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Bilan Compétitivité 2008

"Better competitiveness means greater purchasing power"
(courtesy translation, february 2009)

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Preface

A crisis is not like an incurable illness: it is more like a new birth!

Pierre Mauroy

Luxembourg is not sheltered from the financial maelstrom. It is still far too early to estimate what repercussions this phenomenon will have on the country's economy. In contrast, what is certain is that how Luxembourg's competitive position shapes up as the crisis recedes will depend largely on the implementation of the National Plan for Innovation and Full Employment. The measures of the national Plan are part of the Lisbon Strategy and are supported by the social partners who met in the Tripartite Coordination Committee in April 2006 and those in the Economic and Social Council. The measures also enjoy the support of Parliament.

The financial crisis that has struck at the core of our economic motor is a reminder to us of just how vulnerable we are. Yet all crises are also opportunities to be seized! Continuously diversifying our economic fabric has always been a high priority: now it has become an urgent obligation. The analysis completed by the *Observatoire* has already indicated that diversification must be carried out in non-financial sectors of the economy. This Competitiveness Report emphasizes the deterioration of the economic situation in Luxembourg and calls for a productivity-based reinvigoration of economic policies through improved product and services quality and more specialization of the products of craftsmen, retail trade and manufacturing companies. It is only possible to offer a range of specialized, high quality products for export through innovation and research, and through the management of immaterial resources. Evidence provided by a study carried

out by the research consortium sponsored by the *Observatoire de la Compétitivité* clearly illustrate that R & D efforts promote the development of new innovative products, which in turn increases productivity levels in companies and consequently their competitiveness. This virtuous circle has always been sought after; here is an analysis that shows the existence of a statistical linkage. It is a full justification of Luxembourg's implementation of policy that promotes R & D and innovation.

"Better competitiveness means greater purchasing power". I emphasize the watchword for this edition of the *Bilan Compétitivité*. It cannot be stressed enough that the economic well-being of the country is best ensured by improving inhabitants' purchasing power. To achieve this, we must maintain high levels of productivity and strong progress in employment and economic growth. One cannot exist without the other! Focusing exclusively on the inflation rate - a sort of "index mania" - hardly addresses the problem of purchasing power. In line with the Lisbon Strategy for Growth and Jobs, the Government supports purchasing power through an action plan to combat excessive inflation and through fiscal and social measures that increase disposable incomes of households.

Progress achieved through the implementation of the National Plan for Innovation and Full Employment should be scrutinized by means of monitoring and effective evaluation processes. This monitoring should be founded on qualitative and quantitative analyses that compare resources expended to results achieved. The Government, Parliament and the social partners all require reliable, objective and official data readily available to all parties in order to determine our competitive situation. The *Observatoire de la Compétitivité* aims to provide this through its 2008 *Bilan Compétitivité*.

Jeannot KRECKE

Minister of the Economy
and Foreign Trade

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1.1 Role and Mission 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.

1.2 The Lisbon Strategy and the National Plan for Innovation and Full Employment

The Ministry of the Economy and Foreign Trade is the Luxembourg ministry responsible for coordinating implementation of the Lisbon Strategy 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, which was subsequently submitted to the European Commission as part of the renewed triennial Lisbon strategy (2005-2008)[1]. To optimize 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*

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

Compétitivité section of the Ministry of the Economy and Foreign Trade. This network brings together Lisbon Strategy coordination managers within the ministerial departments and administrations concerned.

In 2006, the Luxembourg Government submitted its first implementation report to the European Commission. The report outlines the measures applied by the Government adapted from the major objectives set out in the 2005 National Plan for Innovation and Full Employment, following the integrated guidelines. This report also includes new political measures taken since that time as well as those agreed upon at the outcome of the April 2006 Tripartite Coordination Committee. In 2007, The Government of Luxembourg submitted its second implementation report, which closed off the first triennial cycle of the renewed Lisbon Strategy.

In the March 2008 European Council session, Member states were requested to ensure that their individual reform programs for the new three-year cycle of 2008-2010 were updated. Several European Council decisions would also have to be included in the new national reform programs. A bilateral meeting between Luxembourg and the European Commission was held on 20 June 2008, in preparation for the first report of the new triennial cycle. This bilateral meeting allowed all parties involved to exchange views with the European Commission acting as facilitator. In the morning session, the various ministerial departments concerned went over progress achieved in the area of priority actions set out by the European Council in the areas of the competitiveness with a special emphasis on companies, the “flexicurity” concept, national objectives in the realm of R & D, Internet access in schools and at home, and measures to combat failure rates in school. As the renewed Lisbon Strategy places particular emphasis on national acceptance and on communication, the Integrated Guidelines Enlarged Bureau of the Economic and Social Council (ESC) was subsequently consulted, as was done in 2007. Discussions centered on implementing the Lisbon Strategy in Luxembourg and on the strengths and vulnerabilities of Luxembourg as highlighted in the December 2007 Annual Progress Report. There was also a meeting with the Parliamentary Commission for the Economy, Energy, Post Office and Sports, which is responsible for monitoring the National Plan for Innovation and Full Employment and the Lisbon Strategy in Parliament. The Chairman of the Parliamentary Commission gave a summary of the two public hearings on the Lisbon Strategy that were set up by

Parliament in March and April 2008[2] intended to involve civil society in discussions on the broad guidelines of economic policy.

1.3 Events and publications in 2008

One objective of the *Observatoire de la Compétitivité* is to keep both economic policy players and the general public informed on the theme 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 www.odc.public.lu.

1.3.1 Colloquia and conferences

The communication strategy of the *Observatoire de la Compétitivité* goes hand in hand with the "competition watch" and also maintains and serves to launch public deliberations on the main themes that characterize the competitiveness of the Luxembourg economy and the Lisbon Strategy. Setting up public events is an integral part of this responsibility.

Seminar: "For a strategic forecasting process in Luxembourg"

According to Michel Godet: "*Forecasting is not an intellectual discipline, but rather an art that requires such talents as non-conformism, intuition and common sense to properly exercise it; it nonetheless requires intellectual rigor to illuminate the actions of men and to guide them toward a looked-for future.*"[3].

The *Observatoire de la Compétitivité*, STATEC and the Henri Tudor Public Research Center (CRP-HT) set up a seminar on the methods and practice of economic forecasting in January 2008, chaired by Jeannot Krecké, Minister of the Economy and Foreign Trade[4]. It was in this «*Zukunftsdebatte*»[5] context that the

[2] For more information please go to the *Observatoire de la Compétitivité* web page: http://www.odc.public.lu/actualités/2008/03/audience_publique/index.html and http://www.odc.public.lu/actualités/2008/04/audience_publique2/index.html

[3] Quote by Mr. Godet, Director of the Labouratory for Investigation in Prospective, Strategy and Organization in: *Manuel de prospective stratégique : L'art et la méthode*, Dunod, 2007.

[4] For more details see: http://www.odc.public.lu/actualites/2008/01/23_sem_eco/index.html et http://www.sitec.lu/prospective

multidisciplinary research seminar was given, as well as within the framework of a more comprehensive reflection on the contribution of these methods to the main issues facing Luxembourg: demography and the aging of the population, the durability of the welfare state, land use planning, housing, competitiveness, the information and communication society and sciences and technology. Indeed, this seminar served as the occasion to introduce the discipline of forecasting, its objectives, scope of applications, its limitations and commonly used methods. In addition, the results of territorial, technological and professional forecasting methods were introduced. Participants numbered around one hundred and the themes discussed brought together a variety of players representing the Luxembourg government, the social partners, the Superior Council for Sustainable Development and the Economic and Social Council. Participants took advantage of the exchange forum between researchers and economic policy makers to deliberate over international studies and their applications to the situation in Luxembourg.

Luxembourg Economy Days – Development opportunities for Luxembourg-based companies

The *Observatoire de la Compétitivité*, the Chamber of Commerce and PricewaterhouseCoopers (PwC) held a colloquium in February 2008 on economic development in the Grand Duchy and its future perspectives[6]. The 2008 edition of the Economy Days was themed around the issue "Development opportunities for companies: viewpoints of family-run and international companies based in Luxembourg". Participants included Jeannot Krecké, Minister of the Economy and Foreign Trade and Fernand Boden, Minister of the Middle Classes, Tourism and Housing, as well as family-run company CEOs and international economic policy makers. Special attention was paid to the Luxembourg cluster[7] of automotive equipment manufacturers and the future role of Indian and Chinese manufacturers. All participation fees were paid over to the 1, 2, 3 Go initiative, an interregional entrepreneurial group, set up by the non-profit association Business Initiative and the Chambers of Commerce of the Greater Region, whose objective is to motivate and

[5] See http://www.gouvernement.lu/gouvernement/etatnation2007/
[6] For more details see: http://www.odc.public.lu/actualites/2008/02/13_jour_eco/index.html and http://www.odc.public.lu/publications/lettre_observatoire/lettre_Obs_Comp_N8.pdf.
[7] Michael Gartside, a PwC expert in this domain, started off the debate, which was monitored by a panel including the principal managers of the Grand Ducal cluster.

provide free assistance to future innovative company startups as they work to realize their projects.

Methodology Seminar: "Inflation in Luxembourg: Measures and determinants"

The *Observatoire de la Compétitivité* put on a methodology seminar assembling domestic and international experts to deliberate on the theme "Inflation in Luxembourg: Measures and determinants" in June 2008[8]. Current studies on inflation were presented to a limited audience that was highly interested in the subject. The presentation involved ongoing work that will be published in part at a later date[9]. The social partners were able to state their case and to contribute to the debate. This seminar illustrated that an interactive approach and more advanced modeling processes are necessary. The *Observatoire de Compétitivité* will continue its work in this area as part of the research agreement between the *Observatoire*, STATEC and the Henri Tudor Public Research Center (CRP-HT). Chapter 8.3 gives a detailed report of the seminar.

Methodological seminar on the use of structural models to evaluate strategic policies of the Lisbon accords

Luxembourg introduced the first results of the Luxembourg Structural Model (LSM)[10] for various policy scenarios as part of a methodological seminar on the use of structural models to evaluate Lisbon Strategy policies set up by the European Commission. The Luxembourg model was built in collabouration with Professors Fontagné of the Sorbonne in Paris and Marcellino of Bocconi University in Milan and the European University in Florence. The European Commission produced a summary table of the various national simulations and compared them with those obtained from the supranational QUEST model used by the Commission's departments. The Commission had a positive reaction to the results of the model produced by the *Observatoire de la Compétitivité.* A second seminar will take place at the end of the year. The LSM model and the Luxembourg results will also be presented at the third Luxembourg "En route vers Lisbonne" colloquium on the

[8] For more details see: http://www.odc.public.lu/actualites/2008/06/S__minaire_m__thodologique/index.html
[9] Published studies may be downloaded from the *Observatoire de la Compétitivité* site: http://www.odc.public.lu/actualites/2008/06/S__minaire_m__thodologique/index.html
[10] See the *Bilan de Compétitivité de l'Observatoire de la Compétitivité* 2007 for a detailed description of the methodological approach : http://www.odc.public.lu/publications/perspectives/PPE_7.pdf

knowledge economy that will take place on 4 and 5 December 2008[11]. The model and its initial simulations are discussed in Chapter 8.5.

OECD presentation of the 2008 Luxembourg economic study

Jeannot Krecké, Minister of the Economy Foreign Trade, Mady Delvaux-Stehres, Minister of National Education and Professional Training and Mars Di Bartolomeo, Minister of Health and Social Security, participated in the presentation of the Luxembourg economic study by the OECD in early July 2008[12]. Every two years the OECD publishes an economic study on each of the organization's Member states that contains a section with a special theme[13]. The *Observatoire de la Compétitivité* assisted the OCDE in the preparation of this report and provided the technical and political support necessary for the study. Responsibility for the study's content rests with the OECD Secretariat. The study bears on the economic situation and public policy actions implemented to improve the economy's performance over the long term.

A fruitful debate ensued between the authors of the study and the ministers in attendance for its presentation. Andrew Dean, an Economics department Director for Country Studies of OECD countries, explained that the most important challenges facing Luxembourg were to maintain the strength of the financial sector and to ensure budgetary viability.

The Minister of the Economy Foreign Trade, Jeannot Krecké, was disappointed that the part of the study focusing on the financial center received the lion's share of attention in the debate about the fiscal and regulatory framework. He stated that on the whole, Luxembourg's financial sector has resisted the recent market tensions better than other financial centers. Jeannot Krecké emphasized that the financial sector could not be reduced to questions about banking secrecy or taxation of income from savings. The Minister refused to accept that Luxembourg be considered "*a stowaway of international finance, an offshore center with no regard for the rules*". He stressed the importance of innovation and R & D, which lead to the development of new products that are more sophisticated and have higher added value. Training

[11] More details on this 'Road to Lisbon' colloquium, put on by CRP-HT, STATEC and the *Observatoire de la Compétitivité* are available on the following site: http://www.tudor.lu/Lisbonne2008
[12] For more details see: http://www.odc.public.lu/actualites/2008/07/comm_rapport_OCDE/index.html
[13] The special theme for the OECD's 2006 Luxembourg study was education, while in 2008 it was health.

and education play an essential role in this sense, to be able to respond to demand on the labour market. The Luxembourg School of Finance (LSF), a finance research center, was established for this purpose. Jeannot Krecké retains confidence in the creative vitality of the financial sector. Lastly, the Minister regretted that the OECD study failed to address either the problem of inflation or that of the surge in food and oil prices.

The structural theme of the report was devoted to effectiveness of public expenditures in the area of health care and education. Patrick Lenain, head of OECD's National Studies Division, feels that despite the significant financial, human and technical resources available in Luxembourg, the country's health situation is still ranked lower than the average of OECD members. He recommended several paths for reform aimed at restraining expense and improving quality. Costs in the hospital sector cannot be controlled due to the current overcapacity situation of hospitals. He suggested that a preferred physician system be set up, that reimbursement rates of prescriptions vary depending on efficiency of medications and that pharmacists be permitted to offer lower cost substitute medications.

The OECD also recommended that the legal retirement age be increased to 68 years in order to confront the issue of paying pensions and retirement benefits. Mr. Mars Di Bartolomeo, the Minister for Health and Social Security, responded that increasing the legal age for retirement hardly made sense, as the average age that people actually retire is currently 58. According to the Minister, Luxembourg would do better to introduce measures for keeping older workers on the job.

According to the OECD, Luxembourg's educational system is inefficient. Educational expenses are excessive when compared to scholastic results achieved. Directors of schools lack autonomy to manage their establishments and are not held responsible for scholastic achievement failures. The OECD study also criticizes the fact that pedagogic curricula have not been decentralized. The Minister of National Education and Professional Training, Mady Delvaux-Stehres, praised the importance OECD is according education as essential to a nation's economy. She observed that the latest OCED study was back in 2006 and that it was practically impossible to gauge the success of reforms implanted after only two years. The Minister was extremely cautious about the issue of granting more autonomy of schools and directors of

school, as this could also produce negative effects and bring about differences in performance levels of various schools.

The « En route vers Lisbonne» Colloquium

The wide success of the first Luxembourg colloquium on the Lisbon Strategy set up in 2004, and that of the succeeding edition in November 2006, has paved the way for a third event, sponsored by the Ministry of the Economy and Foreign Trade, the *Observatoire de la Compétitivité*, STATEC and the CRP-HT[14]. This colloquium will bring together researchers and policy-makers to discuss central Lisbon Strategy themes such as the links between R & D, innovation, competitiveness, technology transfer, initial and continuing education, the dissemination and impact of ICT, immaterial capital and the management of knowledge and intellectual property. The colloquium has grown into a major event that hosts several hundred participants.

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 Ministry of Economy and Foreign Trade's research arm, *Direction générale des Etudes économiques.* 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[15].

- N°1: Theoretical and empirical analyses of the determinants of overall factor productivity - An application in the Grand-Duchy of Luxembourg
- N°2: Study of the impact of the statutory minimum wage on employment and salaries in Luxembourg
- N°3: Competitiveness of Luxembourg: A Flaw in the Steel
- N°4: The Road to Lisbon, First Luxembourg colloquium on the knowledge economy from a European perspective

[14] For more details see: http://www.tudor.lu/Lisbonne2008
[15] All issues of *Perspectives de Politique Economique* can be downloaded from the following site : http://www.odc.public.lu/publications/perspectives/index.html.

- N°5: Innovation and research activities in the Grand-Duchy of Luxembourg – Current status and lines of inquiry
- N°6: *Bilan compétitivité* (Competitiveness Report) 2006 – The Road to Lisbon
- N°7: *Bilan compétitivité* (Competitiveness Report) 2007 - The Road to Lisbon
- N°8: LUXKLEMS: Productivity and Competitiveness!
- N°9: Innovation and Productivity
- N°10 : *Wirtschaftliche Auswirkungen der Lohnindexierung* (The Economic Consequences of Wage Indexation Practices)

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 *Observatoire de la Compétitivité* itself. This publication addresses both the economic actors and a wider audience[16]. The most recent issues deal with the following subjects:

- N°4: Entrepreneurialism and the Demography of Companies
- N°5: The Road to Lisbon
- N°6: Challenges of diversification – Economy Day
- N°7: Evaluation and Effectiveness of Public Policies
- N°8: Economy Days: Development Opportunities for Companies Doing Business in Luxembourg

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 all the information and publications concerning the competitiveness of the Luxembourg economy and the Lisbon Strategy. The site provides information about the competitiveness of the Luxembourg economy appearing in foreign publications. It serves as a platform for communication to all the actors involved in implementing the Lisbon Strategy in Luxembourg and it makes available information in the Competitiveness Scoreboard.

[16] *Observatoire de la Compétitivité* newsletters can be downloaded from http://www.odc.public.lu/publications/lettre_observatoire/index.html.

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.

1.4 An Outline of the 2008 Competitiveness Report

Chapter 2: **Price Competitiveness and Indexation: Implications for the Grand Duchy,** was written specifically for the *2008 Bilan* by Professor Lionel Fontagné of the University of Paris I Sorbonne Panthéon**.** This work examines the concept of competitiveness in trade and the evaluation of price and cost competitiveness and in Luxembourg.

Chapter 3: Price and Cost Competitiveness: the Real Effective Exchange Rate illustrates changes in the real effective exchange rate, from the perspective of price and cost, which is a key measure of competitiveness for Luxembourg's economy. The two indicators confirm a certain degree of weakening of the country's competitive position with regard to its principal trading partners.

The collective attention paid to purchasing power is due to it being deemed a gauge of changes in standards of living and, by extension, of economic progress and well-being of the population. **Chapter 4: Controlling inflation: Greater Competitiveness Means Greater Purchasing Power** attempts to draw together various points of view concerning purchasing power and price changes in general. This chapter also provides a glimpse of the measures of the Action Plan implemented by the Luxembourg government on the basis of recommendations of the Tripartite Coordination Committee of April 2006 to combat excessive inflation. The Plan addresses the double challenge of preserving households' purchasing power and resolving cost competitiveness issues of Luxembourg companies.

As part of its monitoring mission, the *Observatoire de la Compétitivité* closely follows Luxembourg's rankings in the various summary competitiveness indicators. **Chapter 5: Benchmarks of Competitiveness and Attractiveness** 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 6**, an update of the **Competitiveness Scoreboard** of the *Observatoire de la Compétitivité* allows an 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 on the basis of this Scoreboard gives a good idea of the relative competitiveness of Luxembourg with relation to its partners.

In addition to the composite indicators of competitiveness and attractiveness, a multitude of social health and well-being indicators have emerged over recent years. As it is impossible to present all of these indicators in our report, **Chapter 7: Composite indicators for Quality of Life, Human Development and Social Progress**, deals with some subjects of the "Beyond GDP" international conference, analyzing some quality of life indicators and introducing the Luxembourg social health index using pertinent indicators from the Competitiveness Scoreboard.

In **Chapter 8: Theme Studies**, the *Observatoire de la Compétitivité* presents the results from a range of studies sponsored under the research convention between the Henri Tudor Public Research Center, STATEC and the *Observatoire de la Compétitivité* and the convention with international experts. This involves the study on the status of entrepreneurs, on innovation and productivity and on productivity cycles. Another section is consecrated to inflation and more particularly to the seminar set up to review this issue by the *Observatoire de la Compétitivité*. The final section introduces the LSM model, developed by Professors Fontagné and Marcellino, which models the impacts of the reforms brought on by the Lisbon Strategy, and the results of the preliminary simulations relating to this.

2 Price Competitiveness and Indexation: Implications for the Grand-Duchy by Lionel Fontagné

World inflation has been the surprise guest at the end of the globalization banquet. While disinflationary pressure that may have been exerted on world prices by the growing strength of countries with lower wage scales, especially China, had led to an assessment of the deflationary impact of the emerging countries[17], the real question now is how to identify what has been causing world prices to surge and what are the possible consequences of a resurgence of inflation in national economies? In the turmoil of the current crisis, such questioning might be seen as misplaced, but the short term fluctuations should not hide the fundamental issue of competitiveness addressed in this contribution.

Agricultural prices have temporarily clearly been affected by poor harvests, heavy demand and speculation in the markets. The same is true with energy prices, which have been pushed up by strong demand together with market strains related to supply restrictions. Also, raw materials prices over adjusted in response to an overheated world economy. The overall features of these disorders are easily identifiable: A U.S. current deficit related to an overly expansionist policy mix; accumulation of dollar reserves in the coffers of emerging countries, obliging them to adopt real interest rate policies that are often negative in already overheated economies; the euro area had failed to not step in as a springboard for growth to take the place of the American market because of an overvalued currency; petroleum prices have been drawn upwards due to the reluctance of oil-producers to produce more in an environment of prices set in a weak currency; greater competitiveness of biofuels with relation to petroleum, which exerts upward pressure on agricultural prices; benefits of the dollar's depreciation for the U.S. current account are wiped out by the increase in energy costs; shift of portfolios to the euro, which brakes growth in Europe; etc.

Now that EU interim forecasts envisage a sharp downturn in growth in the European Union in 2009, and a slight recovery in 2010, such inflationary pressures should be

[17]See Pain N., Koske I., Sollie M. (2006), Globalization and Inflation in the OECD Economies, Economic Department Working Paper, 524. This document mentions the two opposing forces of globalization: lowering of prices or imported goods and increase in prices of raw materials. It concludes that the first outcome has dominated in the majority of OECD countries.

temporarily held back. Consumer prices should fall from 3.3% in 2008 (4.1% in Luxembourg) to 1% only in 2009 in the euro area (resp. 0.6%), before coming back in the vicinity of the ECB target in 2010 in the euro area (1.8%), or more in Luxembourg (2.5%).

In a small, open economy inflation is largely imported prior to being sustained, either through internal mechanisms or expectations: the specter of a second round effect is particularly frightening to this type of economy.

The unfavorable and highly volatile climate will certainly reopen the debate on such questions as pricing policies and the inflation gap between the Grand-Duchy and its surrounding countries, which are its main competitors, and consequently, the issue of measuring the real effective exchange rate. One particular dimension of this issue is naturally the indexing mechanism, which was temporarily changed by the Tripartite Coordination Committee following publication of the Fontagné report, but is now subject to an impending review.

With this as a backdrop, this chapter examines three related issues, moving from the most general to the most specific. The concept of competitiveness in trade is examined briefly first. We shall then proceed to an evaluation of price and cost competitiveness in Luxembourg. A third section will deal with the issues facing the automatic wage indexation mechanism in Luxembourg.

2.1 Competitiveness in trade

The term competitiveness in trade used here reminds us of the requirement that the competitiveness of an economy is a much wider notion; however, this point needs not be reviewed in detail now in view of the in-depth and recurring work on the subject carried out by the *Observatoire de la Compétitivité*.

This narrower notion of competitiveness is the simple capacity for capturing market share, that is to see the value of ones exports increase faster than world demand. Competitiveness is present as a determinant in macroeconomic exporting equations. They generally combine a demand variable that takes into account the geographical structure of exports from the country under consideration, a variable of

competitiveness, either price or cost, and possibly a trend representative of the growing competitive pressure exerted by emerging countries[18].

The explanatory power of such equations is to be considered carefully, as we all know. The non-price (cost) dimension of competitiveness is absent from them and outsourcing policies in low-wage countries is not taken into account. More fundamentally, the microeconomic dimension of the competitiveness phenomenon is now considered essential. For all of these reasons then, one often relies on macroeconomic equations augmented by *ad hoc* terms that attempt to take into consideration one determinant or another. A more radical position consists in turning directly to microeconomic explanations of export performance. We shall now scrutinize these various points: notwithstanding, the message is not that price or cost competitiveness is a negligible determinant. If this determinant alone does not provide a full explanation of competitiveness, this does not imply that it should be disregarded.

Let us begin by using the most traditional approach to these mechanisms. Without distinguishing between goods and services, competitiveness—in percentage change—may be expressed as the sum of productivity, gross salaries, margins and the exchange rate. Offsetting actions between these different terms, such as salary increases that are higher than productivity being offset by depreciation of exchange rates with like margins, maintain a constant level of competitiveness. In that case, exports must change at the rate of demand.

If, in contrast, a distinction is drawn between goods and services, it is possible that two competing countries export the same category of goods or services to the same foreign market at different prices. The difference in price for a similar good reflects non-price dimensions of competition. In this way German manufactured products

[18] The orthodox equation is the so-called Armington equation. Since this equation does not allow for obtaining unitary long-term coefficients for the elasticity of demand it is customary to introduce a trend, justified by Krugman in terms of increase in varieties offered by emerging countries. Without this trend of income elasticity, countries that are catching up through rapid growth would be obliged to permanently keep down their exports prices in order to be able to sell increasing volumes of goods on the world market. This depreciation of the real exchange rate is the exact opposite of what is being observed. What truly explains the macroeconomic equations is an aggregate of goods and services, the content of which increases with the growth and diversification of the exporting economy. See Armington A. (1969): The Geographic Pattern of Trade and the Effects of Price Changes, IMF Staff Papers, 16(2): 179-201, and Krugman P. (1989), Differences in Income Elasticities and Trends in Real Exchange Rates, European Economic Review, 33(5): 1031-1046.

traditionally benefit from a "bonus" with regard to the rest of their European competitors, because they are perceived differently by consumers.

Yet this in no way signifies that price competition does not come into play. While German manufacturers on the average have the benefit of a better perception over French producers of similar products, any shift in German costs, like overly rapid gains in salaries or insufficient productivty gains, with relation to French costs cannot be absorbed by the non-price dimension. This shift in costs does not improve consumers' perception of German products. This has actually hurt the German competitive position in the 1990s. Inversely, if German manufacturers compress their unit costs, which are defined as the ratio of wages to productivity, this will not harm perception of German products and the Germans will pick up market share on competition, as has been observed since 2000[19].

When one attempts to empirically implement this simple approach, two types of conclusions are reached.

Firstly, it is difficult to select the proper indicators and weightings when one calculates price competitiveness and cost competitiveness at the macroeconomic or sector level. The simplest approach is to use trade weights, but such weights should be defined at the sector or product level. Weights will indeed vary from one period to another, which causes the standard problems of setting up indices. Also, calculating price, cost and competitiveness indicators is laden with pitfalls, especially when dealing with services and even more so when the services involved are financial services, as with the case of Luxembourg[20].

Secondly, the capacity for macroeconomic export equations that include a term of competitiveness to explain export performance varies from one country to another and even from one period to another. It is therefore useful to round out these equations with additional explanatory variables. One good example of this is the

[19] Let us make no mistake about meaning of the causality. BMW sells its autos at a higher price because they are high quality vehicles and not the inverse. If prices for Lancia vehicles rise more quickly than those for BMW, this does not detract from the quality bonus BMW holds over others. Even though Lancia and BMW products are different, more BMW products and fewer Lancias will sell.

[20] Prices being measured could have a quality effect. In this case, macroeconomic equations produce overly weak price elasticities. These elasticities can be significantly increased by controlling the image of products being exchanged. See. Crozet M., Erkel-Rousse H. (2004), *Trade Performances, Product Quality Perceptions and the Estimation of Trade Price-Elasticities,* Review of International Economics, 12(1): 108-129.

recent drop in French exports. Until 2000, a simple error correction model using price competitiveness and demand as export determinants, with unit elasticity of demand[21], gave a clear picture of changes in the volume of export of goods and services. In contrast, the same model cannot replicate changes in exports and therefore changes in market share after that time.[22] Economic literature generally uses domestic demand differentials, the amount of outsourcing practiced, investment, R&D investments and industrial output differentials to track changes[23]. Controlling for worldwide opening up of economies—not trend—the domestic demand differential and R&D[24], the OFCE satisfactorily duplicates[25] the changes in French exports since 2000. The INSEE adopts an approach that favors the differences among outsourcing practices in low-wage countries[26]. These difficulties encountered in accounting for changes in exports by using only the combination of demand and price competitiveness is not restricted to French foreign trade. Using a panel of OECD countries considering only exports of manufactured products, the OFCE shows in rather systematically that the traditional approach has become less reliable in the years following 2000. Introducing the variables cited above, this time without restricting elasticity of demand, partially resolves these difficulties[27].

Justification for this is attained easily. The domestic demand differential corresponds to the idea that manufacturers can prefer selling their products on the domestic rather than export market in order to save on export costs, or perhaps to increase their margins on a less competitive domestic market[28]. Offshore outsourcing measured by the weight of imports originating in low-wage countries in intermediate

[21] In principle, this correction is unnecessary: when estimated elasticity is lower than unit we are dealing with market share determinants that do not result from price competitiveness.
[22] Cochard M., *Le commerce extérieur français à la dérive*?, Revue de l'OFCE (106): 29-65. This model does not consider the trend toward worldwide opening of economies represented by the competition surge of emerging nations in the version cited.
[23] See Erkel-Rousse H., Sylvander M. (2007), Perfor*mances à l'exportation exceptionnelles et faiblesse de la demande intérieure : l'apparent paradoxe allemand*, L'Économie Française, Comptes et Dossiers, Édition 2007-2008, INSEE-Références, June, Overview frame, 19-23., or Sillard P., L'Angevin C., Serravalle S. (2006) : *Une analyse structurelle de l'évolution des exportations de la France par rapport à ses principaux concurrents*, Supplement to the Artus – Fontagné Report, CAE, 153-178.
[24] This variable is meant to take into account non-price competitiveness.
[25] The Observatoire de la Compétitivité is currently setting up a research project with its partners to duplicate these analyses for Luxembourg.
[26] Erkel-Rousse H., Sylvander M. (2009), *Externalisation à l'étranger et performances à l'exportation de la France et de l'Allemagne.* Supplement n°1 to the Fontagné-Gaulier Report, CAE, January.
[27] The role played by the domestic demand differential remains a problematic. See Blot C., Cochard M., (2008), *L'énigme des exportations revisitée*, Revue de l'OFCE (106): 67-100.
[28] Firms are fully exposed to international competition on foreign markets, while this is only true on domestic markets to the extent of a penetration ratio by exports.

consumption by industry[29], captures the impact of cost reductions that is imperfectly measured by cost competitiveness indicators. Capital expenditure, such as R&D, attempts capturing an improved offer, in terms of quality or variety of products. Differentials in the growth of industrial production are supposed to capture the variety of offer in various countries and thus should ultimately show fluctuations in market share associated with the now standard hypothesis that consumers seek variety.

It is not worthwhile to push the envelope of methodological limits of these various appendages of the traditional equation. Industrial production is obviously linked to exports, outsourcing exerts pressure on domestic salaries already taken into account in unit costs, investment goes with exports through a simple acceleration effect, etc.

More microeconomic analyses emerging now aim at directly accounting for explanatory dimensions that are not properly depicted in macroeconomic equations. These include price or income elasticity of exports at a more detailed level, exchange rate pass-through and demography of exporters.[30] These analyses deal with the impact of imperfect competition and with the heterogeneous productivity of firms[31]. So when the value of exports is broken down into numbers of firms, times the number of destination markets, times the number of products, times the average export value, increased performance in exports stems from gains in productivity with more firms exporting, R & D investment, which increases the number of products, etc[32].

In all, the limits of the indicators mentioned here fail to invalidate price competitiveness as a determinant of competitive positions, but rather emphasize that it enters into play in a complex manner, all other things being equal.

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[29] Or better, the weight of intra-consumption on the diagonal of the Input-Output Table.

[30] Artus P., Fontagné L. (2006) *Evolution récente du commerce extérieur français*, *Rapport du Conseil d'Analyse Economique*, 64; Fontagné L., Gaulier G. (2008) An analysis of performance differences in exports between France and Germany, Report of the *Conseil d'Analyse Economique* to be published.

[31] Studies concentrating on firms' heterogeneity have confirmed that only some of them are sufficiently productive to bear the fixed and variable costs associated with exporting and that firms can find it advantageous to focus their exports on a limited fraction of their portfolio. See Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica, 71(6):1695–1725; Bernard, A. B., Redding, S. J., and Schott, P. K. (2006). Multi-product firms and trade liberalization. NBER Working Papers, 12782.

[32] For this breakdown and its applications, see Mayer, T. and Ottaviano, G. (2007). The happy few: the internationalization of European firms. Bruegel Blueprint Series vol. 3, Brussels; and Baldwin R., Di Nino V., Fontagné L., De Santis R.A., Taglioni D. (2008) Study on the Impact of the Euro on Trade and Investment, European Economy, Economic papers 321, May.

2.2 Price and Cost Competitiveness in Luxembourg

Several sources may be mobilized to perform a diagnostic on price and cost competitiveness in the Grand-Duchy. These different sources were reviewed in detail in a previous chapter of the preceding *Observatoire de la Compétitivité* report, thus dispensing us from formulating a detailed reconstruction of each of them[33]. The general principle adopted is to always use a weighted average of trading partners' exchange rates, which is duly deflated by consumer price indices, whether or not they are standardized, or by manufactured or overall unit costs. Weightings can deal only with exports, exports and imports, may take into account or not third markets as with a double weighting system, and consider only full or partial trade in goods or trade in goods and services. All of these selections bear an influence on the results, with no grouping of hypotheses taking precedence by principle. More fundamentally, the concept of real exchange rates as a product of the Law of one Price raises difficulties in the presence of non-traded goods, imperfect competition, etc. These usual critiques should not cause us to reject the notion of real exchange rates, but do induce caution in interpreting its changes. *In contrast, lasting divergences in series being monitored inevitably reflect competitiveness problems.*

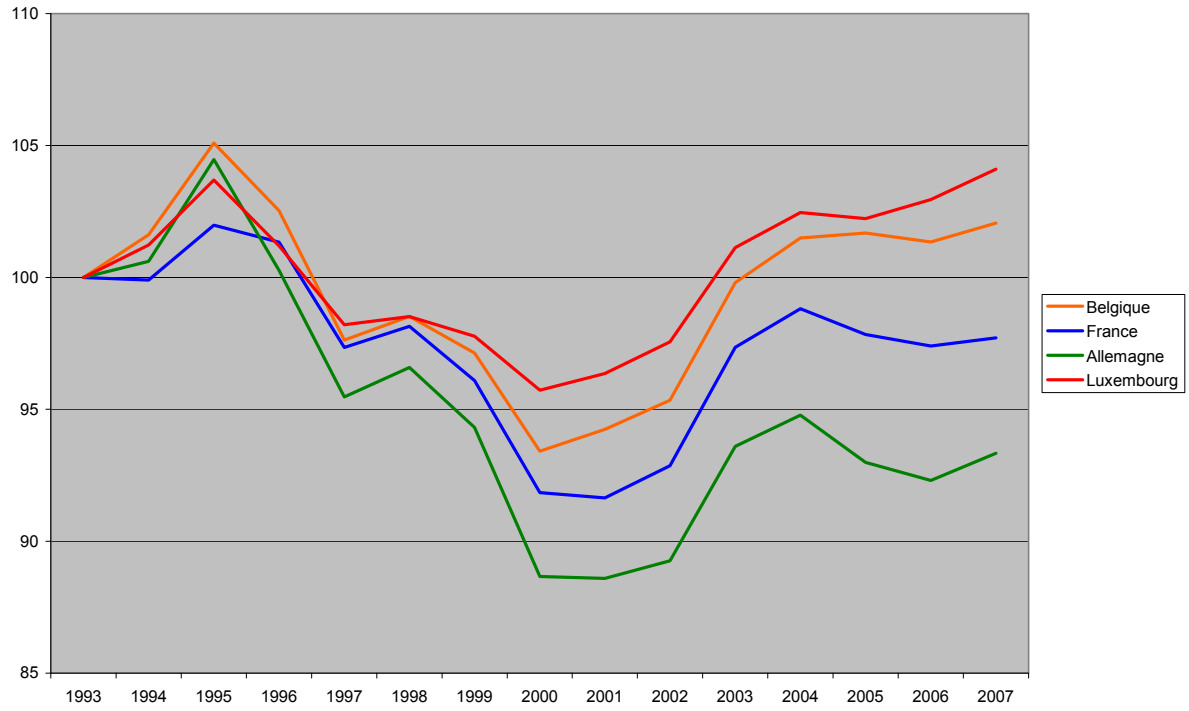
The OECD publishes Real Effective Exchange Rate (REER) for Luxembourg in quarterly or annual series, using a weighting of exchange rates for 42 different countries. This allows for an international comparison, especially with Luxembourg's direct competitors, using a unified methodology and based on consumer price indices or unit costs[34].

Figure 1, which is based on data deflated by consumer prices, illustrates the worsening of the price competitiveness situation of Luxembourg beginning from 2000. Belgium finds itself in a similar situation, though less pronounced. France, and especially Germany, boast better performance in terms of price.

[33] Price and cost competitiveness: the real effective exchange rate, Chapter 5 of the *Observatoire de la Compétitivité* Report, October 2007.

[34] Durand, M., C. Madaschi and F. Terribile (1998), "Trends in OECD Countries' International Competitiveness: The Influence of Emerging Market Economies", OECD Economics Department Working Papers, No. 195. See also OECD Economic Outlook Sources and Methods (http://www.oecd.org/eco/sources-and-methods).

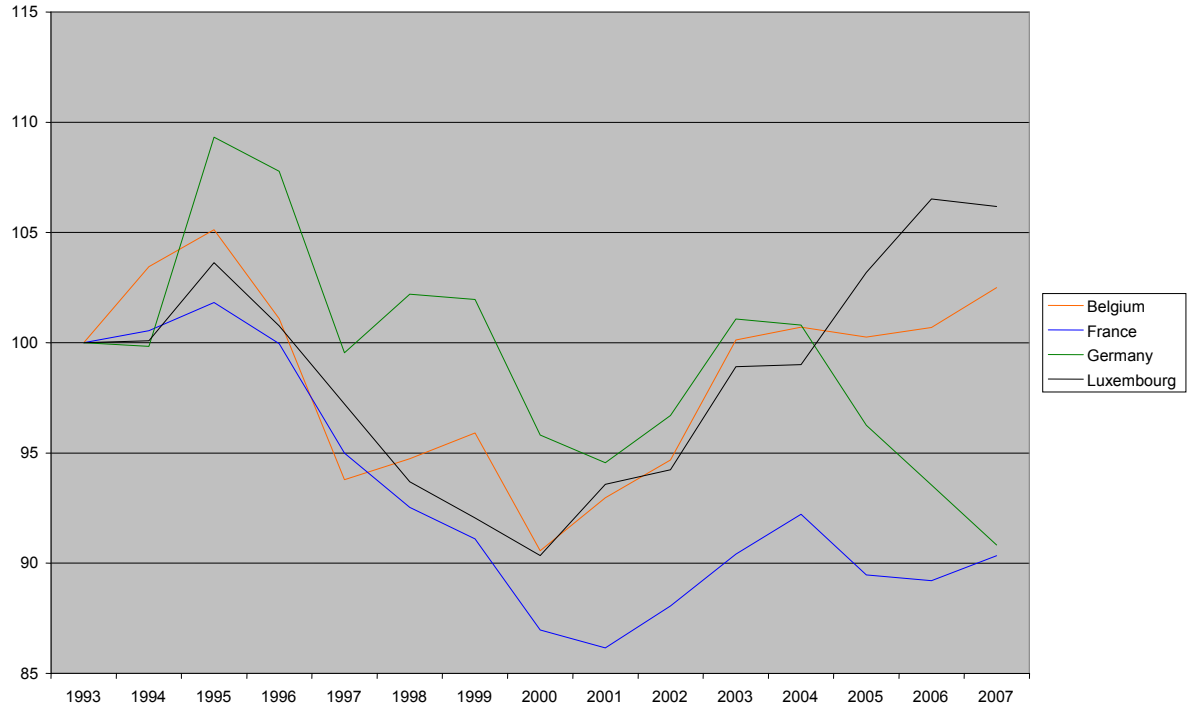
Figure 1: Real Effective Exchange Rate for Luxembourg and its three main trading partners (Annual data for 1993 – 2007). Deflator: Consumer prices



Note: An increase in the indicator means an appreciation of the real effective exchange rate, i.e. a drop in competitiveness.
Source: OECD Economic Outlook (83), June 2008

The real exchange rate indicator calculated on the basis of unit labour costs in Figure 2 confirms the decline of Luxembourg's price competitiveness. The change is particularly sharp at the end of the period in contrast with what was observed for Germany.

Figure 2: Real Effective Exchange Rate for Luxembourg and its three main trading partners (Annual data for 1993 – 2007). Deflator: Unit labour costs



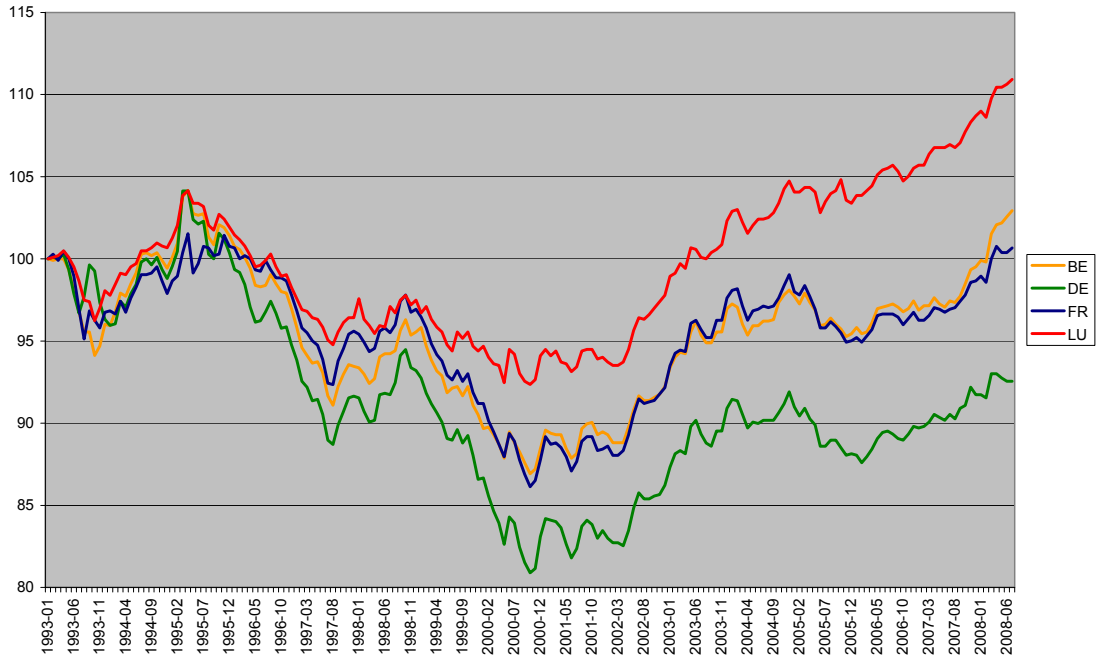
Note: An increase in the indicator means an appreciation of the real effective exchange rate, i.e. a drop in competitiveness.
Source: OECD Economic Outlook (83), June 2008

The European Central Bank (ECB) publishes its own price competitiveness indicators for the euro area and its members, by calculating the real effective exchange rate using double weighting. The group of currencies used in the comparison differs depending on the indicators for the euro area, with a basket of 12, 22 and 42 currencies. As for individual REER of the individual countries in the monetary union, the largest basket is used. Weightings used are those of trade, including competition on third markets. Data used is seasonally adjusted.

This index can be subjected to several critics. In the first place, using consumer prices hides changes in the price of professional equipment goods, which are nonetheless traded on the market, while numerous goods and services included in the consumer price indices are not traded. Imported products also affect the index. And then, prices are impacted by various taxes and subsidies. Second, the price index used by euro area countries is the HCPI (Harmonized consumer price index), which is standardized to European guidelines. This penalizes Luxembourg because of the weighting of energy products purchased by cross-border consumers.

The Luxembourg Central Bank publishes its own real effective exchange rate for Luxembourg using the same weighting system as the ECB but substituting its own National Consumer Prices Index (NCPI) for the HCPI to correct this preceding issue[35]. Finally, STATEC publishes a STATEC/CREA competitiveness indicator[36].

Figure 3: Real Effective Exchange Rate for Luxembourg and its three main trading partners (Monthly data: January 1993 - July 2007). Deflator: Consumer prices



Source: ECB, Data available as from 16 August 2008

The ECB approach is illustrated by Figure 3 above. It is clear from the chart that until 1999, Luxembourg had a price competitiveness indicator that moved roughly in line with those of its partners and that after that time a divergence appeared. This situation contrasts with the German position that is characterized by a price competitiveness effort that initially allowed it to capitalize more than its partners on the weak euro, before better insulating itself against the effects of its appreciation. Over ten years, Germany has managed maintain its level of price competitiveness, while Luxembourg has registered a 15% increase in its REER. Belgium and France are in an intermediary position for the period, with Belgium nonetheless registering a stronger deterioration at the very end of the period: Belgium's increase in REER was 9% in contrast with 5% for France.

[35] See Chapter 3 of this Report, which introduces the BCL indicator.
[36] See Schuller G., Bley L. (2007), *Les indicateurs synthétiques de compétitivité 1995-2006, Economie et Statistiques,* (20), STATEC, Luxembourg.

Parallel to these standard indicators, a significantly different line of approach was suggested in Chapter 5 of the 2007 Competitiveness Report of the *Observatoire de la Compétitivité* in collabouration with STATEC. The REER is calculated in this publication at the sectoral level, based on prices or costs. The objective was to account for changes that could prove to be divergent from one sector to another. The interest for Luxembourg was to determine the contribution of services in general and of the financial sector in particular to the overall observed loss of competitiveness. Prices used were value added deflators by branch for Luxembourg's eight main trading partners.

On this basis, a worsening of the price competitiveness situation in Luxembourg has appeared, pulled along essentially by prices in the services sector. If the financial sector, where prices are calculated from *ad valorem* margins, is excluded from other marketable services, the preceding conclusion remains valid, even though services' contribution to the worsening competitiveness situation is more limited.

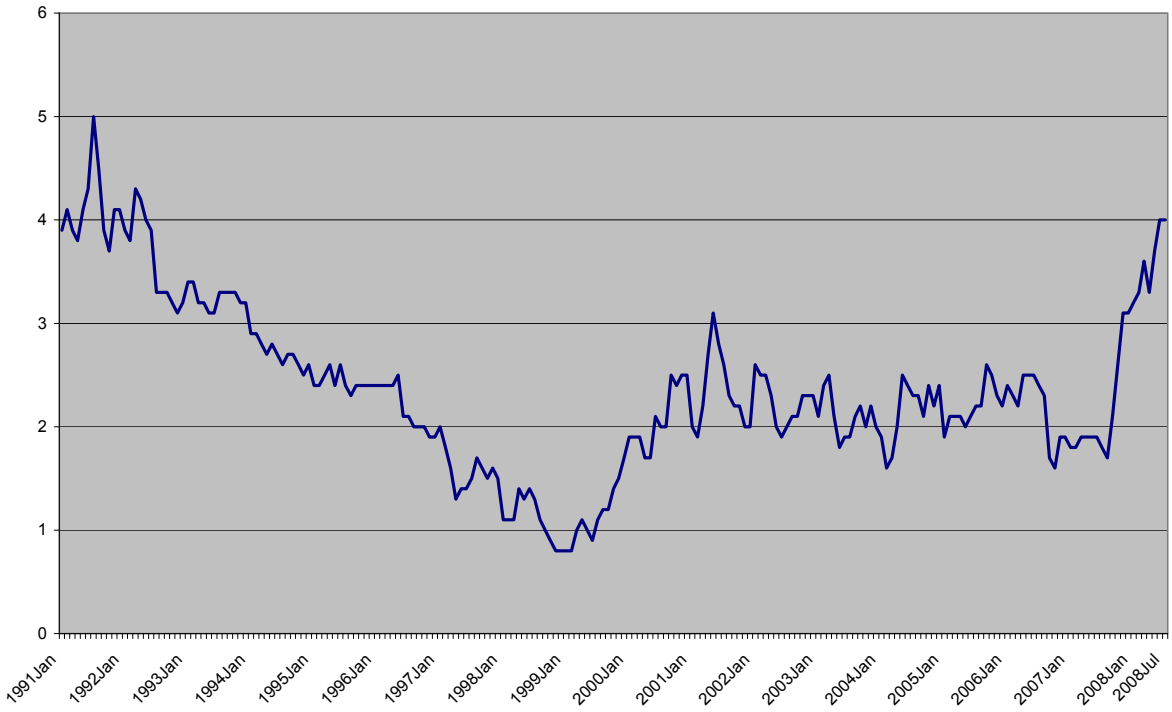
In considering cost competitiveness, pricing issues evoked previously should not enter into play, as fluctuations in share prices should be included in margins. Yet the conclusions reached earlier remain valid as unit wage costs in the Luxembourg services sector experienced a worsening trend over the entire period being analyzed. Thus added value did not rise quickly enough with relation to wages paid. In industry, on the other hand, changes in terms of costs were less favorable than in terms of prices.

Therefore, despite intrinsic methodological limitations and differences in assumptions made by index builders, the various indices all converge to manifest a certain worsening of the Luxembourg price competitiveness.

2.3 Indexation and propagation of inflation and price competitiveness

The more structurally inflationary feature of the Grand-Duchy's economy compared to its three main trading partners took on particular importance in an environment of surging inflation in both the euro area and worldwide, with many emerging countries heading toward annual indices in the double digits. In the euro area, this change contrasted with the long period of disinflation prior to the launching of the single currency, followed by a period where inflation was kept within the target scope of the ECB (see figure 4). We shall now examine how Luxembourg's economy reacted to this temporary situation.

Figure 4: The resurgence of inflation in the euro area
(Monthly figures January 1999 – August 2007)



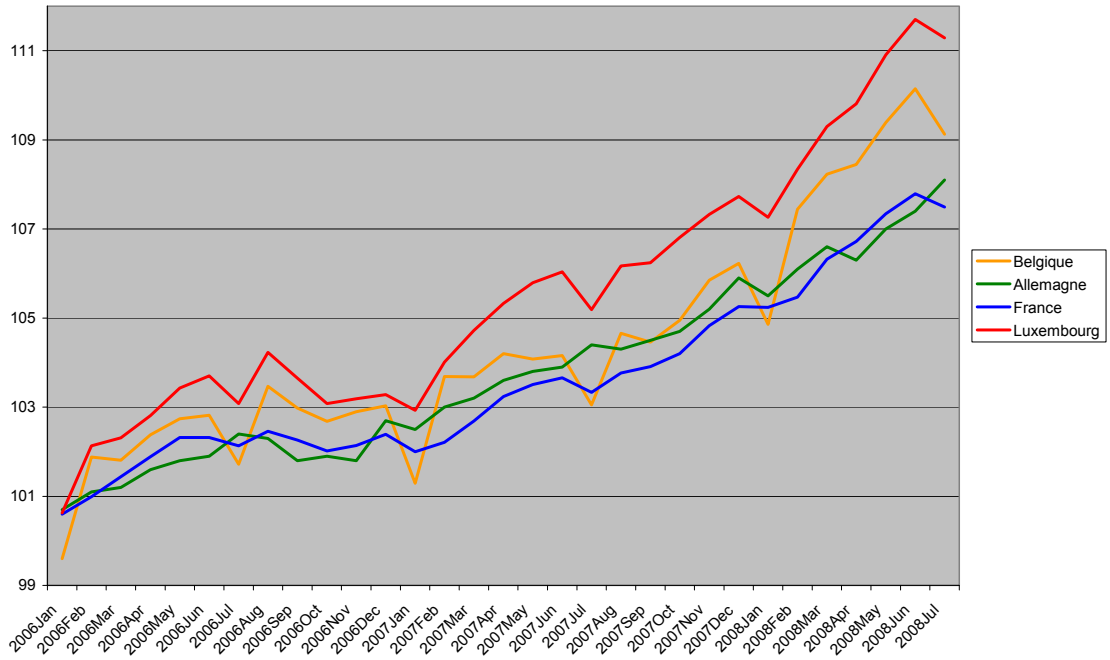
Source: ECB, Data available as from 16 August 2008

Since the beginning of this inflationary event[37], Luxembourg had stuck with its trend of the economy continuing to record inflation rates higher than its three main competitors, even though Belgium had followed closely in its wake (see Figure 5). However, this structural gap had not worsened, which emphasizes that while underlying inflationary trends remained slightly higher, there had been no second

[37] According to the NICP, this event dates from September, 2007. As an annual rate, inflation rapidly reached 3.7%, compared to an average of 2% up till this time. Excluding petroleum products, the NICP rose at an annual rate of 2.4% in 2007, mostly as a result of agricultural price pressures.

round effect in Luxembourg. This positive note can be credited to the temporary suspension of the automatic wage indexation mechanism adopted per the Law dated 27 June 2006 that reforms certain application methods[38]. The new mechanism had in reality arrived at a point designated for avoiding a severe worsening of price competitiveness: since the deadline for activating the mechanism expired in November, it should have been in December, in the midst of the inflation event, that the automatic wage increase was to have been triggered. By carrying it forward to March 2008, a loop effect with second round effects and an even stronger drop in households' expectations regarding inflation has been avoided. In the same manner, the automatic wage indexation that was to have been triggered in September 2008 was carried over to March 2009, to a time when inflation peaks will have receded. [39].

Figure 5: Harmonized indices of consumer prices for Luxembourg and its three main trading partners (Monthly change, January 2006 to July 2008).



Note: The HICP used here is unfavorable to Luxembourg because of the weighting of petroleum and tobacco products in this index involving large cross border consumption

Source: Eurostat, Data available as from 16 August 2008

Difficulties will appear afterward if the agreement is not temporarily extended. With the agreement expiring at the end of 2009, two increases could be envisaged, one in

[38] The agreement provides for a 12 month period between two successive automatic increases.
[39] A marked slowdown in the euro area, easing of agricultural prices and lower petroleum prices in the face of slowing world demand should limit inflationary pressures.

January 2010 and another in the middle of the year.[40]. It is clear that the price competitiveness issue in Luxembourg has major implications for the social partners. For the issue is ultimately whether to extend or to abandon the temporary arrangement concerning the moving wage scale. For this reason, the intrinsic limitations of indicators, as discussed above, will certainly take center stage in the deliberations, at the risk of hiding the fundamental concern.

It is therefore useful to perform an in-depth analysis of costs and of the elements causing them to evolve. This was done at the BCL using the European Commission's AMECO database. Unit labour costs were calculated over a decade, for our four countries, using a well-established method involving the standard production function, total factor productivity, etc. The results, shown in Table 1 below, confirm the analysis made earlier and provide an opportunity to better identify the respective components of productivity in all its elements and the unit cost of wages. On average, over the ten years Luxembourg has paid more compensation per employee than its three principal competitors. Luxembourg also recorded lower labour productivity levels. However, the difference is primarily in wages, since rates of productivity are close to those in Germany. In all, cost competitiveness has deteriorated more in Luxembourg. Why then has labour productivity been inadequate? In reality, Luxembourg has a greater capital deepening contribution than its direct competitors—probably because labour costs increased more rapidly—but less in terms of total factor productivity. Luxembourg has invested more but had fewer efficiency gains in using productive resources. From this last perspective, the difference with Belgium is striking. Over the past five years, losses in cost competitiveness in Luxembourg have been confirmed. Wage increases remain strong, while a clear dip in labour productivity has emerged. Again, capital intensity levels are higher in Luxembourg, but here efficiency in the use of resources drops, while elsewhere it continues to increase. This situation contrasts sharply with that observed in France, where labour productivity hardly slows at all, whereas in Luxembourg the figure drops by two-thirds. In contrast, over the entire period, Germany adjusts changes in wages to labour productivity. Naturally, any assumption made can be contested, such as constant returns to scale. However, results

[40] Luxembourg Central Bank: Annual Report 2008.

obtained side with a cluster of concordant observations obtained through different methods.

Tableau 1: Unit labour costs of Luxembourg and its three main trading partners (1996-2006)

	Luxembourg	Allemagne	France	Belgique
	Moyenne 1996-2006			
Coût salariaux unitaires (1) = (2)-(3)	1,95%	-0,05%	1,38%	1,22%
Salaire par employé (2)	3,01%	1,03%	2,52%	2,49%
Productivité du travail (3)=(4)+(5)	1,06%	1,08%	1,14%	1,27%
Contribution productivité totale des facteurs (4)	0,45%	0,58%	0,64%	0,87%
Contribution capital-deepening (5)	0,61%	0,50%	0,50%	0,40%
	Moyenne 2001-2006			
Coût salariaux unitaires (1) = (2)-(3)	2,76%	-0,09%	1,98%	1,61%
Salaire par employé (2)	3,12%	0,90%	2,93%	2,65%
Productivité du travail (3)=(4)+(5)	0,36%	0,99%	0,95%	1,04%
Contribution productivité totale des facteurs (4)	-0,56%	0,51%	0,26%	0,64%
Contribution capital-deepening (5)	0,93%	0,47%	0,69%	0,40%

Source: BCL, 2008 Annual Report

2.4 Conclusion

The recent resurgence of inflation has already been called in to question by the real consequences of the financial crisis and the accompanying recession. Nonetheless, this temporary surge in inflation has put questions regarding the internal mechanisms that propagate inflation back to the forefront. In a small, extremely open economy the risk of inflation is indeed high in the type of environment that reigned in mid-summer last year. The retreat of oil prices coupled with the contraction of business in the second half have put the brakes on the inflation rate since the month of August. Still, the issue of the inflation rate differential between Luxembourg and its competitors and consequently the REER and price competitiveness gaps merit close examination. The indexation mechanism, temporarily amended by the Tripartite Coordination Committee, requires review in short order and will provide a particular resonance to debate on the issue.

In an earlier section we noted the basic concepts concerning the real exchange rate and its capacity to provide explanations for changes in market share. An initial difficulty arises in choosing indicators and weightings. In addition, recent econometric studies show that traditional equations must be augmented by variables meant to capture the more microeconomic dimensions related to non price and non cost competitiveness. This still does not invalidate the standard conclusions, which enters into play in a complex manner, all other things being equal.

A second section employed different data and indicators to measure competitiveness in the Grand-Duchy. A comparison was made with change observed in data of the Duchy's main competitors. Despite minor methodology differences, it was confirmed that Luxembourg's competitiveness position has worsened. Belgium finds itself in a comparable, though less pronounced situation. France, and above all Germany boast the best performance in terms of price.

The third section concentrated on pricing in Luxembourg. We note that the Grand-Duchy, while structurally more inflationary than its principal competitors, did not register a second round effect, thanks to the action of the Tripartite Coordination Committee. Yet if the existing agreement is not extended, successive salary increases will be necessary after inflation has receded and competing countries inflation rates return in the vincinity of 2%. This issue is particularly worrisome in as much as Luxembourg has limited margins of maneuver since over the recent period, despite heavy contribution to capital deepening, gains in productivity were lower while employee compensation increased.

While competitiveness is not exclusively concentrated on the price aspect, changes in price related to second round effects will continue to worsen the Grand-Duchy's competitiveness situation.

3 Casting the spotlight on real effective exchange rates

3.1 Introduction

The Real Effective Exchange Rate (REER) plays a key role within the framework of competitiveness indicators. This indicator is used annually to the evaluate cost and price competitiveness of Luxembourg[41] relative to its main trading partners, both in the industrial and services sectors, and in the economy in general.

As illustrated by Lionel Fontagné in his contribution to this competitiveness report (*Bilan Compétitivité 2008),* the most recent data show that Luxembourg's price competitiveness continues to decline and that this is essentially due to the largest sector of the country's economy, the services sector.

Cost competitiveness of the Luxembourg economy, measured by the cost version of REER, continued to weaken over the observation period. The overall change is strongly influenced by the services sector, which worsened throughout the entire period of observation. However, over the same period, the industrial sector recorded less of a loss of cost competitiveness, although at the end of the observation period this was also falling.

These conclusions drawn with regard to cost and price competitiveness in the Luxembourg economy, as measured by REER, are all confirmed by the results of other domestic and international organizations.

3.2 The Real Effective Exchange Rate of Luxembourg

In principle, the exchange rate is considered an important competitiveness variable. Indeed, a fall in the exchange rate improves a country's competitiveness by making its products cheaper abroad and making its competitors' products more expensive on the domestic market.

[41] Numerous studies have in fact shown that it is important to have available this type of composite index that can be used to follow the competitiveness of a country relative to that of its principal trading partners. See BULDORINI L., MAKYDAKIS S., THIMANN C., « *The effective exchange rates of the euro* », Occasional paper series N°2, ECB, Frankfurt, February 2002. In Luxembourg, STATEC regularly publishes the STATEC/CREA competitiveness indicator (see SCHULLER G., BLEY L., « *Les indicateurs synthétiques de compétitivité 1995-2006* », *ECONOMIE ET STATISTIQUES*, N° 20/2007, STATEC, Luxembourg 2007).

However, in an increasingly globalized world, a bilateral, two-currency exchange rate gives only a very partial image of competitiveness. A more appropriated measure is provided by the nominal effective exchange rate (NEER) which is a weighted average of the various bilateral exchange rates between a country's domestic currency and the foreign currency of its major trading partners. In the case of Luxembourg, even in a heavily globalized environment, the most important competitors are still its closest geographical neighbors, Germany, Belgium and France. This section will look at the eight most important trading partners of Luxembourg: Germany, Belgium, France, Italy, the Netherlands, the U.S. and Switzerland, with weights depending on each nation's relative importance to the Luxembourg economy.

The real effective exchange rate (REER) can provide a macroeconomic comparison of domestic and foreign prices expressed in a common currency and thus serves as a measure of competitiveness. Depending on whether one deflates the NEER by a price or cost indicator, this provides a measure of price or cost competitiveness.

From the price perspective, prices of domestic goods and services can thus be compared with those of a nation's principal competitors. From the cost perspective, the domestic unit labour cost, that is, the cost of labour per unit of real added value produced is compared with those of the reference nation's main trading partners.

Luxembourg is a member of the European monetary union among whose members exchange rates are fixed. The main competitors of Luxembourg are also part of this union. Because of this, the adjustment mechanism applied by competitiveness gaps is essentially based upon market forces that act as a stabilizer against inflation differentials.

In particular, within a monetary union if one country is experiencing lower than average inflation, it becomes more competitive with regard to the other countries. Inversely, a country that registers higher inflation becomes less competitive. Over time, this phenomenon tends to increase demand in the country with a favorable inflation differential, while demand is reduced in the other countries[42]. This

[42] According to the purchasing power parity principle, bilateral exchange rates between countries should evolve over the long term in order to maintain price equality between two countries. Thus the depreciation of an exchange rate can simply be the reflection of higher inflation rates; such depreciation is not necessarily the sign

competitiveness channel thus becomes the main adjustment path among the economies of a monetary zone, such as the euro zone.

Over recent years Luxembourg has had strong GDP growth despite a worsening of the REER indicator. The analysis performed in the 2007 *Bilan Compétitivité* illustrated that this was explained by changes in the financial sector where prices are set ad valorem[43].

It is appropriate to note that this analysis is primarily concerned with two aspects of competitiveness, prices and nominal unit labour cost. An abundant economic literature makes clear that many other factors affect competitiveness, generically collected under the heading "non price" or "non cost" competitiveness. These factors can be linked to innovation or quality for example, but can also originate from a country's legal or regulatory framework. In Chapter 3, the Competitiveness Scoreboard attempts to describe the situation as it relates to Luxembourg's economy.

The degree to which price and non-price factors are allocated can obviously vary from one country to another and even from one branch to another. The 2007 *Bilan Compétitivité* showed that aside from the price effects registered by the REER, the Luxembourg funds industry should benefit from an excellent non-price competitiveness situation because on the European level, it occupies the first position in terms of portfolios under management. Ultimately, however, it goes without saying that the fundamental law of economics applies—that quantities and prices of economic goods and services traded on the market are determined by the interaction between supply and demand. So when there is strong demand for a good or service with few "producers", it is clear that the quantity "sold" increases, even if the real effective exchange rate changes unfavorably for the purchaser[44].

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of improved competitiveness but merely the manifestation of a more rapid increase in prices. To account for such phenomena, a distinction is drawn between the nominal effective exchange rate and the real effective exchange rate, which introduces a factor in each term of the weighted average. The factor is made up of the relationship between two price indicators, one for the domestic economy and the one for the trading partner in question.

[43] See also Lionel Fontagné's contribution in Chapter 2 above.

[44] See also the 2007 Annual Report of the BCL, which deals with this same issue.

3.3 Methodology and Weightings

For the price perspective of the reel effective exchange rate, the REER is deflated by a price indicator providing a comparison between the price of domestic goods and services and prices of the main competing countries. From the cost perspective, the unit labour cost is compared, or the cost of labour per unit of real added value produced domestically, to that of the countries among the reference country's main trading partners.

The real effective exchange rate is put together using currencies of the principal trading partners of Luxembourg, including Germany, Belgium, France, Italy, the Netherlands, the United States, Great Britain and Switzerland. A weighting that reflects the relative importance of the country in question to the structure of economic trade in Luxembourg is assigned to each bilateral exchange rate. A different weighting structure must be applied for the overall economy, for the industrial sector and for the services sector. This reflects a different geographic breakdown of the exchanges of goods and services[45]. The weightings used in calculating the real effective exchange rate—which reflect the relative importance of the principal partners in Luxembourg's exports—are adjusted each year to take into account changes in the geographic structure of Luxembourg's exports.

The real effective exchange rate, from the perspective of price, measures the relationship between domestic prices and foreign prices expressed in euros. The notion of price is measured by the implicit value added deflator[46]. Foreign prices, by branch, are obtained by multiplying the index of value added prices by branch by the weighted exchange rate. In calculating this weighting, nominal exchange rates for currencies of the countries outside the euro zone such as the USD, GBP and CHF are weighted by relative importance of the respective country in Luxembourg's exports.

[45]See SCHULLER G., WEYER N., *Le commerce extérieur du Luxembourg*, STATEC Bulletin, Luxembourg. - Vol. 49(2002), n° 8, STATEC, Luxembourg, 2003

[46] One talks also of value added deflators because they are obtained by dividing the value variable at current prices by the volume variable at constant prices.

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Table 1: Relative share of exported goods (8 countries)

Année	Total(8pays)	DE	BE	US	FR	IT	NL	GB	CH
1995	**0,83**	0,28	0,13	0,03	0,20	0,05	0,05	0,06	0,02
1996	**0,83**	0,28	0,13	0,03	0,20	0,05	0,05	0,07	0,02
1997	**0,81**	0,26	0,14	0,03	0,19	0,05	0,05	0,07	0,02
1998	**0,82**	0,24	0,13	0,05	0,20	0,06	0,05	0,06	0,02
1999	**0,83**	0,25	0,13	0,04	0,22	0,05	0,05	0,08	0,01
2000	**0,81**	0,24	0,13	0,04	0,21	0,06	0,05	0,07	0,02
2001	**0,81**	0,24	0,12	0,04	0,19	0,06	0,04	0,09	0,01
2002	**0,80**	0,26	0,12	0,03	0,20	0,06	0,04	0,07	0,01
2003	**0,80**	0,26	0,12	0,03	0,20	0,06	0,05	0,06	0,01
2004	**0,79**	0,26	0,12	0,03	0,20	0,07	0,05	0,05	0,01
2005	**0,76**	0,26	0,12	0,03	0,18	0,06	0,05	0,05	0,02
2006	**0,74**	0,25	0,12	0,03	0,17	0,06	0,05	0,05	0,01
2007	**0,75**	0,26	0,13	0,03	0,17	0,05	0,05	0,05	0,01

Source: STATEC (2008)

To calculate price competitiveness in industrial branches, we use the relative share of goods exported to eight countries. It should be noted that their total share in merchandise trade continued to drop over the past eleven years, falling from 82.6% in 1995 to 74.5% in 2006. This can be explained by the fact that exports from Luxembourg to countries like Austria, China and Poland have risen sharply. Nonetheless, Luxembourg's three immediate neighbors (Germany, France and Belgium) are still the primary destination of exported goods, even though their relative shares have fallen and they still account for half of all trade.

Table 2: Relative share of exported services (8 countries)

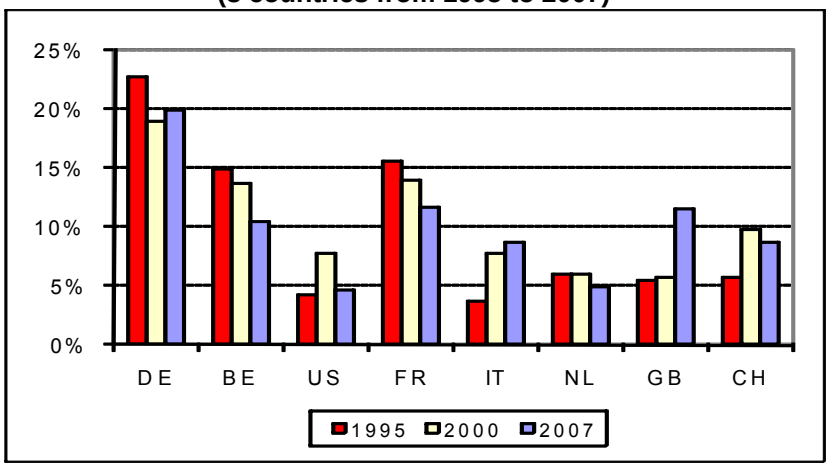
Année	Total(8 pays)	*DE*	*BE*	*US*	*FR*	*IT*	*NL*	*GB*	*CH*
1995	**0,74**	*0,18*	*0,16*	*0,05*	*0,12*	*0,03*	*0,06*	*0,05*	*0,09*
1996	**0,74**	*0,18*	*0,16*	*0,06*	*0,12*	*0,03*	*0,06*	*0,06*	*0,08*
1997	**0,72**	*0,17*	*0,16*	*0,07*	*0,11*	*0,03*	*0,05*	*0,05*	*0,08*
1998	**0,88**	*0,20*	*0,16*	*0,10*	*0,11*	*0,04*	*0,06*	*0,05*	*0,15*
1999	**0,89**	*0,19*	*0,16*	*0,10*	*0,13*	*0,06*	*0,06*	*0,05*	*0,16*
2000	**0,84**	*0,17*	*0,14*	*0,09*	*0,11*	*0,08*	*0,06*	*0,05*	*0,13*
2001	**0,86**	*0,19*	*0,13*	*0,08*	*0,10*	*0,10*	*0,05*	*0,07*	*0,14*
2002	**0,85**	*0,19*	*0,14*	*0,06*	*0,11*	*0,10*	*0,05*	*0,07*	*0,13*
2003	**0,83**	*0,19*	*0,13*	*0,05*	*0,11*	*0,08*	*0,05*	*0,08*	*0,13*
2004	**0,83**	*0,19*	*0,12*	*0,05*	*0,12*	*0,09*	*0,05*	*0,09*	*0,12*
2005	**0,82**	*0,19*	*0,12*	*0,05*	*0,11*	*0,09*	*0,05*	*0,10*	*0,12*
2006	**0,82**	*0,20*	*0,11*	*0,05*	*0,10*	*0,10*	*0,05*	*0,11*	*0,11*
2007	**0,82**	*0,18*	*0,10*	*0,05*	*0,10*	*0,10*	*0,05*	*0,13*	*0,11*

Source: STATEC (2008)

Between 1995 and 2006, the geographic structure of exports of services changed more dramatically than exports of goods. The share of exported services to for some countries like Switzerland, the United Kingdom and Italy increased rapidly, in the

wake of strong development of the investment funds sector. In calculating the real effective exchange rate, one must obviously take into account these variations in the structure of trade. Unlike trade in goods, the total share of the eight major partners shows an upward trend over the long run, representing 83% of exported services in 2006, compared to 74.5% in 1995.

Figure 6: Share of exports of goods and services (8 countries from 1995 to 2007)



Source: STATEC (2008)

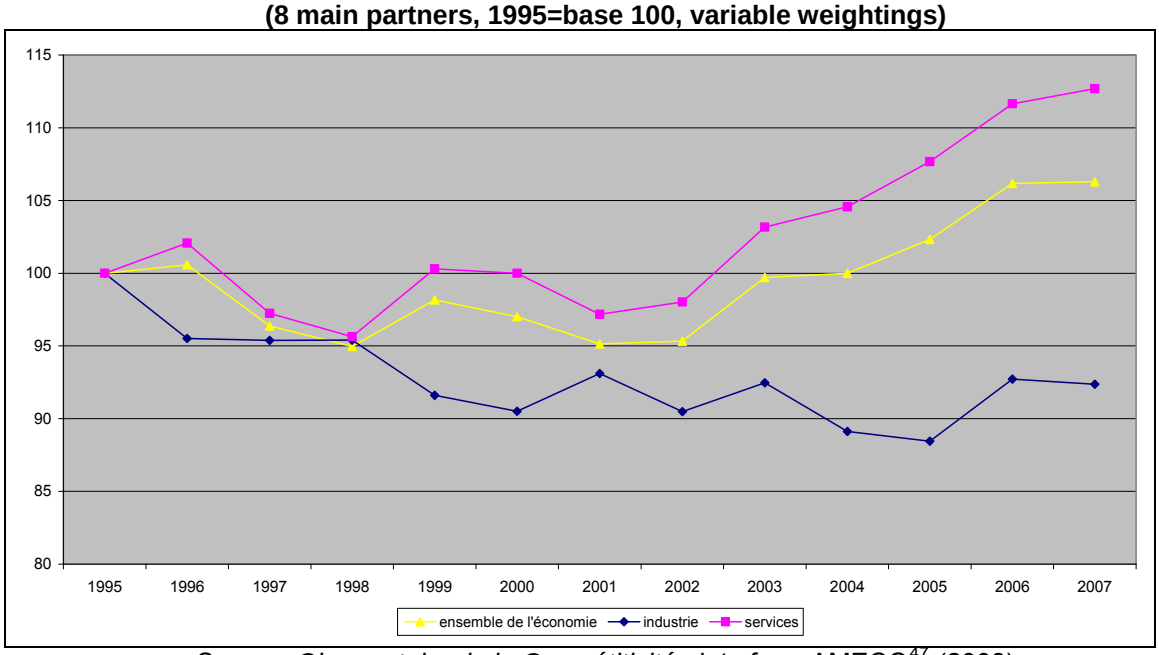
With regard to the overall economy, weights have clearly moved in conformity with what was observed in the industrial and services sectors. Between 1995 and 2007, the share of manufacturing in value added fell from 13.9% to 8%, while in the services sector this share increased over the entire period, which is reflected in the weights for the overall economy shown above.

3.4 Results

3.4.1 Price Competitiveness

The graph below reports price competitiveness as measured by REER for the price perspective, tracking the relationship between domestic prices and foreign prices expressed in euros. Thus a drop in the REER indicates improvement in Luxembourg's price competitiveness, since domestic prices change more slowly than foreign prices expressed in euros. Inversely, an increase in the REER indicates a decline in competitiveness.

Figure 7: REER: Indicators of Luxembourg's real effective exchange rate (8 main partners, 1995=base 100, variable weightings)



Source: *Observatoire de la Compétitivité*, data from AMECO[47] (2008)

Along the pattern of earlier years, price competitiveness follows a deteriorating trend essentially due to the services sector. This trend, reflected by the upward pate of the REER curve in the above graph, is consistent with the analysis of previous years and with REER analyses performed by other institutions that publish REER price competitiveness indicators, see previous chapter by Professor Fontagné.

Remember, this analysis is concerned only with the price and cost aspects of competitiveness and does not take into account many other factors that affect competitiveness, generically collected under the label "non-price" and "non-cost" competitiveness. The importance of these factors varies from one branch to another. In addition, some branches must be recognized as being "protected" sectors, notably in the non-market sector.

In industry, Luxembourg's price competitiveness has improved, as indicated by the slightly descending REER curve.

In conclusion, in can be said in analyzing Luxembourg's REER from the price perspective that the country's price competitiveness situation is worsening and that this is primarily due to our economy's flagship sector, the services sector. This

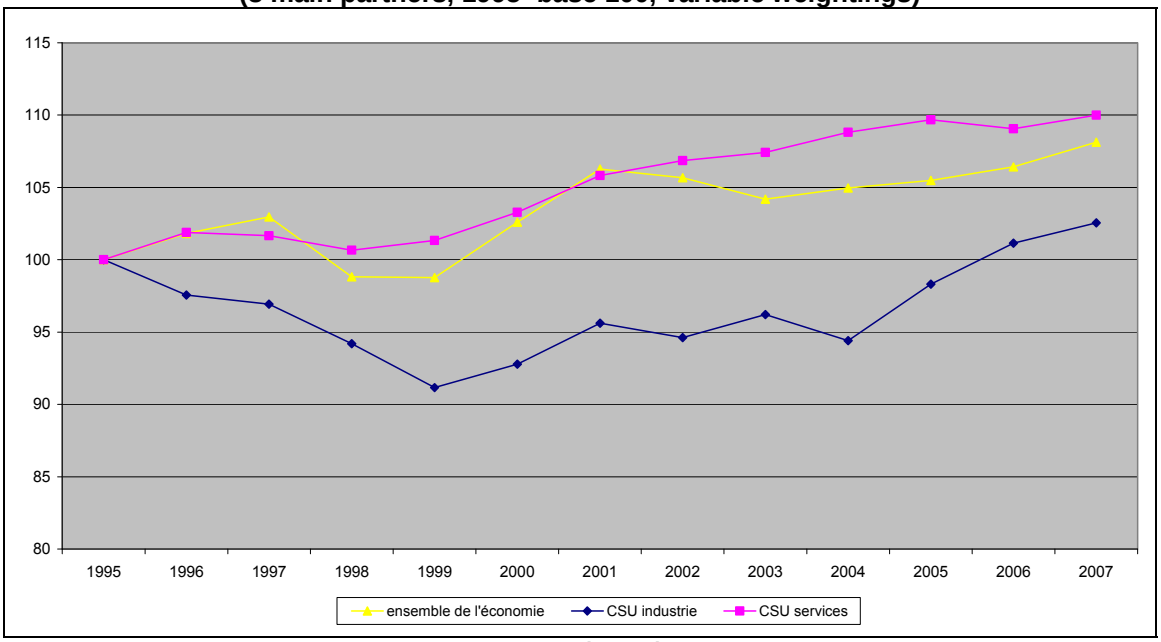
[47] This is the European Commission database, http://ec.europa.eu/economy_finance/indicators/annual_macro_economic_database/ameco_en.htm .

finding is mitigated by the large weight and atypical behavior of the financial sector within the domain of market services.

3.4.2 Cost competitiveness

From the cost perspective, the domestic unit labour cost, that is, the cost of labour per unit of added value produced is compared with those of Luxembourg's main trading partners. Unit labour cost indicators incorporate two different aspects of competitiveness, wage costs and productivity. Although changes in labour costs can thus explain a loss of competitiveness measured by the real effective rate of exchange, from the cost perspective, changes in productivity also affect the REER[48].

Figure 8: Indicators of Luxembourg's real effective exchange rate (8 main partners, 1995=base 100, variable weightings)



Source: *Observatoire de la Compétitivité*, data from AMECO (2008)

Looking at the above graph, a worsening of the cost competitiveness situation over the entire Luxembourg economy is clearly discernable. Over the entire economy, changes in the REER from the cost perspective are closely knit to those in the services sector, the flagship of Luxembourg's economy. The services sector is characterized by a continuous and rather pronounced deterioration, shown by the upward movement of the REER on the graph. In contrast, the deterioration is less stark for industry over the period, as it even improves until 1999, but then seems to

[48] See Bianco (below) and Dimaria and Ciccone (2008) for a detailed analysis of changes in productivity in Luxembourg.

deteriorate rapidly during the last years considered, a phenomenon which may be linked to the significant climb in value of the euro.

In conclusion, cost competitiveness in Luxembourg as measured by the REER from the cost perspective has declined continuously over the period under analysis. Changes in cost competitiveness in the country's economy are heavily influenced by trends in Luxembourg's flagship services sector. However, the loss of competitiveness is less clear in the industrial sector, but changes unfavorably toward the end of the period.

3.5 Comparison with other published REER indicators

In his contribution to this work, Professor Lionel Fontagné introduced REER indicators of the OECD and the ECB, stressing the importance of monitoring them and accounting for any methodological deficiencies. In addition to the ECB's REER indicator, the BCL publishes an indicator that considers Luxembourg's national index of consumer prices (NICP) to be more relevant than the European harmonized (HICP) indicator for studies concerning Luxembourg.

3.5.1 The Luxembourg Central Bank (BCL)

Since 2003, the BCL has regularly published competitiveness indicators based on real effective exchange rates and deflated by various price and cost indices. These indicators compare prices and costs in Luxembourg with a weighted average of the same prices and costs in the principal partner countries (all expressed in a common currency). The weightings reflect the importance of the country in question in international trade with Luxembourg. These indicators are calculated for a group of 37 countries including the 27 in the European Union and ten other commercial partners listed in the BCL bulletin 2005/2, depending on availability of data. The data are presented on a quarterly basis and analyze industry separately from the rest of the economy[49]. The BCL uses the double weighting method that takes into account competition from other markets, as set out by Buldorini, Makrydakis and Thimann (2002).

[49] See Guarda and Olsommer (2003) for a description of the methodology used.

Figure 9: Competitiveness Indicators based on consumer prices, the GDP deflator and Unit Labour Costs (ULC) for the whole economy

Sources: Eurosystème, FMI, and BCL calculations

It is clearly apparent that the various BCL competitiveness indicators show a deteriorating trend in Luxembourg's competitiveness, evinced by the rising curve. The greatest loss in competitiveness is on the cost side, as the path of the GDP deflator indicator exceeds the upward trend of the consumer price indicator.

3.6 Conclusion

Price competitiveness in Luxembourg as measured by the REER continues to deteriorate and this trend is essentially due to changes in the Luxembourg economy's flagship services sector. Still, the mitigating factor in this scenario is the weight and atypical behavior of the financial sector within market services and especially the value added deflator of the financial sector.

Cost competitiveness in the Luxembourg economy as measured by the REER continues to decline. Changes in cost competitiveness of the overall economy are fundamentally influenced by developments in the services sector. Cost competitiveness of the services sector worsened throughout the observation period with a slight improvement in 2006. Industry, in contrast, has suffered a less stark loss in competitiveness, which however accelerated toward the end of the period.

These results are consistent with the conclusions of other domestic and international organizations. Nonetheless, methodological problems regarding the REER merit further investigation and should be interpreted with caution.

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4 Controlling Inflation: Better Competitiveness Means Greater Purchasing Power

4.1 The real debate about purchasing power

The issues of inflation and purchasing power are at the heart of economic vitality and social dialogue. Purchasing power has become a subject in the news and the collective attention paid to it is due to the fact that it is considered a yardstick by which to measure changes in standards of living and, by extension, economic progress and well-being of the population[50]. Limiting discussion about purchasing power to only wage demands, tax reductions and state subsidies has proven insufficient and it is important to avoid giving in to any sort of "index mania"[51]. It is of primordial importance to emphasize the importance of competitiveness and of structural realities that are the foundations of long-term economic growth, and consequently of structural and sustainable growth in revenue.

Measures to promote purchasing power can be divided overall into two categories: measures intended to increase disposable income and those that act on prices.

Regarding disposable income, discussion about purchasing power must not eclipse cost and price competitiveness issues that influence economic growth. Competitiveness and purchasing power are two closely knitted concepts[52]. The central debate must remain concentrated on competitiveness, productivity and economic growth. When a country's competitiveness level declines it loses market share and can no longer finance necessary social programs. Higher economic growth means steady progress for all and it is the political majority's responsibility to share this out as it sees fit. Countries must create the conditions necessary to achieve gains in productivity and to increase competitiveness. This assumes the combination of different factors, such as continued development of know-how and technical innovation, effective competition, an opening up to foreign areas and extensive willingness to face risk on the part of the population. Some of these measures take years before their full effects can be felt on growth, such as the

[50] See also discussions in the colloquium « *Vers de nouveau indicateurs de richesse* » set up by the Chamber of Private Sector employees (CEP-L) and the *Observatoire de la Compétitivité* of the Ministry for the Economy and Foreign Trade on 12 July 2006. http://www.odc.public.lu/actualites/2006/07/12_ind_rich/index.html

[51] This term was used in the *Handiwierk* editorial (July-August/2008), the official organ of the *Chambre des Métiers et de la Fédération des Artisans du Luxembourg*, in its discussions on inflation.

[52] MOATI P., ROCHEFORT R., op. cit., pp.131-133

establishment of a competition authority and simplification of regulatory conditions in the case of R&D. The true issue is therefore to create an environment suitable for growth.

Certain actions not related to disposable income measures can exert an impact on prices, though the margin of maneuverability is very limited in an economic environment where free price formation and competition are the rule, as in the quasi totality of Western economies[53], and where the concept of free price formation is also a political objective of the European Union[54]. As in the majority of cases prices cannot be set by legal or regulatory means, one measure or another may contribute to supporting purchasing power, such as these examples:

- Intensifying competition and freeing up protected markets. All monopolies are sources of revenue and any increase in competition is in principle an advantage to consumers and contributes to purchasing power

- Provide access to better information about prices. All measures intended to make the pricing system more transparent should be encouraged

- Promote education in fundamental economic reasoning to greater audiences, including the press

- Maintain conscientious monitoring levels on the types of contract marketing that tends to tie consumers into commitments engendering continued expense

The links between the concepts of inflation, purchasing power and competitiveness will be addressed in greater detail later in this section. In addition, we will present an overview of the various measures agreed upon by the social partners and the Luxembourg government to control inflation implemented under the auspices of the Tripartite Coordination Committee in April 2006. These measures address both the preservation of purchasing power and cost competitiveness of companies.

[53] In Luxembourg, the Law dated 17 May 2004 on competition sets the free formation of prices as a general rule in its Art.2: «*Les prix des biens, produits et services sont librement déterminés par le jeu de la concurrence (…)*». http://www.legilux.public.lu/leg/a/archives/2004/0762605/index.html

[54] See the Luxembourg Parliament's, *Projet de loi relative à la concurrence n°5229*, Luxembourg, 13 November, 2003

4.2 Purchasing Power of Households

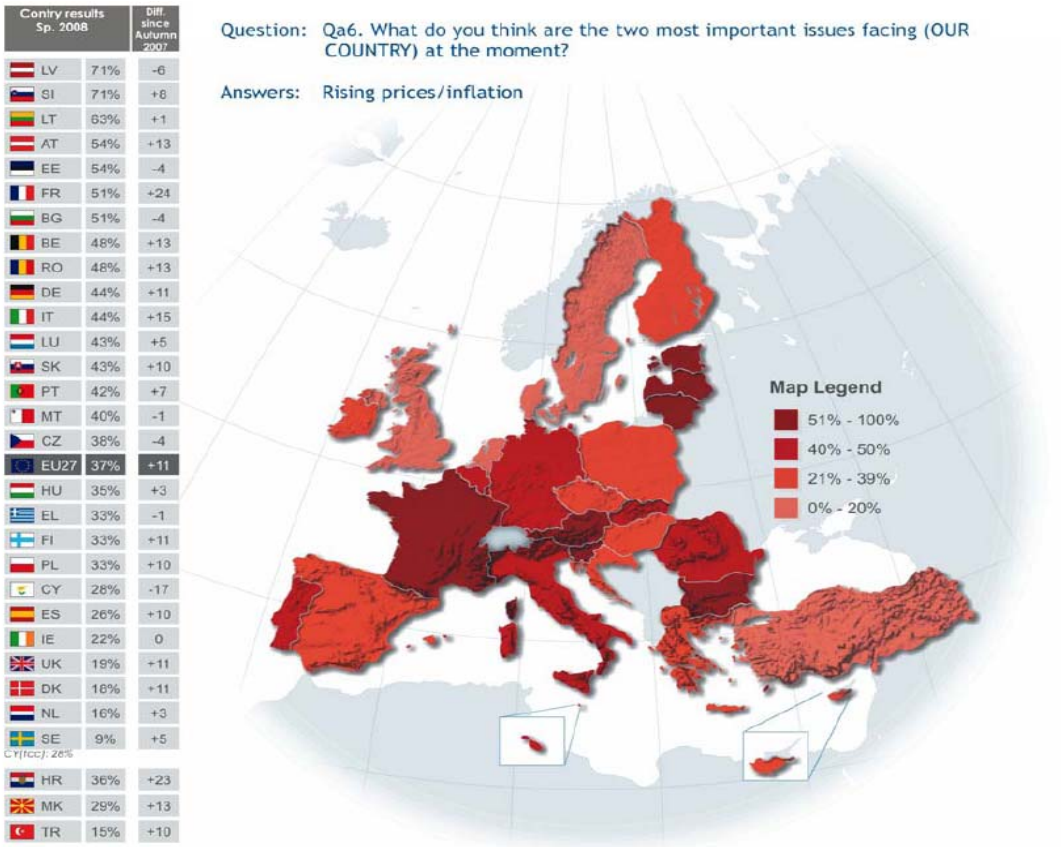
4.2.1 Changes in purchasing power

In the face of rampant inflation, purchasing power has become a theme, perhaps even *the* most worrisome theme, of many European countries. The Eurobarometer survey conducted in the spring of 2008 illustrated this situation[55]. Asked what were the two most important issues facing their country, 43% of Luxembourg citizens responded by saying changes in prices, up 5% since the fall of 2007. In the EU, an average of 37% of respondents answered similarly, up 11% since the fall of 2007. Among Member states, inflation is the primary worry in 14 countries. An absolute majority considers it the main worry in Latvia, Lithuania, Estonia, Austria, Belgium and France. Since the autumn of 2007, the number of persons surveyed that consider inflation and the increase in prices generally to be the most important challenge on the national level grew significantly in over half of the countries covered by the study. The most significant increases were recorded in France, up 24 points, Italy, up 15 points, and Austria, Rumania and Belgium, all up 13 points.

Luxembourg nationals, like other consumers in the other Member states of the euro zone, believe that since the changeover to the euro, prices have increased significantly and that their purchasing power [56] has declined. There is some difficulty in squaring official statistics with the perception of price changes in day-to-day life[57]. Useful studies for showing this, which are especially revealing for Luxembourg, are the price surveys of the Luxembourg Consumers Union (ULC) and TELECRAN[58] both of which use the basket of goods approach.

[55] EUROBAROMETER, First results – Spring 2008, June 2008
http://ec.europa.eu/public_opinion/archives/eb/eb69/eb69_en.htm
[56] One should not confuse the concept of purchasing power with that of standard of living. The first term refers to a basket of data that has not changed for several years and therefore does not take into account changes in the structure of consumption occurring over time. The possibilities for substituting one good for another are unknown. Thus, protecting one's standard of living does not necessarily imply maintaining purchasing power at the same level.
[57] ULC, *Enquête de prix: le panier de la ménagère*, Konsument, Luxembourg, June 2008
[58] TELECRAN, *Ungebremster Preisanstieg – mehr Geld für weniger Ware*, Luxembourg, 16 July 2008

Figure 10: What are the two most important issues facing your country at present? Response: Price increases – inflation



Source: Eurobarometer (Spring 2008)

There is a gap between inflation felt by households and inflation measured by a consumer price index. In reality, these two views reflect two different perspectives that result in a source of confusion about the term "purchasing power". The excerpt below attempts to reconcile the different viewpoints.

Frame 1: Distinction between the official concept of inflation, perceived inflation and purchasing power

Many studies have been consecrated recently to evaluating purchasing power[59]. Purchasing power is a muddy concept for those who do not specialize in the subject. There is a significant gap between inflation felt by households and that measured by price indices. Therefore, a central and preliminary aspect of debate on purchasing power must be that of how it is measured.

For economists, purchasing power is the sum of goods and services that can be acquired with disposable income. Economists generally adopt a macroeconomic perspective in this framework by discussing average purchasing power wherever households are naturally inclined to consider things

[59] For more details see: MOATI P., ROCHEFORT R., *Mesurer le pouvoir d'achat*, Report produced for the Economic Analysis Council, Paris, 2008 and MINISTERE DE L'ECONOMIE, DES FINANCES ET DE L'EMPLOI, Rapport de la Commission *Mesure du pouvoir d'achat des ménages* , Report submitted to Christine Lagarde, Paris, 6 February 2008

from their individual viewpoints. Overall, in its absolute form, the concept of purchasing power corresponds therefore with the ratio between the nominal value of income and a price index. The higher this ratio, the greater the purchasing power.

However, rather than considering purchasing power in its absolute form, consumers are more often concerned with how it changes. It is comparative change in income and prices that conditions increases in purchasing power. Changes in purchasing power measure changes in household income, less the rise in price indices for the goods and services that they consume. Therefore, a rise in income increases purchasing power, while a rise in the price indices erodes purchasing power of income.

Disposable income of households refers to gross revenue that includes salaries, interest and dividend income, transfers from other households and transfers paid from governments to persons such as pensions and unemployment benefits, less tax and social security contributions paid. It is the portion of income available to households for consumption and savings[60]. This concept of disposable income includes more than that of simple salary revenue.

Public debate is concentrated essentially on assessing changes in prices. The Consumer Price Index (CPI), which is the denominator in calculating purchasing power, purportedly does not correctly account for the actual dynamic of prices and therefore distorts calculations on changes in purchasing power. In Luxembourg, just as in many Member states of the European Union, the primary objective of the CPI is to measure inflation. The methodology behind its development pursues this objective. However, there is a conceptual difference between inflation and changes in purchasing power that explains why the CPI is at the heart of the controversy confronting the situation described by official statistics and that perceived by households. The methodology naturally presents a certain number of limitations, particularly when the CPI is seen as a measure of change in purchasing power, such as incomplete coverage of consumption by households, the difficulty in measuring the quality impact, etc. In addition to these technical limitations, CPI structuring methodology fails to take into account the impact on prices of a certain number of recent trends observed on consumer markets, such as problems related to arbitration taken up by consumers about varieties of a like product and about distribution channels like hard discount and low cost operations. The CPI measures the change in prices of an exactly identical basket of goods and services between two periods. As such, it strives to evaluate the monetary decline from one period to another. In contrast, it does not attempt to furnish a complete measure of changes in the cost of living, which is the result not only of price increases for each product but also of modifications in the structure of consumption. Constant utility indices such as the CPI do not take into account the regular appearance of new goods that substitute or complement the existing offer and that contribute to transforming consumer preferences. The manner in which households evaluate increases in purchasing power is therefore dependent on the structure of consumption, which is a function of the period: the consumption standard of this epoch.

[60] PROBLEMES ECONOMIQUES, *La controverse autour du pouvoir d'achat*, n°2916, Paris, 2007, p.5

This is why some economists feel that it would be useful to complement this analysis with a Cost of Living Index, which would be based on requiring a break with the fundamental principles of the CPI, to whit, the observation of movement in prices on a set basket of goods. In this case, it would not be a question of discerning the shift in prices for each product as such but of attempting to evaluate changes in what it costs households to meet their needs, and subsequently to summarize expenses households must make to keep up a constant standard of living in the face of changing prices. Maintaining standards of living is often deemed less restrictive than maintaining purchasing power because substitute goods exist that allow consumers to meet their needs "similarly", in spite of any decrease in purchasing power. From this perspective, consumers modify consumption choices in response to changes in price and this substitution mitigates the impact of the price variation, contrary to that which is measured by indices that use a basket of consumer goods. Thus, contrary to current opinion, protecting standards of living does not therefore necessarily imply maintaining a constant level of purchasing power.

Households often confuse the notions of purchasing power and changes in prices. Debate on purchasing power therefore focuses on price increases. Nonetheless, changes in purchasing power depend also in large measure on changes in income[61]. There is a tendency to focus on monitoring the first factor rather than the latter one. Official statistics are reliable, but they relate to the average consumer regardless of socio-professional group, consumption habits or income[62]. *"These indicators are overall indicators. In addition, in order to make international comparisons, they are expressed in the particular language of national accounts, which is quite distant from the accounting language of the cash register that households experience daily*"[63]. Indeed, households are not equally exposed to inflation; depending on the specific characteristics of their expense structuring, they suffer greater or lower degrees of exposure[64]. Although differences between categories are not spectacular, the results by category demonstrate that different classes of households are subjected unequally to inflation and that in particular, prices have changed more rapidly for persons with lower incomes.

[61] LA DOCUMENTATION FRANCAISE, *La relance du pouvoir d'achat, regards sur l'actualité* n°341, Paris, June 2008

[62] PROBLEMES ECONOMIQUES, *La controverse autour du pouvoir d'achat*, n°2916, Paris, January 2007

[63] Excerpts of the contribution of Alain Quinet, Inspector General of Finances in France, Chairman of the Commission for measuring purchasing power of households, at the Bercy economic workshops (Codice) held on 25 March 2008. *Les Notes Bleues de Bercy* - No 351 - 17 July 2008 – Purchasing Power Dossier http://www.minefi.gouv.fr/notes_bleues/nbb/351/pouvoir_achat.pdf

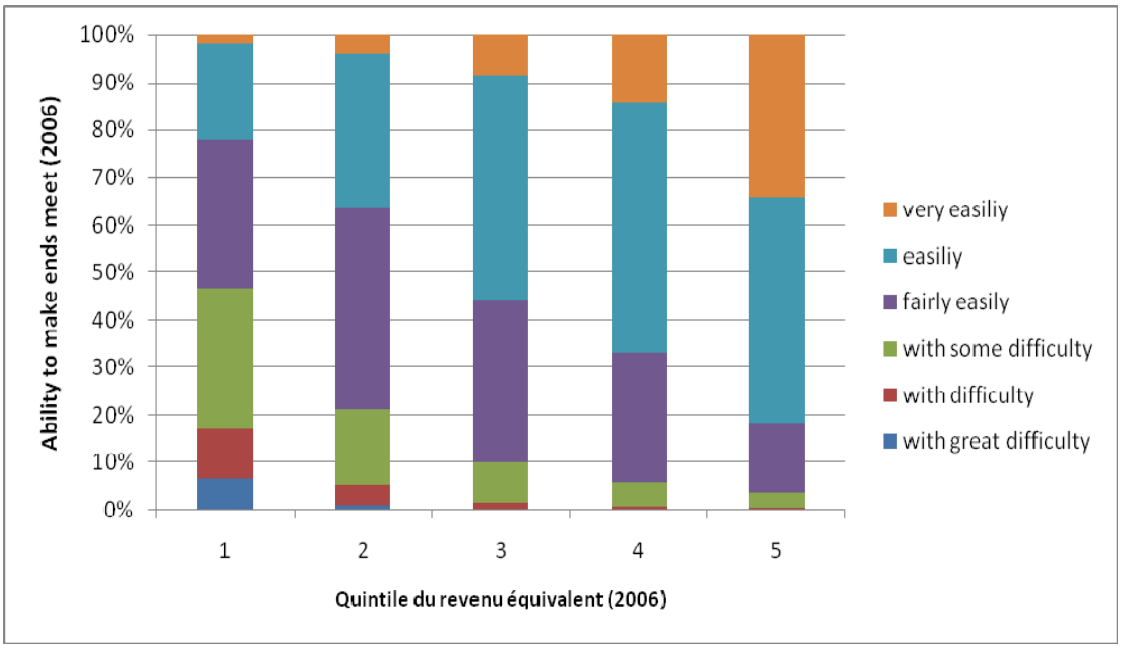
[64] STATEC has just put a personal inflation simulator online. This pedagogic tool is intended to provide a simple illustration of the functioning of the official measure of inflation, the Consumer Price Index. http://www.statistiques.public.lu/fr/economie/ipcinflation/sip/index.html

Frame 2: Purchasing power as perceived in Luxembourg

The European Community Survey on Income and Living Conditions (EU-SILC) provides a comparison of the relative situation of each of the Member states of the European Union through a harmonized format of assembled data[65].

This survey tracks the distribution of total disposable household income[66] using the "make ends meet" variable[67] for 2005 and 2006. One may conclude from the STATEC figures that overall the proportion of households that have difficulties diminishes with increases in income.

Figure 11: Distribution by quintile of equivalized income using the "make ends meet" variable of the EU SILC survey in 2006



Data: STATEC

Data for 2006 show that 6.7% of households whose income falls in the first quintile have great difficulty making it to the end of the month, while this proportion is only 0.9% in the 2nd quintile and 0.3% in the 3rd quintile.

For economists, purchasing power represents the number of goods and services that can be acquired with disposable income. For members of the population, purchasing power represents their capacity to acquire goods and services that make up the standards of the moment. In brief, statistics adopt a macroeconomic perspective

[65] For more details see: STATEC, statnews 54/2004, Luxembourg, 2004
http://www.entreprises.public.lu/actualites/2004/12/15_statnews_54_2004_cohesion_sociale/stat_54_2004.pdf

[66] Total income of a household divided by the number of units of consumption represented by each household member.

[67] Definition: "*The household respondent's assessment of the level of difficulty experienced by the household in making ends meet. A household may have different source of income and more than one household member may contribute to it. Thinking of the household's total monthly income, the idea is with which level of difficulty the household is able to pay its usual expenses*".

where households tend to consider things from their individual viewpoints[68]. Many new studies are concentrating on this issue and have shown that pessimism concerning the purchasing power of households is apparently bolstered by the impression that wages are falling[69] and that individual situations are different. This tends to increase the gap between perceptions of purchasing power and the effective calculation of the phenomenon.

Frame 3: Calculating purchasing power

This frame[70] offers an estimate of changes in purchasing power of households in Luxembourg. Changes in purchasing power sidestep the automatic indexing of salaries system, which is intended to offset price increases by adjusting salaries, because they include components of income other then salaries alone. Later, these changes will be compared to those in other European countries in order to determine what position Luxembourg holds in this area.

In its simplest definition, purchasing power corresponds to the quantity of goods and services that can be purchased—that is consumed—for a given income. Rather than considering purchasing power in its absolute form, consumers are more often concerned with how it changes. From the consumer's viewpoint, the goal is to increase their purchasing power, or at least to keep it intact. In other words, consumers ensure that the prices of goods and services they consume do not rise faster than their incomes.

In view of changes in the prices for goods and services, it is appropriate to account for changes in the CPI, or the inflation rate. Incomes are more complex to ascertain. On the macroeconomic level, salaries make up a significant part of income, but there are other variables. By considering only changes in average salaries with relation to inflation, a measure of what could be called 'purchasing power of wages', as opposed to overall purchasing power. Here we must introduce the concept of disposable income, because this is what will be used to determine changes in income within the framework of this analysis of changes in purchasing power. Disposable income includes income for personal activity, be it salaried or unsalaried, asset-based income from property or securities, transfers from other households and income paid by governments to persons, such as pensions and unemployment benefits, less taxes and social contributions. This disposable income may be gross or net income - depending on whether or not collective services provided to individuals such as health or education services are included—and in-kind services.

Price and income data are available for 22 European countries. The HCPI index (Harmonized Consumer Price Index) is used for consumer prices, except in the case of Luxembourg where it is

[68] MOATI P., ROCHEFORT R., *Mesurer le pouvoir d'achat*, Report produced for the Economic Analysis Council, Paris, 2008

[69] In Luxembourg, modulation of wage and salaries indexing for the period 2006-2009 could have increased this feeling of anxiety while disposable income rose.

[70] STATEC, *Note de conjoncture* 3-2007, Luxembourg, February 2008. http://www.statistiques.public.lu/fr/publications/conjoncture/noteConjoncture/index.html

more appropriate to work with the domestic index, the National Consumer Price Index[71] (NCPI). Eurostat data with a simplified sequence of sector accounts and net disposable income of households is used for disposable income, except, again, for Luxembourg. Indeed, Luxembourg does not yet have available national accounts and net disposable income must be estimated. To accomplish this, STATEC calculated a net disposable income for households based on certain data taken from national accounts. The starting point is labour costs, less employer contributions. International organization employees residing in Luxembourg, who do not belong to the domestic labour base and are therefore excluded from national data, are included, with the assumption that average labour cost for each of them is 1.5 times that of Luxembourg national wage earners. In addition to this are added self-employed workers for whom it is assumed the average labour cost is identical to Luxembourg nationals. From this is obtained a total of wage and salary costs, less employer contributions, that represents the entire working population; cross-border workers are also excluded from this accounting. Employee contributions are deducted from this sum, and government social disbursals are added back in. Imputed rents are added in and considered imputed in the sense that owners of housing units are supposed to pay in exchange for use of their housing unit. Imputed rents are considered an expense, or a unit of consumption, and must therefore be included in disposable income. Next, taxes paid by physical persons are deducted while a purely nominal fraction, 20%, of the operating surplus of non-financial resident companies, is added to account for households' participation in profits as shareholders.

Purchasing power in a country is strongly influenced by the development of its population. A country that has experienced major immigration trends, which is often related to a dynamic labour market, will naturally tend to record more rapid income levels than a country whose population is declining. In order to eliminate this effect, changes in disposable income are diminished by changes in population. In other words, only changes in purchasing power per inhabitant are taken into account for the European comparison. The period examined is from 1991 to 2006 for Luxembourg data, and from 2000 to 2006 for the European comparison.

Purchasing power, the real net disposable income per inhabitant, grew by 2.4% per year from 1991 to 2006 in Luxembourg. Changes in purchasing power generally follow economic cycles relatively closely because incomes have the tendency to increase more rapidly in periods of strong growth. This can be confirmed as well for Luxembourg, which nonetheless broke away rather sharply in 2001 and 2002. This can be explained by the impact of the tax reform that was instituted during this period (see below). The last economic resurgence, which began in 2004, coincides with a rebound in purchasing power, but it seems to be somewhat limited against the backdrop of historical data. From 2004 to 2006, purchasing power rose an average of 0.9% in contrast with the long-term average of 2.4%, while during the same period, economic growth registered 5.3% per year, which was higher than the long-term average rate of 4.3% from 1991 to 2006.

[71] The HCPI is not appropriate for Luxembourg, because in accords exaggerated weighting to products subject to excise tax such as fuel, tobacco, etc. The index is calculated on the basis of internal consumption, meaning residents and cross-border persons, and not on domestic consumption of solely residents. A decidedly marked difference between the HCPI and the NCPI has been observed in recent years for Luxembourg, as they have been characterized by simultaneous increases in fuel and tobacco.

Remember that due to the automatic adjustment of salaries to inflation mechanism, Luxembourg households have a guarantee for maintaining their purchasing power of wages, which makes up part of their overall purchasing power, as seen earlier. Any adjustments to the automatic indexing system naturally generate an impact on the purchasing power of households.

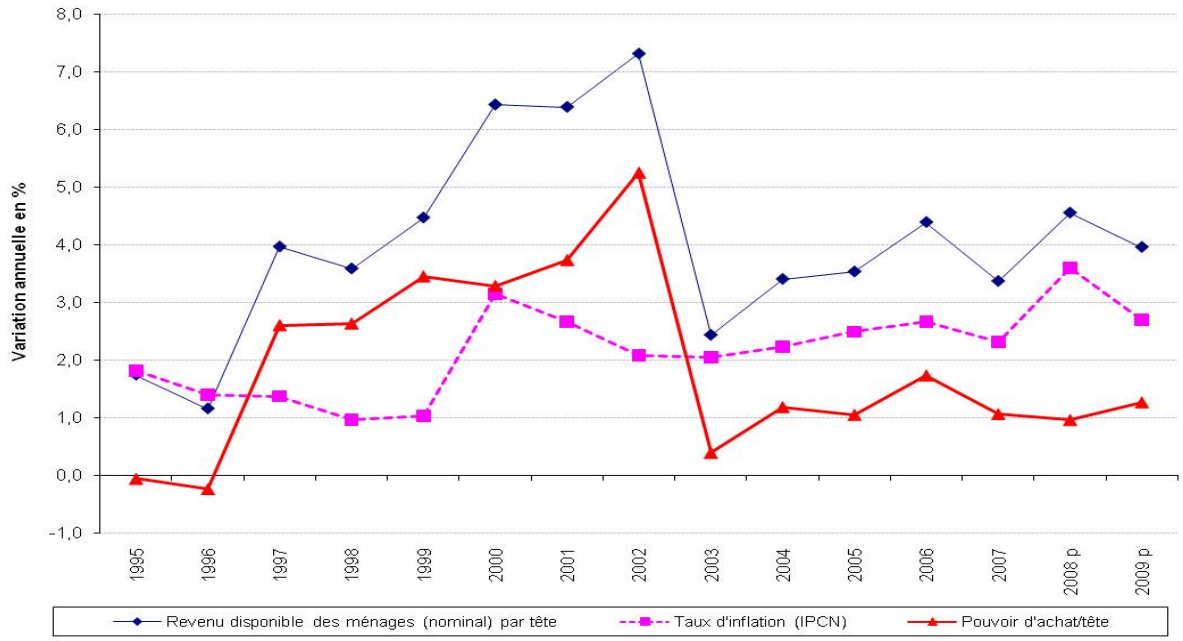
Between 2000 and 2006, the purchasing power of Luxembourg consumers increased by 2.1% per year, twice as rapidly as elsewhere in the euro zone for that period. Graph movements recorded on the two series have very strong similarities, with the notable exception of 2002. It must be remembered that the tax reform of 2001-2002 bore a major (and positive) effect on income of households in Luxembourg, as well as to the adjustment of the tax status of physical persons[72]. When the contribution of each component that affects changes in the nominal value of household income is analyzed, the years 2001 and 2002 are set apart by the fact that contributions to taxes, which generally fall as incomes rise, are positive. It can also be seen that the wage component has a tendency to contribute more over the years that the economy shows vigor. The reform, to give an idea of its size, corresponds to a lessening of the tax burden on households in the order of nearly 500 mn euros, roughly 2 GDP points. If the years 2001 and 2002 are omitted from the comparison, the resulting increase in purchasing power is only 1.2% per year in Luxembourg, which would still slightly exceed the average for the entire euro zone by 0.9%.

According to STATEC (June 2008) annual change in purchasing power is estimated at 1.1% in 2007 for Luxembourg. The latest macroeconomic forecasts used by STATEC show an annual change of 1.0% in purchasing power for 2008, and of 1.3% in 2009[73].

[72] For more information on the specifics of this reform, see the file on the reform on the Government site. http://www.gouvernement.lu/dossiers/economie_finances/refiscale/index.html

[73] http://www.statistiques.public.lu/fr/communiques/economie/prix_salaires/2008/09/20080915/index.html

Figure 12: Change in disposable income per inhabitant and in purchasing power (1995-2009)



Source: STATEC

4.2.2 An international comparison: distinctions between notions of wealth, purchasing power and the cost of living

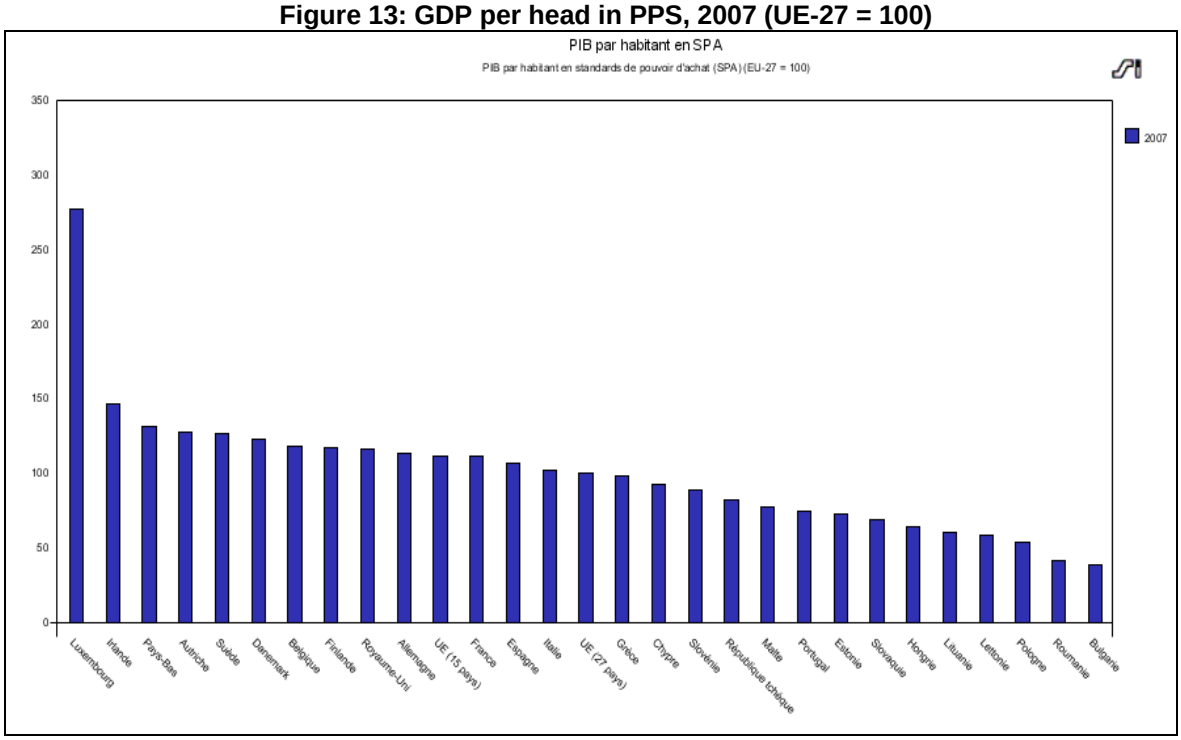
The GDP per inhabitant ratio is often taken to mean - especially by the press - an indicator for comparing purchasing power ("pouvoir d'achat" - "Kaufkraft") between countries[74]. In point of fact, it is a national accountancy indicator that measures wealth and standards of living in general, which are much broader concepts than simple purchasing power[75]. As an example, for 2007, Luxembourg was placed at 276 on an index for which the average for the EU-27 was 100. Luxembourg holds the first position in terms of wealth, far ahead of Ireland (146) and the Netherlands (131). Notwithstanding, for Luxembourg, which is largely open to a cross-border movement of factors, this wealth indicator leads to biased comparisons. It does not take into account the commuter factor and therefore overvalues the country's

[74] See the newspaper "d'WORT": *Kaufkraft : Luxemburg klarer EU-Spitzenreiter*, Luxembourg, 27 June 2008

[75] The Gross Domestic Product (GDP) indicator per inhabitant as a standard for purchasing power is often used to measure wealth within the various territorial entities throughout the world. However, this indicator seems to be used in many other applications, such as an indicator of purchasing power. As has been reiterated during the *Vers de nouveaux indicateurs de richesse* colloquium, "GDP is not an *'eierlegende Wollmilchsau'(…)*» that can be used whenever the need arises.
http://www.odc.public.lu/actualites/2006/07/12_ind_rich/statec.pdf
MINISTERE DE L'ECONOMIE ET DU COMMERCE EXTERIEUR, *Bilan Compétitivité 2006 - En route vers Lisbonne*, Luxembourg, September 2006, pp. 24-26
For more details regarding indicators of wealth, see Chapter 7 - *Indicateurs synthétiques de qualité de vie, de développement humain, de progrès social du présent rapport*.

economic performance. For this reason it is preferable to base comparisons on Gross National Income (GNI)[76] per inhabitant, which accounts for returns on the factors of labour and capital of the others as well. If this indicator is used as a reference, Luxembourg is indexed at 228, still in first place although with less of a gap, ahead of the Netherlands (136) and Austria (127), with the UE-27 average at 100[77].

Figure 13: GDP per head in PPS, 2007 (UE-27 = 100)



Source: Eurostat

Other studies analyze purchasing power through price and income surveys. For example, the UBS – Prices and Earnings study[78] concentrates on 71 world cities and a basket of 121 goods and services. Data on prices registered were matched with those of wages earned by workers, which does not imply their disposable income. These calculations were based on data concerning wages, social contributions and time spent at work for fourteen professions spread throughout the world. When disposable income is compared to prices, a purchasing power index is obtained. According to UBS, salaries in Zurich, Geneva, Dublin and Luxembourg are highest for the numbers of hours worked.

[76] Gross National Income is Gross Domestic Product plus primary incomes, less income paid to all others. Comparisons are made in PPS to account for the different price levels between countries.
[77] See Chapter 6 – Competitiveness Scoreboard of this report.
[78] UBS, Prices and Earnings – A comparison of purchasing power around the globe, March 2008

Tableau 3: TOP-20 cities where domestic purchasing power including rents is the highest

City[3]	Salaire horaire brut[1] Zurich = 100	Salaire horaire net[2] Zurich = 100
Copenhague	103.2	77.4
Zurich	100.0	100.0
Berlin	99.2	89.5
Genève	98.1	94.5
Francfort	95.6	86.5
Bruxelles	95.3	79.5
Oslo	93.0	81.6
Munich	90.3	83.2
Luxembourg	84.0	90.9
Helsinki	83.9	81.6
Sydney	82.1	81.1
Auckland	81.9	84.8
Vienne	80.7	77.2
Amsterdam	80.7	70.5
Chicago	80.7	80.1
Los Angeles	80.1	83.4
Stockholm	79.9	70.6
Dublin	79.7	87.5
Montréal	79.1	76.4
Toronto	78.9	79.2

Source: UBS (March 2008)

Note: (1) Gross hourly wage divided by the cost of the entire basket of commodities including rent.
(2) Net hourly income divided by the cost of the entire basket of commodities including rent.

GfK publishes an annual study on purchasing power in forty European countries[79], using a disposable income perspective[80]. With average purchasing power of €27,395, Luxembourg is ranked behind Switzerland and Liechtenstein in 2nd position. France (9th), Germany (10th) and Belgium (12th) are ranked behind Luxembourg. Ireland is ranked first in terms of growth.

[79] The "GfK Purchasing Power Europe" study is conducted each year and covers forty European countries. Purchasing power represents net annual income including government allocations. http://www.gfk-geomarketing.com/

[80] It includes transfers from the government, such as unemployment benefits, allocations for children and pensions.

Table 4: Purchasing Power Per Capita 2007, TOP-20

Country	Rank in 2006	Rank in 2007	Purchasing Power 2007 per capita in EUR
Switzerland and Liechtenstein	1	1	27,521
Luxembourg	2	2	27,395
Norway	3	3	24,993
Ireland	6	4	22,207
Denmark	4	5	21,521
Iceland	5	6	20,511
UK	7	7	19,863
Austria	8	8	18,960
France	9	9	18,873
Germany	10	10	18,055
Sweden	13	11	17,217
Belgium	11	12	17,143
Finland	12	13	16,882
Italy	14	14	16,617
Netherlands	15	15	15,814
Spain	16	16	13,431
Cyprus	17	17	12,344
Greece	18	18	12,203
Portugal	19	19	9,674
Slovenia	20	20	8,851

Source: GfK (November 2007)

MERCER publishes an annual Cost of Living index that includes the major business centers throughout the world[81]. This index uses the price perspective and ignores income. In 2008, the study took in 143 cities in six continents and measured comparative costs of 200 goods including lodging, transportation, food, clothing, etc. The study is intended to help multinationals and governments to set compensation for their internationally based employees. On the worldwide level, Moscow is the most expensive city, followed by Tokyo and London. Luxembourg holds the 43rd position, identical to 2007. On the European level, numerous cities are more costly than Luxembourg. In the above table, Luxembourg is used as a benchmark with an index rating of 100. Luxembourg occupies the 23rd rank on the European level and thus is less expensive than many nearby cities such as Paris (7th; +19.8% more costly), Amsterdam (12th; +6.2% more costly), Brussels (21st; +1.8% more costly), Frankfurt (22nd; +1.3% more costly).

[81] MERCER HRC, Worldwide cost of living survey 2008 – City ranking, London, 24 July 2008
For more information see: www.mercer.com/costofliving

Table 5: *Cost of living survey 2008* – Rank of European Cities (TOP-25)

Rank	City	Cost of living index 2008
1	London	136.9
2	Oslo	129.6
3	Copenhagen	128.4
4	Geneva	126.8
5	Zurich	123.4
6	Milan	121.9
7	Paris	119.8
8	Dublin	113.8
9	Rome	113.8
10	Vienna	112.0
11	Helsinki	110.7
12	Amsterdam	106.2
13	Athens	106.2
14	Madrid	105.9
15	Prague	105.1
16	Barcelona	104.3
17	Stockholm	104.3
18	Warsaw	104.1
19	Munich	102.0
20	Berlin	101.9
21	Brussels	101.8
22	Frankfurt	101.3
23	**Luxembourg**	**100.0**
24	Bratislava	99.2
25	Düsseldorf	99.0

Source: MERCER HRC (2008)
Note: Luxembourg = Base 100, calculations by *Observatoire de la Compétitivité*

In conclusion, the studies presented above show that regardless of the yardstick by which it is measured, Luxembourg occupies a favorable and enviable position in when compared internationally.

4.3 Cost and price competitiveness

In discussions centering on inflation, cost and price competitiveness of companies established on national territory cannot be ignored, especially from the medium and long-term perspective[82]. In this framework, the real effective exchange rate allows macroeconomic comparisons of domestic and foreign prices expressed in a common

[82] The term "competitiveness" used here refers only to competitiveness in international exchanges. It must not be confused with competitiveness of an economy, which is a much broader concept having the following definition: "The capacity of a nation to durably improve the standard of living of its inhabitants and to procure for them a high level of employment and social cohesion while preserving the environment."

currency and thus furnishes a measure of competitiveness[83]. From the cost perspective, nominal domestic unit labour costs - the cost of labour by unit of added value produced - are compared to costs incurred by a country's trading partners. In particular, if within a monetary union one country's internal inflation rate is lower than the average, it becomes more competitive than other countries. Inversely, a country that registers a higher inflation rate drops in terms of competitiveness. Over time, this phenomenon tends to increase demand within a country with a favorable inflation differential and reduce it in the others[84].

Nonetheless, use of these indicators and the conclusions that may be drawn from them does not necessarily meet with the agreement of the social partners. For example, the CEP-L criticized the use of the CPI (IPCN) inflation rate as an indicator of Luxembourg's competitiveness because of the numerous methodological limitations that weigh it down, such as the fact that consumer prices are largely sheltered from international competition and that they do not well represent all productive activities of Luxembourg[85]. The Chamber of Commerce feels that the real effective exchange rate, and therefore the inflation rate, is an appropriate measure of competitiveness, although it could be perfected. For the Chamber, the REER is readily available, less volatile than other indicators and is used by many national and international institutions to gauge the competitiveness of the Luxembourg economy[86].

4.4 Controlling excessive inflation Luxembourg

4.4.1 The Tripartite Coordination Committee reform package

The Tripartite Coordination Committee selected inflation control as one the of the six major reform areas in its April 2006 session[87]. The social partners and the Government agreed on a group of measures that take into account the double constraint of "*preserving households' purchasing power*" and "*cost competitiveness of Luxembourg companies* ".

[83] MINISTERE DE L'ECONOMIE ET DU COMMERCE EXTERIEUR, *Bilan Compétitivité 2007 - En route vers Lisbonne*, Luxembourg, September 2007, pp. 125-147
[84] See Chapters 2 and 3 of this report.
[85] CEP-L, *L'inflation au Luxembourg de 1999 à 2007: mythes et réalités*, dialogue analysis n°4, May 2008
[86] CHAMBRE DE COMMERCE, *Les effets de l'inflation vus par la Chambre de Commerce*, in MERKUR, Luxembourg, July/August 2008, pp. 58-59
[87] MINISTRY OF STATE, *Avis du Comité de coordination tripartite*, Luxembourg, 28 April 2006

Following the Tripartite Coordination Committee meeting and numerous exchanges of viewpoints with the social partners, federations and NGOs concerned, an action plan to combat excessive inflation began to take shape and was submitted to the Government Council. The Council stressed that prudence must be exercised in using genuinely effective instruments in the Government's arsenal and in evaluating the actual scope in the fight against such an incontestable phenomenon as inflation. Neither must it be forgotten that the policy of controlling excessive inflation is the shared responsibility of all the social partners and players in the public arena. Lastly, this action plan also listed a series of available measures for use to better control excessive inflation, based on the Tripartite Coordination Committee Opinion.

Frame 4: Excerpts from the Tripartite Coordination Committee Opinion

"*The social partners and the Government are convinced of the necessity to lower the level of inflation in the Grand Duchy and thus agree on a group of measures to better control inflation and core inflation.*

To this end, voluntary sales price control agreements will be concluded with various economic sectors. To monitor changes in the competitiveness of Luxembourg trade compared to that of surrounding regions, a comparative price indicator for the Greater Region will be introduced. Contracts concluded with the Government will be de-indexed by limiting the impact of indexing on only the volume of payroll in the contracts. Rules and practices for imports will be reviewed from the perspective of European Competition law. A revitalization policy will be implemented by the Government through better synergies between the Competition Council and the Competition Inspectorate.

The Government will pursue a prudent policy in preventing jolts in administered prices.

Increases in existing taxes and excise duties and new taxes and excise duties on certain goods to be allocated to achieving ecological or public health objectives will be neutralized from the wage indexation mechanism. This includes fuel taxes for increasing the Kyoto mechanism financing and the increase of water prices that will come about as a result of the implementation of directive 200/60/CE of the European Parliament and the Council on 23 October 2000 that establishes a framework for a community policy in the area of water. The objective of this policy of neutralizing price increases is to eliminate the negative impact of their repercussion on inflation transmitted through the wage indexation mechanism.

In order to limit the impact of high inflation, the social partners and the Government set the application rates of the wage indexation mechanism for 2006-2009

- The next application, which was to enter effect in August according to the last forecast, is put off till December 2006.

- No application will be used in 2007, as it is understood that the social partners and the Government agree to limit the wages indexing mechanism for 2006, 2008 and 2009.

- The application that current forecasts call for in 2007 is carried forward to January 2008. It will be moved back by two additional months, to March 2008 should the price of Brent exceed USD 63 on the average for the remainder of 2006 and 2007. In this case, increases in the price of oil will be offset by an increase of the heating allocation in 2008.

- The next application will not be set before 1 January 2009. Application of the adjustment mechanism tied to changes in oil prices is also valid here, which can be pushed back to 1 March 2009, if necessary.

These measures will be applied until 31 December 2009. The Government to be formed after the next elections will have to determine what to do about these measures, depending on changes in the economic, social and financial situation of the country.

Source: Ministry of State (April 2006)

4.4.2 Implementing the action plan to counter excessive inflation

a. Voluntary pricing agreements with different sectors of the economy.

Free price formation and competition is the rule for the quasi-totality of Western economies. Free price formation is also a political objective of the European Union[88]. Setting prices or inflation rates is therefore not an option through regulatory or legislative means. In Luxembourg, the Law dated 17 May 2004 relating to competition set free pricing as the general rule in Article 2: "Prices of goods and services are set freely through competition *(…)*"[89]. Since then, pricing supervision has become the exception, rather than the rule. Now public authorities, rather than acting directly on pricing policies, must set the rules of competition on the market each time the free play of competition is distorted or risks distortion. Recent abrupt price increases - and to a lesser extent, those occurring during the transition to the euro - have propagated a feeling of suspicion with regard to suppliers, who they suspect of taking advantage of circumstances in order to profit at the expense of consumers. The objective of voluntary pricing agreements is to promote transparent and well-grounded pricing policies for goods and services. Through these pricing agreements, professionals are requested to show their commitment to and support

[88] Parliament, *Projet de loi relative à la concurrence n°5229*, Luxembourg, 13 November, 2003, p.30
[89] http://www.legilux.public.lu/leg/a/archives/2004/0762605/index.html

of these principles and to shield consumers. Voluntary pricing agreements must therefore be considered from the perspective of awareness actions by economic players, who are encouraged to pursue self-regulatory practices.

Frame 5: Voluntary Pricing Agreements: the Fair Price Charter - *Eis Präisser si korrekt !*

Voluntary pricing agreements were signed at the end of February 2008 between the Ministry of the Economy and Foreign Trade, the Ministry of the Middle Classes, Tourism and Housing, Luxembourg Trade Confederation, the Federation of Craft workers and HORESCA[90].

The objective of this Charter is to promote the use of transparent and well-grounded pricing policies for products and services. Professionals wished to manifest their commitment and support of these principles. They are aware that consumer confidence is one of the pillars of customer loyalty and wish to actively collabourate with the Government in fencing in inflation that is harmful to the economy and to consumers' purchasing power. At the same time, the environment in which professionals operate is one subject to international competition and economic pressures that influence their pricing policies domestically. The Charter stipulates that professionals promise to implement four proper pricing commitments. Members of the Luxembourg Trade Confederation, the Federation of Craft workers and HORESCA have all:

- Agreed to promote the Charter among their members and among consumers.

- Expressed their support for fair pricing practices. Neither general pressure on prices nor changes in wages, salaries, pensions or annuities that may result from triggered increases in the sliding of salaries can serve as a pretext to impose excessive or covert price increases on consumers.

- Extended the role of watchdog to ensure that the terms of the Charter are applied to the Consumer Council[91], which is made up of representatives of the Government, consumers and professionals under the aegis of the Ministry of the Economy and Foreign Trade.

- Expressed their support for collabouration with the Consumer Council by providing it with price data on a periodic basis so that it may perform its monitoring duties as prescribed by this Charter.

Source: Ministry of the Economy and Foreign Trade (2008)

b. A comparative price indicator for the Greater Region

Luxembourg has a small, open economy that is incorporated into a larger territorial area, the Greater Region. It is very important in this situation to possess an instrument for cross-border price comparisons. The purpose of setting up a comparative price indicator in the Greater Region is both to determine prices and

[90] http://www.eco.public.lu/salle_de_presse/com_presse_et_art_actu/2008/02/29_inflation/acc_volont__prix.pdf
[91] For more information on the Consumer Council see:
http://www.eco.public.lu/attributions/dg2/d_consommation/protection_consomateurs/annexe_3/index.html

changes in prices in Luxembourg as compared with those in its border regions of Germany, Belgium and France.

Frame 6: Getting a Comparative Price Index for the Greater Region

An analysis of available literature indicates only scant supplies of information that is reliable, comparable and available to the public in the area of trans-border price comparisons[92]. Still, several qualitative and quantitative surveys have been carried out over the last decade that provide some indication of cross-border price comparisons[93]. Existing surveys were reviewed before a specialist company called Nielsen was commissioned to perform an initial comparative study in 2006.

Nielsen's scope was limited to consumer goods in the initial phase of the survey. One major observation was made with relation to product offer. Only a very small percentage of identical products exist that are available in all four countries in the region, representing 2% only of products used in Luxembourg. A rather significant proportion of products exist that are exclusive to individual countries: 30% of products listed in Luxembourg are found only in Luxembourg, 28% only in Belgium, 82% only in France and 82% only in Germany. Of identical products available in all four regions, in other words, fully comparable items, it can be said that in terms of price the Luxembourg, Belgian and French indices are near the average for the Greater Region. Only Germany appears to have significantly lower prices when comparing indices: LU – 101.8; BE – 103.9; FR –101.8 and DE – 92.5. If all products held in common by at least two countries are listed in an aggregate index, two salient observations can be made. First, overall the same result is noted in terms of price. Second, between November 2006 and November 2007, France increased its level of competitiveness significantly in the Greater Region, and to a lesser extent, so did Luxembourg. Looking at the change in price between November 2006 and November 2007 by region, it was France that recorded the lowest change in price by far, with an increase of only 0.4%. Luxembourg was second, with 2.4%, followed by Belgium at 2.8% and Germany with 3.5%.

In the second phase, the researchers decided to broaden the survey to other non-food sectors in order to comprehend the problematic from a more global perspective, notably in light of results of the STATEC "Household Budget" survey, which gives an indication of what share of household budgets are spent by Luxembourg citizens to purchase goods outside of the country, by product category. This represents the logical next step of a study whose first stage centered on food items in large stores. This second analysis was methodologically more complex that the food sector survey as researchers had to address the dual problematic of whether the brand-store-product grouping was truly representative and whether products were comparable. In view of the overall lack of identical products for a trans-border non-food comparison, Nielsen based the analysis on a basket of products

[92] It is noteworthy that the European Commission is taking progressively greater interest in this issue, manifested by its involvement in a Consumer Markets Scoreboard, in which the price variable makes up one of five basic indicators. European Commission, First Consumer Markets Scoreboard - Monitoring consumer outcomes in the single market: the Consumer Markets Scoreboard, SEC(2008) 87/2, Brussels, 29.1.2008

[93] See. Ministry of the Economy and Foreign Trade, *Vers un indice comparatif des prix dans la Grande Région*, *in Bilan Compétitivité* 2007 – the Road to Lisbon, Luxembourg, September 2007 http://www.odc.public.lu/publications/perspectives/index.html

containing “identical” products, if available, and “lowest price consumption unit”. Identification of the lowest price offer was accomplished using identical and indisputable physical characteristics, as follows: Plate / China / Flat / Smooth / Diameter 22 cm.

In all, the researchers analyzed 378 products, 19% of which were identical, brand name products and 81% of which were the lowest price consumption units. Survey results show that average indices within the Greater Region reveal comparable data on identical products and that the Luxembourg indices are relatively high when pricing the lowest price consumption units. However, according to Nielsen, recorded differences were minor overall and quite meaningless

Source: NIELSEN, Ministry of the Economy and Foreign Trade (2008)

c. Desindexation of contracts concluded by the State

The objective of desindexation of contracts concluded by the State is to limit repercussions of automatic indexing clauses in public contracts and to give more weight to negotiations[94] with a view to containing the impact of self-igniting inflation. The anticipated effect of this action is a potential lowering of costs and consequently expenditure by the State. This measure is expected to bring about an improvement of the budgetary situation and discourage the State from raising taxes, sales tax and fees.

d. Rules and practices regarding imports

The general framework used in importing goods and services in a country can influence both levels and changes in prices. As an example, sales prices consumers pay and margins that vendors realize may be dictated from abroad and geographic segments can lead to exclusivity contracts or to making certain products unavailable on the market, sales outlets could be limited, etc. Companies in a small economy that have proportionally little bargaining power with foreign multinational suppliers because of the size of the market are especially affected by these types of purchasing terms. These types of terms penalize companies and indirectly put a strain on purchasing power[95]. The expected impact of improvements in supplying Luxembourg companies is a potential lowering of import prices that could lead to lower consumer prices.

[94] See also the Law dated 30 June 2003 on government markets, *Section III. Adaptation du contrat* , p.65
[95] Also look in the *Merkur* section of the CHAMBER OF COMMERCE, May 2008, p.23 et http://www.clc.lu/incacontent/upload/Communiqué%20de%20presse%202008%2006%2019.pdf

e. A policy for reinvigorating competition.

Sustained and vigorous competition forces companies to reposition themselves constantly with relation to changes in production techniques, product and services features, pricing, etc., in order to remain competitive. Over time this leads to a diversification of goods and services, improvements in quality of goods and services and reductions in cost as well as sales prices of these items. The anticipated effect of this action is to increase productivity in companies in the long term while restraining price increases and augmenting the potential offer[96].

Frame 7: Draft law to amend the Law dated 17 May 2004 on Competition (5816)

The Government has submitted a draft law[97] to optimize synergies between the Competition Committee and the Competition Inspectorate. This measure intended to revitalize competition aims at providing the Competition Committee the means of legal action required to carry out active and vigorous policies to promote increasing the free play of competition.

f. A prudent policy in adapting administrated prices

Public service charges have a direct impact on inflation. They make up part of the various internal factors that push inflation rates upward. Specific political decisions in the area of adapting public service charges can therefore have an impact on changes in the inflation rate. The Government decided to set up a procedure for a mandatory review of the impact of increases in public service charges on the inflation rate before implementing an increase[98]. It is also temporarily deferring all increases in administrated prices and invited municipalities to follow suit in April 2008. "*The Government has decided (…) to freeze administrated prices for the remainder of this year and the entire upcoming year*"[99].

Frame 8: What is the issue with administered prices?

Over the past year, administered prices have become a major economic policy theme in Luxembourg and throughout the European Union on the whole. The argument against them can be broken down

[96] For more details see: http://www.concurrence.public.lu/
[97] Draft law to amend the Law dated 17 May 2004 on Competition (5816). http://www.chd.lu/fr/portail/role/default.jsp
[98] http://www.mcm.public.lu/fr/admin/espace_administrations/procedure_analyse_flux/index.html.
[99] Also see the Government's statement on the economic, social and financial situation of the country in 2008 as presented to Parliament by the Prime Minister a. http://www.gouvernement.lu/gouvernement/etat-nation/etat-nation-FR-2008/index.html

into two sections. Firstly, changes occur more rapidly with them than on the general level of prices and secondly it is said generally that too many prices are administered.

What exactly are administered prices? From a restrictive legal perspective, the definition should read prices that are determined by a governmental or regional administration, or those subjected to a previous accord. A definition with a wider perspective would include all prices influenced in one way or another by the State. Yet neither of these definitions can adequately account for government influence on prices and markets.

Interestingly, at the current time there exists no precise or harmonized definition of the term "administered prices", either on the European or national level. It is not easy to distinguish between prices determined by market mechanisms and those set by the public authorities. On the European level, work is currently underway to compile administered prices from among the ECB, the Central Banks of the Member states and EUROSTAT. In Luxembourg, definitions currently used with regard to administered prices lack any homogeneity and differ from each other far too often[100]. In Switzerland, the Price Monitoring Unit of the Federal Economy Department[101] has also delved into an exercise in typology and uses the following four categories as a reference point:

- Directly administrated prices: A government administration intervenes directly in the setting of prices, either by determining them or by means of a prior agreement.

- Public monopoly-related prices: "Free" prices of goods and services of the State, or of companies in which the State is a majority shareholder, in a monopoly.

- Fiscally influenced prices: Prices for goods and services that are influenced in a targeted or significant manner by means of taxation or subsidies.

- Prices indirectly influenced through regulatory means: Prices for goods and services that are significantly influenced through a type of government or regulatory intervention.

[100] STATEC, *Note de conjoncture* n°3-06, Luxembourg, pp. 35-36 and STATEC, *Note de conjoncture* n°3-07, Luxembourg, p.33
http://www.statistiques.public.lu/fr/publications/conjoncture/noteConjoncture/index.html
CEP-L, *Prix administrés: des hausses toujours marquées*, *econews*, 28 February 2007 and CEP-L, *Un gel des prix administrés qui intervient après de fortes hausses*, *econews*, 29 April 2008
http://www.cepl.lu/ceplweb/econews.htm
BCL, Annual Report 2006, Luxembourg, p.24 http://www.bcl.lu/fr/publications/rapports_annuels/index.html
BCL, Nominal rigidities and inflation persistence in Luxembourg: a comparison with EU15 member countries with particular focus on services and regulated prices, Study n°14, Luxembourg, April 2005, p.4
http://www.bcl.lu/fr/publications/cahiers_etudes/index.html
[101] DEPARTEMENT FEDERAL DE L'ECONOMIE, *Administrierte Preise: Rechtssituation, Okonomie und Inventarisierung*, Berne, April 2005

g. Neutralization and modulation of the wage indexation mechanism

The objective of the policy of neutralizing certain taxes and duties from the vista of the *wage indexation mechanism* is to eliminate the negative impact of these taxes and duties on inflation. In addition, the application of the mechanism was set legally for the period 2006-2009 with the object of containing the self-igniting effects of inflation.

Frame 9: Projections on wage indexation[102]

The threshold quotes were exceeded in June 2008, triggering a 2.5% increase in salaries as from 1 March 2009, in accordance with the law dated 27 June 2006, which adapts certain application methods to the wage indexation mechanism.

According to STATEC projections of 7 July 2008, the half-yearly average for applying the wage indexation mechanism will be reached in the first half of 2009 and again in the first half of 2010. Therefore transition to the next wage indexation will be triggered in the first half of 2009. However, legislation that is currently in effect stipulates that "*no other adaptation can occur from 2006 to 2009*".

Table 6: Projected inflation and forecasts of upcoming application in the period 2008-2010

	Taux d'inflation			Prochains dépassements du seuil de déclenchement d'une tranche indiciaire		
	2008	2009	2010			
Scénario bas	3.7	2.7	2.7	avril-09	avril-10	2011
Scénario central	3.8	2.9	2.8	mars-09	février-10	2011
Scénario haut	3.9	3.1	3.0	février-09	janvier-10	octobre-10

Source: STATEC

In the short term, it is expected that this measure will a negative impact on disposable income of households, but in the long term a positive impact should come about through a lowering of production costs and an improvement in the competitiveness of Luxembourg companies, benefits of which will also be shared by employees.

h. Access to better pricing information

One of the simplest measures of making the pricing system more transparent consists in providing access to better pricing information. The objective of implementing this type of policy is to limit the rise in prices. The Ministry of the Economy and Foreign Trade began to intensify its efforts in the area of sector pricing

[102] See parliamentary question 2686 on 9 July 2008 by Deputy Gast Giberyen to the Minister of the Economy and Foreign Trade concerning projections on index groupings.

studies to this end. The Luxembourg Consumer's Union (ULC) was asked to contribute to increasing transparency in the markets and to give consumers a means for comparing prices and quality[103]. In this same vein, STATEC intensified its information dissemination program toward the general public. In this context, it put a report online dealing with the consumer price and inflation index and stepped up promotion in the press of its evaluation mechanisms for monitoring changes in prices[104].

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[103] As an example, see ULC, *Enquête de prix: Le panier de la ménagère*, de Konsument, Luxembourg, June 2008. http://www.ulc.lu

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5 Benchmarks of Competitiveness and Attractiveness

5.1 Introduction

The debate about territorial attractiveness and competitiveness is regularly resumed on the national level through the publication of rankings and composite indicators by international organizations, even though at present the public economic policy debate in Europe appears to bear on purchasing power and inflation issues[105]. Competitiveness studies that address structural issues have been somewhat pushed away from the center of public discussions in favor of such analyses as the UBS – Prices and Earnings study[106] that focus on purchasing power[107].

In the competitiveness and attractiveness debate, the best-known rankings are that of the World Economic Forum (WEF),[108] the International Institute for Management Development (IMD)[109] and the Heritage Foundation[110]. In addition to these reports, there are a multitude of other rankings[111] less well-known to the general public, such as "Doing business"[112] of the World Bank, the European Competitiveness Index[113] by Huggins, the Nation Brands Index[114] by Anholt-GfK Roper and various other fiscal attractiveness studies such as those by BAK Basel[115] and Ernst & Young[116]. These rankings have been widely publicized. Theme-based studies are also frequently set

[105] See the Spring 2008 Eurobarometer survey. In answering the question "What are the two most important issues facing your country at present?" 43% of Luxembourg citizens claimed it was changes in prices, up 5% since the fall of 2007 (EU-27 average = 37%, up 11% since the autumn of 2007). http://ec.europa.eu/public_opinion/archives/eb/eb69/eb69_en.htm

[106] UBS, Prices and Earnings – A comparison of purchasing power around the globe, March 2008

[107] See Chapter 4 – "Controlling Inflation: Better Competitiveness Means Greater Purchasing Power" of this report.

[108] In addition to the overall competitiveness of countries report, the WEF also publishes various sector reports, such as "Travel and Tourism Competitiveness Report 2007", "Global information technology report 2007-2008" and "*Global Enabling Trade Index 2008*". See the following website for more details: http://www.weforum.org/en/media/publications/CompetitivenessReports/index.htm

[109] For more information: http://www.imd.ch/research/publications/wcy/index.cfm

[110] For more information: http://www.heritage.org/research/features/index/

[111] For more information: http://www.odc.public.lu/indicateurs/etudes_internationales/index.html
Also see http://www.economist.com/rankings/

[112] Luxembourg was recently included for the first time in the autumn of 2007 edition of this report. http://www.doingbusiness.org/

[113] For more information: http://www.hugginsassociates.com/

[114] For more information: http://nationbrands.com/

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[116] ERNST&YOUNG, *Baromètre de la Compétitivité fiscale 2008 - Analyse comparée des fiscalités dans l'OCDE*, Paris, 2008

up to allow experts to debate issues of territorial competitiveness and attractiveness[117].

In the 2006 and 2007 editions of the *Bilan Compétitivité*[118], the *Observatoire de la Compétitivité* reviewed several of these composite indicators. The objective of this chapter is to summarize and update some of these reports. It must be remembered that a series of these analyzed rankings cannot be updated annually because they are not always published on a yearly basis. Also, indicators and rankings have been added compared to previous years[119].

5.2 Luxembourg's ranking

This chapter provides a summary of the principal international reports that have been published over the past year, relays the most significant comments the authors of these reports are addressing to Luxembourg and reproduces a sampling of less widely known rankings.

The table below summarizes the rankings of the primary composite indicators for competitiveness and growth. Each of the indices represents the 25 highest ranking countries, highlighting the rankings of Luxembourg. Contrary to 2007, in which Luxembourg improved its rankings in three out of four indices with respect to 2006, the country's position has fallen in three of the indices and remains unchanged in the last one[120].

[117] For more details about this subject see http://www.labaulewic.com/la_baule_wic/default.asp and http://www.bakbasel.ch/wEnglisch/benchmarking/forum/programme2008.shtml.
[118] For more information see: http://www.odc.public.lu/publications/perspectives/index.html
[119] Some rankings listed in the 2006 and 2007 *Bilan Compétitivité* cannot be included this year, because the reports containing them are either published more irregularly or they have not included Luxembourg in the studies.
[120] It should be noted that WEF has changed its methodology for the 2007-2008 report. Using the former criteria, Luxembourg placed 22nd in 2006-2007, but the new calculation method retroactively ranks it 25th for the same period.

Table 7: Update of the principal composite indicators for competitiveness and growth

	World Economic Forum	IMD	Heritage Foundation	European Commission
	GCI	*GCI*	*Economic freedom*	*SII*
	2007-2008	2008	2008	2007
1	United States	United States	Hong-Kong	Sweden
2	Switzerland	Singapore	Singapore	Switzerland
3	Denmark	Hong-Kong	Ireland	Finland
4	Sweden	Switzerland	Australia	Israel
5	Germany	**Luxembourg (-1)**	United States	Denmark
6	Finland	Denmark	New Zealand	Japan
7	Singapore	Australia	Canada	Germany
8	Japan	Canada	Chili	United Kingdom
9	United Kingdom	Sweden	Switzerland	United States
10	Netherlands	Netherlands	United Kingdom	**Luxembourg (-2)**
11	Korea	Norway	Denmark	Iceland
12	Hong-Kong	Ireland	Estonia	Ireland
13	Canada	Taiwan	Netherlands	Austria
14	Taiwan	Austria	Iceland	Netherlands
15	Austria	Finland	**Luxembourg (-7)**	France
16	Norway	Germany	Finland	Belgium
17	Israel	Chine	Japan	Canada
18	France	New Zealand	Mauritius	Estonia
19	Australia	Malaysia	Bahrain	Australia
20	Belgium	Israel	Belgium	Norway
21	Malaysia	United Kingdom	Barbados	Czech Republic
22	Ireland	Japan	Cyprus	Slovenia
23	Iceland	Estonia	Germany	Italy
24	New Zealand	Belgium	Bahamas	Cyprus
25	**Luxembourg (0)**	France	Taiwan	Spain

Note: The figures in parentheses show the change in Luxembourg's rank with relation to its position in the previous year. Plus and minus signs indicate an advance or retreat in the rankings, while a 0 indicates no change.

5.2.1 The best known composite indicators and rankings

a. The WEF's Global Competitiveness Index (2007-2008)

The World Economic Forum (WEF) provides a holistic view of critical productivity growth determinants, and consequently of competitiveness, through its Global Competitiveness Index (GCI)[121]. The index takes into consideration that countries do not have the same levels of economic development and therefore that the relative importance of the various competitiveness factors depends on circumstances at the

[121] For more information see: http://www.gcr.weforum.org/

outset[122]. Rankings are based on both quantitative and qualitative indicators and on an annual executive opinion survey.

Countries are ranked according to the determination of an overall competitiveness index that takes into account a detailed analysis of three fundamentals for growth and competitiveness on the world scale. First, basic requirements are analyzed, with a look at public institutions, infrastructure, macroeconomic stability and health and primary education. Next, efficiency enhancers made up of higher education and training, goods and labour market efficiency, financial market sophistication, technological readiness and market size are considered. Lastly, the index studies the determinants of innovation and sophistication by assessing levels of business sophistication and degrees of innovation.

The latest report analyzed 131 countries throughout the world. Luxembourg is ranked 25th in the report, outranked by its neighboring countries - Germany holds the 5th slot in the report, with France 18th and Belgium 20th. The country's competitiveness situation is roughly equal to the one it held in the 2006-07 report. As in the previous year, the U.S. occupies first place in the ranking. Thirteen European countries, ten of which are E.U. members, are ahead of Luxembourg in ranking. Scandinavian countries once again are rated in top slots.

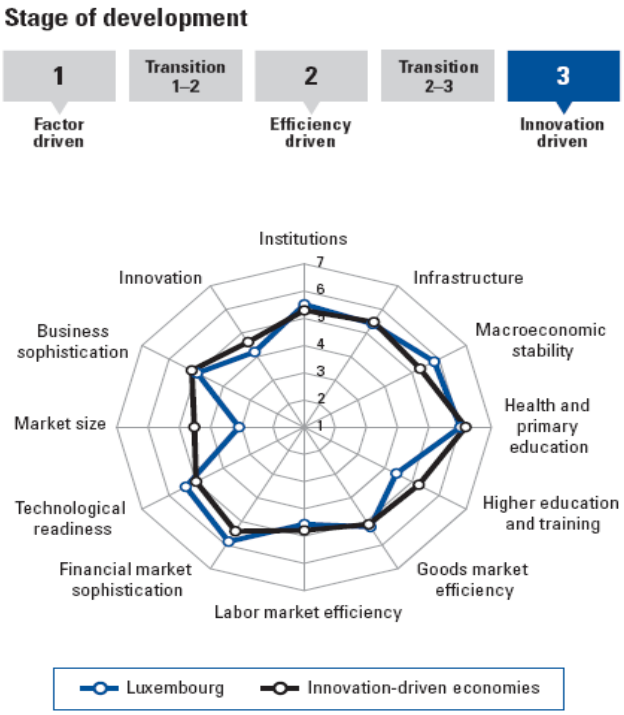
Luxembourg performed well in the basic competitiveness requirements phase. It holds the 15th rank overall because of its stable political environment, high quality infrastructure and satisfactory macroeconomic performance, despite overly high inflation and lack of diversification in its economy. The neutral quality of the country's health and educational system weighed on the countries ranking in these basic parameters.

Luxembourg is ranked 25th in terms of efficiency enhancers. This is due to poor results in higher education, low efficiency in the labour market and the size of the country's market. Weakness in the university system is largely a result of low rates of access to university studies, lower quality management schools, etc. Lower labour market efficiency resulted from poor ratings for flexibility in wage determination, overly rigid hiring and firing practices, low female participation in the labour force and

[122] WEF also produces a second composite index called the Business Competitiveness Index. Luxembourg is not one of the countries analyzed in this index.

a poor pay to productivity ratio. In contrast, the country's ranking in goods market efficiency, sophistication of financial products and technological readiness is quite high.

Figure 14: Position of Luxembourg according to the GCI of WEF (2008)

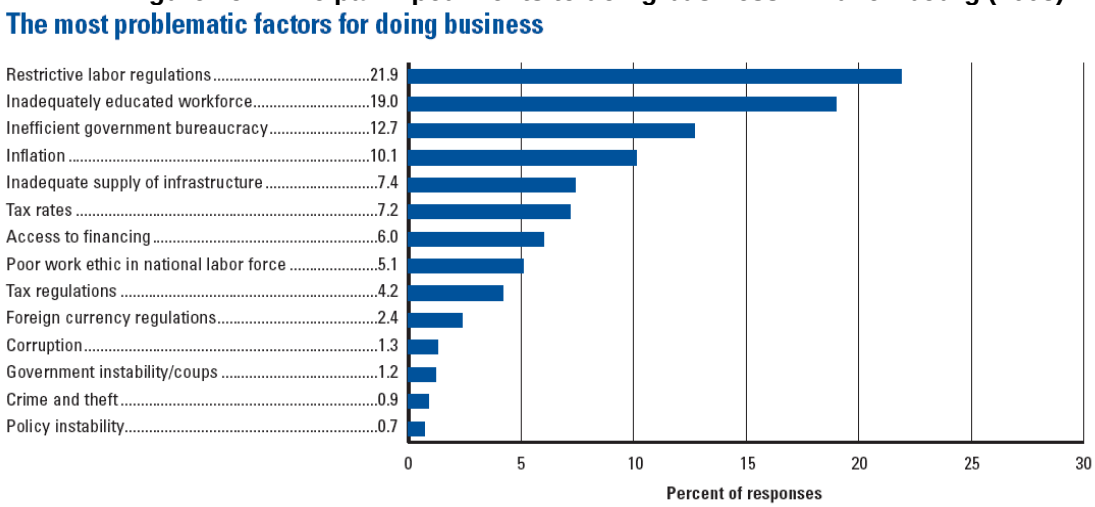


Source: WEF, 2008

In the category of Innovation and sophistication factors, Luxembourg occupies the 23rd slot worldwide for business sophistication and 24th for innovation. The report praises the Government's efforts in supporting innovation in companies, as well as the country's level of sophistication in product processes and innovation capacity, but also points to very mediocre performance in retaining engineers and scientists, in the quality of scientific research institutions and in collabouration between universities and industry in research.

The major factors impeding business activities in Luxembourg were highlighted by the qualitative survey. These include restrictive labour regulations, inadequate skills in the workforce, inefficient government bureaucracy and high inflation rates.

Figure 15: Principal impediments to doing business in Luxembourg (2008)



Note: From a list of 14 factors, respondents were asked to select the five most problematic for doing business in their country and to rank them between 1 (most problematic) and 5. The bars in the figure show the responses weighted according to their rankings.

Source: WEF, 2008

Frame 10: Various sector competitiveness indices produced by WEF

In addition to its yearly Global Competitiveness Index, WEF also performs periodic sector analyses in the area of competitiveness. Among the sectors analyzed are Tourism, International Business, Information and Communications Technologies (ICT) and Financial Development[123].

In 2007, WEF produced for the first time a sector index on the competitiveness of the tourism sector, baptized Travel & Tourism Competitiveness Index (TTCI). The objective of this index is to measure factors that determine competitiveness. It was determined that the key factors for success in this sector include a favorable regulatory framework, combined with high quality tourism and transportation infrastructure and a focus on human and natural resources. Switzerland is ranked first, followed by Austria and Germany. Luxembourg holds the 9th position out of 124 countries analyzed in the 2007 report.

WEF also analyses the international business sector through its Global Enabling Trade Index (GETI). This index measures the capacity of 118 countries to capacity for facilitating international trade, using ten factors for enabling trade, including tariff barriers, efficiency of customs administrations and the availability and quality of transport infrastructure and communications. In 2008, Hong-Kong led the pack, followed by Singapore and then Sweden. Luxembourg occupied the 12th place position in the index overall. In Europe, Luxembourg was ranked behind Sweden, Norway, Denmark, Finland, Germany, Switzerland and the Netherlands.

The WEF also publishes a periodic index that focuses on competitiveness in countries in terms of vitality in the use of Information and Communications Technology (ICT). In 2008, the Forum published

[123] Luxembourg was not surveyed in the 2008 Financial Development Report of the WEF. For more details see: http://www.weforum.org/en/initiatives/gcp/FinancialDevelopmentReport/index.htm

its 7th report of this type covering 127 countries. 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 will of individuals, companies and the public sector to use ICT and the most recent use made of ICT. Denmark, Sweden and Switzerland are at the top of 2008 rankings in this index. Luxembourg is in 24th place, ranked one position higher with respect to the previous year. Germany holds the 16th position, France is 21st and Belgium is 25th.

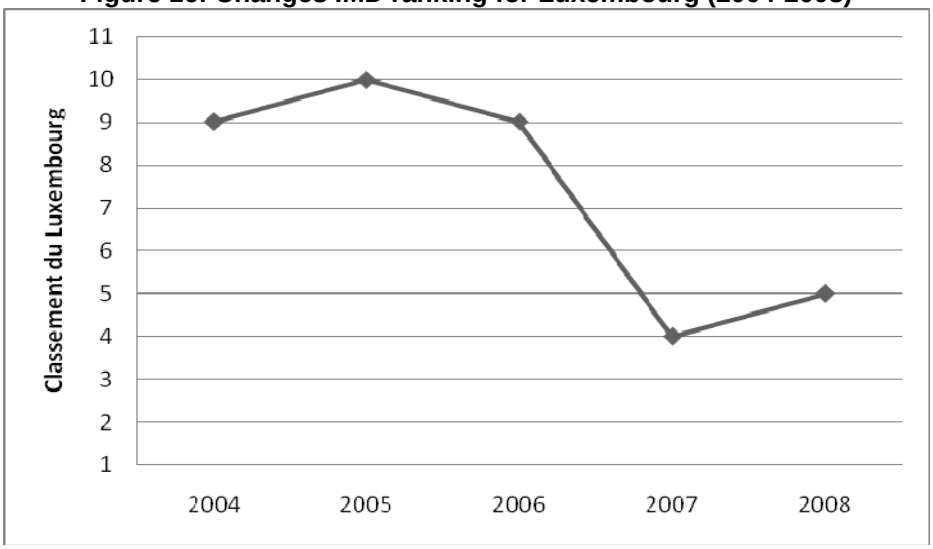
b. The IMD Global Competitiveness Index (2008)

The *International Institute for Management Development* (IMD) produces an annual competitiveness report in which it analyses each year 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. The analysis is based on both quantitative indicators and the results of an annual opinion survey[124].

According to the 2008 report, Luxembourg is ranked 5th in the list of the most competitive economies. Luxembourg dropped one position in the 2008 ranking as compared with the previous year. Overall, Luxembourg has been ranked behind the same trio of nations as the previous year, the U.S. in first place, followed by Singapore and then Hong Kong. This year, Switzerland moved ahead of Luxembourg. France and Belgium also advanced in the ranking, while Germany's position was unchanged.

[124] In Luxembourg, the survey addressing local companies was coordinated by the Chamber of Commerce.

Figure 16: Changes IMD ranking for Luxembourg (2004-2008)



Source: IMD (2008)

IMD bases its analysis for the rankings on four indicator series: economic performance, government efficiency, business efficiency and infrastructure.

In this ranking, Luxembourg holds the 4th place in economic performance on the world level. The country's good economic record is powered by a vigorous foreign trade sector, particularly in exports of services. Still, this high level of performance does not succeed in masking the structural weaknesses that persist. In spite of efforts to become specialized within various sectors, IMD stresses a lack of diversification. The economy remains strongly dependent on the financial sector, which in periods of international financial turbulence such as with the recent sub-prime crisis, can cause high economic risk to set in.

In the realm of public administration efficiency, IMD notes a rather sharp deterioration of performance in Luxembourg. In 2007 the country was rated 9th; in 2008, it has dropped to 14th in this ranking. Nonetheless, political stability and a high degree of social cohesion comprise major assets for Luxembourg. In addition, the country's low level of public debt and its high degree of adaptability to economic change may be considered competitive advantages.

Luxembourg has fallen in the ranking in the category of business environment, dropping to the 9th position in 2008. The performance of the financial sector remains among the best worldwide. The report praised the high level of labour productivity

but panned the low percentage of women in the work force and excessive wage costs.

Lastly, the infrastructures indicator proved to be the category in which Luxembourg registered its lowest performance. The nation dropped three positions over the previous year, falling from 15th to 18th in 2008. This area includes telecommunications infrastructure, human capital formation and sciences.

c. The Heritage Foundation Index of Economic Freedom (2008)

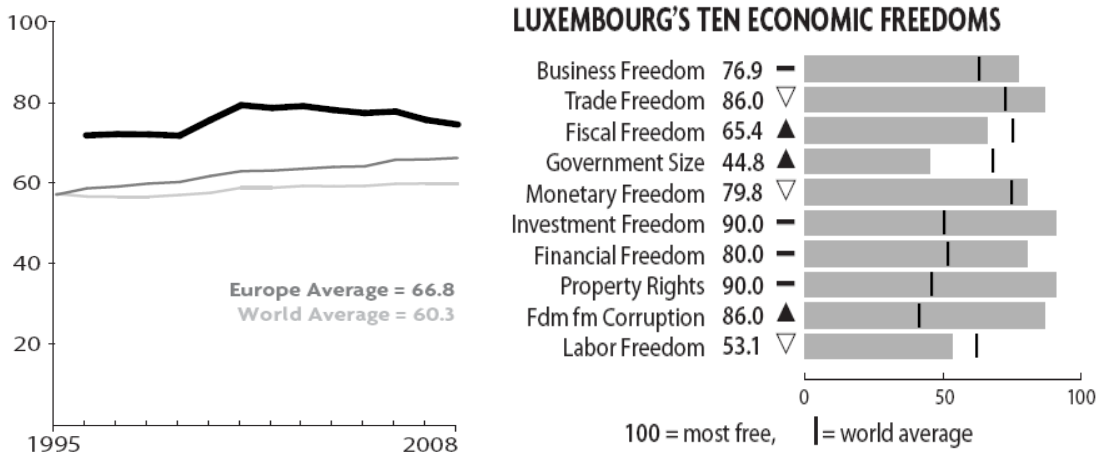
The Heritage Foundation ranks countries each year according to their degree of economic openness, using the Anglo-Saxon free enterprise approach to economics. According to this institute, free enterprise favors economic growth. The more open the economy, the fewer barriers exist to free trade and the 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 2008 report, Luxembourg was ranked 15th dropping seven positions with relation to the 2007 index[125]. Luxembourg had already lost a position between 2005 and 2006, where it was ranked 4th overall, and again it lost four places between 2006 and 2007. Luxembourg was ranked 8th out of 41 countries reviewed in Europe, compared to 3rd in 2007. Belgium came in 20th, Germany 23rd and France 48th, all far behind Luxembourg.

The Heritage Foundation gave Luxembourg a good score in the areas of investments, international business, finance, intellectual property and in business environment. Its performance was deemed below world averages in the tax system, employment and the degree to which the economy is state controlled.

[125] For more details see: http://www.heritage.org/index/country.cfm?id=Luxembourg

Figure 17: Luxembourg's ranking (2008)



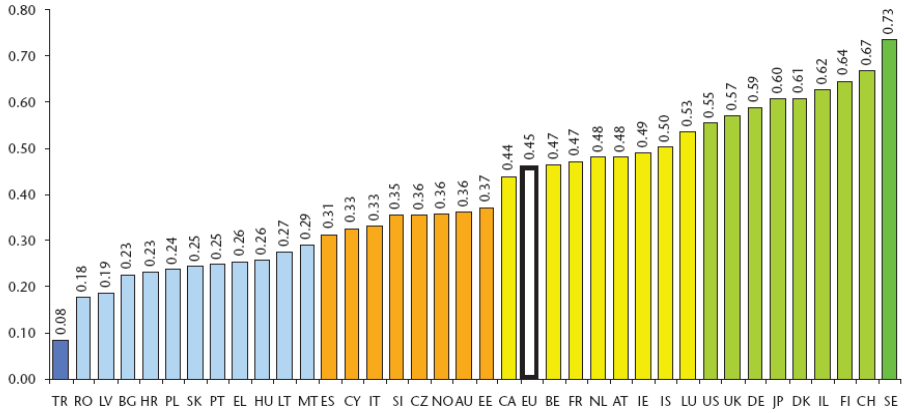
Source: Heritage Foundation (2008)

d. The European Commission's SII (2007)

The European Commission[126] publishes annually a report titled "European Innovation Scoreboard". This is an instrument that was developed as part of the Lisbon Strategy[127] in order to develop a comparison tool for performance of Member states in the area of innovation. In February 2008, the European Commission published its 7th edition of this report, which includes an aggregate indicator called the Summary Innovation Index (SII) that reviews members' performance in innovation[128]. On the basis of SII, the European Commission registered four categories of nations and called them Innovation leaders, Innovation followers, Moderate innovators and Catching-up countries. Luxembourg, together with Austria, Belgium, Canada, France, Iceland, Ireland and the Netherlands are in the second category of countries, the Innovation followers.

[126] For more information see: http://www.eis.eu/
[127] For more information see: http://ec.europa.eu/growthandjobs/index_fr.htm
[128] See also the Ministry of the Economy and Foreign Trade, STATEC, Luxinnovation, *Les activités d'innovation et de recherche au Grand-Duché de Luxembourg - Etat des lieux et pistes de réflexion*, Perspectives in economic policies n°5, November 2005
http://www.odc.public.lu/publications/perspectives/index.html

Figure 18: The European Commission's SII-2007



Source: European Commission (February 2008)

As in previous EIS reports, the twenty-five innovation indicators in this SII index have been classified into five dimensions to better capture the various aspects of the innovation process, as follows:

- Innovation drivers: Luxembourg posts the worst performance in all categories. The country is at the bottom of the table. The culprits are indicators relating to higher education and training that are the input indicators for innovation.

- In the Knowledge Creation dimension, Luxembourg is situated in the middle of the table. This category includes mainly input indicators related to R & D expenditures.

- In Innovation and Entrepreneurship, Luxembourg scores high marks. This category includes mainly input indicators that promote innovation.

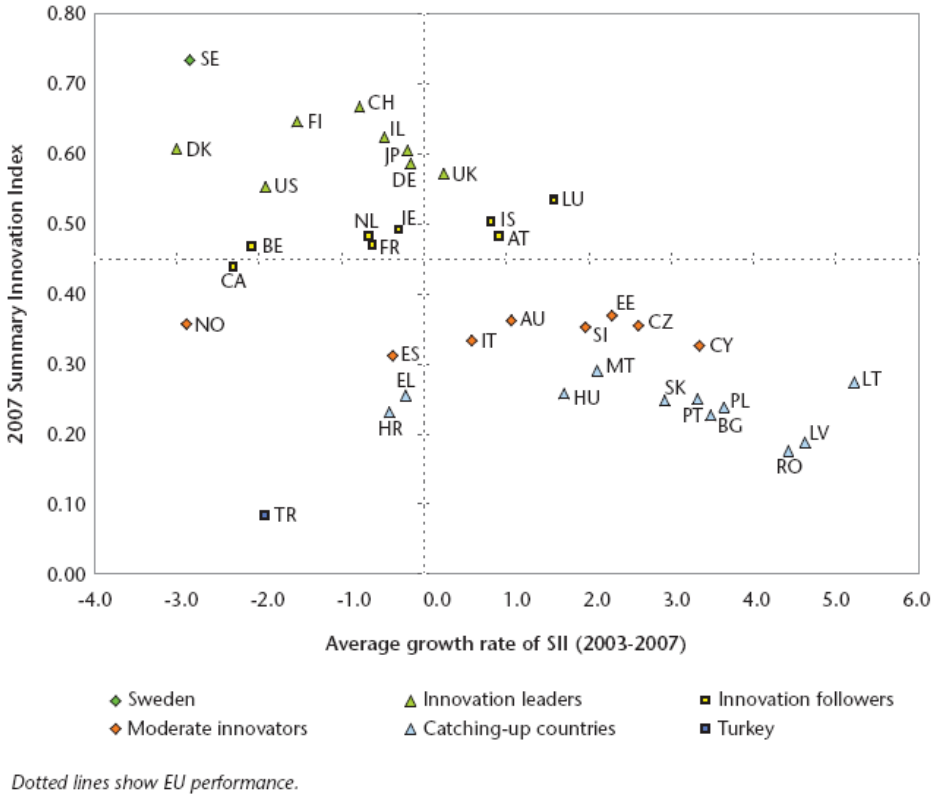
- In Applications, Luxembourg again scores high marks. This category includes output indicators for employment, exports and sales revenue related to innovation activities.

- Luxembourg also is ranked among the highest in the area of Intellectual Property. This category includes output indicators relating to patents, brands and models.

In addition to measuring innovation performance, it is also useful to analyze performance over time. The figure below shows the convergence of nations' growth

in SII innovation through time. Performance as measured by the SII is shown on the vertical axis while growth rates of SII are shown on the horizontal axis. The European Commission thus created four quadrants. Luxembourg is located in the quadrant with countries that have both levels of innovation achievement and growth rates that are forging ahead of averages for the EU (upper right hand quadrant).

Figure 19: Convergence in innovative performance



Source: European Commission (February 2008)

e. Correlation of rankings

Having reviewed these four benchmark index rankings, it is interesting to analyze the correlation between them all. The Kendall coefficient is ideal for this type of analysis. Indeed, it measures the degree of agreement between several rankings, in this case four rankings. A correlation was calculated in 2008 on 27 countries for which the four rankings were available, similar to 2007.

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. In the 2006 and 2007 reports, a strong correlation existed between the

rankings of the four major institutes used at the time. The same is true in 2008, as the Kendall coefficient register 0.87 and is thus very close to the results recorded in 2006 and 2007[129]. There exists then, just as in the two preceding years, a correlation between the rankings made by the four institutes. Therefore, even though the four institutes claim to have come up with different composite indicators, overall the rankings are strongly correlated. Luxembourg however does appear atypical among the rankings, which justifies a more in-depth look at some of the indices.

Table 8: Rectified rankings(2008)

		WEF	IMD	Heritage Foundation	European Commission
1	Germany	5	11	12	6
2	Austria	10	9	15	11
3	Belgium	13	15	11	14
4	Denmark	3	4	5	4
5	Spain	17	20	16	20
6	Estonia	16	14	6	15
7	United States	1	1	2	8
8	Finland	6	10	9	3
9	France	12	16	21	13
10	Greece	27	24	26	23
11	Hungary	24	23	20	22
12	Ireland	14	8	1	10
13	Italy	23	26	23	19
14	Japan	7	13	10	5
15	Lithuania	19	21	13	21
16	Luxembourg	15	3	8	9
17	Norway	11	7	17	16
18	Netherlands	9	6	7	12
19	Poland	25	25	27	26
20	Portugal	21	22	22	24
21	Slovak Republic	22	18	18	25
22	Czech Republic	18	17	19	17
23	United Kingdom	8	12	4	7
24	Slovenia	20	19	25	18
25	Sweden	4	5	14	1
26	Switzerland	2	2	3	2
27	Turkey	26	27	24	27

Source: Observatoire de la Compétitivité

[129]The Kendall coefficient was 0.86 for the same 27 countries in 2006 and 0.83 in 2007. Direct comparability of results for 2007 and 2008 with 2006 should be put into perspective because one ranking had been replaced by another in 2007 (the Goldman Sachs indicator was replaced by that of the European Commission).

5.2.2 A look at some less well-known rankings

a. European Smart Cities ranking by the Vienna University of Technical (2007)

The Vienna University of Technology has developed a new ranking instrument in collabouration with the Universities of Ljubljana and Delft to study "medium-sized" European cities of fewer than 500,000 inhabitants[130]. According to the study, 120 million people live in some six hundred cities in this size range, roughly 40% of all European citizens.

The study uses six criteria, including economy, people, governance, mobility, environment and living. A medium-sized town is considered to be a Smart City if it demonstrates forward-looking development on the basis of a combination of local circumstances and activities carried out by politics, business and inhabitants. Ranking is structured on three levels. For the six criteria or characteristics 31 factors were defined which were determined through 74 indicators. For example, the factor 'innovative spirit' is in turn determined by the three indicators 'research and development expenditure, rate of employment in knowledge-intensive areas' and 'relative number of patent applications'.

Of the seventy cities analyzed, the 'smartest' middle-sized cities are located in Finland, Denmark, Austria, Germany and in the Benelux. Luxembourg comes in first in the overall ranking, followed by Aarhus (Denmark), Turku (Finland) and Aalborg and Odense (Denmark). Various cities located near Luxembourg are also included in the ranking such as Eindhoven which is 8th, Gent at 16th, Maastricht 18th, Bruges 20th, Nancy 26th and Trier 27th.

b. The World Bank's Ease of doing business Index (2008)

The World Bank publishes an annual report entitled "Doing Business" that makes international comparisons between various countries' regulations designed to bolster business activity, as well as those that limit doing business. The principle behind the study is commendable: "*What gets measured gets done. Publishing comparative data on the ease of doing business inspires governments to reform*." The 2009 report

[130] For more details see: www.smart-cities.eu

ranks 181 economies[131]. Ranking is accomplished by means of six business regulation indicators that measure time and cost expended to satisfy official requirements for setting up and managing a business, doing cross-border business, paying taxes and closing a business. Luxembourg was included in the survey for the first time in the fall of 2007[132]. Of the 181 countries analyzed, Luxembourg was placed in the 50th slot in the "Ease of doing business index 2009". Belgium was 19th position, Germany 25th and France was in the 31st slot. If OECD countries, which are developed countries with high standards of living, were used as a reference, Luxembourg would rank 24th out of 27 countries[133].

Table 9: Luxembourg's ranking in "Doing business 2009", by category

Ease of...	Doing Business 2009 rank	Doing Business 2008 rank	Change in rank
Doing Business	**50**	**45**	**-5**
Starting a Business	69	60	-9
Dealing with Construction Permits	40	39	-1
Employing Workers	167	167	0
Registering Property	118	119	+1
Getting Credit	109	102	-7
Protecting Investors	113	110	-3
Paying Taxes	14	13	-1
Trading Across Borders	31	30	-1
Enforcing Contracts	2	2	0
Closing a Business	48	49	+1

Source: World Bank (2008)

The report is based on qualitative data furnished by local experts and on the applicable laws and regulations for each locality. There is little quantitative input, which leaves the door open to a certain degree of subjectivity. The choice of indicators used in the report may also infer that ideological principles are inserted. For example, Luxembourg received a poor ranking in the 'Employing Workers' category and especially in the "Rigidity of Employment" index. Is it necessarily a negative thing to guarantee stable jobs to workers, even if it hinders the flexibility of companies?

[131] For more details see: http://www.doingbusiness.org/Features/Feature-2008-22.aspx
[132] For more details see: http://www.doingbusiness.org/ExploreEconomies/?economyid=115
[133] The report appears to work for developing countries and lends itself less well to economies with developed service sectors. In a developed country it is more difficult to implement new reforms, while with developing countries that lack regulatory framework, reforms are more easily put in place

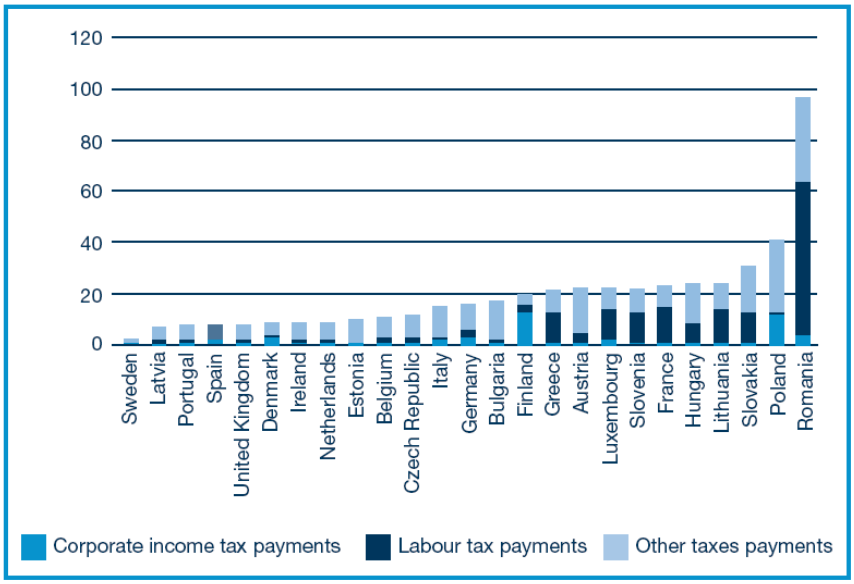
Frame 11: Ease of paying taxes index 2008

The World Bank and PriceWaterhouseCoopers have published a report[134] focusing more on the details of the 'Paying Taxes' category results of the Doing Business survey. A total of 178 countries were included in the study comparing tax systems throughout the world. Three indicators make up the foundation of the Ease of Paying Taxes index: The number of tax payments, time to prepare and file tax returns and the total tax rate. These three indicators have equal weighting. A case study serves as the underlying basis of the analysis, thus rendering data comparable throughout the world. In this frame, we are focusing principally on comparisons within Europe, since the economic and social bases underlying taxation systems are more comparable there.

Overall in the world, Luxembourg occupies the 17th rank in the Ease of Paying Taxes Index. Rankings are headed by the Maldives, with Singapore and Hong Kong in the second and third spots. Within the European Union, Ireland is first holding the 6th place overall, followed by Denmark at 13th, then Luxembourg, whose immediate neighbors are ranked less favorably: Belgium is 65th, Germany 67th and France is 82nd.

Luxembourg is ranked 58th worldwide in the sub-indicator 'Number of Payments'. The country's businesses make an estimated 22 payments, among the largest number within the EU.

Figure 20: Comparison of number of tax payments made in UE

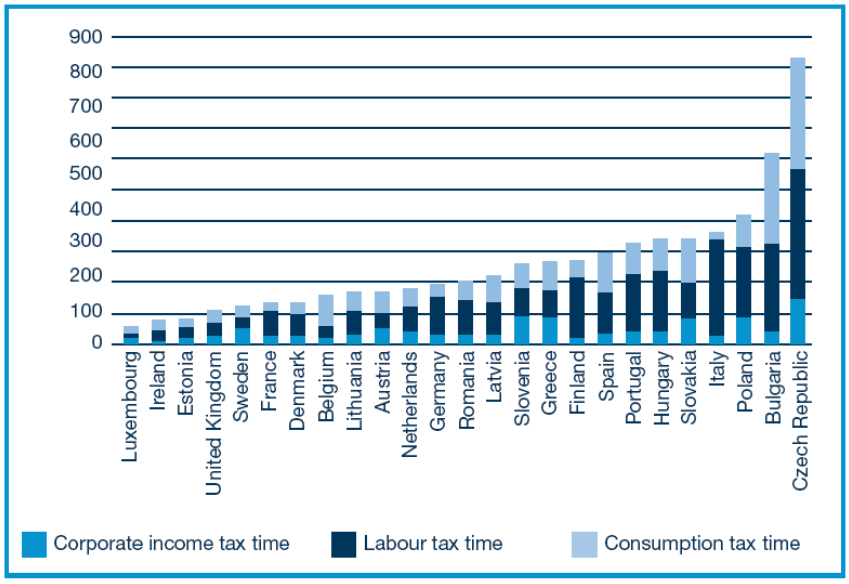


Source: World Bank, PriceWaterhouseCoopers

[134] WORLD BANK, PRICEWATERHOUSECOOPERS, Paying Taxes 2008 - The global picture, 2007

With respect to the sub-indicator of number of hours required to prepare documents for meeting tax obligations, Luxembourg is ranked 4th in the world. Luxembourg businesses need an estimated 58 hours to prepare and submit payments, making it the country with the lowest estimated hours in the EU.

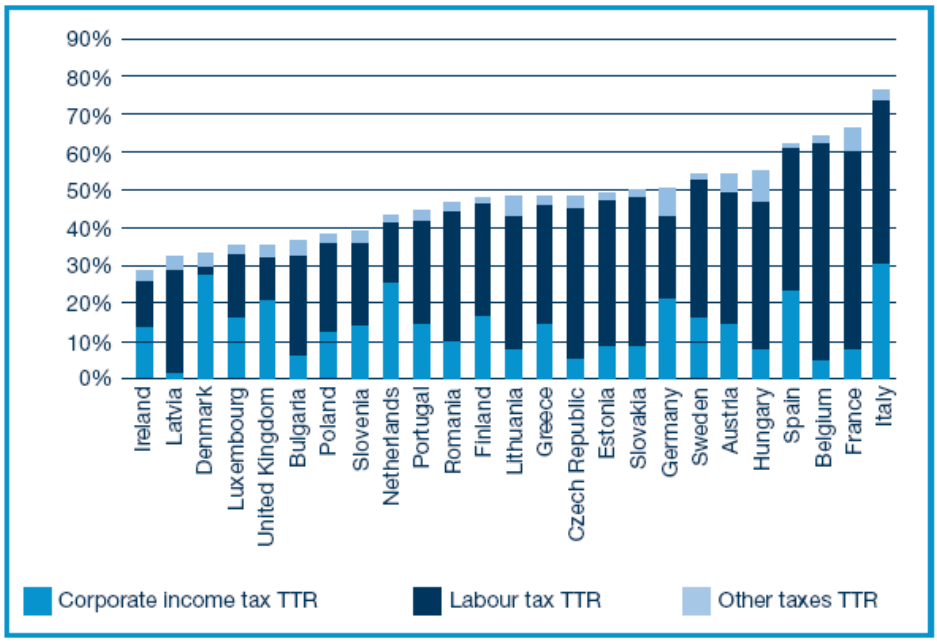
Figure 21: Comparison of hours required to meet tax obligations in the UE



Source: World Bank, PriceWaterhouseCoopers

Lastly, with regard to the Total Tax Rate (TTR), Luxembourg is in 47th place worldwide. Its TTR rate is 35.3%, estimated to be one of the lowest tax rates within the EU. Ireland, at 28.9%, Latonia at 32.6% and Denmark with 33.3% are the ranking leaders.

Figure 22: Comparison of the Total Taxation Rate in the EU



Source: World Bank, PriceWaterhouseCoopers

c. The Lisbon Scorecard by the Centre for European Reform (2008)

The Centre for European Reform[135] publishes a scorecard entitled the Lisbon league table that provides an evaluation of overall performance of EU Member states in implementing the Lisbon Strategy[136]. This table is based on a list of Eurostat structural indicators[137] that measure the performance of Member states in the economic, social and environmental areas, studying such topics as employment rates, greenhouse gas emissions, R&D expenditures, etc.[138].

The scorecard is supposed to provide a summary of the reforms undertaken by Member states and to anticipate the capacity of EU Member states and economies with high labour costs to sustain their standard of living in a world that is becoming increasingly more globalized.

Denmark and Sweden top the rankings in this table. These two Member states both obtain high scores in the social cohesion, labour market functioning and sustainable development indicators and are also highly classed in the area of innovation. The two countries manage to reconcile high taxation rates and a high degree of social security with competitive market structures. Luxembourg comes in twelfth in the ranking, down five positions with respect to 2006. Germany is in the 8th spot, France is 9th and Belgium is 13th.

As already noted in the 2006 *Bilan Compétitivité*, many of these structural indicators used in the framework of the study have proven ill-suited for the specificities of Luxembourg, such as the employment rate or GDP/inhabitant, two indicators that cannot account for the large cross-border flows connected with Luxembourg's economy[139].

[135] For more information see: http://www.cer.org.uk/
[136] See the National Plan for Innovation and Full Employment submitted by the Luxembourg Government to the European Commission as part of the domestic implementation of the Lisbon Strategy. http://www.odc.public.lu/publications/pnr/index.html
[137] For more information see: http://epp.eurostat.ec.europa.eu/
[138] See also the *Bilan Compétitivité 2007*, pp. 51-54. The European House & Ambrosetti attribute a "rapidity profile" to Member States by means of a benchmark, which estimates the capacity of Member States to achieve quantitative objectives set at the European institutional level, and the swiftness with which each Member State nears its objectives.
[139] For a critical view of these structural indicators as they pertain to Luxembourg, see *Ministère de l'Economie et du Commerce extérieur, Bilan Compétitivité 2006 - En route vers Lisbonne*, Luxembourg, September 2006, pp. 33-38

Tableau 10: Overall Performance of Member states

	Rank 2007	Rank 2006
Denmark	1	1
Sweden	2	2
Austria	3	5
The Netherlands	4	3
Finland	5	6
Ireland	6	8
UK	7	4
Germany	8	9
France	9	11
Slovenia	10	12
Estonia	11	15
Luxembourg	12	7
Belgium	13	13
Czech Republic	14	10
Cyprus	15	14
Spain	16	17
Latvia	17	18
Lithuania	18	20
Greece	19	22
Slovakia	20	23
Portugal	21	16
Hungary	22	19
Italy	23	21
Romania	24	25
Bulgaria	25	24
Poland	26	27
Malta	27	26

Source: CER

d. The Swiss Federal Institute of Technology's (ETH-Zurich) KOF Index of Globalization (2008)

Domestic markets for products, capital and labour are becoming more and more closely integrated, which is a consequence of globalization. The dissolving of customs barriers, technical progress and lowering of transportation and communication costs are the principal motors behind this phenomenon. Direct international links are currently becoming established in a durable fashion.

In view of the heightened visibility of globalization to the general public through the relocation of firms and the widening offer of products, and the undeniable requirement of nations to adapt to this new world order, it is useful to consult the KOF Index of Globalization implemented by the ETH in Zurich[140]. This index measures the economic, social and political dimensions of globalization for 122 countries between 1970 and 2005, basing its work on a group of 24 variables spread out over three dimensions, nine of an economic nature, twelve of which are social variables and three of which political. The economic dimension measures the flow of

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

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 and consulates it establishes in foreign countries, or how the nation is represented in international organizations.

Overall, with an index ranking of 72.88, Luxembourg is 27th among the most globalized countries in the world, compared to a ranking of 25th in 2007. First place in the ranking goes to Belgium, with Austria in second place and Sweden in third. With regard to economic globalization, Luxembourg ranks second after Singapore, displaced from its world leader rank in 2007. The majority of the top ranked countries in this ranking have small, open economies. In the social dimension of globalization, Switzerland leads in the ranking, with Austria and Singapore occupying the second and third places respectively. Luxembourg has a lower ranking in this domain, placing only 18th in the index. Lastly, with regard to the globalization of politics, France is in the lead, followed by the United States and Russia. Here again, Luxembourg is ranked rather poorly in the 99th position.

Table 11: The 30 most highly globalized countries in the world (2008)

	country	Globalization Index
1.	Belgium	92.09
2.	Austria	91.38
3.	Sweden	90.02
4.	Switzerland	88.60
5.	Denmark	88.42
6.	Netherlands	88.40
7.	United Kingdom	86.67
8.	Czech Republic	85.51
9.	France	85.38
10.	Finland	84.65
11.	Germany	83.01
12.	Spain	82.73
13.	Hungary	82.52
14.	Portugal	81.57
15.	Canada	81.21
16.	Ireland	79.82
17.	Norway	79.75
18.	Italy	79.44
19.	Poland	78.42
20.	Singapore	78.37
21.	Australia	77.35
22.	United States	76.76
23.	Slovak Republic	75.82
24.	Malaysia	75.60
25.	Greece	73.43
26.	New Zealand	73.40
27.	Luxembourg	72.88
28.	Estonia	72.18
29.	Israel	71.80
30.	Slovenia	70.26

Source: ETH
Note: The KOF index measures globalization on a scale of 1 to 100. The more a country is deemed globalized, the closer its score will be to 100.

In conclusion, we can see that Luxembourg has posted a rather constant score since 1970, curving slightly upward for the last fifteen years.

e. Prognos Corporation's «*Freihandels- und Investitionsindex*» index (2008)

Prognos[141] publishes an index dealing with trade relations and foreign investment of German companies. This index is supposed to provide German companies with reliable information about conditions in foreign markets. The index analyzes attractiveness and potential of one hundred foreign markets for German companies. Two sub-indices then review the current level and dynamics of these markets. Rankings are based on economic, institutional and political indicators. In all there are thirty-four individual indicators assembled within nine separate categories. These are Market Size, Degree of Openness, Degree of Development, Institutions and Infrastructure, Business Environment, Stability, Training and R&D, Market Efficiency and Distance from Germany.

[141] For more details see: http://www.prognos.com/

The United Kingdom is ranked first in domestic markets[142] that are the most attractive to German companies, followed by Singapore and the United States. Luxembourg is ranked 8th. In the static ranking, that is the current level of importance, Luxembourg is classed 13th. This ranking is again led by the same three countries as for the overall index. In the dynamics ranking, which measures future development potential, Luxembourg does better, ranking third behind Hong Kong and Singapore.

f. The European Cities Monitor by CUSHMAN&WAKEFIELD (2007)

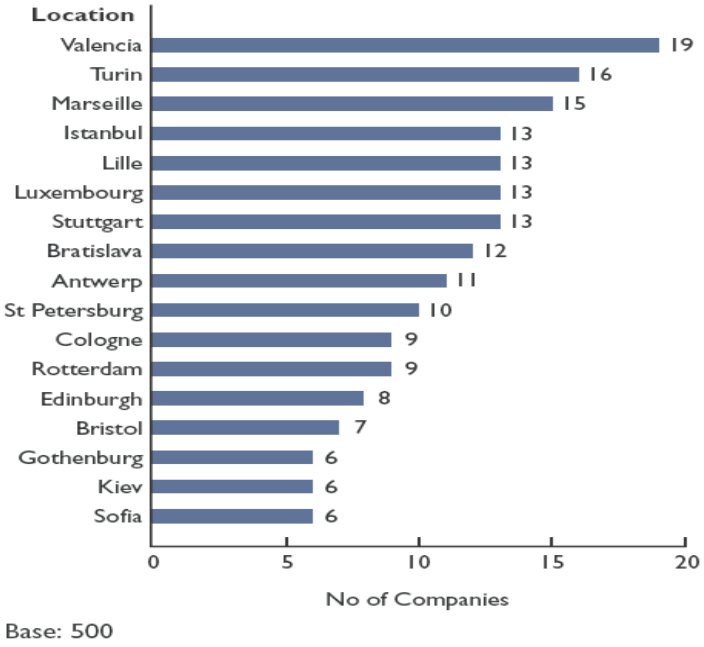
CUSHMAN&WAKEFIELD publish an annual qualitative survey on the principal business cities in Europe. They have been conducting this annual survey since 1990[143]. In 2007, 500 managers chosen from among the largest companies in Europe were asked to give their opinions on the major business cities in Europe. The factors behind policy maker decisions for establishing their businesses in a given city are access to markets, the factors of communication and cost. In 2007, London was ranked first in the in-depth city analysis, followed by Paris then Frankfurt, as was the case the previous year.

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. One survey question also dealt with other cities, which were not analyzed, in detail.

Of the managers who were contacted in 2007, only 2.6% were very or moderately familiar with the economic environment in Luxembourg, as opposed to 2.7% of those surveyed in 2006. This is a very low percentage compared to other cities that are located near to us, such as Paris, which 81% knew well, Brussels (67%), Frankfurt (64%) and Amsterdam (52%). Although the Luxembourg economy often boasts impressive results, a large pool of potential investors appears unaware even of its potential, which is a negative factor in terms of attractiveness.

[142] The EU is ranked in first place, but is not, strictly speaking, a country.
[143] For more information see: http://www.cushmanwakefield.com/cwglobal/jsp/globalHomeSSO.jsp

Figure 23: "Are there other European cities which are important as business locations and which do you know fairly or very well?"



Source: CUSHMAN&WAKEFIELD

5.3 Conclusions

As we have demonstrated in this chapter of the 2008 report and in *Bilan Compétitivité*[144] drafted in previous years, numerous comparative studies on the subject of competitiveness and attractiveness have been published on an annual basis. The interest of these types of studies and rankings increases as the globalization phenomenon develops. The reason that such particular attention is paid to these types of studies is that many expect to find in the composite competitiveness indicators data that explains and helps make forecasts about the future economic development of a country.

These studies are based on methodologies that often differ widely, while indicator categories are often similar. As we have seen, Luxembourg's rankings vary widely from report to another. Indeed, while Luxembourg was ranked 5th in the 2008 IMD report involving 55 countries, its position was 25th in the WEF's 131 country analysis. In addition, it was seen that WEF has changed methodology since the 2007-2008 report, which also had an impact on Luxembourg's 2006-2007 ranking, According to the previous methodology, Luxembourg was ranked 22nd in 2006-2007, whereas

[144] It should be noted that, in addition to some of the indicators detailed above, there are a plethora of other indicators that were not included in this section. Consult the *Bilan Compétitivité* for 2006 and 2007 for more information.

using the new method the country has been retroactively ranked 25th for 2006-2007. Thus methodology influences final rankings of countries.

Despite the draw of their clearly apparent simplicity, many indices have considerably disparate methodologies. Even when attempting to measure a like phenomenon such as level of competitiveness and growth potential, differences appear in the very definition of the measurement. Thus when WEF measures the capacity of a country to achieve sustainable economic growth, IMD is analyzing the ability of a country to establish and sustain an environment conducive to the competitiveness of businesses, because creation of wealth is thought to occur within companies that operate in a domestic environment that either encourages or blocks competitiveness. Another regular complaint directed at various studies is that they contain methodological weaknesses. These appear most prominently in three areas: Quality of sources used, choice of underlying indicators and method used in arriving at the composite indicator. Before analyzing and interpreting the results of various composite indicators, as well as how to rank countries, a critical review of the methodology used should take place as a prelude. This review would analyze the quality of primary and secondary data sources, potential ideological bias and the method used to calculate the composite index and weightings for each of the base indicators[145]. As an example, base indicators used as part of these benchmarks have often proved unsuitable to the specificities of Luxembourg's economy. The best-known example of this is the renowned "GDP per inhabitant" indicator that fails to account for the flow of persons crossing into Luxembourg to work and consequently greatly overvalues Luxembourg's economic performance compared to other countries[146].

What to think then of these aggregate rankings and indices, and how should they be interpreted? In all events, one should avoid succumbing to the ranking for the sake of ranking syndrome. The different rankings, statistics and other items do indeed furnish useful information about the competitive situation of a country, but the data cannot be taken as an end in itself. Logic should not be thrown out. One must not lose sight of the fact that overall indicators that are furnished in these types of

[145] See Ministry of the Economy and Foreign, *Bilan Compétitivité 2007 – En route vers Lisbonne*, Luxembourg, 2007

[146] It would be more appropriate to use Gross National Income as a reference in the case of Luxembourg to better account for the cross-border phenomenon, as is done in the Competitiveness Scoreboard.

reports are often of far too general a nature to be usable with the specific case of each type of business or project. One must therefore above all exercise prudence. Composite indicators should be used to focus ones attention, then invite subsequent rigorous analysis and critique. To this end the Tripartite Coordination Committee acknowledged in 2003 the need for a table of broader indicators to better assimilate competitiveness of Luxembourg. The Committee contracted with Professor Lionel Fontagné to develop proposals to deal with this subject. Professor Fontagné's proposal for a scoreboard in November of 2004 was adopted and the *Observatoire de la Compétitivité* periodically updates data and comments on changes in the competitiveness situation. The following chapter summarizes the update on the Competitiveness Scoreboard that was carried out in 2008[147].

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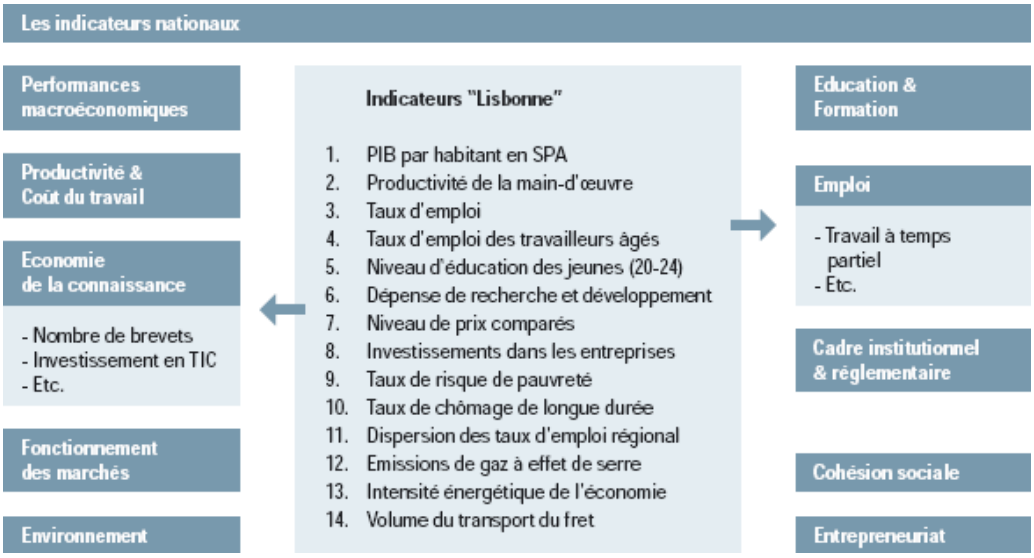
6 The Competitiveness Scoreboard

Competitiveness is a very fashionable concept these days that is unfortunately too often considered an end in itself and used as a political reason for getting through socially unbalanced measures. Yet competitiveness, as understood by the *Observatoire de la Compétitivité,* is only an instrument at the service of a longer-term objective, the social well-being of citizens. "Competitiveness is the capacity of a nation to durably improve the standard of living of its inhabitants and to procure for them high levels of employment and social cohesion while preserving the environment."

This concept of competitiveness is the basis of the Competitiveness Scoreboard (French acronym TBCO). This scoreboard uses 86 indicators and analyzes competitiveness through the economic, social and environmental pillars of sustainable development. These indicators were chosen on the basis of the Fontagné report entitled "*La compétitivité: Une paille dans l'acier*" (2004)[148].

Table 12[149]: Lisbon and Domestic Indicators



Source: *Observatoire de la Compétitivité*

[148] Lionel Fontagné (2004), *Compétitivité du Luxembourg : Une paille dans l'acier*. http://www.odc.public.lu/publications/perspectives/PPE_3.pdf

[149] 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.

Chapter 4 of this report reviews the entire panoply of international benchmarks and their advantages and disadvantages. It is therefore even more important to analyze Luxembourg's competitiveness through a battery of judiciously chosen indicators.

Table 13: Competitiveness Scoreboard [150]

Category 1: Macroeconomic performance (13 indicators) ➢ Gross National Income per capita (PPS) ➢ Real growth rate of GDP ➢ Growth in domestic employment ➢ Unemployment rate as a percentage ➢ Inflation rate as a percentage ➢ Public balance as a % of GDP ➢ Public debt as a % of GDP ➢ Gross fixed capital formation of the public administration ➢ Terms of trade ➢ Real effective exchange rate (1995=100) ➢ Diversification – entropy coefficient ➢ FDI inflows ➢ FDI outflows	**Category 2: Employment (9 indicators)** ➢ Employment rate ➢ Employment rate (Men) ➢ Employment rate (Women) ➢ Long-term unemployment rate ➢ Persons holding a part-time job ➢ Unemployment rate of persons under 25 ➢ Employment rate of persons aged 55 -64 (total) ➢ Employment rate of persons aged 55- 64 (Men) ➢ Employment rate of persons aged 55 - 64 (Women)
Category 3: Productivity & Labour Cost (5 indicators) ➢ Trends in total factor productivity ➢ Trends in apparent work productivity ➢ Productivity per hour worked as a percentage of U.S. figures ➢ Changes in unit labour costs ➢ Costs / Revenue ratio in the banking sector	**Category 4: Market Operations (10 indicators)** ➢ Percentage of full-time workers on minimum wage ➢ Price of electricity (ex-VAT) – industrial users ➢ Price of gas (ex-VAT) - industrial users ➢ Market share of the primary operator in the cellular telephone market ➢ Composite basket of fixed and cellular telecommunications (ex-VAT) ➢ Composite basket of cellular telephone royalties (ex-VAT) ➢ Broad band Internet access rates ➢ Basket of domestic royalties for 2Mbits leased lines (ex-VAT) ➢ Public markets – value of public markets using open procedure procurement ➢ Total of State aid as a % of GDP (excluding horizontal objectives)
Category 5: Institutional and Regulatory Framework (11 indicators) ➢ Corporate taxes ➢ Standard VAT rate ➢ Tax wedge: Single, without children ➢ Tax wedge: Married, with 2 children, one wage-earner ➢ Public sector payroll costs ➢ Administration efficiency index ➢ Observance of the law index ➢ Regulatory quality index ➢ Degree of sophistication of online public services ➢ Public services fully available online	**Category 6: Entrepreneurship (4 indicators)** ➢ Propensity for entrepreneurialism ➢ Self-employed jobs as a percentage of total employment ➢ Net change in number of companies (start-up rate less close-down rate) ➢ Volatility among companies (start-up rate plus close-down rate

[150] Indicators marked with an asterisk have not been updated.

Category 7: Education & Training (8 indicators) ➢ Annual cost per student in public educational facilities ➢ Portion of the population aged 25-64 with a secondary education ➢ Portion of the population aged 25-64 with a university education ➢ Percentage of human resources in scientific and technological fields as a % of total employment ➢ Percentage of foreign nationals in S&T human resources ➢ Percentage of highly qualified workers (ICT) in total employment figures ➢ Lifelong learning (participation of adults in training and teaching programs) ➢ Secondary school dropouts	**Category 8: Knowledge economy (14 indicators)** ➢ Internal R&D expenditure ➢ Public R&D budget credits ➢ Portion of public research financed by the private sector ➢ Percentage of sales allocated to the introduction of new products on the market (new or significantly improved products) ➢ Number of researchers per 1,000 employed persons ➢ Scientific publications per million inhabitants ➢ Number of patents (OEB/USPTO) per million inhabitants ➢ Use of Internet by companies (broad band) ➢ Investment in public telecommunications as a percentage of gross fixed capital formation ➢ Percentage of households that have Internet access at home ➢ Number of cell phones per 100 inhabitants ➢ Percentage of households that have broad band Internet access ➢ Number of secure web servers per 100,000 inhabitants ➢ Percentage of total employment in medium or high technology sectors
Category 9: Social Cohesion (6 indicators) ➢ Gini Coefficient ➢ At-risk of poverty rate after social transfers ➢ At persistent risk of poverty rate ➢ Life expectancy at birth ➢ Wage gap between men and women ➢ Serious work accidents	**Category 10: Environment (6 indicators)** ➢ Number of ISO 14001 and EMAS certifications par thousand companies ➢ Total greenhouse gas emissions ➢ Percentage of renewable energy sources ➢ Volume of municipal waste generated ➢ Energy intensity of the economy ➢ Modal split in transportation choice-percentage of car users as transportation method

Source: Fontagné (2004)

The methodology used to analyze Luxembourg's competitiveness by means of the scoreboard has not changed over recent years. Indicators are analyzed from two perspectives.

First Luxembourg is considered with relation to European averages.

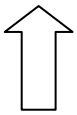
If a score for Luxembourg is 20% better or equal to the EU-x average, the indicator is classified as green, or favorable.

When a score for Luxembourg is between +20% and -20% of the EU-x average, the indicator is classified orange, or neutral.

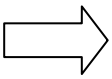
If a score for Luxembourg is 20% lower or equal to the EU-x average, the indicator is classified as red, or unfavorable.

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

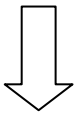
the tendency of the most recent changes, be it an improvement or worsening of indicator data.



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 14: Acronyms

DE	Germany	FR	France	NL	Netherlands
AT	Austria	GR	Greece	PL	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
ES	Spain	LT	Lithuania	UK	United-Kingdom
EE	Estonia	LU	Luxembourg	SI	Slovenia
FI	Finland	MT	Malta	SE	Sweden

Source: Eurostat

6.1 Analysis and Results

Several observations apply to the 79 surviving indicators of the original Fontagné report in 2007 that can be compared using the methodology described above[151]. In the first place, Luxembourg's performance in the "Serious work accidents," "Terms of

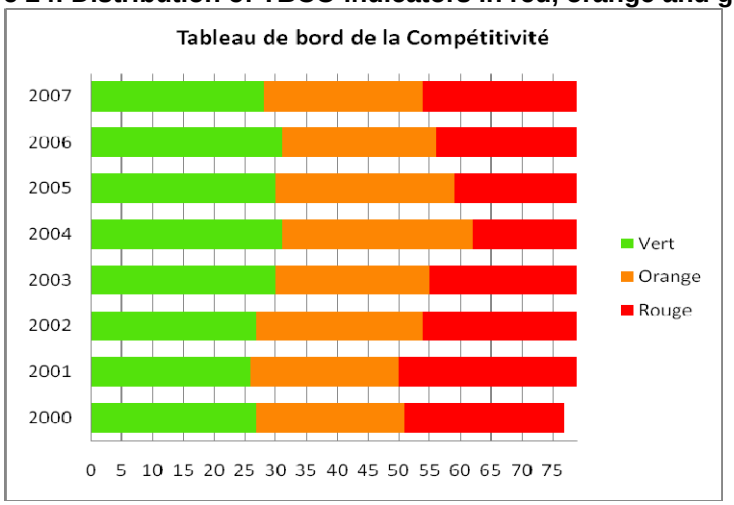
[151] Luxembourg's performance in the "Serious Work Accidents," "Terms of Trade" and "Real Effective Exchange Rate" indicators are measured over time using a base index of 100.

trade" and "Real effective exchange rate" indicators are measured over time using a base index of 100. Secondly, two of the 79 indicators, "Changes in unit wage costs" and "Trends in total factor productivity" cannot be calculated for the year 2000. Indeed, trends in indicators are registered using 2000 as the base year, with 2000 = 100. Results for the 2008 Competitiveness Scoreboard are as follows:

- Luxembourg had 28 indicators in the Green zone.
- Luxembourg had 26 indicators in the Orange zone.
- Luxembourg had 25 indicators in the Red zone.

In general, the number of green indicators increased constantly until 2004. The tendency is reversed after 2004, with a steady rise in the number of red indicators.

Figure 24: Distribution of TBCO indicators in red, orange and green



Source: *Observatoire de la Compétitivité*

The 2008 *Bilan Compétitivité* contains an update of the Competitiveness Scoreboard, calculated retrospectively for EU-27, up till 2000. Luxembourg's results are summarized by category in the table below.

Table 15: Comparison of Competitiveness Indicators: 2000-2007

		2000	2001	2002	2003	2004	2005	2006	2007
Macroeconomic performance	Green	8	8	8	8	8	8	8	8
	Orange	1	1	2	2	2	2	1	2
	Red	1	1	0	0	0	0	1	0
Employment	Green	2	2	2	2	1	1	1	1
	Orange	3	3	3	4	5	5	5	5
	Red	4	4	4	3	3	3	3	3
Productivity and Cost of Labour	Green	2	1	1	2	2	4	5	3
	Orange	1	1	2	1	2	1	0	0
	Red	0	3	2	2	1	0	0	2
Market Operations	Green	4	4	4	3	6	5	5	4
	Orange	2	2	2	3	2	2	1	2
	Red	4	4	4	4	2	3	4	4
Institutional and Regulatory Framework	Green	5	5	6	6	5	5	5	5
	Orange	2	2	2	2	4	3	3	4
	Red	3	3	2	2	1	2	2	1
Entrepreneurialism	Green	1	1	0	1	0	0	0	0
	Orange	2	2	3	2	3	3	3	2
	Red	1	1	1	1	1	1	1	2
Education and Training	Green	0	0	0	2	2	1	1	1
	Orange	3	3	4	1	2	3	3	2
	Red	3	3	2	3	2	2	2	3
Knowledge Economy	Green	5	5	5	5	6	6	6	6
	Orange	3	3	3	3	4	3	2	2
	Red	6	6	6	6	4	5	6	6
Social Cohesion	Green	0	0	1	1	1	0	0	0
	Orange	5	5	4	4	4	5	5	5
	Red	0	0	0	0	0	0	0	0
Environment	Green	0	0	0	0	0	0	0	0
	Orange	2	2	2	3	3	2	2	2
	Red	4	4	4	3	3	4	4	4
Total	Green	27	26	27	30	31	30	31	28
	Orange	24	24	27	25	31	29	25	26
	Red	26	29	25	24	17	20	23	25
Indicator total		77	79	79	79	79	79	79	79

Source: *Observatoire de la Compétitivité*

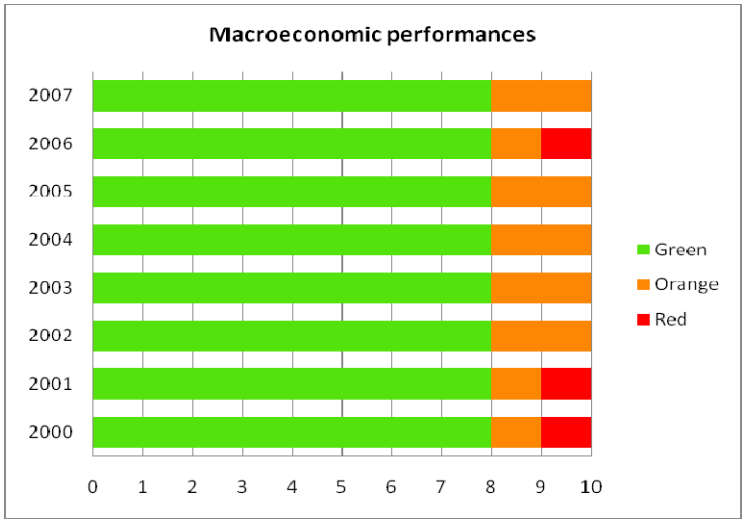
As noted, overall between 2001 and 2004 the number of red indicators gradually diminished while the number of green indicators increased. Between 2005 and 2007 this tendency was reversed. Nevertheless, the figures can vary widely from one category to another. A detailed analysis of each category of indicators, appearing in sections 6.1.1- 6.1.10, puts this generally discouraging view of the results into perspective by detailing changes in indicators within the various categories.

6.1.1 Macroeconomic Performances

Table 16: Category 01 Macroeconomic performances

Code	Indicator	LU[152]		EU-27	DE	FR	BE	MIN	MAX
ECO 01	Gross National Income at market price, per inhabitant in PPS (2007)	→	230 V	100	116	111	122	BU 38	LU
ECO 02	Real Growth Rate of GDP in % (2007)	↓	4,5 V	2.9	2.5	2.2	2.8	HU 1.3	SK 10.4
ECO 03	Growth in domestic employment, in % (2007)	↑	4 V	1.6	1.7	1.2	1.4	HU -0.1	PO 4.4
ECO 04	Unemployment rate (2007)	→	4.7 V	7.1	8.4	8.3	7.5	NL 3.2	SK 11.1
ECO 05	Inflation, in % (2007)	↑	2.3	2.3	2.3	1.6	1.8	MT 0.7	LT 10.1
ECO 06	Public balance as % of GDP (2007)	↑	2.9 V	-0.9	0	-2.7	-0.2	HU -5.5	FI 5.3
ECO 07	Public debt as % of GDP (2007)	↓	6.8 V	59	65	64	95	EE 3.4	IT 104
ECO 08	Gross fixed capital formation as % of GDP (2007)	↑	3.86	2.56	1.49	3.31	1.69	AT 1.01	CZ 5.54
ECO 09	Terms of trade (2007)	↓	104	:	100	108	100	FI 100	RO 102
ECO 10	Real Effective Exchange Rate using Index 2000=100 (2007)	↓	109	123*	105	106	109	SE 96	SK 151
ECO 11	Diversification – Entropy coefficient (2007)	↓	1.36	1.59	1.52	1.56	1.55	LU	RO 1.66
ECO 12	Market integration (2006)	→	275 V	1.8	2.1	4.4	14.6	FI 1.7	LU

*EU-15; Inflation rate LU: NCPI, others HCPI; Harmonized unemployment rate EUROSTAT/BIT



Note that in this primary category, Luxembourg's performance is excellent, as no red indicators appear. Only the Inflation Rate [153] showed red in 2006 and then returned to orange in 2007 dropping from 2.7% in 2006 to 2.3% in 2007.

Despite the fact that Luxembourg is no longer completely in the red zone with regard to its inflation rate, in the "Real Effective Rate of Exchange" indicator, which takes

[152] In order to better distinguish orange boxes from green ones in a black and white version of the Report, the indicators in green zones are marked with a "V", for *Vert*, or Green.

[153] Note that the NCPI indicator is used when analyzing Luxembourg, whereas the HCPI is used for other countries. This is because the HCPI harmonized indicator used on the EU level does not account for Luxembourg's specific situation with regard to the high number of non-resident consumption occurring on its territory and the resulting over-weighting of certain goods in analyses.

the inflation variable into account in its measure of a country's price competitiveness[154], Luxembourg's position worsened between 2006 and 2007, moving from 107.5 in 2006 to 108.9 in 2007. This illustrates that this indicator accounts for the relative improvement in other countries[155].

Luxembourg is at the head of the pack for the "Gross national income at market price, per inhabitant in PPS" indicator.

The indicator "Growth in domestic employment" also rose significantly, by 4% in 2007 compared to 3.7% in 2006, with the Community average at around 1.6%. The "Unemployment rate" indicator, however, was stagnant at 4.7 % between 2007 and 2006. This indicator nonetheless remains well below the Community average of 7.1%.

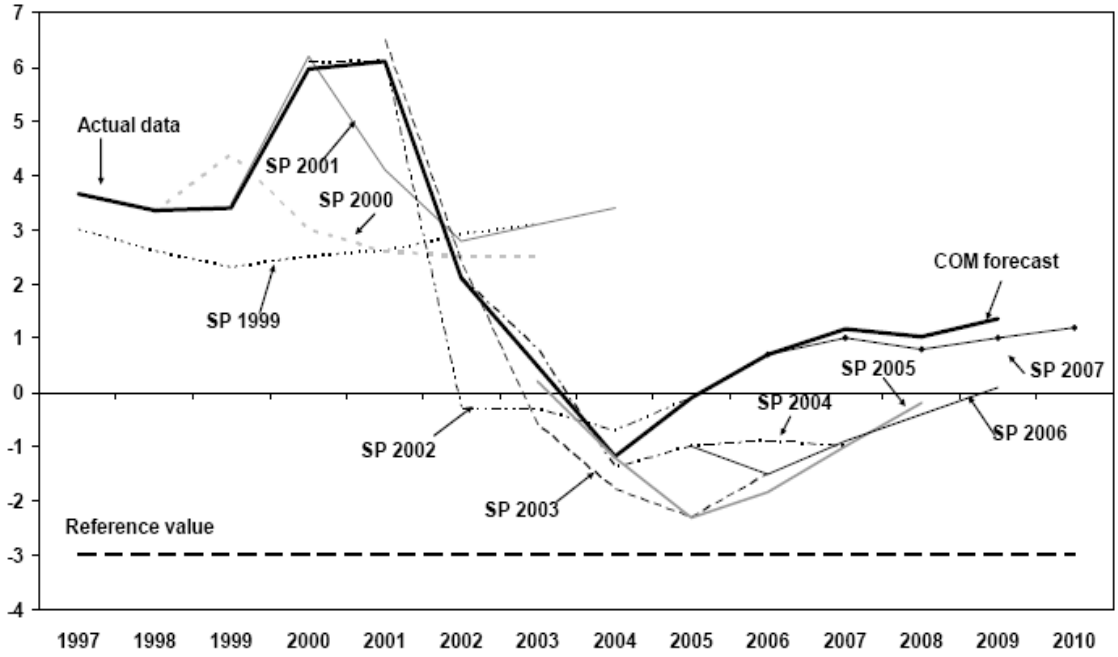
In comparison with the other EU countries, the Grand Duchy boasts, alongside Estonia, a very low "Public debt" figure of 6.8% of GDP, compared to a Community average of 59% of GDP. The "Public balance" remained in the green zone and showed clear improvement between 2006 and 2007, increasing from 0.1% of GDP to 2.9% of GDP.

[154] Also see chapters 2, 3 and 4 of this Report.
[155] See Chapters 2 and 3

Frame 12: Change in the Public balance as seen by the Social Partners

The economic and social committee (CES) recommendations in the 2008 Annual Opinion should be investigated in-depth.

Figure 25: Budgetary positions in the yearly stability programs of Luxembourg



Source: European Commission, February 2008

The graph represents the various years of stability programs submitted to the European Commission by the Government and approved by the Ecofin Council in 1999. Each stability program set out hypotheses on current and future macroeconomic environments and outlined each Member state's budgetary position forecast for the upcoming five years, comparing them with medium-term objectives that were set.

The CES has to bring to light that following the latest submittal dated 31 March 2008 in accordance with EC regulation 3605/93, the budget surplus for 2007 will be significantly greater than initially estimated in February 2008 (see graph 100), and will amount to 3% of GDP

The graph shows that since 2002, when the economic slowdown caused by the financial crisis hit the real Luxembourg economy, estimated budgetary positions were negative and it was forecasted that equilibrium or even a surplus would not return till 2008 or 2009. The 9th update of the stability program in 2007, the most recent one that is used in this opinion, estimates a surplus in excess of 1% in terms of GDP between 2008 and 2010. Each update, done on an annual basis, must account for new budgetary items submitted to the Commission in the months of April and October, as well as changes in the past and foreseeable future economic situation.

The graph also shows that budgetary positions, which displayed big surpluses before the technological bubble burst in 2002, were 6% of GDP. This melted away rapidly as tax income fell and public spending increased. The balance was near 0 in 2003, became a deficit in 2004, moved back toward equilibrium in 2005 and went into surplus as from 2006, without however reaching the level of budget surpluses enjoyed prior to the bursting of the technological bubble.

The graph also displays a significant gap between predicted and actual annual public deficits. This illustrates the need for an integrated and reliable statistical information system providing data at least twice per year.

Lastly, the graph reveals that the Government and the Social Partners in future will do well to address serious problems when they are clearly perceived and to arrive at decisions regarding them immediately, by means of the Tripartite Coordination Committee if necessary. This would limit the scope of austerity measures and allow rapid repeal of those measures no longer justifiable when the economy improves or a structural problem is apparently resolved.

The medium term objective (MTO) in terms of public balance amounts, that is required by the terms of the Stability and Growth Pact (SGP), must be achieved through Government policy decisions and concerted action by the social partners. The Lisbon Strategy as described in the National Plan for Innovation and Full Employment must be mirrored in the medium term budget policy and should promote knowledge society principles, an inclusive social policy, security of professional career orientations in the spirit of the social model, social programs and the attractiveness of the country to investors. The public accounts balance, which keeps the maximum public deficit set by the PSC—3% of GDP—from being exceeded, is fixed at –0.8% for Luxembourg according to European Commission figures.

CES has learned other things as well from observing changes in public finance over recent years. To judge the state of public finance in a country it is not sufficient to isolate nominal budget balances from year to year. It is necessary to develop an analysis framework based on different criteria and to evaluate it from a medium-term perspective.

Thus budget policy must not favor a cyclical outlook. It cannot encourage overheating tendencies, nor accentuate slowdowns, in the economy. To avoid this, it must break down nominal budget balances into an economy component and a structural component. The structural component, freed from the negative or positive impact exerted upon it by the state of the economy, will be the judge of the underlying status of public finances.

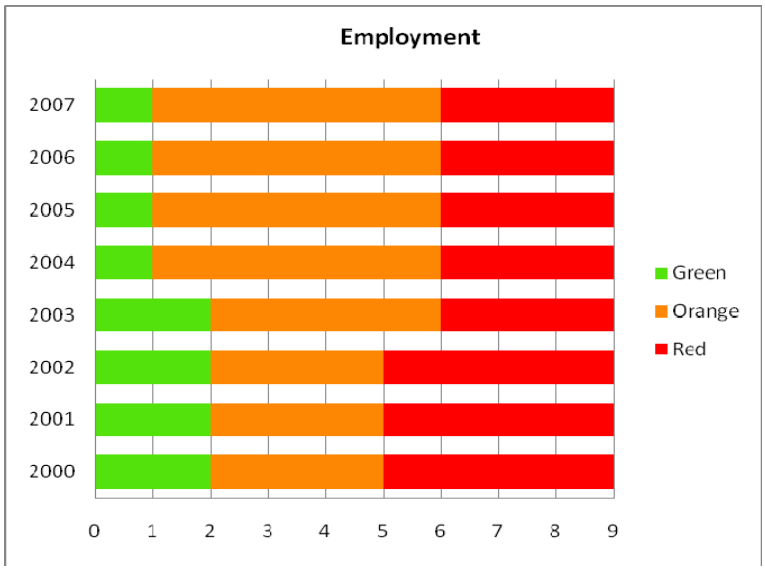
Other criteria to be taken into account in evaluating budget balances include the level, structure and quality of public expenditures. A lower budget balance, or even a deficit, is not viewed in the same way for every type of consumer or investment expenditure a government makes. Each expenditure, if effectively managed, can be used to develop material or immaterial infrastructure and will thus increase the potential for economic growth.

Source: CES 2008 Annual Report

6.1.2 Employment

Table 17: Category 02 Employment

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
EMP01	Employment rate, in % (2007)	→	64	65	69	65	62	MT 55.7	DK 77
	Men (2007)	↓	72	73	75	69	69	PL 64	NL 82
	Women (2007)	↑	55	58	64	60	55	MT 37	DK 73
EMP02	Long-term unemployment rate, in % (2007)	↑	1.3[V]	3	4.7	3.3	3.8	DK 0.6	SK 8.3
EMP03	Persons holding a part-time job, in % (2007)	↑	18	18	26	17	22	BU 1.7	NL 47
EMP04	Unemployment rate of persons under 25, in % (2007)	↓	17.5	15,4	11.1	19,4	18,8	NL 5,9	GR 22.9
EMP05	Employment rate of persons aged 55 - 64, in % (2007)	↓	33	45	52	38	34	MT 28	SE 70
	Women (2007)	↑	28	36	44	36	26	MT 12	SE 67
	Men (2007)	↓	38	54	60	41	43	LU	SE 73



Only one indicator in this category remains in the green. Of the 5 indicators in the orange zone, 2 have worsened, 2 have improved and 1 remains unchanged.

The indicator "Unemployment rate[156] of persons less than 25 years", is in the orange zone and deteriorated again between 2006 and 2007, rising from 16.2% in 2006 to 17.5% in 2007. The "Long-term unemployment rate", which is still in the green zone, has improved. In 2006, this figure was 1.4% in Luxembourg compared to 1.3% in 2007, which is relatively low compared to the Community average of 3 %.

Luxembourg has stagnated in the Lisbon indicator "Employment rate". At 63.6%, it is in the orange zone, below the European average, which improved slightly from

[156] STATEC, *Les jeunes face au marché du travail*, Bulletin N° 7/2007

64.3% in 2006 to 65.4% in 2007. The employment rate of women in Luxembourg grew from 54.6% in 2006 to 55% in 2007, with the average for the European Union at 58.3% in 2007. These rates must be put into perspective to account for Luxembourg's specificity of significant cross-border flows of workers.

Lastly, it should be noted that the "Employment rate of older worker" (Women)" increased slightly from 27.8% in 2006 to 28% in 2007. With the EU average in this indicator at 36%, Luxembourg remains situated in the red zone.

Frame 13: Unemployment in Luxembourg: an integrated approach

Unemployment is an economic and social phenomenon that exists in various dimensions that largely reflect the economic situation of a country. Accurately measuring it is therefore fundamental for public authorities, social partners and for public opinion. The STATEC report on unemployment in Luxembourg is by nature descriptive and cannot hide the bare facts by putting it into a conceptual perspective in order to place unemployment in a broader context.

In Luxembourg, as with the majority of EU Member states, unemployment is measured by means of a survey and addressing an administrative source.

Each year, results of this survey on the labour force (EFT –*Enquête sur les forces de travail*) carried out by STATEC are awaited eagerly because it measures the number of unemployed persons from a survey base of 8,500 households using the definition for unemployed persons set out by the International Labour Office (ILO). Unemployment figures furnished by this agency are also the only ones used in international comparisons with other Member states and countries that accept its standard.

Unemployment information published monthly by the Luxembourg Labour Administration (ADEM), provide valuable information on current unemployment status of the economy. For this reason, the information is used in the media and public debate on unemployment.

The STATEC report offers an integrated analysis of unemployment using these two sources. The report opens with a methodology section that summarizes the definitions of unemployment, presenting the sources of data used and comparing unemployment rates in Europe and the Greater Region. Section 4 of the report then provides a brief description of the situation of the population of Luxembourg with respect to employment and business activity. Section 5 has an analysis of

unemployment based on the Luxembourg segment of the EC survey on the Community's labour force and Section 6 gives an analysis of the unemployed population in the meaning of the ILO definitions, depending on whether or not these persons are registered with ADEM. Section 7 focuses primarily on job seekers registered with ADEM. This analysis is carried out using administrative data assembled by ADEM but is not limited to "simple" job seekers. One part of this section is consecrated to persons enrolled in employability measures. A final section is dedicated to analyzing job offers, a component that very often receives no attention whatever in unemployment studies. The report ends by giving specific recommendations for improving the statistic.

Source: STATEC Bulletin n 5-08;

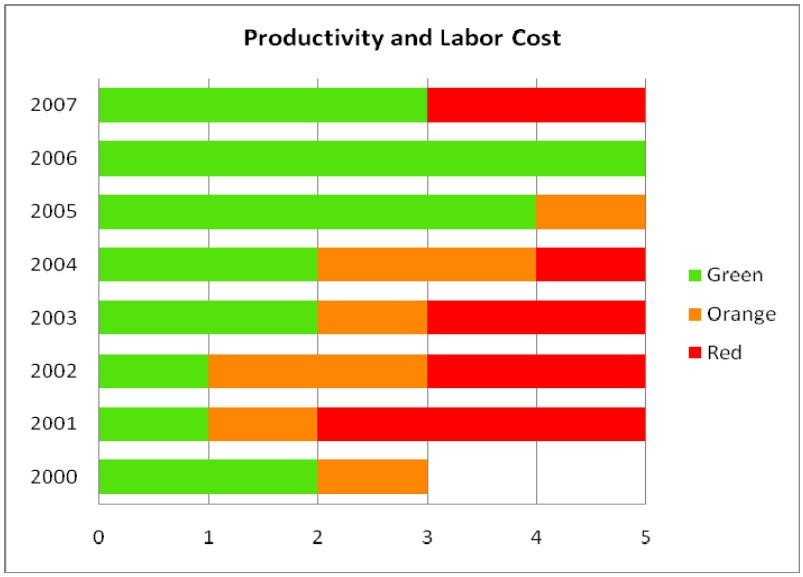
"Unemployment in Luxembourg: An Integrated Approach"

6.1.3 Productivity and Labour Cost

Table 18: Category 03 Productivity and Labour Cost

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
PC 01	Trends in total factor productivity (2007)	↓	0.13 V	0.70*	0.94	0.18	0.65	LU	FI 2.07
PC 02	Trends in apparent labour productivity (2006)	↑	2.3	1.7	2.7	1.2	1.6	IT 0.1	LV 7.2
PC 03	Productivity per hour worked as a percentage of U.S. figures (2007)	↓	97.5 V	64.3	83.3	98.5	96.3	RO 15.1	FR
PC 04	Changes in real unit labour costs (2007)	↓	0.02	-0.74	-1.67	-0.02	0.26	CY -0.71	LU
PC 05	Costs/Income ratio in the banking sector (2006)	↑	42.94	57.4**	68.7	62.4	64.9	DE 68.7	UK 40.5

*EU-15; **EU-25



The category "Productivity and Labour Cost", which had no red indicator in 2006, has deteriorated significantly. Two indicators have gone from green to red.

Three of the five indicators in this category have deteriorated: The indicator "Trends in total factor productivity" went from green to red (0.13 % in 2007 as opposed to 2.11% in 2006); the "Productivity per hour worked as a percentage of U.S. figures" indicator, which fell from 102.39% in 2006 to 97.5% in 2007, and "Changes in unit labour costs" went from -0.06% in 2006 to 0.02 in 2007. One of five indicators improved: this was "Trends in apparent labour productivity", which rose from 1% in 2005 to 2.3% in 2006. The indicator "Costs/Revenue ratio in the banking sector" went from the orange to the green zone in 2006.

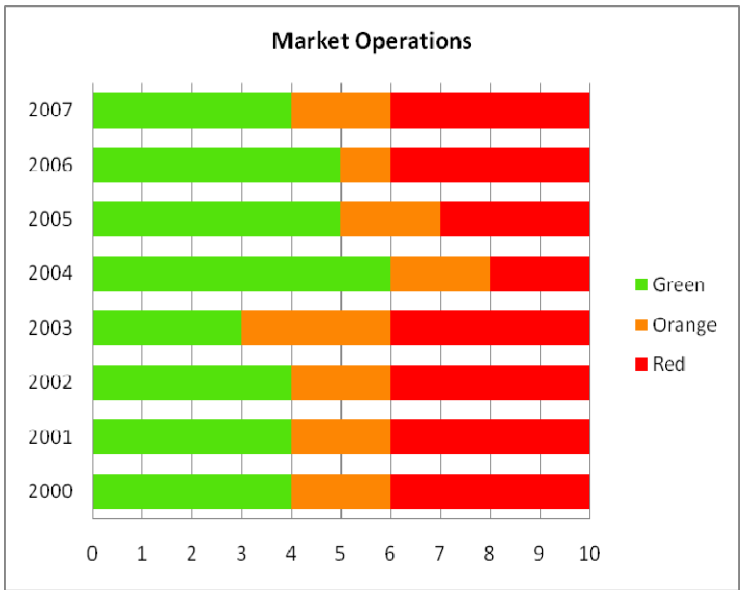
6.1.4 Market Operations

Table 19: Category 04 Market Operations[157]

Code	Indicator		LU	EU-19	DE	FR	BE	MIN	MAX
F01	Minimum monthly wage as a proportion of average monthly earnings (2007)	→	11	5.9*	:	17	:	ES 0.75	FR
F02	Price of electricity (ex-VAT) –industrial users, in € per 100kw hours (2007)	↓	9.63	7.74**	9.46	5.31	8.8	LV 4.43	IR 11.25
F03	Price of gas (ex-VAT) –industrial users, in € per GJ (2007)	↓	9.85	9.14***	12.15	7.63	6.89	EE 3.69	DE
F04	Market share of the leading operator in the mobile telecommunication in % of total market telephone market (2006)	↑	51	39**	37	46	45	UK 26	CY 90
F05	OECD basket of mobile telephone rates for large consumers, VAT included – Total in USD (2006)	↑	400 V	635	703	620	651	DK 184	CZ 1,066
F06	OECD composite telephone charges, professional subscribers, ex-VAT - Total in USD (2004)	↑	795 V	1380	1214	1150	1256	DK 731	PO 2613
F07	Broadband internet access rates in USD PPP/MB (VAT included) (2007)	↓	50.8	47	32.2	36.7	46.1	FI 31.2	CZ 88.9
F08	OECD composite of domestic rates for 2Mbit leased lines, ex-VAT – in USD (2006)	↑	11,376 V	57,6560	15,716	22,043	18,905	DK 4,174	SK 695,7370
F9	Public procurement- value of public procurement which is openly advertised, as % of GDP (2006)	↓	1.39	3.27**	1.65	3.44	2.42	LU	LV 13.82
F10	Total State aid as a % of GDP (excluding horizontal objectives) (2006)	↑	0.32 V	0.58**	0.87	0.58	0.39	BU 0.21	MT 2.29

* EU-18; **EU-25; ***EU-24; ****EU-15

[157] Data for the countries BU, CY, EE, LV, LT, MT, RO, SL, PO, SK, CZ are not yet available for category 04 "Market Operations".



In this category one indicator in the green dropped to orange while the number of red indicators remained stable between 2006 and 2007.

Five of ten indicators nonetheless improved, one remained unchanged and four fell, including the price of energy (electricity and gas) for industrial users, “Public procurement—value of public procurement which is openly advertised as % of GDP” and “Broadband internet access rates”. In this last indicator, Luxembourg dropped from green to orange. Gas prices rose significantly between 2004 and 2007, moving from €5.94 to €9.85 per GJ. Electricity rates also rose sharply from €7.52 to €9.63 per 100kw hours in 2007, the same trend occurring in the European Union with rates rising from €6.59 to €7.74 per 100kw hours between 2005 and 2007. This is obviously related to rising oil prices on the international market.

The indicator “Minimum montly wage as % of average monthly earnings” is situated in the red zone and has stagnated at 11% from 2005 – 2007.

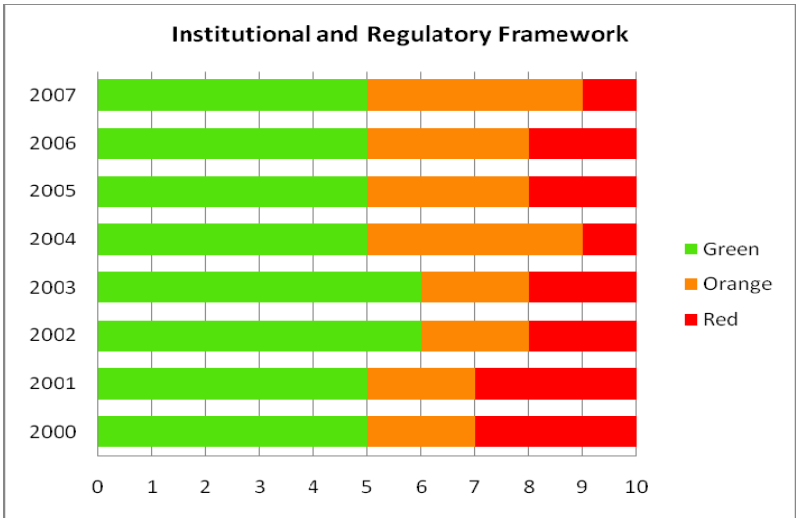
The “Market share of the primary operator in the cellular telephone market” changed considerably, dropping from 58% in 2005 to 51% in 2006. The indicator “Public procurement—value of public procurement which is openly advertised as % of GDP” worsened from 2.52% in 2005 to 1.39% in 2006.

6.1.5 Institutional and Regulatory Framework

Table 20: Category 05 Institutional and Regulatory Framework[158]

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
CAD01	Corporate tax rate, as a % (2007)	→	29.63	25	38.4	33.3	34	BU 10.00	DE
CAD02	Personal income tax rate, as a % (2006)	↓	39	41.6*	45.4	55.9	53.5	SK 19.00	DK 59.70
CAD03	Standard VAT rate in % (2007)	→	15 V	19*	19	19.6	21	LU	SE 25
CAD04	Tax wedge – Single, without children, % (2007)	↓	37.5	43**	52.2	49.2	55.5	IE 22.9	BE
CAD05	Tax wedge – Married, with 2 children, one wage-earner (2007)	↓	14.3 V	31.8**	36.4	41.9	40.5	IE -1.1	HU 43.8
CAD07	Goverenement effectiveness index (2007)	↑	1.76 V	1.15	1.68	1.30	1.59	RO -0.09	DK 2.21
CAD08	Rule of law index (2007)	↑	1.85 V	1.10	1.78	1.32	1.52	RO -0.17	DK 1.95
CAD09	Regulatory quality index (2007)	↑	1.89 V	1.27	1.5	1.15	1.48	RO 0.48	DK 1.93
CAD10	Degree of sophistication of online public services, in % (2007)	↑	67	76*	84	87	80	PO 53	AT 99
CAD11	Full online availability of public services, as a percentage (2007)	↑	40	58*	75	70	60	BU 15	AT 100

*** EU-25 ; **EU-19**



Five of the ten indicators in this category improved from the red zone to the orange. These include notably the “Regulatory quality index”, the “ Government effectiveness index”, the “Rule of law index”, “Degree of sophistication of online public services” and “Full online availability of public services”. The three other indicators, “Tax wedge – Single, no children”, “Tax wedge – Married, with 2 children, one wage-earner” and “Tax rate on physical persons” all fell in the standings.

[158] The indicator “Public sector payroll costs” was withheld from the TBCO because data concerning it was unavailable.

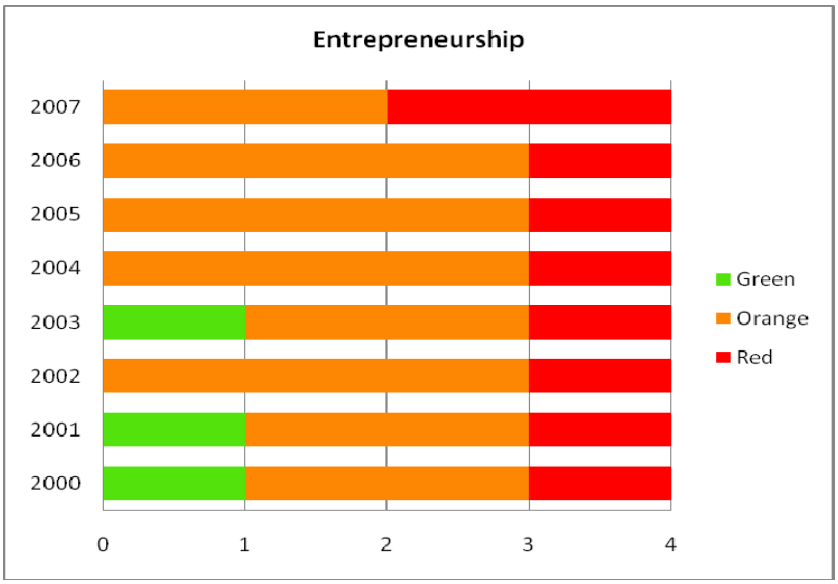
One single indicator in this category is ranked in the red zone for Luxembourg. This is the “Full online availability of public services”, which improved with the others from 2006 to 2007, rising from 25% to 40%, but is still in the red.

6.1.6 Entrepreneurialism

Table 21: Category 06 Entrepreneurship

Code	Indicator		LU-27	EU-27	DE	FR	BE	MIN	MAX
E01	Proportion of the general public in favor of self-employed status, as a % (2007)	↓	35	44.4*	41	41	30	CZ 30	LT 59
E01	Self-employed as a percentage of total employment (2006)	↑	6.01	15.25	11.18	8.89	16.30	SE 5.55	GR 34.79
E01	Net change in number of companies, as a % (2004)	↓	2	2**	:	:	-2	BE	LV 12
E01	Volatility among companies, as a % (2004)	↓	22	19**	:	:	16	PT 10	LV 11.5

* EU-15 ; **EU-17



No indicator for this category has earned a position in the green zone since 2003. The indicator “Proportion of the general public in favor of self-employed status”[159] remains in the red zone despite a modest increase from 5.96% in 2006 to 6.01% in 2007.

The indicators “Net change in number of companies” and “Volatility among companies” dropped in value and are now in the orange zone. It should be noted that new Member states are performing rather well in this category of indicators.

The indicator “Propensity for entrepreneurialism” went from 48% in 2004 to 35% in 2007.

[159] See *Lettre de l’Observatoire de la Compétitivité N°4 « Entreprendre : entre volonté et réalité. Un paradoxe luxembourgeois ? »*

6.1.7 Education and Training

Table 22: Category 07 Education and Training[160]

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
EDU01	Annual cost per student in public educational facilities, in PPS (2005)	↑	1,224	5,612	5,744	6,588	6,889	RO 1467	LU
EDU02	Percent of population achieving at least the second cycle of secondary education (2007)	↑	66	71	85	69	68	MT 27	CZ 91
EDU03	Percent of the population aged 25-34 tertiary education (2006)		12.1**	54.83*	37	80.3	62.5	LU	LT 89.5
EDU04	Percentage of human resources in science and technologyl (HRST), as a percentage of total employment (2006)	↑	38.40 V	29.7*	35.8	30.5	32.9	PT 17.5	SE 39.1
EDU07	Life long learning (2007)	↓	7	9.7	7.8	7.4	7.2	BU 1.3	SE 32
EDU08	Percentage of early school leavers (2006)	↑	15.1	14.8	12.7	12.7	12.3	SL 4.3	MT 37.6

* UE-15 ;**2000

This category recorded a slight improvement over the situation of 2006-2005, where it had deteriorated to some extent.

Luxembourg is the country with the highest expenditures in the red listed indicator "Annual cost per student in public educational facilities"[161]. It should be noted that a high level of expenditure in public teaching establishments is fully justifiable when they are made in adherence to the principle of efficiency. In addition, differences are mitigated when these figures are put into perspective with regard to GDP. Luxembourg devotes 3.7% of its GDP to public and private expenditures in primary,

[160] The indicators "Percent of foreign nationals in ST human resources" and "Percentage of highly qualified ICT workers in total employment figures" are not evaluated in the Scoreboard because data for them was unavailable.

[161] See. OECD Economic Studies – Luxembourg, volume 2006/9, Paris, July 2006, focused on the theme of education. In Chapter 7 of the 2007 *Bilan Compétitivité*, the subject of a presentation in the seminar "Evaluation and Efficiency in Public Policies" was the importance of an evaluation and of the efficiency of educational systems. The results of this PISA survey-based evaluation were released in December 2007.

secondary and post-secondary, non-degree education, thus placing itself almost exactly in the average of OECD countries, which is 3.8%[162].

The indicator "Percentage of human resources in science and technology (HRST), as a percentage of total employment", which was not updated in 2007, is in the green zone, up from 38.17% in 2004 to 38.40% in 2006. Still, Luxembourg's good performance in this indicator is primarily due to the presence of foreign nationals in the field of science and technology.

In the orange zone, the indicators "Early school leavers" and "Percent of population achieving at least the second cycle of secondary education" improved slightly. This indicator came out of the Community survey on the labour force that does not take into account the academic system in Luxembourg. The Ministry of National Education analyzed the dropout issue in Luxembourg using its own data, presented in the frame below. On the other hand, the indicator "Life long learning" fell further, moving from the orange zone level of 8.2% in 2006 to a red zone figure of 7% in 2007.

Frame 14: Analysis of early school leavers in Luxembourg 2006-2007

According to an analysis by the Ministry of National Education and Professional Training, Luxembourg's dropout rate fell from 14.9% in the 2005-2006 academic year to 9.4% in the 2006-2007 academic year.

	Ministère de l'Education nationale et de la Formation professionnelle (MENFP)	Enquête Force du travail (EFT)
2003/2004	17,20%	12,70%
2005/2006	14,90%	17,40%
2006/2007	9,40%	15,10%

The analysis involved 1,320 students who dropped out of secondary and secondary technical school between 1 May 2006 and 30 April 2007 without receiving their diploma. Since 2003, the Ministry has been following up on students who stopped their studies short of receiving a diploma on an individual basis. A list of these young people is prepared monthly and sent to the regional centers of Local Action for Youth (*Action Locale pour Jeunes-ALJ*). The ALJ individually contacts these young people to ask them the reasons that induced them to leave school and to inquire how their personal situation has evolved since they left. If appropriate, ALJ then offers help in finding a training program or a school.

Of the 1,320 students who dropped out of school between 1 May 2006 and 30 April 2007, 369 have since enrolled in a different school, either in Luxembourg or abroad, and 538 have dropped out of

[162] Ministry of National Education and Professional Training, Press Release, Comments on the 2008 edition of the publication entitled EDUCATION AT A GLANCE – REGARDS SUR L'ÉDUCATION, September 2008

school for good. Of the group that left school, 104 have found work, 138 are enrolled in a job seeking initiative and 296 have no occupation. The remainder of these students, 413 in number, could not be found despite efforts to do so by the ALJ. The great majority of these former students have very likely left the country. A comparison with the two previous studies undertaken shows that the dropout rate fell by 45% with relation to 2003-2004.

This decrease substantiates the success of the measures undertaken by the Ministry of National Education and Professional Training, which has made an absolute priority of fighting academic exclusion. The Ministry's method includes improving academic guidance counseling per the recommendations of the 2005 academic advancement regulation, systematic monitoring of students who leave school by the ALJ, creation of new academic programs for students in difficulty such as remedial classes for students with behavior issues, classes specifically for students repeating their year and professional initiation or guidance classes (the *Cours d'orientation et d'initiation professionnelle – COIP* program).

The study's second part shows that certain groups of students run a greater risk of dropping out; boys are more susceptible to this than girls, as are foreign born students, students in the *régime préparatoire,* in the 9th grade practical course and in the vocational program and students who are at least two years behind in their studies—this being the factor that most strongly indicative of dropping out.

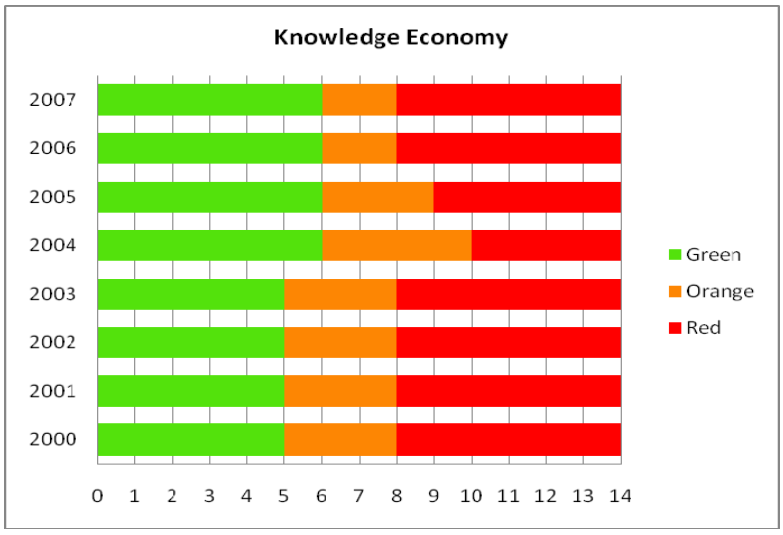
Source: Ministry of National Education and Professional Training

6.1.8 Knowledge Economy

Tableau 23: Category 08 Knowledge economy[163]

Code	Indicator		LU	EU-27	DE	FR	BE	MIN	MAX
EC01	Internal R & D expenditure under Lisbon accords, as a % of GDP (2006)	↓	1.47	1.84	2.53	2.9	1.83	CY 0.42	SE 3.73
EC02	Public R & D budget credits, as a % of GDP (2005)		16.6	34.2	28.4	38.4	24.7	LU	CY 67
EC03	Portion of public research financed by the private sector, as a % of GDP (2005)		3.9 V	8.5	9.9	7.4	9.2	GR 1.3	NL 16.1
EC04	Percentage of sales allocated to the introduction of new products on the market (2002)	↑	5 V	6**	8	6	5	HU 1	SK 19
EC05	Number of researchers per 1,000 employed persons, public and private sectors taken together (2004)	↑	7.1	5.9*	6.9	7.7	7.7	CY 1.43	FI 17.3
EC06	Scientific publications per million inhabitants (2005)	↑	127	477	535	482	653	RO 41	SE 1109
EC07	Number of patents submitted to the OEB per million inhabitants (2005)	→	189	101	115	149	125	CY 0	DE 269
	Number of patents awarded by the USPTO per million inhabitants (2006)	↑	79.6	44	110	49	49	LV 0	FI 161
EC08	Use of broadband connections by companies as a % (2007)	↑	86	83*	84	93	89	RO 54	ES 95
EC09	Investment in public telecommunications as a percentage of GFCF(2005)	↓	0.77	2.23***	1.68	1.86	1.60	LU	SL 3.62
EC10	Percentage of households that have internet access at home (2007)	↑	75 V	54	71	49	60	BU 19	NL 83
EC11	Number of cell phones per 100 inhabitants (2005)	↑	225.46 V	155.39**	156.23	136.75	149.19	SK 103.67	LU
EC12	Percentage of households that have broadband internet access (2007)	↑	77	77	70	87	94	GR 29	BE 94
EC13	Number of secure web servers per 100,000 inhabitants (2006)	↑	54.93	37.37***	33.11	8.98	14.02	SK 2.62	LU
EC14	Percentage of total employment in medium-high or high technology sectors (2006)	→	1.26	6.6	10.72	5.93	6.33	CY 1.03	DE 10.72

* EU-25 ; ** EU-19, ***OECD



The situation remains unchanged in this category since 2004. It is important to note that five of the fourteen indicators could not be updated. These include “Public R & D

[163] Data for BU, CY, EE, LV, LT, MT, RO, SL, PO, SK and CZ are not always available in category 8, “Knowledge Economy”.

budget credits, as a percentage of GDP", "Researchers per 1,000 employees, public and private sectors taken together", "Percentage of sales allocated to introducing new products on the market", "Investment in public telecommunications as a percentage of GFCF" and "Number of cell phones per 100 inhabitants". The "Number of patents awarded by the USPTO per million inhabitants" increased from 71 in 2006 to 79.6 in 2007. The "Portion of public research financed by the private sector" rose from 2% in 2003 to 3.9% in 2005. The number of "Scientific publications per one million inhabitants" fell from 135 in 2004 to 127 in 2005.

In the "Knowledge Economy" category, it has been shown that five of the eight indicators that could be updated have improved. Both "Percentage of households that have Internet service at home" and "Percentage of households that have broadband Internet access" show an upward trend, with the latter indicator moving form 63% in 2005 to 77% in 2006. The "Number of secure web servers per 100,000 inhabitants" increased, rising from 44.39% in 2005 to 54.93% in 2006. The indicator "Use of broadband connections by companies" which earned a position in the orange zone for Luxembourg improved from 81% in 2006 to 86% in 2007.

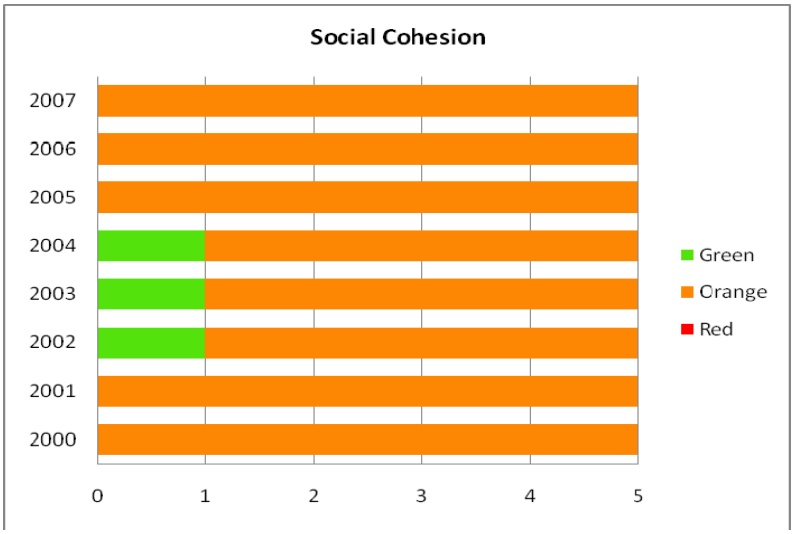
The situation degraded slightly in terms of the indicator "Internal R & D expenditure", dropping from 1.56% in 2005, compared with 1.47% in 2006.

6.1.9 Social Cohesion

Table 24: Category 09 Social Cohesion

Code	Indicator		LU	EU-25	DE	FR	BE	MIN	MAX
SOC01	Gini Coefficient (2006)	↓	0.28	0.30	0.27	0.27	0.28	BU 0.24	LV 0.39
SOC02	At-risk of poverty rate after social transfers, as a % (2006)	↓	14	16	13	13	15	NL 10	LV 23
SOC03	At persistent risk of poverty rate, as a % (2001)	↓	9	9*	6	9	7	NL 5	PT 15
SOC04	Life expectancy at birth (2006)	↓	79.4	78.8	79.9	80.9	79.5	LV 70.9	ES 81.1
SOC05	Gender pay gap, as a % of gross hourly wages of male employees (2006)	→	14	15**	22	11	7	MT 3	EE 25
SOC06	Serious accidenta at work , using a base year index of 1998=100 (2005)	↑	72	78	65	90	62	SK 52	EE 126

* EU-15; **EU-27



In this category, solidly orange indicators prevail, denoting a status quo that reigned between 2005 and 2007. While the absence of green indicators may be regretted, there are at any rate no red indicators, a positive sign, which should nonetheless not escape monitoring activities to ensure that orange indicators do not slip into the red zone.

Of the six indicators used in this category, the “At persistent risk of poverty rate” and “Gender pay gap” have not been updated, the first since 2001, and the second since 2006.

The Gini Coefficient, which is a measure of unequal income disparities, grew from 0.26 in 2005 to 0.28 in 2006.

The indicator “Serious accidents at work ”, expressed in numbers of serious accidents using a base of 100 in 1998 improved between 2004 and 2005, when it dropped from 94 to 72. The indicator “At-risk of poverty rate after social transfers”, in which Luxembourg occupies a favorable position with a rate of 14%, compared to the EU average of 16%, nonetheless dropped 1 percentage point between 2005 and 2006.

Frame 15: The CEP-L Social Panorama (2008)

The CEP-L recently published a social panorama of Luxembourg that analyzes social health from various viewpoints including unemployment, working conditions, inequality of income and the situation of youth. Unemployment is evaluated using the variables of

gender, age, level of education and duration. The second category of indicators concentrates on work conditions by focusing on the different forms of work, i.e. temporary, part-time work or off hours and on occupational safety. Next, there is an analysis of inequality between men and women as well as the rate of risk of poverty by age, sex and education. The final category is consecrated to the situation of youth in Luxembourg depending on activity, education, training and poverty level.

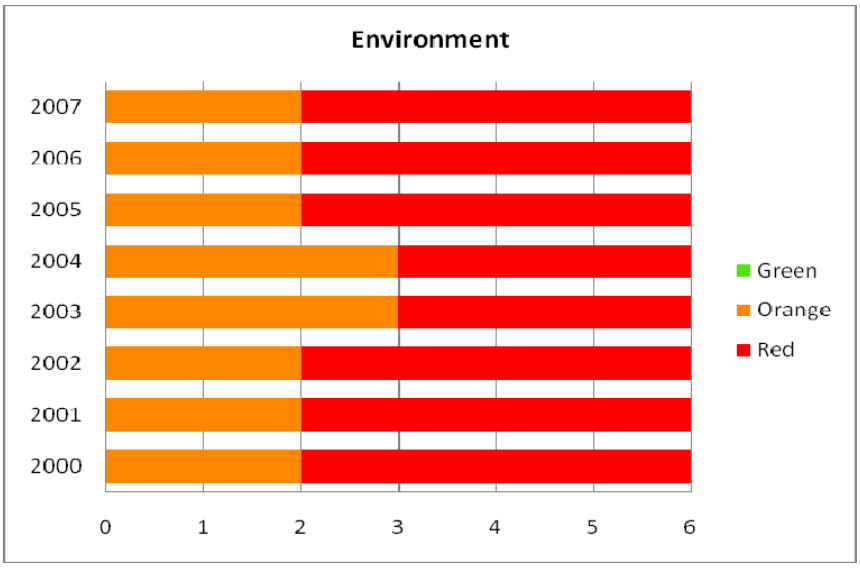
This panorama provides a more detailed analysis of the various components of social health than the Competitiveness Scoreboard and the social health index of the *Observatoire de la Compétitivité*.

6.1.10 Environment

Table 25: Category 10 Environment

Code	Indicator		LU	UE-27	DE	FR	BE	MIN	MAX
ENV01	Number of ISO 90001 certifications per millions of in habitants	↑	321.45	772.59	482.83	389.79	459.24	LT 43.06	IT 1672.63
	Number of ISO 14001 certifications per millions of inhabitants (2005)	↓	74.35	97.27	53.84	52.45	62.92	BU 6..35	SE 407.75
ENV02	Total greenhouse gas emissions: Base index 1990=100 (2005)	↑	100.4	92.1*	81.3	99.1	97.9	LV 42	CY 163.7
ENV03	Electricity generated from renewable energy (2006)	↑	3.5	14	10.5	12.4	2.8	CY 0.0	AT 56.6
ENV04	Volume of municipal waste generated in kg per person, per year (2006)	↑	702 V	525	566	553	475	PO 259	IE 804
ENV05	Energy intensity in kg of oil equivalent per thousands of euros (2005)	↑	189.85	208.05	157.02	185.47	205.7	DK 114.12	BU 1582.41
ENV06	Car share of inland passenger transport – Percentage of car users in passenger kilometers (pkm) (2006)	↑	80.4	94.1**	90.9	90.5	92.2	SK 66.6	LT 147

* EU-25; **EU-15



This category is registering a status quo since 2000, with unfortunately not a single indicator in green.

Luxembourg's position with regard to renewable energies improved slightly between 2005 and 2006, rising from 3.2% in 2005 to 3.5% in 2006.

The indicator "Volume of municipal waste generated", which replaces the former indicator "Volume of municipal waste collected" that appeared too ambiguous when evaluating performance, improved slightly, dropping from 705 kg per person per year in 2005 to 702 kg per person per year in 2006.

Indicators concerning ISO 90001 and 14001 certification, and the indicator "Energy intensity of the economy", which measures energy consumption of an economy and its overall energy efficiency, as well as the degree to which an economy is dependent on the energy factor, could not be updated.

The indicator "Total greenhouse gas emissions" which is and important factor in the choice of policies intended to achieve the objectives outlined in the Kyoto protocol, improved very slightly, falling from 100.8 in 2004 to 100.4 in 2005[164].

[164] http://www.emwelt.lu/

6.2 The TBCO Composite Indicator

"Benchmarking is a method that was first used as a management tool. It implies an analysis of internal practices and processes using a systematic comparison of other entities' processes to identify and apply the best practices" (Arrowsmith and others, 2004).

Ranking of entities using a composite indicator is a special form of benchmarking because it provides not only a comparison against a particular yardstick, but also furnishes a listed order among a group of countries.

The *Observatoire de la Compétitivité* chose to employ a simple and transparent method for calculating a composite indicator in basing it on the European Scoreboard composite indicator[165].

In their initial stages, base indicators were standardized by the re-scaled values method. Each indicator *i* is transformed using the following formula according to country *j* over time *t*.

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

The composite index *CI* of the category of sub-indicators at moment *t* is calculated using a weighted average of 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 weighting method chosen is very simple; each indicator has the same importance and thus allocated a like weight through a simple average.

In 2007, Luxembourg was in the 9th position among 27 Member states. Luxembourg thus lost 3 positions with relation to 2006. According to the scoreboard, Finland has

[165] European innovation scoreboard
http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=5&parentID=51

the most competitive economy of all the countries in EU-27, followed by Denmark, then Sweden. Sweden had occupied first place in the ranking from 2000 to 2005.

Table 26: Rankings by composite indicator from 2000 to 2007

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

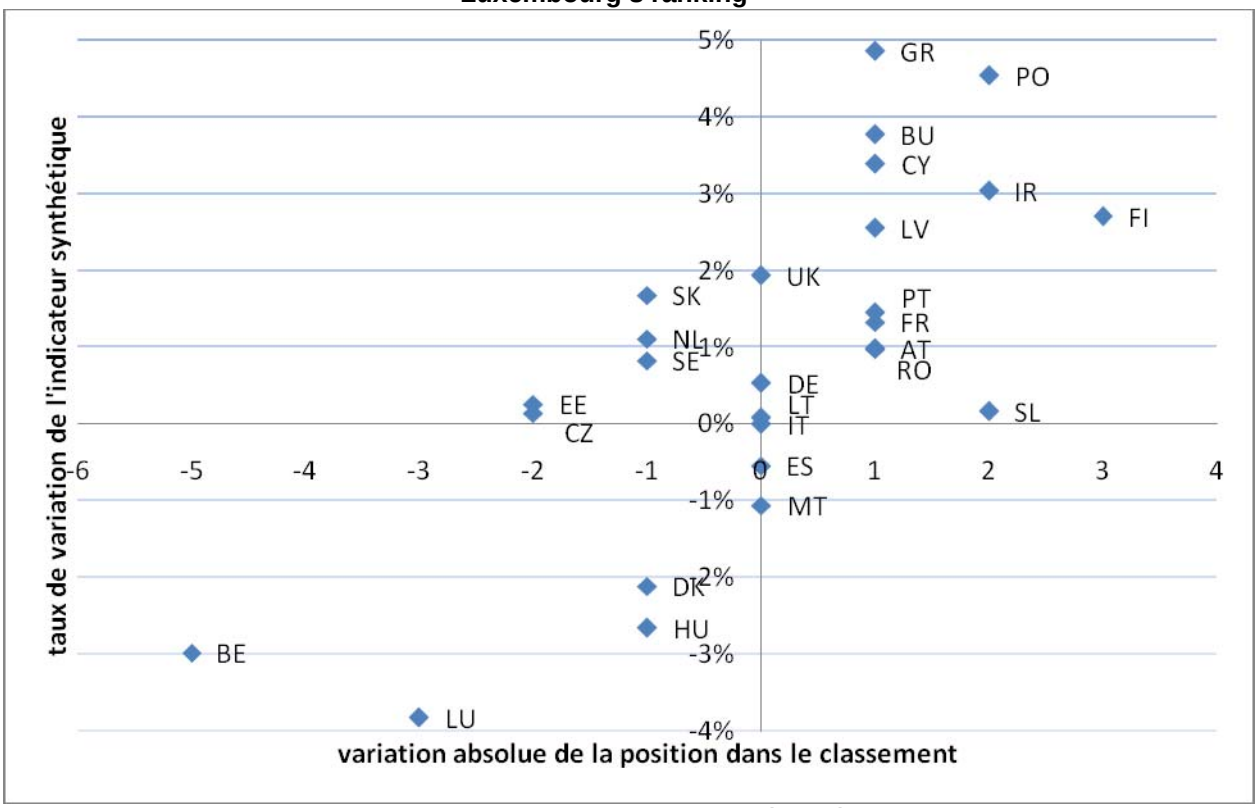
Source: Calculated by the *Observatoire de la Compétitivité*

At first look, one may suppose that Luxembourg's position has fallen since 2000. However, it is important to remember that this is a relative ranking, in other words the ranking of Luxembourg also depends on the performance of other countries. Even though Luxembourg scores highly in indicator categories, other countries may have improved more, causing Luxembourg's relative ranking to slide in the end.

Lastly, it is important to remember that every year the *Observatoire de la Compétitivité* provides a full, retrospective update for the observation period of 2000 to 2007, of all the indicators appearing in the Competitiveness Scoreboard. The update contains all the latest figures available for the 27 Member states of the European Union. Because of this, it is possible that the current rankings of the 27 countries and especially that of Luxembourg could diverge from rankings published in previous issues of the Competitiveness Report.

In the graph below, one can see that the composite indicator for Luxembourg fell between 2006 and 2007 and that Luxembourg lost three positions in the ranking over the same period. In the Czech and Slovak Republics as well as Estonia, the Netherlands and Sweden, one can see that the countries lost position in the rankings despite an increase in composite indicator. This stresses the relative nature of ranking countries with relation to other countries. It is also important to understand that this composite indicator does not take into account starting points among the different Member states.

Figure 26: Change in the composite indicator of Luxembourg compared to change in Luxembourg's ranking



Source: *Observatoire de la Compétitivité*

The synthetic indicator's volatility, which is measured by the standard deviation of country performance over the period 2000-2007, indicates that the relative position of new Member states is much more volatile than that of the others. As a result, in the table below the composite indicator is calculated only for the 15 "older" Member states. Luxembourg places 6th in the EU-15 rankings, while it was 9th when the 27 were ranked. Since 2006, Luxembourg has dropped four positions, as opposed to three positions among the EU-27 group, which nonetheless reflects a rather parallel trend toward lower competitiveness. Denmark is at the head of the pack for EU-15.

Again we must remind readers that the results of each country depend on performance of the other countries included in the analysis. Among the EU-27, Finland is the most competitive country, while with EU-15 it is Denmark. Still, Denmark is ranked 2nd in EU-27 groupings, while Finland is 3rd, which reflects the sensitivity of the composite indicator in depicting relative positions in terms of the relative advantages and disadvantages each country presents. Including new Member states provided a positive impact for Finland while underscoring the fact that even in varying the perspective, the Nordic countries have the top rankings.

Table 27: EU-15 composite indicator

	2000	2001	2002	2003	2004	2005	2006	2007
Austria	6	5	6	6	7	7	7	7
Belgium	11	12	9	10	8	13	11	14
Denmark	4	2	4	3	1	1	1	1
Finland	7	6	7	7	6	6	5	3
France	10	9	11	9	10	11	12	11
Germany	8	8	10	8	9	9	8	8
Greece	14	13	15	12	11	10	13	10
Ireland	9	10	8	11	13	8	9	9
Italy	12	11	12	14	12	14	14	13
Luxembourg	1	7	2	5	5	3	2	6
Netherlands	3	1	5	4	3	4	6	4
Portugal	13	14	14	15	15	15	15	15
Spain	15	15	13	13	14	12	10	12
Sweden	2	4	1	1	2	2	4	5
United Kingdom	5	3	3	2	4	5	3	2

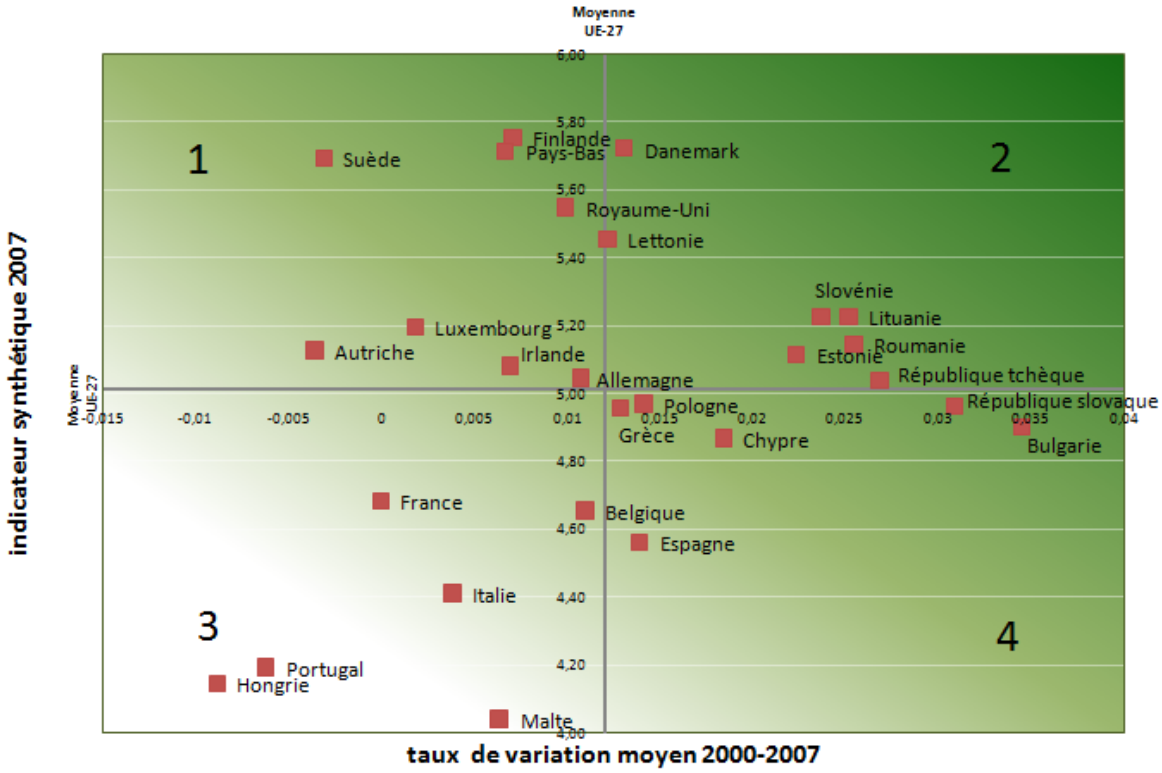
Source: Calculation by the *Observatoire de la Compétitivité*

In general, a divide exists between the North and South countries, and between old Member states and new ones. The graph below shows the 2007 composite indicator on the y-axis and the indicator's average rate of change on the x-axis.

Quadrant 1 contains countries whose composite indicator is above the Community average but for which the rate of change is lower in comparison to the Community average, meaning competitive countries that are firmly established at the head of the pack. This includes the Scandinavian countries, Luxembourg, Ireland and Austria.

In quadrant 2 are found countries for which both performance and rate of change are above the Community average, indicating that their position in the leading group is highly subject to change.

Figure 27: 2007 Composite indicator and rates of change 2000-2007



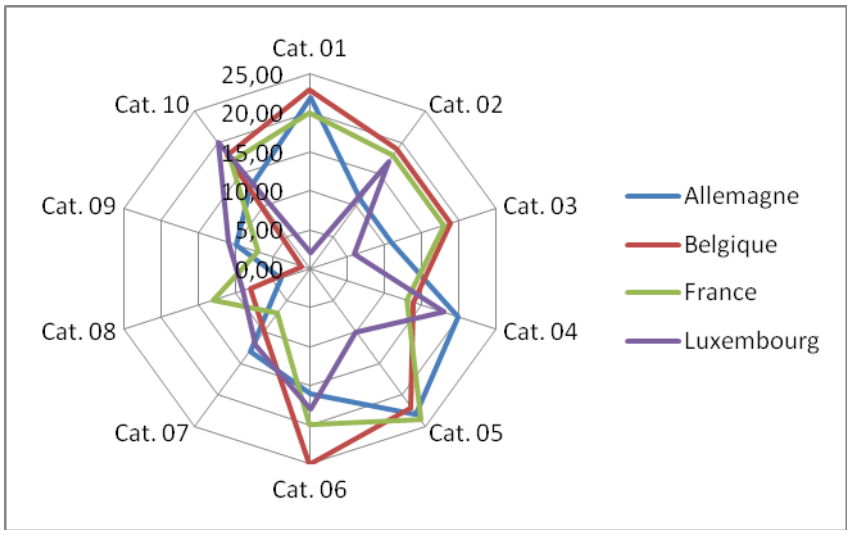
Source: *Observatoire de la Compétitivité*

Quadrant 3 includes countries whose performance and trends are below the Community average. These countries seem to have gotten stuck into less competitive situations. This includes France, Belgium, Italy, Portugal, Hungary and Malta.

Finally, quadrant 4 shows countries whose 2007 score is poor but are characterized by sharp changes in situation and can therefore expect to move rapidly into a better performance scenario.

It is interesting to compare Luxembourg to its bordering countries[166], as in the graph below.

Figure 28: Luxembourg's ranking compared to its bordering countries



Source: *Observatoire de la Compétitivité*

By category, Luxembourg scores the highest in "Macroeconomic Performance", (Cat. 01), "Productivity and Labour Cost" (Cat. 03) and "Institutional and Regulatory Framework" (Cat. 05). In contrast, in the categories "Environment" (Cat. 10) and "Social Cohesion" (Cat. 09) Luxembourg's ranking is the worst of the four countries. France has the lead in "Education and Training (Cat. 07), although it does the worst of the four in "Knowledge Economy" (Cat. 08). Germany has high marks in "Entrepreneurship" (Cat. 06) and "Employment" (Cat. 02), but in "Market Operations" (Cat. 04) it has ground to make up.

[166] The *Observatoire de l'emploi* for the Greater Region recently published an index on the competitiviteness of the Greater Region. For greater detail with regard to this index, please consult Chapter 7 of this report.

Table 28: The 2007 composite indicator by category

	Cat. 01	Cat. 02	Cat. 03	Cat. 04	Cat. 05	Cat. 06	Cat. 07	Cat. 08	Cat. 09	Cat. 10
Austria	17	7	9	19	26	22	14	7	6	7
Belgium	23	19	19	14	22	25	10	8	1	18
Bulgaria	11	21	25	3	2	10	23	23	13	25
Cyprus	13	5	16	27	4	4	19	22	19	27
Czech Republic	6	13	12	22	8	17	9	20	14	8
Denmark	10	2	17	1	25	27	2	3	5	12
Estonia	15	9	1	2	11	15	17	14	26	19
Finland	5	12	5	7	21	21	3	1	9	6
France	20	18	18	13	24	20	7	13	7	17
Germany	22	11	11	20	23	16	13	2	10	13
Greece	25	24	15	5	13	2	24	27	17	21
Hungary	27	25	24	23	12	14	20	18	21	3
Ireland	4	6	7	11	9	24	16	17	20	23
Italy	24	23	27	17	15	8	22	15	15	9
Latonia	3	8	4	4	1	9	15	26	27	4
Lithuania	1	10	8	9	6	7	6	25	25	24
Luxembourg	2	17	6	18	10	18	12	9	11	20
Malta	18	22	14	26	20	12	27	11	2	26
Netherlands	7	1	21	6	18	19	4	6	8	15
Poland	14	26	22	15	7	3	11	19	22	11
Portugal	26	15	20	21	17	5	26	21	23	22
Rumania	16	20	23	24	3	1	21	24	18	10
Slovak Republic	21	27	2	25	5	13	18	10	12	5
Slovenia	8	14	10	16	19	23	5	12	3	2
Spain	9	16	26	12	14	11	25	16	16	16
Sweden	12	3	13	10	27	26	1	5	4	1
United Kingdom	19	4	3	8	16	6	8	4	24	14

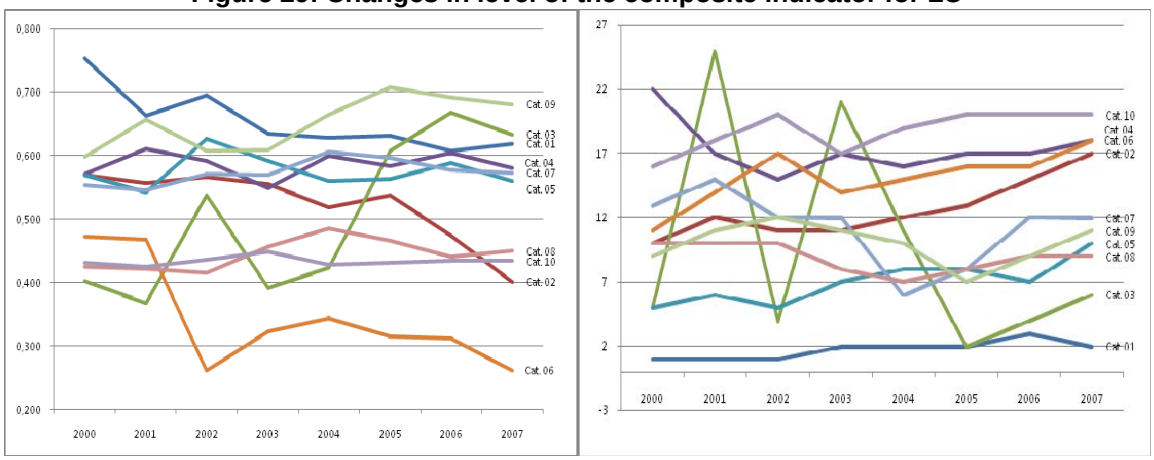
Note: Cat.01 Macroeconomic Performance, Cat. 02 Employment, Cat.03 Productivity and Cost of Labour, Cat. 04 Market Operations, Cat. 05 Institutional and Regulatory Framework, Cat. 06 Entrepreneurialism, Cat. 07 Education and Training, Cat.08 Knowledge Economy, Cat. 09 Social Cohesion, Cat. 10 Environment
Source: *Observatoire de la Compétitivité*

The table above shows rankings by category of the 27 Member states. Luxembourg is second in “Macroeconomic Performance” and sixth in “Productivity and Labour Cost”, while in such categories as “Employment”, “Market Operations,” “Entrepreneurship ” and “Environment”, Luxembourg falls to 17th, 18th and 20th place. Note that in the “Employment” category, it is the employment rate of older people and women that weighs on the country’s ranking. In the category “Market

Operations", the reason for Luxembourg's low relative ranking is chiefly the cost of energy. In the "Environment" category, energy intensity and the low percentage of renewable energy sources that have a negative influence on the ranking.

The graphs below show changes in the composite indicator for Luxembourg between 2000 and 2007, as well as changes in Luxembourg's position over the same period.

Figure 29: Changes in level of the composite indicator for LU



Source: *Observatoire de la Compétitivité*

A comparison of the rankings with or without such and such a category furnishes information about the difference in ranking that each exclusion of category would bring about for Luxembourg. Thus it is possible to analyze the influence of each of these categories on the overall ranking of Luxembourg among its EU partners.

The table below shows Luxembourg's ranking if various categories are excluded one by one. A higher ranking than that seen in the overall ranking, i.e. a negative score in the last column shows how, without this category, Luxembourg would have fared better or worse in the ranking.

Table 29: Sensitivity test

	2000	2001	2002	2003	2004	2005	2006	2007
IG-TBCO (cat. 01 excluded)	7	8	7	10	7	7	6	14
IG-TBCO (cat. 02 excluded)	3	6	3	8	3	2	4	8
IG-TBCO (cat. 03 excluded)	5	6	6	6	6	7	8	10
IG-TBCO (cat. 04 excluded)	2	6	3	6	5	4	5	9
IG-TBCO (cat. 05 excluded)	5	7	7	10	7	6	7	10
IG-TBCO (cat. 06 excluded)	6	8	5	8	5	5	5	8
IG-TBCO (cat. 07 excluded)	5	7	5	8	6	7	6	9
IG-TBCO (cat. 08 excluded)	3	6	4	10	6	5	6	11
IG-TBCO (cat. 09 excluded)	4	8	5	10	9	8	9	11
IG-TBCO (cat. 10 excluded)	4	6	4	7	5	4	4	8
IG-TBCO	5	7	5	8	6	7	6	9
Difference between IG and IG (cat. 01 excluded)	-2	-1	-2	-2	-1	0	0	-5
Difference between IG and IG (cat. 02 excluded)	2	1	2	0	3	5	2	1
Difference between IG and IG (cat. 03 excluded)	0	1	-1	2	0	0	-2	-1
Difference between IG and IG (cat. 04 excluded)	3	1	2	2	1	3	1	0
Difference between IG and IG (cat. 05 excluded)	0	0	-2	-2	-1	1	-1	-1
Difference between IG and IG (cat. 06 excluded)	-1	-1	0	0	1	2	1	1
Difference between IG and IG (cat. 07 excluded)	0	0	0	0	0	0	0	0
Difference between IG and IG (cat. 08 excluded)	2	1	1	-2	0	2	0	-2
Difference between IG and IG (cat. 09 excluded)	1	-1	0	-2	-3	-1	-3	-2
Difference between IG and IG (cat. 10 excluded)	1	1	1	1	1	3	2	1

Source: *Observatoire de la Compétitivité*

Luxembourg performs well in categories 01 (Macroeconomic Performances), 03 (Productivity and Labour Cost), 05 (Market Operations), 08 (Knowledge Economy) and 09 (Social Cohesion). Indeed, since Luxembourg's ranking without these categories is worse than it is with them, one may conclude that Luxembourg is ranked well in these categories with relation to the other Member states of EU-27.

6.3 A composite indicator for measuring the Lisbon Strategy on the European level

Benchmarking can be used to evaluate the economic policy of countries; it also measures successes in countries and can furnish the required motivation for adopting reforms. A comparison with EU-27 Member states gives data on the current situation, facilitates the exchange of best practices and encourages applying pressure both on the European and national levels. Referring to experiences of other countries can thus help overcome domestic resistance to reforms since this can allay

uncertainty as to the results of policies, doubts about the merits of such policies and motivation for policy partisans.

The Economic Policy Committee (EPC) of the EU, whose work is scrutinized by the *Observatoire de la Compétitivité*, however warns against a too hasty implementation of this benchmarking method. Friction may indeed arise when analyzing and classifying economic policies of other Member states and applying these same practices to a given country. It is important to avoid sending out universal economic policy messages that do not account for priorities and specific circumstances concerning nations. An excessively perfunctory approach can also result in incorrect conclusions.

Other arguments against using benchmarking in the framework of EU policy include the possible loss of data due to the benchmarking method employed, a concentration of quantitative instead of qualitative indicators, the risk of opportunistic behavior on the part of a Member state that wishes to portray their policies as the most successful ones, accreditation of simplistic economic policy models, the difficulty in weighting the various domains of the Lisbon Strategy and a lack of methodological structure for conducting this type of exercise. Benchmarking does not take into account a country's situation from the outset. In consequence, quantitative benchmarking should always be accompanied by plenty of qualitative evaluation and proof.

The EPC thus decided to set up a working group that it baptized "LIME-Lisbon methodologies". The group covers all methodological aspects of evaluation and contributes to working out an evaluation methodology for structural reforms. There are three methodologies that allow for the following:

1) Methodology I: a full evaluation of the implementation of reforms based on a detailed inventory of reforms targeted by the national reform program

2) Methodology II: an evaluation of the impact of a certain number of main reform measures based on an analysis of their impact on growth and employment drivers, such as R & D intensity, labour resources and labour productivity

3) Methodology III: an evaluation of the overall economic impact of reforms by means of an econometric model

As part of Methodology III, Luxembourg has adopted a dynamic stochastic general equilibrium model formulated by Professors Fontagné and Marecellino. Chapter 8 of this report presents the initial results of a simulation using this model. The model itself will be presented during the "Road to Lisbon"[167] colloquium held on 4 and 5 December 2008.

The European Commission, in conjunction with the Member states of the LIME-Lisbon methodology working group attached to EPC and with close collabouration with EMCO, has developed the Lisbon Assessment Framework (LAF) as part of Methodology II. This analytical tool was developed to support the evaluation of political challenges facing Member states in increasing growth potential. It makes a systematic comparison of Member states' performance in terms of GDP and in twenty economic policy areas linked to growth with relation to the EU-15 reference point. This tool is based on an analysis of economic literature and implies a consistent and transparent statistical review of the principal indicators.

- Firstly, a study is made of the source of differentials between GDP per inhabitant and the primary growth drivers. In particular, a statistical analysis is carried out on the 12 components of GDP, both in terms of level and relative change with relation to the EU-15 reference point.

- Secondly, a performance analysis is done on the basis of indicators in twenty areas of economic policy that economic literature has designated as relevant to growth. Results are an evaluation of relative performance (+ = -) of all policy areas.

- In a final phase, the areas of economic policy in which countries perform poorly are marked in order to undertake a subsequent examination of the link between them and the 12 GDP components.

[167] http://www.tudor.lu/Lisbonne2008

Table 30: The Lisbon Assessment Framework methodology

The LIME Assessment Framework (LAF)

	GDP	Policy Performance	Screening
ANALYSIS	Analyses of 12 GDP components in level and changes	Evidence-based analysis of 20 policy areas affecting GDP. Indicator-based assessment which is then qualified with country-specific information	Examines links (identified in literature survey) between performance in policy areas and relevant GDP components
OUTPUT	Relative performance (+ = -) of GDP components	Relative performance (+ = -) of policy areas	Underperforming policy areas qualified with links to GDP components

Source: European Commission (ECFIN/E1/G2 REP 52837)

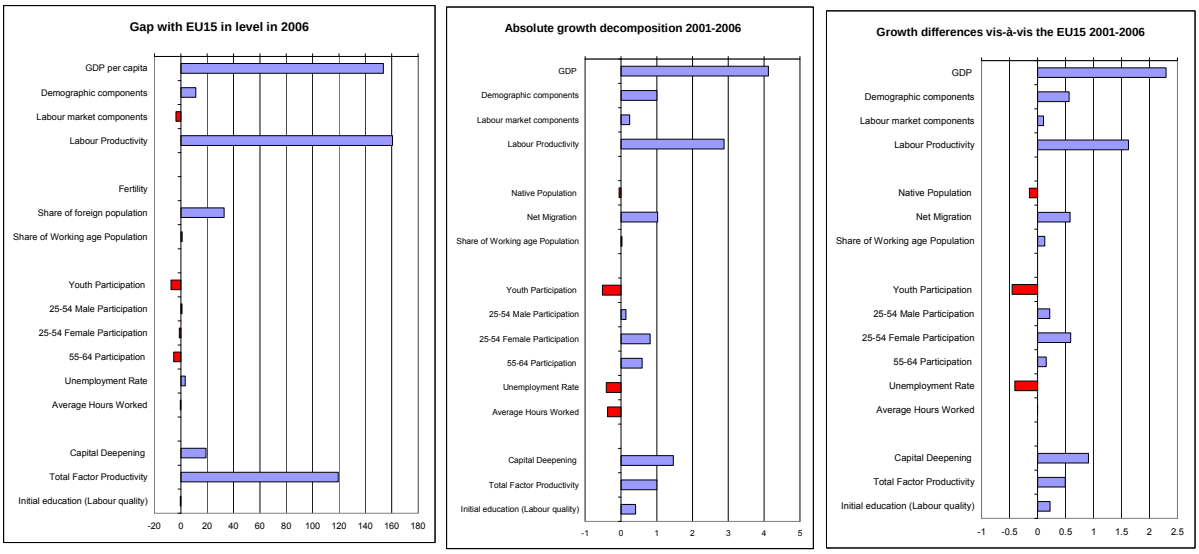
6.3.1 Results for Luxembourg

Luxembourg is the country with the highest GDP per inhabitant within the EU. Although the reason for this is the large population of cross-border workers, the criterion for GDP per inhabitant exaggerates the country's economic performance and this figure is much higher that the average for EU-15. Luxembourg owes its exceptional position principally to its high level of labour productivity. The demographic element has a weak positive impact and the labour market component has a weak negative effect on GDP per inhabitant. High productivity levels also contribute to good economic performance in Luxembourg in terms of growth. With regard to the demographic component, it is clear that its positive role on the GDP per inhabitant figure and on growth is in large part connected to the high proportion of foreign nationals in the country, both immigrants and non-residents. The contribution to growth in the labour market combines two different developments. First, participation by all population groups has increased, excepting only young workers. Secondly, unemployment has increased since 2000, in contrast to falling unemployment in nearly all of the EU-15 countries since 2003.

Generally speaking, the analysis suggests that attention should be focused on two components of GDP. Participation rates for young people and older worker are lower than the EU-15 average. Women and older workers numbers have increased considerably in the labour force over recent years. Nonetheless, the country will not achieve the EU-15 participation rate of older workers before 2020. The average

retirement age in Luxembourg is among the lowest of the UE and the rate of participation in the labour force of young workers is the lowest of UE-15. The decrease in this figure between 2000 and 2006 cost the nation 0.5% per year in GDP. The fall in activity rates of young people between 15 and 24 reflects a substantial decline in the rate of working young and an increase in youth unemployment. It indicates that the increase of unemployment in Luxembourg over the past few years was due to new entries in the labour force who did not find work, rather than by persons losing their jobs. Job creation benefits non-residents more than residents.

Figure 30: Luxembourg's performance compared to that of the UE-15



Source: European Commission (2008)

An evaluation was made of the performance of EU countries in twenty domains of economic policy. Luxembourg had deficiencies in four areas, including specific measures for older workers, hours of work, regulation of network economies and start-up conditions for entrepreneurs.

Lastly, the relationships between under-performance in economic policy and the deficiency of components of GDP were scrutinized. Three observations were drawn from this scrutiny. First, the deficiency in the area of specific measures for older workers in Luxembourg coincides with under-performance in unemployment. The other weaknesses identified in the areas of policy such as hours worked, regulation of networks and conditions for entrepreneurs and their start-ups coincide with no other GDP component. In the second place, while youth unemployment accounts for a large part of the unemployment figure, the under-performance in youth

participation that was identified in the growth accounting exercise coincides with no other weakness in the area of labour market policy. In this context it is important to note that it is difficult to interpret the accomplishments of Luxembourg's educational system because the various indicators available do not fully portray the system. Thirdly, it is somewhat surprising that the exceptional productivity noted in Luxembourg should not be reflected by high performance levels in areas of policy that influence productivity. The absence of a link between the areas of policy and productivity performance is probably related to Luxembourg's sector specialization in financial services. In accordance with a notion of high productivity resulting from specialization in a given sector, performance for the country in the area of R & D and innovation is relatively weak. In addition, while Luxembourg has high marks in competition policy, the analytical system fails to account for the limited capacity of competition authorities in Luxembourg.

Table 31: Areas of economic policy and relative indicators

	Indicator-based assessment		Qualification	Overall assessment
	I		II	III
	Level	Change		
Labour market				
Active labour market policies**	9	-6		+
Making work-pay: interplay of tax and benefit system***	2	-4		=
Labour taxation to stimulate labour demand ***	15	3		+
Job protection and labour market segmentation/dualization**	8	-1		+
Policy increasing working time***	-6	-11		-
Specific labour supply measures for women***	-1	6		=
Specific labour supply measures for older-workers***	-13	1		-
Wage bargaining and wage-setting policies**	11	9		+
Immigration and integration policies***	15	-7		+
Labour market mismatch and labour mobility**	3	7		=
Product and capital market regulations				
Competition policy framework*	14	4		+
Sector specific regulation (telecom, energy)**	-7	-1		-
Business environment - Regulatory barriers to entrepreneurship**				=
Business Dynamics - Start-up conditions***	-5			-
Financial markets and access to finance**	16	-4		+
Market integration - Openness to trade and investment**	26	-13		+
Innovation and knowledge				
R&D and Innovation***	-3	0		=
ICT**	5	8		+
Education and life long learning***	1	6		=
Macro economy				
Orientation and sustainability of public finances ***	2	-2		=

Source: European Commission (2008)

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7 Composite Indicators for Quality of Life, Human Development and Social Progress

7.1 Beyond GDP

"GDP and well-being are not equivalent concepts. Yet it is undeniable that productivity and high employment contribute to well-being, both directly and indirectly, by procuring resources that can be used in other activities that improve well-being. It is therefore essential that implemented policies do not impede either productivity or employment, unless if other aspects of well-being justify it."[168].

This conclusion by the OECD succinctly summarizes the fundamental question about indicators of well-being, quality of life, human development and social progress.

Attempts to better measure creation of wealth in opposite to the traditional reckoning of GDP are numerous and give rise to various composite indicators of quality of life, human development and social progress[169]. The theoretical framework behind these indicators is generally larger than the simple addition of added value and wealth.

This section does not seek to define the wealth of nations. This would direct the discussion to a largely open philosophical debate. It will rather attempt to first present several subjects broached during the international "Beyond GDP" conference[170],. Then several quality of life indicators will be discussed[171]. Lastly, the Luxembourg Social Health Index (ISSL), which was developed on the basis of pertinent indicators stemming from the Competitiveness Scoreboard of the *Observatoire de la Compétitivité*, will be examined.

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168 OECD, Economic Policy Reforms: Going for Growth 2008, Structural Policies: Indicators, priorities and analyses, OECD 2008

169 See 2007 *Bilan Compétitivité*, pages 101-113

170 In November 2007 the *Observatoire de la Compétitivité* participated in the international conference in Brussels '*Beyond GDP*'. This conference was set up by the European Commission, the European Parliament, the 'Club of Rome', the WWF, and the OECD. The conference is the continuation of the Second OECD World Forum: Statistics, Knowledge and Policy*:* Measuring and Fostering the Progress of Societies, 27-30 June 2007, Istanbul, Turkey

171 Here we present the United Nations IDH human development indicator, the quality of life indicators of Employment Conditions Abroad ECA, those of Mercer Human Resource Consulting, those of the *Observatoire Interrégional du marché de l'Emploi OIE* and of the *Interregionale Arbeitsmarktbeobachtungsstelle IBA*. Note that the well-being aspect of the UNDP indicator, which analyzes the development of countries in the world, is different from the well-being aspect of quality of life indicators of the ECA, of MERCER and even of the OIE who analyze the quality of living situation in developed countries.

7.2 The Beyond GDP conference

The international conference *'Beyond GD'*[172]*: measuring progress, true wealth and the well-being of nations'*[173] organized in November 2007 in Brussels by the European Commission, the European Parliament, the 'Club of Rome', the WWF, and the OECD, brought together more than 500 participants from the world over[174].

Political leaders and researchers initiated an interesting dialogue and stressed that while GDP is an important indicator, especially with regard to the Maastricht criteria and the Stability Pact, economic growth does not necessary lead to improvements in well-being. More composite indicators are required to have a wider view, while continuing to gauge the weight of each individual variable. In this context, using "green accounting" appears to be one of the most promising leads. Progress is significant in this area. Currently 24 EU Member states—and shortly 26—produce accounts on air quality and very many Member states are furnishing information on expenditures for the protection of the environment undertaken by public administrations and private corporations. Note that Luxembourg has not yet adopted the green accounting concept but that this project is waiting to be achieved.

The interactive statistical program developed by the Swedish Karolinska Institute was introduced with a view to making statistics understood and 'alive'[175]. From this viewpoint a unified and interactive format was desired, which allowed access to data to inform citizens. The notion that correct information is essential to democracy was stressed, as well as the importance of high quality, complete and transparent data and input from civil society regarding the data. In this way users of the data will have faith in it and the data will be understood and used.

The importance of the "Social and ecological market economics" concept was called to mind and at a round table discussion reserved for companies and finance professionals, managers of major international corporations discussed the contribution of companies to well-being. The concepts of Corporate Social Responsibility (CSR) and Triple Bottom Line, which entails social, economic and

[172] Part of a response by the Minister of the Economy and Foreign Trade to parliamentary question N° Q2201 regarding 'Beyond GDP' on 4 January 2008, by Deputy Marcel Oberweis.
[173] See the 2007 Competitiveness Report on the OECD Worldwide Forum at Istanbul
[174] See the summary of the conference on \: http://www.beyond-gdp.eu/download/bgdp-summary-notes.pdf
[175] See: http://www.gapminder.org/

environmental issues, as well as its corollary full cost accounting, were brought to light. BASF presented its analytical model of eco-efficiency that is used to evaluate full cost, including environmental and social charges to the production chain.

The evaluation method used by companies that adhere to the principles of sustainable development and who can genuinely claim a CSR approach was developed. An ISO standard is being reviewed which, like 14001 for the environment, could certify companies using the CSR process.

The World Bank developed three dimensions of the notion of prosperity based on produced capital, natural capital and intangible capital. It presented its 'Genuine Savings' indicator.[176] That seeks to contribute to measuring sustainable development in a given country, through various additions and subtractions of non economic resources, notably environmental ones, using domestic economic savings as a base. This relatively critical indicator [177] does not include any social variables.

It was stressed that national and international monetary policies must be reinforced to regulate financial flows that are not connected to the real economic sphere. Indeed, it is illusory to require of economic agent that they modify their manners of consumption in exchange for diminishing their well-being.

In conclusion, the European Commissioner for Environment, Stavros Dimas, emphasized that this conference should not be considered the end of the debate, but rather the beginning of a process that will lead the European Commission to publish a communiqué in 2008 that will underscore the need for an alternative measure to GDP for use in evaluating well-being. He highlighted the importance of cooperation with other international organizations, companies, NGOs and all other concerned parties.

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[176] The genuine savings indicator has been published by the World Bank through its World Development Indicators program since 1999. The definition of genuine savings = gross domestic savings – consumption of fixed capital + change in the value of human capital – decrease in the value of fossil fuels supply – depletion of minerals supplies – depletion of forest holdings – value of damages caused by carbon dioxide emissions; Change in the value of human capital (probably under estimated);Energies (crude oil, natural gas and coal) minerals (bauxite, copper, gold, iron, lead, nickel, phosphate, tin, silver and zinc); forest resources valued by the difference in world prices and extraction costs; Carbon dioxide emissions: $20 per ton of carbon
For a vigorous and well argued criticism of this concept, see G. Everett and A. Wilks, www.brettonwoodsprojects.org

[177] For a vigorous and well argued criticism of this concept, see G. Everett and A. Wilks, www.brettonwoodsprojects.org

This conference followed up on a series of conferences put on by the OECD that ended in June 2007 with the Istanbul Declaration [178]where signatories committed to implement all their efforts to better measure social progress. It may be predicted that work carried out in the future to gauge well-being will capitalize on national accounting procedures spread to other areas such as human, social and environmental capital. Composite indicators, key indicators and integrated accounts will be the watchwords in this area in future.[179]

Frame 16: Increases in standards of living between 2003 and 2006

One of the key items of information derived from the PSELL-3/EU-SILC survey, which was conducted on a representative sampling of persons residing in Luxembourg, is the monetary measure of the standard of living of the individuals interviewed. Form the figures it can be confirmed that the gap in income between the richest and poorest inhabitants remained relatively constant between 2003 and 2006. But are those persons who were interviewed —rich or poor—the same in 2003 as in 2006? Starting in 2003, this survey can be used to study not only income structures and poverty each year but also to monitor changes in individual standards of living of the people surveyed.

The official statistics of the country as well as those of the European Union on the whole measure peoples' standards of living according to yearly disposable incomes of the household to which they belong, divided by the number of consumer units in the household. Household income is calculated by adding all income earned by its members regardless of source, be it income from work, social or private transfers, pensions, dividends, etc, less social charges and income tax. Standards of living naturally depend on household income but also on the makeup of the household, which directly impacts the number of consumer units among which the full revenue is shared. For example, if a child is born, resources are split between a greater number of persons and each person's standard of living falls, assuming no change in income.

In the sampling analyzed by the PSELL survey, annual real increases in standards of living rose on the average 1,300 euros between 2003 and 2006, an increase of 4%. However, this average growth conceals major differences among those interviewed. Ten percent of these in fact experienced a loss of standard of living in excess of 900 euros, while inversely another ten percent registered a gain of over 12,000 euros.

[178] For more information see: http://www.oecd.org/dataoecd/23/14/39558112.pdf

[179] The entire collection of reference papers and texts of presentations are available on the Beyond GDP site: http://www.beyond-gdp.eu/index.html. One can also find the poster sessions on display during the two days the conference was held. The third OECD World Forum on "Statistics, Knowledge and Policies" will be held in Korea from 27 to 30 October 2009.

Similar results are noted in most of the Member states of the European Union. They suggest that a sort of catching up occurred between 2003 and 2006, with the standard of living of the poorest people drawing closer to the level of the richest, a kind of social elevator effect. This observation is mitigated by two essential elements. First, the catching up process is rather slow. Second, one must not draw conclusions about overall changes in poverty. Official figures reveal that poverty is going into a period of relative stagnation. The seemingly contradictory results can be explained simply by concluding that the persons with the lowest standards of living are not always the same over the years. One third of the persons in the poorest category in 2003 left that group by 2006. However, they were replaced by new poor people.

In the end, the gap between rich and poor people remained essentially the same between 2003 and 2006.

Source: *Vivre au Luxembourg; Chroniques de l'enquête PSELL-3/2006 du CEPS/Instead*

7.3 International comparisons of development and quality of life indicators

7.3.1 United Nations UNPD human development indicators

The Easterlin paradox[180] suggests that there is no relationship between the economic development of a society and the average level of well-being, known as subjective well-being. In addition, it implies that overall the degree of well-being over the span of an adult life remains relatively constant and is therefore invariable with relation to income. In general, Easterlin concludes that it is essential changes in desires occurring over a life cycle that explain this paradoxical relationship between income and well-being. According to Easterlin, the correlation to well-being is more pronounced with relative income—that is individual income—than with absolute income. Thus overall growth of all incomes hardly contributes to levels of well-being. According to him, absolute income has a direct impact on well-being up to a certain level, beyond which relative income essentially takes over. Numerous studies focusing on this issue have shown the contrary: that the link between income and satisfaction is very significant and robust in the course of time. Betsey Stevenson

[180]See also: Easterlin, Richard A. (1974), 'Does economic growth improve the human lot? Some empirical evidence', in Paul David and Melvin Reder (eds.), Nations and Housholds in Economic Growth, New York: Academic Press; Easterlin, Richard A. (1995), 'Will raising the incomes of all increase the happiness of all?', Journal of Economic Behavior and Organization, vol. 27, pp. 35 47; Easterlin, Richard A. (2001), 'Income and Happiness: Towards a unified theory', The Economic Journal 111 (July), 465- 484

and Justin Wolfers[181] demonstrated in their study that there exists a close tie between materially significant circumstances and subjective well-being. Their results showed that the impact of absolute revenue on well-being is four times more important than the impact of relative income. The Stevenson-Wolfers study has launched an animated debate that will surely give rise to many more studies on the subject.

The UNPD was the pioneer in the area of human development indicators through its yearly publication since 1990, the "UNPD Human Development Report", which includes life expectancy at birth and levels of instruction. Subsequent to this, other alternative indicators appeared, progressively calling into question the dominance of GDP by inhabitant as the primary factor, and adding new social and environmental requirements.

UNPD publishes a human development indicator yearly: the HDI, or Human Development Index, bringing three dimensions of human development to the forefront: longevity and health, measured through life expectancy, educational instruction, measured by adult literacy and schooling at the primary, secondary and higher education levels, and a decent standard of living, measured by income in Purchasing Power Standards (PPS)

[181] B.Stevenson, J.Wolfers "Economic Growth and subjective well-being! Reassessing the Easterlin Paradox", IZA August 2008: http://bpp.wharton.upenn.edu/betseys/papers/Happiness.pdf

Tableau 32: HDI (2007)

Classement de l'IDH [a]	Indicateur du développement humain (IDH) 2005	Espérance de vie à la naissance (années) 2005	Taux d'alphabétisation des adultes (% de la population de 15 ans et plus) 1995-2005 [b]	Taux de scolarisation combiné pour l'éducation primaire, secondaire et supérieure (%) 2005	PIB par habitant (PPA USD) 2005	Indicateur d'espérance de vie	Indicateur d'éducation	Indicateur de PIB	Classement du PIB par habitant (PPA USD) moins classement de l'IDH [c]
DÉVELOPPEMENT HUMAIN ÉLEVÉ									
1 Islande	0,968	81,5	.. [d]	95,4 [e]	36 510	0,941	0,978	0,985	4
2 Norvège	0,968	79,8	.. [d]	99,2	41 420 [f]	0,913	0,991	1,000	1
3 Australie	0,962	80,9	.. [d]	113,0 [g]	31 794	0,931	0,993	0,962	13
4 Canada	0,961	80,3	.. [d]	99,2 [e,h]	33 375	0,921	0,991	0,970	6
5 Irlande	0,959	78,4	.. [d]	99,9	38 505	0,890	0,993	0,994	-1
6 Suède	0,956	80,5	.. [d]	95,3	32 525	0,925	0,978	0,965	7
7 Suisse	0,955	81,3	.. [d]	85,7	35 633	0,938	0,946	0,981	-1
8 Japon	0,953	82,3	.. [d]	85,9	31 267	0,954	0,946	0,959	9
9 Pays-Bas	0,953	79,2	.. [d]	98,4	32 684	0,904	0,988	0,966	3
10 France	0,952	80,2	.. [d]	96,5	30 386	0,919	0,982	0,954	8
11 Finlande	0,952	78,9	.. [d]	101,0 [g]	32 153	0,898	0,993	0,964	3
12 États-Unis	0,951	77,9	.. [d]	93,3	41 890 [f]	0,881	0,971	1,000	-10
13 Espagne	0,949	80,5	.. [d]	98,0	27 169	0,925	0,987	0,935	11
14 Danemark	0,949	77,9	.. [d]	102,7 [g]	33 973	0,881	0,993	0,973	-6
15 Autriche	0,948	79,4	.. [d]	91,9	33 700	0,907	0,966	0,971	-6
16 Royaume-Uni	0,946	79,0	.. [d]	93,0 [e]	33 238	0,900	0,970	0,969	-5
17 Belgique	0,946	78,8	.. [d]	95,1	32 119	0,897	0,977	0,963	-2
18 Luxembourg	0,944	78,4	.. [d]	84,7 [i]	60 228 [f]	0,891	0,942	1,000	-17
19 Nouvelle-Zélande	0,943	79,8	.. [d]	108,4 [g]	24 996	0,913	0,993	0,922	9
20 Italie	0,941	80,3	98,4	90,6	28 529	0,922	0,958	0,944	1
21 Hong Kong (région administrative spéciale de Chine)	0,937	81,9	.. [j]	76,3	34 833	0,949	0,885	0,977	-14
22 Allemagne	0,935	79,1	.. [d]	88,0 [e]	29 461	0,902	0,953	0,949	-2
23 Israël	0,932	80,3	97,1 [k]	89,6	25 864	0,921	0,946	0,927	3
24 Grèce	0,926	78,9	96,0	99,0	23 381	0,898	0,970	0,910	5
25 Singapour	0,922	79,4	92,5	87,3 [h,k]	29 663	0,907	0,908	0,950	-6

Source: PNUD, 2007 Report (data from 2005)

In the HDI 2007 version, Luxembourg is in 18th place[182], which results from the simple arithmetic average of the three indices introduced[183].

STATEC recalculated the HDI for Luxembourg for the first time in 2004, after detecting an error in the calculation of the schooling rate[184]. From 2004, STATEC has monitored HDI calculations closely. Thus in the 2006 UNPD report, STATEC saw that the global score of 0.949 in 2005 moved to 0.945 in the report of 2006, this means that Luxembourg fell from the 4th slot to the 12th. If Luxembourg had been able to maintain its score from 2005 to 2006, it would have ranked 7th or 8th. Very slight changes can change a ranking drastically.

A decrease from 88% to 85% in the gross schooling rate for students in primary, secondary and higher education resulted in a drop from 0.95 to 0.94 in the educational level index, which is the weighted average of the literacy rate for adults,

[182] UNDP, Human Development Report 2007/2008 Fighting Climate Change
[183] These three HDI indices are life expectancy, level of education and GDP. See also the 2007 *Bilan*
[184] With the recalculated HDI, Luxembourg would be 3rd instead of 15th, tied with Sweden in the 2003 UNDP report:
http://www.statistiques.public.lu/fr/communiques/economie/competitivite/2004/07/20040714/PDF_Statnews_32_2004.pdf

accounting for 2/3 of the weighting, and for the schooling rate, which accounts for 1/3. Note that in developed countries, the literacy rate is constant at 99%.

According to STATEC this negative change is behind the ranking drop in the HDI, as values for the other two partial indices did not change. The life expectancy index remained the same for the top twenty ranked countries, except for the United States, which recorded an increase from 0.87 to 0.88.

Luxembourg leads the rankings in the GDP per inhabitant indicator. As stated earlier, the usefulness of this indicator is largely in question because it is not truly adapted to the specificities of Luxembourg due to the large number of cross-border workers. In addition, STATEC emphasizes that Luxembourg is penalized when this indicator is used, by the fact that it has been awarded the maximum score of 1.0 for several years now and no further improvement is possible. Thus while in 2005 Luxembourg was the only nation to reach this ceiling, it has since been joined by Ireland and the United States. Other countries have had increases for this index and have therefore been able to reach a higher HDI ranking.

Figures related to the gross schooling rate are taken from EFT surveys that include persons pursuing their studies abroad, who largely escape the attention of administrative sources available to the appropriate ministries. The disadvantage of these surveys is that results are allocated a certain sampling error, which prevents getting an accurate estimate of changes from one year to the next. Estimated rates for 2003, 2004 and 2005 are respectively 83.7%, 88.4% and 84.7%. The 2004 estimate appears to have been untowardly high.

It can be concluded that the UNPD HDI indicator does not appear to be very useful in measuring developed countries, including Luxembourg.

7.3.2 The World Map of Happiness of the University of Leicester

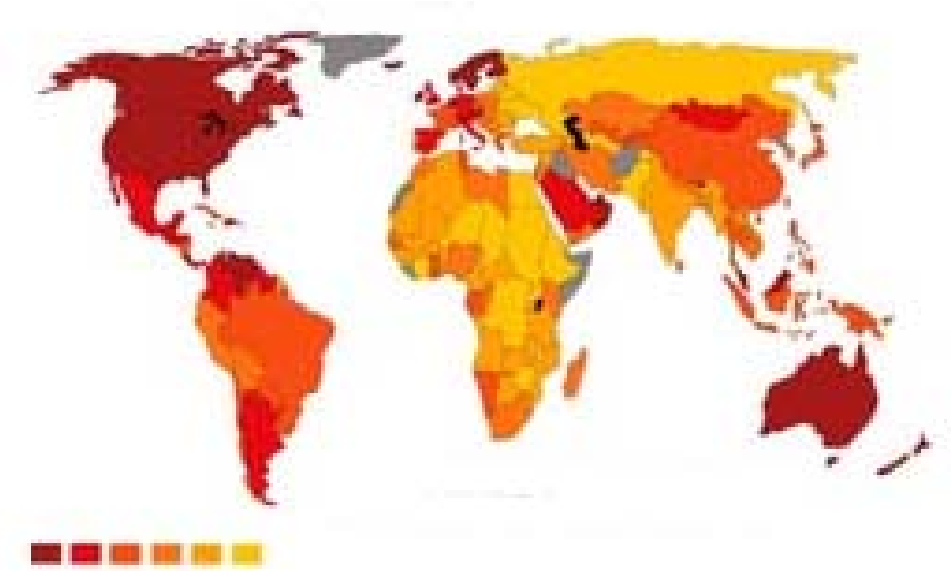
Since 2006, the Department of Psychology of the University of Leicester[185] has been producing a 'World Map of Happiness'. The map is based on UNESCO and the *New Economics Foundation* data, among others, and this subjective well-being ranking also takes into account studies based on questionnaires regarding happiness and

[185] White, A. (2007). "A Global Projection of Subjective Well-being: A Challenge To Positive Psychology?" Psychtalk 56, pp.17-20. See also: www.le.ac.uk

satisfaction with life in general. Researchers analyzed more than 100 studies based on questionnaires addressed to some 80.000 persons in producing the ranking.

The country that continually comes in first place in this ranking is Denmark, followed by Switzerland then Austria. Luxembourg is in 12th place out of a total of 178 countries, preceded by Iceland in fourth place, the Bahamas in fifth, Finland in sixth, Sweden in seventh, Bhutan in eighth, Brunei in ninth, Canada in tenth and Ireland in eleventh. France is in 62nd place, while Germany is 35th.

Figure 31: World Map of Happiness (Dark Red = Happy, High indicator ranking)



Note: (Dark Red = Happy, High indicator ranking)
Source: University Leicester

On the above graph, it is apparent that many Asian countries have relatively low "happiness" scores, including China 82nd, Japan 90th and India 125th. It is also interesting that many highly populated countries such as Russia, in 167th place, score poorly. It is hardly a surprise to see that Africa is scant on happiness, with the lowest ranked countries hailing from that continent: Republic of the Congo (176), Zimbabwe (177) and Burundi (178).

The lack of surprise arises from researchers' findings from the micro-data confirm that the three most significant determinants correlated with the rankings are health, GDP per inhabitant and access to education. The researchers summarize their findings: "There is a belief that capitalism leads to unhappy people. However, when people are asked if they are happy with their lives, people in countries with good

healthcare, a higher GDP per capita, and access to education were much more likely to report being happy."

This ranking gives GDP a preponderant place among the well-being indicators, showing that peoples' health, financial and educational requirements weigh more heavily than the frustrations of modern life.

7.3.3 The ECA International Quality of Life and MERCER Human Resource Consulting (HRC) Indicators

Some composite "Quality of Life" indicators were set up by consulting companies to help other companies and expatriate workers in their search for information on quality of life in countries and cities the world over.

a) The ECA International study

ECA International published its recent annual ranking of cities in March 2008. This study ranks 254 world cities according to several criteria including climate, natural cataclysms, access to health care and risk of illness, transportation, remoteness, quality and availability of goods and services, housing, education, language, culture, leisure, crime and socio-political climate.

Results of this study are intended for ECA International clients who seek to estimate financial packages for expatriates to compensate for the difficulty in adapting to their new locations.

Copenhagen dethroned Geneva in the most recent ECA ranking, which now considers it the city with the best quality of life.

Table 33: Top 35 of world cities where Europeans enjoy living in 2008

Ville	Classement 07/08	Classement 06/07
Danemark - Copenhague	1	2
Suisse - Genève	2	1
Suisse - Basel	3	2
Suisse - Bern	3	13
Belgique - Anvers	5	7
Belgique - Bruxelles	5	5
Luxembourg - Luxembourg	5	2
Allemagne - Dusseldorf	8	7
Allemagne - Bonn	9	5
Allemagne - Munich 9 7	9	7
Pays-Bas - Amsterdam	9	7
Allemagne - Francfort	12	7
Allemagne - Hambourg	12	7
France - Strasbourg	14	15
Allemagne - Berlin	14	14
Suisse - Zurich	16	17
Autriche - Vienne	17	15
Irlande - Dublin	18	18
Finlande - Helsinki	19	19
Canada - Vancouver	20	20
France - Paris	20	21
Canada - Toronto	22	25
Suède - Stockholm	23	22
Norvège - Oslo	24	22
Espagne - Madrid	24	29
Portugal - Lisbonne	26	22
Royaume-Uni - Londres	26	29
Espagne - Barcelone	28	26
Canada - Ottawa	29	28
Etats-Unis - Boston MA	29	33
Australie - Melbourne	29	26
Canada - Montreal	32	37
Etats-Unis- San Francisco CA	32	37
Australie - Canberra	32	31
Malte – La Vallette	35	31

Source: ECA International

Overall, European cities are well ahead in the rankings. Copenhagen, Geneva, Basle, Bern, Antwerp, Brussels, Luxembourg, Düsseldorf, Bonn, Munich and Amsterdam make up the top 10.

Cities in Eastern Europe have been moving to the forefront of rankings after major progress in the areas of security, housing and health services. Bucharest in 74th and Bratislava in 55th place are the cites that have advance the most in standings, moving ahead 21 and 9 ranks respectively compared to 2006.

b) The Mercer Human Resource Consulting (HRC) Study

The MERCER HRC analysis is part of a yearly international quality of life survey intended to help governments and multinational corporations in overseas assignments of personnel.

Multinational companies with high international flows of personnel must take in to account a wide range of factors in setting up remuneration packages for employees assigned abroad.

These firms may experience difficulty in finding qualified personnel to manage their operations abroad and need to base their decisions on benchmarks to ensure that remuneration is attractive enough to employees with transferable skills that they will accept assignments abroad.

The most recent MERCER HRC annual study[186] encompasses 215 cities and is based on the analysis of 39 quality of life criteria.

Overall, there are two rankings in this study: there is a ranking that focuses on quality of living and one on personal safety.

In the quality of living ranking [187]European cities score high in the rankings. Luxembourg moved up one position, to 17th place compared to18th in 2007.

[186] http://www.mercer.fr/home.htm
[187] http://www.mercer.fr/pressrelease/details.htm?idContent=1308870

Tableau 34: Quality of living index (TOP 50)

Top 50 cities: Quality of living MHR			
Rank 2008	**City**	**Country**	**Index 2008**
1	Zurich	Switzerland	103.05
2	Vienna	Austria	102.95
2	Geneva	Switzerland	102.95
3	Frankfurt	Germany	102.09
4	Bern	Switzerland	101.62
5	Copenhagen	Denmark	101.33
6	Amsterdam	The Netherlands	100.85
7	Brussels	Belgium	100.57
8	Berlin	Germany	100.19
9	Luxembourg	Luxembourg	100.00
10	Stockholm	Sweden	99.71
11	Nuremberg	Germany	99.33
12	Hamburg	Germany	98.66
13	Helsinki	Finland	98.28
14	Paris	France	98.18
15	Lyon	France	97.23
16	London	United Kingdom	96.94
18	Milan	Italy	96.18
19	Barcelona	Spain	95.99
20	Madrid	Spain	95.89
21	Lisbon	Portugal	95.70

Source: Mercer Human Resource Consulting
Calculation by *Observatoire de la Compétitivité* (Luxembourg=100),

This year a specific ranking appeared that focuses on personal safety and is based on political stability, crime, enforcement of the law and diplomatic relations. Luxembourg ranks first in this list with Berne 2nd, Geneva 3rd and Zurich 4th.

The city deemed the most dangerous in Europe is Moscow, ranked 196th. Personal and family safety is an important factor for employees considering a post abroad. Cities that are not safe or that do not appear to be safe will attract fewer employees with superior qualifications.

Tableau 35: Personal safety index

Top 50 cities: Personal safety			
Base City: New York, US (=100)			
Rank 2008	City	Country	Index 2008*
1	Luxembourg	Luxembourg	131.4
2	Bern	Switzerland	126.3
2	Geneva	Switzerland	126.3
2	Helsinki	Finland	126.3
2	Zurich	Switzerland	126.3
6	Vienna	Austria	121.1
7	Oslo	Norway	120.8
7	Stockholm	Sweden	120.8
9	Singapore	Singapore	120.2
10	Auckland	New Zealand	119.4
10	Wellington	New Zealand	119.4
12	Copenhagen	Denmark	117.2
12	Dusseldorf	Germany	117.2
12	Frankfurt	Germany	117.2
12	Munich	Germany	117.2
12	Nurnberg	Germany	117.2
17	Dublin	Ireland	117
18	Katsuyama	Japan	116.6
18	Omuta	Japan	116.6
18	Tsukuba	Japan	116.6
18	Yokkaichi	Japan	116.6
22	Amsterdam	Netherlands	115.8
22	Calgary	Canada	115.8
22	Montreal	Canada	115.8
22	Ottawa	Canada	115.8
22	Toronto	Canada	115.8
22	Vancouver	Canada	115.8
28	Brussels	Belgium	114.3
29	Melbourne	Australia	113.2
29	Perth	Australia	113.2
29	Sydney	Australia	113.2
32	Papeete	French Polyne	112.8
33	Abu Dhabi	United Arab E	112
34	Ljubljana	Slovenia	111.7
35	Kobe	Japan	111.5
35	Nagoya	Japan	111.5
35	Osaka	Japan	111.5
35	Tokyo	Japan	111.5
35	Yokohama	Japan	111.5
40	Berlin	Germany	111.4
41	Hamburg	Germany	110.1
41	Leipzig	Germany	110.1
43	Glasgow	United Kingdo	109.9
43	Hong Kong	Hong Kong	109.9
45	Lisbon	Portugal	108.7
45	Prague	Czech Republ	108.7
47	Dubai	United Arab E	108.3
48	Bratislava	Slovakia	108
49	Adelaide	Australia	107.6
49	Brisbane	Australia	107.6

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Source: Mercer Human Resource Consulting[188]

7.3.3 Quality of Life indicator for the Greater Region

The “Report on the Economic and Social Situation in the Greater Region” of the Interregional Employment Market Observatory (OIE) uses the expression “quality of life” in its survey of life as a global designation of monetary and non-monetary standards of living. So monetary and non-monetary indicators determine quality of life.

An analysis of monetary indicators of well-being such as income, cost and social charges brings back to the analysis in the *Bilan Compétitivité*[189].

[188] Mercer just completed its ‘Cost of living 2008’ surveys. See Chapter 5 of this report dealing with this subject, or the following site: http://www.mercer.fr/homepage.htm?siteLanguage=101

[189] Let us remember that GDP is not a reliable indicator for evaluating monetary well-being of the population because it is not possible to determine how much income is effectively disposable. GDP fails to account for the

Pecuniary well-being in the OIE survey[190] is measured by means of average disposable income, social charges and consumer price indices, which are the indicators also analyzed by the *Observatoire de la Compétitivité*.

The OIE analysis of non monetary indicators of well-being comes back to an analysis of the housing and living conditions of inhabitants of the Greater Region. For this purpose, the indicators chosen were the degree of urbanization of the regions, which shows a breakdown of urban and rural zones, the number of break-ins discovered by the police and the infrastructure segment of the health sector.

The OIE then compares the international HDI index[191] of UNDP[192], that the *Observatoire de la Compétitivité* also commented on[193], and the IPH poverty index, even though both of them correspond to rankings by country that are not available on the regional level. The OIE also compares the 'New Economics Foundation[194] Happy Planet index with neighboring countries, which ranks Luxembourg's carbon footprint better than other countries.

It is regrettable that the OIE only analyzes various existing indicators; it does not develop the concept of a composite indicator specifically for the Greater Region.

7.4 The ISSL: Luxembourg Social Health Index

Rather than performing an analysis of competitiveness as a whole, it is interesting to focus solely on the social component of the phenomenon. In the 2007 *Bilan Compétitivité*, the *Observatoire de la Compétitivité* worked out a social health index

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fact that over one third of total employment in Luxembourg is made up of cross-border non resident persons who contribute to GDP but who are not included in the resident population. Consequently they are not included as denominators of the GDP/inhabitant equation. In order to have a more appropriate wealth indicator at one's disposal, their contribution would have to be deducted and focus be drawn more on the Gross Domestic Income (GDI) figure per inhabitant. GDI certainly constitutes a more appropriate measure than GDP with which to approach the monetary "wealth" of Luxembourg residents compared to other countries. In doing this, it becomes clear that although GDI per inhabitant is sharply lower than GDP per inhabitant, yet Luxembourg is still considered one of the "richest" countries. GDI is thus a much better adapted yardstick than GDP for evaluating the monetary "wealth" of Luxembourg's inhabitants compared to those of other nations.
Also see the 2007 *Bilan Compétitivité* pages 102 and 104

[190] For more details see:
http://www.granderegion.net/fr/files/RAPPORT_SUR_SITUATION_ECONOMIQUE_SOCIALE_GRANDE_REGION_CESGR_10_SOMMET_GRANDE_REGION_01-02-08.pdf

[191] HDI: Human Development Index; see the contribution on the UNDP Human Development Report 2007/2008 in sub-section 7.3.1 of this chapter.

[192] UNDP: United Nations Development Program

[193] See7.3.1 "United Nations UNPD human development indicators"

[194]The 'Happy Planet' indicator measures the ecological efficiency of well-being for the world over. More details available at http://www.happyplanetindex.org/

for Luxembourg for the first time, baptizing it the ISSL[195], an approach whose origin dates back to a shared conference with CEPL in July 2006 around the theme "Toward New Indicators of Wealth"[196] .

Remember that the ISSL is based on all the fundamental indicators in the Competitiveness Scoreboard categories that are appropriate to the exercise because of their social dimension. These include "Unemployment", "Health", "Working Conditions", "Inequalities" and "Environment and Education". The indicators are shown in the table below.

In calculating the social health index the same calculation method was used as that for the composite competitiveness indicator. (See Chapter 6)

Table 36: Building a social health indicator for Luxembourg

Categories	Indicators
Unemployment	Unemployment rate
	Youth unemployment rate
	Long-term unemployment
	Unemployment women / men
	Employment rate men / women
Health	Life expectancy at birth
Working conditions	Work accidents
Inequalities	Gini Coefficient
	At-risk of poverty rate
	At persistent risk of poverty rate
	Wage gap between men and women
Environment	Energy intensity
	Share of renewable energy sources
	Greenhouse gas emissions
	Volume of waste generated
Education	Secondary school dropouts
	Percentage of people 25-34 with a university degree
	Percentage of people 25 to 64 with a secondary education

Source: *Observatoire de la Compétitivité*

[195] See the site for the *Observatoire* 2007 *Bilan Compétitivité* page 113 http://www.odc.public.lu/actualites/2007/09/26_bilan_compete/07_09_25_Bilan_Competitivite_2007_VF2.pdf

[196] See the 2007 *Bilan compétitivité* page 113

This methodology is applied to ISSL indicators retroactively to cover the years 2000 to 2007 for all EU Member states`, with results appearing in the table below.

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

Source: *Observatoire de la Compétitivité*

In the social domain, Luxembourg fell from the 10th slot in 2006 to the 11th in 2007. Therefore, Luxembourg's social position, already weaker than its competitive position, fell further, albeit modestly. The first eight places in this ranking are occupied by the following countries: Austria, Denmark, Sweden, the Netherlands, Slovenia, Belgium, Finland and Germany.

Remember that while Luxembourg dropped one position in the social health ranking between 2006 and 2007, this only implies that the relative position of Luxembourg with regard to the 27 Member states has deteriorated. In other words, even if the

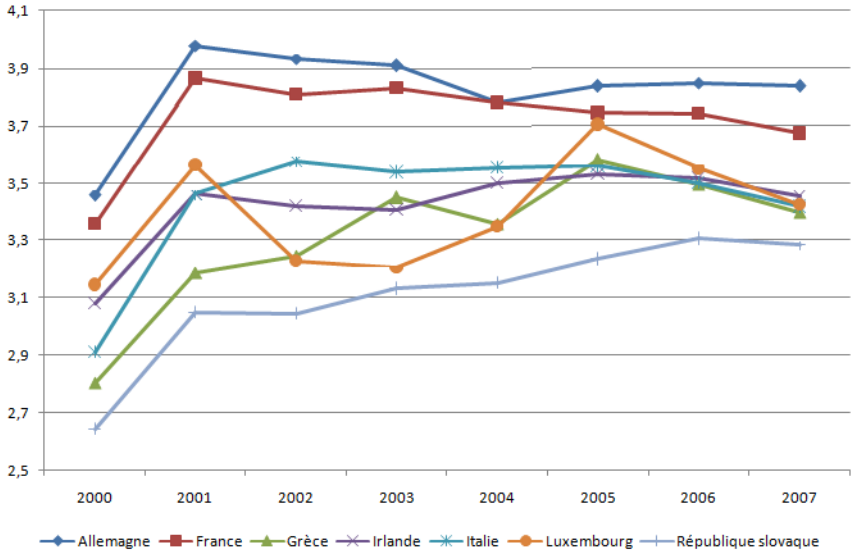
level of social health increases in Luxembourg, it is possible that other countries experience even more rapid improvements in this area.

Figure 32: Change in ISSL for Luxembourg and Rank of Luxembourg

Source: *Observatoire de la Compétitivité*

It is therefore important to consider not only Luxembourg's ranking but also changes in the value of the social health index, remembering that social health improves when the index rises. Between 2006 and 2007, Luxembourg lost a position in the index ranking and the social health situation deteriorated.

Figure 33: Relative change in the ISSL and the ISS of Luxembourg's neighbors in the EU rankings



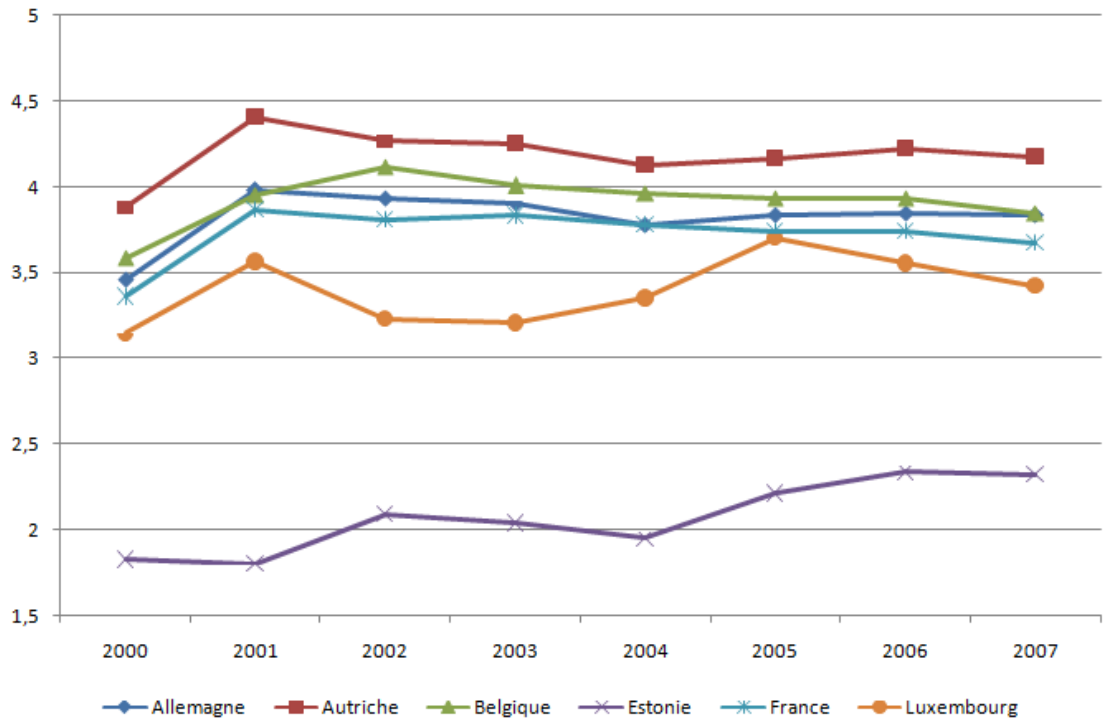
Source: *Observatoire de la Compétitivité*

The above graph shows the countries with approximately the same level of social health as Luxembourg. On the graph it is clearly shown that Ireland, whose ISS rank has overtaken the ISS of Luxembourg, was able to improve its situation.

Following the logic of the Competitiveness Scoreboard, the graph below shows the trend for the best performing country, Austria, and the trend for the worst performing, Estonia. The graph also traces trends of Luxembourg's neighbors Germany, Belgium and France.

The ISS trend for Austria and Germany is rather constant. That of Belgium, France and Luxembourg falls off between 2006 and 2007.

Figure 34: ISS trend for Luxembourg and its neighboring countries, as well as the highest and lowest trends in the EU-27



Source: *Observatoire de la Compétitivité*

In view of Luxembourg's relatively weaker position with regard to the ISSL as opposed to the TBCO within the EU, it would be interesting to know which category of indicators influences more Luxembourg's relative position in the ISSL.

To discover this, the following table traces the relative ranking Luxembourg would have had, if such and such category of indicators were omitted from the ISSL indicator. Comparing the rankings with or without a given category then furnishes

data on the ranking difference Luxembourg would experience for each omitted category.

The results of calculating an average trend over the period studied are roughly the same as in 2006[197] and thus lead us to conclude that Luxembourg's position in the area of social health would have deteriorated sharply if the "Life Expectancy" indicator had been omitted. Indeed, excluding this indicator would have resulted in Luxembourg dropping six positions in the ranking.

While the difference in ranking is greater when the "Life Expectancy" indicator is excluded, omitting the categories "Inequalities" and "Unemployment" would also have had a negative effect on the country's ranking, causing it to lose 3 or 4 positions.

Inversely, if the "Education" were to be removed, Luxembourg's position would improve by 2 slots with respect to its EU partners, which underscores to what extent this area is a problem for Luxembourg.

Tableau 37: ISSL Strength Test

Rangs du Luxembourg	2000	2001	2002	2003	2004	2005	2006	2007
ISS	10	10	16	15	13	10	10	11
ISS sans espérance de vie	15	13	21	21	20	11	15	17
ISS sans chômage	17	15	20	23	16	12	15	15
ISS sans inégalités	13	12	19	20	16	12	13	14
ISS sans accidents	9	11	12	12	11	12	12	13
ISS sans éducation	10	8	13	14	11	5	7	9
ISS sans environnement	10	11	14	15	12	6	11	11
diff. Rang ISS- ISS sans espérance de vie	-5	-3	-5	-6	-7	-1	-5	-6
diff. Rang ISS-ISS sans chômage	-7	-5	-4	-8	-3	-2	-5	-4
diff. Rang ISS-ISS sans inégalités	-3	-2	-3	-5	-3	-2	-3	-3
diff. Rang ISS-ISS sans accidents	1	-1	4	3	2	-2	-2	-2
diff. Rang ISS-ISS sans éducation	0	2	3	1	2	5	3	2
diff. Rang ISS-ISS sans environnement	0	-1	2	0	1	4	-1	0

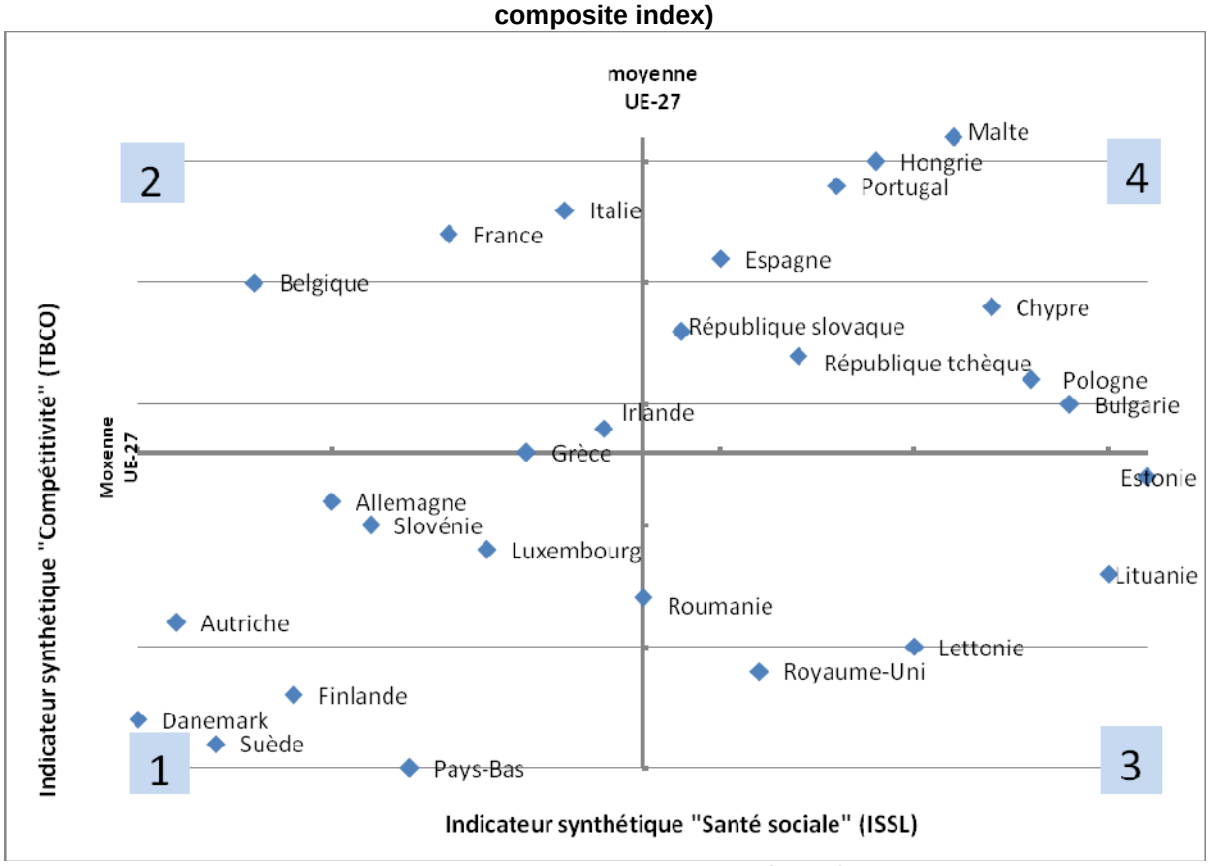
Source: *Observatoire de la Compétitivité*

The x-axis of the following graph represents the ISSL rankings of EU countries and the y-axis shows the TBCO rankings. The graph puts the relative position of Luxembourg in the TBCO and ISSL indicators in sharper focus.

[197] See the 2007 *Bilan compétitivité* on the *Observatoire de la Compétitivité* web site under the heading 'Publications': http://www.odc.public.lu/

In general, the countries in quadrant 1 are those that perform well in the area of competitiveness and social health. Luxembourg is side by side in this category of good performers with the Nordic countries, Netherlands, Austria, Ireland and Slovenia, which is the only new Member state of the UE in this category. Nonetheless, in contrast with the Nordics, Luxembourg is the country closest to the limit in the area of social health. Luxembourg's big neighbor Germany is ranked in the first quadrant of competitive countries, and is better positioned than Luxembourg along the social health axis, while less for competitiveness.

Figure 35: The "Competitiveness" (TBCO) composite index and the "Social Health" (ISSL composite index)



Source: *Observatoire de la Compétitivité*

Countries situated in the second quadrant are less competitive but perform better in the area of social health. Observe the presence here of two other neighbors of Luxembourg: France and Belgium. Quadrant three countries are competitive but perform less well in terms of social health and quadrant four countries have relatively poor performance in both indicators.

The introduction of this social health index for Luxembourg with accompanying analyses has revived the debate with the social partners on the social dimension of

competitiveness. It would nevertheless appear important to discuss the protean definition of social health in order to account for other more pertinent indicators if needed.

7.5 Conclusion

Numerous attempts at developing a quality of life indicator have been made over recent years, all of which share a common feature:[198] they attempt to give a more complete notion of the entire gamut of human activity and to underscore that advances in well-being are increasingly weaker over that past twenty years and are even fading[199]. The creation and analysis of the ISSL indicator shows that Luxembourg appears to be no exception to this phenomenon, as the country's social health is clearly less favorable than its competitive position.

It is important to remember that social health indicators are complements to the cost/price indicators developed in Chapter 6 of the Competitiveness Report in the Competitiveness Scoreboard, as well as those national accounting indicators such as GDP and GDI. The major disadvantages of composite indicators were outlined in the 2006 *Bilan Compétitivité* and social health indicators share them as well.

As part of its duties and the initial definition chosen for the term competitiveness, the *Observatoire de la Compétitivité* prepared a preliminary sketch for a Luxembourg social health index. The intent was to explore the methodological difficulties and to launch discussions to resolve which composite indicators and basic statistics to use. Indeed, building a composite indicator is no easy chore in as much as it must necessarily contain a subjective dimension. A choice of basic indicators must be made that depend, as Jean Gadrey puts it, "on the political conventions and values systems of a given society."

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[198] Such as the economic well-being indicator cited in 2003 by Osberg and Sharpe, as well as so many other indices like those of Jany-Catrice or Gadrey in 2003.

[199] For this subject, see *Article Richesse* D. Méda, *Dictionnaire de l'autre économie*, Jean-Louis Laville and Antonio David Cattani (Director of work.), Desclée de Brouwer Editions, February 2005; Also, *'27 questions d'économie contemporaine'-Economiques volume 1* by Cohen and Askenary, Albin Michel collection: The Easterlin paradox suggests that income does not bring on an increase of well-being, yet the "flat" curves that he uses contradict other studies based on microeconomic data. In fact, a review of the literature available illustrates that there are actually two types of social interactions: direct interactions involving comparisons and adaptation to the deflator effect of satisfaction versus the indirect interactions such as informational apprenticeships and expectations of positive impact on well-being. The respective weighting of these two types of interactions depends on economic context, especially the degree of uncertainty and mobility in the economy.

In addition, building a composite indicator obviously opens the door to well-known criticisms[200]. Still, the principal advantage of composite indicators is that they provide an overall look at the subject, an advantage that should be exploited in order to illuminate the social health situation of Luxembourg. One must nevertheless beware of the influence of the press and of demagogy on the uninformed public; the main criticism here lies in the choice of weightings used, or that they are totally absent. So, as with competitiveness indicators, to assimilate the social health of a country, one must always analyze in detail the basic indicators and changes occurring within them.

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[200] See Chapter 2 of this report

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8 Thematic Studies

In 2005, Centre de Recherche Public Henri Tudor, the *Observatoire de la Compétitivité* and STATEC signed an agreement on a series of studies on "Measuring and understanding the Knowledge Economy". Complementarities and synergies arising from the cooperation guarantee that projects will be coherent and consistent. This triple partnership will ensure the results of the research program and improve the communication of the results to the stakeholders, which include not only economic, political and social decision makers, but also the scientific community and civil society. The themes of the studies were derived from the *desiderata* expressed by the social partners in the tripartite meetings as well as from the recommendations of the Fontagné report.

The Ministry of Economy and Foreign Trade will finance part of the program and the *Observatoire de la Compétitivité*. Is responsible for the overall project coordination. STATEC will provide the project with data which it collects through its regular production of national statistics. STATEC also offers possibilities for cooperation with international organizations such as Eurostat and OECD. In addition, it will supply researchers with access to micro-data, this data availability obeys data confidentiality rules and Statec will monitor the published results. CRP Henri Tudor is responsible for the whole research package and will mobilize a multi-disciplinary research team with expertise in economics, econometrics, management science and organization sociology.

The scope of the studies will encompass following topics: 1) ICT and total factor productivity, 2) Entrepreneurship and enterprise demography, 3) Role of innovations for growth and competitiveness. Multi-disciplinary research will be conducted on both macro- and micro-levels.

Results of the research conducted within this framework will be used as inputs for the Competitive Scoreboard of the *Observatoire de la Compétitivité*, and especially for the Luxinnovation Scoreboard concerning the themes dealing with research and innovation.

This partnership delivers workshops, reports, supervision of doctoral theses and a major international colloquium “On the Road to Lisbon”. The results of these studies are aimed at improving our own awareness as well as that of the companies involved. In the following four sections the results of the studies so far are presented.

- 8.1 Innovation and productivity

- 8.2 The Search for Entrepreneurs: The research project on the status of self-employed persons in Luxembourg

- 8.3 Is Luxembourg’s productivity cyclical?

- 8.4 Inflation in Luxembourg: Evaluation and determinants

The LSM structural model used to evaluate Lisbon policies is introduced in section 8.5. This model for Luxembourg’s economy was bet up in collabouration with professors Fontagné of the *University de la Sorbonne* in Paris and Marcellino of the University Bocconi in Milan and the IUE in Florence. The key elements of this tool are a general equilibrium model containing prices and/or rigid salaries and incorporating stochastic shocks. This allows an evaluation of the result of policies executed for well-being of households. This section offers preliminary simulations of different economic policy scenarios to be used in “evaluating” the actions implemented as part of the Lisbon strategy.

8.1 INNOVATION AND PRODUCTIVITY

Based on a study examining the relationship between innovation and productivity using Luxembourgish data[201], originally published in **Perspectives Economiques *n°9 July 2008***

"Innovation is a determining factor of growth and performance in a globalized economy. It is the source of new technologies and products that help face global challenges like health and the environment. By transforming production processes, it stimulates productivity, creates jobs and contributes to improving quality of life for populations." With these words the OECD emphasizes in November 2007 the essential role of innovation in the economic development and furthermore justifies the publicly funded analysis and measurement of the phenomenon. Moreover, there is international consensus among the researchers on the need for public intervention in R&D and innovation. It seems clear that lasting differences in growth rates and competitiveness between countries can be linked to the particularities of the national innovation systems, such as quality of research and educational institutions, culture of entrepreneurship and coordination and sustainability of research finance. These are the ways that public authorities use to support and promote domestic innovation performance. Obviously, there is less consensus on the specific policies to be implemented in order to improve the situation. It is important to determine the exact policy goals and to obtain the means for monitoring, measuring and evaluating the development and achievements. In addition, it is essential to analyze the situation in order to better understand the underlying links between innovation and growth.

One of the means to observe the development at the firm-level is the Community Innovation Survey. It is a harmonized survey conducted in EU countries and coordinated by the Eurostat. It serves as a rich source of information on R&D activities and innovation outcomes in firms. Due to its harmonized nature it enables comparative studies on innovation performance between countries and sectors.

In the collabouration framework of CRP Henri Tudor and STATEC economic analysis on the effects of R&D and innovation on firm's performance has been conducted. The study utilizes a much applied model using Luxembourgish data, for the entire study see « *Innovation and Productivity in Luxembourg* », *Economie et*

[201] This section is based: on "Innovation and Productivity in Luxembourg", *Economie et statistique n°23* , April 2008 , by Anna-Leena Asikainen.

statistiques n°23, April 2008. A summary of the study appeared in a special edition of *Cahiers Economiques* dedicated to innovation in Luxembourg in 2005. However, the current report is a more comprehensive and up-to-date than the previous one:

- The study draws attention to the distribution of the R&D investments in Luxembourg. Large inequality among the R&D investors prevails, as the highest 10% of R&D investors account for 50-80% of all R&D expenditures in each sector. Moreover, in certain sectors there exist some big R&D investors who alone account for a lion's share of the sector's R&D investments. Depending on the sector the R & D expenditures vary not only in intensity but also in composition.

- The results verify the link between innovation and productivity at the firm-level. It seems that investments in R&D have a positive influence on innovation outcomes and an increase in innovation outcome leads to an increase in the productivity.

  The results highlight some factors affecting the propensity to innovate. These factors include size of the firm, whether or not a company belongs to a group and nature of the competition in the firm's market.

- Propensity to innovate increases with size. However, the R&D expenditures per employee and innovation outcomes per employee both are negatively influenced by size.

- Firms being part of a group have higher probability of being engaged in innovation activities and they also have higher average expenditure on R & D per employee.

- The heightened competition and the pressure from the demand side increase likelihood of being engaged in R&D and innovation. Also companies using technological progress as a competitive factor tend to be more often engaged in R&D and innovation.

- Moreover, the results suggest that start-up firms are more likely engaged in innovation. It might be that start-ups use new products as market-openers and process innovations as a way to compete with prices

- Considerable variation in innovation indicators between sectors and the intra-sector inequality in the investment distribution underlines the likely co-existence of different innovation modes in which companies and sectors play different and perhaps complementary roles.

  These results can be used to support public decision making, even though it may be appropriate to continue with the analysis. It is especially necessary to examine the role of international networks and study performance changes in innovating companies over time.

The study shows that R&D and innovation increase firm-level productivity in Luxembourg. This outcome is a clear justification for the policies that Luxembourgish authorities have implemented as part of the Lisbon Strategy and which aim at encouraging, promoting and stimulating R&D and innovation. The report also states that the 'democratization' of R & D should also be further encouraged so that a bigger number of companies, especially SMEs, would start R&D and innovation activities and this would improve their own productivity and contribute to the competitiveness of our economy. Indeed, the dominant role of groups—particularly foreign groups— indicates that strategic decisions are not taken on local basis, but rather taking into account international specialization. Luxembourg holds comparative advantage in the service sector. Moreover, the multitude of very small R&D investors for whom the investments constitute a strategic and probably vital objective, contribute significantly to renewing the country's production structure. Attracting these kinds of innovators to Luxembourg and establishing them in the country corresponds to distinct, complementary and necessary economic policy objectives and instruments.

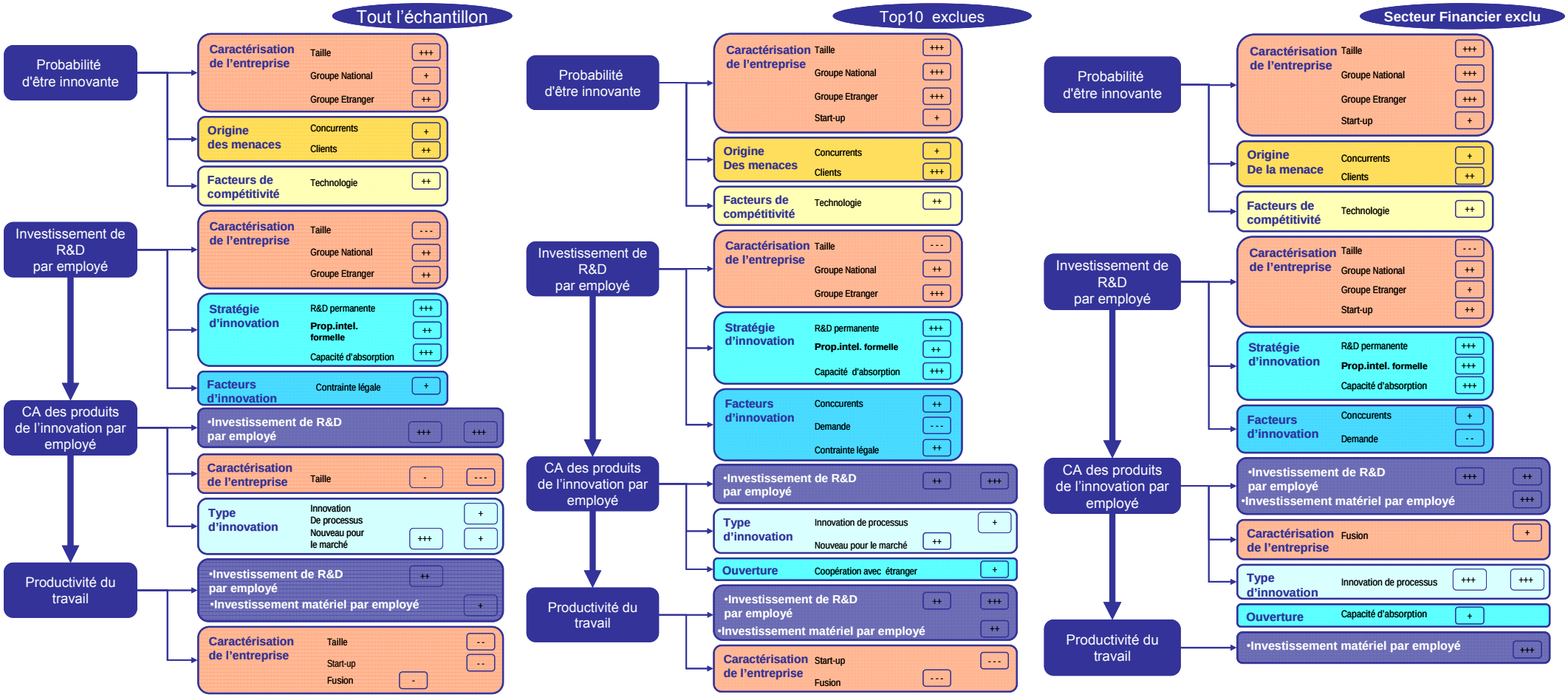
8.1.1 Model and Interpretation of Main Results

The main objective of the econometric study consisted of estimating the impact of R&D expenditures on innovation production and the influence of innovation outcomes on the performance of companies. This is the first study carried out at the company level using Luxembourgish data. A distinct effort was made to analyze the influence of the specific characteristics of the economy. The study laid particular emphasis on identifying the influence of the financial sector and the unequal R&D investment distribution. Part of the analysis emphasises the influence of the biggest

R&D investors, called the Top 10, which account for lion's share of innovation expenditures. The very unequal distribution of R & D expenditures and the clear dominance of the financial sector are taken into account in the estimations by using sub-samples. In addition, the specific influence of R & D investments on the production of knowledge is analyzed. The process that was implemented is similar to the model developed by Crepon, Duguet and Mairesse in 1998 and the data used come from the 'Fourth Innovation Survey—CIS4.

It appears that innovation expenditures have a positive impact on innovation outcome and this outcome contributes to improving productivity in companies. However, this impact seems to be diluted when the sub-samples excluding the major investors or the financial sector are used. The effect of innovation on productivity tends to disappear also when tangible investments are introduced as exogenous variables in the estimation. Outside of the financial sector, the impact of tangible investments on productivity dominates of the impact of R & D and innovation expenditures.

Estimation results depend to certain extent on the sample used. The following diagram is broken down for each three samples and for each equation of the model, and it shows all the statistically significant variables. The level of significance and the parameter sign are indicated in the little boxes on the right hand side of the variable name. The signs used are plus and minus signs: (+++) means that the parameter has very significant positive impact on the dependent variable; name of each dependent variable appears in the blue box on the left hand side of the variables. In the same manner, (-) indicates a variable with significant negative influence on the dependent variable. The results for the specification incorporating tangible investments are added as the furthermost column on the right hand side of the regular results.


Tout l'échantillon
Probabilité d'être innovante
Caractérisation de l'entreprise
Taille +++
Groupe National +
Groupe Etranger ++
Origine des menaces
Concurrents +
Clients ++
Facteurs de compétitivité
Technologie ++
Investissement de R&D par employé
Caractérisation de l'entreprise
Taille ---
Groupe National ++
Groupe Etranger ++
Stratégie d'innovation
R&D permanente +++
Prop.intel. formelle ++
Capacité d'absorption +++
Facteurs d'innovation
Contrainte légale +
CA des produits de l'innovation par employé
•Investissement de R&D par employé +++ +++
Caractérisation de l'entreprise
Taille - ---
Type d'innovation
Innovation De processus + +++
Nouveau pour le marché +
Productivité du travail
•Investissement de R&D par employé ++
•Investissement matériel par employé +
Caractérisation de l'entreprise
Taille --
Start-up --
Fusion -
Top10 exclues
Probabilité d'être innovante
Caractérisation de l'entreprise
Taille +++
Groupe National +++
Groupe Etranger +++
Start-up +
Origine Des menaces
Concurrents +
Clients +++
Facteurs de compétitivité
Technologie ++
Investissement de R&D par employé
Caractérisation de l'entreprise
Taille ---
Groupe National ++
Groupe Etranger +++
Stratégie d'innovation
R&D permanente +++
Prop.intel. formelle ++
Capacité d'absorption +++
Facteurs d'innovation
Conccurents ++
Demande ---
Contrainte légale ++
CA des produits de l'innovation par employé
•Investissement de R&D par employé ++ +++
Type d'innovation
Innovation de processus +
Nouveau pour le marché ++
Ouverture
Coopération avec étranger +
Productivité du travail
•Investissement de R&D par employé ++ +++
•Investissement matériel par employé ++
Caractérisation de l'entreprise
Start-up ---
Fusion ---
Secteur Financier exclu
Probabilité d'être innovante
Caractérisation de l'entreprise
Taille +++
Groupe National +++
Groupe Etranger +++
Start-up +
Origine De la menace
Concurrents +
Clients ++
Facteurs de compétitivité
Technologie ++
Investissement de R&D par employé
Caractérisation de l'entreprise
Taille ---
Groupe National ++
Groupe Etranger +
Start-up ++
Stratégie d'innovation
R&D permanente +++
Prop.intel. formelle +++
Capacité d'absorption +++
Facteurs d'innovation
Conccurents +
Demande --
CA des produits de l'innovation par employé
•Investissement de R&D par employé +++ ++
•Investissement matériel par employé +++
Caractérisation de l'entreprise
Fusion +
Type d'innovation
Innovation de processus +++ +++
Ouverture
Capacité d'absorption +
Productivité du travail
•Investissement matériel par employé +++

8.1.2 Main Conclusions

The results are in-line with results obtained in various international studies using similar approach. Firstly, an increase in R&D expenditures improves the innovation outcomes. Secondly, the productivity of companies increases along with the level of innovation outcome.

The size effect: Propensity to innovate increases with firm size. However, the expenditures per employee and obtained innovation outcomes decrease with size. Overall, what matters is the intensity of the efforts and outcomes rather than the level.

The group effect: Belonging to a group clearly increases both the propensity of being engaged in innovation activities and the average R&D expenditure per employee. Innovation outcomes and their impact on productivity clearly differ between sectors. Companies in the financial sector obtain better results in terms of innovative products and productivity than those in other sectors, whereas the results of IT consultancies and other business service firms are weaker than those of the manufacturing sector.

The competition effect: Perceived competition and changing consumer preferences are important factors when deciding on innovation activities. Expectedly, development of technologically advanced products improves firm's competitiveness in the market.

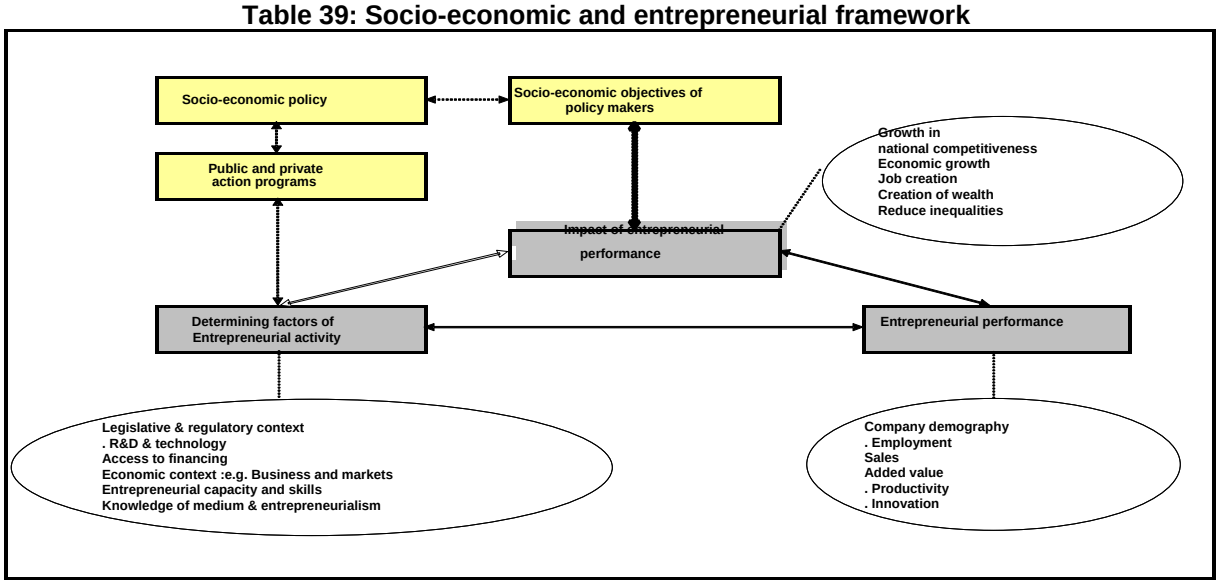
The Top Ten effect: Companies that invest massively in R & D are in all sectors very much bigger than the average firm. R & D expenditures are principally of an external nature, featuring acquisitions of machines, equipment and software. The medium sized and large companies belonging to a group, especially in the financial or business service sector, make substantial purchases of expertise and equipment from other businesses. It is seems that firms collabourate with their customers and suppliers in innovation activities. The main issue to be considered is the high variability in the central innovation indicators between different sectors and the systematic polarization within all sectors. This intra-sector polarization is due to a very small number of companies who account for from over a half to two thirds of the sector's R&D investments. Again, the disparity in resources deployed suggests that there are different types of innovation processes in play.

The start-up effect: R&D activities are not mainly due to the action of companies which newly arrived on the market, although the propensity to innovate is higher in start-ups. Recently established companies who are engaged in R&D activities and innovate also invest heavily in per-employee terms despite their small size, and they do not necessarily achieve any better outcomes in terms of productivity. It might be that the start-ups have not had the time to optimize their internal processes and thus have not yet reached their production frontier. Moreover, while new companies use new products to open up markets, it may be that the impact of innovation on firm's outcome is not perceived in the observation period that might be shorter than that of other companies in the sample. Start-ups seem to come closest to the concept of Schumpeterian entrepreneurialism. Innovation practices, outcomes and related economic performance in small firms should be better portrayed and complementary studies are needed to analyze the reason for the weak results. These research efforts would highlight their important role in the Luxembourgish innovation system.

8.2 In Search of the Entrepreneur: The Research Project on Self-Employed Status in Luxembourg

Self-employed persons, entrepreneurs and the entrepreneurial spirit are at the core of the Lisbon Strategy [202] for growth and employment. This concept is the central theme of Integrated Guideline (IG) 15, which specifically concerns entrepreneurialism and entrepreneurial activity that states, *Promote a more entrepreneurial culture*[203] *and create a supportive environment for SME*[204]. In 2006, an *Avis* by the Tripartite Coordination Committee[205] stated that it was important that "*The implementation of a group of complementary mechanisms promoting competitiveness in companies"* be considered as one of six main strategic avenues of approach.

Table 39: Socio-economic and entrepreneurial framework



Source: Typology of Self-Employed People - Phase I Report on the Status of Self-Employed Persons in Luxembourg (Henri Tudor Research Center, 2008)

The implementation of the Lisbon Strategy comprises formulating socio-economic policies and objectives based on consultations between the government of Luxembourg and the social partners. The national strategic and reform plans, or the

[202] The Lisbon Strategy makes up a whole, of which the essential components are summarized in the following objective set in March 2000 by the European Council: "*To become 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*".

[203] Entrepreneurialism is defined as "the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organization". Commission of the European Communities, Green Paper on European Entrepreneurship, 2003

[204] Small and Medium-sized Enterprises.

[205] *Avis* of the Tripartite Coordination Committee, 28 April 2006.

National Plan for Innovation and Full Employment,[206] is the expression of socio-economic policy. Its implementation is being accomplished by means of legislative reform and public and private action programs based on Public-Private Partnerships (PPP). Professional organizations and chambers are also actively involved with ministries and agencies in the government administration.

It is precisely here where the problem exists with regard to communication and dialogue on self-employed persons, entrepreneurs and the entrepreneurial spirit. The concepts and terms in use remain vague, even inaccurate despite the cooperation. This results in any and all, be it the general public or an administration, an organization or professional chamber, being able to assimilate these concepts according to their own manner.

It was following the realization of this situation that STATEC, the *Observatoire de la Compétitivité* and the Henri Tudor Research Center (CRP HT) came together to launch a research project on the topic of Self-Employed Status in Luxembourg in September 2007. The initial phase of the project, "Typology of the Self-Employed" was carried out between September and December 2007, which concentrated on establishing a state of play for entrepreneurs in the Luxembourg milieu. After accomplishing this it proved possible to come up with a succinct, preliminary definition and typology of Luxembourg entrepreneurs and to identify the central empirical themes to be pursued over the remaining phases of the project. The second phase is now well under way and involves working out a new measure for better estimating the number of entrepreneurs according to personality type. The project's third phase is seen as carrying out an exploratory survey on the typology of entrepreneurs. This survey would aim to prepare the way for specific surveys and research in the future concentrating on the perceived requirements of political and economic agents in providing support in their efforts to develop and implement the Lisbon Strategy.

8.2.1 Limited and Disparate Data on Entrepreneurs in Luxembourg

The *Observatoire de la Compétitivité* is the coordinator for the implementation of the Lisbon Strategy in Luxembourg. In addition to its central role in collecting the

[206] National Plan for Innovation and Full Employment –2007 Implementation Report, Government of the Grand-Duchy of Luxembourg.

plethora of data concerning the Renewed Lisbon Strategy[207], it manages the development effort for analysis and statistical indicator instruments, including those for the Luxembourg Economy Competitiveness Scoreboard[208] (TBCO).

The TBCO, which currently uses 81 indicators divided into ten categories, has a sixth category for entrepreneurialism that comprises four indicators, one of which focuses on the percentage of self-employed jobs as a percentage of total domestic employment. The percentage of self-employed persons as a part of the total domestic employment pool was 5.96% in 2006, a seemingly disappointing figure with relation to most of the 27 Community countries for which the average level in this indicator is 16.94%. The elemental question here is how accurate is this measurement of the percentage of independents as an indicator for entrepreneurial activity. This is a question concerning the definition of what an independent worker is, and secondly, how pertinent the measurement actually is.

The sole reference source for quantitative measurements on self-employed persons is the Inspectorate General of Social Security[209] (IGSS). The Social Security administration gathers information about self-employed persons and independent workers in accordance with social legislation[210]. These are independent workers that exercise a commercial activity in the broad sense, i.e. artisans, trades people and manufacturers, as well as farmers and so-called intellectual workers whose work is personal and non-commercial, such as in the case of doctors and lawyers.

[207] Information may be obtained from the organization's web site *www.odc.lu*.
[208] 2007 *Bilan compétitivité* – The Road to Lisbon, *Perspectives de Politique Economique*, No 7 September 2007, Ministry of the Economy and Foreign Trade.
[209] *Rapport général sur la sécurité sociale* – 2006, *Inspection générale de la sécurité sociale*, Ministry of Social Security.
[210] See *Droit de la sécurité sociale* - Luxembourg, *Inspection générale de la sécurité sociale*, Ministry of Social Security., 2006.

Tableau 40:Self-Employed Persons in Luxembourg - 2006

Profession	Nombre de personnes		
	Homme	Femme	Total
Travailleurs Intellectuels Indépendants	4.010	2.453	6.463
Artisans, Commerçants et Industriels	6.818	3.374	10.192
Agriculteurs	2.076	1.379	3.455
Total	12.904	7.206	20.110

Source: IGSS – General Social Security Report 2006,
Break in series (Law dated 25 July 2005)

The Community count of self-employed persons in Luxembourg, which was used to calculate the proportion of self-employed persons in domestic employment totals for the TCBO of Luxembourg's economy, is in point of fact the outcome of estimates taken from the Community Labour Force survey conducted solely among resident households. Eurostat, by limiting itself to only self-employed persons who conduct business under their own name using a legal format, thereby underestimates the true number of independents that include specifically those persons exercising their profession under the aegis of companies having a legal form, such as an SA or SARL.

With regard to qualitative measures concerning entrepreneurs, the Government and the social partners have only two surveys on the circumstances of entrepreneurs, one done by the European Community that was a survey on Factors of Business Success – FoBS [211]and the other, of indirect value but notwithstanding equally important, done by PwC Luxembourg and entitled "Family Businesses in Luxembourg"[212]. Another source of information on entrepreneurialism is the "Entrepreneurial Survey"[213] carried out by Gallup Polls for the European Commission, which assembles a body of data on the cultural environment of self-employed persons in accordance with the perceptions of respondents to the

[211] See *Une typologie des entrepreneurs luxembourgeois (résultats de l'enquête communautaire FOBS)*. Ries, J. *Cahiers Economiques de STATEC*: No 103, 2007; and *Factors of Business Success*, ec.europa.eu/eurostat/, Eurostat : 2006.
[212] *Les entreprises familiales luxembourgeoises*, *A la recherche des compétences nécessaires pour garantir la croissance et la transmission de l'entreprise*, 2nd edition, PwC Luxembourg: November 2007.
[213] *Entrepreneurship Survey of the EU (25 member states), United States, Iceland, and Norway*, Flash Eurobarometer, Flash EB Series # 192, European Commission: 2007.

survey[214]. These perceptions focus particularly on motivation and obstacles to entrepreneurial status.

The initial finding that comes to light is that we have little information about self-employed persons and that disparate information does not constitute an adequate basis from which to evaluate entrepreneurs or entrepreneurial activity in the context of the Lisbon Strategy. The information available furnishes little support to the political and economic agents in the area of evaluating reforms that have been undertaken and resources implemented as part of the Lisbon Strategy by Luxembourg. What is missing then is both quantitative and qualitative measures. In addition, we are not exactly sure what entrepreneurs actually are nor how they fit into the context of Luxembourg.

8.2.2 Determining How Entrepreneurs Fit into the Implementation of the Lisbon Strategy

The concept of the entrepreneur, either in theoretic and empirical research or in studies conducted by OECD, Eurostat or the European Commission, normally focuses on the business and services economies, in the NACELUX[215] Classification section C to O, excluding public administrations (NACELUX section L). Agriculture and similar activities cited in NACELUX sections A and B are therefore excluded.

Entrepreneurs are thus associated to commercial business activities in the broad sense, exercising a profession in their own names, either under the aegis of a company, typically as a *Société Anonyme*, or S.A. (Joint Stock Corporation) or a *Société à responsablité limitée,* or S.A.R.L. (Closely Held Company). The concept of entrepreneur is compatible with that of a self-employed worker as seen by the Luxembourg Social Security administration that assimilates independent intellectual workers to company managers.

Entrepreneurs are habitually identified with innovation. In reality, few independent entrepreneurs working specifically in SME, which have fewer than 250 employees, consider themselves as innovators, either in processes, products—meaning goods or services—or new markets. Because of this, it is important to acknowledge that

[214] A sampling of 500 included self-employed persons, employees and students.
[215] Classification of activities - Revision 1.1, Luxembourg version of the Classification of Economic Activities in the European Community Revision 1.1 (NACE Revision 1.1), STATEC, September 2004.

entrepreneurs can be simply non-innovative professionals exercising their trade according to the usual standards and practices of their economic activity. It is equally important to recognize that entrepreneurs can be non-innovative professionals while their economic activities are innovative because of employees, from which the notion of entrepreneur arises, meaning an innovative employee-as-entrepreneur. Entrepreneurial activity, seen through measures of company activity, is the appropriate manner of determining entrepreneurial nature and performance.

This brings us to the following definitions of entrepreneurs, entrepreneurial activity and entrepreneurialism.

1. *Independent Entrepreneurs, Non-Innovative Professionals and Innovators*

Independent entrepreneurs are self-employed workers. They are physical persons, working under their own name or under the aegis of a company and they manage an economic activity ostensibly without being answerable to an employer. Their role is to generate economic or social value through the creation, maintenance and expansion of the economic activity for which they are responsible.

2. *Entrepreneurial, non-innovative and innovative activity*

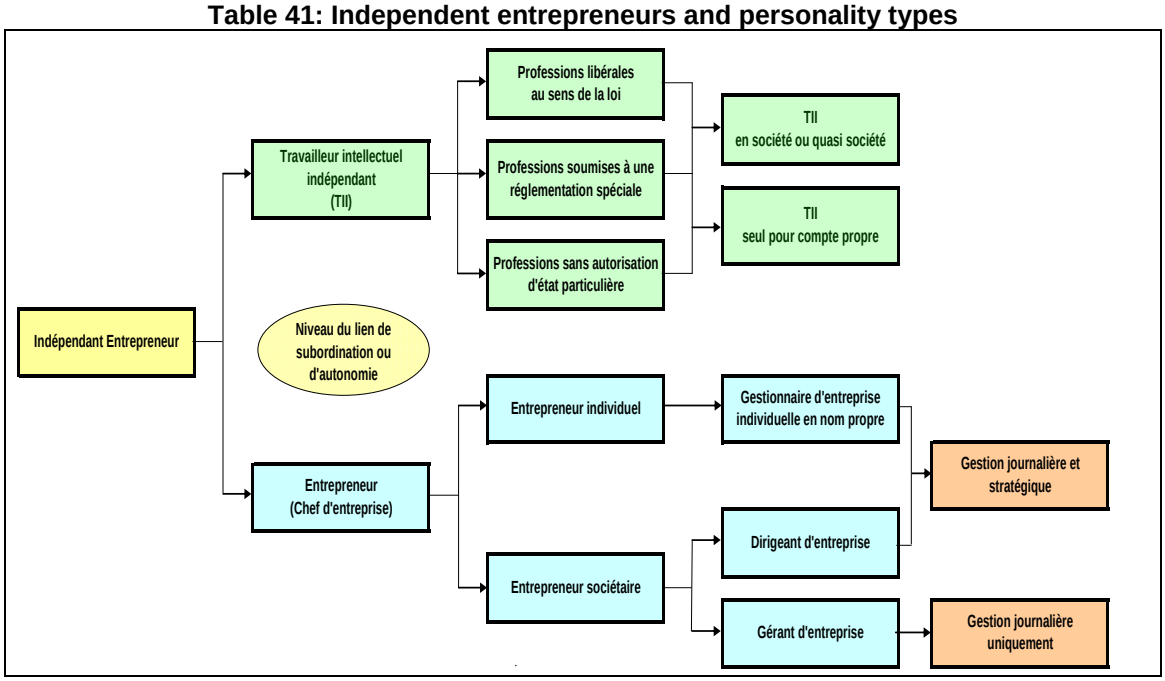
Entrepreneurial activity is comprised of all human actions undertaken in an economic activity having the objective of generating economic or social value through the creation, maintenance and expansion of the economic activity.

3. *Entrepreneurialism*

Entrepreneurialism is the phenomenon observed in the form of effects or manifestations of entrepreneurial activity of an independent intellectual worker or company.

Thus the common operational definition attempts to put things into perspective. It retains only the criteria concerning not being answerable to an employer and autonomy, differentiating between independent intellectual workers, individual and company-linked entrepreneurs and managers or directors of companies. This makes it possible to distinguish between personality types of independent entrepreneurs according to the authority exercised.

Table 41: Independent entrepreneurs and personality types



Source: cooperation on defining the concept of the independent entrepreneur; Working notes – Status of the self-employed worker in Luxembourg, Phase II (McNeill G, 2008)

The definition offered for independent entrepreneurs is that which entrepreneurial activity can be reconciled with a legal and social security framework using basic concepts that originate with theoretical and empirical economic research. It is a practical reference framework that combines routine and innovative activities, while providing for a distinction between independent and company-linked entrepreneurs. It acknowledges that it is companies and their entrepreneurial activities[216] that are the vehicles by which entrepreneurs exercise their professions, allowing a link to be formed between the work and statistics bearing on the companies[217]. Note that independent intellectual workers who adopt a legal form are seen as company-linked entrepreneurs and as managers or directors of companies.

It is possible to combine data from databases using this framework of reference of entrepreneurialism that originates from databases maintained by administrations, organizations and professional chambers. In fact, this is one of the purposes for Phase II of the research project on the Status of Self-Employed Persons in Luxembourg. The intent is to constitute a succinct database with STATEC,

[216] The 3rd action plan to promote SME through the Ministry of the Middle Classes, Tourism and Housing, in April 2008, whose implementation will be the adaptation to the new European commitment to a *Small Business Act* promoting SME, focuses on the company, which clarifies the features of entrepreneurs and their activities.
[217] Like those based on the Community's Structural Business Survey – SBS and the Community Innovation Survey – CIS.

companies and entrepreneurial activities. The database will include STATEC and IGSS data with any pertinent data originating from other databases such as those maintained by the Chambers of Commerce and of Trades. This type of database will serve as a point of departure for phases of future research by furnishing quantitative and qualitative measures that are more complete on entrepreneurs and entrepreneurial or company activities.

Table 42: A preliminary approximation of measures of entrepreneurs in 2005

Types de personnalité	Nombre de personnes	% Emploi intérieur*
Entrepreneurs	18.918	6,72%
Travailleurs intellectuels indépendants (IGSS)	6.221	2,21%
Indépendants entrepreneurs de commerce et des services (*NACELUX sections C à O, hors L*)	25.139	8,93%
Travailleurs indépendants de l'agriculture (IGSS)	3.530	-
Indépendants entrepreneurs de l'agriculture, de commerce et des services (*NACELUX sections A à O, hors L*)	28.669	10,02%
*Emploi intérieur (Comptes nationaux, SEC95): NACELUX sections C à O, hors L - 281.600 personnes et NACELUX sections A à O, hors L - 286.200 personnes		

Source: IGSS (Social Security Report, 2007) and STATEC (Directory of Luxembourg companies as of 1 January 2006)

The table above containing a preliminary approximation of measures of entrepreneurs in 2005, the process for estimating the number of independent entrepreneurs is different. It combines information from different databases, in this case those maintained by the ISSG and STATEC. This estimate comes up with some 28,700 independent entrepreneurs, of which 25,100 worked in the business and services economy. The appropriate measure of self-employed persons exercising their profession as owners or co-owners in a company with no legal personality—according to the concept promulgated by National Accounts—came to 16,723 persons, excluding farmers and 20,253 if farmers are included. This gives, in terms of total domestic employment,[218] a total of 299,100 persons occupied in 2005, self-employed percentages of 5.59% without farmers and 6.77% including farmers, with the latter figure to be compared with Eurostat's EFT survey of 6.19%. Measures in the EFT corresponding to independent entrepreneurs were 8.93% and 10.02% respectively in 2005, according to the economic activities considered, and reflect the fact of accounting for company-linked entrepreneurs working in companies with a legal personality.

[218] Including household employees, NACELUX section P, coming to 4,600 persons in 2005.

8.2.3 Future Paths for the Research Project on Self-Employed Status in Luxembourg

The project's initial phase, Typology of Self-Employed Persons in Luxembourg, identified the central research subjects in particular[219]. The purpose of the next phase is to establish a base for measuring information likely to provide a medium for the government of Luxembourg and the social partners in their attempt to draw up and implement the Lisbon Strategy.

The objective of the three phases of the project following the initial phase is to establish (1) *a framework for analyzing entrepreneurial activity,* (2) *statistical data on entrepreneurs* and (3) *typologies of entrepreneurs according to key attributes[220] by economic activity and company size*. Using this frame of reference and data basis, we will be able to approach specific subjects bearing on the areas of socio-economic policy and there public and private action programs. Note that the themes *Access to financing* and *Impact of category on entrepreneurs' circumstances* sparked wide interest among persons engaged in the first phase of the research. The same is true for the areas *Administrative stature* and *Transition to the status of entrepreneur*. The choice of what themes to study and the order in which they are dealt with depends ultimately on the priorities of political and economic agents in their pursuit to achieve the Lisbon Strategy.

[219] See the table entitled *Thèmes de recherche centraux identifiés*, on page 6 of *Typologie de l'indépendant* report, first research phase, *Le Statut d'indépendant au Luxembourg, Centre de Recherche Public Henri Tudor*, 2008.
[220] For example, age, sex, nationality, educational level and work experience.

8.3 Is productivity[221] in Luxembourg cyclical?[222]

The purpose of this article is to break down trends and cycles of total factor productivity in Luxembourg. To accomplish this, we will use the celebrated Hodrick and Prescott filter of 1997 on data concerning total factor productivity over the period of 1995 to 2006. We find that upward trends in total factor productivity are explained largely by sectors pooling industrial and financial activities.

8.3.1 Introduction

Many studies attempting to estimate trends and data in business cycles have been carried out. Since the pioneering work of Burns and Mitchell in 1946, which introduced the concepts of co-movement and the asymmetric nature of business cycle phases between expansion and contraction, as well as the seminal articles by Hodrick and Prescott in 1997[223], Beveridge and Nelson in 1981, Watson in 1986 and Clark in 1987, much progress has been achieved in developing models for pinpointing business cycles.

In contrast, few studies have focused on the productivity cycle. Indeed, only a scarce few sources come out of available literature, including the Palm and Pfann 1995 study and one by French in 2001. Palm and Pfann use a model with unobservable components to analyze changing features of total factor productivity. More recently, French developed a Markovian model to account for changes in rhythm.

Unfortunately, these two models have limitations related to the data used. The Palm and Pfann and French studies use the Solow residual as a measure of technical progress. However, Hall, in 1990 and Roger in 1995 showed that this term could manifest bias if certain conditions were not adhered to, particularly the pure and perfect competition theory.

By using the non parametric data envelope analysis (DEA) calculation method, DiMaria and Ciccone released the constraints related to functional form and market structure in 2006 and 2008 studies. For this reason, we are using their data to apply

[221] In this article, the term productivity is defines as the relationship between production and the resources necessary to carry it out, i.e. capital and labour. This means that we are analyzing technological change in Luxembourg. For a study on labour productivity, see Bianco (2008).

[222] The author wishes to thank Serge Allegrezza, Anne Dubrocard, Alexandra Guarda-Rauchs and Martine Hildgen for their stimulating observations on the previous version of this article.

[223] The full article appeared in 1997, yet the work by Hodrick and Prescott was carried out in 1981.

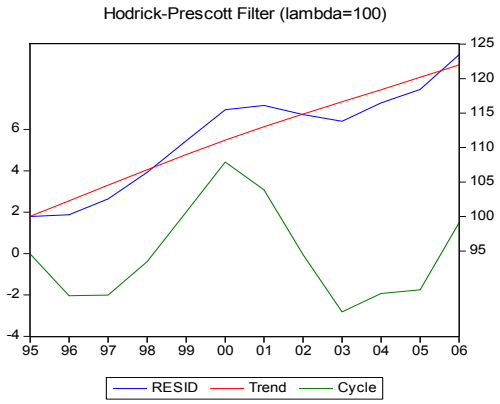
a simple, frequently observed method (see Artis, 2002): the Hodrick and Prescott filter.

The structure of the article is as follows. In the first part, we introduce the results of the breakdown in aggregate form, and then follow up in the second part with those obtained through a sector application.

8.3.2 Breaking Down Total Factor Productivity Trends on the Aggregate Level

As traditionally appearing in economics literature, total factor[224] productivity[225] is calculated using a Tornqvist index[226] using 2000 as a reference price. In order to facilitate reading of productivity trends, we have standardized the reference at 100 in 1995. Results are shown below:

Figure 36: Total factor productivity



Source: STATEC

The total factor productivity trend increases over the entire period. This is rather a positive sign because it is synonymous with technological progress. We also observed the existence of a cycle between 1997 and 2003, with an expansion over that period and slowdown phase between 2000 and 2003. Since 2003, the cycle seems to have returned to an expansion phase.

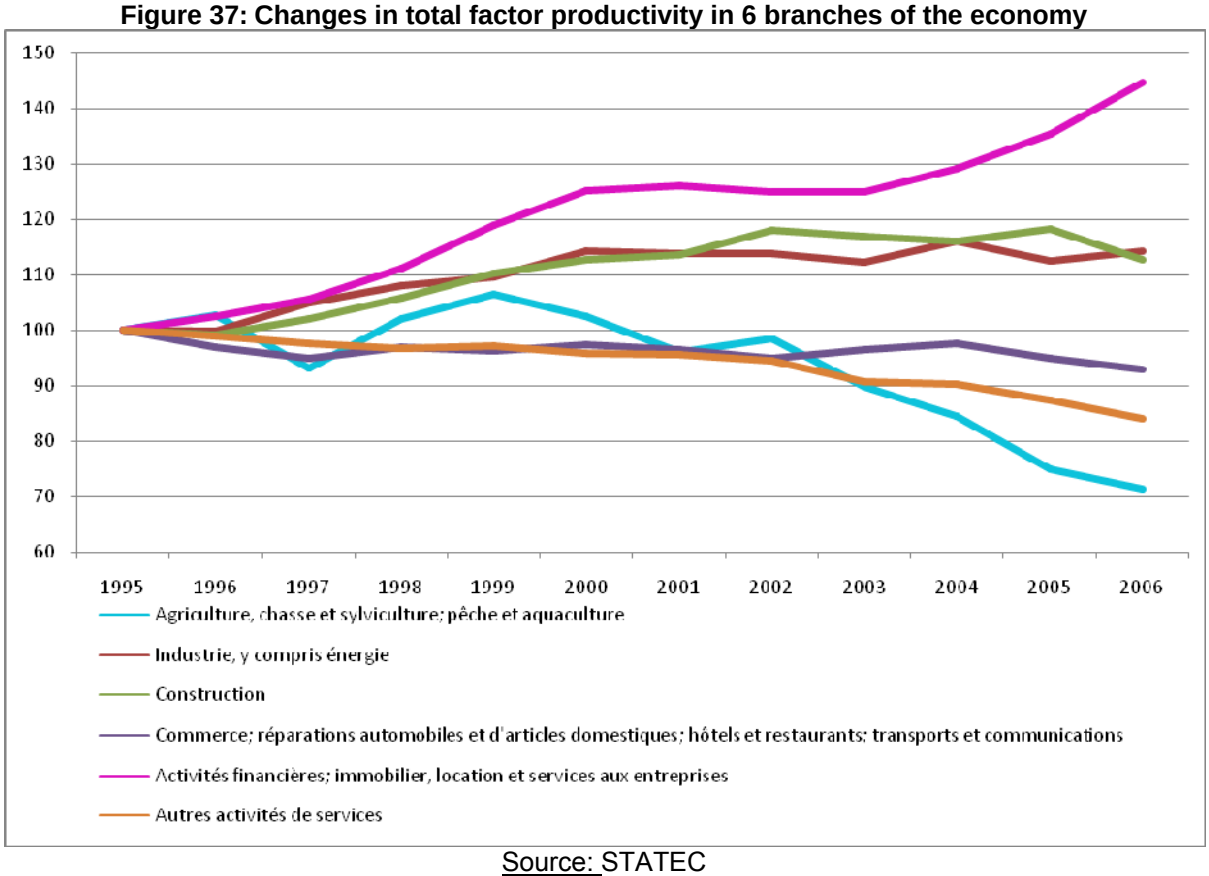
This initial result may be analyzed more closely by reproducing the same method on data broken down at the sector level.

[224] See Bianco (2008) for a discussion of breakdowns of labour productivity cycle trends.
[225] For the various measures of productivity, see OCDE (2001).
[226] The use of a Malmquist index provides similar results; see DiMaria and Ciccone (2008).

8.3.3. Breaking Down Total Factor Productivity Trends on the Sector Level

We observe divergent sector dynamics looking at changes in total factor productivity in the NACE 6 classification. Branches of the economy involving financial activities and business to business services experienced an increase in total factor productivity, as did industry, including energy and construction. Inversely, the branches of trade, transportation and communications, other service industries and agriculture, hunting and fishing all had rather diminished showings in terms of total factor productivity.

Figure 37: Changes in total factor productivity in 6 branches of the economy



Source: STATEC

Cyclical changes and trends for each branch of the economy are presented individually below:

Figure 38: *Agriculture, hunting and fishing*

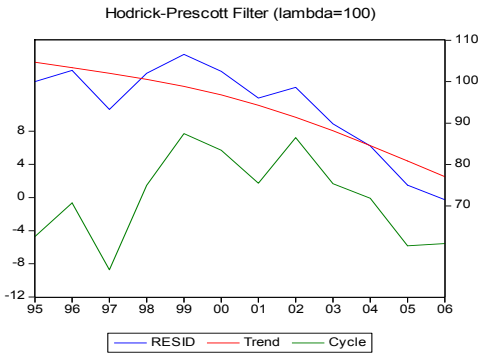


Figure 39: Industry including energy

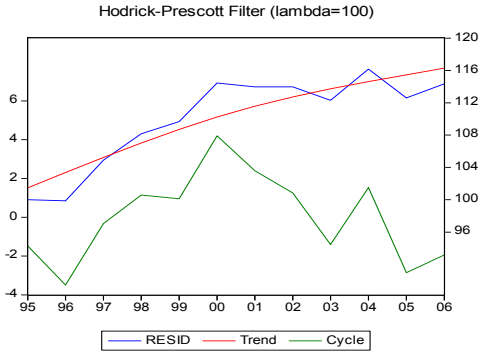


Figure 40: Construction

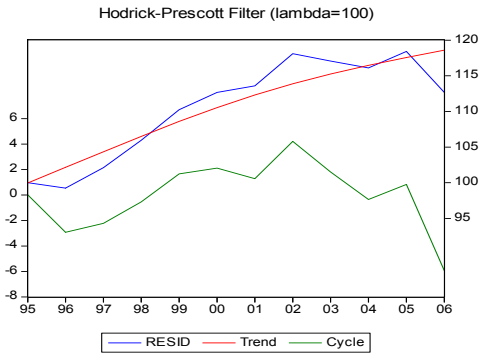


Figure 41: Trade, transportation and communications

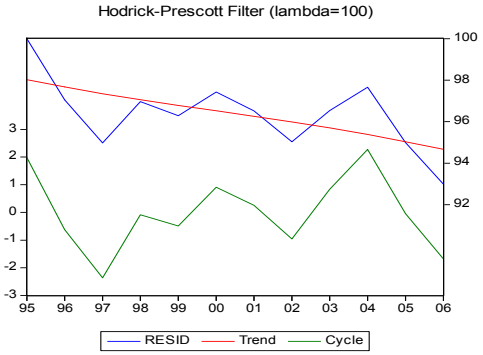


Figure 42: Financial businesses and Business to business services

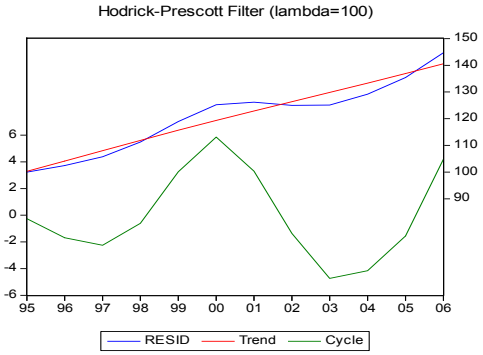
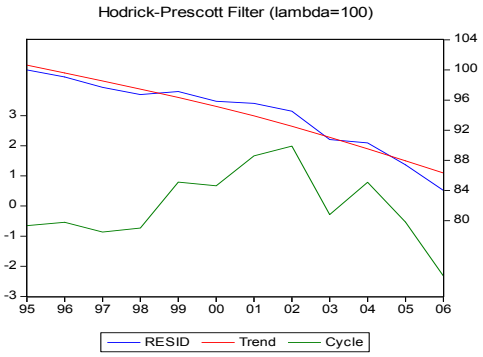


Figure 43: Other service businesses



Source: STATEC

There is a decreasing trend in productivity in the branches of agriculture, trade and other business services. This may be interpreted as a technological regression in this type of mode. While the result may appear surprising, it is nonetheless consistent with the DiMaria and Ciccone study findings in 2007[227]. In contrast, an increasing trend is apparent in productivity in the construction, manufacturing and financial services sectors. This is a good omen, because the financial sector is the largest part of Luxembourg's economy in terms of production, added value and employment.

Concerning the dating of these cycles, all braches of the economy experienced an expansion phase between 1997 and 2003, with the exception of Agriculture in 1999 and the branches of construction and other business services in 2002. Since then, all branches of the economy have been in a drooping phase since 2000 and 2002 up till the present, except financial businesses and trade. Indeed, the drop-off in productivity ended in the financial sector as from 2003, after which the sector entered an expansionary phase. Similarly, in the trade branch, the falling trend ended in 2002, with an expansion phase setting in and lasting till 2004.

8.3.4 Conclusion

We have analyzed the cyclical and structural behavior of total factor productivity in Luxembourg using the HP filter. We highlighted the existence of a total factor productivity cycle lasting five to six years, which was primarily set by the financial sector and, to a lesser extent, by the manufactured products industry.

Nonetheless, the aggregate results emanate from contrasting sector dynamics both from the perspective of the trend and of the cycle. Some branches even experienced dropping trends with much more erratic cycles than those on the aggregate level.

It does however appear clear that these results are strongly dependent on the methodology used and on available data. In order to confirm our conclusions, new data that allows for basing the analysis on longer series and comparing results through alternate means would be required.

[227] Other studies found similar results for some countries and industries, Kumbhabar and Wang in 2005, Duffy and Papageorgiou in 2000, Kneller and Stevens in 2003 and Diewert and Fow in 2004.

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8.4 Inflation in Luxembourg: Measures and Determinants

A summary on the seminar held on 4th of June 2008 under the auspices of the Observatoire de la Compétitivité at the Chamber of Commerce.

8.4.1 Introduction

The Lisbon Strategy aims at more sustainable growth through increasing labour mobility and non-inflationary growth through productivity gains achieved by dissemination of information technologies. However, all Euro zone countries have been facing a resurgence of inflation for nearly a year now. This phenomenon is alarming in many ways and it calls into doubt the ability of the member countries to meet the inflation targets set by the ECB. To fight the inflation it is necessary to know precisely the magnitude of the phenomenon and the internal and external sources behind it, which can vary from one country to another. Regarding external sources of inflation, international experts generally agree that the culprit is inflationary pressure appearing on the raw materials markets, notably the food supply, with the ramping up of power in emerging country economies. In an environment of strong world demand, the least economic setback in agricultural production or energy supply has a rapid impact on prices. However, the extent and speed at which such events are absorbed depend on the particular features of each economy. There exist also well-known internal determinants of inflation. The unbalance between overall supply and demand related to an excess of demand in relation to long-term production capacity sparks inflationary pressures. Impacts on the offer side resulting from increases in one category of specific costs of primary goods or taxes should normally be resolved through short-term price increases, unless it affects expectations of economic agents. Expectations about inflation are a third type of crucial determinant—if everyone expects prices to increase, they do so because producers increase their prices and employees negotiate higher wages to maintain real income.

With regard to Luxembourg, two specificities must be kept in mind. Firstly, the country has been experiencing rising inflation rates in excess of those in the euro zone for numerous years, which have been accompanied by GDP growth rates very much higher than the other euro zone countries. In addition, the country is, along with Belgium, one of the rare EU-27 countries that use the wage indexing system.

For this reason, with rising concern linked to the resurgence of inflation, debate on the national level has been particularly focused on internal causes of the phenomenon and on a possible second round impact.

With this as a backdrop, it is important to political policy makers to be apprised of the data and mechanisms in play and their specificities on the national level. In order to clarify debate and to take stock of knowledge gathered concerning Luxembourg, the *Observatoire de la Compétitivité* invited national experts in the area to participate in a methodological seminar led by Serge Allegrezza. This seminar was used to introduce the main results of work undertaken by STATEC and the Ministry of the Economy and Foreign Trade both to improve tools for measuring inflation and concerning the analyses that attempt to specify the causes and determining factors of the phenomenon, as studied by STATEC and the University of Luxembourg - CREA, the CRP-HT and BCL. Representative of the social partners including the Chamber of Commerce and CEP-L were also invited to express their perspectives.

8.4.2 The Perspective of the Social Partners

The Chamber of Private Sector Employees (CEPL) formally expressed its views on the issue through Mr. S. Hoffmann. He reminded all present that growth in Luxembourg was not very inflationary compared to small European economies that have high GDP growth rates. The first victims of inflation are consumers and resident households whose wages never increase until well after the price increases have been confirmed, as with the principle of indexation. In conjunction with Mr. C Thelen, who presented the point of view of the Chamber of Commerce, he observed that administrated prices and rates account for a significant part of price increases recorded. Nonetheless, their opinions diverge on two other important issues:

1. In the absence of a better instrument for measuring inflation, Mr. Thelen believed that the inflation rate measured by the National Consumer Prices Index (NCPI) was an index showing worsening of the country's economic competitiveness position. Mr. Hoffmann preferred the analysis whereby changes in values of exports were a prime indicator of the good performance of Luxembourg's economy, despite the fact that this conceals major sector differences.

2. The Chamber of Private Sector Employees attempted to gauge potential impacts of the index groupings on prices assuming it was carried back fully. Using this 'accounting' approach and taking into consideration the imported or local market origins of goods consumed, the conclusion was reached that index groupings can have an impact of a maximum of 0.3 points on inflation. The Chamber of Commerce believed that this method tends to underestimate the impact of wage indexing by omitting forceful impacts.

In order to contribute to this debate, it is first necessary to review how inflation is measured before studying the models of the phenomenon that are available.

8.4.3 Measuring Inflation

a) Calculating consumer price indices and their offshoot

Observing changes in price is the foundation for building the crucial economic indicator inflation. This is crucial because European and domestic monetary policies, tripartite negotiations and international comparisons are founded on information concerning inflation. It is therefore important that the methods governing how these kinds of figures are produced be the product of a consensus by virtue of their thoroughness and accuracy. They should constantly be improved upon while taking care to preserve the necessary continuity of series without which the analyses lose their pertinence. Mr. J. Hury of STATEC gave a presentation on various improvements that have been applied to observation methods of prices and calculations of indices for Luxembourg. We should remember above all that price indices are drawn up within an extremely rigid regulatory and legal framework that provides precise guidelines as the methods to be used. Thus sampling, geographic and demographic coverage, classification and weighting systems to be used, frequency of evaluation and adjustment methods of product quality and how to deal with missing prices or some prices of special services are all dependent upon specific regulations. Some recent improvements including the price index for books and that of petroleum products have undergone significant modifications intended to capture a better view of costs and variations in costs incurred when purchasing different types of goods covered by these two general categories. It has also been decided to modify the method for accounting for seasonal products and housing expenses. An obstacle exists in observing data for these two items. Indeed, prices

for seasonal products cannot be observed throughout the year and housing expenses can only be ascertained for certain categories of consumers, in this case owners. Studies are underway on the European level to integrate the Hedonic pricing method in making adjustments for quality. These methods aim at increasing comparability, reliability and pertinence of measurements, both on the national and European levels. As such, the development and use of methods should therefore be harmonized on the European level.

As with the national statistics institutes of France, Germany and the United Kingdom, STATEC has developed a tool that can be accessed through the Internet and used to calculate personal inflation rates. The tool is intended to account for personal consumption habits with a high degree of accuracy. It also offers an index measurement for 'frequent purchases' and 'unchanging taxes'.

P. Thielen of the *Observatoire de la Compétitivité* gave a progress report on the price index project for the Greater Region, which has been previously mentioned in this Competitiveness Report. All these elements contribute to better training and informing consumers and facilitate comprehension of the concepts concerning Consumer Price Indices. It must however not be forgotten that we require a common and unique reference base from which to measure price trends and that can serve as a basis for discussions between representatives of organizations on both the domestic and international levels and for preparing economic policy.

The analyses and models produced by researchers aim to better identify and measure the various determinants of inflation and provide explanations that clarify the features of inflation in Luxembourg.

8.4.4 The Determinants of Inflation

a) Partial statistical models

Measuring the imported part of inflation

Domestic inflation could partially explain why there is a difference in inflation in Luxembourg and in her neighboring countries. But how shall we measure domestic prices? As a rule, the majority of goods making up a basket that is used to calculate an NCPI are not made in Luxembourg, such as oil products and exotic fruits. Prices

for certain goods are easily identifiable as ‘domestic’ prices, such as real estate prices and the price of local services such as hairdressing. An alternative to identifying goods one by one as being domestic or imported in origin consists of calculating local inflation indirectly, as a residual, by purging items from the NCPI that we know to have non-domestic origins, such as petroleum products, prices in border countries and import prices. D. Bianco and A. Minea of the Associated Research Unit of STATEC/CRP H. TUDOR developed an approach that aimed at identifying percentages of inflation rates in Luxembourg attributable to external or internal determinants. In doing this, they used a vector autoregressive model to break down variances by origin. A STATEC model attempts to determine the effect of price increases of petroleum on inflation from monthly seasonal unadjusted data for the period of March 1995 through April 2008. An AMECO model analyzes the impact of price increases of imported goods and services on inflation using annual data for the period 1960-2009. The limitations of this approach are that, by virtue of its construction, the model implicitly supposes that there exists a link of reciprocal determination between its variables. However, results of the estimate show that the impact of domestic inflation on oil prices is insignificant. In contrast, it may be estimated that 20% of the inflation rate is caused by oil prices and 40% when all prices of imported goods are included together. This means that the difference of 60% of inflation in Luxembourg is due to internal determinants. These models were rounded out by a structural approach that accurately specifies the direction of long-term relationships between variables of the model on the economic level. Thus we can make it mandatory that the price of oil be determined structurally, not cyclically, and the same results will be obtained, as oil prices reflect 20% of inflation changes.

Measuring inflation persistence in Luxembourg

In search for the roots of inflation A-L. Asikainen, Associated Research Unit of STATEC/CRP Henri TUDOR, and C-H. Di-Maria, STATEC, draw our attention to the finding that the price fluctuations may be path dependent like many other macroeconomic phenomena. Due to this feature the shocks experienced by the series may affect for a long time, if not forever. The shock persistence is examined using stationarity tests that allow for estimation of the exact degree of integration. Another common feature in macroeconomic series is structural breaks. In inflation series for example an oil crisis can occur as a break, not to mention changes in the

construction of the series (like weighting, treatment of seasonal features, etc). Breaks can be seen as either changes in the trend or as thresholds. More importantly, there exists a risk of misspecification in the stationarity tests if the potential structural breaks are not controlled for.

To examine the shock persistence they analyzed stationarity of the aggregate consumer price index series as well as of 12 sub-indices. Inflation is calculated using monthly price indices published by STATEC for the period extending from January 1995 to January 2008 After controlling for breaks they conclude that inflation seems to follow long memory procedure. Thus, a surge in inflation has a tendency to endure.

The analysis examines also the persistence in the sub-components of inflation. Some sub-indices do not have a long memory, like the groups “Health”, “Transport” and “Others” and “Housing, water, electricity”. In contrast, other groups, such as “Clothes, shoes” and “Household equipment” seem to have long memory properties. In addition, results for category “Food, non-alcoholic drinks”, the basic necessities for households, indicate some persistence but prices tend to return to their historic averages. The same is true for “Communication” which in fact have falling prices.

Another persistence approach was put forth by J.M. Thoss of the Luxembourg Central Bank (BCL), who presented the principal results of studies conducted by the BCL. An analysis of nominal rigidities and inflation persistence in Luxembourg[228] was carried out using a comparison of distributions of price changes for products. There is strong heterogeneity in the degree of persistence of sub-indices of the NCPI disaggregated into 94 items spread throughout the UE-15. It turns out that in the case of Luxembourg, the median duration between two price changes is always shorter for goods; as an example, unprocessed foodstuffs show duration of around 1 month, compared to 5.5 months for services. Within services, the duration is even longer at 7.5 months for administrated prices services. The range of price changes increases with the median duration between two changes. In this case duration is synonymous with persistence. In addition, the asymmetry of upward and downward trends increases toward upward trends with the median duration. Rigidity is therefore

[228] Study published in *Cahier d’études n°14* “Nominal rigidities and inflation persistence in Luxembourg: a comparison with EU-15 member countries with particular focus on services and regulated prices” - P. Lünnemann and T.Y. Mathä (April 2005).

higher when services and regulated services are down. So for Luxembourg, as with most countries, excluding services from the consumer price indices reduces the degree of persistent inflation.

These initial results were after a manner confirmed and made explicit by the results of a BCL survey on a sampling of Luxembourg companies in 2004, the results of which were the object of a study presented by Mr. Thelen of the Chamber of Commerce. The survey aimed to describe companies' behavior in the area of setting selling prices[229]. An analysis of 370 responses shows that over two thirds of Luxembourg companies re-evaluate their prices at most four times yearly, and that there are many more re-evaluations of price than changes to them. In addition, it turns out that companies are more sensitive to production costs, chiefly wage costs and wage indexing thresholds, than they are to variations in demand and that they adapt to upward trends in these factors more rapidly than to downward trends.

b) Complete economic models

Measuring the impacts of the wage-price spiral

F. Adam of STATEC proposed measuring the range of the wage-price spiral using the Modux macroeconomic model. He gave a presentation of the results of two simulations carried out, first assuming an increase of wages or prices abroad and second, attempting to measure the impact of the indexing lag in 2006.

In an initial model, he estimated the impact of a foreign price increase of 10% on inflation and GDP. When faced with this price shock, GDP increased through gains in competitiveness as domestic prices rose to a lesser extent than those abroad. However, the increase in foreign prices also positively influenced prices in Luxembourg, causing a progressive drop in GDP and eventually increased prices domestically. Prices then stabilized at a level of up nearly 10%. In a new simulation, he estimated the effect of a 10% increase in wage costs in the private sector. The simulation showed a drop in GDP due to a loss of competitiveness related to the impact of rising costs on prices and that the increased wage costs became entrenched, exceeding the 10% increase after the first years. At the end of the day,

[229] Study published in *Cahier d'études n°19* "New survey evidence on the pricing behavior of Luxembourg firms" - P. Lünnemann and T.Y. Mathä (May 2006).

surplus inflation was slightly greater than 1% on the average over the first years and GDP returned to its initial level.

In these models, altering of the wage indexing system could perhaps result in a modification of short-term wage-price elasticity. In each previous simulation, the introduction of this modification resulted in only slight changes in results. Indeed, in the first simulation, the favorable impact of the lower indexing scenario showed itself early on, acting more on wages than on consumer prices. Nevertheless, this impact on volumes of growth and GDP remains marginal and is largely accounted for in the habitual margin of error calculation. In the second simulation, the favorable impact on the lesser indexing scenario remains equally feeble in the face of the exterior shock on prices and GDP.

The existence of a wage-price spiral in Luxembourg is thus illustrated and its estimated scope confirmed. In addition, the automatic indexing of wages on prices seems to have an escalating effect on the transmission of impact of prices on wages in the short term. Nonetheless, it should be noted that a model using annual data is only imperfectly appropriate for reflecting this spiral for the statistical and/or mathematical perspective, because automatic indexing is based on a mechanism that reacts to monthly input of data. Moreover, the model does not take into account direct negotiations between companies and employees. In addition, modulating a mechanism operated by means of modifying short-term elasticity fails to adequately represent the real impact of the indexing modulations arising from the 2006 tripartite decisions. Thus, using another simulation, F. Adam measured the effect of modulating the wage indexing system implemented in 2006 on inflation. The impact was obtained by means of a simulation where wages were initially lowered by 2.5%, the equivalent of not applying the index as what actually occurred when wage increases were deferred over 2006-2009. Also, to simplify the simulation, it is assumed that the unions cannot offset lost purchasing power in the short term. According to this scenario, average wage costs drop 0.78 percentage points per year, keeping inflation contained to 0.2 percentage points yearly. It therefore appears that the automatic and integral indexing process contributes to accelerating inflation when prices and wages are subject to shocks. Still the impact of deferring indexing

that was decided on in 2006 represents a gain of at least 0.2 percentage points against inflation per year.

In another perspective for explaining and predicting inflation from a study of wage and price formation, B.F. Aka of the University of Luxembourg – CREA presented a model developed by CREA in 2007[230].

The theoretical model contains two elements. First, a price formation model and second an analytical model of wage formation in a small, open economy. This new open macro economy-inspired approach is based on microeconomic foundations, particularly the modeling of a market structure featuring imperfect competition and union-management negotiations. Here, consumer prices are set by wages, labour productivity and the price of imported goods. Nominal wages are determined by consumer prices, the price of imported goods, labour productivity and the unemployment rate.

Two error correction models were developed for providing empirical estimates by disassociating short and long-term impacts.

The first model measures the impact of foreign prices, productivity and consumer prices on wages. In the short term wages are set more by imported prices, 57%, then by productivity, at 43%. In the long term, inflation and productivity have equal weight. The second model measures the impact of foreign prices, wages, productivity and consumer prices on prices. In the short term, inflation is determined essentially by itself weighing in at 70%, with productivity at 30%, whereas in the long term, inflation is primarily explained by salaries at 61% then by productivity at 35%.

Modeling micro and macro economic impacts of indexing and productivity

Professor Hujer of the University of Frankfurt presented the results of a study on the macro and micro economic impact of automatic indexing of wages[231]. The econometric estimate of an error correction model allows for measuring the impact of

[230] Study published in *Economie et statistiques n°21- modélisation de la formation de l'indice général des prix à la consommation, des salaires et de l'emploi application au cas du Luxembourg* - Bédia F. AKA, Research manager under the direction of Patrice Pieretti, *Cellule de Recherche en Economie Appliquée* (Applied Economics Research Unit)– CREA (December 2007)

[231] See also Hujer R., Rodrigues P., *Wirtschaftliche Auswirkungen der Lohnindexierung*, in *Perspectives de politique économique n°10*, Ministry of the Economy and Foreign Trade, Luxembourg, July 2008. http://www.odc.public.lu/publications/perspectives/index.html

wages and indexing on prices. With Luxembourg, it was shown that an increase in labour costs of 1% retains a positive impact on inflation of 0.125% at the period end. Consequently, an increase in wages due to linkage with the consumer price index generates an excess of persistent inflation. Results were similar for Spain and Belgium, which use a partial indexing system, and in France where only minimum wage employees have their pay indexed. In contrast, results obtained from a simulation with Germany do not indicate a Granger causal effect between wages and the inflation rate

A VAR model was next implemented to determine the effect of the application threshold and prices at the end of the preceding period on prices for each group of products. Two categories stood out. In the first there are twelve groups, significant causality was observed in seven of the twelve. In the second there are forty groups, which gave a clearer picture of the origin of the effect. Significant causality was observed in non alcoholic drinks, clothing and shoes, household goods, recreational and yard equipment, books and paper supplies, education and training and Horeca and social services within the category ‘Other goods and services’

8.4.5 Conclusion

The models and the results presented confirm and specify a certain number of hypotheses concerning the features of inflation in Luxembourg. One part of the inflation rate can be attributed to external causes, notably increases in fuel prices and imported goods. However, it is not possible to explain the inflation differential between the country and its bordering states, which are its principal trading partners, without internal structural causes. The importance of the growth differential between Luxembourg and its immediate neighbors offers an initial explanation; however, Luxembourg’s inflation is also relatively persistent, something that has been illustrated recurrently from several perspectives. Asymmetry in the adaptation of price increases and decreases—with more increases—and prices that remain unchanged for long periods in several categories of goods are a sign of particular rigidities. These rigidities can be attributed to market structures in certain sectors where prices are more rigid in the majority of countries. The wage indexing system that prevails in Luxembourg contributes to the situation as well. All models that were

examined estimate a surplus of persistent inflation for around 10 years. Nonetheless, the range of this contribution varies significantly from model to model.

8.5 Initial Simulations of Economic Policy with the new Luxembourg Economy Model: LSM (Luxembourg Structural Model) by Lionel Fontagné and Massimilliano Marcellino

8.5.1 Introduction

The *Observatoire de Compétitivité* report in the fall of 2007 introduced the project of developing a new model of the Luxembourg economy based on addressing the economic policy preoccupations of the Lisbon Agenda. Two objectives guided the conception of the model and initial exploitation began in 2008. The first objective dealt with accounting for microeconomic foundations of the behaviour of agents, in order to better analyze the impact of reforms and to avoid critiques of the Lucas type. The second objective was to take into account the specific characteristics of Luxembourg's economy, in terms of size, duality of the labour market, social relations and social schemes. To accomplish this, it was decided to employ a Dynamic Stochastic General Equilibrium (DSGE), with the perspective of introducing nominal price and wage rigidities and a model with explicit expectations. This model[232] rounds out the panoply of existing models in Luxembourg, it is not a substitute for them, since each model type responds to a specific question type and presents its own set of advantages and drawbacks. Some examples include MODUX, developed by, Adam in 2004 for STATEC, the Luxembourg Central Bank model developed as the Luxembourg component of the multi-country SEBC model by Guarda in 2005 and LuxMod, developed in collaboration with Ecomod, by STATEC in 2006.

The key elements of this type of tool are a general equilibrium model with rigid prices and/or wages that incorporates stochastic shocks and evaluates the results of implemented policies in terms of well-being of households. Naturally, the model also provides indications of trends of other variables of interest such as GDP and wages. This type of model is generally founded on the hypothesis of a representative consumer, maximizing its utility in an inter-temporal manner under the constraint of income limits. On the supply side, producers of diversified intermediate goods

[232] Note that the model was originally to be called ModEL, before adopting its final moniker LSM.

maximize profits in a context of monopolistic competition. Upstream, producers of finished goods use this variety as input in their production systems and maximize profit in an environment of perfect competition. On the labour and merchandise markets, prices and wages are conditioned by wage rigidities and an acknowledgement of expected inflation. Budget policy is exogenous. Monetary policy for countries with this much autonomy follow a simple Taylor rule. There are different categories of financial assets. The economy is an open economy. We are therefore immediately in the class of open economy macroeconomic models of the 1995 Obstfeld and Rogoff type, the New Open Macroeconomics (NOEM) model.

Initially developed in an essentially academic environment, DSGE have rapidly sparked the interest of Central Bank economic studies sections, transforming these models into economic policy simulation or forecasting tools in an institutional context, as with Fagan and Morgan in 2005. The European System of Central Banks developed its own tool through Coenen et al in 2007.

This type of DSGE model is more exacting in terms of theoretical foundations than LUXMOD or BCL. This is an advantage when constructing economic policy simulations whose aim is to modify the behaviour of economic agents. In contrast, this type of model is less useful for economic forecasting. A modeller has to make the choice of providing a detailed representation of the sectors of the economy, as opposed to a detailed representation of markets with all their dimensions including expectations, rigidities and bargaining power. LSM makes the clear choice of providing a detailed representation of markets and therefore can make no observations on the diversified sector impacts of a given economic policy. Responses to questions put forth by economic policy makers and social partners must be sought in the combination of the results of these formal or informal models.

The development of this model by the *Observatoire de la Compétitivité* elicited sufficient interest for the Observatoire team to be invited to present the results of its work before the European Commission in June 2008 as part of a simulation of a collection of standard Lisbon variants for institutional modelling teams of the various member states to work on. The simulations that we will review briefly in this chapter are those that were presented during this essentially methodological meeting, which was intended to compare the properties of 13 models used by different member

states or at the Community level. Since the aim of this work is to develop a methodology and while a complete open economy version is lacking, one cannot be too careful in recommending caution in the interpretation of the results, which could change as the model is being finalized. In fact, a new version of the model is due to be released in the first quarter of 2009.

The remainder of the chapter comprises a second section that presents the features of the current LSM model and a third section, which introduces the collection of policy changes and shocks under analysis and the results obtained by LSM.

8.5.2 The LSM-1.0 Model

LSM models four types of economic agents: Households, Firms, Unions and the Government. Households have an intertemporal utility function based on which they make their consumption choices, with overlapping generations, each with its separate features[233]. In this way, demographic shocks can be applied and the consequences studied. It also is a means of making consumer choices depend more on current disposable income than on income over an entire life cycle. Each household maximizes its utility subject to its intertemporal budget constraints. Thus it determines the optimal level of its consumption for each period, the optimal level of real estate investment and its financial assets in the form of public bonds, foreign bonds and capital participation in Luxembourg companies.

Each individual's income includes current salary, which is undifferentiated by category of wage, and unemployment benefits, also undifferentiated, weighted by the probability of having or not having a job. Unemployed persons receive their benefits as long as they have not found a job. Each member of each group receives an equal and set share of social transfers. Each group has participations in companies and receives an exogenous and equal share in profits.

The Government collects taxes on income from bonds and foreign assets, on labour incomes of residents and cross-border workers and on profits. It also levies social contributions from employers. The taxes it collects are used to finance public

[233] This involves an overlapping generations model. Developed by Blanchard (1985) and Yaari (1965), this approach has been widely used in institutional macroeconomic models, by the IMF (Faruqee et al. in 1998), the European Commission (Roeger and in't Veld in 1997), and more recently by the Bank of England (BQEM, Harrison et al. in 2005), the Bank of Belgium (NONAME, Jeanfils and Burggraeve in 2005); and the Bank of Finland (AINO, Kilponen and Ripatti in 2006). LSM shares many features with these models.

expenditures including unemployment benefits to residents, other social transfers to residents and non-residents and public infrastructure, R & D and other investments. The budget is not necessarily balanced at each period, and as such may show deficits and surpluses. These surpluses or deficits, combined with interest rates, define changes in the public debt situation, which is financed by public bond sales that are held by domestic or foreign entities.

The interest rate is considered exogenous, consistent with the status of a small economy that is an EMS member. However, in accordance with Schmitt-Grohe and Uribe in 2003, we use the hypothesis of a debt elastic interest rate premium in order to place a realistic constraint on external debt and consequently on the current accounts path.

The three types of assets previously mentioned, i.e. public bonds, foreign bonds and participations in Luxembourg companies, have identical real yields due to the hypothesis of perfect substitution. Investment levels of physical capital in companies are set after maximization of cash flow.

Luxembourg companies produce intermediate and finished goods. The intermediate goods sector is a differentiated goods sector, in monopolistic competition[234]. Companies operate on the basis of a production function with constant elasticity of substitution between capital and two types of labour, resident and cross-border. Labour productivity is partly exogenous, through technical progress, and partly determined by the amount of productive public expenditure, mainly in infrastructure projects. Companies choose optimal amounts of utilized capital, as well as their demand in each of the two types of labour, maximizing profit assuming given costs of capital and labour. In the finished goods sector, a single company operates under conditions of perfect competition through combinations of intermediate goods, under increasing returns to the variety of its suppliers.

Wages are determined by the interaction between companies in the intermediate goods sector[235] and unions that represent employees[236]. Negotiated wage levels determine the demand for work and consequently employment levels. The outcome

[234] Companies are homogenous, resulting in symmetric equilibrium.
[235] The only entry to the finished goods sector is intermediate goods.
[236] Our hypothesis assumes one union per category of employee.

of the negotiations depends on the unions' bargaining power and on the replacement rate set for unemployment benefits. In the end, wages in one category of employees for each period depend on a worker's relative productivity, naturally, but also on the worker's union's bargaining power, on the replacement rate, on a company's rate of profit, from which unions reserve a portion for employees, and on the respective numerical strength of resident and cross-border groups.

In the current operational version of the LSM-1.0 model, the Luxembourg economy is a closed economy. Version 2 of LSM, currently under development, is designed for an open economy. LSM-1.0 is fully calibrated, with values that are representative of stylized facts in Luxembourg, principally because there are no long quarterly time-series for the main variables of the model needed for econometric studies.

8.5.3 First simulations of the Lisbon Agenda

The Lisbon agenda contains multiple dimensions, and it would be illusory to attempt to obtain a detailed measurement of the impacts. Final results depend as much on the structural measurements used as on their implementation schedules, any accompanying measures and on their assimilation by the social partners. This should not discourage the use of a model to structure the reflection process because only a general equilibrium model can assess the global consequences and help designing the proper sequence of mechanisms, taking into account the reactions and expectations of economic agents. The shocks examined here were suggested by the European Commission, as mentioned earlier. As such, they do not constitute economic policy recommendations on the part of the *Observatoire de la Compétitivité*. As we shall see, some results obtained are not intuitive. But we should emphasize that this simulation should be carried out again with the upcoming version of LSM, even if the first results are encouraging and fully justify the assumptions used in the modeling exercise.

The first simulation related to the Lisbon Agenda is to study the effectiveness of improving the productive resources in the economy, summarized by Total Factor Productivity (TFP). Here the idea is to simulate the impact of an increase in TFP of 1%. The first impact is an increase in the size of GDP in Luxembourg. Return on capital increases 1.1% and after two years to 1.2%, compared to a base reference period with no shock applied. This positive impact on GDP is very persistent on all

simulation horizons and rises to 1.4% in the long term. This result comes as no surprise.

The interesting part of this initial exercise is the analysis of the use of this margin of manoeuvre made by the Grand Duchy's economy. In reality, wages of both residents and cross-border persons increase at the same rate as GDP, in the short, medium and long terms. This integral distribution of increases in salary efficiency leaves labour costs unchanged and neutralizes all impact on employment. Profit increases also, at the rate of GDP in the short term, and very slightly so in the long term. In the end, with profits distributed, disposable income increases at the rate of GDP. Public revenues increase automatically, with a favourable impact on public accounts even though this is accompanied by a mechanical increase in public expenditure.[237] Public debt diminishes and public capital increases. Consumption increases and portfolios of financial assets and real estate investment grow larger.

The second LSM simulation concerns an increase of 1% in labour productivity. In the very short term, GDP increases 0.7% as does return on capital 0.8%, leading to increased capital expenditures of 1.7%. After one year the impact on GDP is 0.8%, and after 2 years it is 0.9%. Wages increase 0.7% in the very short term and 0.8% after a year, thus neutralizing all positive impact on employment. Income rises 0.7% in the very short term and by 1% in the long term. Government revenue increases with an accompanying positive impact on public accounts equilibrium. Even in the long term, these various impacts create no employment in Luxembourg.

Two things can be learned from a comparison of this LSM reaction to a second shock with those of representative models of other European economies. With relation to the overall EU model developed by the European Commission through Ratto et al. in 2008, GDP increases slightly more with the LSM, especially in the short term, whereas adjustment to increases in wages is much more rapid, though not as significant in the long term using the LSM. With relation to the group of 13 models, LSM is situated in the average for impacts on all variables, and in the upper regions for wages, due to the explicit accounting for wage bargaining and consistent with the Commission model.

[237] Note that the increase leads to public infrastructure expenditures with a positive impact rebound that bolsters TFP.

The third LSM simulation relates to competition. A simple way to represent increased competition is to inclusively reduce margins in the monopolistic sector of intermediate goods. Here we assumed that margins were reduced permanently by 1%. GDP increased initially by one tenth of one percent, as did return on capital, which more than doubled investment figures. Wages, which include a share of redistributed profits as a result of union bargaining, logically fall by 0.6% among residents and 0.3% among cross-border workers in the wake of lower margins. We observe here a counter-intuitive impact that illustrates the value of an approach similar to that of the LSM when imperfections are present on the markets of goods and factors, an increase in competition on one market will have repercussions on the other market[238]. This adjustment to wages results in heightened demand of work by Luxembourg companies and employment increases by 0.1% to 0.2%. Lower profits have a negative impact on public revenues and therefore on equilibrium of public accounts as well. The lowering of public expenditures, due to the drop in unemployed persons, does not compensate this fall in revenue and public debt rises. Consumption drops off 1%, as does real estate investment. In the medium and long term, the effect is positive on growth, which increases in the same proportion as employment.

In comparing this with the Commission model, LSM delivers higher short and medium term growth, but less in the long term, in response to this competition shock. Investment increases less with LSM, which may explain the gap in long-term growth. The negative impact on employees is more marked in LSM, as is the positive impact on employment; the same is true with consumption, which remains stable overall in the Commission model. The reaction of the labour market is stronger in LSM, which creates more jobs, lower wages and consumption and less investment.

We simulated a 5% drop in the replacement rate attached to unemployment benefits. In the short term, GDP rose 0.02% and then to 0.3% in the long term. Return on capital rose 0.2% as did capital expenditures 0.5%. Wages fell 3.8% for residents and 2% for cross-border workers, bringing on new jobs at the rate of 0.4% and 0.2% respectively. The drop in wages was due to the fact that the replacement rate was one of the elements dealt with during wage bargaining. Incomes, which include other

[238] Note that increasing competition reduces real wages here, in as much as prices are themselves exogenous by assumption, which leads to over evaluating the impact observed.

components besides simply salaries, fell 2%. The measure therefore produced the results expected of it: a drop in unemployment, new jobs, capital expenditure and growth. Yet the price to pay is the lowering of wages and less consumption, even in the long term.

In comparison with other European models, the impact of this policy of lowering replacement rates appears more unfavourable in the LSM. The impact on wages and consumption is more highly negative, fewer jobs are created and the positive impact on growth is much more limited. This observation is even more valid when a comparison is made with the European Commission model. There we see results for both the specific nature of the LSM and for the Luxembourg labour market.

The final simulation involved a 1% drop in the cost of capital. GDP increases 0.1% after one year and 0.4% in the long term. Capital expenditure rose. Wages went up 0.1% in the short term and 0.4% in the long term, with no impact on employment. Profit increased. Government revenue rose automatically, with an accompanying positive effect on public accounts. Private consumption rose, as did investment in real estate. Public expenditures also rose, especially in infrastructure projects with the same positive impact as previously mentioned. The response by LSM to this shock fell in the average of that for other European countries, with however wages shared out to a somewhat greater extent and slightly more consumption in the case of Luxembourg.

The results of these simulations appear in Table 43 below.

Table 43: Medium term effects of various policies in Luxembourg

Variable/Policy	TFP	Labour productivity	Competition of intermediate Goods	Decrease in replacement rate	Decrease in cost of capital
GDP	++	+	(+)	(+)	(+)
Return from capital	+	+	(+)	(+)	-
Investment	+++	++	(+)	+	+++
Resident wages	++	+	-	---	(+)
Trans-border wages	++	+	(-)	--	(+)
Resident employment	0	0	(+)	(+)	0
Trans-border employment	0	0	(+)	(+)	0

Profit	++	+	---	(+)	(+)
Disposable income	++	+	--	--	(+)
Public revenues	++	+	-	--	(+)
Public debt	---	-	+++	+++	-
Consumption	++	+	--	--	(+)

8.5.4 Conclusion

What can be concluded from this preliminary exercise? The first point is that prudence must be exercised in interpreting the results. The models are not all based on the same assumptions. Parameters used are country-specific. From this perspective, a sensitivity analysis using a given model would provide complementary information. In the case of LSM, to this must be added the fact that the version of the model used for these simulations is for a closed economy, while that of Luxembourg is very open because of its size.

The second point to be made concerns interpreting the results in terms of economic policy. Two positions are present here. Some shocks may not give rise to problems of interpretation, such as reducing the cost of capital or increasing TFP. In contrast, economic policies that exhibit lower consensus can be simulated. In this case, one should be prudent not only in stating results but also in interpreting them. For example, the lowering of the replacement rate as considered here has far from exclusively desirable impacts. For all that, it would be inappropriate to use such a result as a pretext for not considering a reform of the labour market. It may be due to the very way the labour market functions that such a policy would have undesirable impacts for Luxembourg. Examining this point would justify different simulations that have not been carried out, such as bargaining power, bargaining methods, etc.

We should lastly note that analyzing policies separately is often misleading. It may prove useful to implement several policies at once and take advantage of this to adjust the scheduling of their implementation. Nothing of this sort has been examined with LSM to date.

Overall, we take this exercise as a validation of LSM and as an encouragement to complete the development of a fuller version of this model.

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9 Appendixes – Competitiveness Scoreboard: Definitions

01 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.

ECO 01 – 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.

ECO 02 – 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.

ECO 03 – 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.

ECO 04 – 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.

ECO 05 – 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.

ECO 06 – 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 maneuver.

ECO 07 – 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 maneuver of the State in its operations.

ECO 08 – 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.

ECO 09 - 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.

ECO 10 – 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.

ECO 11 - 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.

ECO 12 – 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.

02 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 unfavorable 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.

EMP 01 – Employment rate [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%.

EMP 02 – 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 unfavorable economic consequences but it risks weakening social cohesion.

EMP 03 – 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.

EMP 04 – 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 entrepreneurialism 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.

EMP 05 – Employment rate of persons aged 55-64 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.

03 PRODUCTIVITY AND COST OF LABOUR

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.

PC 01 – 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.

PC 02 – 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.

PC 03 – 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.

PC 04 – 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.

PC 05 – 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.

04 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.

F 01 – 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.

F 02 – 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.

F 03 – 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.

F 04 – 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.

F 05 – 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.

F 06 – 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.

F 07 – 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.

F 08 – 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.

F 09 – 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.

F 10 – 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 favoritism 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.

05 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.

CAD 01 – 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 favorable tax regime.

CAD 02 – 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.

CAD 03 –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 favorable 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.

CAD 04 – Tax wedge
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.

CAD 05 – Public sector payroll costs (not included in TBCO)
This indicator represents wage 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.

CAD 06 – 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.

CAD 07 – Observance of the 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.

CAD 08 – Regulation quality index
This aggregate indicator measures prevalence of unfavorable 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.

CAD 09 – 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, enrollment 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.

CAD 10 – 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.

06 ENTREPRENEURIALISM

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.

E 01 – 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 chose 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 entrepreneurialism 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.

E 02 – 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 and innovative ideas.

E 03 – 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.

E 04 – 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.

07 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.

EDU 01 – 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.

EDU 02 – 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.

EDU 03 – 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.

EDU 04 – 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.

EDU 05 – 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.

EDU 06 – 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.

EDU 07 – 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.

EDU 08 – 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.

08 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.

EC 01 – 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.

EC 02 – 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

EC 03 – 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 labouratories 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 labouratories contributes to increased knowledge and can result in major industrial advances.

EC 04 – 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.

EC 05 – 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 labouratory 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.

EC 06 –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.

EC 07 – 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.

EC 08 – 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 center 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.

EC 09 – 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.

EC 10 – 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.

EC 11 – 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.

EC 12 – 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.

EC 13 – 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.

EC 14 – 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.

09 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.

SOC 01 – 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 have no motivation 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.

SOC 02 – At risk of poverty rate after social transfers LISBON

The 'At risk of poverty rate after social transfers' measures the proportion of persons whose equivalized disposable income is below the 'at risk of poverty line,' which is set at 60% of the median equivalized 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.

SOC 03 –At persistent risk of poverty rate

The 'At persistent risk of poverty rate' measures the proportion of persons whose equivalized 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

SOC 04 – 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.

SOC 05 – 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.

SOC 06 – 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.

10 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.

ENV 01 – 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.

ENV 02 – 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.

ENV 03 – 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.

ENV 04 – 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.

ENV 05 – 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.

ENV 06 – Modal split in transportation choice – percentage of car users as transportation method
The modal split in transportation methods of travelers is defined as the ratio between domestic passenger traffic and GDP at like prices of 1995. The unit used is passenger kilometer to represent the transport of one passenger over the distance of one kilometer. 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.

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