive from the fiscal perspective, scoring 136.4 on the index, but earned a weak score of 10.1 in the area of size and liquidity of capital markets.

Lastly, the report also identified two sub-indices within the VCPE global index, one for venture capital investors and the other for private equity investors. Luxembourg is better ranked in the venture capital index at 23, than in the private equity one where it scored 27.

f. ICT Development Index[34]

The International Telecommunication Union (ITU) published a new edition of its report "Measuring Information Society". This report includes a composite indicator called the ICT Development Index, which analyzes the levels reached in implementing information and communications technologies (ITC) in 159 countries. One of the major objectives of this indicator is measuring the potential for ITC development. The direct impacts of the development and dissemination of ITC can be gains in productivity. This composite index is set up using eleven basic indicators tied to access, capabilities and use of ITC. It includes such indicators as use of computers in households, penetration rates of broadband internet services, etc.

Figure 13
ICT Development Index (2010)



Source: ITU

In the 2010 edition[35], Sweden is in first place, followed by Luxembourg and South Korea. Luxembourg managed to move up four places since the previous edition of this report. Luxembourg has excellent performance in the area of costs.

[34] For more details see: http://www.itu.int/ITU-D/ict/publications/idi/2010/index.html

[35] Underlying data dates from 2008

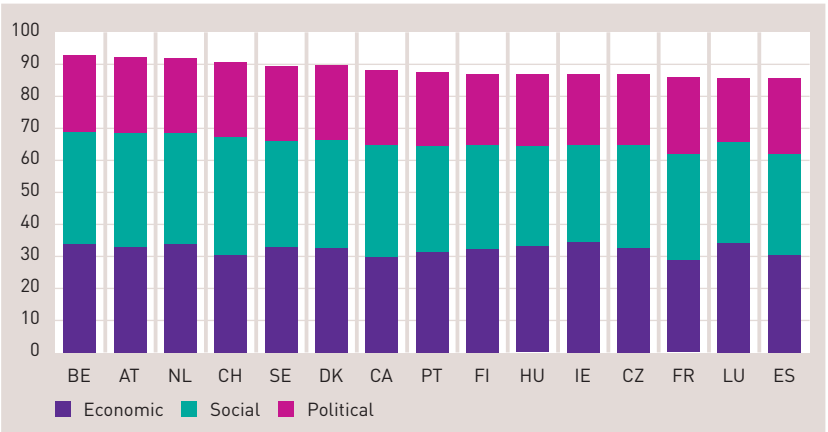
g. KOF Index of Globalization[36]

One consequence of globalization is that domestic markets for products, capital and labour are becoming more and more closely integrated. The dissolving of customs barriers, greater technical progress and lowering of transportation and communication costs are the principal motors behind this phenomenon. Direct international links are now being re-established in a durable fashion. In view of the heightened visibility of globalization, following the shifting of production abroad etc., and the inevitable requirement of countries to adapt to the new world order has lead to the appearance of the KOF Index of Globalization, put out by ETH of Zürich.

This index measures the economic, social and political dimensions of globalization as it affects 156 countries over a long period, based on 24 variables broken down into three dimensions, with the underlying data dating from 2007. The economic dimension measures the flow of goods, services and capital, as well as information and perceptions related to commercial trade. It also measures the degree to which a country limits flows of capital and trade. The social dimension measures the dissemination of ideas and information, of images and persons, etc. The political dimension covers the distribution of a country's government policies, for example, the number of embassies in the country, to what extent a nation is represented in international organizations, etc.

Overall, Luxembourg is 14th among the most globalized countries in the 2010 edition, moving up seven slots compared to last year's edition[37]. First place in the ranking goes to Belgium, with Austria and the Netherlands.

Figure 14
The fifteen most globalized nations in the world



Source: ETH (January 2010)
Remarks: The KOF index measures globalisation on a scale of 1 to 100.
The more a country is deemed globalised, the closer its score will be to 100.

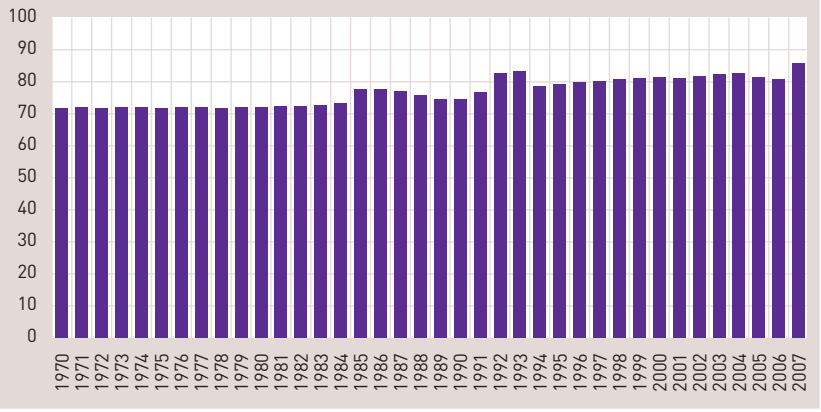
[36] For more details see: http://globalization.kof.ethz.ch/

[37] The study specifically indicates that the results for the 2010 edition are not comparable to those of the 2009 edition, and thus all comparisons with previous years are based on the new calculation method.

With regard to economic globalisation, Luxembourg ranks third after Singapore and Ireland. In the social dimension of globalisation, Switzerland leads in the ranking, followed by Austria and Canada. Lastly, with regard to the globalisation of politics, France is in the lead, followed by the Italy and Belgium. Luxembourg is ranked 54th.

According to this study, Luxembourg's level of globalisation increased considerably between 1970 and 2007, moving from an overall index of 71.7 to one of 85.8. The level of economic globalisation grew in a relatively weak manner, moving from an index score of 92.0 to 93.5, but at the same time social globalisation - from 60.8 to 81.6 - and political globalisation - from 58.4 to 80.9 - experienced very high levels of growth.

Figure 15
Changes in the globalisation index for Luxembourg (1970-2007)



Source: ETH (January, 2010)

h. European Cities Monitor[38]

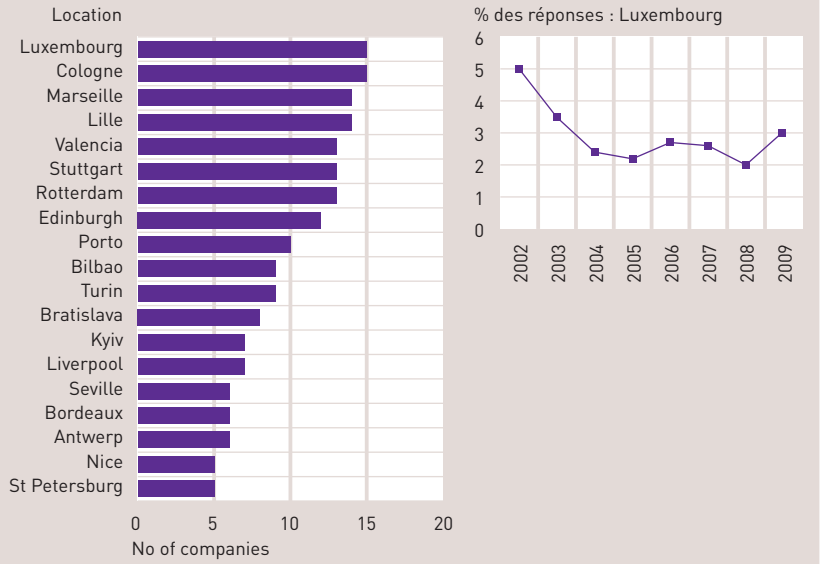
Cushman and Wakefield publish an annual qualitative survey on perceptions about the principal business cities in Europe. In the fall of 2009, 500 managers chosen from among the largest companies in Europe were asked to give their opinions on the major business cities in Europe. London was ranked first among thirty-four cities undergoing an in-depth analysis, followed by Paris then Frankfurt, as in 26 and 2007. Once again, the city of Luxembourg was not among the thirty-three cities analyzed in detail because too few managers could claim intimate knowledge of the city.

Still, one question on the survey that dealt with other business cities in Europe that are less well known[39]. Among managerial staff contacted in 2009, only 3% appear to know the economic environment of Luxembourg quite well or very well. This rate seems to have stagnated since earlier editions and is a very low percentage compared to other cities that are located near to us, such as Paris, which 77% knew well, Brussels (62%), Frankfurt (62%) and Amsterdam (46%).

[38] For more information, see: http://www.europeancities-monitor.eu/

[39] In the 2010 edition of this study, published in October, 2010, this question is not included in the survey.

Figure 16
"Are there other European cities which are important as business locations and which do you know fairly or very well?". Responses to the 2009 survey and Rate of Response 02-09.



Source: CUSHMAN&WAKEFIELD
Calculations: *Observatoire de la Compétitivité*

i. An "external audit" of the European Strategy for Growth and Employment

i.1 Lisbon review index[40]

A certain number of organizations and institutes make periodic attempts to measure the progress of the Member States of the EU in their implementation of the Lisbon Strategy, by means of composite indicators[41].

As an example, in 2010 the World Economic Forum published its 5th analysis entitled the "Lisbon Review Index". Apart from available public quantitative data, the study is based very broadly on the Forum's qualitative survey of corporate directors, the Executive Opinion Survey, and is different in this sense from other studies. The primary objective is to compare the performance of Member States in the implementation of their reforms, as well as to calibrate the performance of EU nations to international benchmarks such as the United States and the Asian countries.

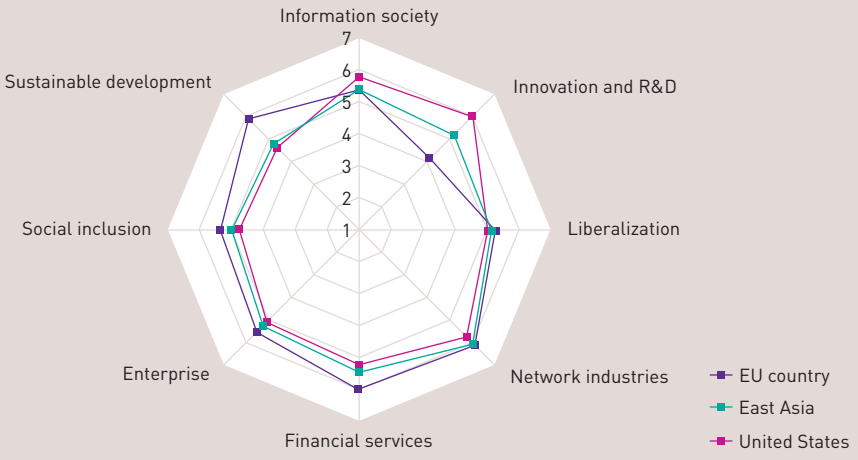
In the 2010 edition, three Scandinavian countries head up the rankings: Sweden, Finland and Denmark. Luxembourg occupies the 5th spot in the overall index, moving up one slot with relation to the 2008 edition. Luxembourg is in the 7th place in the underlying index for the information society, 12th in innovation and R&D, 6th for liberalisation, 5th for network industries, 2nd for financial services, 1st for business environment, 5th for social inclusion and 7th in sustainable development.

[40] For more details see: http://www.weforum.org/en/initiatives/gcp/Lisbon%20Review/index.htm

[41] See the National Plan for Innovation and Full Employment, submitted by the Luxembourg government to the European Commission as part of the national implementation of the Lisbon Strategy. http://www.odc.public.lu/publications/pnr/index.html

Figure 17
Lisbon review index

	Final Index		Subindexes															
			Informarion Society		Innovation and R&D		Liberalization		Network Industries		Financial Services		Enterprise Environment		Social Inclusion		Sustainable Development	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Sweden	1	5.83	1	6.20	2	5.64	1	5.55	2	6.19	1	5.93	4	5.15	3	5.42	1	6.57
Finland	2	5.72	5	5.51	1	6.12	7	5.26	8	5.96	3	5.86	2	5.27	2	5.59	3	6.17
Denmark	3	5.61	3	5.74	3	5.33	5	5.39	4	6.09	6	5.60	7	5.05	1	5.64	5	6.07
Netherlands	4	5.51	2	5.81	5	4.94	2	5.54	7	5.98	7	5.54	6	5.06	4	5.31	6	5.91
Luxembourg	**5**	**5.43**	**7**	**5.43**	**12**	**4.17**	**6**	**5.29**	**5**	**6.08**	**2**	**5.90**	**1**	**5.43**	**5**	**5.31**	**7**	**5.87**
Germany	6	5.39	9	5.27	4	5.10	4	5.39	1	6.49	9	5.36	17	4.50	9	4.85	2	6.19
Austria	7	5.39	6	5.45	8	4.65		5.42	6	6.08	4	5.70	10	4.79	8	4.91	4	6.14
France	8	5.22	10	5.21	9	4.62	11	5.10	3	6.17	5	5.61	12	4.78	13	4.71	9	5.54
United Kingdom	9	5.15	4	5.61	7	4.71	10	5.12	9	5.77	14	5.10	11	4.78	14	4.61	10	5.48
Belgium	10	5.15	14	4.71	6	4.78	8	5.22	11	5.76	11	5.28	8	4.88	6	5.08	11	5.46
Ireland	11	5.00	13	4.78	10	4..47	9	5.20	18	5.24	17	4.87	5	5.08	11	4.72	8	5.64
Estonia	12	4.96	8	5.33	14	3.99	14	4.84	13	5.47	10	5.33	3	5.17	16	4.47	14	5.07
Cyprus	13	4.83	16	4.44	21	3.71	13	4.91	10	5.76	12	5.28	13	4.73	7	5.03	18	4.77
Slovenia	14	4.79	12	4.84	11	4.28	18	4.49	15	5.37	19	4.75	15	4.61	15	4.56	12	5.43
Czech Republic	15	4.71	17	4.43	13	4.02	12	4.96	20	5.11	15	5.00	19	4.47	10	4.73	16	4.96
Portugal	16	4.70	15	4.64	16	3.92	19	4.47	12	5.69	16	4.97	16	4.50	17	4.18	13	5.20
Malta	17	4.58	11	5.15	23	3.50	16	4.73	16	5.30	8	5.49	23	3.99	12	4.71	27	3.80
Spain	18	4.53	20	4.21	15	3.93	15	4.73	14	5.37	13	5.10	25	3.94	21	3.92	15	5.06
Slovak Republic	19	4.45	18	4.42	25	3.46	17	4.70	23	4.64	20	4.75	9	4.81	18	3.98	17	4.86
Lithuania	20	4.39	19	4.38	20	3.76	24	4.15	19	5.11	21	4.58	18	4.49	20	3.93	19	4.73
Hungary	21	4.28	22	4.12	18	3.79	21	4.35	21	4.85	23	4.42	20	4.40	23	3.79	22	4.50
Latvia	22	4.21	21	4.15	24	3.48	22	4.21	24	4.57	26	4.27	14	4.72	26	3.61	20	4.68
Greece	23	4.18	25	3.55	17	3.81	25	4.10	17	5.25	18	4.81	26	3.62	24	3.75	21	4.54
Poland	24	4.07	26	3.50	22	3.64	20	4.44	26	4.12	22	4.46	24	3.95	19	3.96	23	4.49
Italy	25	4.03	23	3.74	19	3.78	23	4.16	22	4.81	24	4.31	27	3.54	25	3.64	24	4.28
Romania	26	3.96	27	3.48	26	3.37	26	4.04	27	4.05	25	4.30	21	4.38	22	3.89	25	4.19
Bulgaria	27	3.77	24	3.63	27	3.12	27	3.82	25	4.23	27	3.80	22	4.22	27	3.55	26	3.82
EU-27	-	4.81	-	4.73	-	4.23	-	4.80	-	5.39	-	5.05	-	4.60	-	4.51	-	5.16
United States	-	5.27	-	5.79	-	6.03	-	5.05	-	5.73	-	5.22	-	5.07	-	4.71	-	4.59
East Asia	-	5.28	-	5.56	-	5.24	-	5.10	-	6.06	-	5.41	-	5.17	-	4.93	-	4.74



Source: WEF

i.2 Lisbon league table[42]

The *Centre for European Reform* publishes its annual *Lisbon league table*. Unlike the World Economic Forum, which uses both quantitative and qualitative indicators, this ranking is based exclusively on the Lisbon objectives and the short list of structural Eurostat[43] indicators that measure the performance of Member States in the economic, social and environmental areas[44]. This scoreboard is intended to provide a summary of the reforms that Member States have engaged on and to predict the capacity of EU nations, which have higher labour costs, to uphold their standard of living in a progressively globalizing world. In the early 2010 edition[45], Sweden, Austria and Denmark were the top ranked member states. Luxembourg is in the middle of the table, at the 12th spot in this ranking, as in the previous year. Germany was ranked 6th, France in 9th, and Belgium ranked 13th again.

The WEF and CER indices presented above should theoretically measure the same thing, i.e. progress achieved by the EU Member States in implementing the European Strategy for Growth and Jobs. A comparison between the two is quite interesting.

Table 8
A comparison of CER/WEF rankings (2010)

Rank	Lisbon scorecard Centre for European reform 2010	Lisbon review Forum économique mondial 2010
1	Sweden	Sweden
2	Austria	Finland
3	Denmark	Denmark
4	Netherlands	Netherlands
5	Finland	**Luxembourg**
6	Germany	Germany
7	Ireland	Austria
8	United Kingdom	France
9	France	United Kingdom
10	Czech Republic	Belgium
11	Slovenia	Ireland
12	**Luxembourg**	Estonia
13	Belgium	Cyprus
14	Cyprus	Slovenia
15	Estonia	Czech Republic
16	Lithuania	Portugal
17	Latvia	Malta
18	Slovakia	Spain
19	Spain	Slovakia
20	Portugal	Lithuania
21	Poland	Hungary
22	Greece	Latvia
23	Hungary	Greece
24	Italy	Poland
25	Bulgaria	Italy
26	Rumania	Rumania
27	Malta	Bulgaria

Source: CER, WEF

[42] For more details see: http://www.cer.org.uk/

[43] Short list of structural indicators: GDP per capita in PPS, Labour productivity per person employed, Youth education attainment level (ages 20-24), Gross domestic expenditure on R&D (GERD), Comparative price levels, Business investment, Employment rate, Employment rate for older workers, At-risk-of-poverty after social transfers, Long-term unemployment rate, Dispersion of regional employment rates, Greenhouse gas emissions, Energy intensity of the economy, Volume of freight transport relative to GDP.

For more information, see: http://epp.eurostat.ec.europa.eu/portal/page/portal/structural_indicators/introduction

[44] As was already stated in the 2006 Competiveness Report, many of the structural indicators used as part of this study are not pertinent to the specificities of Luxembourg's economy. For example, the employment rate or the GDP per capita weigh heavily in rankings yet fail to take into account the significant cross-border flows in Luxembourg. For a critical perspective of these structural indicators relating to Luxembourg, see MINISTERE DE L'ECONOMIE ET DU COMMERCE EXTERIEUR, Bilan Compétitivité 2006 - En route vers Lisbonne, Luxembourg, September, 2006, pp. 33-38

[45] Note that the Lisbon Strategy expired in 2010 and its successor, the Europe 2020 strategy, will use a new set of indicators to monitor implementation progress. In June, 2010, the European Council determined its broad objectives for the new European Strategy for Growth and Employment. For more details see: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/fr/ec/115348.pdf

See Chapter 5 of this 2010 Competitiveness Report.

The comparative table above indicates that there are considerable differences between the two rankings. For example, the rankings for the following countries differ be five positions in at least two of the rankings: Austria (2nd and 7th); Latvia (17th and 22th); Luxembourg (12th and 5th); Malta (27th and 17th); Czech Republic (10th and 15th).

j. Logistics performance index[46]

In 2010, the World Bank published the second edition of its report "Connecting to Compete". This report analyses the logistics of trade, in other words the capacity of a country to efficiently distribute its merchandise and to establish links with manufacturers and consumers in international markets. The underlying logic is that the highest performing countries in the area of logistics can stimulate growth, become more competitive and invest more. 155 countries were analysed in the 2010 edition. The study is based on a survey conducted with international freight forwarders and express carriers and on quantitative data that deal with the performance of key components of the logistical chain within a country. The composite Logistics Performance Index (LPI) that is calculated includes both the international and domestic components of logistics. The International LPI includes the evaluations of local operators within the principal commercial trading partners. This index attempts to measure country performance in the six key dimensions of logistics, as follows: Efficiency of customs procedures, infrastructure quality, ease of arranging competitively priced shipments, competence and quality of logistics services, ability to track and trace consignments and timeliness of shipments in reaching destination within the scheduled or expected delivery time. The Domestic LPI provides assessments of operators working within countries and as such furnishes detailed information on the principal components of domestic logistics.

In the 2010 edition, Luxembourg is ranked 5th moving up 18 positions with relation to the previous report. Germany heads the 2010 rankings, followed by Singapore, Sweden and the Netherlands. Belgium is in 9th palace and France is in 17th.

Table 9
LPI Rankings (2007 and 2010)

Rank	Country
1	Germany
2	Singapore
3	Sweden
4	Netherlands
5	**Luxembourg**
6	Switzerland
7	Japan
8	United Kingdom
9	Belgium
10	Norway

Source: World Bank

[46] For more details see: http://info.worldbank.org/etools/tradesurvey/mode1b.asp

Within these six dimensions under the sub index International LPI, Luxembourg is ranked first in efficiency of customs procedures, 9th for infrastructure quality, 7th in ease of arranging competitively priced shipments, 21st for competence and quality of logistics services, 19th for its ability to track and trace consignments and first in timeliness of shipments in reaching destination within the scheduled or expected delivery time.

k. International Property Rights Index 2010[47]

The Property Rights Alliance (PRA) published a new edition of its composite indicator International Property Rights Index in 2010. The purpose of this indicator is to measure the level of property rights throughout the world. The report analysis the legal and political environment in addition to protection of physical and intellectual property rights within a country. A total of ten indicators are found under these three sub-categories, forming the basis of the overall composite index. These indicators include evaluations of judicial independence, political stability, corruption levels, copyright protection, etc. These underlying indicators are of both a qualitative and quantitative kind.

In this fourth edition of the study, Finland, Denmark and Sweden occupy the first three slots at the head of 125 countries evaluated. Luxembourg is in the 11th position. Luxembourg's overall score has not changed significantly since the previous editions of the report. Regionally, Luxembourg is in 8th place.

Figure 18
The IPRI Rankings for 2010

Source: PRA

[47] For more details see: http://www.internationalpropertyrightsindex.org/

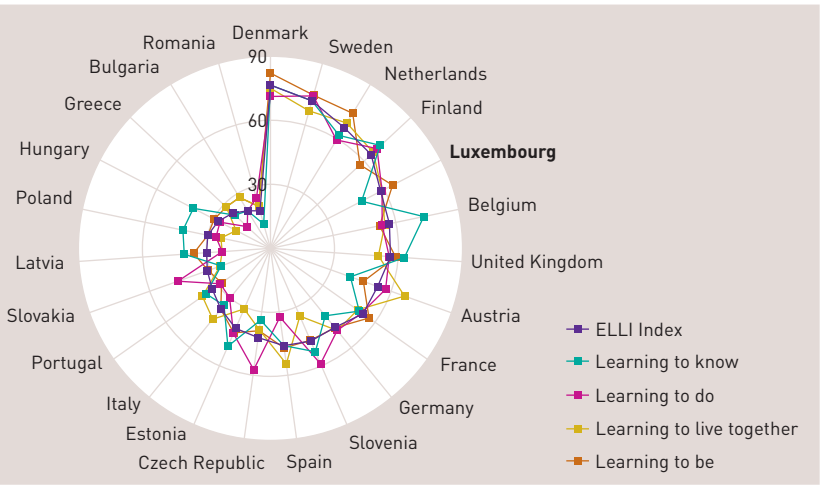
l. European Lifelong Learning Index[48]

The knowledge society in which we live is requiring more and more a lifelong learning effort as a necessary condition for economic growth and development of a country. To address this issue, the Bertelsmann Stiftung (Bertelsmann foundation) published its first composite index in 2010, baptised the European Lifelong Learning Index (ELLI). The purpose of this study is to make a tool available to Member States of the EU that can be used to compare the performance of lifelong learning systems of countries.

The index is made up of 36 indicators divided into four categories that assess the different dimensions of lifelong learning: Traditional formal apprenticeship programmes, professional continuing education, informal social learning programmes and individual learning programmes.

The overall rankings are lead by Denmark, followed by Sweden, the Netherlands and Finland. Luxembourg is ranked 5th overall, in the category of Member States that perform better that the European average. In other rankings by category, Luxembourg is 10th in traditional formal apprenticeships, 4th in professional continuing education, 6th in informal social learning and 4th in individual learning.

Figure 19
Results of the ELLI Study 2010



Source: *Bertelsmann Stiftung*

[48] For more details see: http://www.elli.org/

m. Purchasing power, cost of living and quality of life indices

Purchasing power, cost of living and quality of life are important factors in decisions about establishing economic activity locations and consequently enter into the debate on attractiveness of localities. It is therefore not surprising that many organizations publish country or city rankings based on composite indices rating cost of living, purchasing power and quality of life.

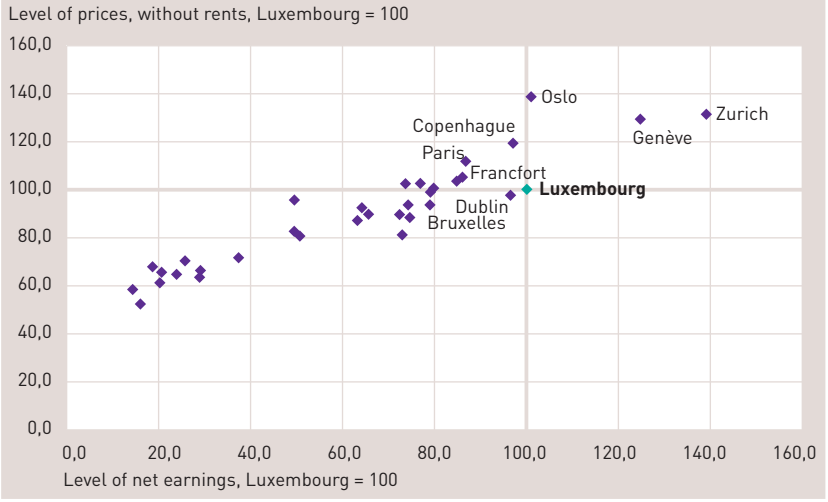
m.1 Domestic purchasing power – UBS[49]

The Swiss bank UBS published a new edition of its "Prices and Earnings" study in 2010. It compares purchasing power in 73 cities the world over. The study uses a basket of 122 goods and services, weighted according to consumption habits in continental Europe, and a survey of 112 questions on earnings, salary contributions and working time for fifteen different professions. In the 2010 version of the study, UBS updated its major indices relating to prices, earnings and purchasing power with relation to previous editions.

Concerning price indices excluding rents calculated by UBS, Oslo is considered the most expensive city in the world, followed by Geneva and Zurich. Luxembourg is 19th in world rankings in terms of urban cost, and 8th among European Union cities. When rents are included in calculating this index, New York, Oslo and Geneva are considered the most expensive cities in the world. Luxembourg is ranked 22nd in this world ranking and the 7th most expensive city in the EU.

Regarding the index of gross earnings, Zurich, Copenhagen and Geneva are the three cities in which salaries are deemed the highest in the world. Luxembourg is ranked 10th in the world and 4th on the European level. With regard to net earnings, i.e. after taxes and social contributions, the rankings are Zurich, Geneva and New York. Luxembourg is ranked 7th in the world and is even ranked as the country with the highest net earnings in the EU.

Figure 20
Net earnings and prices in Europe



Source: UBS
Calculations by: *Observatoire de la Compétitivité*

[49] For more details see: http://www.ubs.com/1/f/wealthmanagement/wealth_management_research.html

Lastly, UBS calculated a purchasing power index comparing earnings with prices, excluding rents. Copenhagen, Zurich and Geneva lead the world rankings in gross purchasing power for gross hourly wages. Luxembourg holds the 13th position in the world and the 5th slot in the EU. In the area of net purchasing power, meaning net hourly earnings, Zurich, Sydney and Miami top the world listings. Luxembourg is ranked 5th in the world, and 1st in Europe.

Table 10
The Top 20 in the World for Domestic Net Purchasing Power

Rank	City
1	Zurich
2	Sydney
3	Miami
4	Los Angeles
5	**Luxembourg**
6	Dublin
7	Geneva
8	New York
9	Chicago
10	Nicosie
11	Montréal
12	Berlin
13	Brussels
14	Toronto
15	Helsinki
16	London
17	Copenhagen
18	Amsterdam
19	Frankfurt
20	Munich

Source: UBS (2010)

m.2 The Mercer Cost of Living Index[50]

With regard to the cost of living, Mercer published an update of its study entitled Cost of Living in 2010, which measures the cost of living in cities inhabited by expatriates throughout the world. This edition covers 214 cities on six continents and measures the cost of 200 products and services, to include housing, transportation, etc.

In the 2010 edition Luanda, Angola, Tokyo, Japan and Ndjamena, Chad are the three cities with the highest cost of living in the world. In Europe, the most expensive cities are Moscow, in 4th place, Geneva, 5th, Zurich 8th, Copenhagen, 10th and Oslo in 11th place. Luxembourg occupies the 55th rank worldwide in the 2010 rankings, while in 2009 the index ranked it 39th out of 143 cities analysed at that time.[51, 52]

m.3 The Mercer Quality of Living Index[53]

In the area of quality of living, Mercer has been conducting surveys on a large number of cities throughout the world for some years now, with the purpose of evaluating quality of living for expatriates in their host cities throughout the world[54]. This survey is carried out to help multinational corporations and governments to set compensation levels for personnel assigned abroad.

50 For more details see: http://www.mercer.com/costofliving

51 For more details see: http://www.guardian.co.uk/news/datablog/2010/jun/30/city-costs-living#data

52 GfK regularly publishes a ranking for purchasing power in Europe. For more details see: http://www.gfk-geomarketing.com/en/gfkgeomarketing/gfk_purchasing_power_europe_20092010.html

UBS bank also publishes a report periodically on purchasing power. For more details see: http://www.ubs.com/1/e/wealthmanagement/wealth_management_research/prices_earnings.html

53 For more information see: http://www.mercer.com/qualityofliving

54 The 2010 survey includes a new "eco-ranking" of cities with the best ecological performances. This ranking is based on water quality, waste management, waste water management, air quality and road traffic. In this second ranking, Luxembourg holds the 44th place worldwide, shared with Vienna. The ranking is headed by the city of de Calgary (Canada), followed by Honolulu (United States) and Ottawa (Canada) / Helsinki (Finland).

The survey is based on those factors considered by expatriates to have a major impact on their quality of life abroad. In the 2010 edition, 221 cities were considered, using 39 indicators to analyse quality of life. Indicators were grouped within the following ten categories: Political and social environment, economic environment, socio-cultural environment, health and sanitation, schools and education, public services and transportation, recreation, consumer goods, housing and natural environment. In the 2010 edition, European cities continue to dominate world rankings. The cities of Vienna, Zurich and Geneva occupy the first three slots in the world rankings. Luxembourg is ranked 19th in the final rankings, thus occupying the same rank it held in the previous edition in 2009.

Table 11
The 20 cities with the highest quality of life in 2010

Rank	City
1	Vienna
2	Zurich
3	Geneva
4	Vancouver
	Auckland
6	Düsseldorf
7	Frankfurt
	Munich
9	Bern
10	Sydney
11	Copenhagen
12	Wellington
13	Amsterdam
14	Ottawa
15	Brussels
16	Toronto
17	Berlin
18	Melbourne
19	**Luxembourg**
20	Stockholm

Source: MERCER

m.4 The ECA Quality of Life Index[55]

ECA International publishes an annual ranking of cities in which the quality of life is considered highest. This study evaluates several factors in order to provide a view of the quality of life in some 400 cities worldwide, drawing notably from comments by expatriates and independent studies. For comparison, the rankings used here include 254 world cities from a European perspective[56]. Rankings of cities are established using various criteria such as the climate, health services, housing, public services, remoteness, social life, recreation and infrastructure, as well as personal security, political tension and air quality. In the 2010 version of the study, Copenhagen and Bern are again the European cities that offer the best living conditions. Luxembourg occupies, as it did in the last edition, the 7th rank worldwide in the rankings of cities in which the quality of life is agreeable.

[55] For more details see: http://www.eca-international.com/showpressrelease.aspx?ArticleID=7144

[56] The results of this survey vary depending on the ethnicity of the expatriates questioned. Indeed, Asian expatriates prefer localities other than those European expatriates favour.

Table 12
The 20 cities most agreeable to Europeans - 2010

Rank	City
1	Copenhagen
	Bern
3	Antwerp
	Brussels
	Basel
6	Geneva
7	**Luxembourg**
8	Frankfurt
	Düsseldorf
	Bonn
11	Amsterdam
	Munich
13	Hambourg
	Vienna
15	Berlin
	Strasbourg
	Dublin
18	Zurich
19	Helsinki
20	Paris

Source: ECA International

m.5 The International Living Quality of Life Index[57]

The organisation International Living also published a new edition of its annual quality of life ranking in 2010. This index measures the quality of life in different countries around the world. It is set up using nine indicator categories: Cost of living, culture and leisure, economy, environment, freedom, health, infrastructure, safety and risk and climate. Luxembourg is ranked sixth out of the 194 countries evaluated. France, Australia and Switzerland occupy the first three positions in the ranking.

Table 13
The ten most agreeable countries to live in - 2010

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

Source: International living

[57] For more details see: http://internationalliving.com/2010/02/quality-of-life-2010/

m.6 The World's Best Countries Index: Newsweek[58]

The American magazine Newsweek published a comparative study in 2010 entitled the "World's Best Countries". This study attempts to designate the countries that currently offer the best opportunities to an individual for a healthy, safe life with a reasonable level of prosperity. Five categories of indicators are implemented to evaluate well-being: education, health, quality of life, economic competitiveness and political environment. In all, 100 countries throughout the world are included in the study and the statistics used date from 2008 and 2009.

Finland places first in the overall ranking, ahead of Switzerland and Sweden. Luxembourg ranks fifth, ahead of its neighbouring countries. Germany was ranked 12th , France 16th and Belgium ranked 19th. In the various rankings by category, Luxembourg was placed 29th in the area of education, in 7th for health, it took 3rd place in quality of life, 9th in the area of economic competitiveness and 7th in political environment.

Table 14
EU rankings among the best countries in the world

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

Source: Newsweek

[58] For more details see: http://www.newsweek.com/feature/2010/the-world-s-best-countries.html

2.3 Trends for Luxembourg in a Series of Rankings

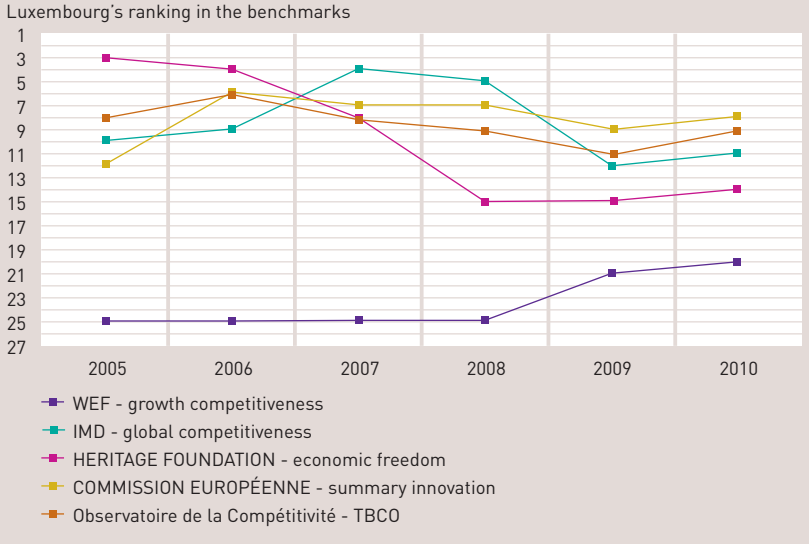
An analysis of the ranks Luxembourg holds in the various rankings measuring competitiveness over the years[59], indicates that since 2007 the comparative situation of Luxembourg's competitiveness appears to be worsening, as the country has dropped in the rankings.

Since the 2009 Competitiveness Report, including the reports published in the fall of 2009 and 2010, Luxembourg's position has changed as follows within the rankings for which temporal series are available:

- Luxembourg rose one position in the world WEF ranking, one position in the IMD ranking, one position in the world ranking by the Heritage Foundation, one position in the European Commission's European rankings, one position in the Länderindex by ZEW in its European rankings and one position in the European Policy Centre's European ranking. A similar observation can be made through an analysis of the TBCO rankings calculated by the *Observatoire de la Compétitivité*[60], where Luxembourg shows marginal improvements in its rankings by moving up two slots in the EU-27.

- Luxembourg dropped one rank in the Fraser world rankings and four ranks in the Z/Yen world ranking of financial centres.

Figure 21
Changes in Luxembourg's rankings in four major global benchmarks and the TBCO Index of the *Observatoire de la Compétitivité* from 2005-2010



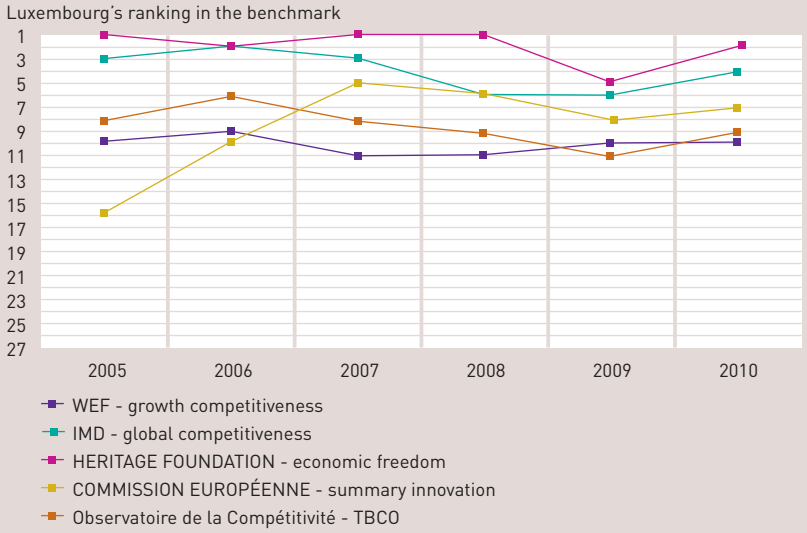
Note: The horizontal axis refers to the year of publication of the report or ranking

[59] The temporal series that shows changes in ranks of countries in different benchmarks should be put in perspective. Changes in methodoloby can occur in calculating indices without these rankings being recalculated over all years, or the number of countries or cities being compared could change over the years.

[60] See Chapter 3 of this Competitiveness Report 2010.

Considering the EU 27 Member States in these four major international rankings, rather than consulting the global rankings as done above, one can observe a slight improvement in Luxembourg's position between 2009 and 2010.

Figure 22
Trends in Luxembourg's ranking among the EU-27 Member States in four major international rankings 2005-2010



Note: The horizontal axis refers to the year of publication of the report or ranking

2.4 Conclusions

As we have demonstrated in this chapter and in Competitiveness Reports drafted in previous years, numerous comparative studies on the subject of "relative competitiveness", also referred to as comparative competitiveness, appear on an annual basis, relating either to countries, regions and even cities. Although the world financial crisis has made it such that since the autumn of 2008 debate on economic policy has been concentrated more on anti-cyclic short-term measures to shore up the economy, on measures to exit the crisis that focus on public balances and public debt, or on countries with financing difficulties on the financial markets, than on structural issues, interest for this type of study is increasing as the phenomenon of globalisation gains precedence. Indeed, the hope that these composite competitiveness and sustainable development indicators can help to explain—and to foresee—the future economic development of a country explains in large part the particular attention paid to them.

There is no doubt that a country's ranking is the item that gets the most publicity in each report. Yet the interpretation of the results of these reports and benchmarks goes much further. In using these types of composite indicators, one must never lose sight of their inherent limitations, to wit the underlying data being used, the methodological differences between the various benchmark indicators and the methodological weaknesses related to this type of comparative exercise. In reality, these indices convey a much more complex story then projected by their apparent simplicity following an initial perusal of the data.

First, with regard to the underlying data, it should be noted that there is a time lag between many of the statistics used and the publication date of composite indicators. The composite indicators used and analysed in the 2010 edition of the Competitiveness Report often use 2008 or 2009 indicators. It follows that the benchmarks and rankings included in these reports should not be considered as short-term forecasting tools, or as a short-term stress-measuring instrument for a crisis.

Next, regardless of the attraction of their apparent simplicity, many indices display considerable methodological differences. Even if they attempt to gauge the same phenomenon - competitiveness - differences appear in the very definition of what is being measured. Thus while the World Economic Forum attempts to measure the capacity of a country to achieve sustainable growth, IMD is analyzing the capacity of a country to create and maintain an environment that sustains competitiveness of companies, since creating wealth is supposedly acquired by companies that operate in a domestic environment that either promotes or hinders their competitiveness. As we have seen, Luxembourg's ranking varies as strongly from one ranking to another depending on the methodology used. Indeed, while Luxembourg's IMD report ranking from a sampling of 58 countries is the 11th position, the country is ranked no better than 20th among the 139 pays analyzed in the recent World Economic Forum report.

Thirdly, there are regular criticisms that the various reports suffer from methodological weaknesses. The three areas in which the critiques arise are the quality of sources used, the choice of underlying indicators and the method of calculating the composite indicator. Therefore, in order to analyze the results of the various composite indices and country rankings, the first step is to perform a critical analysis of the methodologies used. This analysis should include a review of the quality of primary and secondary data sources, the potential for ideological bias, the manner used to calculate a composite index and the weightings of the various base indicators. As an example, the base indicators used as part of these benchmark indices are often inappropriate for Luxembourg's economy. The best-known indicator is the celebrated GDP per capita, which makes no provision for the significant flow of workers crossing into Luxembourg's territory each day, with the result of substantially inflating the country's performance in relation to other countries. In addition, it is clear that some international organizations periodically change their methodology, which can have a significant impact on the position of a country in a ranking.

Fourth, details of countries analyzed in each report have an impact on direct comparisons between them. For example, in their recent editions the WEF compares 139 countries while IMD addresses only 58 and the Heritage Foundation manages 183, which obviously exerts an influence on the relative position of countries in the different rankings. We could decide to compare only European countries included in each of the rankings to ensure a better comparison between the rankings of these countries. In this case, Luxembourg's position would be as follows: Luxembourg would then move from the 20th position to the 12th position in the World Economic Forum rankings, from 11th to 4th in the IMD ranking and from 14th to 5th in the Heritage Foundation rankings.

Fifth, there are groups of countries within many rankings for which the performance of individual countries are relatively close. All things being equal, a slight increase or drop of the national composite index could therefore result in a significant increase or decrease in a country's ranking. Therefore, no given ranking should be consulted separately from the values in the composite index as major differences in ranking could mask slight differences in the composite index.

In view of the inherent weaknesses we have invoked above, what shall we think of the aggregate rankings and indices and, above all, how should we interpret them?

On one hand, despite the numerous limitations of these composite indices, it has nonetheless proven useful to monitor them. In the first place, when these rankings appear in the press, they have a significant impact on a country's image and may influence the perception that investors have of that country, especially foreign investors who generally have limited information on the country. Next, as has been demonstrated by the OECD's PISA study in the area of education, it is possible that a ranking in "comparative competitiveness" could incite a country to accelerate its reforms on the grounds of augmenting national prestige. Indeed, as the European Commission reminds us, *"Indicators that summarise important issues with a single figure are essential communication. They trigger policy debate and give people a feel for whether or not progress is on track"*[61].

[61] EUROPEAN COMMISSION, GDP and Beyond – Measuring Progress in a Changing World, COM(2009) 433 final, Brussels, 20 August, 2009, p.4

On the other hand, we must nevertheless avoid succumbing to a syndrome of having a ranking to have a ranking. These different rankings, composite indicators and other elements certainly provide useful indications on the competitiveness of a country, but they are not an end in themselves. We must not lose sight that the overall indications furnished in these types of reports often have too general a nature to be usable in the specific case of each type of activity and project. The composite indicators should be intended to focus attention and to attract a more rigorous and critical analysis. In fact, there is no single recipe for improving competitiveness. Different policies can be compared and followed, but each country must adapt them to its own socio-economic environment and its own national particularity. Competitiveness strategies succeed when they achieve the right balance between economic imperative imposed by world markets and the social cohesion of a country resultant of its history, its system of values and traditions.

To this end, in 2003 the Tripartite Coordination Committee recognized the need for a wider scope of indicators that take into account the country's particular circumstances in order to properly assimilate Luxembourg's competitiveness situation. It tasked Professor Lionel Fontagné of the *Université Paris I (Sorbonne)* with drawing up proposals on the subject. The Fontagné Report's[62] November 2004 recommendation was to set up a Scoreboard; this was done and the *Observatoire de la Compétitivité* periodically updates data and analyses changes in the competitiveness situation.

Trends in the domestic TBCO that is calculated using data taken from the Scoreboard[63], as well as the majority of benchmarks reviewed in the 2010 Competitiveness Report, show that this year Luxembourg has marginally improved its position this year starting in the rankings. There is no doubt that a country's final ranking is the item that gets the most publicity in each report. However, we must not lose sight of the fact that interpreting benchmarks goes much further than a simple overall ranking on a scale of virtue. So this year, we can indeed conclude from an analysis of benchmarks and rankings that Luxembourg has scored higher in various rankings than last year. However, this positive change does not necessarily mean that the country's performance has truly improved over the past year. In fact, the higher rankings for Luxembourg could also be occurring because other countries have suffered more from the 2008-2009[64] economic and financial crisis than Luxembourg, and their performance may have deteriorated more than Luxembourg, which would explain the relative improved rankings of the country. It is vital to take full account of relative nature of the concept of competitiveness comparisons, where the final rankings always assess the situation of a country as a function of the comparative situation of other countries.

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

For more details see: http://www.odc.public.lu/publications/perspectives/PPE_3.pdf

63 See Chapter 3 – Competitiveness Scoreboard.

64 Data made available to the public for the various benchmarks rarely can be used to analyse the problematic under consideration in detail.

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3 The Competitiveness Scoreboard: 2010

3.1 Competitiveness Scoreboard Methodology

The principal mission of the *Observatoire de la Compétitivité* is to collect and analyse statistical information and to inform the public, the social partners and the government about changes in the competitive situation of Luxembourg. The Fontagné Scoreboard is an analysis tool made up of 81 selected indicators chosen in conjunction with the social partners and updated annually by the *Observatoire de la Compétitivité*. The results of the 2010 Scoreboard update show once again the importance of keeping things in perspective while analysing the Scoreboard using two complementary methods. The first method compares Luxembourg with neighbouring countries and with the Community average, while the second method provides a composite ranking that includes Member States of the European Union according to their level of competitiveness.

Table 15[65]
Lisbon and Domestic Indicators

National Indicators			
Macroeconomic Performances		**Indicators «Lisbonne»**	Education & Training
Productivity & Labour cost	1.	GDP per capita in PPS	Employment
Knowledge Economy	2.	Labour productivity per person employed	- Persons holding a part-time job - Etc.
- Number of patents - ICT investments - Etc.	3.	Employment rate by gender	Institutional & Regulatory Framework
Market Operations	4.	Employment rate of older workers by gender	Social Cohesion
Environment	5.	Youth education attainment level by gender	Entrepreneurship
	6.	Gross domestic expenditure on R&D	
	7.	Comparative price levels	
	8.	Business investment	
	9.	At-risk-poverty rate	
	10.	Long-term unemployment rate by gender	
	11.	Dispersion of regional employment by gender	
	12.	Greenhouse gas emissions	
	13.	Energy intensity of the economy	
	14.	Volume of freight transport relative to GDP	

Source: *Observatoire de la Compétitivité*

In the 2010 edition of the Competitiveness Report, calculation methods are analysed in detail. The *Observatoire de la Compétitivité* ordered an external audit in 2010 by the Joint Research Centre of the European Commission at Ispra, a centre of excellence in the domain of composite indicators, to analyse the method of calculation applied and to recommend improvements. The Observatoire implemented the various recommendations emerging from this audit and applied the impact of these changes to the results.

Subsequently, the Lisbon Strategy expired and was succeeded by a new strategy, the Europe 2020 Strategy. The European Council approved the new list of indicators that replaced the fourteen structural Lisbon Strategy indicators.

Data analysed in the 2010 Competitiveness Scoreboard mostly dates from 2009 and before.

[65] The scoreboard is made up of 79 indicators grouped in 10 categories. Four indicators of the scoreboard submitted with the initial Fontagné report have been withdrawn as they no longer exist.

Table 16
The Competitiveness Scoreboard

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 (9 indicators)

- Percentage of full-time workers on minimum wage[66, 67]
- D2: Price of electricity (ex-VAT) – industrial users (2008)
- D3: Price of gas (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: Composite 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 – value of public markets using open procedure procurement (2007)
- D10: Total of State aid as a % of GDP (excluding horizontal objectives) (2007)
- Market share of the primary operator in the fixed telephony market (2006)[68]

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 number of companies (start – up rate less windup rate (2005)
- F4: Volatility amongst companies (start – up rate plus windup rate (2005)

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

[67] Indicators shaded in gray have not be updated for years and are therefore not used in either the analysis of the Scoreboard nor in calculating the composite indicator.

[68] Indicators marked with an asterisk could not be updated.

Table 16
Continued

Category 7: Education & Training (6 indicators)

- G1: Annual cost per student in public educational facilities (2006)
- GG2: Portion of the population aged 25 to 64 with at least a secondary education (2008)
- GG3: Portion of the population aged 25 to 34 with a university education*[69]
- GG4: Percentage of human resources in scientific and technological fields as a % of total employment (2007)
- GG5: Lifelong learning (participation of adults in training and teaching programmes) (2008)
- GG6: Secondary school dropouts
- GPercentage of foreign nationals in S & T human resources*
- GPercentage of highly qualified workers (TIC) in total employment figures*

Category 8: Knowledge economy (14 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: Use Internet by companies (broad band) (2008)
- H10: Investment in public telecommunications as a percentage of gross fixed capital formation (2005)
- H11: Percentage of households that have broad band 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)

[69] Data for Luxembourg in this indicator are not available.

The 81 indicators evaluating Luxembourg's competitiveness are analyzed from two perspectives. First Luxembourg is considered with relation to European averages.

- If a score for Luxembourg is 20% better or equal to the EU-x average, the indicator is classified as green, or favourable.
- When a score for Luxembourg is between +20% and -20% of the EU-x average, the indicator is classified orange, or neutral.
- If a score for Luxembourg is 20% lower or equal to the EU-x average, the indicator is classified as red, or unfavourable.

Next, changes in Luxembourg's performance are analyzed over time, meaning the most recent data is compared with that of earlier years. Arrows are used to indicate the tendency of the most recent changes, be it an improvement or worsening of indicator data.

- ↑ If Luxembourg's performance in an area has improved since the last scoreboard was published, the indicator under review is designated by an upward pointing arrow.
- → If Luxembourg's performance in an area is unchanged since the last scoreboard was published, the indicator under review is designated by a horizontal arrow.
- ↓ If Luxembourg's performance in an area has worsened since the last scoreboard was published, the indicator under review is designated by a downward pointing arrow.

In addition to comparison with the European average, Luxembourg also undergoes a comparison with the best and worst UE-X results. The following acronyms are used to represent the EU countries:

Table 17
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**	Rumania
EE	Estonia	**LT**	Lithuania	**SL**	Slovenia
ES	Spain	**LU**	Luxembourg	**SE**	Sweden
FI	Finland	**MT**	Malta	**UK**	United Kingdom

Source: Eurostat

3.2 Components of the Scoreboard

Indicators in ten categories are analysed in this sub-chapter. The colours red, green and orange provide information on Luxembourg's position with relation to the Community average. In general, between 2000 and 2007, the number of green indicators gradually increased and the number of red indicators decreased. In 2008, the number of green indicators again fell to 25, and the number of orange indicators rose to 32. In 2009, the number of green indicators and the number of red indicators decreased slightly. Can we deduce from this that the country's competitive position has improved?

Table 18
Comparison of Competitiveness Indicators: 2000-2009

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Macroeconomic performance		8	8	8	7	8	8	8	8	7	8
		2	2	3	4	3	3	2	3	3	2
		1	1					1		1	0
Employment		2	2	2	2	1	2	1	1	1	1
		3	3	3	4	5	4	5	5	5	7
		4	4	4	3	3	3	3	3	3	1
Productivity and labour costs		2	1	1	3	1	4	4	5	3	2
		2	1	1	1	2	1	1			0
		1	3	3	1	2				2	3
Market operations		2	2	3	4	5	4	4	4	3	4
		4	4	4	3	4	4	3	3	3	2
		3	3	2	2		1	2	2	3	3
Institutional and Regulatory Framework		5	5	6	6	6	5	5	5	5	5
		3	3	2	2	3	3	3	3	4	4
		2	2	2	2	1	2	2	2	1	1
Entrepreneurship		1	1					1	1	1	1
		2	2	3	3	3	3	2	1	2	2
		1	1	1	1	1	1	1	2	1	1
Education and Training					1	1					0
		3	3	4	2	3	4	4	3	4	4
		2	2	1	2	1	1	1	2	1	1
Knowledge Economy		6	6	6	6	6	6	6	6	5	6
		3	3	3	3	3	3	3	3	4	3
		5	5	5	5	5	5	5	5	5	5
Social Cohesion						1				1	1
		5	5	5	5	4	5	5	5	4	4
											0
Environment											0
		2	2	2	3	3	2	2	2	2	2
		4	4	4	3	3	4	4	4	4	4
Total		26	25	26	29	29	29	29	30	25	28
		29	28	30	30	33	32	30	28	32	30
		23	25	22	19	16	17	19	20	21	19
Indicator total[70]		78	78	78	78	78	78	78	78	78	78

Source: *Observatoire de la Compétitivité*

[70] 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 Community average. Therefore, the total number of indicators is in fact 78.

It may be concluded from the table above that the country's economic situation has improved compared to the EU average. This observation must be tempered by the knowledge that the other Member States have suffered more severe impacts from the financial and economic crisis than Luxembourg. Analysing changes in Luxembourg's indicators with relation to the previous year is essential, even though the concept of competitiveness is relative. Indeed, of the 81 indicators, 17 have worsened and 42 remained stable for Luxembourg. It should be noted that many of these indicators were not updated for 2009 and it is consequently not possible to record a trend with relation to 2008. Of the 17 factors that worsened, 10 are in Category A, Macroeconomic Performance, and four are in Category C, Productivity and Cost of Labour.

A detailed analysis of each category of indicators is given in sections 3.2.1- 3.2.10 below, which helps put this initial observation in perspective by signalling the details of negative changes in indicator trends in the various categories.

Table 19
Changes in LU indicators with respect to the previous year

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

Source: *Observatoire de la Compétitivité*

3.2.1 Macroeconomic performance

Table 20
Category A: Macroeconomic performance

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
A1	Gross National Income at market price, per inhabitant in PPS (2009)	↓	190.64	100	117.87	108.51	117.02	BU 40.80	LU
A2	% of real growth rate of GDP (2009)	↓	-3.7	-4.20	-4.7	-2.6	-2.8	LV -18.0	PO 1.7
A3	% growth in domestic employment (2009)	↓	0.9	-1.8	0.0	-1.2	-0.4	LV -13.6	LU
A4	Unemployment rate as a percentage (2009)	↓	5.7	8.9	7.5	9.5	7.9	NL 3.4	ES 18.0
A5	Inflation rate as a percentage (2009)	↑	0.4*	1.0	0.2	0.1	0.0	IR -1.7	RO 5.6
A6	Public balance as a % of GDP (2009)	↓	-0.7	-6.8	-3.3	-7.5	-6.0	IR -14.3	SE -0.5
A7	Public debt as a % of GDP (2009)	↓	14.5	73.6	73.2	77.6	96.7	EE 7.2	IT 115.8
A8	Gross fixed capital formation as % of GDP (2009)	↑	3.56	2.89	1.66	3.33	1.82	AT 1.08	RO 5.42
A9	Terms of trade (2009)	↓	108.58	:	103.1	103.46	99.65	FI 89.87	RO 133.32
A10	Real effective exchange rate (2000 =100) (2008)	↓	103.2	103.8**	100.3	100.7	103.3	UK 89.0	SK 125.7
A11	Diversification – Entropy coefficient	↓	0.67	0.82	0.80	0.77	0.79	LU	RO 0.88
A12	Market integration (2008)	↓	234	2.2	2.4	5.2	22.11	IR -1.2	LU

*Inflation rate LU: NCPI, others HCPI; Harmonized unemployment rate EUROSTAT/BIT LU: Adem (National employment agency, Luxembourg); **EU-15

The aftermaths of the crisis are evident in the majority of macroeconomic indicators where Luxembourg's performance has worsened. Despite this, Luxembourg managed to keep the majority of indicators green. However, the country's performance worsened in six of the indicators that are green. Growth in domestic employment in Luxembourg is an example of this, because even though this indicator is green, it dropped by 4.7% to 0.9% in 2009. In other Member States, domestic employment has fallen instead of increasing.

Macroeconomic performance

The low rate of employment growth and the negative rate of -3.4% in real GDP is reflected in the growing unemployment rate, which reached 5.4% in 2009.

In terms of diversification of the economy, Luxembourg's diversification coefficient receded to 0.67, while Germany recorded 0.80, France 0.77 and Belgium 0.79 in 2009. Efforts to diversify have been hampered by the extensive exposure of the entire economy to the strategic choices of a small number of players, as well as the economy's specialisation in a very limited number of business sectors that are very sensitive to the international economic situation[71]. It is important to continue to diversify the country's economy in the areas of biomedicine, logistics, environmental technologies and information and communications technologies. The diversification policies that have been adopted in the economy or that are in progress will take time to come about. Thus, results will only be apparent in the medium and long terms.

In terms of market integration, Luxembourg has experienced a decrease of foreign direct investment, despite leading the EU-27 in this area. This worsening is due primarily to the economic slowdown caused by the financial crisis.

[71] *PERSPECTIVES DE POLITIQUE ECONOMIQUE, Productivité et Compétitivité au Luxembourg : Une comparaison par pays et par branches*, Changes in total factor productivity in Luxembourg between 1995 and 2008, N°14 May 2010, pp.10

3.2.2 Employment

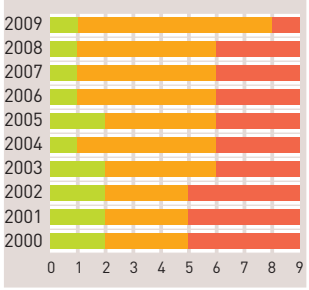
Table 21
Category B: Employment

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
B1	Employment rate, in % (2009)	↑	65.2	64.6	70.9	64.2	61.6	MT 54.9	NL 77
B2	Employment rate - Men in % (2009)	↑	73.2	70.7	75.6	68.5	67.2	LT 59.5	NL 82.4
B3	Employment rate - Women in % (2009)	↑	57	58.6	66.2	60.1	56	MT 37.7	DK 73.1
B4	Employment rate of persons aged 55-64, in % (2009)	↑	38.2	46	56.2	38.9	35.3	MT 28.1	SE 70
B5	Employment rate of persons aged 55-64 (Women) (2009)	↑	29.4	37.8	48.7	36.6	27.7	MT 11.2	SE 66.7
B6	Employment rate of persons aged 55-64 (Men) (2009)	↑	46.5	54.8	63.9	41.4	42.9	HU 39.9	SE 73.2
B7	Unemployment rate of persons under 25, in % (2009)	↓	17.5	19.6	10.4	23.3	21.9	NL 6.6	ES 37.8
B8	Long-term unemployment rate as a % (2009)	↑	1.2	3	3.4	3.3	3.5	DK 0.5	SK 6.5
B9	Persons holding a part-time job as a % (2009)	↑	18.2	18.8	26.1	17.3	23.4	BU 2.3	NL 48.3

Luxembourg improved its performance in this category compared to last year, even though its performance compared to the EU average remains mediocre.

It should be emphasised that the employment rate of women between 55 and 64 is beneath the EU-27 threshold. The only indicator in which Luxembourg's performance worsened is the unemployment rate for persons under 25. In this area, the Ministry of Labour and Employment is trying to facilitate the access of youths to the labour market. Various initiatives and projects are currently underway, including the Second Chance School[72] and the *Prävention der Schulverweigerung*[73] project, both initiatives set up by the Ministry of National Education and Vocational Training, because many young, unemployed people have no diplomas.

Employment



Frame 8
Eric Heyer (OFCE): Youth unemployment: One figure can be hiding another:

Youth unemployment is calculated in the same way as other categories of unemployment, using a ratio of the number of jobless persons in an age group to the working population – adding jobless and working persons together – of the same age group. However, with regard to youth unemployment, the majority of people between the ages of 15-25 are students who are not counted in the "working population" denominator. The indicator measures the rate of unemployment amongst young people who have dropped out of school.

Eric Heyer recommends using a better indicator that relates the number of unemployed persons between 15-25 to the overall numbers of the same age group, students included.

The long-term unemployment rate improved to 1.2%. The importance allotted to this domain is emphasised by the Ministry of Labour and Employment and by the Ministry of National Education and Vocational Training[74], which aims at improving skills of the labour force in order to facilitate reinsertion and adaptation to the labour market and to preserve the social cohesion situation from further fragility.

[72] For more details see: http://www.men.public.lu/actualites/2008/12/081215_ecole_2echance/index.html

[73] For more details see: http://www.men.public.lu/priorites/early_school_leavers/100614_praevention_der_schulverweigerung/index.html

[74] For more details see: http://www.men.public.lu/sys_edu/form_vie/form_personnes_sans_emploi/index.html

3.2.3 Productivity and labour costs

Table 22
Category C: Productivity and labour costs

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
C1	Trends in total factor productivity (2009)	↓	-5.97	-3.61*	-5.61	-2.2	-3.39	FI -6.82	ES -0.70
C2	Trends in apparent work productivity (2009)	↓	-4.6	-2.4	-4.7	-1.4	-2.4	LT -8.5	ES 3.1
C3	Productivity per hour worked as a percentage of U.S. figures (2009)	↓	134.37	68.03	93.25	97.85	102.22	BU 26.72	LU
C4	Changes in unit labour costs (2009)	↓	7.01	2.82	3.62	2.36	3.21	LV -5.87	SK 7.87
C5	Costs / Revenue ratio in the banking sector (2006)	↑	42.94	57.35**	65.19	60.56	54.19	EE 29.55	BU 73.2

*UE-15 ; **UE-25

The impact of the crisis is visible in the worsening of Luxembourg's performance compared with the previous year, as the majority of indicators show. The number of indicators in green decreased and were replaced by red ones.

Referring to the report on productivity and competitiveness of Luxembourg, which analyses changes in total factor productivity between 1995 and 2008, the report states, "Luxembourg has the highest level of work productivity the 15-nation Europe group; however the gap between nations closes between 2000 and 2005. Rates of work productivity growth and of total factor productivity are lower over the entire period[75]. "This weakening is explained by, "...very sustained growth in employment and slow technical progress."[76]

The cost / income ratio in the banking sector, which is green, has not been updated since 2006.

Productivity and labour costs

[75] *Observatoire de la Compétitivité, Productivité et Compétitivité au Luxembourg : Une comparaison par pays et par branches*, Changes in total factor productivity in Luxembourg between 1995 and 2008, N°14 May 2010, pp.9

[76] Idem.

3.2.4 Market operations

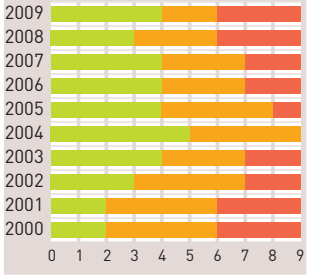
Table 23
Category D: Market operations

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
D2	Price of electricity (ex-VAT) –industrial users, in € per 100kw hours (2009)	↓	0.11	0.0959	0.0975	0.0667	0.1026	EE 0.0587	MT 0.1506
D3	Price of electricity (ex-VAT) –industrial users, in € per 100kw hours (2009)	↓	11.08	9.397	10.86	9.76	8.73	RO 5.0966	SL 11.34
D4	%: Market share of the primary operator in cellular telephones (2006)	↑	51	39*	37	46	45	UK 26	CY 90
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) (2008)	↑	10847	576858**	15475	21082	17327	DK 3239	SK 6957370
D9	Value of public tenders using open procedure procurement, as % of GDP (2008)	↑	1.30	2.86*	1.19	3.68	3.58	DE	LV 9.54
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

*UE-15 ; **OCDE

The number of indicators in green increased, while the number in red remained the same. The number of orange indicators for Luxembourg in this category has dropped compared to the previous year. Luxembourg's performance has improved in two out of the three indicators compared to last year.

Market operations



Indicators for the price of gas and electricity illustrated that Luxembourg has experienced price increases, which bears on companies, making them less competitive. Energy prices are higher in Luxembourg than in neighbouring countries, which can be explained by Luxembourg's heavy reliance on imports from abroad. Under these circumstances, it is essential for the Luxembourg economy to continue promoting new and renewable energy policies.

With regard to cellular phone rates for large consumers, although Luxembourg is in the green it has lost in performance despite being amongst the countries with the lowest rates. It has been confirmed that average telephone rates in the OECD have fallen.

Although the public tenders indicator is red, it has improved. This indicator is linked to the increase in quality of public services, for which competitiveness, market liberalisation and transparency are features that are becoming progressively more important.

Two indicators in this category were not updated. The indicators are "Market share of the primary operator in cellular telephones" and the "OECD basket of mobile telephone rates for businesses".

3.2.5 Institutional and regulatory framework

Table 24
Category E: Institutional and regulatory framework

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
E1	Corporate tax rate, as a % (2009)	↑	28.59	23.2	30.18	34.43	33.99	BU 10	MT 35
E2	Personal income tax rate as a % (2009)	→	38.9	37.61*	47.5	47.8	53.7	CZ 15	SE 56.5
E3	Standard VAT rate in % (2009)	→	15	19	19	19.6	21	LU	SE et DK 25
E4	Tax wedge – Single, without children, % (2009)	↑	33.98	41.63**	50.89	49.22	55.16	IR 28.58	BE
E5	Tax wedge – Married, with 2 children, one wage-earner (2009)	↑	11.19	31.28**	33.71	41.73	38.82	LU	HU 43.69
E6	Administration efficiency index (2008)	↓	1.646	1.152	1.706	1.652	0.098	SK -0.142	DK 2.188
E7	Rule of law index (2008)	↓	1.815	1.144	1.918	1.722	-0.121	BE	DK 1.921
E8	Regulatory quality index (2008)	↓	1.714	1.287	1.459	1.255	1.48	RO 0.534	IR 1.915
E9	Degree of sophistication of online public services, in % (2009)	↑	81	83*	89	90	89	RO 61	PT 100
E10	Full online availability of public services, as a percentage (2009)	↑	68	71*	74	80	70	BU 40	UK 100

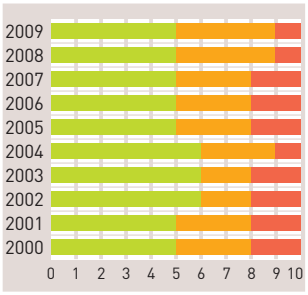
*UE-25 ; **UE-15

Luxembourg has succeeded in increasing its performance compared to the previous year in five out of ten indicators. Although the corporate tax indicator is in the red, it has decreased in Luxembourg. According to a recent study by KPMG[77], corporate taxes are down throughout the world at 24.99%, compared to 25.44% the year before. Personal income tax rates and VAT remained the same. In terms of taxes, single persons without children and couples with a single wage earner and two children benefited from lower taxes approved under the economic plan.

Public services in Luxembourg have been more and more computerized in order to implement administrative simplification procedures in favour of companies in the country[78].

Improving these indicators underscores the importance accorded to maintaining or increasing the attractiveness of the country in the daily lives of citizens and companies.

Institutional and regulatory framework



[77] KPMG's Corporate and Indirect Tax Survey 2010 http://www.kpmg.de/docs/20101014_CorporateIndirectTax2010.pdf

[78] For more details see the "Entfesselungsplang fir Betriber " report: http://www.gouvernement.lu/salle_presse/actualite/2007/04/12boden_entfesslungsplang/

3.2.6 Entrepreneurship

Table 25
Category F: Entrepreneurship

Code	Indicator		LU	UE-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 percentage of total employment (2009)	↑	5.68	16.16	10.96	9.06	16.22	SE 5.45	GR 35.35
F3	Net change in number of companies, as a % (2006)	↑	2.84	1.23**	-	2.62	-	HO -3.17	RO 9.35
F4	Volatility among companies, as a % (2006)	↑	19.4	18.42**	-	16.22	-	IR 0.0	LT 44.78

* UE-15 ; **UE-25

Luxembourg has improved its performance in the indicators analysed in the area of entrepreneurship. According to the OECD, *"...entrepreneurship is more and more considered as an important motor for economic growth, productivity, innovation and employment, and is generally considered an essential aspect of economic vitality"*.[79] Entrepreneurship is linked to the vitality of creating businesses and thus should be associated intrinsically with the process of start-ups and failures of companies, considered creative destruction[80]. The probability of failure is higher amongst young companies. From this perspective, the Ministry of the Economy and Foreign Trade highlights innovation and research and development, and it offers government grants[81] in order to assist new companies in achieving objectives. Independent workers, who represent a major segment of the economy in most OECD nations, are also a part of this category. Yet, according to OECD data, in Luxembourg most persons who embark on independent professional careers are foreign-born[82].

Still, it should be emphasised that growth of entrepreneurialism is also contingent on the quality and simplicity of the regulatory framework and administrative formalities of countries.

Entrepreneurship

[79] OECD, The OECD Innovation Strategy: Getting a Head Start on Tomorrow, Paris, 2010, pp. 116

[80] OECD, The OECD Innovation Strategy: Getting a Head Start on Tomorrow, Paris, 2010, pp. 118

[81] For more details see: http://www.guichet.public.lu/fr/entreprises/finances-aides/index.html

[82] OECD, Measuring innovation: A New Perspective, Paris, 2010, pp. 54

3.2.7 Education and Training

Table 26
Category G: Education and Training[83]

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
G1	Annual cost per student in public educational facilities, in PPS (2007)	↓	**38855.4**	6061.3	6227.8	7239.9	8014.8	BU 2246.5	LU
G2	Percent of population achieving at least the second cycle of secondary education (2008)	↑	**67.9**	71.5	85.3	69.8	69.6	MT 27.5	CZ 90.9
G4	Percentage of human resources in scientific and technological fields as a % of total employment (2008)	↑	**46.7**	41.3	47.2	44.6	48.8	PT 23.9	DK 52.8
G5	Apprentissage tout au long de la vie en % de la population âgée de 25-64 ans (2008)	↑	**8.5**	10.1	7.9	7.2	6.8	BU 1.4	SE 32.4
G6	Secondary school dropouts, as a % (2008)	↓	**13.4**	14.9	11.8	11.8	12	PO 5	MT 39

*UE-25 ; **UE-15

In the area of education and training, indicators are mostly orange. Luxembourg's performance has improved in three out of five indicators compared to last year.

Luxembourg is the country with the highest expenditures per secondary / university student. Although this indicator is in red, it can be considered a positive factor if in the medium or long term an improvement is noted in the efficiency of Luxembourg's educational system. On many occasions, the OECD has reiterated[84] its recommendation that Luxembourg make its educational system more efficient in its 2006 and 2008 country studies.

The indicator for young school dropouts indicates a worsening of Luxembourg's performance in this area[85]. This can be explained by the high rate of foreign residents in Luxembourg, which account for 43% of the nation's population[86]. According to the Minister of National Education and Vocational Training, during the academic year of 2007-2008, 39.8% of secondary and university students in Luxembourg were of foreign origin[87]. One reason often evoked for failure in academics is the difficulty of integrating students into Luxembourg's educational system, where being trilingual is an essential foundation for study. Moreover, a weak family environment in the socio-economic sphere can also bolster the desire to leave the academic system early. However, it has been noted that *"27.5% of students dropping out of school cannot be reached or are not residents as they have moved abroad, i.e. most have returned to their native countries*[88]*"* The Ministry of National Education and Vocational Training still tries to stem the tide of young people dropping out of school by giving them the opportunity to return to a "second chance school" to get a diploma. This school is "intended for young people between 16 and 24 who, because of academic failure or inappropriate academic paths, have left school and have not found an apprenticeship[89]."

Lifelong learning has improved in Luxembourg as a result of initiatives[90] offered by the Ministry of National Education and Vocational Training.

Education and Training

[83] The indicator percentage of foreign nationals in scientific and technological fields and percentage of highly qualified workers in total employment figures were withheld from the TBCO because data concerning it was unavailable

[84] OECD country survey for Luxembourg of 2006 and 2008

[85] According to data from the Ministry of Education and Professional Training, the school drop-out rate is 11.2%: http://www.men.public.lu/priorites/early_school_leavers/index.html

[86] STATEC, http://www.statistiques.public.lu/fr/communiques/population/population/2010/07/20100708/index.html

[87] Ministry of Education and Professional Training, http://www.men.public.lu/publications/etudes_statistiques/chiffres_cles/chiffres_cles_2007/090519_2007_2008_chiffres_online.pdf

[88] For more detailed information see: http://www.men.public.lu/publications/etudes_statistiques/etudes_nationales/091209_decrochage07_08/100104_decrocheurs.pdf

3.2.8 Knowledge Economy

Table 27
Category H: Knowledge Economy

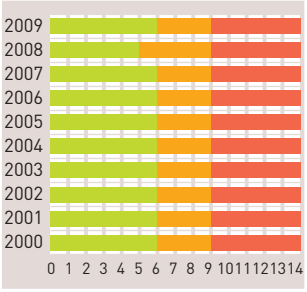
Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
H1	Internal R & D expenditure under Lisbon accords, as a % of GDP (2008)	↑	1.62	1.9	2.63	2.02	1.92	CY 0.46	FI 3.91
H2	Public R & D budget credits, as a % of GDP (2008)	↑	18.2	33.5	27.7	39.4	22.2	LU	RO 70.1
H3	Portion of public research financed by the private sector, as a % of GDP (2008)	↓	3.2	9	10.8	6.8	9.6	DK 0.6	NL 16.1
H4	Percentage of sales allocated to the introduction of new products on the market (2003)	↑	5V	6*	8	6	5	HU 1	SK 19
H5	Number of researchers per 1,000 employed persons, public and private sectors taken together (2008)	↑	11.27	7.35*	7.61	8.44	8.18	RO 2.01	FI 16.15
H6	Scientific publications per million inhabitants (2005)	↑	127	477	535	482	653	RO 41	SE 1109
H7	Number of USPTO patents per million inhabitants (2009)	↑	72.73	44.19	109.77	48.72	55.55	LT 0.37	FI 161.89
H8	Number of OEB patents per million inhabitants (2007)	↑	230.16	116.54	290.70	132.37	139.03	RO 0.98	SE 298.36
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 (2007)	↓	1.10	2.2*	1.22	1.47	1.61	FI 1.03	PT 3.35
H11	Percentage of households that have internet access at home (2009)	↑	87	65	79	63	67	BU 30	NL 90
H12	Number of cell phones per 100 inhabitants (2007)	↓	222.39	155.39*	187.15	152.73	159.69	SK 141.44	LU
H13	Percentage of households that have broad band Internet access (2009)	↑	82	86	82	91	94	RO 62	MT 98
H14	Number of secure web servers per 100,000 inhabitants (2008)	↑	84.53	53.67*	51	15.85	22.76	SK 4.66	NL 97.40
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

It should be stated immediately that two indicators were not updated. These are: *"Percentage of sales allocated to the introduction of new products on the market* and *"Scientific publications per million inhabitants"*.

Comparison with the EU shows that performance has remained constant. Luxembourg's performance has improved in three out of six indicators compared to last year. Improvements in performance were noted by nine of the indicators that were updated.

Knowledge Economy



[89] Ministry of Education and Professional Training, http://www.men.public.lu/actualites/2008/12/081215_ecole_2echance/081215_ecole_2e_chance.pdf

[90] Ministry of Education and Professional Training, http://www.men.public.lu/sys_edu/form_vie/index.html

This category is not an end in itself, but rather underlies innovation, whose final objective is to increase well-being. Yet, according to the OECD, *"the current framework for assessment connects with the role of innovation in economic results and fails to adequately assess innovations that contribute to achieving social objectives*[91], such as ageing of the population and climate change. As such, it is important that the Governement, a major player in promoting innovation investment, account for characteristics of technologies, individuals and geographical places and their respective relationships in order to *"... understand innovative behaviour and its impact on individuals, companies and organisations"*[92].

The OECD underscores that the new indicators on trade brands highlight gradual and marketing innovations in addition to technological innovations. *"Countries with strong industrial bases and specialisations in information and communications technologies more often resort to patents than to marks, while countries with very developed services sectors more often turn to the protection afforded by brands*[93]*"*. Emerging countries have a lower tendency to protect their innovations by registering patents or brands than do OECD member countries.

Individuals have an essential role in improving the knowledge economy. In this context, indicators provide information on the teaching system and on skills characteristics of human capital on the labour market, but also on private habits, such as internet use, etc.

[91] OECD, Measuring innovation: A New Perspective, Paris, 2010, pp. 15

[92] Idem, pp.13

[93] Idem, pp.24

3.2.9 Social Cohesion

Table 28
Category I: Social Cohesion

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
I1	Gini coefficient (2008)	↓	28	31	30	28	28	SL 23	LV 38
I2	At-risk of poverty rate after social transfers (2008)[94]	↑	13	17	15	13	15	CZ 9	LV 26
I3	At persistent risk of poverty rate, as a % (2008)	↑	8	9*	9	7	8	DK 5	PT 15
I4	Life expectancy at birth in numbers of years (2008)	↑	81	79	80	81	80	LT 72	IT
I5	Gender pay gap, as a % of gross hourly wages of male employees (2006)	→	14	15	22	11	7	MT 3	EE 25
I6	Serious accidents at work , using a base year index of 1998=100 (2006)	↓	78	76	66	82	60	GR 55	EE 120

*UE-25

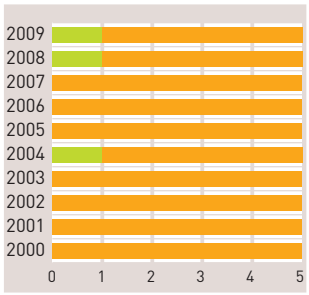
In the EU comparison, orange is the predominant colour in the category of social cohesion. Luxembourg's performance has improved in three indicators compared to last year.

In Luxembourg, the *"At-risk-of-poverty rate"*, *"At-persistent-risk-of-poverty rate"* and *"Life expectancy at birth"* improved with relation to the previous year, while the *"Gini Coefficient"* and *"Serious accidents at work"* fell away. The *"Gender pay gap"* indicator has not been updated.

It is difficult to come up with a single definition of social cohesion as a basis for calculating the phenomenon, in as much as the terminology enters into interdisciplinary fields involving both objective and subjective elements. In its report *"Travail et Cohésion sociale 2009"*, STATEC states that the social cohesion concept should extend *"...beyond that of social exclusion or social capital because it sets up a 'society of fellow creatures" that promotes a virtuous spiral between political stability and social peace, economic growth and prosperity."*[95]

In this context, employment holds an essential position in the analysis of social cohesion as a source of revenue and social protection. The Governement plays a central role in conceiving and making projects in this domain a reality. The poverty rate after social transfers in 2008 stood at 13%; yet STATEC emphasises that without the transfers, the poverty rate would be 24%[96], which demonstrates their positive impact on the life of residents. The Governement is improving and adapting the country's regulatory framework to mitigate the risks of illness, work accidents and old age. The welfare state also puts into practice the concept of equal opportunity, through a national educational system open to all students, or through measures and initiatives intended to improve the role of women in their professional, private and societal lives.

Social Cohesion



[94] The 2009 data were no available at press time

[95] STATEC, *Rapport Travail et Cohésion Sociale*, N°109: http://www.statistiques.public.lu/fr/publications/series/cahiersEconomiques/2009/109_cohesion_sociale/109_cohesion_sociale.pdf?SID=cf768fb8e4c0b285f4c0fe-2ce6e64730, pp.5

[96] STATEC, *Rapport Travail et Cohésion Sociale*, N°109: http://www.statistiques.public.lu/fr/publications/series/cahiersEconomiques/2009/109_cohesion_sociale/109_cohesion_sociale.pdf?SID=cf768fb8e4c0b285f4c0fe-2ce6e64730, pp.14

3.2.10 Environment

Table 29
Category J: Environment

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
J1	Number of ISO 9001 certifications per millions of in habitants (2008)	↑	**503.48**	806.23	588.46	371.75	458.95	LV 220.65	IT 1977.34
	Number of ISO 4001 certifications per millions of in habitants (2008)	↑	**102.33**	143.6	69.52	54.30	68.73	MT 19.40	SE 485.74
J2	Total greenhouse gas emissions: Base index 1990=100 (2007)	↑	**95.2**	88.7	87.8	93.6	92.9	LV 44.4	CY 198.9
J3	Percentage of renewable energy (2007)	↑	**4.1**	16.7	15.4	14.4	5.3	MT 0.0	AT 62
J4	Volume of municipal waste generated in kg per person, per year (2007)	↓	**701**	524	581	543	493	CZ 306	DK 802
J5	Energy intensity in kg of oil equivalent per thousands of Euros (2007)	↑	**158.53**	169.39	151.48	165.38	198.76	IR 103.13	BU 1016.29
J6	Breakdown by passenger transportation method – Percentage of car users in passenger kilometres (pkm) (2007)	↓	**91.8**	93.5	93.1	92.3	96.4	SK 61.8	LT 129.3

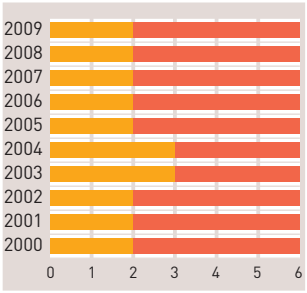
While in this category red and orange reign, Luxembourg has managed to improve performance in the majority of indicators. Only two indicators – *"Volume of municipal waste generated in kg per person, per year"* and *"Breakdown by passenger transportation method – Percentage of car users in passenger kilometres"* – worsened.

Nonetheless, there has been an increase in the number of ISO 9001 and 14001 certifications issued. This improvement underscores the increased importance accorded to the environment by responsible management as well as to consumers, who purchase products manufactured under quality assurance guidelines. Moreover, the certifications, internationally recognised as viable concepts, increase competitiveness of companies.

The indicator for greenhouse gas emissions has improved. Despite this, according to the OECD, Luxembourg continues to produce the highest levels of CO^2 emission in the OECD zone[97]. It must be remembered that calculations include all automobile fuel sales, including daily sales to cross-border persons.

The government continues to target the development of infrastructure, especially the rail sector, in order to reduce greenhouse gas emissions and to provide lasting improvement of the lives of residents and cross-border workers. The principal object is arriving at a use of modal split between individual and public transportation of 25% of the latter by 2020[98]. In addition, several other initiatives have been launched, such increasing inter-connections between trains and buses, building park-and-ride facilities and promoting ride-sharing[99].

Environment



[97] OECD, Economic Survey of Luxembourg, volume 2010/5, May 2010, Paris, pp.49

[98] Idem, pp.59

[99] Idem, pp.59

3.3 The Composite Competitiveness Indicator – Overall results

Luxembourg placed 9th in the 2009 rankings, moving up two positions[100] compared to 2008. The Scandinavian countries and the Netherlands remain favourites in the rankings, which has been the case for ten years. Germany fell from 8th to 10th position, while Belgium moved from 19th to 18th. France fell one position compared to 2008. Since the 2004 Fontagné report, the overall position of Luxembourg has worsened slightly.

Table 30
Ranking of the Competitiveness Composite Indicator

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

Source: *Observatoire de la Compétitivité*

How did Luxembourg improve by two positions in the overall ranking compared to 2008?

From a methodological viewpoint, it is important to remember here that this amounts to a relative ranking, i.e. Luxembourg's ranking also depends on other countries' performance. Even if Luxembourg performs poorly, it may happen that other countries' performance has worsened even further, so that Luxembourg's relative position actually improves in the end. The ranking says nothing about the absolute performance of Luxembourg.

[100] It is important to remember that each year the Observatoire de la Compétitivité performs a full retrospective update for the entire observation period(2000-2009) incorporating all indicators of the Scoreboard and using the latest figures available for the 27 European Union members. As a result, current rankings of the 27 countries including Luxembourg, may diverge with relation to rankings published in previous editions of the Competitiveness Report.

In other words, an improvement in a country's ranking could be caused by a worsening of performance of other countries, and for this reason, the *Observatoire de la Competitivité* always recommends interpreting rankings using complementary information from the Scoreboard, i.e. the base indicators.

An analysis of the results of the categories indicates that Luxembourg's ranking is due to the fact that it moved up seven positions in Category B, Employment. A detailed analysis of the employment rate shows that this has fallen in most Member States, which could be explained by the fact that many people were laid off during the crisis. In Luxembourg, the impact on the employment rate was minimal because of cross-border workers.

Table 31
The 2009 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	11	4	22	20	17	22	8	5	14	14
Austria	8	7	19	7	11	14	10	7	6	9
Austria	13	21	6	18	27	26	14	10	2	17
Bulgaria	6	15	27	4	19	6	21	24	23	25
Cyprus	5	5	20	25	7	5	17	21	17	27
Denmark	10	2	9	3	9	19	2	3	7	18
Spain	23	22	1	21	12	12	20	17	18	4
Estonia	17	10	10	2	1	17	18	11	26	13
Finland	7	8	25	6	13	18	3	2	12	10
France	14	17	3	10	20	13	16	12	5	16
Greece	25	20	4	8	26	1	22	22	16	20
Hungary	24	27	16	23	24	24	19	20	11	7
Ireland	20	13	2	22	2	20	15	14	19	21
Italy	19	24	18	16	25	10	23	15	15	2
Latvia	27	19	13	11	16	11	12	27	27	11
Lithuania	26	16	23	17	18	3	6	25	25	24
Luxembourg	**1**	**12**	**15**	**19**	**3**	**15**	**25**	**8**	**8**	**22**
Malta	15	26	11	26	6	25	26	16	3	26
Netherlands	3	1	21	12	8	16	4	4	10	15
Poland	12	23	7	13	23	4	11	23	20	23
Portugal	18	11	5	15	10	7	27	19	21	19
Rumania	22	18	26	1	22	2	24	26	24	8
United Kingdom	16	6	12	5	4	8	9	6	22	12
Slovak Republic	21	25	17	27	21	21	13	13	13	5
Czech Republic	9	9	8	14	15	23	7	18	9	3
Slovenia	4	14	24	24	5	9	5	9	1	6
Sweden	2	3	14	9	14	27	1	1	4	1

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

In order to analyse the impact of the financial crisis on the performance of Member States, it is useful to analyse gains and losses in rankings by category between 2008 and 2009. The table below shows changes in rankings from 2007 to 2008 by country indicating improvements and drops in the rankings by category of each Member state with + or - signs. Comparing data from one year to the next makes it possible to locate the categories that are comprised essentially of economic indicators. Rankings in the categories fluctuate significantly from one year to another. There are major variations apparent in rankings in Categories A (Macroeconomic Performances), B (Employment) and C (Productivity and Labour Costs).

There are few changes in the other categories. These categories are made up primarily of structural indicators. To detect the presence of structural and economic indicator categories, the cells in the above tables are coloured in red and green, where rankings have fallen or risen by three positions or more. Light pink indicates that the rankings have not moved.

It is interesting to note that Ireland has moved up 20 slots in Category C (Productivity and Cost of Labour), and dropped three in Category A (Macroeconomic Performance). Luxembourg is able to hold its leading slot in the Macroeconomic Performance category. This ranking is primarily due to indicator scores in GDP per inhabitant, public debt, public deficits and direct foreign investment. Although these indicators have worsened in Luxembourg, they are still favourable for the country in comparison with the other Member States. In Productivity and Labour Costs, Luxembourg lost 2 positions.

Table 32
Difference between the 2009 and 2008 rankings by category

	Cat A	Cat B	Cat C	Cat D	Cat E	Cat F	Cat G	Cat H	Cat I	Cat J
Germany	1	3	-10	1	-4	-1	0	0	0	0
Austria	1	2	-12	7	-2	0	0	0	0	0
Austria	5	1	3	0	0	0	0	-1	0	0
Bulgaria	-3	1	-1	-3	-3	7	0	1	0	0
Cyprus	2	0	-17	2	0	0	0	0	0	0
Denmark	-2	0	12	1	-1	-1	0	0	0	0
Spain	0	-5	4	-4	0	-2	0	1	0	0
Estonia	4	-4	15	0	0	-1	0	1	0	0
Finland	-3	0	-9	-1	1	5	0	0	0	0
France	5	1	5	0	0	-1	0	-1	0	0
Greece	2	0	0	1	-1	0	0	1	0	0
Hungary	1	0	-1	-1	-1	0	0	0	0	0
Ireland	-3	-2	20	2	0	-5	0	0	0	0
Italy	5	0	1	-4	-1	-3	0	0	0	0
Latvia	-1	-9	14	-8	3	-2	0	0	0	0
Lithuania	-10	-3	-12	-2	-3	-1	0	1	0	0
Luxembourg	**0**	**7**	**-2**	**0**	**1**	**2**	**0**	**0**	**0**	**0**
Malta	5	0	6	-1	0	-5	0	1	0	0
Netherlands	2	0	-15	1	3	3	0	0	0	0
Poland	-2	2	16	-2	3	-1	0	-1	0	0
Portugal	4	3	13	1	0	-1	0	0	0	0
Rumania	-9	3	-2	5	-1	2	0	-2	0	0
United Kingdom	-2	-2	-10	2	1	0	0	0	0	0
Slovak Republic	-6	-2	-16	-1	1	1	0	0	0	0
Czech Republic	2	3	6	6	3	2	0	-2	0	0
Slovenia	-2	1	-4	-1	-2	2	0	1	0	0
Sweden	4	0	-4	-1	3	0	0	0	0	0

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

The World Economic Forum recorded similar results. Indeed, according to WEF, the Scandinavian countries, Germany, France, the United Kingdom and the Benelux countries head the list of the most competitive countries in the European Union. The Scandinavian and Benelux countries make up for their small market size with excellent institutions and skill sets, and the Scandinavians in particular have an extensive capacity for innovation.

In general, the WEF[101] believes that the European Union should expend extensive effort in innovation, flexibility in the labour market and market size in order to play a preeminent role in the world economy.

[101] For more details see Chapter 2

Table 33
WEF 2010-2011 Rankings – Global Competitiveness Index

Economy	Rank	Score
Sweden	2	5.56
Germany	5	5.39
Finland	7	5.37
Netherlands	8	5.33
Denmark	9	5.32
United Kingdom	12	5.25
France	15	5.13
Austria	18	5.09
Belgium	19	5.07
Luxembourg	**20**	**5.05**
Ireland	29	4.74
Estonia	33	4.61
Czech Republic	36	4.57
Poland	39	4.51
Cyprus	40	4.50
Spain	42	4.49
Slovenia	45	4.42
Portugal	46	4.38
Lithuania	47	4.38
Italy	48	4.37
Malta	50	4.34
Hungary	52	4.33
Slovak Republic	60	4.25
Romania	67	4.16
Latvia	70	4.14
Bulgaria	71	4.13
Greece	83	3.99

Source: World Economic Forum 2010

3.4 An External Audit of the Composite Indicator

The *Observatoire de la Compétitivité* ordered an external audit with JRC of the European Commission at ISPRA to be carried out by Michaela Saisana[102], who performed an in-depth statistical analysis and critical evaluation of the Competitiveness Scoreboard and the composite competitiveness indicator, supplemented by suggestions for possible improvements.

First, the database must be analysed to suggest one or several appropriate methods to attribute missing data, standardise data and process abnormal data. Next, it is important to interpret the results of the various multidimensional analysis methods in order to study internal coherence of the framework of a statistical and conceptual perspective. An evaluation of strength provides independent validation of the scoreboard and the methodology used to combine data and to analyse the incidence of methodological choices of rankings.

The objective of the audit is to identify the limits of both the scoreboard and the current methodology and to recommend alternative methods if necessary, that would be ultimately more appropriate.

3.4.1 Taking into account audit recommendations

Compétitivité in calculating the composite competitiveness indicator as well as the underlying hypotheses. It highlights several positive points of the composite competitiveness indicator, but also underscores certain gaps that the Observatoire wishes to take into account in this chapter. The Observatoire has applied the recommendations concerning data in the 2010 Scoreboard. For the most part, these data are from 2009.

One positive element that has emerged clearly from the audit is that the composite indicator is based on a precise definition of the concept of "Competitiveness". Indeed, the *Observatoire de la Compétitivité* has always recommended using the definition provided by the Economic and Social Committee (ECS): *"The capacity of a nation to sustainably improve the living standards of its inhabitants and to procure for them high levels of employment and social cohesion while preserving the environment"*.

Another strong point of the composite indicator is the transparency of its construction. Thus, everyone can reproduce the results of the indicator using information provided in the Scoreboard and the Excel files, which contain raw data that can be downloaded from the internet site of the *Observatoire de la Compétitivité*. (www.odc.public.lu).

[102] The study is published in Perspectives économiques N°15

The audit describes the synthetic competitiveness indicator as follows: *" ...The Competitiveness Index is clear about its definition, its framework, its underlying indicators, its methodological assumptions and does not fall under the critiques of normative ambiguity at times addressed to composite indicators (see Stiglitz report, p. 65)."*

As a reminder, in the first phase, base indicators are standardised. Each indicator i is transformed by the following formula by country j to time t.

$$y_{ij}^{t} = \frac{x_{ij}^{t} - Min(x_{j}^{t})}{Max\left(x_{j}^{t}\right) - Min(x_{j}^{t})}$$

The composite index CI of the class of sub-indicators at moment t is calculated using a weighted average of the sub indicators in the new scale.

$$CI_{i}^{t} = \frac{\sum_{j=1}^{m} q_{j} y_{ij}^{t}}{\sum_{j=1}^{m} q_{j}}$$

The composite international indicators as discussed in chapter 2 of the 2010 Report do not always reveal the methods used to calculate them and therefore remain as simple black boxes from which emerge a ranking that is interpreted with difficulty.

The external audit also makes recommendations on how the composite indicator can be improved. This is done at the level of the standardisation method as well as in processing missing data and abnormal values. The tables giving correlations between categories and indicators reveal some interesting links.

3.4.2 Data quality

An entire chapter of the external audit was dedicated to the analysis of data quality, i.e. abnormal values, missing values and data coverage. The following was stated concerning data coverage: *"It is recommended that a note on poor data coverage be added regarding the countries and categories discussed above"*.

In general, a coverage rate of 93.9% was determined regarding the data in the 2010 Scoreboard. Statistically, a coverage rate of up to 90% is acceptable. However, it is important to analyse the coverage rate by categories, indicators and countries.

In the categories, coverage was determined to be excellent. The coverage rate by category is above 90%, except for categories D and H, where the rate of missing values slightly exceeded 10%. This is explained by the fact that the indicators of these categories originate mainly with the OECD, which does not calculate indicators for all Member States of the European Union.

Table 34
Missing values, by country and by category

	Cat A	Cat B	Cat C	Cat D	Cat E	Cat F	Cat G	Cat H	Cat I	Cat J
1. Italy	0	0	0	0	0	0	0	0	0	0
2. Denmark	0	0	0	0	0	0	0	0	0	0
3. Portugal	0	0	0	0	0	0	0	0	0	0
4. Netherlands	0	0	0	0	0	0	0	0	0	0
5. Spain	0	0	0	0	0	0	0	0	0	0
6. Luxembourg	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7. Finland	0	0	0	0	0	0	0	0	0	0
8. France	0	0	0	0	0	0	0	0	0	0
9. United Kingdom	0	0	0	0	0	0	0	1	0	0
10. Hungary	0	0	1	0	0	0	0	0	0	0
11. Austria	0	0	0	0	0	1	0	0	0	0
12. Ireland	0	0	0	0	0	0	0	1	0	0
13. Germany	0	0	0	0	0	2	0	0	0	0
14. Austria	0	0	0	0	0	2	0	0	0	0
15. Sweden	0	0	0	0	0	0	0	1	1	0
16. Slovak Republic	0	0	1	0	0	0	0	0	1	0
17. Czech Republic	0	0	1	0	0	0	0	0	1	0
18. Poland	0	0	1	0	0	2	0	0	0	0
19. Greece	0	0	0	1	0	2	0	1	0	0
20. Slovenia	1	0	1	4	2	0	0	3	0	0
21. Rumania	1	0	1	5	2	0	0	3	1	0
22. Latvia	1	0	1	4	2	0	0	5	0	0
23. Lithuania	1	0	1	4	2	0	0	6	0	0
24. Estonia	1	0	1	4	2	0	0	6	0	0
25. Cyprus	1	0	1	5	2	0	0	5	0	1
26. Bulgaria	1	0	1	5	2	0	0	6	1	0
27. Malta	1	0	1	5	2	2	0	6	0	1
TOTAL	8	0	12	37	16	11	0	44	5	2
Number of data units	324	243	135	243	270	108	135	405	162	189
As a %	2.5	0	8.9	15.2	6	10.2	0	10.9	3.1	1.1

Source: *Observatoire de la Compétitivité*

Coverage is satisfactory at the country level. The number of missing values varies between 11 and 18 values for Malta, Bulgaria, Cyprus, Rumania, Lithuania, Latvia, Estonia and Slovenia. It is therefore difficult to interpret results for these countries. Once again, with regard to these countries, values are lacking for some indicators, either because they are not OECD nation members ore because these countries are still exonerated from providing data.

Table 35
Missing values by country

	Number of missing values by country
1. Italy	0
2. Denmark	0
3. Portugal	0
4. Netherlands	0
5. Spain	0
6. Luxembourg	**0**
7. Finland	0
8. France	0
9. United Kingdom	1
10. Hungary	1
11. Austria	1
12. Ireland	1
13. Germany	2
14. Austria	2
15. Sweden	2
16. Slovak Republic	2
17. Czech Republic	2
18. Poland	3
19. Greece	4
20. Slovenia	11
21. Rumania	13
22. Latvia	13
23. Lithuania	14
24. Estonia	14
25. Cyprus	15
26. Bulgaria	16
27. Malta	18
TOTAL	135

Source: *Observatoire de la Compétitivité*

With regard to indicators, nearly half of the data items are missing for indicator C1. According to the report, the indicators with missing values for a greater number of countries should be eliminated, such as indicator C1 "Total Factor Productivity". The *Observatoire de la Compétitivité* is reluctant to eliminate this indicator because it is an important indicator that was chosen by the social partners and by Professor Fontagné. Instead of eliminating it, the missing values can be attributed by a statistical method described in the next paragraph.

Table 36
Missing Values per Indicator

Variable	Missing	Total	Missing/Total
c1	12	27	0,44
a10	8	27	0,30
d5	8	27	0,30
d6	8	27	0,30
d7	8	27	0,30
d8	8	27	0,30
e4	8	27	0,30
e5	8	27	0,30
h4	8	27	0,30
h10	8	27	0,30
h12	8	27	0,30
h14	8	27	0,30
h3	6	27	0,22
h5	6	27	0,22
f3	5	27	0,19
f4	5	27	0,19
i3	5	27	0,19
d3	3	27	0,11
d4	2	27	0,07
j7	2	27	0,07
f2	1	27	0,04

Source: *Observatoire de la Compétitivité*

3.4.3 Imputation

The external audit provided a detailed analysis on the estimation of missing values. In the original calculations, the Observatoire did not attribute any value for those that were missing. When an indicator is not available for a country, the ranking is calculated without this indicator[103].

There are statistical imputation methods available to remedy the problem of missing values. The *Observatoire de la Compétitivité* has attempted to replace missing values in previous reports by using the European average that was available. However, using this method it is possible that some countries could be over or under valued. For this reason, the external audit principal recommended using another method, known as "hot-deck imputation". The idea is to estimate values missing for a country by using values of a country with similar performance. Let us look again at the C1 indicator, for which the values are missing for the new Member States.

[103] In reality, this method is the same as imputing a missing value with the average of values observed for each country.

Table 37
Hot Deck Imputation for Indicator C1 – Illustration

C1: Changes in Productivity and Labour Costs	2009 Raw Data	Imputed Values for 2009	Data imputed via which country?
Germany	-0,0561	-0,0561	
Austria	-0,0372	-0,0372	
Austria	-0,0339	-0,0339	
Bulgaria		-0,0124	Portugal
Cyprus		-0,0175	Greece
Denmark	-0,0317	-0,0317	
Spain	-0,0070	-0,007	
Estonia		-0,0124	Portugal
Finland	-0,0682	-0,0682	
France	-0,0220	-0,022	
Greece	-0,0175	-0,0175	
Hungary		-0,0124	Portugal
Ireland	-0,0296	-0,0296	
Italy	-0,0367	-0,0367	
Latvia		-0,0124	Portugal
Lithuania		-0,0124	Portugal
Luxembourg	**-0,0597**	**-0,0597**	
Malta		-0,0175	Greece
Netherlands	-0,0403	-0,0403	
Poland		-0,0124	Portugal
Portugal	-0,0124	-0,0124	
Rumania		-0,0124	Portugal
United Kingdom	-0,0467	-0,0467	
Slovak Republic		-0,0175	Greece
Czech Republic		-0,0124	Portugal
Slovenia		-0,0175	Greece
Sweden	-0,0426	-0,0426	

Source: *Observatoire de la Compétitivité*

Using this method, Member States such as Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Rumania and the Czech Republic have performance similar to that of Portugal, in yellow, while Cyprus, Malta, the Slovak Republic and Slovenia are similar to Greece, in red.

3.4.4 Outlyer values

Some indicators have outlyer values. Two indicators in the Scoreboard show Luxembourg performing well ahead of the other countries. These are well known indicators. They are A12, *"FDI Inflows and Outflows"* and G1, *"Annual Costs per Student in Public Education"*. As these indicators risk over influencing results, it has been recommended dealing with extreme values by replacing them with values of the country closest to them. These[104] are indicators A9, A12, D8, D10 and G1. The table below shows the various indicators and the abnormal countries that take on values of the countries closest to them.

[104] Indicators are considered as having abnormal values when the skewness measure in absolute values is greater than the 2 and the coefficient of excess in absolute value is greater than 3.5.

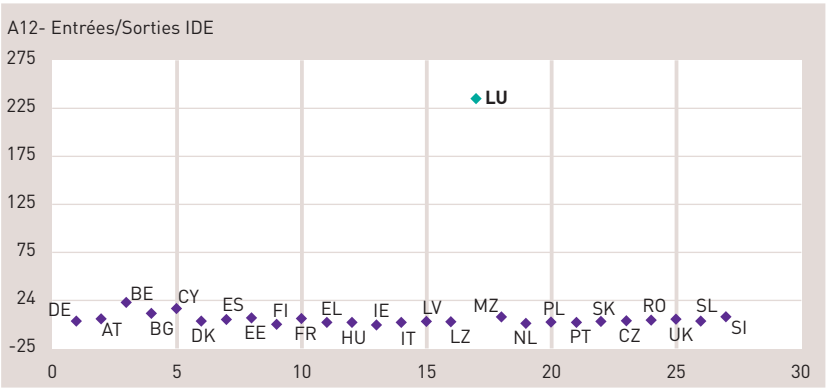
Table 38
Indicators and Abnormal Values

Indicator	Abnormal Value Countries	Equivalent country
A9: Terms of Trade	Rumania	Spain
A12: FDI Inflows/Outflows	Luxembourg	Austria
D8: Basket of Domestic Royalties for Fixed and Mobile Telephones	Slovak Republic and Hungary	Finland
D10: Total of State Aid as a % of GDP	Ireland	Luxembourg
G1: Annual Cost per Student in Public Educational Facilities	Luxembourg	Cyprus

Source: *Observatoire de la Compétitivité*

The Graph below illustrates the abnormal value for Luxembourg in indicator A12, *"FDI Inflows/Outflows"*.

Figure 23
FDI Inflows/Outflows



Source: *Observatoire de la Compétitivité*

The impact of abnormal values is clear in the standardisation mode. As an example, let us analyse in more detail indicator A12, *"FDI Inflows/Outflows"*. By applying the Min-Max method, Luxembourg is assigned the value of 1, while others will be classed within a range of 0 -0.1. After adapting Luxembourg's value, the standardised indicator differentiates more amongst the other countries.

Table 39
Impact of Abnormal Values on Standardisation

Country	A12	A12 Standardised before	A12 after	A12 Standardised after
Luxembourg	**234.00**	**1.00**	**22.10**	**1.00**
Austria	22.10	0.10	22.10	1.00
Cyprus	15.60	0.07	15.60	0.72
Bulgaria	10.30	0.05	10.30	0.49
Sweden	7.20	0.04	7.20	0.36
Malta	6.90	0.03	6.90	0.35
Estonia	6.30	0.03	6.30	0.32
Austria	5.20	0.03	5.20	0.27
France	5.20	0.03	5.20	0.27
United Kingdom	4.70	0.03	4.70	0.25
Spain	4.70	0.03	4.70	0.25
Rumania	3.50	0.02	3.50	0.20
Slovenia	3.00	0.02	3.00	0.18
Czech Republic	2.90	0.02	2.90	0.18
Germany	2.40	0.02	2.40	0.15
Denmark	2.40	0.02	2.40	0.15
Lithuania	2.30	0.01	2.30	0.15
Latvia	2.20	0.01	2.20	0.15
Slovak Republic	1.90	0.01	1.90	0.13
Hungary	1.70	0.01	1.70	0.12
Poland	1.60	0.01	1.60	0.12
Italy	1.30	0.01	1.30	0.11
Portugal	1.20	0.01	1.20	0.10
Greece	1.00	0.01	1.00	0.09
Netherlands	0.70	0.01	0.70	0.08
Finland	-0.70	0.00	-0.70	0.02
Ireland	-1.20	0.00	-1.20	0.00

Source: *Observatoire de la Compétitivité*

3.4.5 Correlation of Indicators

Some indicators that are strongly correlated can be combined. This concerns the indicators for total employment rate, B1 and B4, for men and women, B2/B5 and B3/B6 respectively, the indicators for OEB and USPTO patents, H7 and H8, the indicators concerning administrative and regulatory quality, E6 and E7, as well as the indicators on the degree of sophistication of administrative service on the internet, E9 and E10. The Gini coefficient, I1 and the rate of at risk of poverty after social transfers, I2 are also correlated. Keeping two strongly correlated indicators in the composite indicator doubles the weighting of the subject being analysed. In order to avoid double counting, indicators B1 and B4 are removed from the aggregation process. Moreover, indicators H7 and H8, I1 and I2, E6 and E7 and E9 and E10 are combined into a single indicator by using a simple average.

Table 40
Correlation between two indicators of the same category

Indicators	Correlation
B1, B3	0,90
B4, B6	0,95
E6, E7	0,96
E9, E10	0,97
H7, H8	0,94
I1, I2	0,91

Source: *Observatoire de la Compétitivité*

3.4.6 Aggregation Method

The composite indicator is based on double aggregation. In the first place, the indicators are aggregated by category, then the ten categories are aggregated with equal weighting, i.e. each category is assigned a weight of 10%. Nevertheless, in reality, the impact of a category on the final result depends as much on its weighting, at 10%, as it does on the values of the each indicator, all of which are aggregates. In order to counterbalance the differences of the indicators in the ten categories, the audit suggests standardising them using the min-max method prior to a second aggregation.

"A way to deal with his inconsistency between nominal and effective weights is to re-scale the category scores using the min-max approach and then average them."

As an alternative, it is also possible to use the Copeland method to combine the ten categories during the second aggregation phase. This is based on comparisons of pairs between countries. If country A is better than country B in a majority of the categories—in at least six out of ten—then the score of country A with relation to that of country B is stated as + 1. If country A has a score inferior to country B in a majority of categories, the score of country A compared to that of country B is states as - 1. In the event of a draw between the two—five categories in which country A is better ranked than country B and five categories in which country B is higher ranked than country A—the bilateral score is set at 0. The Copeland score of a country is defined as the sum of scores achieved by these paired comparisons. As an example, Luxembourg is ranked higher than 16 countries and lower than 5. Consequently, the Copeland score for Luxembourg is 11, the result of 16 – 5. In contrast to an arithmetical mean of indices, the Copeland method does not allow for offsetting. The advantage of the method is that it is ordinal, meaning that it uses only ranks of countries in the ten categories and not the values of indices obtained by countries in the various categories. Therefore, re-standardising indices at category level is no longer required.

Table 41
Paired scores for Luxembourg compared to other countries

	Paired scores for Luxembourg compared to other countries
Germany	0
Austria	-1
Austria	0
Bulgaria	1
Cyprus	1
Denmark	-1
Spain	1
Estonia	1
Finland	0
France	-1
Greece	1
Hungary	1
Ireland	1
Italy	1
Latvia	1
Lithuania	1
Luxembourg	**0**
Malta	1
Netherlands	0
Poland	1
Portugal	1
Rumania	1
United Kingdom	-1
Slovak Republic	1
Czech Republic	0
Slovenia	1
Sweden	-1
Luxembourg's Copeland score	**11**

Source: *Observatoire de la Compétitivité*

In the end then, there are two ways to rank countries overall. The first option ranks countries using an arithmetic mean of the ten categories. The second method involves using Copeland scores to obtain rankings.

Table 42
Obtaining results using the Copeland method

Country	Average of indices	Copeland score
Germany	5.20	7
Austria	5.93	19
Austria	4.56	-5
Bulgaria	4.31	-4
Cyprus	4.27	-11
Denmark	6.68	23
Spain	5.03	-8
Estonia	4.71	2
Finland	5.80	16
France	5.08	1
Greece	4.55	-14
Hungary	3.85	-20
Ireland	4.90	-1
Italy	4.27	-15
Latvia	3.25	-22
Lithuania	4.26	-10
Luxembourg	**5.47**	**11**
Malta	4.03	-11
Netherlands	6.31	20
Poland	4.51	-10
Portugal	4.13	-8
Rumania	4.29	-13
United Kingdom	6.10	17
Slovak Republic	4.37	-10
Czech Republic	5.83	15
Slovenia	5.09	6
Sweden	7.09	25

Source: *Observatoire de la Compétitivité*

3.4.7 Impact of the 10 categories on the composite indicator

In general, one expects a more or less strong correlation between a composite indicator and the indicators in the ten categories. It is indeed desirable that an improvement or worsening in one category should correspond with improvement or worsening overall. In 2009, the correlation between category H, Knowledge Economy and the composite indicator was particularly prominent. This suggests that good performance in this category is related to good positioning in general in the area of competitiveness.

Table 43
Correlation between the composite competitiveness indicator and the ten categories for 2009

Cat A	Cat B	Cat C	Cat D	Cat E	Cat F	Cat G	Cat H	Cat I	Cat J
0,65	0,79	-0,20	0,47	0,28	-0,36	0,48	0,80	0,46	0,32

Source: *Observatoire de la Compétitivité*

One point brought up during the audit that merits discussion is the negative link between entrepreneurship and competitiveness. A negative correlation was found between entrepreneurship and competitiveness upon examining correlations between the categories.

"There is a trade-off between competitiveness and entrepreneurship and that the more competitive countries are those with lower entrepreneurship scores."

In view of this negative correlation between category E and the overall index, a trade-off between entrepreneurship and competitiveness should have been put in place. Since the audit was based on a 2009 database, this negative correlation could have been interpreted by the following phenomenon. During crisis periods, laid off employees tend to become entrepreneurs rather than unemployed persons. Yet an analysis of the correlation between 2000 and 2009 shows that this hypothesis did not bear out.

Table 44
Correlation between Entrepreneurship and the composite competitiveness indicator between 2000 and 2009

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Correlation	-0.36	-0.36	-0.43	-0.51	-0.53	-0.39	-0.42	-0.50	-0.43	-0.38

Source: *Observatoire de la Compétitivité*

One argument that could explain the negative correlation of data is that the indicators of the Entrepreneurship category contain much missing data—the coverage rate is only 10% in this category—and one indicator is based on a subjective survey. Thus, it might be appropriate to redistribute indicators in other categories or add other indicators that reflect all facets of entrepreneurship to this category. These possibilities should be explored more in the near future.

3.4.8 Main drivers: Lisbon Strategy indicators

The audit also analysed the conceptual framework of the Competitiveness Scoreboard and found the following: *"The inclusion of an indicator in a conceptual framework provides no guarantee that the indicator will affect the final Index results. The Competitiveness dataset composed of 82 indicators in 2008 reveals that not all that is included in the framework has an impact on the results."*

The audit underscores that 25 indicators have no significant impact on the overall indicator. *"An eventual revision of the conceptual framework of Competitiveness could take this into consideration and eventually streamline the 82 indicators into a smaller number of indicators. The advantage of such a streamlining exercise will be that all indicators included in the revised framework will play an important role in the country classification and it will be easier to communicate to the audience that " all that is included in the Index matters."* The audit recommends focusing on the most important indicators and even halting aggregation at the level of the categories.

One positive point derived from this analysis of indicators is that it brings us back to the Lisbon Strategy. The majority of indicators that have an impact on the overall index are Lisbon Strategy indicators centred on innovation and employment, the objective of which was to make the economy of the European Union the most competitive in the world and to achieve full employment in 2010. These include indicators such as the employment rate, internal R & D expenditures, number of scientific publications per one million inhabitants, number of patents and the percentage of households connected to the internet, which have a major impact on the composite index.

Table 45
Main drivers

	Indicator	Correlation with its category	Correlation with the TBCO index
g5	Continuing education	0.47	0.84
h6	Scientific publications per one million inhabitants	0.84	0.83
h14	Number of web servers	0.79	0.82
h1	Internal R & D expenditures	0.85	0.78
h11	Percentage of households connected to the internet	0.80	0.70
h7	Number of patents	0.88	0.69
b2	Employment rate (Men)	0.80	0.68
b9	Persons with part-time jobs	0.74	0.68
b3	Employment rate (Women)	0.83	0.66
a1	Gross Domestic Product per inhabitant	0.67	0.66
e8	Regulatory quality index	0.50	0.64
h5	Number of researchers	0.79	0.64
g4	Percentage of human resources in sciences and technologies	0.59	0.61
c3	Hourly productivity of work	-0.04	0.60
h12	Number of fixed and mobile telephone connections	0.47	0.59
e6	Administrating efficiency index	0.43	0.58
g1	Annual yearly expenditures per student	-0.07	0.56
e2	Taxes on physical persons	-0.19	0.54
i4	Life expectancy at birth	0.72	0.50

Source: *Observatoire de la Compétitivité*

As a reminder, the Scoreboard was initially set up by Professor Fontagné in conjunction with the social partners using 14 structural indicators set in 2000 by the European Council as part of the Lisbon Strategy. Additional indicators were added to these to give a more accurate picture of Luxembourg's economy. The Lisbon Strategy expired in 2010, to be replaced the Europe 2020 Strategy. Structural indicators have thus changed also. Now there are five major objectives, including Employment; R & D and innovation, Education, Social Cohesion and the Environment. The European Council[105] meeting of March and June, set out the 11 key structural indicators shown in the table below.

[105] Procedural details are discussed more thoroughly in Chapter 5 of this Competitiveness Report

Table 46
EU 2020 Indicators

Major Objectives	Key Indicators
75% of the population aged 20-64 years must be employed	Employment rate by sex for the age group 20-64
3% of GDP must be dedicated to R & D	Gross internal R & D expenditure
The 20/20/20 objectives in the Climate and Energy package must be achieved, with the possibility of reducing emissions by 30% if the appropriate conditions are met.	Greenhouse gas emissions, base year 1990
	Portion of renewable energy consumed in final gross energy consumption
	Energy intensity of the economy, a substitute indicator for 'Energy savings', which is currently been drafted
Academic dropout rates should be lower than 10% and at least 40% of persons aged 30-34 should have a university education or equivalent	Persons who have left school or training programmes before completing them
	Level of university educated persons by sex for ages 30-34
Poverty must be reduced, with the commitment of sheltering at least 20 million people from facing the risk of poverty or social exclusion	Population at risk of poverty or exclusion
	Persons living in households with extremely low work intensity levels
	At risk of poverty after social transfers
	Severe material destitution

Source: *Observatoire de la Compétitivité*

The Observatoire changed indicator B1 *"Employment rate for persons aged 15-64 as a percentage"*, to "Employment rate for persons aged 20-64" The indicator for gross internal R & D expenditure remains unchanged as does the indicator for greenhouse gas emissions with 1990 as a base year, and for energy intensity of the economy. The indicator for renewable energy changed slightly with relation to the Scoreboard indicator, exchanged for *"Portion of renewable energy consumed in final gross energy consumption"*. In the area of education; the indicator for persons who have left school or training programmes before completing them and the level of university education by sex for persons aged 30-34 replaced similar indicators on the Scoreboard. The social indicators, such as the population risking poverty and social exclusion, persons living in household with extremely low work intensity levels and severe material destitution were added to Category I, apart from the at-risk-of-poverty rate, which was already in the scoreboard. The indicators for the Europe 2020 strategy are analysed in more detail in Chapter 5 of this report.

It is desirable to reopen discussion on the choice of indicators so as to replace indicators that are no longer updated and the Lisbon Strategy indicators by indicators for the new Europe 2020 strategy.

3.4.9 The Composite Competitiveness Indicator – Results Obtained Using the Alternative Method

The composite indicator introduced in Section 3.3 can be improved by certain technical modifications that were discussed in the preceding sub-chapters.

Table 47
Methodological differences

	Current Method	**Recommended Method**
Standardisation	Min-Max	Min-Max
Imputation of missing values	No explicit imputation	Hotdeck imputation
Treatment of abnormal values	No	Yes, A9, A12, G1, D8, D10
Combination of strongly correlated indicators	No	- E9 and E10; E6 and E7; H7 and H8, I1 and I2; - B1 and B4 were excluded because of double counting
Re-standardisation of indicators in the ten Re-standardisation	No	Yes, using the Min-Max method
Aggregation of indicators in the ten categories	Simple arithmetic average	- Simple arithmetic average - Copeland Method, using ordinal aggregation

Source: *Observatoire de la Compétitivité*

Nonetheless, a modification to the calculation method often has an impact on the result. Instead of introducing a new ranking for each modification, the *Observatoire de la Compétitivité* opted to introduce a single new ranking on the basis of all modifications carried out.

Luxembourg improved two positions in Category B (Employment), going from 12th using the former methodology to 10th with the new methodology regarding categories. This is explained by the fact that the indicators for which Luxembourg's performance was average lost in importance using the new methodology. Luxembourg falls two positions in Category C (Productivity & Labour Costs) because of the new imputation method. Lastly, in Category G (Education and Training), Luxembourg jumped ahead four positions using the new methodology, passing from 25th in the old methodology to 21st under the new one. The treatment of indicator G1 (Annual expenditure per student) as an abnormal value helps Luxembourg, for which the relative performance with relation to other countries improved considerably.

Table 48
Results of categories using the recommended method in 2009.

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

Source: *Observatoire de la Compétitivité*

Overall, results depend on the type of aggregation uses, an arithmetic average of the Copeland method. In both cases, Luxembourg moves up one position compared with the former method.

With regard to the aggregation method, Greece could be highlighted, in 16th place when aggregated using an arithmetic average and in 24th place using the Copeland method. In terms of paired comparisons, Greece's performance is higher than only three countries, Italy, Latvia and Lithuania, which explains its unfavourable ranking using the Copeland method. Greece is first in the Entrepreneurship category. The maximum value obtained for the index of this category contributes then, to offsetting lower values in indices for Greece in the other nine categories. By taking the average of indices in the ten categories, Greece thus manages to score in the 16th position.

Table 49
Composite indicators using current and recommended methodologies

	Recommended method (Arithmetic average)	Recommended method (Copeland)	Current Method
Germany	9	9	10
Austria	5	4	6
Austria	15	15	18
Bulgaria	19	14	22
Cyprus	21	21	15
Denmark	2	2	2
Spain	12	16	14
Estonia	14	11	12
Finland	7	6	5
France	11	12	11
Greece	16	24	16
Hungary	26	26	25
Ireland	13	13	13
Italy	22	25	21
Latvia	27	27	26
Lithuania	23	18	23
Luxembourg	**8**	**8**	**9**
Malta	25	21	27
Netherlands	3	3	3
Poland	17	18	17
Portugal	24	16	20
Rumania	20	23	19
United Kingdom	4	5	4
Slovak Republic	18	18	24
Czech Republic	6	7	8
Slovenia	10	10	7
Sweden	1	1	1

Source: *Observatoire de la Compétitivité*

In general, the external audit was very positive regarding the composite indicator mechanism. It underscored transparency in calculating the indicator and indicating a precise definition of competitiveness and of the phenomenon being measured. The indicator does not solely reflect the size of the country. Indeed, the results of the composite indicator are not correlated to the population of countries, nor to Gross Domestic Product (GDP). A simple correlation to GDP would have meant that Luxembourg's competitiveness was simply productivity, so the *Observatoire de la Compétitivité* promulgates the ECS definition in the area of competitiveness, which is much broader:

"The association between the Index scores and population is not statistically significant, which implies that the index is not biased with respect to population size or to the land area."

In her audit, the author also discusses the pertinence of a competitiveness indicator:

"While an EU country will score higher than some and lower than others, the purpose of the Competitiveness Index is not to identify winners and losers. Instead the Index and its ten categories could foster discussions about what factors contribute to good competitiveness performance at national level and also provide insight into the nature of relevant policy challenges at the EU level."

The *Observatoire de la Compétitivité* has always recommended a multi-level analysis, meaning that the object is not to establish a simple ranking. On the contrary, it is clear that a detailed analysis of the indicators is vital.

"The Observatoire de la Compétitivité in its report 2008 Bilan Compétitivité is in fact thoroughly discussing the national performance of the 27 EU Member States at the category level. The construction of the Index was a secondary objective of the report."

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4 Toward a Short Term Scoreboard

It was decided in the 2009 government programme[106] that economic indicators in the Grand Duchy regulation dated 4 April 1985, as applied by article 21, paragraph 6 of the amended law dated 24 December, 1977, which authorises the government to implement economic stimulation measures and to maintain full employment date *"...from before the introduction of the Euro and 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. A new scoreboard for the short term will integrate short term indicators allowing rapid reaction to changes in the economic situation that often depend on international changes, by highlighting long term structural indicators."*

This reform proposal was one of the 65 proposals submitted by the Minister of Economics and Foreign Trade to improve domestic competitiveness to the Tripartite Coordination Committee on Tuesday, 20 April, 2010. It states: *"17. Replace the economic indicators included in the Grand Duchy regulation dated 4 April 1985, as applied by article 21, paragraph 6 of the amended law dated 24 December, 1977, which authorises the government to implement economic stimulation measures and to maintain full employment, by a Competitiveness Scoreboard to be implemented by the Observatoire de la Compétitivité as part of the LU 2020 strategy, following consultation with the social partners in the Tripartite Coordination committee."*

This chapter provides detail about the laws and regulations concerned and attempts to trace an initial path toward building an intelligent and operational short-term scoreboard.

4.1 Background of the 1977 law and the 1984 and 1985 Grand Duchy regulations

The amended law dated 24 December 1977 authorises the government to implement economic stimulation measures and to maintain full employment.

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

Extracts of the law dated 24 December 1977 authorising the government to implement economic stimulation measures and to maintain full employment.

Article 1. The State may gradually implement and coordinate the measures specified below for the purpose of stimulating the economy and maintaining full employment.

Article 2. The measures mentioned in Article 1 shall be implemented gradually in order to take into account the four levels of severity of the cyclical and structural economic situation. Immediate action shall be taken to stimulate economic growth and to maintain full employment.

More penetrating measures as specified by this law shall be applied through Grand Duchy regulations, only when levels 1, 2 and 3 are reached.

The trigger thresholds shall be determined by the number of job seekers, either without employment or having been given layoff notice, as presented in the official statistics of the national labour administration.

The first threshold shall be breached when there are one thousand five hundred (1,500) job seekers, either without employment or for whom layoff notice has been recorded.

The second threshold will be triggered when the numerical criteria heretofore stated shall reach two thousand five hundred (2,500).

The third threshold shall be reached when after the expiration of the second threshold a serious threat of unemployment shall become clear. This threat shall be confirmed by applying the stated criteria and in accordance with the procedure described by this law.

Article 2. A Tripartite Coordination Committee shall be established which shall submit its opinion prior to implementing necessary measures after one of the three thresholds have been reached. This consultation deputation involves, among other items, an analysis of the overall economic and social situation and of the type of unemployment. The Coordination Committee shall comprise four members of the government, four employer representatives and four delegates from the most representative unions on the national level. There shall be an alternate member for each sitting member.

A Grand Ducal regulation shall determine the manner of designating sitting and alternate members, state the rules for deliberation and determine the Committee's functioning.

(...)

Article 2. If level 2 has been reached, and if the majority of the members of each of the groups representing the most representative employers and unions on the national level sitting on the Coordination Committee believe that the economic and social situation risks worsening to the point where a significant number of jobs are threatened, the government shall be authorised to adopt the following specific measures, by means of Grand Duchy regulations to be implemented following the opinion of the Council of State and the approval of Parliament's working committee.

1. The rules for applying the sliding scale, including its ceiling based on a certain income level, may be temporarily modified up until 31 December 1979 at the latest, for both salaried wages and for all other categories of income.

2. Simultaneous to and in correlation with the measures indicated under 1 above, and without prejudice to the primacy of the provisions of the law dated 30 June, 1961, for which the purpose was to replace the Grand Duchy decision dated 8 November, 1944 establishing a prices bureau, a temporary freeze of margins and prices for goods and services may occur, including for rents, to the extent that factors behind increases are not caused by either an act by the authorities or by the initiative of foreign suppliers.

3. The number and impact of the indexed groups may be temporarily limited.

4. Simultaneous to and in correlation with the measures indicated under 3 above, periods of notice of layoffs may be extended by means of a Grand Duchy regulation.

5. Maximum periods for awarding tide-over allowances in the event of pre-retirement as described by article 11 of this law may be extended for an additional maximum period of two years.

It was not until 1982 that the *"...special measures for securing continued employment and overall competitiveness of the economy."* were specifically cited in the law dated 8 April, 1982, establishing special measures for securing full employment and the overall competitiveness of the economy.

The "law dated 24 December, 1984 amending 1), article 11 of the amended law dated 22 June, 1963 setting salaries for government employees, and 2), article 21 of the amended law dated 24 December, 1977 authorising the government to implement legislated measures intended to aid economic recovery.

Extracts of "law dated 24 December, 1984 amending 1), article 11 of the amended law dated 22 June, 1963 setting salaries for government employees, and 2), article 21 of the amended law dated 24 December, 1977 authorising the government to implement economic stimulation measures and to maintain full employment".

The heading of Chapter 6 and article 21 of the amended law dated 24 December 1977 authorising the government to implement economic stimulation measures and to maintain full employment, shall be replaced by the following heading:

"Chapter 6 – Measures of general application and for national solidarity in the event of worsening of the economic and social situation.

Article 21.

1. In the event that worsening of the economic and social situation should incur a perceptible divergence of the domestic rate of inflation with relation to that of the average of the principal trading partners, or a weakening of the competitiveness of Luxembourg companies on the international markets, the government shall rapidly convene the Tripartite Coordination Committee. It may submit to the Committee such legislative and regulatory measures it deems necessary to improve the economic and social situation, which could bear on the following, depending on requirements:

a) the rules for apply the sliding scale, to include a temporary limitation of the number and impact of index groups and their ceilings based on income thresholds that may be temporarily adapted, affecting both salaries and all other categories of income.

b) a temporary freeze of margins and prices for goods and services may occur, including for rents, to the extent that factors behind increases are not caused by either an act by the authorities or by the initiative of foreign suppliers.

c) periods of notice of layoffs may be extended.

d) extension of periods for awarding tide-over allowances in the event of pre-retirement as described by article 11 of this law for an additional maximum period of two years.

2. The opinion of the Tripartite Coordination Committee bears both on the evaluation of the economic and social situation that invoked its convening by the government and the proposals of the government to improve the situation. The Coordination Committee shall decide by majority vote of the members of each group sitting for the most representative employers and unions in the country, while the government delegation shall present its perspective in accordance with the position of the government itself.

3. Should no majority opinion as provided for by paragraph 2 be forthcoming, the government may, following consultation with the Tripartite Coordination Committee, appoint a mediator to submit a reasoned proposal for improving the economic situation with a period set by the government.

4. In the event of both paragraph 1 and paragraph 3, the Coordination Committee issues an opinion within the timeline given it by the government.

5. Following consideration the Tripartite Coordination Committee's opinion or after the expiration of the timeline, the government may address in Parliament all legislative measures in the areas cited in paragraph 1 that are intended to improve the economic situation.

6. The terms and conditions under which a mediator shall be appointed, as well as the economic indicators used to evaluate the critical threshold of the economic and social situation in the meaning of the paragraph concerning the invoking of the Tripartite Coordination Committee by the government, shall be determined by the Grand Duchy regulation to be approved with the opinion of the Council of State and the assent of the Labour Commission of Parliament.

The Grand Duchy regulation dated 5 April, 1985, on the basis of the law dated 24 December, 1977 outlines a system of competitiveness indicators. This was the first attempt to implement a system of economic indicators that address the worsening of the economic and social situation and of competitiveness of companies.

Extracts of the Grand Duchy regulation dated 5 April, 1985, in application of the provisions of article 21, paragraph 6 of the amended law dated 24 December 1977 authorising the government to implement economic stimulation measures and to maintain full employment.

Article 1: To evaluate the critical threshold relating to the worsening of the economic and social situation required to convene the Tripartite Coordination Committee in accordance with article 21, paragraph 1 of the amended law dated 24 December, 1977 authorising the government to implement economic stimulation measures and to maintain full employment, the government shall use the economic indicators cited below in its actions:

a. the divergence of the domestic rate of inflation with relation to that of the weighted average of Luxembourg's principal trading partners, i.e. Belgium, Germany, France and the Netherlands

b. the effective rate of exchanger of the Luxembourg franc, weighted to export and import markets

c. changes in exports and imports of goods

d. terms of trade calculated by reference to unit values of exports and imports

e. the competitive position of Luxembourg's industry expressed in wage cost per unit produced

f. prices of industrial production

g. indicators for the main sectors of economic activity

h. changes in unemployment or partial unemployment

i. changes in purchasing power of wage earners

If the government's opinion concerning changes in these economic indicators leads to a conclusion that a perceptible worsening of the economic situation or of companies' competitiveness levels has occurred, it will submit to the Committee such legislative and regulatory measures it deems necessary to improve the economic situation.

Article 2: The mediator, appointed in accordance with the provisions of paragraph 3 of article 21 of the amended law dated 24 December, 1977 authorising the government to implement economic stimulation measures and to maintain full employment, shall have the responsibility of producing objective documentation concerning all economic and social data related to the issue and to set out the terms of a solution acceptable to the parties. The mediator may undertake all investigations or consult expert opinions need to assemble data essential to accomplishing this mission. The mediator is bound to professional confidentiality.

Article 3. After attempting to reconcile all parties view, the mediator shall submit a reasoned recommendation containing proposals for settling contentious issues to the Tripartite Coordination Committee, within a timeline set by the government, which may be extended. The conclusions and recommendations of the mediator shall be submitted to the committee.

Article 4. The Tripartite Coordination Committee shall render a decision on the conclusions and recommendations submitted to it within a period set by the government. The Committee shall decide by majority vote of the members of each group sitting for the most representative employers and unions in the country, while the government delegation shall present its perspective in accordance with the position of the government itself.

The list of economic indicators in the Grand Duchy regulation dated 5 April, 1985 cited above is outdated and should be replaced by a new set of indicators. The 2009-2014 government programme stipulates that *"The economic indicators included in the Grand Duchy regulation dated 4 April 1985, as applied by article 21, paragraph 6 of the amended law dated 24 December, 1977, which authorises the government to implement economic stimulation measures and to maintain full employment, shall be replaced by a Competitiveness Scoreboard, following consultation with the social partners in the Tripartite Coordination committee. This Competitiveness Scoreboard will have indicators to replace several ones dating from prior to the introduction of the Euro and 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. It will integrate short term indicators allowing rapid reaction to changes in the economic situation that often depend on international changes, by highlighting long-term structural indicators. It will ensure compatibility with sustainable development indicators.[107]"*

In the proposals submitted by the Minister of Economics and Foreign Trade to improve domestic competitiveness[108] to the Tripartite Coordination Committee on Tuesday, 20 April, 2010 the following is stated: *"17. Replace the economic indicators included in the Grand Duchy regulation dated 4 April 1985, as applied by article 21, paragraph 6 of the amended law dated 24 December, 1977, which authorises the government to implement economic stimulation measures and to maintain full employment, by a Competitiveness Scoreboard to be implemented by the Observatoire de la Compétitivité as part of the LU 2020 strategy, following consultation with the social partners in the Tripartite Coordination committee. This scoreboard will integrate short term indicators allowing rapid reaction to changes in the economic situation that often depend on international changes, by highlighting long term structural indicators."*

[107] Government programme appended to the Prime Minister's statement, p.56

[108] Proposals by the Ministry of the Economy and Foreign Trade to the Tripartite Coordination Committee to improve domestic competitiveness , 20 April 2010, p.6: http://www.eco.public.lu/

4.2 From theory to practice

One weakness of the Competitiveness Scoreboard updated annually in the Report is that it cannot be used to describe the short-term situation and to react rapidly to changes in the economy. Indeed, in the 2010 Report, the Observatoire explicitly advises readers that the majority of the most recent data in the Scoreboard dates from 2009 and before. Some data were updated following the publication of the national accounts on 1 October 2010.

It is therefore necessary to establish a short-term scoreboard that should be based on indicators that are published monthly or quarterly and that can be compared to other countries in as much as possible. Examples of available data that can describe the short-term economic situation are the nation's quarterly accounts, the unemployment rate and the inflation rate.

This task is by no means easy if the objective is to possess an intelligent and operational scoreboard that furnishes stable results. It is difficult to summarise a complex reality such as the economic situation of a small country characterised by intense volatility with a half dozen indicators.

A short-term scoreboard could include a series of four to six indicators that compare Luxembourg with other countries and define "a worsening situation", a limit that would entail robust and specific measures in a meeting of the Tripartite Coordination Committee.

First, it is important to decide which countries one would wish to be compared to Mr Jean-Claude Juncker, the nation's Prime Minister, in his State of the Nation speech in May, 2010: *"An dofir musse mer eis a Saache Kompetitivitéitsmoossung ëmmoduléiert Instrumenter ginn, Parameteren déi ee vun Ufank vun der Währungsunioun bis haut kann aktionéiere fir eis Situatioun, virun allem eis Situatioun par rapport zu eisen dräi Haapthandelspartner Däitschland, Frankräich an d'Belsch, kënnen ze vergläichen."* (And it is for this reason that, with regard to evaluating competitiveness, we have to equip ourselves with re-modulated tools, e.g. parameters, which can be implemented extending from the beginnings of the monetary union until today, to be able to compare our situation, especially with respect to our three primary trading partners, Germany, France and Belgium).

The *Observatoire de la Compétitivité* completed this initial analysis and compared Luxembourg with these neighbouring countries, which are also its primary trading partners.

As to frequency, it should be stated that STATEC has only been producing quarterly national accounts for a few years now. In its latest economic report, STATEC advises consumers of quarterly statistics that, *"in a small country with high growth rates, volatility is intrinsically high, which generally leads to more or less strong changes.*[109]*"*

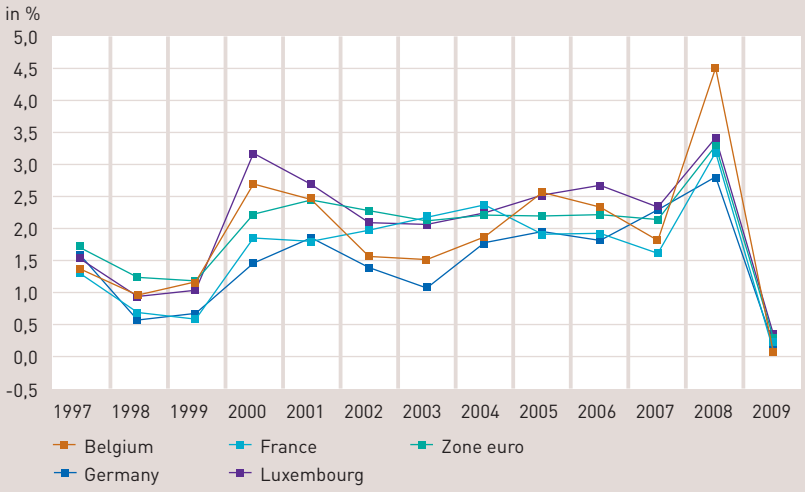
Another disadvantage of quarterly national accounts is that they are published three months after the end of each quarter, per European community regulations; the first quarter accounts for 2010 were published in early July.

[109] Economic Notes 1-2010, STATEC

The alert mechanism for worsening economic situations remains flawed because of this high degree of volatility of quarterly and monthly data.

As an example, take the inflation rate. The *Observatoire de la Compétitivité* calculates a weighted average for the neighbouring countries. This average for neighbouring countries is then compared to that of Luxembourg using a simple ratio. In a second phase, the historical average of this differential is calculated over the analysis period of 1997-2009, which makes it possible to detect a worsening or even a deterioration of the economic situation.

Figure 24
Inflation rate of Luxembourg, its neighbouring countries and the Euro zone between 1997-2009



Source: Eurostat, STATEC

The annual rate measures changes in price between a given month and the same month of the preceding year. The above graph shows the time series of the Harmonised Indices of Consumer Prices (HICP) for Germany, France, Belgium and the Euro zone, but for Luxembourg, the graph refers to the National Index of Consumer Prices[110].

An analysis of the above graph confirms that the inflation rate in Luxembourg, measured by the National CPI is on the average higher than that of neighbouring countries and the Euro zone measured by the HCPI.

[110] The NCPI (IPCN in Luxembourg) is the measure for domestic inflation. It is distinguished from the HCPI by the sole fact that it uses a different weighting. NCPI weightings are based on final consumer prices of residents within the country, while HCPI uses expenditures of both residents and non-residents. As a result, some items, essentially petroleum and tobacco products, major spending items for cross-border visitors to Luxembourg territory, have a lower weighting in the NCPI than in the ICPH. TH Harmonised Consumer Price Index (HCPI) is the official measure of inflation in the European. Numerous regulations specify the methodology to use for guaranteeing that the index remains comparable from one Member State to another . For this reason the HCPI is often used to compare changes in inflation between various countries as well as for calculating aggregate inflation in the Euro zone or the European Union in general.

Table 50
Inflation rates

Country/ Differential	Unit	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 1996-2011
Luxembourg	%	1,4	1,0	1,0	3,2	2,7	2,1	2,0	2,2	2,5	2,7	2,3	3,4	0,4	2,06
France	%	1,3	0,7	0,6	1,8	1,8	1,9	2,2	2,3	1,9	1,9	1,6	3,2	0,1	1,63
Belgium	%	1,5	0,9	1,1	2,7	2,4	1,6	1,5	1,9	2,5	2,3	1,8	4,5	0,0	1,90
Germany	%	1,6	0,6	0,7	1,4	1,8	1,4	1,0	1,8	1,9	1,8	2,3	2,8	0,2	1,48
Neighbouring countries weighted average	%	1,4	0,6	0,7	1,8	2,0	1,6	1,5	2,0	2,0	2,0	2,0	3,3	0,1	1,62
LU-Neighbouring countries weighted differential	Percentage points	0,04	-0,32	-0,29	-1,31	-0,68	-0,46	-0,52	-0,24	-0,44	-0,71	-0,35	-0,12	-0,24	-0,43

Source: Eurostat, STATEC, Calculation by the *Observatoire de la Competitivité*

By what threshold can Luxembourg's inflation rate be qualified as excessive? Let us analyse the difference between Luxembourg's inflation rate and the weighted inflation rates of neighbouring countries.

In the table above, we can see that the LU (Luxembourg)--PV (Neighbouring Countries) differential between 2000-2003 and 2006-2007 was higher than the historical average. In 2000, there is a differential of – 1.31 percentage points. In 2008, the LU-PV differential was quite low, yet a generally high – or high and wide-ranging – inflation rate was observed.

Upon analysing the growth rate in 2000, we set that it is 8.4%. Likewise, in 2006 and 2007, the growth rate was 5.6% and 6.5% respectively. Only in 2001 and 2003 do we observe a low rate of growth and a high inflation differential.

Table 51
Growth rates

Country/ Differential	Unit	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average 1996-2011
Luxembourg	%	5,90	6,50	8,40	8,40	2,50	4,10	1,50	4,40	5,40	5,60	6,50	0,00	-4,10	3,81
France	%	2,20	3,50	3,30	3,90	1,90	1,00	1,10	2,50	1,90	2,20	2,40	0,20	-2,60	1,71
Belgium	%	3,70	1,90	3,50	3,70	0,80	1,40	0,80	3,20	1,70	2,70	2,90	1,00	-2,80	1,80
Germany	%	1,80	2,00	2,00	3,20	1,20	0,00	-0,20	1,20	0,80	3,20	2,50	1,30	-4,90	1,12
Neighbouring countries average	%	2,57	2,47	2,93	3,60	1,30	0,80	0,57	2,30	1,47	2,70	2,60	0,83	-3,43	1,54
LU-PV differential	Percentage points	3,33	4,03	5,47	4,80	1,20	3,30	0,93	2,10	3,93	2,90	3,90	-0,83	-0,67	2,27

Source: Eurostat, STATEC, Calculation by the *Observatoire de la Competitivité*

According to P. Krugman in 2009[111], when the economy is depressed and jobs are hard to find, inflation tends to diminish, whereas with a boom economy, inflation tends to augment. The problem is to determine when inflation can be designated as excessive.

High inflation is not necessarily a symptom of an ailing economy. It can reflect the vitality of a society, which has requirements and desires met by loans intended to maintain or increase consumption. Capital expenditures are drivers of economies.

In contrast, massive use of loans to maintain and finance a high standard of living can be the sign of a sick economy. What ensues is a mechanical increase of insolvency of economic agents, nations or private individuals. Expanding the money supply may bring on a separation between the amount of money existing and the real economy and a monetary bubble with an increasing probability of bursting, as well as the risk of a general economic crisis accompanied by a deflation phenomenon.

4.3 Work at the European level

In its document COM(2010) 527 final, the European Commission recommends addressing the major macroeconomic imbalances arising from the financial and economic crisis by developing a new structured procedure for preventing and correcting unfavourable macroeconomic imbalances in each Member State. In particular, it underscores the necessity of widening economic surveillance in order to detect and deal with macroeconomic imbalances at an early stage. In order to meet these challenges, in July, 2008 Eurogroupe decided to launch a regular analysis of changes in competitiveness within the Euro zone.

The monitoring mechanism referred to by the treaty must be modified and added to, keeping consistent with the Stability and Growth pact. This is the reason the European semester was established.

The mechanism for preventing and correcting macroeconomic imbalances comprises two proposals for draft regulations. The first proposal sketches out an Excessive Imbalance Procedure (EIP), while attempting to provide a framework for identifying and dealing with macroeconomic imbalances, including deterioration of competitiveness trends. As such, it rounds out the macro-structural monitoring process called for by the Europe 2020 Strategy, while the second one emphasises its application.

[111] Macroeconomics, Paul Krugman, Robin Wells, 2009, De Boeck.

The EIP includes a regular evaluation of risks and imbalances, with an alert mechanism, together with rules for enabling the implementation of corrective measures to address any negative macro economic imbalances extending beyond fiscal policy. The EIP applies to all Member States. The alert mechanism is comprised of a trend chart that is transparent, reasonably simple and backed up by economic analysis.

Thus, a group of objective indicators should be set up to ensure rapid identification of imbalances arising in different sectors of the economy. Thresholds should be considered as indicative values for guiding assessments, but should not be interpreted mechanically. They should be supplemented by economic appraisals and expertise in some countries.

The Commission will publish indicators that make up this trend chart, their respective values and their underlying methodologies in the near future, in order to fully ensure transparency of the functioning of the alert mechanism. The trend chart's composition could evolve over time, by changing dangers that weigh on macroeconomic stability or progress in the area of availability of data.

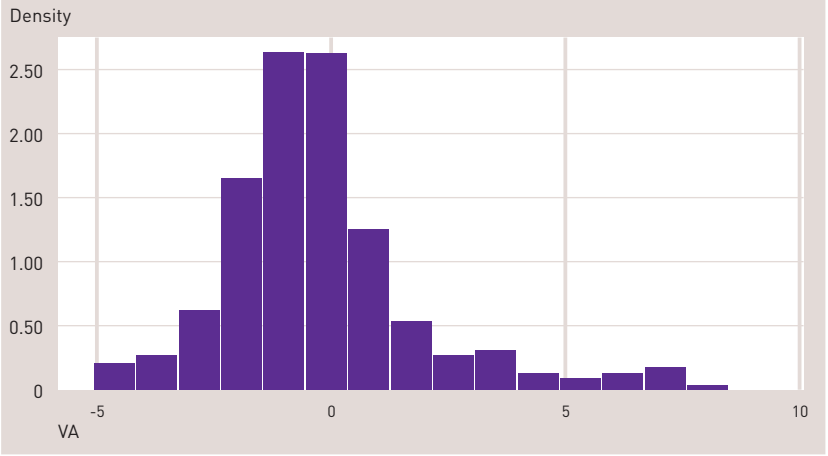
When macroeconomic imbalances are detected, affected Member States would have to adopt a remedial plan within a set time period to determine implementation of policy measures.

The European Commission is currently analysing through a working group, a method for determining thresholds using a more neutral criterion than that analysed above by the *Observatoire*.

All observations over time and amongst countries shall be assembled to generate the statistical population of the variable for which thresholds are calculated. The statistical population includes all observations available on the difference in terms of percentage compared to the average for the indicator in all EU Member States since 1996. The upper and lower quartiles of the distribution are determined in a second phase. It is possible to determine the quartiles of the distribution that divide selected data into four equal parts, so that each part represents one quarter of the population sampling. This implies that 25% of all observations are considered "too weak", 50% are normal and 25% are "too strong". Whenever one value of an indicator falls in the first or last quartile, the alert is given.

Let us look at this method using the nominal unit wage cost -- year to year.

Figure 25
ULC Distribution for all Member States for 1996-2009



Source: Calculation by *Observatoire de la Compétitivité*

Table 52
Descriptive statistics for the series Nominal Unit Wage Cost

		Year to year		
	Percentiles	**Smallest**		
1 %	-4.418827	-5.060729		
5 %	-3.0303	-4.60094		
10 %	-2.362206	-4.418827	**Obs**	246
25 %	-1.436782	-4.319247	**Sum of Wgt.**	246
50 %	-.4972681		**Mean**	-.2154476
		Largest	**Std. Dev.**	2.185173
75 %	.4621072	7.179487		
90 %	2.308496	7.234881	**Variance**	4.774979
95 %	4.092333	7.332627	**Skewness**	1.328272
99%	7.234881	8.547009	**Kurtosis**	5.849996

Source: Calculation by *Observatoire de la Compétitivité*

Table 53
Determination of quartile for each observation concerning Luxembourg

Year	A	Year to year	quart4
1995	103		
1996	102.9	-.0970859	3
1997	104.7	1.749267	4
1998	104.1	-.5730644	2
1999	99.5	-4.418827	1
2000	100	.5025126	4
2001	106.4	6.400002	4
2002	106.5	.0939835	3
2003	101.9	-4.319247	1
2004	101.3	-.588811	2
2005	98.8	-2.467917	1
2006	93.8	-5.060729	1
2007	92.5	-1.385931	2
2008	94.1	1.729728	4
2009	101	7.332627	4
2010	98.7	-2.277231	1
2011	96.6	-2.127658	1

Source: Calculation by *Observatoire de la Compétitivité*

According to this method, the alert threshold would have been reached in 1997, 2000, 2001, as well as in 2008 and 2009. Once again, we observe that in 1997, the growth rate was 5.6% and in 2000, it even rose to 8.6%. In contrast, in 2001, 2008 and 2009 the growth rate was very low. Implementing an automatic alert mechanism is not easy.

This chapter has been dealing with what is a work in progress and seeks to illustrate the problematic that we must confront in designing a useful short-term scoreboard. In the near future, the European Commission will publish a first draft of this type of scoreboard that could be supplemented by indicators considered pertinent on the national level with the objective of analysing and signalling macroeconomic imbalances.

4.4 Bibliography

Krugman P., Wells R.
Macroéconomie, De Boeck, 2009.

Law dated 24 December 1977 authorising the government to implement economic stimulation measures and to maintain full employment.

STATEC
Economic report 1-2010

Law dated 24 December, 1984 amending 1), article 11 of the amended law dated 22 June, 1963 setting salaries for government employees, and 2), article 21 of the amended law dated 24 December, 1977 authorising the government to implement economic stimulation measures and to maintain full employment".

Grand Duchy regulation dated 5 April, 1985, in application of the provisions of article 21, paragraph 6 of the amended law dated 24 December 1977 authorising the government to implement economic stimulation measures and to maintain full employment.

Government programme appended to the government statement made by the Prime Minister

Proposals submitted by the Ministry of Economics and Foreign Trade to improve domestic competitiveness to the Tripartite Coordination Committee on Tuesday, 2010 April

5 A look at the Indicators for the Europe 2020 Strategy

5.1 Moving from the Lisbon Strategy to the Europe 2020 Strategy

The Europe 2020 Strategy[112], a central element of the European Union (EU) response to the world economic crisis, was conceived to update and replace the Lisbon Strategy[113] that came into being in March, 2000 and was renewed in 2005 as the European Strategy for Growth and Jobs. This new strategy will imply strengthened coordination of economic policies and will concentrate on the major areas in which measures will be taken to stimulate inclusive sustainable growth potential and competitiveness in Europe. In view of the economic crisis and the challenges being faced in re-establishing public finances, the ageing of Member States' populations, growing inequalities and climate change, a new approach has proven necessary. Emerging from the crisis should be the entry point into a social market economy, a greener and more intelligent economy, in which prosperity will be the result of innovation capacities and improved use of resources, the key element of which will be knowledge.

In January, 2010, the Luxembourg government sent a position statement, as did the other Member States, for public consultation of the Europe 2020 concept, set up by the Commission[114] to this end. Luxembourg insisted on the importance of the EU and the Member States drawing lessons from the Lisbon strategy. Its successor, the Europe 2020 strategy, should form the ambitious long-term strategy for the EU and its Member States, that will provide the framework for sustainable economic policy at the highest political level. It should be based on the successful elements of the Lisbon Strategy as a partnership for growth and jobs, and renew this strategy to confront its challenges. Special attention should be given to continuing the process and implementing reforms, to reinforcing the focus on growth and employment in the interest of greater social cohesion, in taking into account the specific nature of national characteristics and of the cross-border aspect. Also, to the need for concentrating on a reduced number of key objectives on both the Community and national levels, to adopting efficient monitoring mechanisms on both the Community and national levels, to a debate and shared diagnostic amongst parties for structural reform and to communication efforts directed at the general public concerning the benefits of this type of strategy.

After public consultation, the Commission issued a communication in February, 2010 concerning its vision of the Europe 2020 strategy. The strategy will require implementing three mutually self-bolstering priorities:

- Intelligent growth: develop an economy based on growth and innovation
- Sustainable growth: promote an economy that uses resources more efficiently, more ecologically and more competitively.
- Inclusive growth: encourage an economy with strong employment rates that favour social and territorial cohesion

[112] For more information see : http://ec.europa.eu/eu2020/index_fr.htm

[113] For more information see : http://ec.europa.eu/archives/growthandjobs_2009/

[114] For more information see : http://ec.europa.eu/dgs/secretariat_general/eu2020/docs/luxembourg_gov_fr.pdf

The Commission's proposals centred on the key objectives[115] to be met by 2020 for the EU as a whole, as well as for the Member States, who are representative of these three priorities. In March, 2010 the European Council discussed the new 2020 strategy on the basis of this Commission document. It approved the principal elements of the document, including the key objectives that will guide the implementation of the provisions aimed at improving follow-up mechanisms. The European Council agreed on a series[116] of elements that subsequently were to be formally adopted in June, 2010. In March, the European Council set out an initial draft of the major common guidelines for Member States and for the Union.

In Luxembourg, an orientation debate[117] on the Europe 2020 Community strategy was held in early June, 2010, in Parliament prior to the programme's final adoption by the European Council meeting of June, 2010. Discussions centred primarily on the European Commission's proposals and the March 2010 Council conclusions, especially the European and national objectives to be set.

The June[118] European Council meeting finalised the new Europe 2020 strategy. The European Council confirmed the five headline targets of the EU, which will constitute the shared objectives guiding the action of Member States and the Union as regards promoting employment, improving the conditions for innovation, research and development; meeting our climate change and energy objectives, improving education levels and promoting social inclusion, in particular through the reduction of poverty:

- *"aiming to raise to 75% the employment rate for women and men aged 20-64, including through the greater participation of young people, older workers and low-skilled workers and the better integration of legal migrants*

- *improving the conditions for research and development, in particular with the aim of raising combined public and private investment levels in this sector to 3% of GDP; the Commission will elaborate an indicator reflecting R&D and innovation intensity*

- *reducing greenhouse gas emissions by 20% compared to 1990 levels; increasing the share of renewables in final energy consumption to 20%; and moving towards a 20% increase in energy efficiency; the EU is committed to taking a decision to move to a 30% reduction by 2020 compared to 1990 levels as its conditional offer with a view to a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities*

[115] EUROPEAN COMMISSION, Europe 2020 A strategy for smart, sustainable and inclusive growth, COM(2010) 2020, Brussels, 3 March, 2010

[116] EUROPEAN COUNCIL, Conclusions, Brussels, March 2010

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

[117] For more information see: http://www.odc.public.lu/actualites/2010/06/europe_2020/index.html

[118] European Council, Conclusions, Brussels, June 2010

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

- *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. The population is defined as the number of persons who are at risk-of-poverty and exclusion according to three indicators (at-risk-of poverty; material deprivation; jobless household), leaving Member States free to set their national targets on the basis of the most appropriate indicators, taking into account their national circumstances and priorities."*

In order to increase national ownership and communication, each Member State should translate these European objectives into national objectives[119] as part of their next National Reform Programme (NRP)[120], to be submitted at the end of 2010. These objectives should take into account the original positions and national specificities of each Member State and should be determined using a dialogue approach with the Commission.

5.2 Follow-up of Priorities and Objectives by Means of Indicators

It is obvious that the new governance for the Europe 2020 strategy, of which the headline targets and the monitoring indicators are a part, will not alone suffice to spur growth, employment and prosperity in Europe. It is the substance, the instruments of the strategy that will determine future growth and job creation in Europe, such as developing the internal market.

The Europe 2020 strategy will nonetheless ensure that primary importance is accorded to the headline targets and monitoring indicators. These targets and indicators will be the focus of political and public attention. They make available measurable and tangible information on the basis of which work can be achieved with optimal use of available public resources. Implementing policies without measurable objectives or indicators for monitoring is not the path to follow because evaluating the success of such policies must be subjective[121]. Despite many limitations on indicators, such as availability of data, comparability, etc., a well-implemented aid to decision making is the best method of measuring performance of policies put into effect and of meting out responsibility to decision makers. As noted by the European Policy Centre (EPC), *"The first step in designing the new strategy should be to re-examine how targets 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 targets must be the foundation for the new European strategy"*.[122]

[119] Except for greenhouse gas emissions and renewable energy, for which there already exist restrictive national objectives

[120] For more information see: http://www.odc.public.lu/activites/programme/index.html

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

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

5.2.1 The Lisbon Structural Indicators

During the 2000 European Council in Lisbon, the EU set the strategic objective for the decade of becoming *"the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion."* The Council had also requested of the Commission that it draw up an annual summary on the basis of structural indicators, that would provide an objective measure of progress achieved in the framework of the Lisbon objectives and that would transmit the key messages of the report. These structural indicators had been created to support the analysis developed by the Commission in its annual report to the European Council[123].

Over the years, the Lisbon agenda rapidly became too extensive. More and more indicators were added to measure multiple objectives that had been added to the agenda. As noted by the Centre for European reform *"The Lisbon agenda was a bit of a Christmas tree, with disparate and sometimes inconsistent objectives being tagged on or removed according to the fashion of the moment"*[124]. In time, the Commission President decided to limit the number of objectives for measuring agenda progress to two, an employment rate of 70% and R&D expenditures of 3% of national GDPs. In 2005, a short list of 14 structural indicators[125] was drawn up in concert with the Council. This made the presentation more concise and gave a better assessment of the results achieved[126].

Table 54
Short list of 14 structural indicators or the Lisbon Strategy

General
1. Per capita Gross Domestic Product (GDP)
2. Labour productivity
Employment
3. Employment rate
4. Employment rate of older workers
Innovation and research
5. Education level of young people (aged 20-24)
6. Gross domestic expenditure on R&D
Economic reform
7. Comparative price levels
8. Business investment
Social cohesion
9. At-risk-of-poverty rate after social transfers (total)
10. Long-term unemployment rate
11. Dispersion of regional employment rates
Environment
12. Greenhouse gas emissions
13. Energy intensity of the economy
14. Volume of freight transport relative to GDP

Source: Eurostat

123 For more details see: http://epp.eurostat.ec.europa.eu/portal/page/portal/structural_indicators/introduction

124 CENTRE FOR EUROPEAN REFORM, The new Commission's economic philosophy, in Policy brief, February, 2010, p.6

125 Structural indicators initially numbered 127, encompassed six general economic domains including, employment, innovation and research, economic reform, social cohesion and the environment.

126 For a critical summary of the structural indicators for Luxembourg, see:

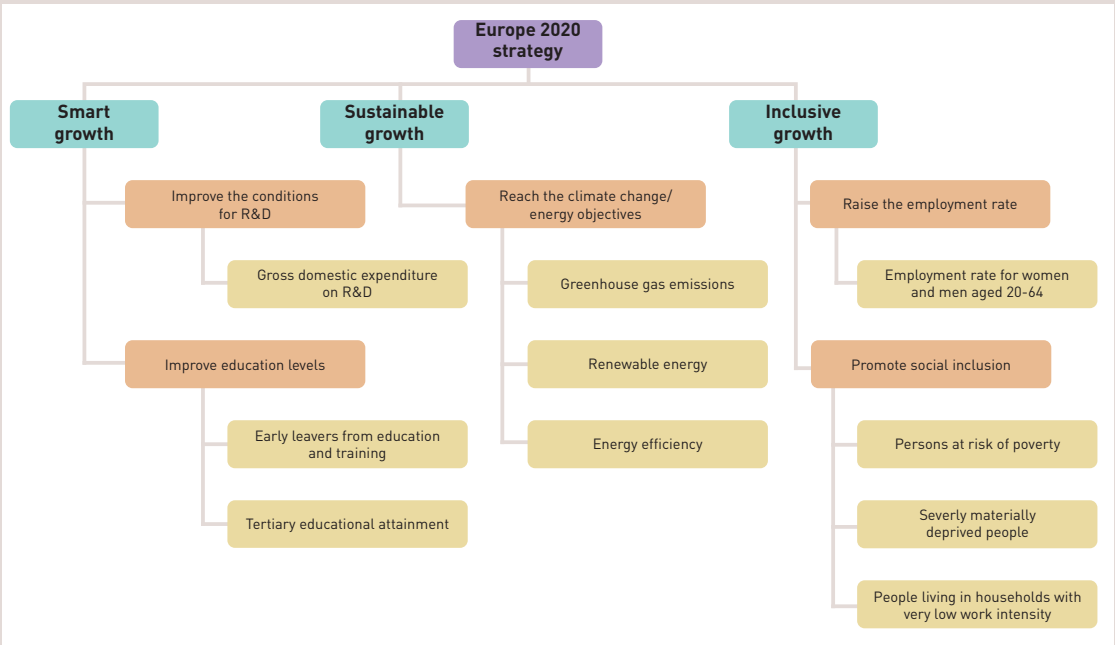
MINISTERE DE L'ECONOMIE ET DU COMMERCE EXTERIEUR, Bilan Compétitivité 2006 - En route vers Lisbonne, Luxembourg, September, 2006

5.2.2 Priorities, objectives and indicators for Europe 2020

The new Europe 2020 strategy in the future will be based on:

- three mutually reinforcing priorities: smart growth, sustainable growth and inclusive growth
- Five European headline targets to be achieved by 2020: Improve conditions in R&D, increase levels of education, meet the climate change and energy objectives, increase the employment rate and reduce poverty
- Ten indicators for measuring progress achieved on the objectives that were set: internal R&D expenditures, school drop-out rates, percentage of persons with university or equivalent diplomas, greenhouse gas emissions, share of renewable energy in energy used, employment rates for men and women aged 20-64, at-risk-of-poverty, material deprivation and living in a jobless household.

Figure 26
Priorities, objectives and indicators for the Europe 2020 strategy



Source: *Observatoire de la Compétitivité*
Note: Diagram prepared by the *Observatoire de la Compétitivité* on the basis of a March, 2010 European Commission communiqué and June, 2010 European Council conclusions

Priorities and objectives are closely linked. For example, improved levels of education improve employability and increase the employment rate, which helps to reduce poverty, and higher R&D capacity and innovation, combined with heightened efficiency of resources use improves competitiveness and promotes job creation. Investing in clean technologies with few carbon emissions improves the protection of the environment, helps to combat climate change and creates new businesses and employment possibilities.

With the diversity of Member States within the EU, and their highly uneven levels of economic development, applying the same objectives and criteria to all Member States, as was initially done under the Lisbon agenda, has not proven to be the right approach. Therefore, the major European objectives will not apply to all Member States uniformly under the Europe 2020 strategy. These European objectives must be broken down into national objectives by Member States, according to individual start-off situations and national specificities of each Member State, arrived at through dialogue with the European Commission. Therefore, each country must end up by honouring its national commitment by 2020. In the end, the sum of national objectives set in the autumn of 2010 by the Member States should constitute the European objectives determined in March and June of 2010. This two-phase approach has been criticised by the European Policy Centre, which feels that European objectives should have been set after the fact on the basis of national objectives once they had been set by the Member States, and not before the fact[127].

The European objectives cannot be achieved unless the sum of national objectives meets total European objectives and, if this initial condition is met, if each Member State honours its national objectives in 2020. This mode of governance therefore includes a sort of de facto peer pressure system that is to act in such a way that should certain countries fail to implement sufficient resources to meet their national goals, they will be called to order by their peers because they endanger causing the failure of the major European objectives, and thus all the efforts made by governments who did honour their commitments. The EU statistics office, Eurostat will publish indicators for each Member State periodically[128].

[127] EUROPEAN POLICY CENTRE, Europe 2020: better – but still not good enough, in Commentary, 5.3.2010

[128] The most recent update of data was at the end of July, 2010. For more details see: http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators

In the future, these new Europe 2020 indicators will replace Lisbon structural indicators Competitiveness Scoreboard of the *Observatoire de la Compétitivité* - See Chapter 3.

A. Intelligent growth

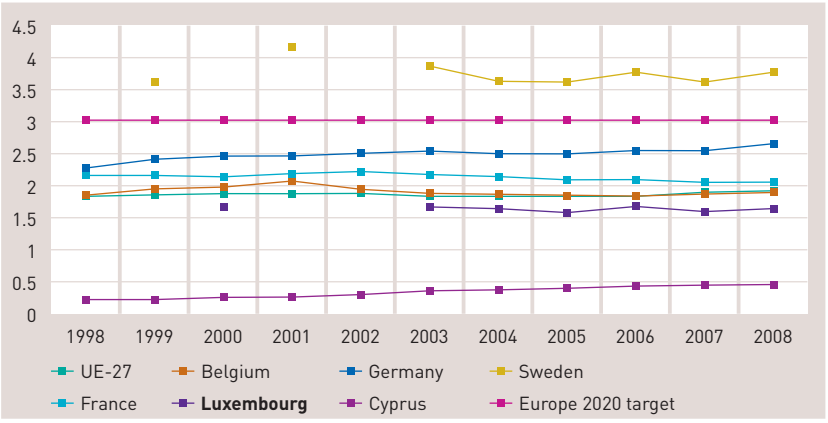
a.1 Improve conditions for innovation and R&D

Expenditures in R&D, apart from human capital, are essential to ensure the development of knowledge and new technologies. The objective of achieving R&D expenditures amounting to 3% of GDP was set by the European Council in Barcelona in March, 2002. It was one of the two key objectives of the former Lisbon strategy. The underlying logic of this objective was that knowledge-based economies allocate a considerable percentage of their resources to R&D when the Lisbon Strategy was launched, as in the case of the United States with 2.7%, or Japan, with 3%. It was recommended that the target level of 3% be maintained for the Europe 2020 Strategy, as a symbol to focus public attention on the importance of R&D. The trajectory of this indicator will depend broadly on structural factors and public policies favouring R&D.

Sweden has the highest rate of R&D expenditure, at 3.75% of GDP in 2008. Cyprus has the lowest rate, at 046%. Germany comes in at 2.63%, Belgium, 1.92% and France, 2.02%. Luxembourg's rate is 1.62%, and has been nearly constant since 2000, when it registered 1.65%[129].

The EU objective is to achieve a rate of 3% of GDP by 2020. Luxembourg has set an objective of 2.6% of GDP for R&D by 2020[130].

Figure 27
Gross domestic expenditure on R&D[131]



Source: Eurostat
Note: Not available - Sweden (1998, 2000, 2002), Luxembourg (1998, 1999, 2001, 2002)

[129] The first available data for Luxembourg dates from 2000.

[130] For more details see: http://www.gouvernement.lu/salle_presse/conseils_de_gouvernement/2010/05-mai/21-consgouv/index.html

[131] 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.

It should be noted that in Luxembourg, R&D expenditure comes principally from the private sector. Indeed, in 2007, 76% of research investment was carried out by the private sector. A large majority of these expenditures within the private sector are concentrated in several large subsidiaries of multinational companies in Luxembourg. A 2006 study[132] showed the extent of concentration of R&D expenditures in the private sector to be extremely high: less than 20% of R&D expenditure is done by 90% of companies performing R & D operations, for a Gini index rating of 0.85.

a.2 Improve education levels

Investment in human resources, apart from those in the area of R&D, are essential to ensure the development of knowledge and new technologies. As the goal of the Europe 2020 Strategy is intelligent and inclusive growth, two objectives were set in the area of education and training.

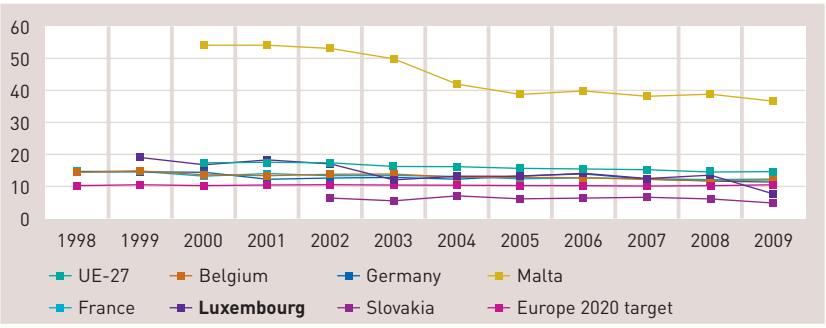
In general, the tertiary teaching path is determined by demographic and social changes, just as are political and institutional reforms. This indicator is not influenced by cyclical fluctuations.

a.2.1 The drop-out rate

The lowest drop-out rate within the EU-27 in 2009 was Slovakia's, at 4.4% Malta has the highest rate, at 36.8%. Germany and Belgium come in at 11.1%, and France at 12.3%. In Luxembourg the overall drop-out rate is 7.7%[133], with the rate higher amongst men than women[134].

The EU objective is a dropout rate of 10% by 2020.

Figure 28
Persons leaving the educational and training system without certification in %[135]



Source: Eurostat; Note: Luxembourg – break in data series in 1999, 2003 and 2009
Note: unavailable - UE-27 (1998, 1999), Germany (1998), Luxembourg (1998), Malta (1998, 1999), Slovakia (1998, 1999, 2000, 2001)

[132] MINISTRY OF THE ECONOMY AND FOREIGN TRADE, *Bilan Compétitivité 2006 - En route vers Lisbonne*, Luxembourg, September, 2006, pp. 111-112

[133] There was a break in the series in 1999 (19.1%), 2008 (13.4%) et 2009 (7.7%), which makes it difficult to draw a comparison of rates over time for Luxembourg.

[134] Data deemed doubtful or uncertain for Luxembourg: rate for men 8.9% and rate for women at 6.6%.

[135] 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.

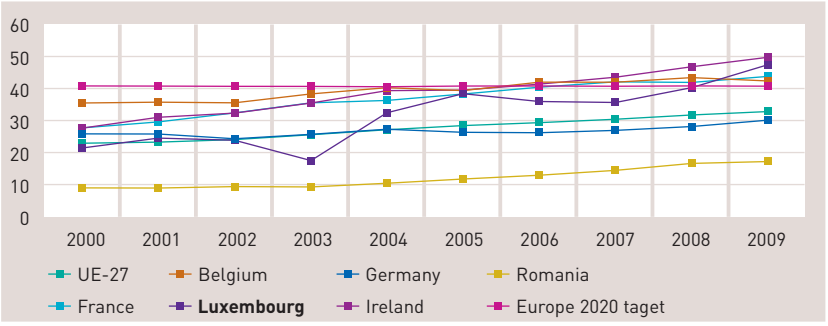
In Luxembourg, the figures coming out of the Labour Forces Survey (LFS) are subject to strong annual variations due to the limited size of both the sampling and to the fact that in the labour force the percentage of immigrants educated abroad is high. Luxembourg has put in place a national tool for following early school leavers from the Luxembourg[136] scholastic system since 2003. The permanent theoretical dropout rate for 2007-2008 is 11.2%.

a.2.2 Percentage of persons with University Degrees

Ireland, with 49% in 2009 has the highest rate in this area. Rumania has the lowest rate at 16.8%. Germany comes in at 29.4%, Belgium, 42% and France, 43.3%. In Luxembourg, this rate is 46.6%[137]. The number of men with university diplomas nearly doubled in Luxembourg between 2000-2009, from 24.7% to 48.4%, while the percentage of women rose from 17.7% in 2000 to 44.9% in 2009.

The overall EU target under Europe 2020 is 40% for 2020.

Figure 29
Level of tertiary education in the age group 30-34[138]



Source: Eurostat
Note: Luxembourg – break in data series in 2003 and 2009

This indicator, which came out of the Labour force survey (LFS), is not fully representative of Luxembourg because it includes foreign degree holders working and living in Luxembourg, and includes neither Luxembourg university graduates trained and working abroad, nor cross-border degree holders. In this way, the actual rate of Luxembourg residents with diplomas from Luxembourg schools is at a lower level, nearer 30%[139], far cry from the 46.6% listed in the figure above. In order to evaluate the quality of the national educational system and meet the objective, it will therefore be necessary to produce statistics that distinguish persons who attended Luxembourg schools.

[136] For more details see: http://www.men.public.lu/publications/etudes_statistiques/etudes_nationales/091209_decrochage07_08/100104_decrocheurs.pdf

[137] There is a break in the series with 2003 (17.3%) and 2009 (46.6%), which renders comparison between rates over time difficult for Luxembourg.

[138] 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.

[139] Contribution of the Minister for Higher Education and Research during public session number 43 of Parliament (13 July, 2010). For more details see: http://www.chd.lu/

B. Sustainable growth

b.1 Meet the climate change and energy targets

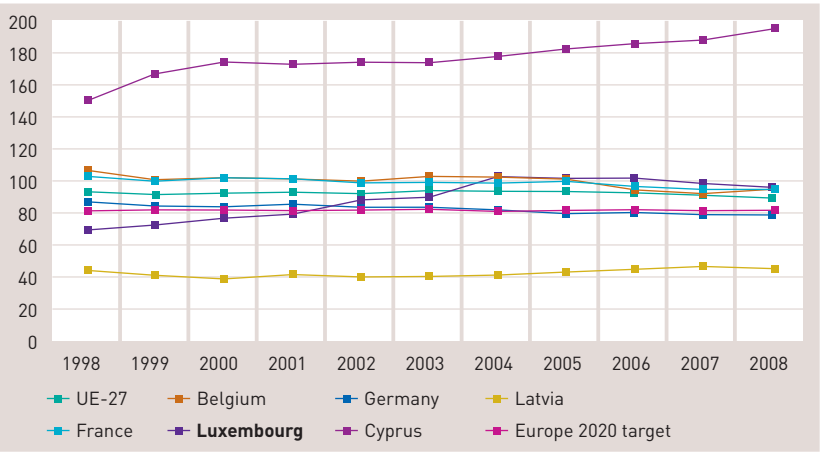
In order to meet the targets in the domain of climate change and energy, the European Council objectives set during the March, 2007 meeting will be maintained under the Europe 2020 strategy. These greenhouse gas emission reductions and share of renewables in the total energy consumption scheme objectives are legally binding[140].

b.1.1 Greenhouse gas emissions

Cyprus currently has the highest level of CO2 emissions within the EU 27, in relation to its 2008 emissions output logged at 193.9 compared to the 100 starting point in 1990. Latvia has the lowest emissions with 44.4 in 2008, compared to its starting point. Germany comes in at 77.8%, Belgium, 92.9% and France, 93.6%. Luxembourg registered 95.2 in 2008, a slight decrease since 2005 when it reached a level of 101.2.

The EU objective is to attain a level of 80 by 2020, which represents 20% than the 1990 level. Luxembourg shares this objective and has also set an objective of 20% lower for 2020.

Figure 30
Total greenhouse gas emissions, 1990 = base level 100 for each country[141]



Source: Eurostat

It should be remembered that Luxembourg registers a very high level of fuel consumption that is taken into account for calculating emissions. In fact, a large part of this is fuel purchased in Luxembourg and consumed abroad by cross-border users.

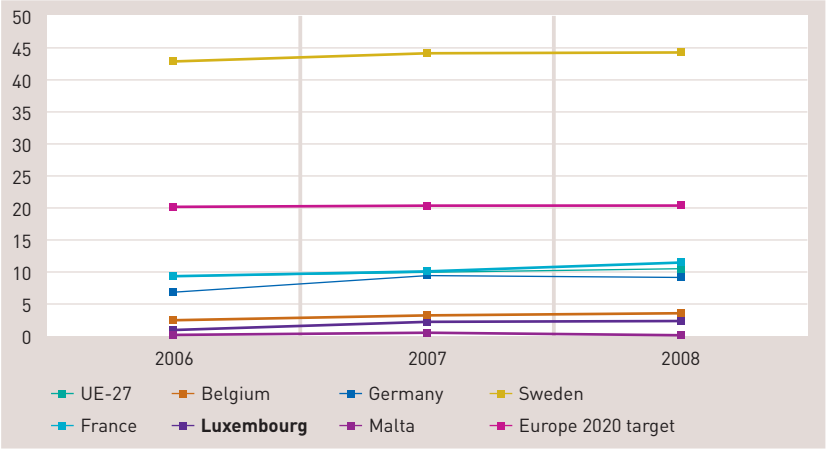
[140] See European Directive 2006/32/CE. Reducing energy consumption is a political objective that has been confirmed by the Member States in their Energy efficiency action plan.

[141] 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 (CO2), methane (CH4), nitrous oxide (N2O), and the so-called F-gases (hydrofluorcarbons, perfluoro-carbons 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 CO2 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. CO2 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

b.1.2 Percentage of renewable energy sources in energy consumption

Sweden has the highest proportion of renewable energy in the EU-27, with 44.4% in 2008. Malta has the lowest, with 0.2%. Germany comes in at 9.1%, Belgium, 3.3% and France, 11.0%. In Luxembourg, this rate went from 0.9% in 2006 to 2.1% in 2008. The EU set a proportion of renewable energy sources of 20% as a target for 2020. Luxembourg set an objective of 11% of renewables in its final energy use in 2020[142].

Figure 31
Percentage of renewable energy in final gross energy consumption in %[143]



Source: Eurostat

b.1.3 Energy efficiency

Bulgaria has the highest energy intensity ratio in the EU-27, and consequently the lowest energy efficiency rate, with 944 kgoe per €1,000 of GDP. Denmark has the lowest intensity with an index of 103. Germany's index is 151, Belgium's is 199 and France, 166. Luxembourg is situated at 154, falling steadily since 2004, when it peaked at 185.

The EU target is to obtain an increase in energy efficiency of 20% by 2020. Luxembourg's target is currently 9% for 2016[144].

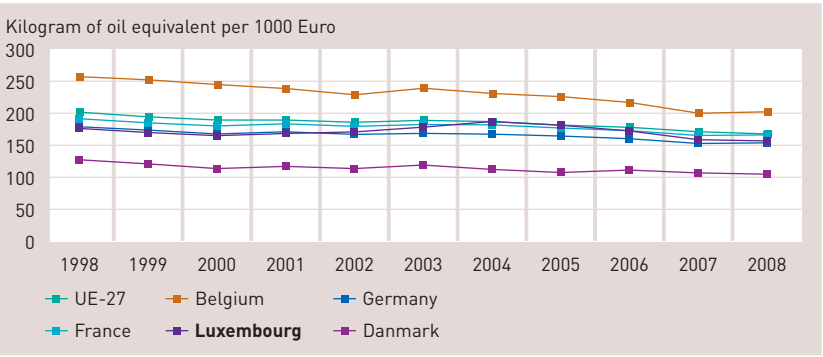
[142] Transportation sector: an objective of 10% of renewable fuels in final energy consumption .

For more details see: http://www.gouvernement.lu/salle_presse/conseils_de_gouvernement/2010/07-juillet/23-consgouv/index.html

[143] 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

[144] For more details see: http://www.eco.public.lu/salle_de_presse/com_presse_et_art_actu/2010/07/Conf__rence_de_presse_sur_les___nergies_renouvelables/index.html

Figure 32
Energy intensity of the economy[145]



Source: Eurostat
Note: Substitute Indicator for energy savings, currently being prepared.

C. Inclusive growth

c.1 Promote employment

There already existed a target with relation to employment policies in the Lisbon Strategy from 2000-2010: the employment rate. The new Europe 2020 target shows two major changes with relation to the former Lisbon Strategy objective. First, the age range considered moves from 15-64 for the 2010 objectives to 20-64 for the 2020 strategy, in order to reduce any conflict that may arise between employment policies and education and training policies. Second, the reference value to be achieved rose from 70% in 2010 to 75% in 2020.

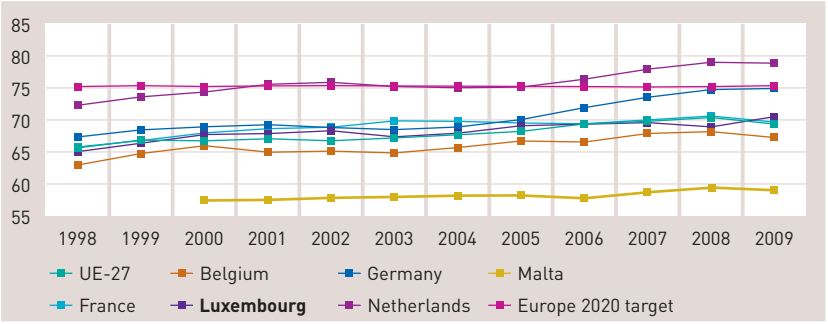
The change in the employment rate depends on many uncertainties, which must be accounted for in setting targets for the Europe 2020 Strategy. Indeed, the employment rate indicator is a very cyclical one. The effective date of emergence from the crisis will play a decisive role on the course of this indicator.

The Netherlands have the highest employment rate for 2009, with 78.8%. Malta has the lowest employment rate at 58.8%. Germany comes in at 74.8%, Belgium, 67.1% and France, 69.6%. The rate of employment in Luxembourg is 70.4% in 2009, a significant rise since 1998, when it was at 64.9%. The employment rate of men amounted to 79% in 2009, with this rate oscillating between 80.8% and 77.2% from 1998-2008. The employment rate for women reached 61.5% and underwent a strong rise since 1998, when it registered a mere 49.5%

The EU objective for 2020 is to achieve a 75% total employment rate.

[145] 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.

Figure 33
Employment rate, age group 20-64 in %[146]



Source: Eurostat
Note: Luxembourg - 2007, estimate / 2008, forecast unavailable – Malta (1998, 1999)

Although an increase in the employment rate increases the supply of domestic labour, gives vitality to growth and eases the social and public expenditure situations, these observations must be put into perspective in the case of Luxembourg. In Luxembourg, the labour supply is divided into three groups, native citizens, cross-border workers and immigrant workers. Cross-border workers are not included in the employment rate concept. This concept is purely a national one, of residence. But domestic employment includes a population of around 40% cross-border workers, and about one half of newly created jobs in the recent past have been filled by cross-border workers. As the Economic and Social Council notes (ECS)[147], this indicator "is not representative of the macroeconomic reality in Luxembourg and is even less appropriate as a macroeconomic objective for employment, upon which an employment policy should be determined". In contrast, the rate of employment amongst young people, women and older persons is useful to understand the use of human resources in the economy.

[146] 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.

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

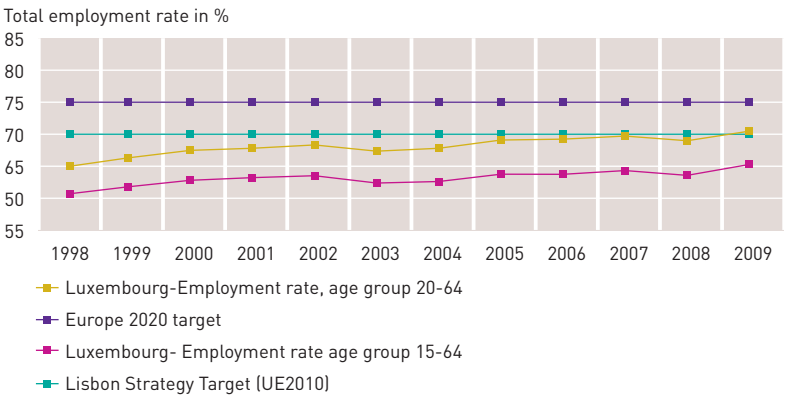
For more information see: http://www.ces.public.lu/fr/avis/index.html

Frame 9

Comparison of Lisbon employment rates (age group 15-64, 70% target for 2010) and Europe 2020 employment rate targets (age group 20-64, 75% target for 2020)

The employment rate for the 2000-2010 Lisbon Strategy was determined with relation to the age group of the population between 15-64 years and had an objective of 70% total employment rate for 2010. The new objective under the Europe 2020 Strategy incorporates two major changes compared to the Lisbon Strategy objective. First, the age group has been changed to include people between 20-64 years and secondly, the employment objective has been increased to 75% for 2020.

Figure 34

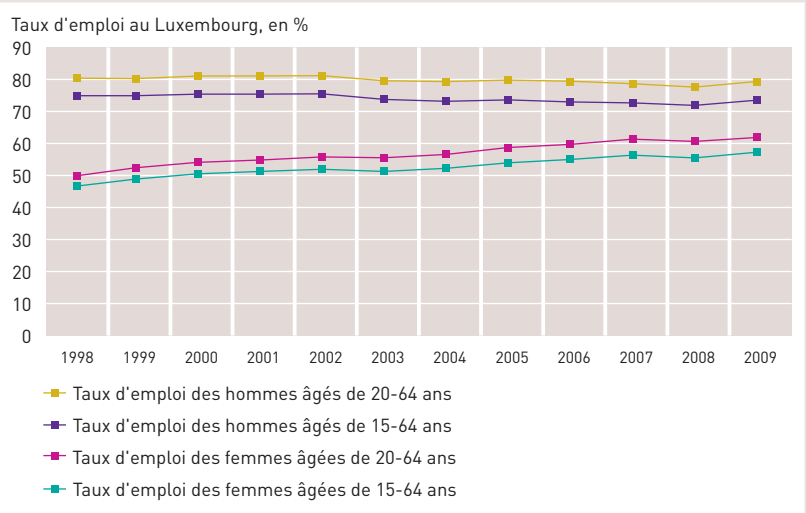


Source: Eurostat

The employment rate for persons aged 20-64 is higher than that of the group of people between 15-64 years of age. This can be explained by the fact that in the age group of 15-19 years, the employment rate is low because many young people are in school, which drags down the employment rate of persons aged 15-64 compared to those in the 20-64 age group.

This observation is valid for both employment rates of men and women between 20-64 years, compared to the employment rates for men and women in the 15-64 age group.

Figure 35



Source: Eurostat

c.2 Reduce poverty

The original European target proposed by the European Commission for social inclusion involved reducing poverty by twenty million people who were at risk of poverty. In order to meet the Europe 2020 Strategy target of promoting inclusive growth, the European Council requested of the Commission in March, 2010 that it work more on the social inclusion indicators, especially non-monetary indicators. Subsequently, the European Council agreed in June, 2010 to lift at least 20 million people out of the risk of poverty and exclusion and defined as the number of persons who are at-risk-of-poverty and exclusion according to the three indicators listed below, leaving Member States free to set their national targets on the basis of the most appropriate indicators, taking into account their national circumstances and priorities.

- At-risk-of poverty: persons who live with less than 60% of the median national revenue. The at-risk-of poverty is the flagship indicator for measuring and monitoring poverty in the EU. This is relative measure of poverty, linked to the breakdown of revenue, which accounts for all monetary resource, including market income and social transfers. It reflects the role of work and social protection in preventing and reducing poverty.

- Rate of material destitution: persons for whom living conditions are severely limited by a lack of resources, who live deprived of at least four out of nine situations that have been set out[148]. The rate of material destitution is a non-monetary measure of poverty that also reflects the various levels of prosperity and living standards within the EU as it is based on a single European threshold.

- Persons living in a jobless household: This population is defined with relation to a zero or very low level of work over a full year, so as to properly reflect situations involving extended exclusion from the labour market. This involves persons living in families that confront situations of long-term exclusion from the job market. Long-term exclusion from work is one of the principal factors of poverty and aggravates the risk of transferring the difficulty from one generation to the next.

The risks affecting the course of poverty indicators are linked to macroeconomic developments, but also to the capacity of employment policies to promote an inclusive labour market with employment opportunities for all, and the capacity of social protection systems to gain in efficiency and effectiveness despite limitations that weigh on public finances.

One final thing to note is that monetary poverty indicators, such as the poverty rate or the rate of material destitution, have one major limitation in that they do not account for multiple non-monetary public programmes available to citizens[149]. In Luxembourg, one example of these types of services are the emergency services checks available to the poor for basic food, hygiene and other necessities.

[148] 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, i ii) 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. It concerns 17% of the overall EU population, varying from 3.5% to 51% (2008 data). The stricter definition proposed above, based on 4 out of 9 items, would concern 8.3% of the EU population varying from 1% to 33%.

[149] In this context, see the OECD publication on poverty :OCDE, Growing Unequal? Income Distribution and Poverty in OECD Countries, OECD, Paris, October, 2010

c.2.1 Poverty and exclusion in hard numbers in Luxembourg

As the European headline target determined by the European Council in June, 2010 fixed hard numbers to the poverty and exclusion phenomenon *by aiming to lift at least 20 million people out of the risk of poverty and exclusion*, it appears useful in an initial stage to analyse Luxembourg's situation with relation to the various indicators, as follows:

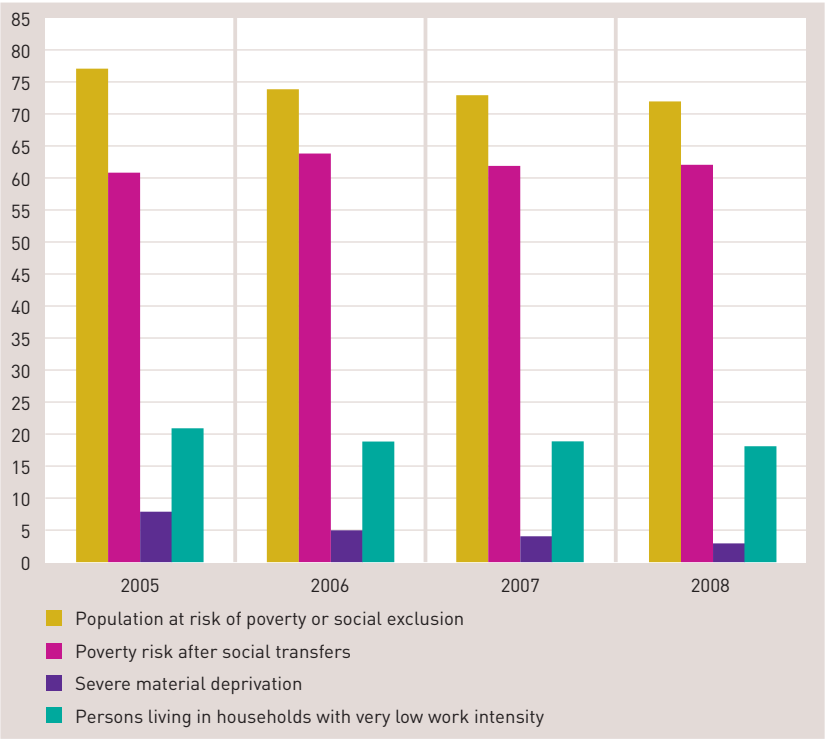
- In all, the population facing poverty and exclusion through the indicator calculated by combining the three individual indicators "At-risk-of poverty", "Material Destitution" and "Living in a Jobless Household"[150] numbered 77,000 analysis in 2005. This number fell between 2005 and 2008 arriving at 72,000 in 2008, a drop of 5.000.

- The population at-risk-of poverty after social transfers[151] involved 61,000 analysis units in 2005. This number rose between 2005 and 2006, then fell in 2007 to stabilise at 62,000 units in 2008[152].

- In 2005, the population facing severe material destitution[153] came to 8,000 analysis units. This figure fell by 5,000 between 2005 and 2008.

- In 2005, la population faced with the single indicator of living in a jobless household numbered 21,000 persons[154]. This number fell between 2005 and 2008 to 18,000 people in 2008.

Figure 36
Persons confronted with poverty and exclusion in Luxembourg (in thousands)



Source: Eurostat

150 Definition: This indicator summarizes the number of people who are either at risk-of-poverty and/or materially deprived and/or living in households with very low work intensity. Interactions between the indicators are excluded.

151 Definition: The number of persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income (after social transfers).

152 STATEC published its sixth report on work and social cohesion, after press time for this report and on the occasion of the International Day for the Eradication of Poverty and the European Year for Combating Poverty and Exclusion. This report used data for 2009.

For more details see: http://www.statistiques.public.lu/fr/communiques/population/population/2010/10/20101015/index.html

153 Definition: The collection "material deprivation" covers indicators relating to economic strain, durables, housing and environment of the dwelling. Severely materially deprived persons have living conditions severely constrained by a lack of resources, they experience at least 4 out of 9 following deprivations items: cannot afford i) to pay rent or utility bills, ii) keep home adequately warm, iii) face unexpected expenses, iv) eat meat, fish or a protein equivalent every second day, v) a week holiday away from home, vi) a car, vii) a washing machine, viii) a colour TV, or ix) a telephone.

154 Definition: People living in households with very low work intensity are people aged 0-59 living in households where the adults work less than 20% of their total work potential during the past year.

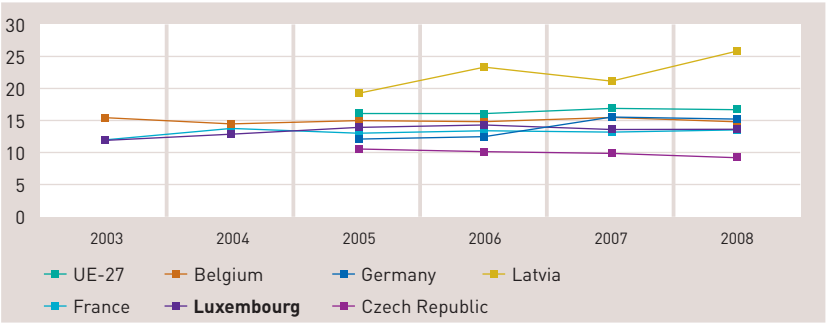
c.2.2 Figures for poverty and exclusion in Luxembourg compared to European figures

Apart from the analysis of the level and changes in hard number of persons facing poverty and exclusion in Luxembourg according to the three indicators selected, it is also useful to analyse the relative position of Luxembourg with respect to the other Member States of the EU.

In 2008, 13.4% of persons were at risk of poverty after social transfers in Luxembourg. In Belgium, this rate was 14.7%, in Germany 15.2% and in France 13.4%. Within the EU-27, the lowest rate of persons in this situation was in the Czech Republic, at 9%, while the highest rate was 25.6% in Latvia.

In Luxembourg[155], between 2003 and 2008, the at-risk-of poverty rate remained relatively stable, fluctuating around 13%.

Figure 37
Persons at-risk-of poverty after social transfers in %



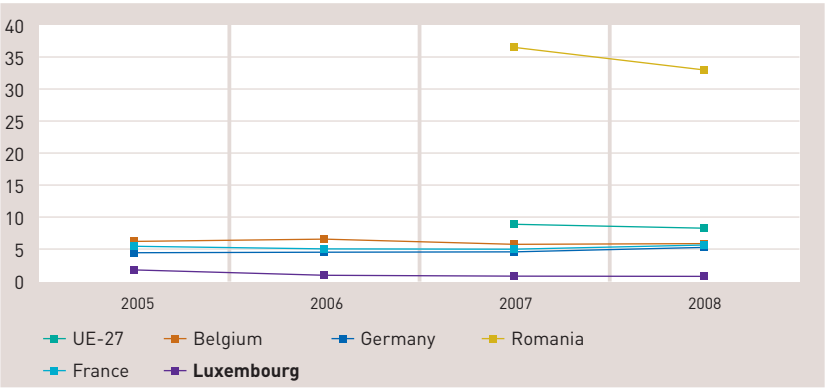
Source: Eurostat
Note: Data unavailable – EU-27 (2003, 2004), Czech Republic (2003, 2004), Germany (2003, 2004), Latvia (2003, 2004)

A rate of 0.7% persons faced severe material destitution in 2008 in Luxembourg, the lowest rate within the EU-27. In Belgium, this rate was 5.7%, in Germany 5.1% and in France 5.5%. Rumania has the highest percentage of severe material destitution within the EU-27 at 32.9%.

In Luxembourg, this indicator has been improving over the years as the material destitution rate fell from 1.8% in 2005 to 0.7% in 2008.

[155] After press time for this document, STATEC published new data for Luxembourg concerning the At-risk-of-poverty rate. The at-risk-of-poverty rate surged considerably from 2008 to 2009, progressing from 13.4% to 14.9%.

Figure 38
Severely materially deprived persons in %

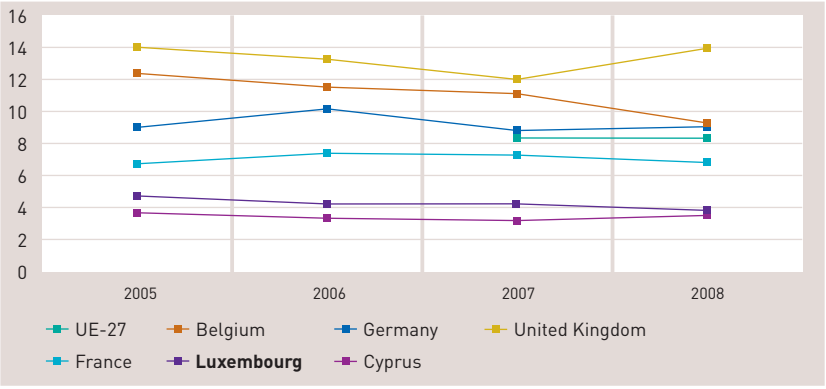


Source: Eurostat
Note: Data unavailable – EU-27 (2005,2006), Romania (2005, 2006)

Lastly, 3.8% of persons in Luxembourg lived in jobless households in 2008. In Belgium, this rate was 9.3%, in Germany 9% and in France 6.8%. Within the EU-27, the rate is lowest in Cyprus at 3.4%, and highest in the United Kingdom at 13.9%.

In Luxembourg, this indicator has been improving over the years as the rate of persons living in jobless households fell from 4.7% in 2005 to 3.8% in 2008.

Figure 39
Persons living in jobless households in %



Source: Eurostat
Note: Data unavailable – EU-27 (2005, 2006)

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6 Cost and Price Competitiveness in Luxembourg

6.1 Introduction

The Real Effective Exchange Rate (REER) traces changes in price and cost competitiveness by analysing the relationship between domestic costs and prices and foreign costs and prices expressed in Euros. An increase in this rate means a decrease of Luxembourg's competitiveness.

An analysis of the REER in Luxembourg reveals a major decline of price and cost competitiveness in Luxembourg's economy. The regression in cost competitiveness is more conspicuous over the entire period, however toward its end, a rapid acceleration of the weakening of price competitiveness became apparent.

6.2 A Euro Zone perspective

The Eurogroup Finance Ministers discussed the competitive situation of Luxembourg at their informal session in Brussels on September 30th, as they analyse the situation of all countries in the Euro zone. This analysis focuses on the competitive position of Member States and on the relationship between their competitiveness and current account balances. It is part of the new cycle of economic analyses within the Europe 2020 framework.

The principal conclusion drawn by Olli Rehn, European Commissioner for Economic and Monetary Affairs, is that Luxembourg must monitor changes in its competitiveness situation, even though at this time the degradation of competitiveness is not resulting in a negative current accounts balance because of exported services, primarily in the area of finance. According to the Commission, Luxembourg's finances are sound, but the country should not underestimate the challenges ahead. One item to monitor specially is the ageing of the population, which presents less optimistic perspectives over the longer term. In addition, the Commission recognised the advantages of having a large financial sector, but noted that the country's vulnerability level is high because of the dependence of this sector, thus redoubling its efforts to diversify the economy. Jean-Claude Trichet, President of the European Central Bank insisted on the necessity of eliminating the automatic wage indexation system, as in a single currency zone, indexing only exacerbates any external competitiveness issues.

Discussions within the Eurogroup are prepared by the Commission and the Member States by Eurogroup meetings of the Economic Policy Committee and the Economic and Financial Committee on the basis of detailed paper by the European Commission. This paper forms the basis of a critical and detailed technical discussion, which is then taken to the ministerial level. The frame below reproduces the document that served as a basis for macroeconomic monitoring of the Eurogroup Member States.

Frame 10
Note of the European Commission on Luxembourg's competitive position

Follow-up to the ongoing surveillance exercise of intra-euro-area imbalances and competitiveness divergences: Issues note on Luxembourg

1. Background
At the meeting in Madrid on 16 April 2010, Eurogroup Ministers decided to carry forward the surveillance of divergences in competitiveness and macroeconomic imbalances within the euro area through a series of ad hoc peer country reviews. As a contribution to this review, this note presents the main issues for discussion on Luxembourg. It is based on the in-depth analysis provided in the comprehensive Commission Report "Surveillance of Intra-Euro-Area Competitiveness and Imbalances" (European Economy 1/2010) as well as on further reflection on the challenges stemming from analytical work carried out under Europe 2020 in particular with a view to the identification of bottlenecks for growth ("Macro structural bottlenecks to growth in EU Member States", European Economy Occasional Paper 65, 2010).

This issues note begins with a brief update based on recent developments and then turns to the main challenges facing Luxembourg in terms of adjustment to macroeconomic imbalances and improving competitiveness. For convenience, the main indicators relating to competitiveness developments are presented in an attached table.

2. An update on the fiscal situation and long term sustainability
The situation of public finances in Luxembourg before the recession was very favourable compared to other EU countries: with the sole exception of a minor deficit in 2004, the general government had recorded recurrent and often sizeable surpluses since at least the beginning of the 1990s. Moreover, at 6.6% of GDP in 2007, the public debt ratio was one of the lowest in the EU. This allowed the authorities to let automatic stabilisers play fully in response to the crisis and to adopt a comprehensive package of additional measures in order to support activity and employment.

Still, the general government balance has deteriorated substantially in the recent past. The 2010 budget, presented to Parliament in October 2009, envisaged that the general government deficit would increase from an estimated 2.3% of GDP in 2009 to 4.4% in 2010. However, in the stability programme, which was submitted at the beginning of February, the deficit for 2009 was revised downwards to 1.1% of GDP and the projection for 2010 to 3.9%. The April EDP notification showed a projection of 4.2% of GDP for 2010. Consequently, the Commission adopted a report based on Art. 126(3) considering whether an Excessive Deficit existed in Luxembourg. Finally, based on the Commission Services' spring 2010 forecast, additional adjustment measures adopted by the authorities, and the notification by the Luxembourgish authorities in June, showing a 2010 deficit of 2.8% of GDP, it was concluded that Luxembourg was not in excessive deficit.
In a longer-term perspective, public finances in Luxembourg present a less positive outlook. Indeed, the long-term budgetary impact of ageing is among the highest in the EU, influenced notably by a very considerable projected increase in pension expenditures. Although the currently low debt ratio and the significant amount of assets accumulated in the social security system contribute to offsetting the projected long-term budgetary impact of ageing populations, this is not sufficient to cover the projected sizeable increase in age-related expenditures.

3. An update on competitiveness and macroeconomic imbalances

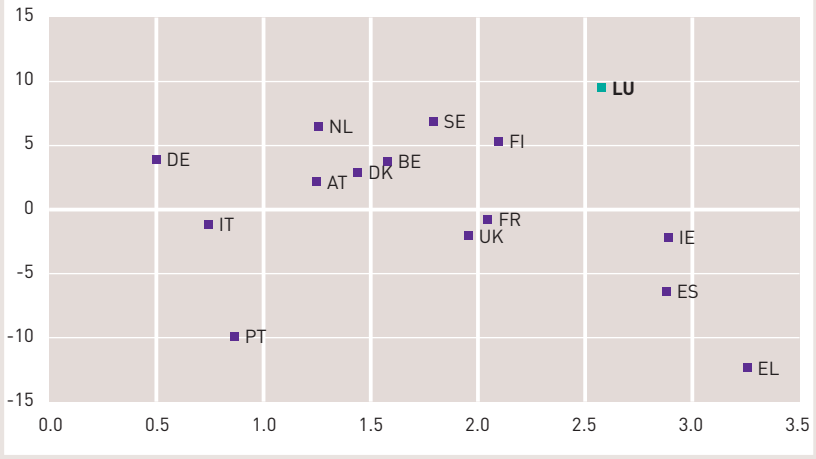
3.1 Structure of external trade and export performance
Both Luxembourg's external trade and current account balances continuously recorded large surpluses over the period 1990-2009. The balance of goods was always strongly negative and broadly stable at about 10% of GDP but the surplus of trade in services steadily increased from about 15% of GDP in the early 1990s to more than 40% in recent years. This led to rising surpluses in the overall balance of goods and services, which reached about 33% of GDP in 2007-2009. However, these surpluses were increasingly offset by developments in net primary income flows from abroad, which changed from a surplus of about 10% of GDP at the beginning of the period to a deficit of more than 30% in 2009.

[156] http://ec.europa.eu/economy_finance/publications/european_economy/2010/pdf/ee-2010-1_en.pdf

Frame 10
Continued

This change essentially reflects the rising recourse to cross-border workers, who now account for more than 40% of the total labour force compared to about 10% in the early 1980s. In the future, this negative net income from abroad will be supplemented by the increasing flow of pensions paid to retired cross-border workers. In sum, the balance of current transactions has exhibited a fairly stable surplus, with the rising surplus on the balance of goods and services to a large extent offset by the net income from abroad. The current account surplus has averaged 10% of GDP since 1990 without a clear upward or downward trend until recently when it fell to +5.5% of GDP on average in 2008 and 2009.

Figure 40
EU-15: % growth of real domestic demand (x-axis) and current account balance as a % of GDP (y-axis) (averages over the period 2000 – 2009)



Source: Commission services

This large current account surplus – and the even much larger trade surplus – was not accompanied by weak domestic demand. As Graph 1 shows, Luxembourg had on average over the years 2000-2009 one of the most dynamic domestic demands inside the EU-15[157] (2.6% growth per year in volume terms compared with an EU-15 average of 1.5%) and even the most dynamic domestic demands among the EU-15 countries recording a current account surplus. Actually, the persistently large trade surplus is a by-product of the exceptional concentration of activity and jobs in Luxembourg. Since the beginning of its "success story", the country was able to attract a considerable amount of activities thanks to the favourable legal, regulatory and fiscal environment that the authorities were able to develop and preserve. A measure of this attractiveness is that there are today in Luxembourg more than 70 jobs per 100 inhabitants, while in other EU countries there are usually about 45 jobs per 100 inhabitants and seldom more than 50.

Exports of goods and services as a percentage of Luxembourg's GDP rose from slightly more than 100% in 1990 to about 160% in 2009, by far the highest percentage in the whole EU (Ireland is in second place with slightly above 90%)[158]. Exports of services now represent the lion's share of Luxembourgish exports: they rose from about half of both GDP and total exports in the early 1990s to more than 130% of GDP and about 80% of total exports in recent years. Symmetrically, the share of exports of goods declined from about half of total exports to around 20% over the same period. However, their importance should not be understated: boosted partly by re-exports[159], they still amounted to 30.1% of GDP in 2009, which exceeds the EU-27 average (27.0%) and is more than in France (18.0%) or Italy (19.2%) and only slightly less than in Germany (34.3%).

Exports of goods are for the most part directed to the EU (85.9%), mainly to Germany (26.4%), France (16.9%) and Belgium (12.5%). They are essentially composed of metal-made manufactures (33.2%), machinery and equipment (18.1%) and "other" or "diverse" products (25.3%). Exports of services are chiefly directed towards Germany (18%), the UK (13%), Switzerland (11%), as well as Belgium, France and Italy (10% each).

[157] It seems more meaningful to compare Luxembourg with the EU-15 rather than with the whole EU-27 because most recently-acceded member states of the EU-12 are typical catching-up countries with high growth rates (domestic demand rose on average by 3.8% a year between 2000 and 2009 in the EU-12) and current account deficits.

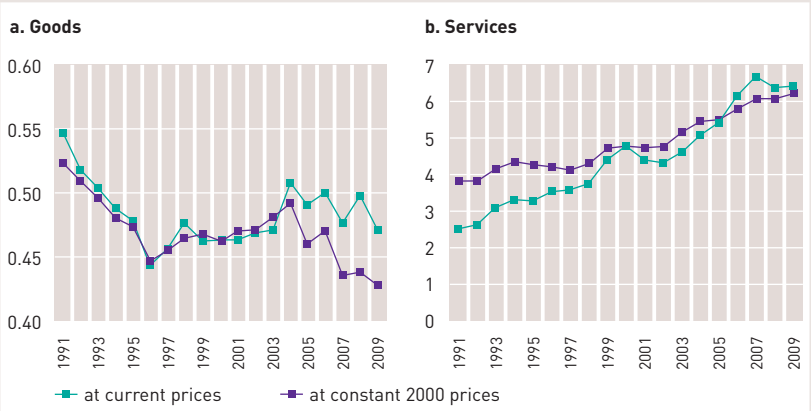
[158] The share of exports in GDP recorded a large drop in 2009 as a result of the collapse of international trade after having reached about 175% in 2007 and 2008. This happened in nearly all EU-27 countries, the sole exceptions being Ireland, Latvia and Romania.

[159] Luxembourg-Findel is the fifth airport for freight in the EU ahead e.g. of Brussels, Milan and Munich.

Frame 10
Continued

Starting in 1990, the share of Luxembourg in EU-15 exports of goods first declined up to 1996, and then began to increase until 2004. Since then, it has broadly stabilised in value terms, while declining once again in volume terms (see Graph 2a). This decline in Luxembourg's share of EU-15 exports of goods was thus quite sizeable (from 0.40% of total EU-15 exports in 2004 to less than 0.36% in 2009, a decrease of more than one tenth). However, it was compensated in value terms by a sharp rise in prices (which might perhaps also have been one of the causes of this decline, the Luxembourgish industry being certainly price-taker). By contrast, Luxembourg's share in EU-15 exports of services increased almost continuously over the period, more than doubling in value and rising by more than one and a half in volume terms (see Graph 2b).

Figure 41
Luxembourg : share in EA-12 exports (in %)

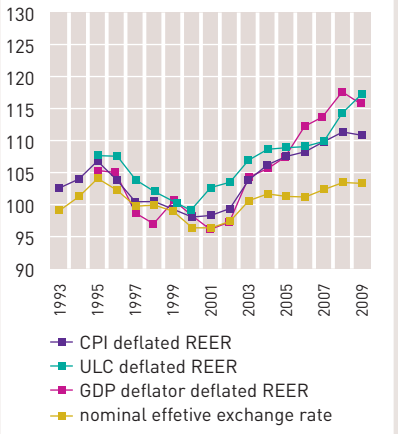


Source: Commission services

3.2 Developments in cost competitiveness

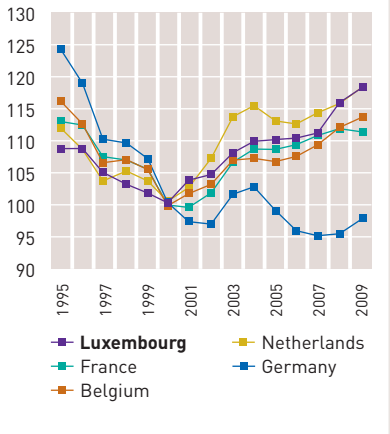
As Graph 3 clearly shows, the price and cost competitiveness of Luxembourg, as measured by the real effective exchange rate, have deteriorated substantially since the beginning of the current decade, whatever the index chosen, with the ULC-deflated real effective exchange rate showing the largest deterioration.

Figure 42
Luxembourg : real effective exchange rates versus 21 industrialised countries



Source: Commission services and ECB

Figure 43
Luxembourg and neighbouring countries : ULC-deflated real effective exchange rates



Source: Commission services and ECB

Frame 10
Continued

Part of this deterioration is due to the appreciation of the euro but this factor has influenced the cost-competitiveness of all countries of the euro area and probably less that of Luxembourg, whose exports exhibit a greater concentration on the euro area. Moreover, Graph 4, which compares ULC-deflated REERs for some countries of the euro area, shows that since the beginning of the current decade, the cost-competitiveness of Luxembourg has deteriorated more than most neighbouring countries, especially in the last few years.

This faster rise in ULCs, in turn, is due to less favourable developments both in wages and productivity. Table 1 decomposes developments in real GDP, employment, productivity, wages and unit labour costs in Luxembourg and neighbouring countries since 2000. The main conclusions that may be drawn from these data are the following:

- Since 2000, real GDP grew substantially more in Luxembourg than in neighbouring countries and about three times more than in the EU-15 as a whole;
- The same happened with employment. Luxembourg outperformed its neighbours and the average of the EU-15 even more in terms of job creation than in terms of output growth;
- Essentially as a result of massive labour hoarding both during the slowdown at the beginning of the current decade and – on an even larger scale - during the recent recession, employment rose more than output in Luxembourg over the period 2000 – 2009, an almost unique development inside the EU. As a result, real GDP per person employed, though remaining the highest in the EU, decreased over the period, while it increased in all other EU countries except Italy;
- Over the same period 2000-2009, wages rose about one and a half time faster in Luxembourg than on average in the EU-15 and more than twice as fast as in Germany, the country where they increased least; and
- As a result of both the stronger increase in wages and the decline in labour productivity, unit labour costs rose one and a half times faster in Luxembourg than on average in the EU-15 and more than four times faster than in Germany, the best performer in the EU.

Table 55
Luxembourg, neighbouring countries and EU-15: productivity, wages and labour costs (2000 – 2009)

Indices levels 2009 (2000 level = 100)	LU	BE	DE	FR	NL	EU-15
1. Real GDP	129.6	112.1	104.8	111.5	112.0	110.6
2. Total employment	133.5	108.0	102.9	104.8	106.7	106.4
3. Real GDP per person employed (1:2)	97.1	103.8	105.7	104.6	108.4	106.0
4. Compensation of employees per head	129.4	127.2	114.1	126.5	136.8	119.0
5. Unit labour costs (4:3)	133.4	122.5	107.9	120.9	126.1	122.4

Source: Commission services

It could be argued that these unfavourable developments in cost competitiveness have had no influence to date on the country's growth performance (as shown by the very large and rapidly rising trade surplus as well as the strong increase in Luxembourg's market share in the EU exports of services) and may thus be considered with some kind of benign neglect. However, some factors caution against such a complacent approach:

- As indicated above, the large trade surplus is exclusively due to services and, in particular, to the dynamism of the financial sector. For reasons that have probably less to do with its intrinsic soundness than with the future of financial activities at world level after the financial crisis, it is far from certain that the sector will be able to keep on playing the role of Luxembourg's growth engine to the same extent it did in the last 25 years.
- In contrast to services, Luxembourg's share in the EU-15 exports of goods has significantly declined in recent years and it is possible that the deterioration in cost competitiveness has played a role in this development.
- It can thus not be ruled out that Luxembourg might be suffering from some local version of the "Dutch disease", where some dynamic and competitive parts of the services sector (in particular financial services) set the tone for wage increases in the whole economy,

Frame 10
Continued

while other sectors, in particular manufacturing industry, which is a price-taker, have more or less to follow suit, although the rise in labour costs hampers their competitiveness.

As regards other possible imbalances, while house prices have been growing strongly over the past few years, this seems to be less the case of a speculative bubble than the result of normal functioning of the housing market in which a strong demand is confronted with probably insufficient supply.

4. Main challenges facing Luxembourg

The main underlying challenges, identified in this report and by analytical work carried out under Europe 2020, are summarised in the following paragraphs.

- Addressing cost competitiveness by taking into account productivity developments in **wage setting**. Since the beginning of the decade, Luxembourg has significantly outpaced its main competitors as far as the rise in ULCs is concerned. Although the large current account surpluses recorded up to now seem to suggest that this has not yet resulted in a significant problem, there is at least a potential risk. Moreover, these current account surpluses essentially reflect the large surpluses in services generated by the financial sector, the future of which is unclear. As explained above, wage developments are not the only factor behind this faster rise in labour costs since the decline in productivity related to the cycle also played an important role. However, as developments in productivity are beyond the influence of the authorities and social partners at least in the short and medium run, it seems opportune to try to influence the other term of the equation, namely wages. Wage increases in the coming years should thus take into account the fact that the rise in labour costs since the beginning of the decade has been significantly stronger than in most EU-15 countries.

- Ensuring **a viable and stable financial sector**. The financial sector has been the economy's main engine of growth in the latest 25 years. Ensuring its viability and stability is thus a key challenge for Luxembourg. Due to the international character of the sector (both in its structure of ownership and activity), many factors influencing it are beyond the reach of the Luxembourgish authorities but one aspect that could be useful in this respect is to enhance international cooperation in regulation and monitoring.

- Continuing the efforts **to diversify the economy** in order to reduce its vulnerability to sector-specific shocks. It is far from certain that financial activities will be able to remain the country's main engine of growth in the future as they were since the early 1980s. Moreover, the extreme reliance of the Luxembourgish economy on a single sector (the steel industry in the past, financial services today), whatever its dynamism, is in itself a source of vulnerability. Even though there are obvious limits to economic diversification for a 500,000 inhabitant country, the efforts already made in that direction should be continued and reinforced. This problem is related to the wage-setting issue to the extent that other sectors probably suffer more from the deterioration in cost-competitiveness than financial services.

- Reforming the **pension system** in order to ensure its long-run sustainability. The increase in age-related public expenditure in Luxembourg up to 2050 is projected to be the strongest in the EU (18 percentage points of GDP), especially due to the generosity of the pension system. Although reforming the pension system would not in itself improve competitiveness in the short run, it would prevent a scenario from materialising where the rise in age-related public expenditure would require a parallel increase in the tax burden, which would eventually undermine the country's competitive position.

- Reducing **disincentives to work** for the unemployed and older workers. The employment rate of residents is low at both ends of the age spectrum because youth unemployment is higher than the EU average and the pension system provides very high replacement rates and often allows workers to retire before the statutory pension age. Increasing the employment rate of younger and older workers would not per se improve the country's competitiveness but would alleviate the burden that unemployment and early retirement constitute for public finance. This burden is far from unbearable at the moment but it could increase in the future.

- Improving the **efficiency of spending on education**, in particular on secondary education. The performance of the educational system is below average, which constitutes a handicap for residents in the quest for jobs since they are facing an intense competition from numerous – and often skilled – potential cross-border workers. Improving the performances of the educational system would contribute to reduce youth unemployment, which is higher than the EU average although total unemployment is significantly lower.

6.3 Analysis of the *Observatoire de la compétitivité* – The Real Effective Exchange Rate for Luxembourg (REER)

Since 2006, the *Observatoire de la Compétitivité* has published regularly a detailed report on the external competitiveness from the costs and prices perspectives of Luxembourg companies. This analysis is based on the real effective exchange rate (REER) used to evaluate the competitive position of the country with relation to its principal trading partners by comparing relative changes of prices, costs and exchange rates amongst these partners. The REER analysis is more detailed than that of the European Commission set out above as it presents not only a REER for the entire economy but it provides further detail on changes between industry and the services sector.

Indeed, as broad as the definition of competitiveness can be, Price competitiveness and Cost competitiveness are essential determinants of Luxembourg's foreign trade situation. Changes in prices and wages in Luxembourg have and will continue to have an impact on the competitiveness of Luxembourg companies.

The exchange rate is an important variable of competitiveness. A lowering or depreciation in the value of currency improves the country's competitiveness by making its products less expensive abroad and by making its competitors products more expensive on the domestic market.

Since a bilateral exchange rate cannot reflect the competitive position of a country with relation to all of its principal trading partners, it is appropriate to analyse a weighted average, by the importance of each partner in Luxembourg's exports. This is called the nominal effective exchange rate. Depending on whether we deflate the nominal effective exchange rate by a price or cost indicator, this gives a measure of the price competitiveness or the cost competitiveness, the real effective exchange rate version of prices or costs. REER is used to compare domestic and foreign prices at the macroeconomic level expressed in[160] a common currency, thus providing a measure of competitiveness.

For Luxembourg, a member of the Euro Zone with fixed exchange rates, the adjustment mechanism using the competitiveness differential is based essentially on market forces that act as stabilisers of pronounced price and cost differentials. In particular, if a country has an inflation below the average, it becomes more competitive with relation to its partners in the same monetary zone.

For deflation of the real effective exchange rate from the price perspective, a comparison is made between the price of domestic goods and services and those of a country's primary competitors, with the understanding that "prices" represent prices with added value inherent. From the cost perspective, domestic unit wage costs—this means the cost of work per unit of added value produced—are compared to costs faced within the countries that are primary trading partners.

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

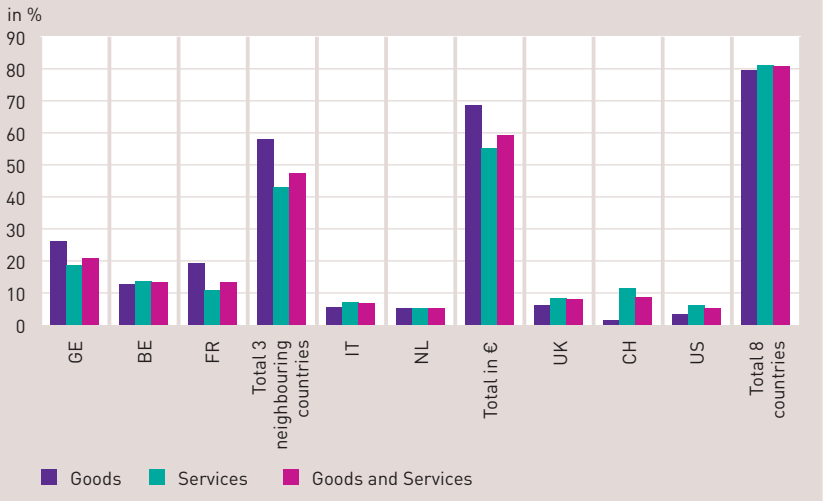
6.3.1 Weightings

The real effective exchange rate is comprised of currencies of the principal trading partners of Luxembourg, which are Germany, Belgium, France, Italy, the Netherlands, the United States, the United Kingdom and Switzerland. A weighting is assigned to each bilateral exchange rate outside of the Euro zone – member nations within the zone obviously use a like exchange rate per unit – that reflects the average relative importance of a given country in the trade structure of Luxembourg.

Obviously, a different weighting structure should be applied for the entire economy, and for the services and industrial sectors. This reflects a different geographic breakdown from exchanges of goods and services. The weightings used to calculate the real effective exchange rate – reflecting the relative importance average of the principal trading partners in Luxembourg's exports – are modified each year for REER calculations to take into account the changes in the geographic structure of exports.

The various weightings used to shape the real effective exchange rate stem from the Luxembourg Statistics on Foreign Trade published on a regular basis by STATEC[161]. The graph below traces the "relative importance" of each of our eight major economic partners for Luxembourg's foreign trade or even the average share of each of these countries of export of goods, services and total exports of Luxembourg, with these 8 countries representing 80% of all Luxembourg's exports.

Figure 44
REER weightings (Average relative importance of Luxembourg's foreign trade)



Source: STATEC, *Observatoire de la Compétitivité*

[161] www.statec.lu

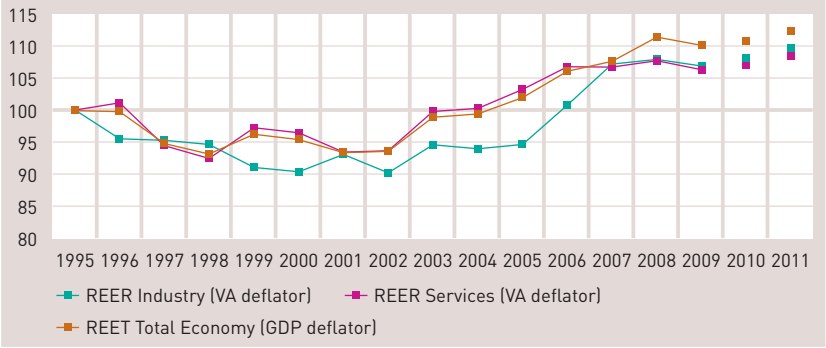
It is clear that weightings differ slightly and depend on whether one is considering exports of goods—weightings used for the REER of industrial production—exports of services—weightings used for services exports—or exports of goods and services—weightings used for the REER of the entire economy. One may also notice that around 50% of exports go to our neighbouring countries and about 60% go to the Euro Zone, with this figure more like 70% for services. This illustrates what has been stated above, namely, that for Luxembourg, the adjustment mechanism by competitiveness differential is based essentially on market forces that act as stabilisers of pronounced price and cost differentials.

6.3.2 The real effective exchange rate from the price perspective

The price perspective of the real effective exchange rate measures the relationship between domestic prices and foreign prices expressed in Euros. Here, the concept of "prices" represents prices with added value inherent. Foreign prices by sector are obtained by multiplying indices of added value prices by the weighted exchange rate. The nominal exchange rate of currencies outside of the Euro zone ($, £ et CHF) enters in to the calculation of this rate, weighted by the average relative importance of a given country with respect to Luxembourg's exports.

The graph below traces the evolution of price competitiveness measured by the REER, from the price perspective, showing the relationship between domestic prices and foreign prices expressed in Euros. In this sense, the drop of the REER which is indicated by a falling curve should be considered as an improvement in price competitiveness for Luxembourg, with domestic prices changing more slowly than foreign prices expressed in Euros. The inverse, a rise in REER, represented by a rising curve represents a drop in competitiveness. The data serving as a basis for REER calculations originate from the AMECO database of the European Commission, DG ECFIN[162], with data for 2010 and 2011 being forecasts.

Figure 45
Real effective exchange rate-indicator of price competitiveness of Luxembourg



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

[162] It should be noted that AMECO data comes from the Offices nationaux de Statistiques and are passed on following verification by Eurostat. For the AMECO database, see: http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm

It can be observed that the trend for the price competitiveness of Luxembourg is falling, as shown by the rising curve, and that this trend is essentially influenced by the services sector. However, the trend of the Industry REER is also rising: price competitiveness of industry, after improving at the beginning of the observation period and on through the middle of it, ended up falling precipitously at the end of the period. This is all the more disquieting given that industrial companies are relatively more exposed to price competition than are companies in the services sector, especially financial companies[163]. Nonetheless, it can also be observed that, at the end of the period, due to the crisis, there appears to be a stabilising of price competitiveness trends of Luxembourg companies, in both the industrial and services sectors.

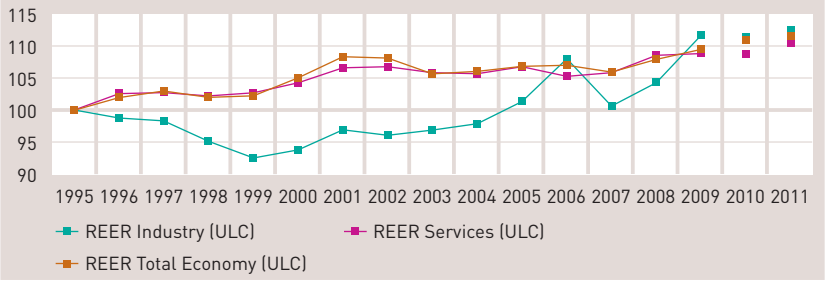
6.3.3 The real effective exchange rate from the cost perspective

To obtain the REER cost perspective, nominal domestic unit labour costs TCER, i.e. the cost of labour per unit of added value produced, are compared with those of the economic partner countries. The unit labour cost indicator (ULC) included two different aspects of competitiveness: labour costs and productivity. Although changes in labour costs can explain a loss of competitiveness measured by the real effective exchange rate from the cost perspective, changes in productivity contribute to this as well[164].

By observing REER cost curves in the graph above, a continuous decline of the cost competitiveness situation of Luxembourg's economy is apparent as shown in the rising curve. Changes in the REER for the entire Luxembourg economy from the cost perspective are strongly linked to the services sector, which is the flagship sector of Luxembourg's economy. This sector displays a rather pronounced and continuous worsening of competitiveness between 1995 and 2009, with forecasts for it to continue into 2011.

In the industrial sectors, results in the beginning of the period are less clear, because cut since cost competitiveness even improved temporarily. Nonetheless, there was a rapid deterioration of cost competitiveness in industry beginning in 2002, with an exceptional period in 2006 and 2007, which turned sharply downward in 2008 and 2009. Only at the end of the observation period did a tenuous stabilisation begin to set in, although this part of the chart is based on forecasts.

Figure 46
Real effective exchange rate-indicator of cost competitiveness of Luxembourg



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

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

[164] For a detailed analysis of productivity by sector 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 the Economy and Foreign Trade, May, 2010

6.3.4 A partial update

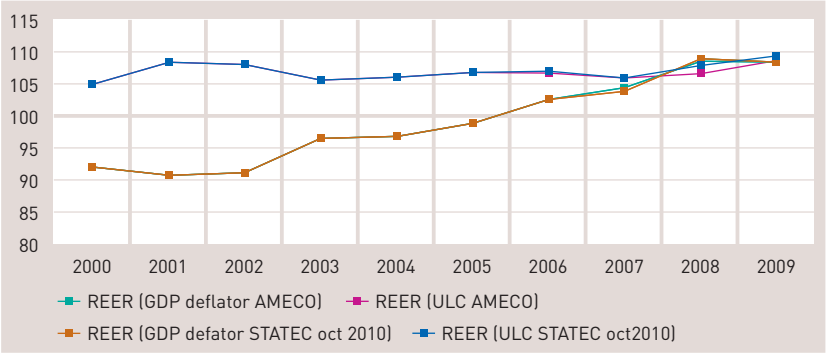
On 5 October 2010, STATEC published an update of the nation's accounts. The AMECO data used for calculating the REER above will not be revised until the end of November, 2010.

The graph below shows the partial update of the REER competitiveness indicator where data concerning Luxembourg from 2000 to 2010 are based on the new set of STATEC national accounts, whereas values for other countries originate from AMECO and date from April, 2010. Nevertheless, this update is only possible for the entire Luxembourg economy, as a detailed analysis of industry and services cannot be done at this point due to missing data.

Although at the end of the period, several differences stand out, primarily in the cost version, due to updates of data. These differences tend to confirm rather than invalidate observations based on data from April, 2010, to wit:

- Strong decline of price and cost competitiveness of the Luxembourg economy
- Worsening of cost competitiveness is more pronounced over the entire period
- At period's ending there is a strong acceleration in the drop of price competitiveness prix.

Figure 47
REER prices and costs for the entire economy
(AMECO April 2010 and STATEC October 2010)



Source: AMECO, STATEC, *Observatoire de la Compétitivité*
(Graph: REER for Luxembourg. 8 major trading partners, 1995=100)

6.4 Conclusion

The definition of competitiveness in the broad or "structural" sense as set out by the *Observatoire de la compétitivité* does not exclude the cost / price dimension of competitiveness. The costs / prices are the essential determinants of the capacity of Luxembourg companies to export their goods and services. Indeed, other factors enter into play, such as international demand which is an extremely cyclical element and product quality. The real effective exchange rate is used to evaluate the competitive position of the country with relation to its primary trading partners by comparing related changes in price, cost and exchange rates amongst these partners.

It must be recognised that there was a major decline of price and cost competitiveness in Luxembourg's economy, that worsening of cost competitiveness is more pronounced over the entire period even though at the end of the period there was a strong acceleration in the loss of price competitiveness. These results agree with those presented by other international organisations, such as the Organisation for Cooperation and Economic Development[165] (OECD), the International Monetary Fund[166] (IMF), the European Central Bank[167] (ECB) and the Luxembourg Central Bank, which provided an update of its indicator in June, 2010 in its annual report[168].

This has also been confirmed by the recent analysis of the competitive situation of Luxembourg that was done by the European Commission for the Eurogroup (see frame above). The Commission advises the country to maintain a very high level of vigilance on these losses in external competitiveness in view of the danger to public finances in the long term due to the ageing of the population and because of the very heavy reliance of the economy on the country's financial sector.

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

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

[167] ECB Harmonised Competitiveness Indicators: http://www.ecb.int/stats/exchange/hci/html/index.en.html

[168] http://www.bcl.lu/fr/publications/rapports_annuels/2009

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7 Impacts of wage indexation; a brief look at recent studies

7.1 Introduction

For decades now, wage indexation has been a topic that has embittered economic, social and political debate in Luxembourg. Although little remains to be said or written on the subject, it appears that very few people have attempted a serious analysis of this complex phenomenon. It is just as surprising that very few people have gone over the recent studies dedicated to the topic, which remains taboo in Luxembourg.

Professional organisations and the media give priority to certain studies or certain isolated results, often cite older analyses, some of which are outdated, and neglect the wealth of studies that have become available over the past few years. This is one more reason to review this succession of studies, to determine whether there are not useful data in them and whether we cannot use them to perfect our knowledge in the field.

First of all, we must admit that the wage formation system is hardly limited to the wage indexation process. There are the wage cost components[169]: indirect costs amount to 16% of total labour costs, including employer and employee contributions, and other contractual payments including vocational training. Gross pay represents 75% of direct wage costs, the remainder is equally shared out between bonuses and days lost. Wages result from more or less explicit bargaining processes between employees, management and shareholders, carried out collectively or individually.

To understand fully the specific importance of the wage indexation process, results must be compared with other countries. Indeed, all countries use a more or less explicit process to adapt wages to inflation. Some countries such as Luxembourg and Belgium, as well as Cyprus, Malta and Spain, have introduced, at least partially, an automatic system to adapt wages to inflation[170].

The link between inflation and wage increases is not direct. First production costs must be tied to prices. Using a definition of prices as a margin rate applied to unit wage costs[171], we can establish a link between changes in wage costs, expressed formally as shown below:

$$\frac{\Delta P}{P} = \frac{\Delta m}{m} + \frac{\Delta w}{w} - \left(\frac{\Delta Y}{Y} - \frac{\Delta N}{N}\right) .$$

Prices change with profit margins, wage rates and work productivity. Yet this breakdown gives little satisfaction. Changes in wages depend in turn on consumer prices on a sliding scale and on the unemployment rate; also on trade margins, market power of companies, etc. Pieretti and Aka submitted a very complete theoretical model showing the relationship between prices and wages in 2007.

A statistical description of data does not suffice to examine the link between wage indexation, labour costs and inflation. Studies on the topic have attempted approaching the issue using three perspectives, as follows:

- an analysis of the series of consumer prices or wage costs
- an reduced macroeconomic analysis of the wage-price spiral
- an overall macroeconomic analysis

[169] *Le coût de la main d'œuvre,* STATEC Bulletin n° 3-07, 2004

[170] Eurofound, Wage indexation in the European Union, Background Paper, European Foundation for the Improvement of Living and Working Conditions, 2010, Dublin, http://www.eurofound.europa.eu/

[171] See J-D. Lecaillon, Jean-Marie Le Page, Ch. Ottavj Economie contemporaine, De Boeck Université, 2001, Chapter 9

$$P = (1 + m)\frac{wN}{Y} = (1 + m)\frac{w}{\frac{Y}{N}}$$

7.2 The partial viewpoint

Table 56
Analysis of variance
Monthly inflation cpi (1995m1-2010m7)

Tranche	Mean	Std. Dev.	Freq.
0	1.9851954	.98761713	163
1	2.238993	.94262392	12
Total	**2.0025987**	**.98408801**	**175**

F-test: 0.74 prob : 0.3901

Source: Calculation by authors, variable=cinf2

Another very rough approach consists of comparing inflation averages for months to adjustments to salaries without considering adjustments done through the automatic wage indexation system. The difference here, shown in frame 1 below, is around 0.25 points. This difference is not statistically material using the Fisher test. Results do not change when price increases are tested two or three months after the expiration of the sliding scale. This leads to an in-depth analysis.

An unpublished descriptive analysis on 256 items in the consumer basket, with 8 index groups concerned, shows that three months after the indexation hikes on wages were applied, 20-25% of prices fell, 7-10% of prices remained stable and 66-70% of prices increased. There exists therefore a wide degree of variance of behaviour in consumer prices when broken down.

The time dimension also plays a role, as consumer prices are determined by exogenous variables such as, for example, oil prices. A deeper analysis of the ADL type (Autogressive Distributed Lags)[172], which relates consumer prices and the price of oil from the level and change perspectives, shows that the impact of an indexation hike does not come out clearly (see frame 2). Two specifications, Mod 1 and Mod 2, account for the seasonal effect using monthly indicators and, alternatively, the sales months of January and July. An indexation hike group would have an impact of around 0.14 – 0.21 on short term inflation, but the coefficient is insignificant until the last specification of Mod 4 in Frame 2. At first glance, the conclusion to be drawn is that the impact of the indexation hike is low, even nil. Naturally, this result is contingent upon the type of modelling used, which is understandable for what is, after all, a rather complex phenomenon. Other studies have shown that alternative specifications that do not take inflation as a dependent variable, but rather underlying inflation without the seasonal effect and purged of volatile pricing, including energy prices show a significant impact by the dummy variable "tranche".

Analyses based on a reduced form model, with inflation as a dependent variable and other pertinent variable such as the price of oil and lagged variables do not give full satisfaction. Therefore, the analyses must be carried further by linking inflation and wages inside of a broader macroeconomic framework.

[172] A standard formula for ADL is A(L)yt = m + B(L)xt + u, with L= lag operator

It is true that a more detailed, microeconomic perspective of the disaggregate changes to wages and consumer prices can provide many lessons. However, the task of tracing direct and indirect effects in increases of wages on inflation, while taking into account the influences of a string of other relevant variables such as productivity and unemployment, relies on structural analysis.

Table 57
ADL Model (6.6)

Variable	**Mod1**	**Mod2**	**Mod3**	**Mod4**
logip L1.	-.10795917***	-.0258342*	-.02286029*	-.02667618**
logpete L1. |	.02679548***	.00548814*	.0049035*	.00617623**
loginfpete	.00337177*	.00283756	.00279358	
tranche	**.00015437**	**.00134289**	**.00132814**	**.00216208***
loginfpete				
L1.		.01365957***	.01400301***	.01359189***
L2.		-.00995647**	-.01007961**	-.01190607***
L3.		-.0013239	-.00128478	
L4.		-.0032712	-.0033643	
L5.		.00139312	.0015157	
L6.		-.00013677	-.00009706	
loginf				
L1.		.55498279***	.55797777***	.78444098***
L2.		.1662761	.16650921	
L3.		-.00896828	-.00520391	
L4.		.13395918	.1282578	
L5.		-.13476284	-.13341205	
L6.		.13967091	.14229328	
m				
1		.00001637		
2		.0005486		
3		.00070401		
4		.000411		
5		.00046904		
6		-.00006123		
7		-.00038523		
8		-.00020133		
9		.00005994		
10		-.00043954		
11		.00019639		
jan			-.00020114	
juil			-.00054774	
_cons	.42083342***	.10173442*	.09020007*	.10470618**
N	175	169	169	173
r2_a	.64828997	.87558813	.88195009	.87617517
F	81.181432	44.790869	70.729273	203.84318
aic	-1305.142	-1414.6043	-1431.0182	-1468.9618
bic	-1289.3181	-1326.9672	-1371.5502	-1446.8887

legend: * p<.05; ** p<.01; *** p<.001
Source: Calculations by authors
Variables: loginf (ipcn-ipcn_12) in log,logip = ipcn en log, logpete = price of oil in log, loginf = change in logip over 12 months, loginfpete = change in price of oil, tranche = indicator for month of application of wage indexation, jan = indicator for month of January, juil = indicator for month of July , m1-m11= indicator of month. Results of tier assessment.

Hujer-Rodrigues (see below) examined consumer prices in detail, using a group of 12, then of 40 products, examining their variations following a change in the sliding wage scale. Variations in consumer price within the group of 12 products, which account for around half of the basket, had a major impact on the sliding scale, which came to 0.13% of the total. Variations in prices of the group of 40 major products, covering 42% of expenditures, are reflected by cumulative elasticity of 0.08%. These results can be compared with Adam and Dacosta (2002)[173], who did a detailed analysis of changes in consumer prices using 164 product groups. These authors used Granger equations to detect 24 products for which prices rose perceptibly at the increase of the sliding scale following the application of an indexation hike with elasticity between prices of goods and services and an application quotes of around 0.2.

In this context, it is useful to cite a series of studies on inflation persistence. Nominal rigidity can be explained by company pricing policies and the wage formation process in an environment of monopolistic competition. The strong resistance opposed by workers to reductions in nominal wages during cyclical downturns could be due to a certain form of money illusion or the feeling of injustice in reducing wages of workers. Entrepreneurs, for their part shy away from such reductions for fear of discouraging work and consequently productivity among workers. Companies may envision refraining from automatically adjusting their prices each time a change in demand for their products occurs. Apart from administrative costs linked to this type of modification, the ticketing or menu change costs, they fear that frequent price changes risk harming relations with their customers. In contrast, not changing prices incurs costs as well, costs that are all the higher because current prices differ from desired prices. From this perspective, Luxembourg-style automatic wage indexation is part of the group of institutional rules including minimum wage, collective bargaining and regulation of markets for products that command changes in wages and sales prices. This rigidity should reflect greater persistence of consumer prices. Rigidity may arise in pricing policies of companies over time, achieved through the framework of the European system of central banks in which the BCL also participates[174]. The authors have found a relatively low degree of persistence in the case of Luxembourg compared to the EU15.

Between January, 1999 and December, 2004 a detailed analysis was performed of the varieties of price indices obtained by STATEC. The authors[175] analysed frequencies of price changes for various products, the prices that remained unchanged and the seasonal rate of price changes. The weighted average of a price change was 17%, and prices remained static for an average of eight months. The majority of price changes, 60% of them, were increases, but a significant proportion were price decreases, 40%, and were dissimilar throughout the range of product types. The analysis uses a qualitative regression model with the logit model incorporating unobserved dissimilarity, which tests the impact of a group of variables on price change episodes, with price increases and decreases separate.

[173] Adam, F., Z. da Costa *Le phénomène d'auto-allumage dans le contexte de l'indexation des salaires*. Statec Bulletin 49, 2002

[174] P. Lünnemann, T. Y. Mathä "Inflation persistence in Luxembourg: a comparison with EU 15 countries at the disaggregate level, working paper BCL n°12 , October 2004

[175] P. Lünnemann and T.Y. Mathä Consumer price behaviour in Luxembourg. Evidence from CPI microdata, working paper BCL no 17, November 2005

Among the explanatory variables, there are time variables for month and year, which are dummies, wage indexation, also a dummy, and dummies for regulated prices, the switchover from the franc to the euro and certain categories of specialised products, such as services. In addition, the regression contains variables on the extent of price changes, either increases or decreases, that precede the price change analysed, as well as cumulative inflation of consumer prices in the main categories of products.

The results clearly show an impact of wage indexation, all other things being equal, especially on price increases.

"The probability of an adjustment to prices is impacted by the expiration of wage indexation episode. Adjustment to wages implies a rise in the probability of an increase as well as a diminution of the probability of a decrease. The analysis suggests nonetheless that the impact of the expiration of a renewed index group of the sliding wage scale is limited to a reduced number of consumer products. More specifically, on the basis of a multivariate analysis, ten categories of products were identified for which prices were significantly impacted by the expiration of this type of wage indexation, including "Home maintenance services", "Appliance repairs", "Employment of domestic staff", "Maintenance and repairs" and "Hairdressing shops."

The BCL[176] produced an interesting study on wages, on the basis of data furnished by the Luxembourg *Inspection de la Sécurité sociale*, IGSS, for the period of 2001 - 2006. After a thorough cleaning of the base file, the authors tried to discern the actual changes in wages by removing episodes of wage indexation, marriage or increases in the minimum wage. They found that nominal wages change only 7% and only 5% if insignificant changes to the statistical tests basis are discounted. The authors made a remarkable finding: There are practically no diminutions in real terms, either nominal wages fall or they increase less rapidly than the wage indexation. This would mean that companies cannot lower or halt nominal wages in such a way as to counter the impact of wage indexation. Unfortunately, these data do not contain information on bonuses on overtime hours, which are the prime components of wage adjustments.

Lastly, let us look at another contribution, that of the Private Employees Chamber[177]. By formulating a series of ad hoc hypotheses on the structure of production consumed by residents and its share in the basket of consumer goods the Chamber of Private Employees[178] derives a figure of 0.3 percentage points corresponding to the part of the increase in consumer prices that would be specifically due to the indexation process. Nevertheless, the authors, who favour a univariate descriptive analysis, offer no integrated economic analysis of inflation determinants.

In conclusion, we should remember that each of these studies throws an interesting light on certain specific points: a detailed analysis of consumer prices and wages helps observe the characteristics of those series subject to certain shocks, such as wage indexation. The studies are used to locate and quantify the apparent impact of wage indexation. The principal weakness is that it does not account for the dynamics of all the determinants of the wage-price spiral. Therefore, other approaches must be examined.

[176] P.Lünnemann and L. Wintr, Wages are flexible, aren't they? Evidence from monthly micro wage data, BCL study

[177] Since incorporated into the Employees Chamber

[178] CEPL *L'inflation au Luxembourg de 1999 à 2007 : mythes et réalités, Dialogue*, May 2008

7.3 The wage-prices spiral (reduced model)

Several studies ordered sequentially by the *Observatoire de la compétitivité* and STATEC have increased our understanding of the wages-prices link.

These include the Hujer[179]-Rodrigues and Pieretti -Aka[180] studies.

The *Observatoire de la compétitivité* contracted Professor R. Hujer and his assistant, P. Rodrigues of the University J.W. Goethe of Frankfurt/Main to study the effects of wage indexation on inflation using a comparative approach. In their report, the authors first gave a synopsis of existing literature on the impacts of wage indexation. They then approached the issue empirically be comparing Luxembourg with other countries such as Spain, Belgium, Germany and France. Their econometric analysis was implemented using quarterly data from 1995-2006 furnished by international organisations such as OECD and EUROSTAT. They used the vector error correction model (VECM) in their analysis of five countries. The authors found that consumer prices increased 0.125% in Luxembourg when labour costs increased 1% in a persistent fashion. The Granger causality tests show that labour costs had a positive impact on consumer price indices. This is also true for Spain, France and Belgium, but not Germany, which does not have an automatic wage indexation system and applied a very strict wage moderation policy.

Under the direction of Professor P., followed by empirical estimates using quarterly data of a wage-price spiral. The author developed a price formation model in the context a new open economy macroeconomics. This model incorporates microeconomic bases and market imperfections in the form of monopolistic competition with price rigidity in the formation of prices and inflation dynamics. The theoretical results indicate that the general index of consumer prices depends negatively on work productivity, but positively on wage rates and foreign prices. The paper showed that at a stationary level, increases in work productivity bring on decreases in price equilibrium and increases in wage equilibrium, as well as a lowering of the unemployment rate.

[179] R. Hujer and P.J.M. Rodrigues *"Wirtschafliche Auswirkungen der Lohnindexierung"*, *Perspectives de politique économique, Observatoire de la compétitivité*, Minister of the Economy and Foreign Trade, December 2007, can be downloaded from www.odc.lu

[180] F. Aka, under the direction of P. Pieretti, *"Modélisation de la formation de l'indice général des prix à la consommation, des salaires et de l'emploi application au cas du Luxembourg"*, *Economie et statistiques*, STATEC, no 2, December, 2007.

The author used a VAR model and set constraints from the theoretical model developed previously. To sum up, the estimating model is comprised of a two equation system where consumer prices, labor productivity, nominal wage rates and the unemployment rate all enter into play. Empirical results show that in the short term, consumer prices in Luxembourg are principally affected by their own historical trends and by productivity over the previous period. Current wages are mostly influenced by foreign prices and by productivity over the previous period. The paper also furnishes a thorough breakdown of the indirect effects of "spontaneous ignition", which may be quite significant. So increases in foreign prices of one percentage point implies an initially weak impact of 0.06 points, which can subsequently rise—quintuple—to 0.3% either by an indirect or self starting effect of 0.24 points.

F. Aka updated the data (February, 1995.- March, 2008) and re-estimated the model: unpublished results show that the incidence of prices on wages in the short term is significant at 0.8.

In conclusion, what we must retain from these approaches is that the effects between prices and wages are very complex, as shown in the theoretical model developed specifically for Luxembourg.

One passing weakness of these studies is that they are based on quarterly accounts that are still recent and are regularly revised. Therefore, one is obliged to go back over the estimates to validate their scope when the data has solidified and there are a more ample number of points. At any rate, the VAR structural model is a very promising approach even though it sometimes requires delicate handling during implementation.

7.4 The overall macroeconomic approach

The fullest and most rewarding approach is the macroeconomic modelling methodology, because it can be used to build a more complex base scenario that accounts for a large number of variables that impact prices and wages. STATEC's annual MODUX model provides this type for simulating impacts of increases in wages through indexation[181]. Below we cite the conclusions of a simulation published in 2007 on the effect of a wage shock:

"Increases in labour costs triggered the following reactions on the main variables in Modux:

1. Increases in the cost of labour, diminishing employment and increasing unemployment
    a. As a result, capital is substituted for work
    b. Wages rise, which result in lower profitability for companies
2. Available income to households results as wages rise faster than consumer prices
    a. The increase in available revenue is an increase in real terms that favours private consumption, an initial increase in GDP resulting from the wage shock is primarily a consequence of higher consumer spending
    b. Higher income increases attractiveness of Luxembourg for cross-border workers, which promotes substituting cross-border residents for Luxembourg nationals, so domestic employment falls more than cross-border employment
3. An overall rise in prices is caused by falling price-competitiveness with a consequent fall in exports, which in turn causes GDP to recede over four years
4. The original 2.5% jump in labour costs increases over the years due to the wage - price spiral There is therefore also a persistent growth of inflation, which is the initial difference in price levels. A certain falling off of increases in inflation is noted after several years.
5. It should be noted that the cost of labour shock, with all the consequences it entailed, seems to have had rather neutral effect on public finances, a slight worsening in fact. The interesting aspect of this simulation is the simultaneous play of internal and external demand, linked to whether or not nominal interest rates were modulated. Indeed, the initial wage increase increased households' purchasing power, which drove private consumption higher. The overall impact on GDP is positive. Gradually, price increases spread and the competitive position of the country worsens. The fall in exports exacerbates while, because of the increase in consumer prices and in unemployment, the positive impact on private consumption via real disposable income falls off as from the fourth year.

[181] F. Adam, *Cahier des variantes*, Economic Notes n° 104 du STATEC, September 2007

These simulations illustrate the dynamic aspect of this spiral. Thus, an initial increase of 2.5% in the cost of labour in the private sector induces a persistent shock on the inflation rate of consumer prices in the area of 0.2 percentage points per year. However, it is possible to discern a certain dip in the positive impact on prices. This would be due to the restoration forces integrate in Modux: the rise in unemployment that mitigates increases in wages, the positive output gap, which acts on gross added value prices, the price competitiveness process, which acts on imports and exports.

Because of the high degree of openness of Luxembourg's economy, restoration forces are probably weaker than in larger, more closed economies. Lastly, this impact recalls that any increase or decrease of domestic prices—consumer prices or gross added value prices—changes real interest rates, which acts on private consumption and gross formation of fixed capital."

It is surprising that these results have never been cited by professional organisations, nor by public authorities. An update of the model for the first half 2010 Tripartite meeting (unpublished) showed very similar results. The impact of the hike of an indexation hike on GDP in volume is primarily positive, mainly because of the increase in private consumption, which results from more disposable income. Capital expenditure increases also, partly because of a slight multiplier effect for the rise in business, but primarily because of the drop in employment due to higher wages, an impact of the work/capital substitution phenomenon. Exports fall, which is sufficient to pull down GDP in three or four years. Employment falls, primarily among cross-borders. Unemployment rises on the average around 0.1%.

The multiplier effect on prices remains moderate, while inflation rises about 0.1 percentage point per year after the impact. In all, consumer prices increase by 0.4% over 4 years, but wages go up by 3.1%. Gross added value prices would be increasing less than costs, which compresses margins for companies. Thus, wages or the equivalent of real unit labour costs, rise 0.3 to 0.5 of a percentage point, while margin rates diminish by as much. The impact of public finances is roughly neutral because of the symmetrical increase, to approximately the same extent as revenue and public expenditures.

To confirm this analysis, it would be useful to redo wage impact simulations to the same extent as those that trigger wage indexation, as part of the two other macroeconomic models available to STATEC and the *Observatoire de la compétitivité*, LuxGem[182], a computable general equilibrium model and LSM[183], the Luxembourg structural model. Contrasting these macroeconomic models will provide a wealth of results to comment on.

[182] To appear in a series of economic notes by STATEC

[183] L. Fontagné, M. Maffezzoli, M. Marcellino, LSM-Luxembourg Structural Model, no13, December, 2009, *Perspectives de Politique Economique, Observatoire de la compétitivité, Ministère de l'Economie et du Commerce extérieur*

7.5 Conclusion

It is useful to go over the abundance of studies on inflation and wage indexation that have been completed in recent years concerning Luxembourg. These studies are accessible to the public on the STATEC and *Observatoire de la compétitivité* web sites. The *Observatoire de la compétitivité* set up a seminar in 2008 reserved for experts of the social partners and the government to discuss these studies. These studies are therefore certainly known in concerned circles.

What can be drawn from these studies? It can be observed that a solid link exists between inflation and wages, in both directions. In addition, the impact of wage adjustments is weak in the short term, with a greater effect over the long term. Coefficients are marked by some uncertainty, if only by the length of the statistical series. Lastly, the exact role played by the particular wage indexation mechanism with relation to other wage adjustment mechanisms is still unknown.

This contribution illustrates that we have already thrown light on some of the facets of the relationship between wages and inflation in a small, open economy. There remain a series of questions to address and work yet to complete. Some examples of this include: 1) Simulations on the impact of wage shocks using the LSM and LuxGem tools mentioned above, 2) A study of the institutional characteristics that govern the wage formation systems in Europe and contractual indexation clauses, 3) An analysis of companies' conduct in setting prices and behaviour of consumers in making purchases, as well as contractual wage indexation clauses, 4) A re-estimation of quarterly models using newly revised data.

On and ending note, we need a summary report in layman's terms to translate econometric results, which are too often consigned to the impenetrable language of the researcher, so that the general public can understand the issue, without which it is hardly possible to bring citizens into the debate with policy makers.

Due to its extensive experience in wage indexation issues, the Economic and Social Council (ECS) has been assigned the task of drafting a note on "Non-inflationary Growth" by the Prime Minister, an opinion that should deal with both the cost competitiveness aspect and the dimension of purchasing power of inflation. It will also deal with the role of wage indexation. The social partners need to come to an agreement over what is a "good" rate of inflation, and over a referential standard that is compatible with the other macroeconomic objectives of growth and employment. In this context, M Menei[185] has begun to explore the concept of a benchmark, or "excessive" rate of inflation for the ECS Secretariat, within a small, open economy that could serve as a guideline to the government and the social partners' economic policy programme. Unfortunately, discussions preliminary to the drafting of this important opinion have not progressed.

[184] *Observatoire de la Compétitivité,* Methodological seminar *"Inflation au Luxembourg, mesure et déterminants"*, 4 June 2008, Chamber of Commerce

[185] M. Menei *"Inflation excessive : essai de définition et de mesure"*, pp. 340-347 in *L'économie luxembourgeoise. Un kaléidoscope, Editions le Phare*, 2009

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8 The GDP Well-being project

8.1 Beyond Gross Domestic Product and Gross National Income, to GDP well-being

8.1.1 Introduction

Until the end of the sixties, the per capita Gross Domestic Product (per capita GDP) was the absolute and undisputable indicator for measuring economic growth of a country, and consequently its well-being. At present, GDP is still an essential indicator for measuring growth of production of goods and services. As such, *"GDP is defined as the sum of all goods and services produced in a country over time, without double counting products used in other output"*[186]. Although this is a useful economic indicator, it must be remembered that it has limitations, especially in evaluating sustainable development and living conditions within a society, because it was not conceived to measure these two essential branches of well-being. There are alternatives for countering the various limits of the GDP per inhabitant, such as the Gross National Income per inhabitant (GNI per capita.), which entered into effect with the new SEC95 system of national and regional accounts. . This indicator shows the revenue of a nation's residents, not its production. It now replaces "Gross Domestic Product per inhabitant" used in SEC79 and which was conceptually identical to GNI per capita[187].

In the case of Luxembourg, with a population of cross-border workers numbering 149,314[188] in May 2010, using GNI per inhabitant presents a more impartial assessment. GNI per capita is defined as "GDP/inhabitant plus primary income and less payments made to other countries.

This indicator is calculated in purchasing power parity (PPP) so as to account for different price levels between countries.[189] The indicator provides a more authentic view of economic growth and well-being of a country and especially of its residents. According to the latest figures available, Luxembourg has the highest per capita RNI and leads this ranking for wealth[190]. However, this does not, mean that the Grand Duchy also ranks first regarding well-being, because neither GDP per capita, nor RNI per capita—the concept that better reflects the well-being of a country's residents—meet the optimal conditions for measuring well-being and quality of life[191]. To achieve this goal, indicators must include both: objective and subjective aspects- that make up the lives of the persons being evaluated. These new measures show the necessity of bypassing the traditional unit of measure and integrating indicators that go beyond economic resources. According to the Stiglitz Commission, the aspects considered, *"Both types of indicators play an important role in evaluating quality of life"*[192].

[186] OECD http://www.observateurocde.org/news/fullstory.php/aid/1460/Pour_ou_contre_le_PIB__.html

[187] Presentation by STATEC in a colloquium on 12 July, 2006. Title: *Vers de nouveaux indicateurs de richesse*

[188] STATEC http://www.statec.public.lu/fr/education/indicateurs/index.html?highlight=travailleurs%22frontaliers

[189] *Observatoire de la Compétitivité* (2005), *Compétitivité du Luxembourg : une paille dans l'acier*, n°3 March 2005, pp.143

[190] The OECD Statistics Brief No.11 September, 2006 - Alternative Measures of Well-being.

[191] Joseph STIGLITZ, Amartya SEN and Jean-Paul FITOUSSI (2009), *Richesse des nations et bien-être des individus,* Chapter II, pp.229-273.

[192] Idem, pp.230-231

Per capita GDP and RNI can therefore be used as monetary indicators of well-being, *"yet well-being goes beyond the monetary dimension and so should be evaluated by other indicators, in the areas of society, the environment, culture etc."*[193]. In addition, per capita GDP and RNI do not include a series of activities that are *"non commercial, such as work at home, volunteer work, worsening of the environment, insecurity, inequality and others"*[194]. These indicators should provide a more in-depth analysis that goes beyond simply measuring economic growth and well-being that can be used to include sustainable development inclusive of societal well-being and "sustainable wealth", as well as subjective wealth.[195] Therefore, the new indicators for evaluating GDP well-being should include indicators that are both monetary and non-monetary which are objective, as well as subjective indicators centring on individuals and on society.

8.1.2 Conceptual Approaches to Evaluating Well-being

This section explores the three conceptual approaches used by the Stiglitz Commission[196] to establish an adequate way of evaluating quality of life and well-being, adopted because of persistent complexity, especially in conceiving ways to evaluate well-being.

Firstly, the Stiglitz Commission uses the criteria of social sciences research, especially in psychology, to indentify subjective well-being. The Commission alludes primarily to a "utilitarian tradition" in this approach[197]. This economic theory stresses the fact that individuals are capable of identifying their own material and immaterial requirements and to determine what makes them "happy" or "sad" or even "angry".

The second approach is rooted in the notion of "capabilities"[198]. *"In this approach, the life of a person is considered as a combination of diverse "conditions and actions" [...]"*[199]. Each person consequently the freedom to choose among these functionalities. However, even with the freedom of choice, beneficial effects cannot be enjoyed because of a lack of capacities. This situation underscores the fact that societies are made up of divergent individuals can be a like entity and not be homogenous. In this meaning, political actors must ensure that failures, including social injustice, i.e. heterogeneity, in a society are taught so that they can be transformed into initiatives.

[193] For more details see: http://ratc9435ez.free.fr/economy/pib&critic.htm

[194] Idem

[195] Idem

[196] Commission for assessing economic performance and social progress set up by Joseph STIGLITZ, Amarty SEN and Jean-Paul FITOUSSI, commissioned by Mr Nicolas SARKOZY

[197] Bentham writes of the main concept of utility in the first chapter of his Introduction to the Principles of Morals and Legislation with the first edition published in 1789, as follows:

By the principle of utility we mean the principle according to which any action whatsoever must be accepted or disavowed depending on whether it tends to increase or diminish the happiness of the parties affected by the action augmenter. [...] Utility designates the tendency of something to generate well-being, benefits, joy or happiness. http://www.histophilo.com/utilitarisme.php

[198] Joseph STIGLITZ, Amartya SEN and Jean-Paul FITOUSSI (2009), Richesse des nations et bien-être des individus,

Chapter II, pp.231

[199] Idem

Last but not least[200], the approach is based on the notion of "fair allocations". "The basic idea, which is common to welfare economics, is that of weighting the various non-monetary dimensions of quality of life in a way that respects people's preferences"[201].

These three approaches, while very different, have common features. Yet, as the Commission states, the choice between these approaches is ultimately a cognitive decision to be taken by the researcher. In addition, for the Commission, these approaches overreach the various data based on market transactions, but include diverse types of data that extend beyond the monetary and objective dimension[202].

The Stiglitz Commission offers five recommendations[203] that characterise the measure of well-being and quality of life:

1. *Measures of both objective and subjective well-being provide key information about people's quality of life. Statistical offices should incorporate questions to capture people's life evaluations, hedonic experiences and priorities in their own survey*[204].

2. *Quality of life depends on people's objective conditions and capabilities. Steps should be taken to improve measures of people's health, education, personal activities, political voice, social connections, environmental conditions and insecurity*[205].

3. *Quality-of-life indicators in all the dimensions covered should assess inequalities in a comprehensive way*[206].

4. *Surveys should be designed to assess the links between various quality-of-life domains for each person, and this information should be used when designing policies in various fields*[207].

5. *Statistical offices should provide the information needed to aggregate across quality-of-life dimensions, allowing the construction of different indexes*[208].

[200] Idem, pp.232

[201] Idem

[202] Idem, pp.233

[203] Idem, pp.270-273

[204] Idem, pp. 270

[205] Idem, pp. 271

[206] Idem, pp.271

[207] Idem, pp.272

[208] Idem, pp.273

8.1.3 The Easterlin paradox[209]

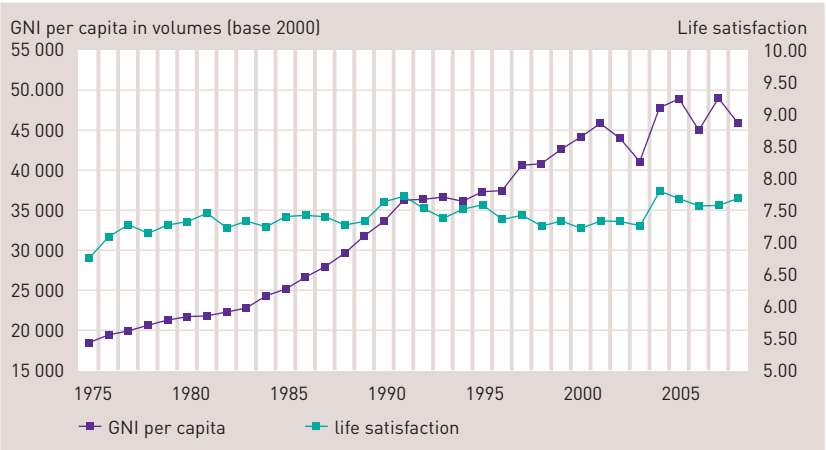
IIn 1974, Richard Easterlin published his famous article demonstrating that in spite of the increased annual income of the United States between 1946 and 1970, people were scarcely happier. This finding is also known as the Easterlin paradox or the well-being paradox. In the article, Easterlin cites the economist Abramowitz[210]:

"We must be highly sceptical of the view that long term changes in the rate of growth of welfare can be gauged even roughly from changes in the rate of growth of output"[211].

This article appears against a backdrop of calling in question the foundations of traditional economic thought, which implies that more wealth means more well-being, with happiness as a direct consequence of the wealth.

Yet recent domestic and international studies confirm that the subjective well-being of individuals is linked to monetary well-being[212]. However, after a certain monetary level an accurate and clear correlation can no longer be established[213]. In fact, according to research by Economics Nobel Prize psychologist Daniel Kahneman and the economist Angus Deaton of the University of Princeton, satisfaction begins to lag after attaining annual income levels of $75.000[214]. Luxembourg is no exception to this, as shown in the graph below.

Figure 48
Gross national income per capita in Purchasing Power Standard per inhabitant and life satisfaction in Luxembourg 1975-2008



Source: STATEC

[209] Richard A. EASTERLIN, http://graphics8.nytimes.com/images/2008/04/16/business/Easterlin1974.pdf

[210] M. Abramowitz (1959), The welfare interpretation of secular trends in national income and product

[211] Richard A. EASTERLIN (1974), Does Economic Growth Improve the Human Lot? Some Empirical Evidence, pp.89

[212] STATEC, http://www.statistiques.public.lu/fr/communiques/population/population/2010/08/20100816/ 20100816.pdf?SID=18f71ae89a797f6b292759139957bc8e

[213] Idem

[214] For more details see: http://www.wort.lu/wort/web/freizeit/artikel/2010/09/ 112754/geld-macht-zufrieden-aber-nicht-immer-gluecklich.php

As invoked above, in order to measure well-being, various monetary, non-monetary and subjective indicators can be used, because they are closely correlated, "but generally, the more they target well-being, the more difficult it is to obtain a reliable series of data available for different countries and concerning different periods"[215].

In addition, it should be stressed that different indicators will be a considerable aid in understanding the well-being of a society in the long and medium term. However, it should be noted that a comparative measure of well-being in different societies, involving different countries, would prove less viable because of cultural differences and dissimilar values existing amongst countries. Thus, each country should adapt indicators for its own internal assessment.

Below, we will analyse how the sphere of labour integrates the various indicators cited above. We could have chosen other sectors, such as the environment or the health sector, but the labour sector can be used as a representative example because it extends beyond a strict relationship between economic growth and well-being. The labour sector, in addition of representing individuals' monetary source, is also associated with other values[216]. Moreover, this sector helps us examine different monetary, objective and subjective indicators.

Nonetheless, the indicators that evaluate well-being should use approaches that are monetary, objective—i.e., non-monetary, linked to sustainable development and quality of life—and subjective, i.e. related to personal values. With regard to the monetary indicator, we are using sectors that are related strictly to the financial well-being of a society. The objective indicators integrate domains associated with health, education, quality of the environment, governance and political representation, social links, insecurity and social cohesion, to adequate infrastructure. These indicators, also cited in the Sitglitz Commission report, may be related to the monetary aspect, but go beyond that indicator, as they generally include sustainable development and the domains that contribute to quality of life. To this must be added the subjective indicators that stem from the domain of human psychology, with individual or societal connotations for values.

[215] For more details see, OECD: http://www.oecd.org/dataoecd/17/17/37883038.pdf

[216] The various values will be developed below

8.1.4 The Value of Work in Luxembourg[217]

In July, 2010, the CEPS/INSTEAD published a study based on the central concept of the sociologist, Frederick Mertz. In 2002, this concept, *"...noted that work makes up a collective standard to which the residents of Luxembourg adhered strongly"*[218].

The graph below highlights the importance of work, which has been even more strongly affirmed in Luxembourg's society. Nonetheless, this analysis demonstrates that the importance accorded to work transcends the monetary domain. *"Still, results tend to contradict the trends observed in Western countries over the course of the last few decades [...]"*[219]. The graph headings *Work is an obligation with relation to society or Money earned without working is humiliating* underscore the importance of social and ethical indicators with relation to work functionality. Thus, for the respondents work is very important to maintain Luxembourg's social model and as a consequence, to maintain solidarity vis-à-vis fellow citizens.

The second heading highlights the ethical or moral aspect of work in the Grand Duchy. From this perspective, it is implied that wages do not have only monetary value but rather associated with an effort expended prior to receiving them. Wages represent then a form of material recognition subsequent to a physical or intellectual effort performed.

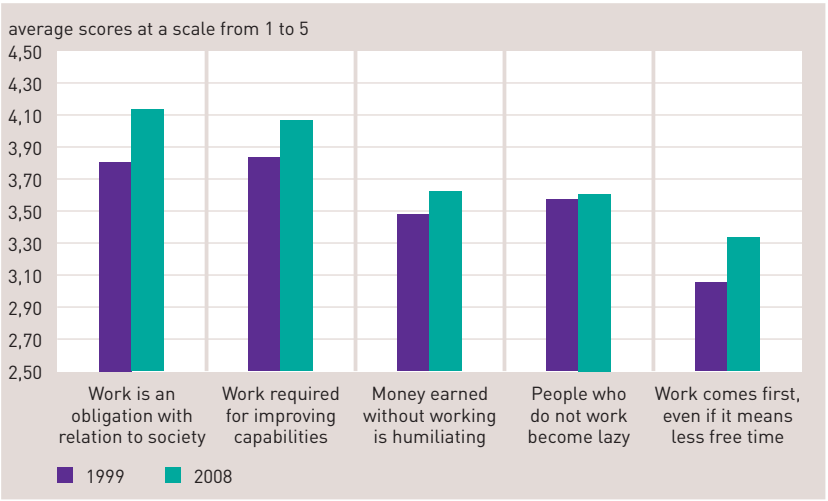
Values for the graph heading *Work required for improving capabilities* have also increased since 1999. This shows that the connotation of work is not strictly monetary, but also linked to subjective or even personal purposes of individuals. Here, work is assimilated as an essential basis for developing either personal or professional knowledge and/or capacities. The responses cited in the graph below reveal moreover that work does not amount to strictly monetary features it also has a social, ethical and even moral aspects, as well as a subjective one, notably to develop knowledge independent of the sector of activity.

[217] This part provides a link between the CEPS/INSTEAD publication, La pression morale du travail s'accroît au Luxembourg, cahier n°2010-15, July 2010, Les valeurs au Luxembourg : Premiers résultats du programme European Values Study. Enquête 2008 sur les valeurs and the theme dealt with in this chapter

[218] MERTZ Frédéric cited in the CEPS/INSTEAD publication, *La pression morale du travail s'accroît au Luxembourg, cahier* n°2010-15, July 2010

[219] CEPS/INSTEAD, *La pression morale du travail s'accroît au Luxembourg, cahier* n°2010-15, July 2010

Figure 49
Social representations of work in 1999 and 2008 (average scores at a scale from 1 to 5)



Source : EVS Luxembourg, 1999, SESOPI et 2008, CEPS/INSTEAD
Field of analysis: population aged 18 years or over international officials

In this sense, it is clear that the term "value" requires a definition. CEPS/INSTEAD states in its June 2010-12 issue that, according to R. Rezsohazy, *"Everything that people appreciate, have esteem for, wish to obtain, recommend, or offer up as an ideal, can be considered as being a value"*[220]. CEPS/INSTEAD stresses that, *"...to this author, as to the majority of sociologists and psycho-sociologists, the concept of value is inseparable from the concept of preference [...]*[221]". Following the brief analysis above relating to the questions and the responses, we took four items that could constitute the term "value"[222] and attempted to explain them by establishing a link between "work" and the principal values associated with that concept:

1. *"Central values: these are values shared by the entire population*[223]. With some exceptions, one could say that work is a basic value of the respondent's life. If one considers, for example, the question, Work comes first, even if it means less free time, the increase shown underscores the importance of work, because respondents are prepared to sacrifice more and more of their free time and are willing to devote more time to their jobs.

2. *"Structuring values: These are values that give a meaning to peoples' lives or that guide them; this could be family, love, professional success, money, etc."*[224]. This approach relates to the heading Work is necessary to develop one's capacities, for which the work function goes beyond the financial aspect, but also contributes to professional, or even personal success. Here, work has a fundamental role, since it is directly related to human and personal development.

[220] *Les cahiers du CEPS/INSTEAD, Les valeurs au Luxembourg : Premiers résultats du programme European Values Study. Enquête 2008 sur les valeurs*, 2010, p.7, citing Rudolf REZSOHAZY, Sociologie des valeurs, 2006, p.5

[221] Idem, p.7

[222] Citation of, Idem, p.8 : "1. Each value has a purpose (that which is valued, such as family, work, recreation, trust,...) 2. This purpose is qualified by a judgement. In the EVS survey, the majority of the responses should be part of a scale opposing modalities such as "Very important", "Not at all important", "Very good", "Very poor", etc. (using a cognitive evaluation) 3. Values can become norms (this occurs when values prescribe conduct or behaviour 4. There exist bearers of values, who can be person, or collective entities; thus there are values defended by such and such political party, values of young people or displayed by one personality or another, or by a segment of the population or social groups".

[223] *CEPS/INSTEAD publications, Les valeurs au Luxembourg : Premiers résultats du programme European Values Study. Enquête 2008 sur les valeurs,* 2010, p.8

[224] Idem

3. *"Instrumental and final values: final values are the goals that are targeted, while instrumental values are necessary to achieve these goals"*[225]. In this context, work has a role of being an intermediate stage of the desire to achieve a final goal, be it monetary or non-monetary. From this perspective, work does not constitute an end but an essential mean to achieve another objective, desire or material or immaterial asset. Still, having a job can become a final goal, depending on the personal situation of the respondents, who may be unemployed or living with an extended illness, and at this stage, the value attributed to work exceeds the strict monetary connotation.

4. *"Moral values: this category is easily recognisable as it contains the values that are appreciated on the basis of judgment scales: Good/Bad, Just/Unjust, Licit/Illicit"*[226]*. Considering questions like Work is an obligation with relation to society and People who do not work become lazy,* one can perceive the notion of fairness or good, as well as bad and unfairness, because according to the scores of the answers it can be concluded that work also has a moral meaning. Here the function is represented by one's responsibility within a society. Respondents judge those who do not work and characterise them as lazy.

CEPS/INSTEAD also cites overall, sector, explicit and latent values[227].

This analysis emphasises that work is more than a monetary indicator, it is characterised by other fundamental aspects/indicators. The domain was selected because, even as the fundamental monetary source for the majority of individuals, its characteristics go beyond the monetary aspects. The values attributed to this sector are based on indicators of the social, ethical, moral, monetary, immaterial, psychological and environmental domains.

This makes clear that the well-being of individuals should not only be correlated with the per capita GDP/GNI indicators, but also with indicators indentified as values which are appreciated by society. Indeed, the standard statistic should exceed the per capital GDP/GNI monetary indicators and create indicators related to quality of life and sustainable development, which are fundamental components of well-being. Nevertheless, we deny the indictments of the per capita GDP and GNI, because these indicators were not conceived to measure well-being, nor the quality of life of a society or country, but simply the production of goods and services. We believe that the charges directed against these two indicators are not justified and can even be considered abusive, since the basic conception of the two indicators did not include an end goal of measuring quality of life or well-being, but rather the production.

In this sense, the per capita GDP/GNI continues to be valid indicators, viable in the economic sphere for which they were conceived. We suggest that other indicators of diverse sectors be set up, such as in the areas of culture, health, environment and others, in order to fashion a tangible, viable and appropriate measure for GDProsperity.

[225] Idem

[226] Idem, p.9

[227] Idem

8.2 Progress of the GDP well-being Project in Luxembourg

The context described above forms the backdrop for measuring the real well-being of Luxembourg's population through the 2009 government programme, stipulating that *"the Observatoire de la Compétitivité, in conjunction with the CSDD—Higher Council for Sustainable Development and the Economic and Social Committee (CES), develop a composite indicator for well-being apart from the standard per capita GDP indicator in order to evaluate progress in society over the long term. This indicator will account for international progress in the area and will be implemented using base statistics and official databases as furnished by STATEC."*

The Economic and Social Council (ECS) and the Higher Council for Sustainable Development (CSDD) are responsible for implementing a "Well-being GDP" system of indicators that goes beyond the per capita GDP figures and is based on established work in the domestic and international arenas:

- Work accomplished by CES and CSDD
- The Competitiveness Scoreboard of the *Observatoire de la Compétitivité*
- Indicators developed by Eurostat and the OECD
- Recommendations of the Stiglitz-Sen-Fitoussi report
- The OECD Global Project on "Measuring the Progress of Societies"
- The European Commission communication "Beyond GDP"
- Work accomplished by foreign social and civil dialogue institutions

8.2.1 The Work Programme

A joint working group made up of the members ECS and CSDD, has been set up to select topics, to determine the work programme involving framework, target and communication mechanisms and to organise the timing, process and participants of consultations. In addition, a group of technical advisors made up of participants in the Joint Working Group has been set up to monitor the project daily.

8.2.2 An Extensive Consultation Effort

Extensive consultations have begun with the civil society and will continue in the form of three workshops set up around the themes of "Reforming GDP", "Quality of Life" and "Sustainability", which will give citizens, scientists and representatives of associations the opportunity to impart their concerns with respect to quality of life issues and their societal expectations. A specially designed, interactive web site will host the GDProsperity project to assemble comments and proposals from the general public.

Dates of these events, past and future, are as follows:

- The "Reform of the System of National Accounts and GDP", workshop held on 19 May, 2010 at the E.I.B.
- The "The Path to Sustainable Development in Luxembourg" workshop, held on 29 October, 2010
- The "Better Assimilation of Quality of Life" workshop, held on 11 November, 2010 at the European Court of Auditors

In addition, two other conferences were held:

- The "Other Measures of Wealth and Well-Being" conference, with Mr Le Clézio, who officially launched the GDProsperity project on 1 March at the Luxembourg Chamber of Commerce
- The "Have More or Feel Better?" and "How to Evaluate Well-Being?" conference, with Mr Patrick Viveret, philosopher, advisor the Court of Auditors of the French Republic and author of the report "Reconsidering Wealth" that was given on 2 June, 2010 at the *Cercle-Cité*

The purpose of these consultations is to better associate civil society in Luxembourg, to determine its expectations, priorities and concerns and to listen to its comments and proposals. Their objective is also to help establishing a system of indicators and information that reflects the concerns of citizens and that authorities can use to guide their choices and actions. They will also be used to help draft a joint report with ECS-CSDD summarising certain lessons and proposals.

8.2.3 The Final Report

When the work is completed, a report summarising lessons and proposals will be included in the joint report of the ECS and the CSDD for submittal to the government.

In order to better identify the final purpose of this work it was necessary to define the term "well-being". The following formula has been recommended: "Well-being = Sustainable Development + Quality of life".

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9 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