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A Study of the Diachronic Evolution of the EU's Structural Indicators Using Factorial Analysis

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CENTRE OF PLANNING AND ECONOMIC RESEARCH

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ABSTRACT

The European Council decided on March 2000 during the Lisbon Summit a new strategic goal for the next decade: *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*. The aim of this study is to evaluate the above strategy through the analysis of 12 basic structural indicators that, according to the European Commission, reflect the progress of the E.U. in the relevant fields of the strategy (economic growth, employment, social cohesion, environment protection, economic reforms and research & innovation).

Using the Correspondence Factorial Analysis (AFC) and the Classification at Serial Hierarchy (CAH) methods we achieve a comprehensive study of the evolution of the relevant positions of the E.U. member - states, with regards to the 12 indicators, for the 1995 - 2004 period. Thus, without the use of any economic models or hypothesis and through the discovery of new variables with qualitative characteristics we are able to evaluate this strategy of the union, that overall appears far from the agreed targets.

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1. Introduction

In March 2000, the Lisbon European Council outlined its strategic goal for the next decade: "*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*". This strategy will be achieved by a combination of policies, aiming at boosting information society and R&D, accelerating structural reforms for competitiveness, enhancing innovation and completing the internal market, while modernising the European social model. Simultaneously to the above, a macroeconomic policy mix that favours growth is applied as well. The combination of the ambitious objectives and policies is widely known as the "Lisbon Strategy" (LS) or the "Lisbon Agenda" and is being implemented from 2000 until 2010.

The aim of this paper is to evaluate the progress of the Lisbon Strategy with reference to the 15 Member-States (MS) of the union half-way through its execution in 2005. This evaluation of the strategy is perceived from the relative evolution of the MSs perspective and not from their absolute performance. In order to achieve this, the first part of the paper presents the main objectives and elements of the LS, with an introduction of the associated Structural Indicators (SI) chosen as the quantitative surveillance tool of the process. The second part reveals a short review about the progress achieved to date, including evidence supporting or criticizing the strategy. Finally, the third part introduces the factorial analysis methodology applied in this research and presents the relative evolution of the member-states while the final part offers a discussion and concluding remarks.

2. Description of the Lisbon Strategy (LS)

In the Lisbon European Council (2000), the European Union (EU) originated the ambition to transform itself into the most competitive and dynamic economy in the world, based on knowledge and sustainability, with higher employment rates and increased social cohesion (Lisbon Presidency Conclusions, 2000). In order to achieve this, the Council decided to launch a 10-year strategy (from 2000 to 2010) focused on reaching a leading economic position in dynamic and competitive terms, based on four axes[1], namely (a) *Reaching a knowledge-based economy*, after (b) *modernising the European social model*; (c) *developing a framework of appropriate and stability- oriented macroeconomic policies*; (d) *achieving sustainable*

[1] The Lisbon Strategy is extended to the New Member Sates of the European Union and the objectives implemented

development (COM2001/79). According to the Commission (COM2000/7), the implementation of these policies would result in a sustainable and non - inflationist growth with lower unemployment rates and sustainability of public finances.

In order to progress in all four actions, the EU has established several objectives in different European Councils (Lisbon, 2000; Stockholm, 2001; Gothenburg, 2001; Barcelona, 2002; Brussels, 2003), grouped mainly in five dimensions: (1) *Employment,* (2) *Innovation & Research*, (3) *Structural economic reforms*, (4*) Social Cohesion* and (5) *Environment*. In general, these main objectives have specific and detailed sub - objectives, aiming at to realize the strategy's concept. A shortlist of these specific objectives is presented below in Table 1, while a more comprehensive analysis is provided in Annex A (see appendix). The objectives below are quantified in shortlist of Structural Indicators, comparable for every member - state.

Table 1. Main & Specific Objectives of the Lisbon Strategy

A. Employment	1. More and better jobs for Europe: developing an active employment policy.
B. Innovation & Research	2. Information society for all. 3. Establishing a European Area of Research and Innovation. 4. Education and training for living and working in the knowledge society.
C. Structural Economic Reforms	5. Creating a friendly environment for starting up and developing innovative businesses, especially SMEs. 6. Economic reforms for a complete and fully operational internal market. 7. Efficient and integrated financial markets. 8. Coordinating macro-economic policies: fiscal consolidation, quality and sustainability of public finances.
D. Social Cohesion	9. Modernising social protection. 10. Promoting social inclusion.
E. Environment	11. A strategy for sustainable development.

The Special Lisbon European Council (March 2000) determined the regular need to assess the progress made in achieving the strategy's objectives. Consecutively, the Commission was invited by the Council to present an annual synthesis report (*Spring Report*), including commonly agreed Structural Indicators (SI) that will ensure the necessary coherence and standardisation of presentation. The structural indicators selected from the Commission relate directly to the five dimensions of the policy objectives[2], with the addition of the general

initially by the 15 Member States are also applied to the 10 new members as well.

[2] The Gothenburg European Council held in June 2001 included the domain of the environment in the list of structural indicators.

economic background indicators that were included to present the overall economic perspective in which the structural reforms take place. In other words, the SI's are politically important socio-economic indicators, covering all the policy domain of the LS, namely employment, innovation and research, economic reform and social cohesion.

Since 2000, the European Commission presents an annual communication under the name "Structural Indicators" that includes a set of indicators under the LS umbrella. The indicators intend to be used in the synthesis report for the respective Spring European Council[3]. According to the Commission (EC, 2000), the structural indicators should be *short*, in order to guarantee the deliverance of clear, simple and focused policy messages, and *balanced*, to mirror the equal importance of each of the five domains (employment, innovation and research, economic reform, social cohesion and environment, with the addition of general economic background). The selected indicators are mainly provided by the European Statistical System (Eurostat), so sets can be mutually consistent, timely available and comparable across the Member - States. Finally, the Commission concluded in the presentation of 14 structural indicators (from the original list of 42 indicators), in order to achieve a better coverage of the MSs and to present information at all levels and performance changes in an easier way (COM2003/585 final).

The final list of the agreed structural indicators is presented below in table 2. However, as the Commission argues, the indicators should primarily be considered as measures of progress for the countries vis-à-vis the Lisbon objectives, rather than measures of policy objectives (European Commission, COM (2000) 594 final, p.22).

Table 2: Lisbon Strategy's Short List of Structural Indicators

GDP per capita in PPS	At risk-of-poverty rate*
Labour productivity	Long-term unemployment rate*
Employment rate*	Dispersion of regional employment rates*
Employment rate of older workers*	Greenhouse gas emissions
Educational attainment (20-24)*	Energy intensity of the economy
Research and Development expenditure	Volume of freight transport
Comparative price levels	
Business investment	

* *Indicators disaggregated by gender*.

As stated above, the strategy's objectives are arranged through a combination of policies

[3] COM-2000 594 final, COM-2001 619 final, COM-2002 551 final, COM-2003 585 final, COM-2004-29 final.

and structural reforms, aiming to transform the EU into a dynamic and competitive economy. Between 2000 and 2005, several European Councils agreed a number of quantifiable targets relating to the five objectives of the LS. These quantifiable targets are presented in Annex B (see appendix).

The above synthesis and structure of the Lisbon agenda applied by the EU is considered to be in line with the wider economic theory and policy focused upon improving the efficiency and the dynamism of economies (EFN, 2004). Specifically, as structural reforms have become an important element for policy action in national economic agendas, Structural Indicators (SI) help to focus attention on aspects of structural adjustment and surveillance, as they are amenable to quantification (OECD, 1990). Such use of quantitative indicators can strengthen the monitoring of policy reforms, as simple and objective measures of the of policies costs and benefits and of progress towards a more favourable balance, can help to guide governments in their reform efforts and to focus public attention on what is at stake (OECD, 1989).

Furthermore, in order to assess the potential value of the selected SIs in the process of policy surveillance, it is critical to define the objectives of the economic policy applied (Boeri & Dean, 1990). As the LS clearly states (COM2000/3 final), economic growth is perceived through market competition, accelerated via research and innovation in a sustainable and social context that promotes employment. This is a widely accepted objective, even though broad in its perspective, aims to maximise individuals welfare on a sustainable basis. Additionally, the above central target of the LS includes a combination of both individual (member - state level) and shared (EU level) goals. Evidently, institutional and national welfare conflicts may arise due to different misinterpretation of preferences and choices regarding economic policy and its objectives, with possible distribution implications.

The LS provides response to the above criticism through two features arising from its structure. First, according to the European Commission (COM 2003/585 final) the main objective of economic growth consists, and derives from five domains of equal importance: employment, innovation and research, economic reform, social cohesion and environment. By these means, specified objectives are clearly presented and linked to the ultimate objective of economic growth and welfare maximisation. Second, numerous sub-objectives supporting the main strategy areas have quantifiable targets with a precise time target for completion (i.e. 2010). The sub-objectives and the quantifiable targets of the SI allow the final goal to be

interpreted more readily, with a view to progress and outcome achieved.

A final criticism concerns the way in which the strategy is assessed and monitored via the structural indicators process. The selected indicators represent all the strategy's objectives equally. They are also easy to read and understand, according to the Commission's relative communication (COM2003/585 final). Nonetheless, the final result produced ignores one of the initial characteristics of the LS: the multiplicity of objectives. It is fundamental that the LS is based on this combination of multi-objectives regarding growth creation. This part of the strategy attempts to tackle this research through the factorial analysis applied later in our methodology . This is owing to the systemic approach that the analysis applies, allowing a more spherical examination of the strategy, without the use of any *a priori* model or hypothesis. The fourth part of the research that follows provides more details of this analysis.

3. The Lisbon Strategy (LS): What Have We Achieved?

The partial implementation, up to this date, of the reforms under the Lisbon Strategy seems to be starting to have some success, regarding the initial objectives. According to the Commission's report to the last European Council (COM2004/29 final), the progress achieved is proved by: (a) the increase in the total employment rate from 62,5 in 1999 to 64,4 in 2004. In addition, long-term unemployment has dropped sharply in EU, falling from 4% in 1999 to 3% in 2004, (b) various markets have been completely or partly exposed to competition (telecommunications, postal services, energy and other), (c) the knowledge-based economy is becoming a reality, due to the European Research Area, (d) the sustainable development, as an approach, is being taken more into account in policymaking, (e) finally, 100 regulations, directives and programmes have been implemented and adopted in numerous areas under the Lisbon agenda. The performance of the 15 EU member-states for the 12 structural indicators between 1995 and 2004 period are presented in Annex C in the Appendix (Graphs 1 to 12).

Although a few obvious signs of performance improvement in the EU's economy can be observed, a number of the strategy's key targets will be unable to be implemented until the final period. Specifically, employment will be hard to reach its target of 70 % by 2010, while growth appears to be far from the 3 % prediction for the end of this decade. As a result, growing criticism over the LS highlights the major problems which need to be dealt with urgently. These include: the need for public finances to be viable, the inadequate contribution of employment

and productivity to growth, the insufficient development of the internal market and, finally the lack of sustainability of growth.

In detail, *budgetary and fiscal discipline* has not been in line by all the MS, due to the slow growth of the economy and expansionary budget policies at other instances. Thus, the deficit of the EU stood at 2,8% of GDP in 2003 and in 2,7% in 2004. Also, medium and long term public finances at national level should be sound in order to handle future demographic trends and sustainable development. At present (2004), the average level of government for the EU is expected to rise to 64,1% of GDP, with six MS exceeding the reference value of 60% of GDP.

Furthermore, *employment and productivity* are considered to be the main hurdles of the EU economy. Both the interim and the final target for employment (70% and 60% for male and female respectively) appear to be a high challenge. Growth is continuing to be slow in the Euro area, which is close to 2% for the 2000-04 period. Low contribution of employment and productivity is considered to be the main reason for unsatisfactory growth (EC, 2005a). It is widely believed that growth in the EU is not linked strongly enough with Information and Communication Technologies (ICT) and that relative investment is insufficient (OECD 2003). Consequently, more investment is required by both the private and public sector towards R&D infrastructure and human capital (EC, 2005b).

A more controversial issue linked with European growth is that of *internal market and its competitiveness levels*. In detail, the internal service market appears fragmented where the product market is slowly decreasing in volume (OECD, 2005). Also, network industries are not yet fully benefited from market openings yet, while related efficiency effects, inter-connectivity and security of supply in the Union have similarly not been yet realised (EFN, 2004). Strong political action is required in order for strategic measures to increase competitiveness.

In addition, growth is still lacking sustainability, although some improvement has been made in environmental areas, mainly at legislative level. It is argued that the relationship between growth and environment can prove to be counter-productive in the medium and long term (EC, 2004). Finally, the social European indicators illustrate that the real risk of poverty is increasing in a number of MS, where unemployment and the social protection challenge contributes to the later (EC, 2005c).

4. The Evolution of the Relative Positions of the Member - States (1995 - 2004)

As the introduction outlines, the focus of this analysis does not lie with the absolute values of the SIs under review. Rather, it is placed in their relative evolution. Consequently, the acceptance of such a point requires the revelation of qualitative characteristics behind the quantitative evolution of the empirical data.

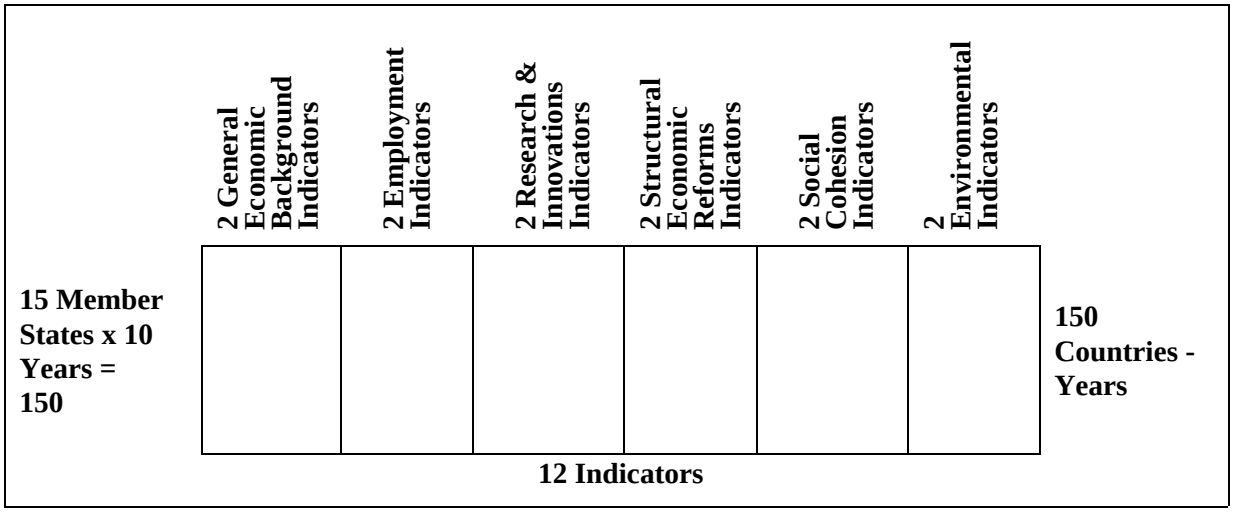
The methodology that better reflects the above notion is the Correspondence Factorial Analysis *(Analyse Factorielle des Correspondances - AFC)* in conjunction with the Classification at Serial Hierarchy method *(Classification Ascendante Hierarchique - CAH)*[4] (Benzecri, 1973). The main aim of AFC is the analytical description of data tables that correspond to qualitative variables, so that their interpretation can arise without *a priori* constraints or limitations. The method also allows the discovery of new complex variables that characterise the data as a whole. In addition, the application of AFC ensures the overall description of the phenomenon under analysis that's related with the data table. This means that data tables with large dimensions can be treated statistically without any restrictions. The later is its principal advantage over other multidimensional statistical analysis methods. Moreover, the CAH method offers the analysis of tables with large dimensions by dismembering the overall observations into homogeneous ones with respect to the whole variables, while each one is considerably dissimilar from the others. Thus, the hierarchy of the observations is achieved through the breaking down of the observations, since the further you move away from the initial dismember the more details it reveals (Papadimitriou, 2002).

By combining the above two methods an attempt is made to determine the crucial characteristics of the strategy as a process and its application by the member-states economies during the 1995 - 2004 period, without the utilisation of any *a priori* model. Moreover, this provides an opportunity to reveal new synthetic variables that characterise the data and the time period as a whole (Baciocchi, 1997). The shift from quantitative to qualitative was feasible by categorising into three intervals for each year from 1995 until 2004 and each variable (Papadimitriou, 1990), for all the SI and the countries of the Union (EU–15). The evolution of these statistical parameters allows the assessment of the LS into time. Specifically, the evolution of these statistical parameters allowed the categorisation of data. These categories were named**:**

[4] also known as cluster analysis.

Minimum (Min), Medium (MED) and Maximum (MAX). The intervals for each variable were defined using the mean and standard deviation for every year and SI examined (see Graph 2, p.18)[5].

The combination of the correspondence factorial analysis together with the classification at serial hierarchy and the search for qualitative characteristics from the quantitative data offers the examination of the evolution of the relative position of each EU member-state in relation to the others and to compare the periods that preceded and followed the initiation of the strategy (1995 to 2005). Examining the evolution of the relative positions of the MS aims to demonstrate the effort undertaken by each member during the implementation of the LS. Applying the above two methods allowed for the presentation and analysis of the route that each country (member–state) separately followed with specific reference to the three constituted categories for the period examined, where all the efforts and the fall backs confronted were photographed.



Graph 1: Basic Table

As it is obvious, the purpose of this study is to access the convergence process of the EU member – states with respect to the LS objectives and targets. Consequently and subsequent to the growth goal, the indicators of employment, innovation & research, economic reform, sustainability and social cohesion which reflect the real development of the European economies have been appraised as well.

[5] The necessary computations for the AFC and CAH methods where achieved using the M.A.D. (Methodes d' Analyses des Données) software.

According to the above, the *Basic Table of Data* (Graph 1) is constructed with a dimension of 150 x 12. The 150 lines of this basic table represent the 10 years of the 1995-2004 period for the 15 MS of the EU[6] (Structural Indicators Database, Eurostat). The performance of the15 EU member- states for the above SI is presented in Annex C in the Appendix (Graphs 1 to 12).

The 150 lines are described by the 12 columns that correspond to the selected indicators. The twelve indicators chosen where selected from the Commission's SI short list. It should be noted that it was not possible to include all the short-listed (14) indicators due to data availability difficulties. These indicators are systematically and analytically presented as follows in Table 3 (The right-hand side column corresponds to the code given to the relative indicator).

Table 3. List of Structural Indicators Applied

General Economic Background	1. **GDP per capita** (Gross Domestic Product pc in Purchasing Power Standards)	**GDP**
	2. **Labour Productivity per person employed** (GDP in PPS per person employed)	**LPR**
Employment	3. **Employment Rate** (aged 15-24 as a share of the total population at the same group)	**EMP**
	4. **Unemployment Rates** (Unemployed individuals as a share of active population. Eurostat definition)	**UNP**
Innovation & Research	5. **Spending on Human Resources** (Total public expenditure on education as a % of the GDP)	**SHR**
	6. **Gross Domestic Expenditure on R&D** (as % of GDP)	**RDE**
Structural Economic Reforms	7. **Comparative Price Levels** (of final consumption by private households incl. indirect taxes)	**CPR**
	8. **Business Investment** (Gross fixed capital formation by the private sector as a % of GDP)	**BIN**
Social Cohesion	9. **At-Risk-Poverty rate after social transfers** (share of persons with equivalised disposable income below the threshold of 60% of the national median, after social transfers)	**PVR**
	10. **Total Long-Term Unemployment Rate** (12 months or more, as a % of the total active population)	**LUN**
Environment	11. **Total Greenhouse Gas Emission** (% change in 6 main gases, according to Kyoto Protocol)	**HGE**
	12. **Energy Intensity of the Economy** (Gross Inland Consumption of Energy Divided by GDP)	**EIE**

[6] The data were obtained from the Structural Indicators database of the Lisbon Strategy, Eurostat (http://epp.eurostat.cec.eu.int) and from the AMECO Macroeconomic database, DG for Economic & Financial Affairs, European Commission (www.europa.eu.int).

Category **Minimum**	Category **Medium**	Category **Maximum**
Minimum $\bar{X} - \sigma / 2$	$\bar{X}$	$\bar{X} + \sigma / 2$ Maximum

Xij = Average of the variable for the whole year and the 15 member-states
(i = 1,2,…,6; j = 1990, 1991…2004)

_ij = Standard deviation for the whole year and the 15 member-states
(i = 1,2,…,6; j = 1990, 1991…2004)

The collaboration of the AFC and the CAH methods allow us to convert the quantity contents of the 12 variables into qualitative ones by categorising them into 3 classes (Benzecri, 1986), as Graph 2 illustrates, in a systemic approach.

Graph 2: Definition of the Categories

Having determined the intervals in an earlier stage, the *Basic Table* is transformed into a *Logical Table* (0 – 1, NO – YES) (Papadimitriou, 1990). In this Logical Table all the lines that correspond to the 150 countries–years (points) have been allocated with the same weight of 12 (Graph 3).

12 x 3 = 36 Categories of Structural Indicators													
150 countries - years	**001**	**010**	**001**	**010**	**100**	**001**	**010**	**001**	**010**	**100**	**001**	**010**	**12 12 12 12 12 . . . . 12**
36 Categories													

Graph 3: Logical Table

At this point, it is useful to re-emphasise that this research id focused upon the diachronic evolution of the relative positions of each MS with respect to the others and for each separate variable. Consequently, it is possible to have a case where a MS remains diachronic in the same category (i.e. in the **Min**) despite the improvement of its absolute values. This is because the improvement in absolute values of the MS in question has been followed with a parallel improvement with the other MSs for the same variable (SI in our case). The results that follow will take place in the first factorial level, that is in the level of the first two factorial axes. Initially, we will be able to determine the categories of the variables that characterise each group of points (country – year). Second, we examine the diachronic movement of the position of the points of each MS, in relation to the predetermined categories (Burtschy, 1991).

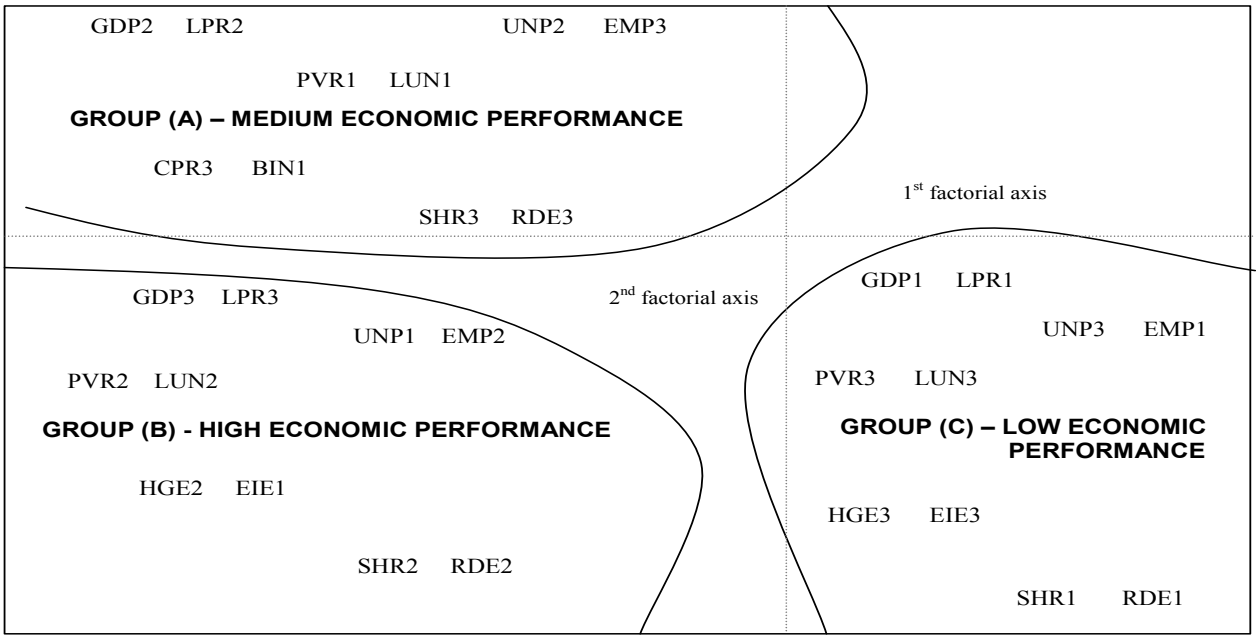
The statistical analysis was applied by a per year examination of the 1995 to 2004 period. Consequently, the diachronic evolution of the 15 MS of the EU was examined, employing a number of structural indicators that were shortlisted by the European Commission (Table 3). Therefore, it was possible to construct curves presenting the route that every MS pursued diachronical, within the framework that generated the factorial levels. Moreover, it was feasible to compare and contrast the diachronical routes that were followed by the different MS's, deriving valuable conclusions regarding their effort to fulfil the objectives of the LS.

4.1. Determination of the Characteristics of the Group of Points (Country – Year)

At the first factorial level (1 x 2) (Graph 3) we can observe the formation of three classes of points (country-year). They are clearly distinguished and identifiable for the period under analysis (1995-2004):

(A) On the left hand side, at the top of Graph 4, we can observe the formation of a group of points (country-year) characterised by:

GDP pc in PPS (GDP) :	**MED**	At-Risk-Poverty Rate (after ST) (PVR) :	**MIN**
Labour Productivity (LPR) :	**MED**	LT Unemployment Rates (LUN) :	**MIN**
Employment Rate (EMP) :	**MAX**	Gross Expenditure on R&D (RDE) :	**MAX**
Unemployment Rate (UNP) :	**MED**	Spending on Human Resources (SHR) :	**MAX**
		Energy Intensity of the Economy (EIE) :	**MED**
		Total Greenhouse Gas Emissions (HGE) :	**MIN**



Graph 4: First Factorial Level (1x2)– Performance Indices and Characterisation of the Groups

This group (a) was named as: Medium Economic Performance Group.

(B) On the left hand side of the Graph 4 we can observe the formation of a group of points (country-year) that is characterised by:

GDP pc in PPS (GDP) :	**MAX**	At-Risk-Poverty Rate (after ST) (PVR) :	**MED**	
Labour Productivity (LPR) :	**MAX**	LT Unemployment Rates (LUN) :	**MED**	
		Employment Rate (EMP) :	**MED**	Gross
Expenditure on R&D (RDE) :	**MED**			
Unemployment Rate (UNP) :	**MIN**	Spending on Human Resources (SHR) :	**MED**	
		Energy Intensity of the Economy (EIE) :	**MIN**	
		Total Greenhouse Gas Emissions (HGE) :	**MED**	

This group (b) was named as: High Economic Performance Group.

(C) Finally, on the right of the Graph 4 we can distinguish a group of points (country-year) that is characterised by:

GDP pc in PPS (GDP) :	**MIN**	At-Risk-Poverty Rate (after ST) (PVR) :	**MAX**
Labour Productivity (LPR) :	**MIN**	LT Unemployment Rates (LUN) :	**MAX**
Employment Rate (EMP) :	**MIN**	Gross Expenditure on R&D (RDE) :	**MIN**
Unemployment Rate (UNP) :	**MAX**	Spending on Human Resources (SHR) :	**MIN**
		Energy Intensity of the Economy (EIE) :	**MAX**
		Total Greenhouse Gas Emissions (HGE) :	**MAX**

This group (c) was named as: Low Economic Performance Group.

The indicators of Comparative Price Levels (CPR) and of Business Investments (BIN) presented low significance and weren't categorised in the above groups.

From this we can observe an apparent distinction between the MS with middle and high economic performance (groups (a) and (b)) and those with low economic performance (group (c)). This distinction is obvious with the contradiction of the groups (a) and (b), which are projected on the negative values of the 1st (horizontal) factorial axis and of group (c) which is projected on the positive values on the same factorial axis.

In more detail, the high economic performance group (b) is characterised by the points (country-year) at the max category for the GDP pc (GDP3) and the labour productivity (LPR3), together with med category employment (EMP2), long-term unemployment (LUN2) and poverty (PVR2) rates. Also, this group presented unemployment levels at the min category (UNP1). Additionally, the group illustrated medium (med) category spending on human resources (SHR2) and on R&D expenditure (RDE2), accompanied by medium levels of total greenhouse emissions (HGE2) and points at the min category for the energy intensity of the economy (EIE1).

On the contrary, the low economic performance group (c) is characterised by points (country-year) at the min category for the GDP pc (GDP1), labour productivity (LPR1) rates as well as employment rates (EMP1), coupled with max category unemployment rates (UNP3), long-term unemployment rates (LUN3) and poverty rates (PVR3). Further, this group presents points (country-year) of the min category for the spending on human resources (SHR1) and on R&D expenditure (RDE1), associated with points at the max category for the total greenhouse emissions (HGE3) and energy intensity of the economy (EIE3).

Finally, the medium economic performance group (a) is characterised by points (country-year) that fall under the med category regarding GDP pc (GDP2), labour productivity (LPR2) and unemployment rates (UNP2), but with min levels of long-term unemployment rates (LUN1)

and poverty rates (PVR1). Also, employment rates (EMP3) appear at the max category, together with the spending on human resources (SHR3) and with R&D expenditure (RDE3). Concluding this presentation of the middle performance group, the environmental indicators appear to be included in the min category for the total greenhouse emissions (HGE1) and in the med category for the energy intensity of the economy (EIE2).

Overall, we can obtain some useful conclusions from the definition of the groups analysed above. First, we can observe that growth (GDP) is categorised consistently with labour productivity (LPR) for all three groups (i.e. GDP3 & LPR3 in the group of high economic performance etc.). This reveals the close relation between labour productivity and growth (expressed at PPS) which is significant for all the MS and for the whole period analysed.

Parallel to the above, the medium economic performance group - where growth and labour productivity is at average levels (GDP2 & LPR2) - presents significant increased employment rates (EMP3) while the high economic performance group - where growth and labour productivity is categorised in the highest category (GDP3 & LPR3) - employment is at medium levels (EMP2). The above categorisation between growth and employment observed for the MSs raise some questions. In other words, during this decade of examination the MS's experiencing the highest levels of growth can not consequently reach the highest levels of employment; on the contrary, the MS's with average growth levels are accomplishing the higher employment rates. As the link between growth and employment is of utmost importance in the Lisbon agenda, policy makers should consider the structural issues and difficulties of the EU economy preventing this link from becoming feasible.

In relation this, the high economic performance group – where growth and labour productivity are at the highest category - presents long-term unemployment rates and poverty rates in the med category (LUN2 & PVR2). On the other side of the spectrum, the lower levels of long-term unemployment rates and poverty rates (LUN1 & PVR1) are categorised in the medium economic performance group, together with moderate growth and labour productivity levels (GDP2 & LPR2).

A final comment on the high and the medium economic performance groups notes the knowledge-based economy and the sustainability objectives of the strategy. As for the knowledge-based economy, the medium economic performance group presents the highest levels of spending on human resources and expenditure in R&D (SHR3 & RDE3 respectively), where

human resources and R&E expenditure are grouped in the med category regarding the high economic performance group (SHR2 & RDE2). Thus, investment towards innovation, human resources and R&D appears stronger from MS's with average levels of growth than from those experiencing higher ones, possibly in an effort to 'catch-up' and compete in this economic sector.

To conclude, it would be pertinent to remark upon the strategy's sustainability objective. Throughout the years examined the high economic performance group presents average levels (med) of total greenhouse emissions (HGE2) coupled with the least energy intensity of the economy (EIE1), while on the other hand, the less significant levels of emissions are shown by the medium economic performance group (HGE1) with average levels of energy intensity of the economy (EIE2). Consequently, the highest levels of both total greenhouse emissions and energy intensity of the economy are observed in the low economic performance group (HGE3 and EIE3 respectively).

4.2. The Diachronic Evolution of the MSs in Relation to the Constituted Groups

The presentation of the diachronic evolution of the points (country-year) from the perspective of the 15 MSs of the Union requires the repetition of the previous analysis and its presentation from a different perspective. In detail, the study of the first factorial level (1 x 2) and the formation of the categories of points (country - year) discussed in the previous section reveals some very interesting information about the diachronic evolution of the MSs. According to the information we can obtain from the first factorial level (1 x 2) of the analysis we can observe the following developments concerning the diachronic evolution of the MSs (Graph 5).

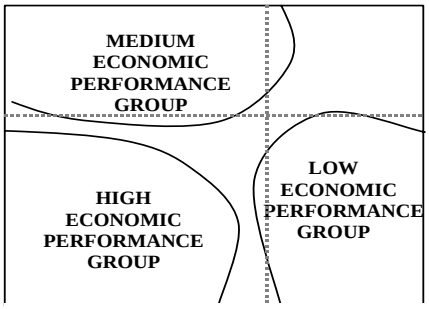
First, Greece (**GR**), Spain (**ES**) and Portugal (**PT**) as well as Italy (**IT**) remain in the low economic performance group for the whole decade examined (Graph 5.1). The points (country-year) that correspond to the above MSs are the ones that actually constitute this group.

Second, Luxembourg (**LU**), Netherlands (**NL**) and Austria (**AT**) remain solely for the period under analysis (1994-2004) in the medium economic performance group (Graph 5.2). Again, the points (country-year) that correspond to the above MSs are the ones that actually constitute this group.

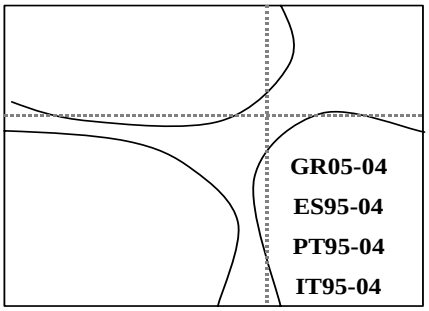
Third, two of the Scandinavian MSs of the union, Finland (**FI**) and Sweden (**SE**), as well as France (**FR**) remain in the high economic performance group for the whole period analysed (Graph 5.3).

Also, we can observe a number of MSs that have altered diachronical their relative

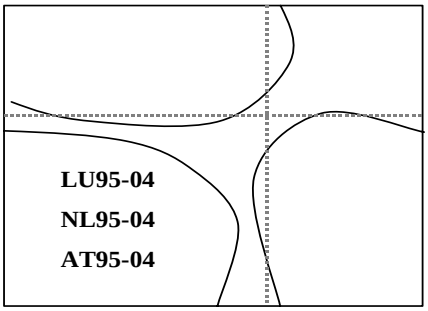
position, presenting themselves among a number of economic performance groups. Starting with Ireland (**IR**), we can observe that during the 1995-1998 period, its relative position was located in the low economic performance group (Graph 5.4), entering then in the medium economic performance group until the end of the examined time period (1999-2004). By this repositioning, Ireland altered its position in relation to the other MS.



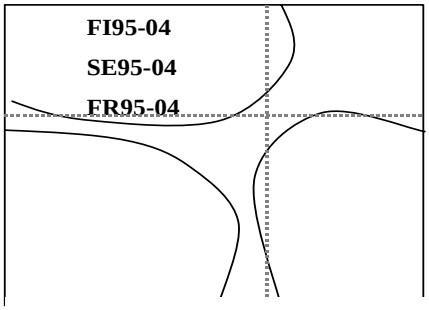
Graph 5.0: Categorisation of the MS



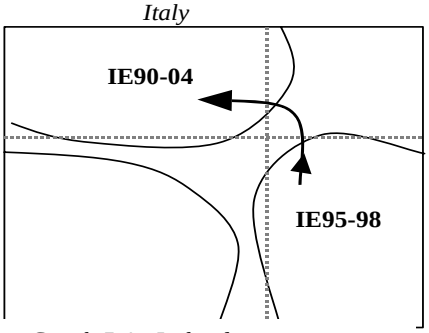
Graph 5.1: Greece, Spain, Portugal & Italy



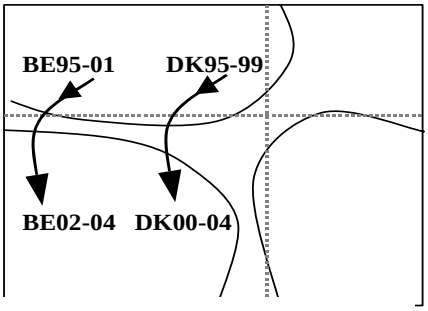
Graph 5.2: Luxembourg, Netherlands & Austria



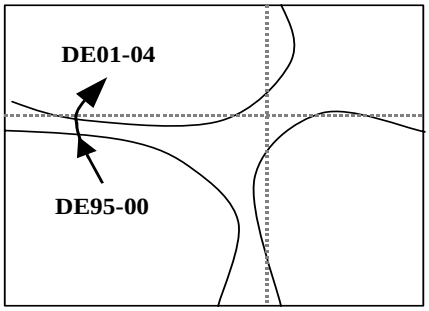
Graph 5.3: Finland, Sweden & France



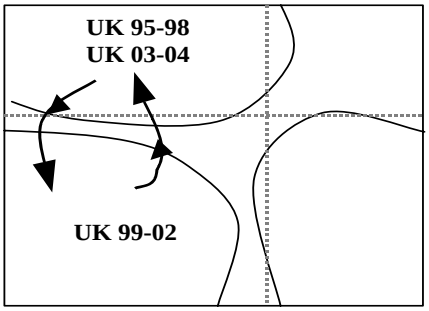
Graph 5.4: Ireland



Graph 5.5: Belgium & Denmark



Graph 5.6: Germany



Graph 5.7: United Kingdom

Graph 5.0: First Factorial Level (1x2) – Performance Indices of the Diachronic Evolution of the 15 EU Member – States.

Continuing this analysis of the relative movements of the positions of the MSs, Belgium (**BE**) and Denmark (**DK**) followed a parallel course of movements within the three economic performance groups (Graph 5.5). Both countries were part of the medium economic performance

group from the beginning of the period until approximately early 2000 (1995 to 2001 and 1995 to 1999 respectively) and then entered the high economic performance group where they remained until the end of 2004.

In addition, a counter-trend is presented by Germany (**DE**) in Graph 5.6. Between 1995 and 2000 this country is presented in the high economic performance group and then it moves its relative position for the 2001 to 2004 period to the medium economic performance group.

Finally, the United Kingdom (**UK**) followed a more complex course within the constituted groups of economic performance (Graph 5.7). In detail, from 1995 until 1998, the country was categorised in the medium economic performance group, then it repositioned its relative position in the high economic performance group for the 1999-2002 period, to finally rearrange its position again to return to the medium economic performance group for the last two years of the period under analysis (2003 and 2004).

5. Discussion and Conclusions

This research has analysed and quantified diachronical the Lisbon agenda and its related objectives by applying the statistical method of correspondence factorial analysis with the classification at serial hierarchy. The main aim of the study was to employ a methodology unbound by any models and *a priori* hypothesis, capable of leading us to the assessment of the evolution of the relative positions of every member - state for the related structural indicators.

In conjunction with this, the findings of the research indicate that the Mediterranean partners of the Union, namely Spain, Portugal, Greece and Italy, have portrayed unchanged relative positions in relation to the other MSs, for the 1995-2004 period. They are characterised by low levels of growth pc and labour productivity, insignificant investments in R&D and human resources, with the addition of poor social indicators performance (highest levels of unemployment, long term unemployment and poverty rates). Throughout the European integration process, the above MSs were insufficient to implement the necessary structural reforms from the Lisbon Agenda in order to increase and enhance their competitiveness and welfare levels.

At the other end, the union's member-states that have achieved increased relative performance in the economic background indicators (GDP pc and labour productivity) constitute the high economic performance group. These MSs were Luxembourg, the Netherlands and

Austria. These countries, although traditionally considered as social-economic leaders of the union, consistently present for the time period under analysis relative positions with medium levels of employment and poverty rates, coupled with low unemployment rates.

Somewhere in between, the medium economic performance group can be considered as the engine of the European innovation and knowledge-based economy, due to the high importance placed on R&D spending and investments in human resources. In this group, medium levels of growth pc and labour productivity are coupled with upper levels of employment and the lowest levels of poverty and long term unemployment rates, in relation to the other union members. In this middle economic performance group, the Scandinavian non Euro MSs Sweden and Denmark (for four years) are categorised. Questions are raised regarding the distinct employment levels that these MSs offered for the time period analysed, considering that they are not participating in the common European currency. Additionally, Ireland is a MS which has rearranged its categorisation during the decade under which it was examined from the low intensity growth group to the more dynamic medium economic performance group. It has based its growth on propelled innovation and R&D expenditure, improving its capability of competing internationally through extensive investments in the "knowledge-based economy".

The detailed analysis of the evolution of relative positions indicates clearly that there are still issues to be tackled in most of the MSs, and all of them need to make a greater effort in order to achieve the required objectives. It is fair to comment that the revision and assessment of the Lisbon agenda shows a moderate progress in most of the areas under consideration. It is believed that the strategy has been unsuccessful, not because it set the wrong goals but because it was a purely inter-governmental agreement without sufficient involvement of EU institutions and was hampered by insufficient political will and lack of an enforcement mechanism.

The EU members-states should formulate a viable long-term joint economic strategy and explain it in detail: how to secure stronger growth, employment and a decent standard of living; where they will take the reform programmes and how to maintain fiscal solvency in the long run. The union should continue to focus on the Lisbon Agenda in order to improve its competitiveness, without ignoring its multiplicity with the other direct or indirect levels of economic policy such as employment, economic change, social cohesion and environment.

The way forward for the Lisbon Agenda is an appropriately prioritised and supported strategy with feasible and specified objectives (IMF, 2005). In other words, the EU should not

just proceed straight to reforms per se but with the right kind of reforms. In turn this, will assist in completing the transition from the monetary to the economic union.

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APPENDICES

Annex A. Specific Objectives of the Lisbon Strategy

A.1. More and better jobs for Europe: developing an active employment policy: in order to reduce unemployment and to rise the employment rate, four areas arise: improving employability and reducing skill gaps; increase adaptability through lifelong learning; increase employment in services; and reducing occupational segregation.

B.2. Information society for all: the shift to a digital, knowledge-based economy has to be based on an inexpensive, world-class infrastructure that avoids info-exclusion. The promotion of sure e-commerce and a telecoms competitive regulatory framework is needed, together with ensuring resources in education and public services.

B.3. Establishing a European Area of Research and Innovation: The creation of a European Research Area may ensure an integrated, efficient and innovative alternative to best brains. The basic steps are: networking research together with the coordination and benchmarking of national research and promoting mobility; improve private research investment and start-ups; and ensure the Community patent as a tool for rewarding innovation.

B.4. Education and training for living and working in the knowledge society: Europe's education and training systems have to offer learning and training opportunities of the knowledge society through three main components: development of local learning centres, the promotion of new basic skills, and increased transparency of qualifications. Particular targets arise: halving the proportion of 18 to 24 year olds with only secondary level; schools as multi-purpose local learning centers; a European diploma for basic IT skills; promoting mobility for the education actors; a common format for curricula vitae.

C.5. Creating a friendly environment for starting up and developing innovative businesses, especially SMEs: lower costs of doing business can be achieved through a better regulatory climate and key interfaces in innovation networks (start-ups, risk-capital initiatives), with a special focus on small companies, an engine for job-creation in Europe (micro-enterprises).

C.6. Economic reforms for a complete and fully operational internal market: certain sectors can still complete internal market: remove barriers in services; liberalise gas, electricity, postal services and transports; update public procurement rules (that should take place on-line); simplify the regulatory environment; and generally speaking to promote competition, reducing support to individual companies or sectors, and focusing on key areas.

C.7. Efficient and integrated financial markets: more efficient financial and risk-capital markets through a set of particular policies such as enhancing the comparability of companies' financial statements or promoting the better functioning of government bond markets, among others.

C.8. Coordinating macro-economic policies: fiscal consolidation, quality and sustainability of public finances: it must be created a relationship of trust between all the actors involved in policy making, in order to have a proper understanding of each other's positions and constraints. The clear objective is to pursue fiscal consolidation and to improve the quality and sustainability of public finances. Particular policies are recommended: reduce tax pressure on labour; redirect public expenditure towards physical and human capital accumulation; and ensure long-term sustainability of public finances.

D.9. Modernising social protection: the European social model must be adapted as part of an active welfare state to ensure that work pays, to secure their long-term sustainability in the face of an ageing population, to promote social inclusion and gender equality, and to provide quality health services. It can be done through strengthen cooperation between Member States by exchanging experiences and to prepare studies on the future evolution of social protection from a long-term point of view.

D.10. Promoting social inclusion: The potential of the new knowledge-based society for reducing poverty also brings a risk of an ever-widening gap of social exclusion. Several steps are recommended: promote a better understanding of social exclusion; national promotion of inclusion, complemented at the Community level by the Structural Funds framework; develop priority actions addressed to specific target groups (minorities, the disabled, etc.

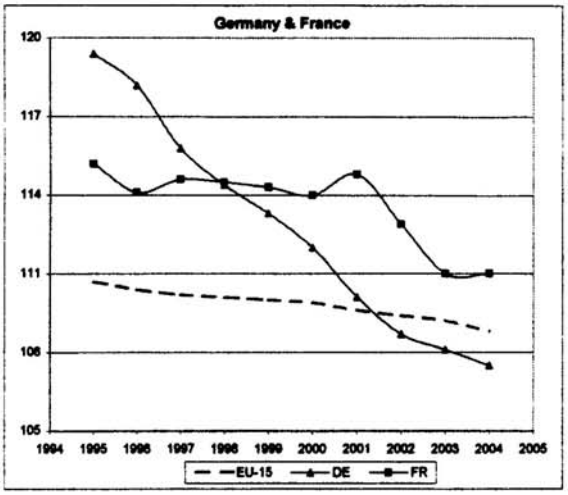
E.11. A strategy for sustainable development: this environmental dimension was added to the Lisbon strategy, to complete the Union's political commitment to economic and social renewal, and establishes a new approach to policy making. Several themes have special emphasis: a new approach to policy making; the global dimension (Johannesburg); environmental priorities for sustainability; combating climate change (Kyoto); ensuring sustainable transport; addressing threats to public health; managing natural resources more responsibly; and finally maritime safety.

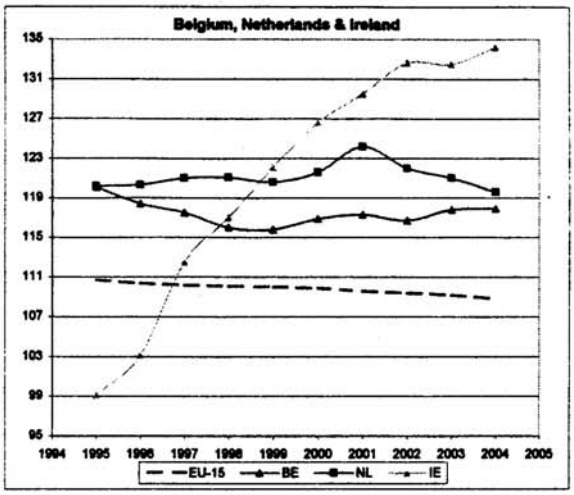
Annex B. The Quantifiable Lisbon Targets

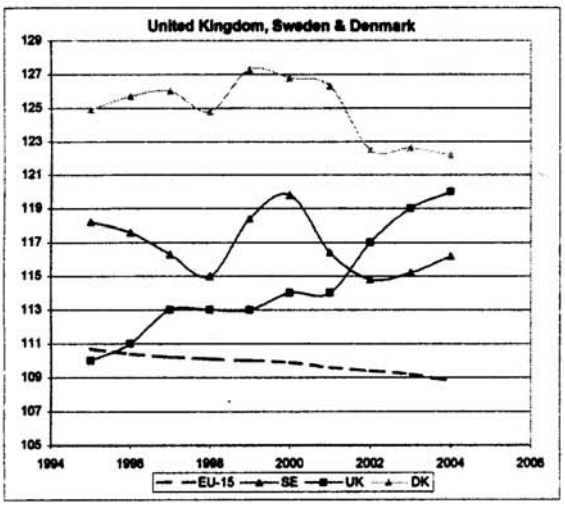
	Number of MS that meet the target at March 2005
1. Overall employment rate to reach 67 per cent by 2005 (interim target)	8
2. Overall employment rate to reach 70 per cent by 20 10	4
3. Female employment rate to reach 57 per cent by 2005 (interim target)	14
4. Female employment rate to reach 60 per cent by 2010	8
5. Employment rate for workers aged 55-64 to reach 50 per cent by 2010	6
6. Increase in average effective retirement age by 5 years to ensure EU average of 65 by 2010	0
7. Available childcare for children over three to reach 90 per cent by 2010	8
8. Available childcare for children under three to reach 33 per cent by 2005	2
9. R&D spending to reach 3 per cent of GDP by 2010	2
10. Business expenditure on R&D to amount to 67 per cent of total by 2010	2
11. Household internet penetration to reach 30 per cent	13
12. Governments to provide 100 per cent of basic services online by 2003	0
13. Transposition rate of internal market directives to reach 98.5 per cent	2
14. Two year time limit for transposition of internal market directives	3
15. Reduce the number of early school-leavers by 50 per cent by 2010	8
16. Meet Kyoto targets by 201 0 (member-states have individual targets)	12
17. Meet 22 per cent target for renewable electricity productions (memberstates have individual targets)	0

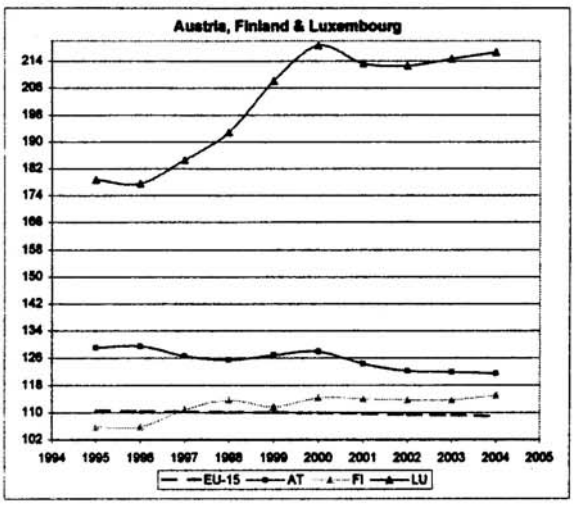
ANNEX C: The Performance of the 15 EU Member-States for 12 Structural Indicators Between 1995 and 2004.

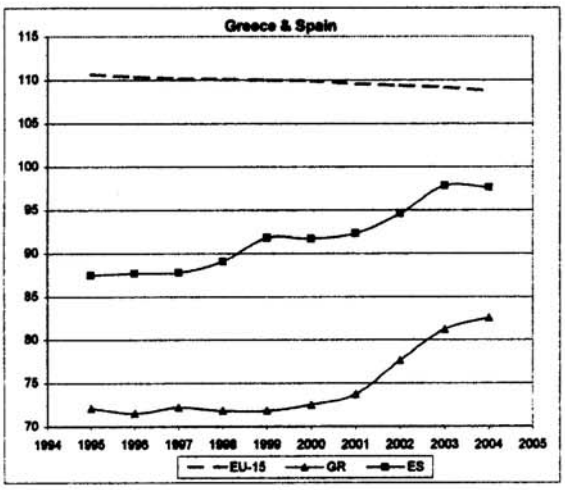
1. GDP per capita (Gross Domestic Product pc in Purchasing Power Standards)

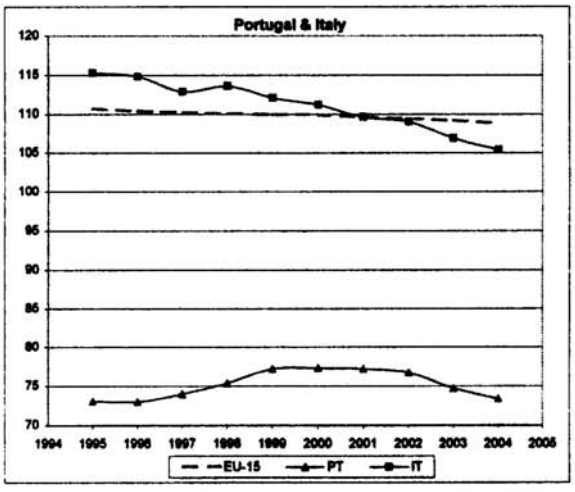




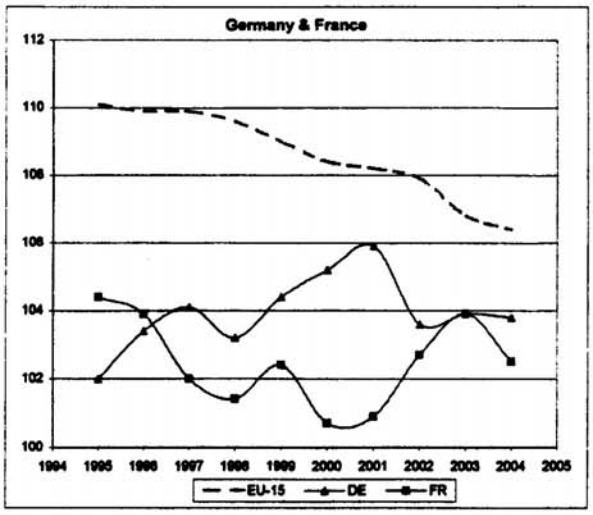


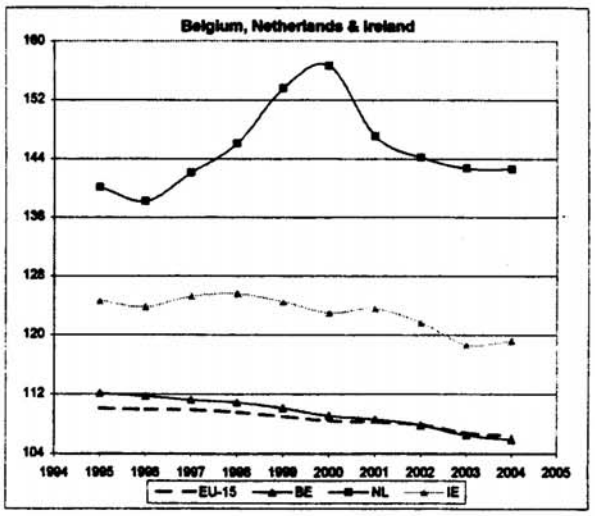


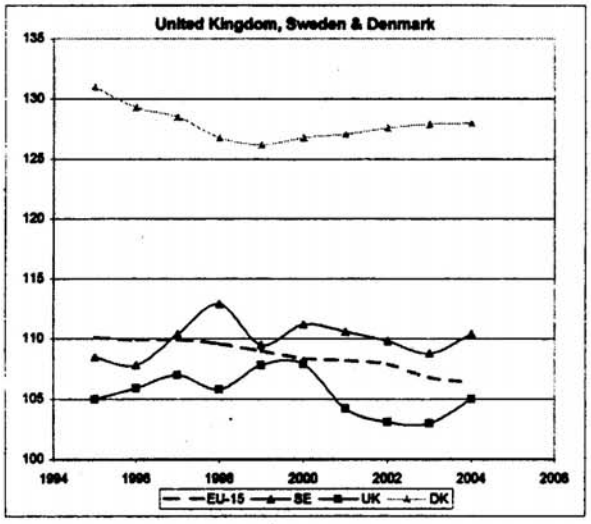


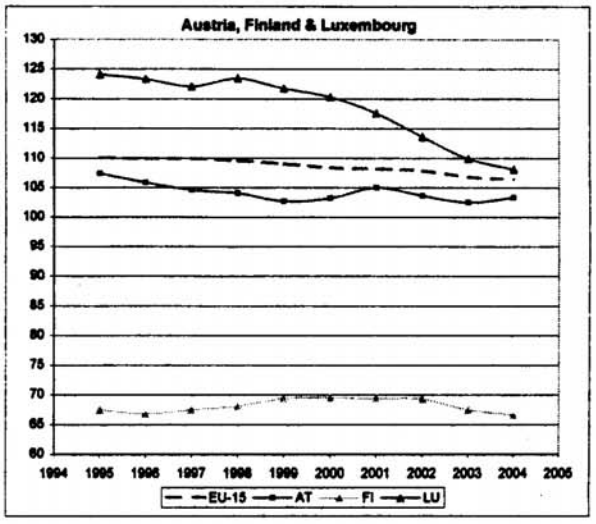


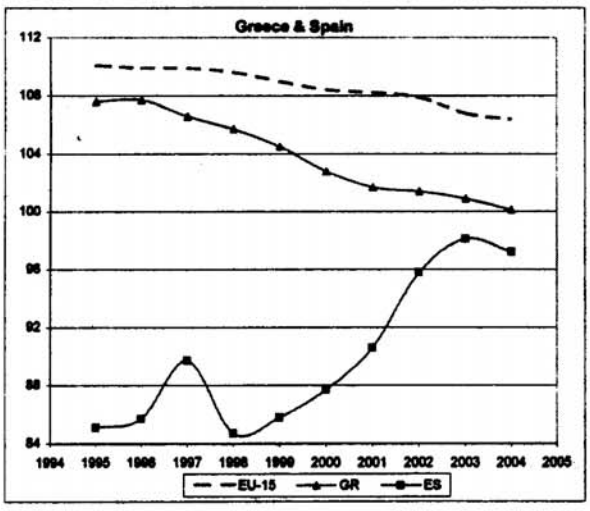
2. Labour Productivity per person employed (GDP in PPS per person employed)

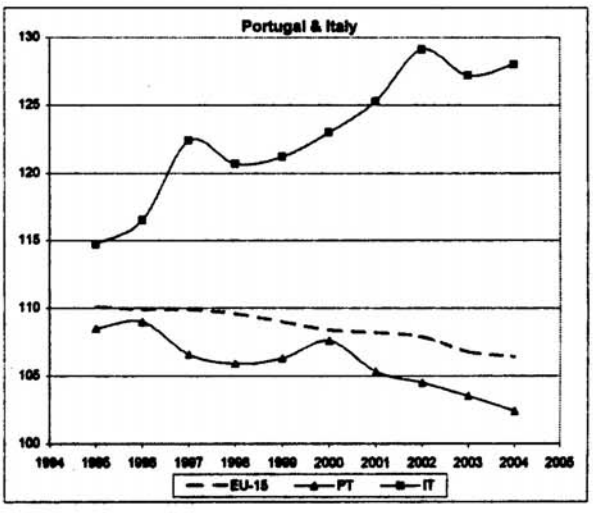




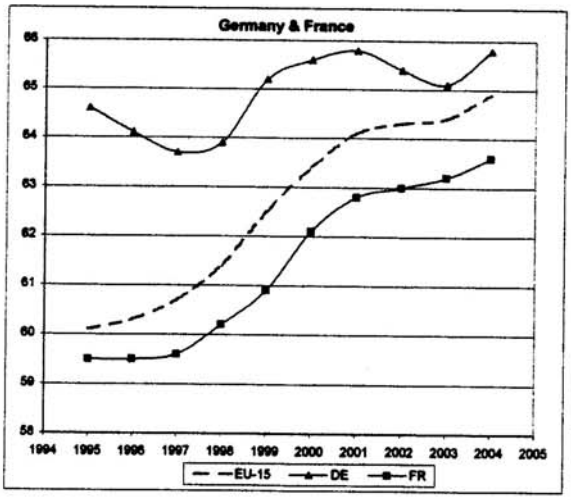


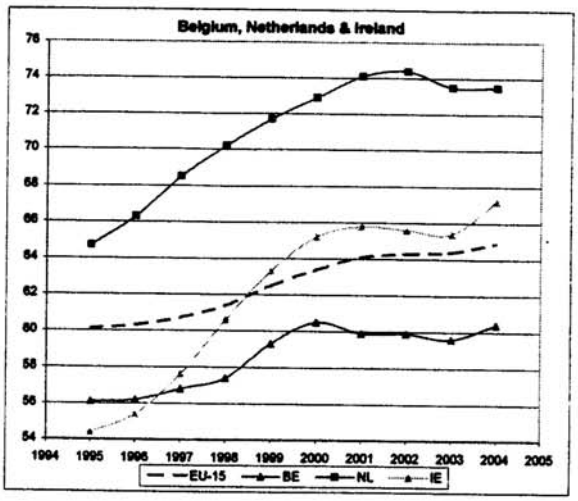


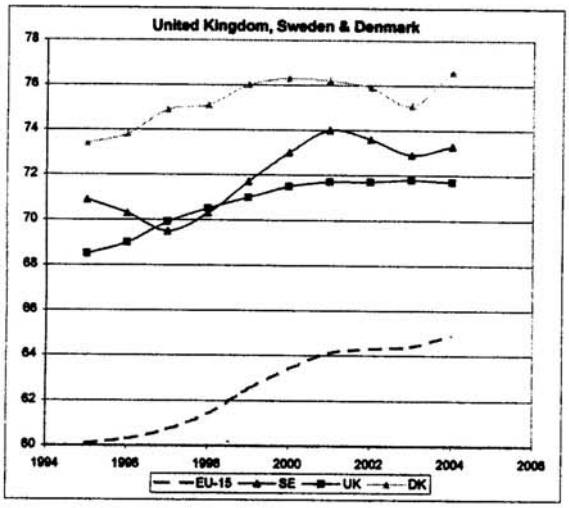


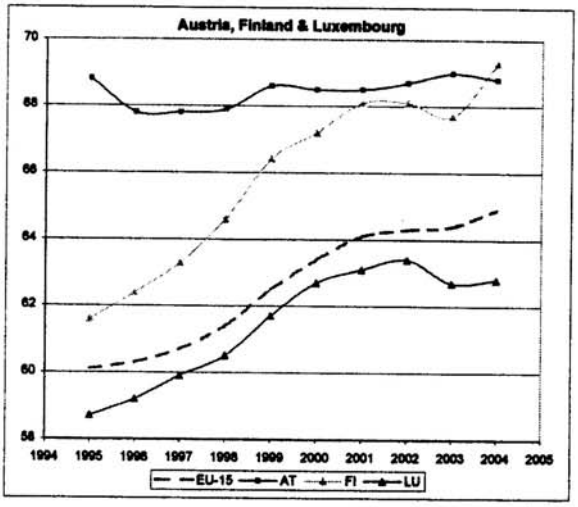


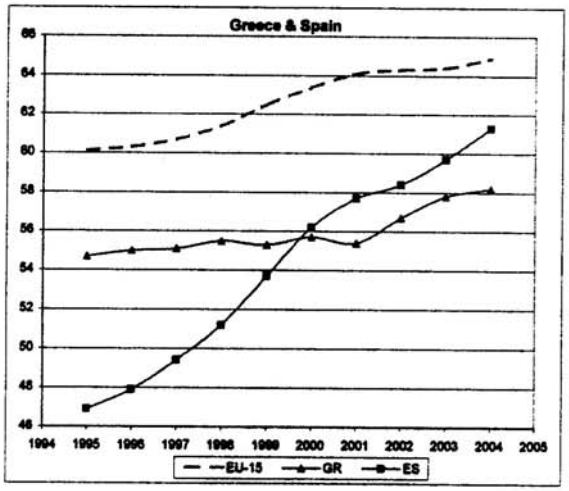
3. Employment Rate (aged 15-24 as a share of the total population at the same group)

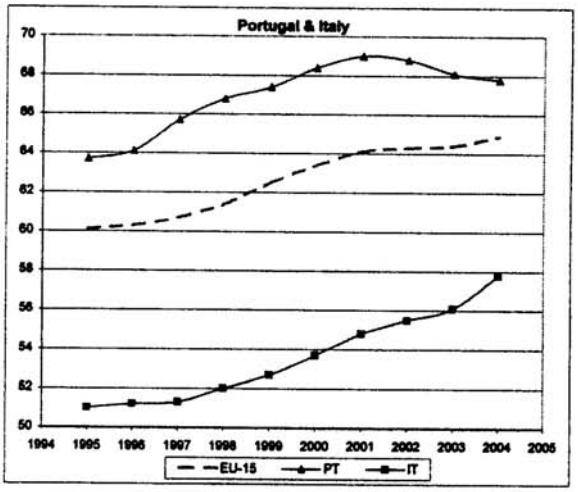




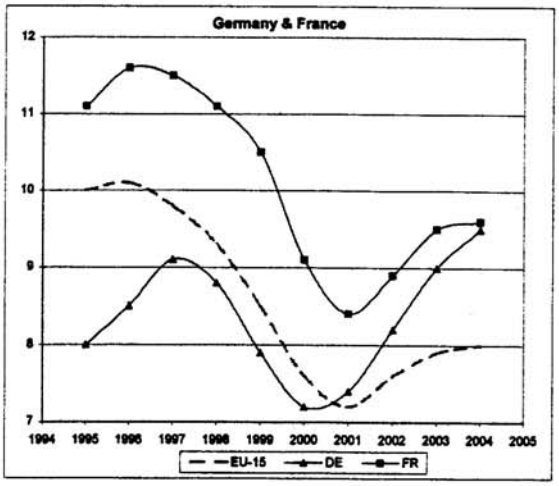


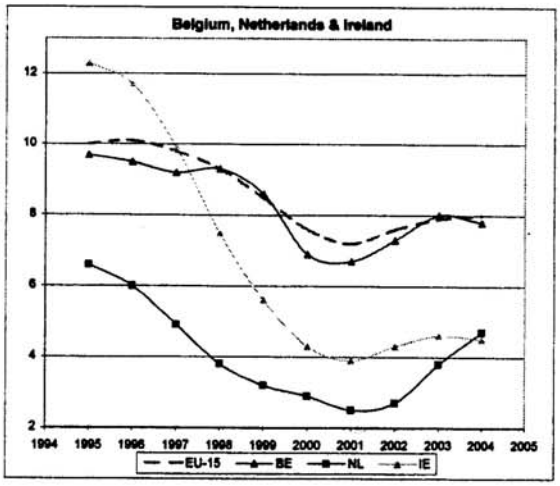


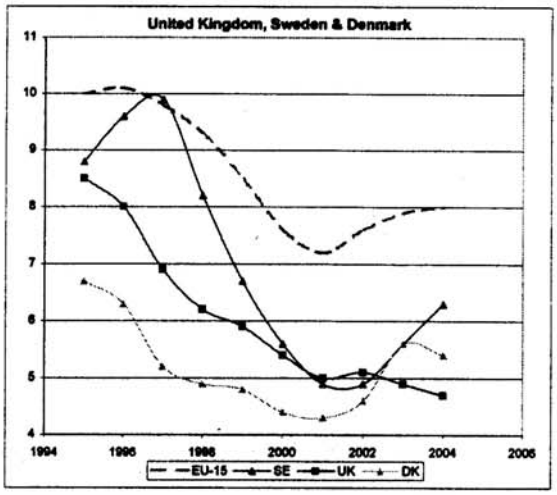


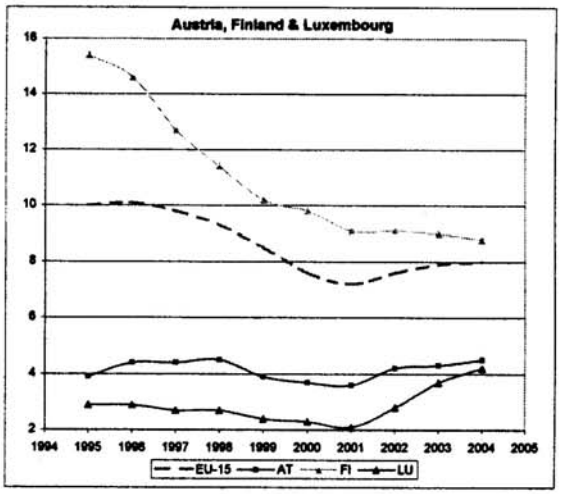


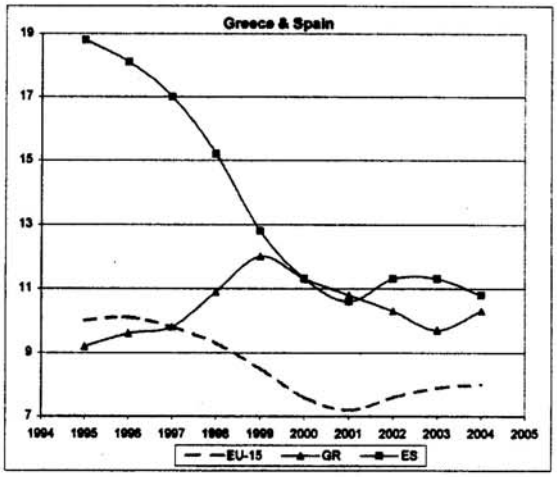
4. Unemployment Rates (Unemployed individuals as a share of active population. Eurostat definition)

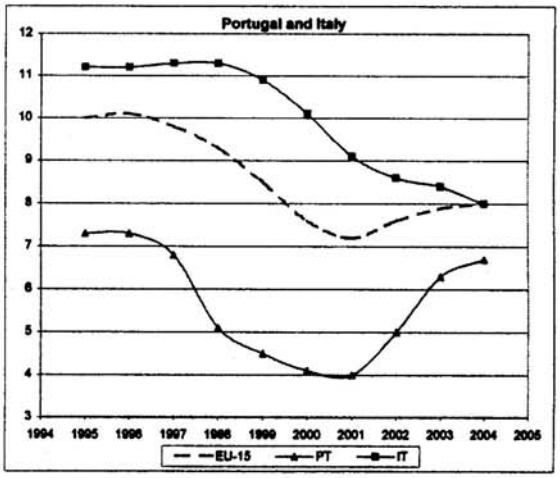




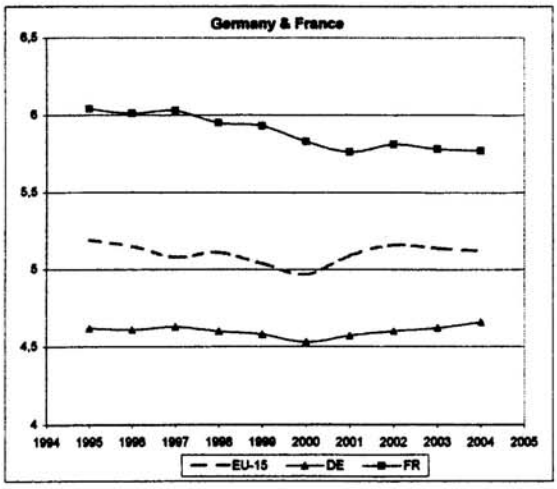


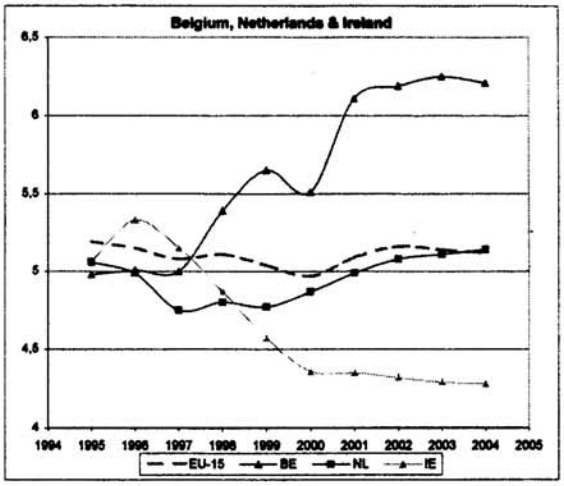


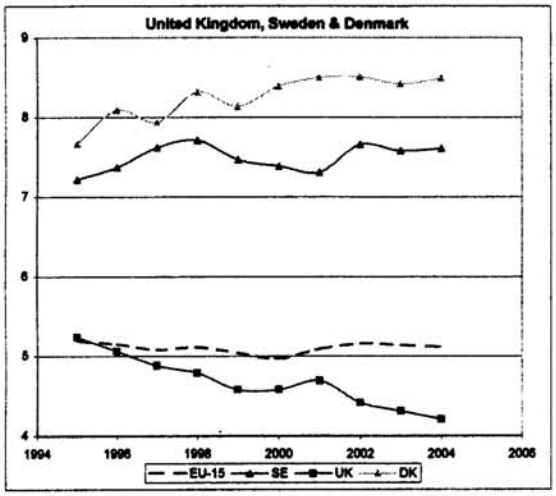


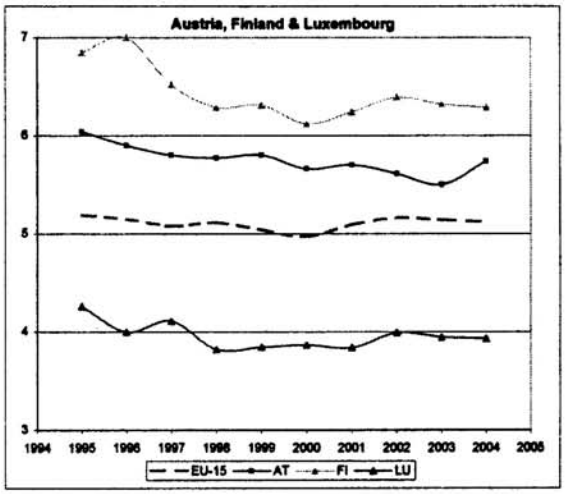


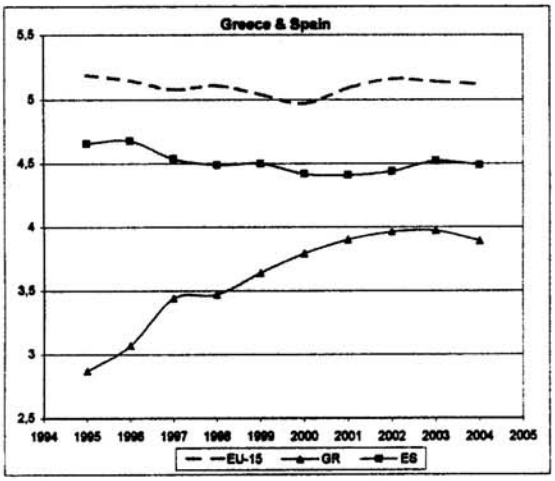
5. Spending on Human Resources (Total public expenditure on education as a % of the GDP)

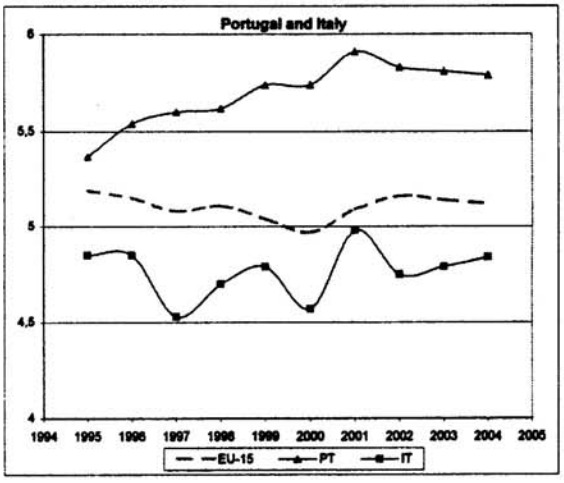




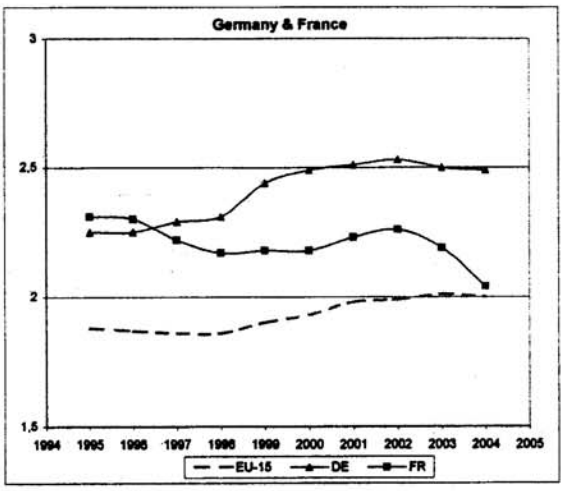


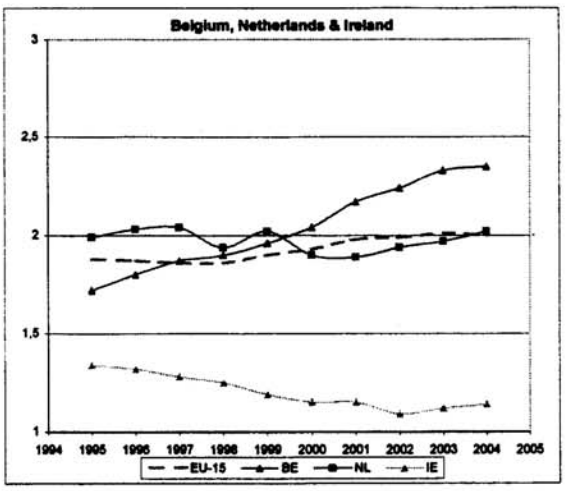


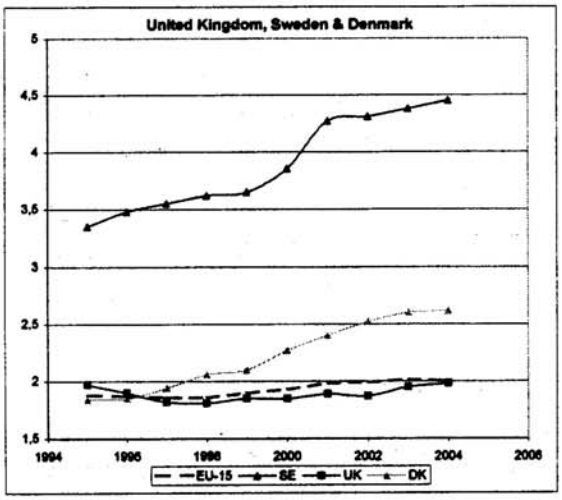


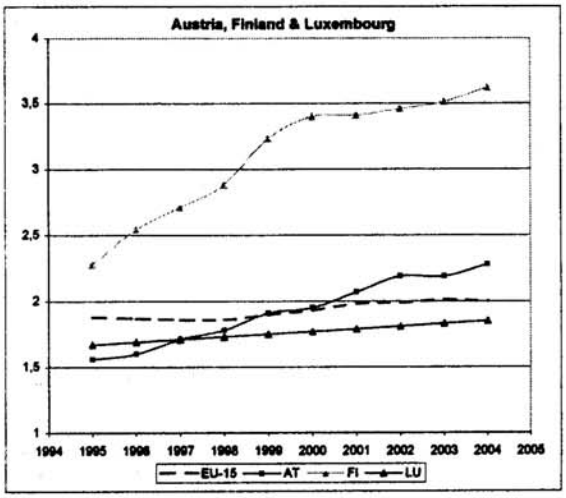


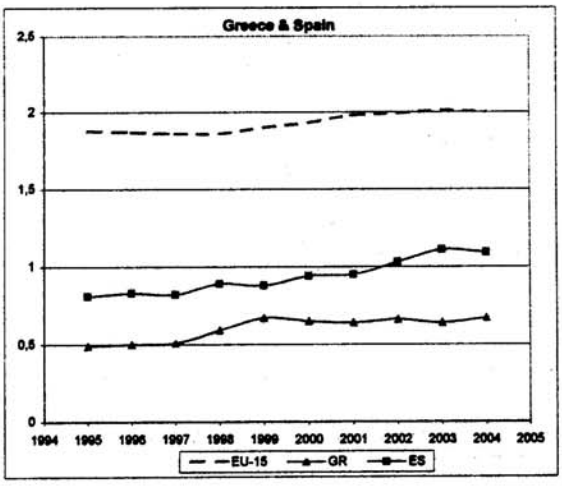
6. Gross Domestic Expenditure on R&D (as % of GDP)

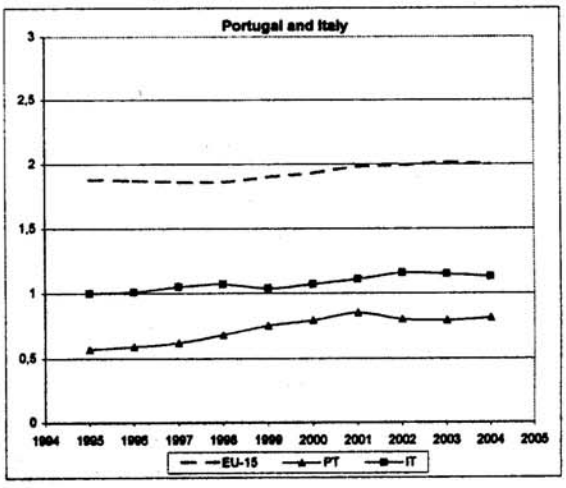




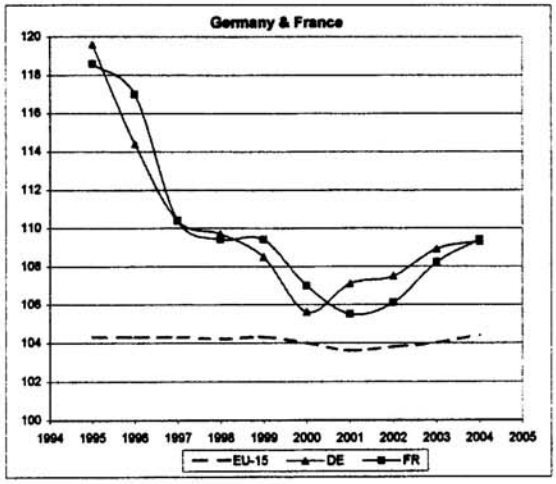


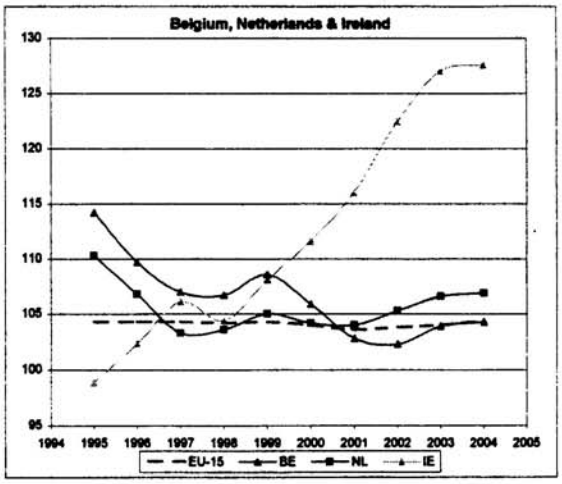


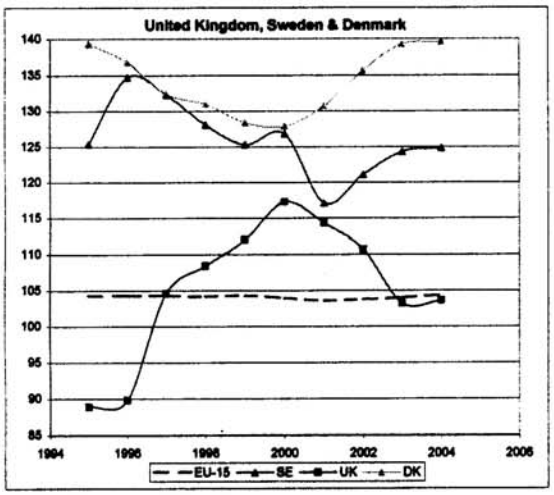


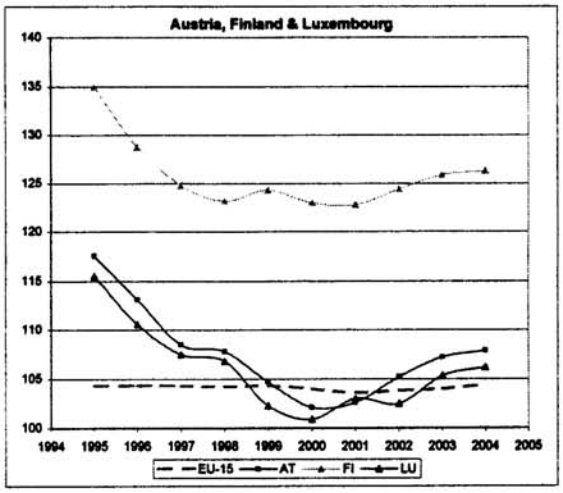


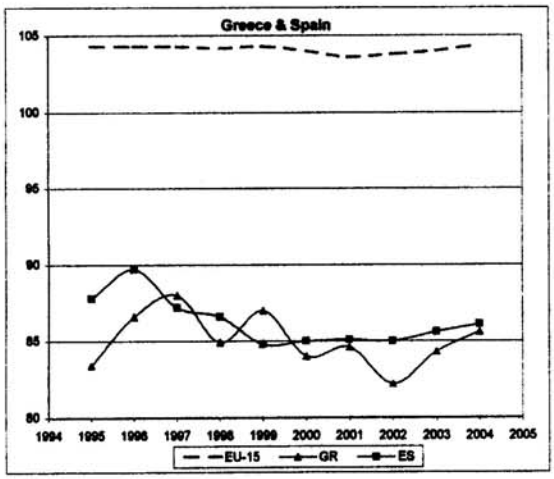
7. Comparative Price Levels (of final consumption by private households incl. indirect taxes)

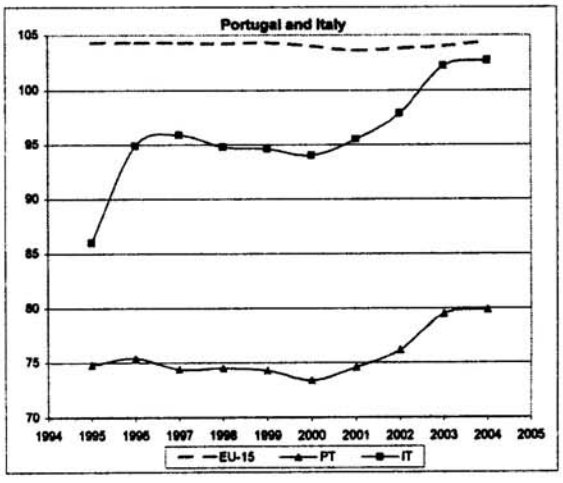




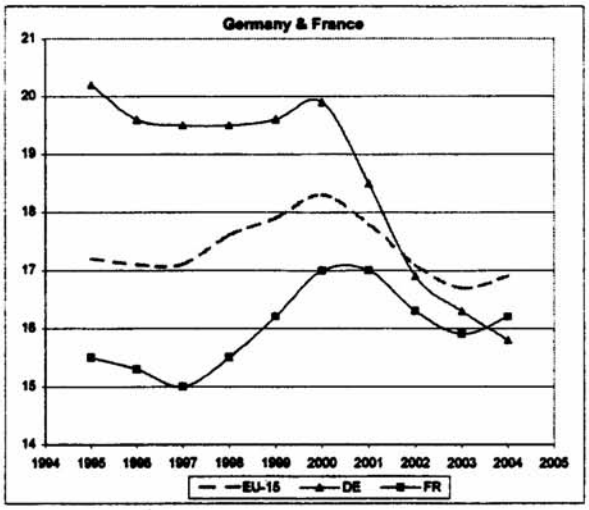


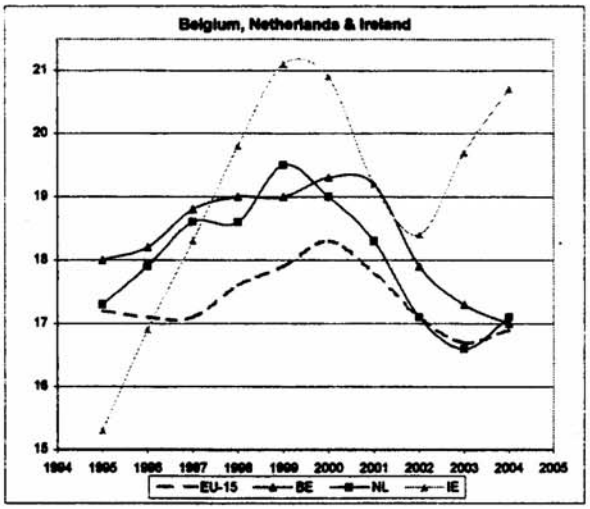


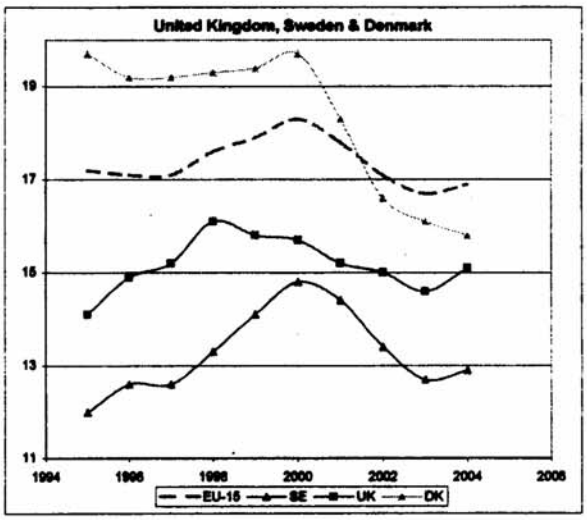


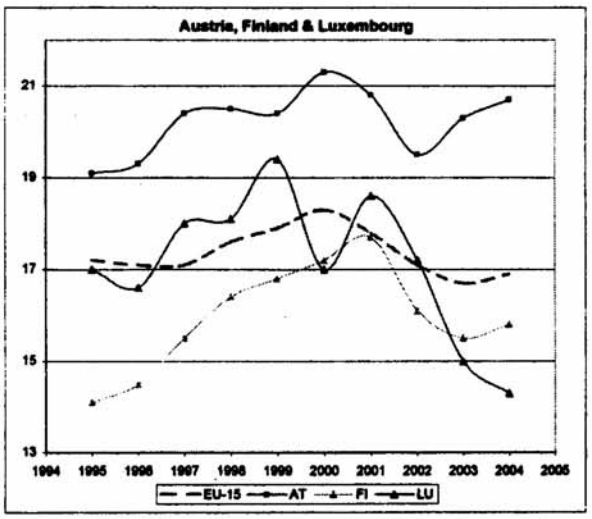


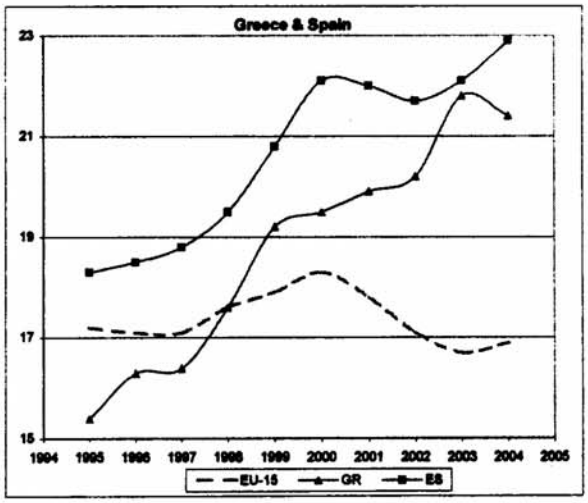
8. Business investment (Gross fixed capital formation by the private sector as a % of GDP)

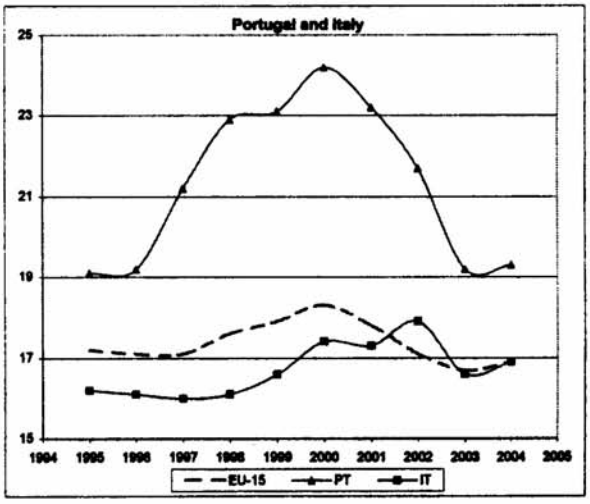




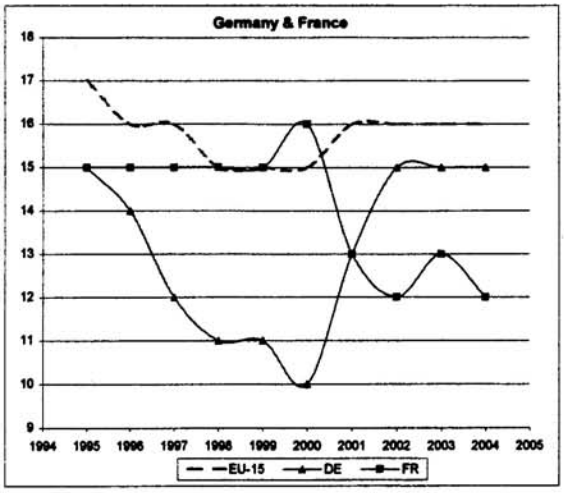


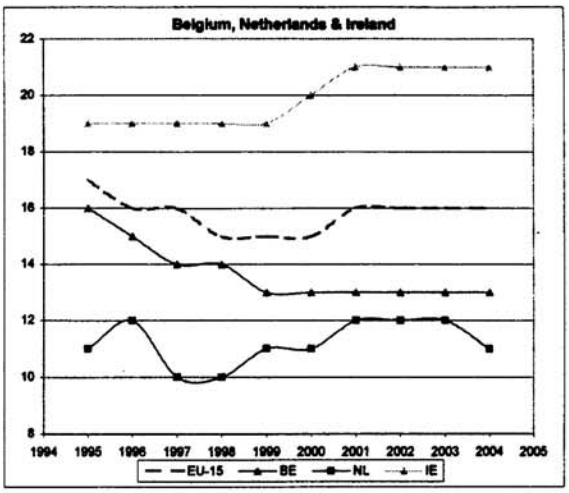


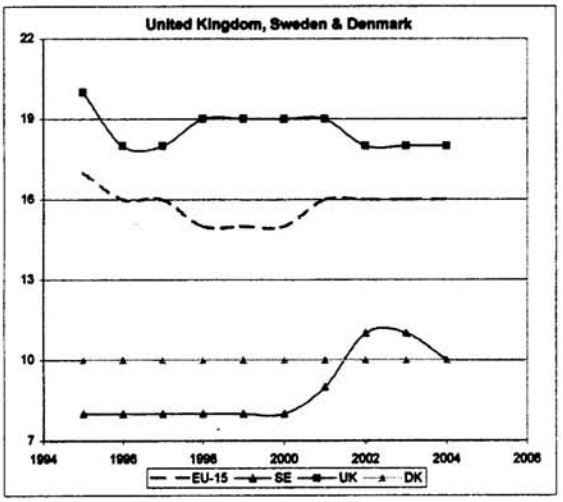


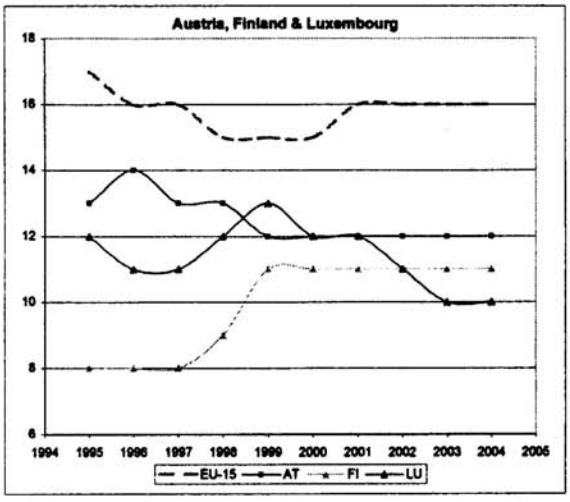


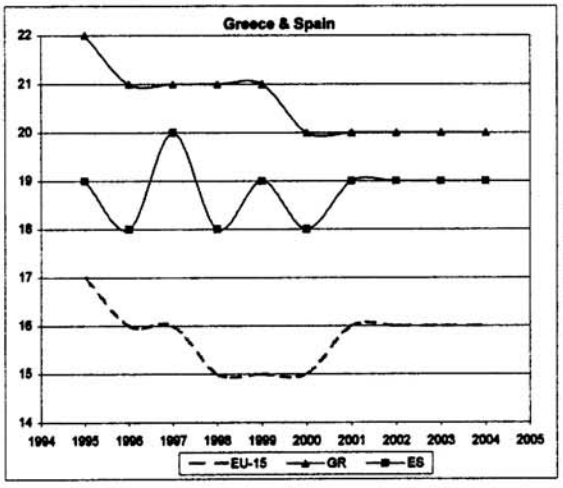
9. At-Risk-Poverty rate after social transfers
(share of persons with equivalised disposable income below the threshold of 60% of the national median, after social transfers)

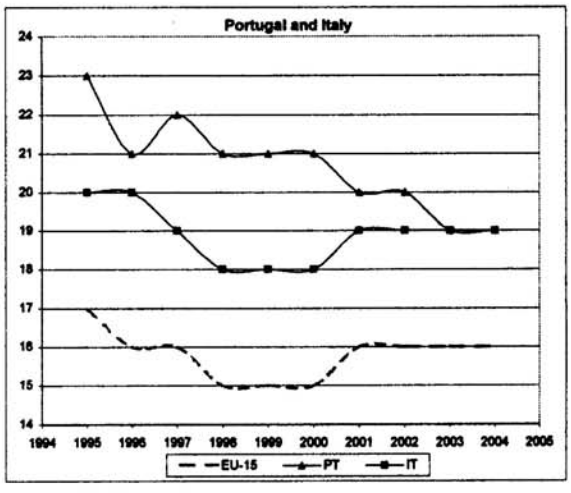




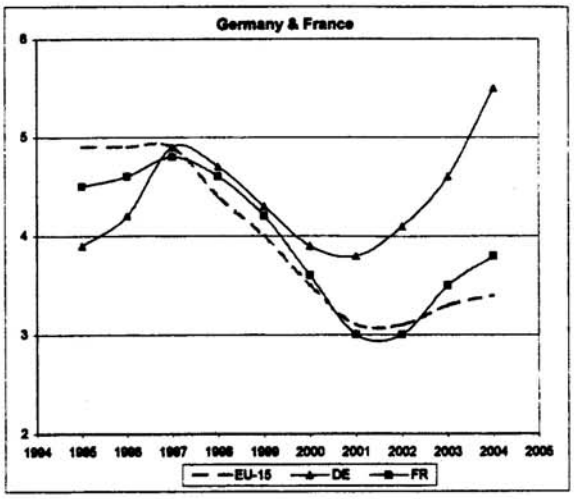


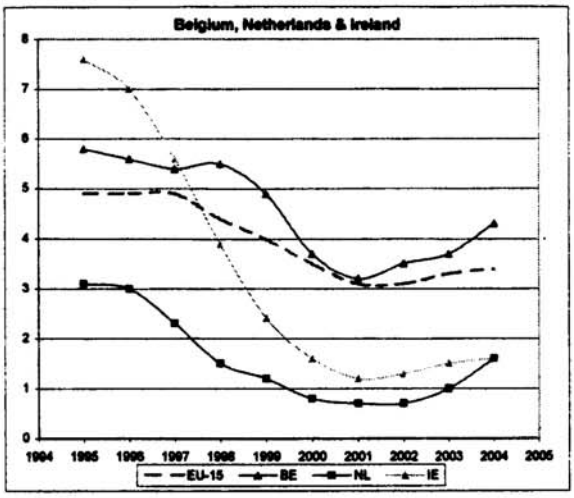


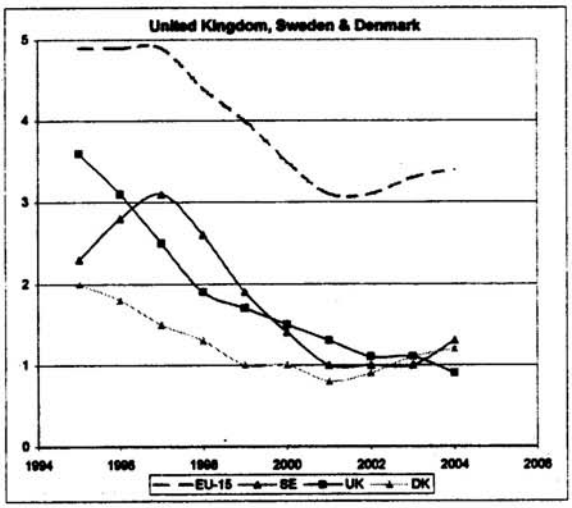


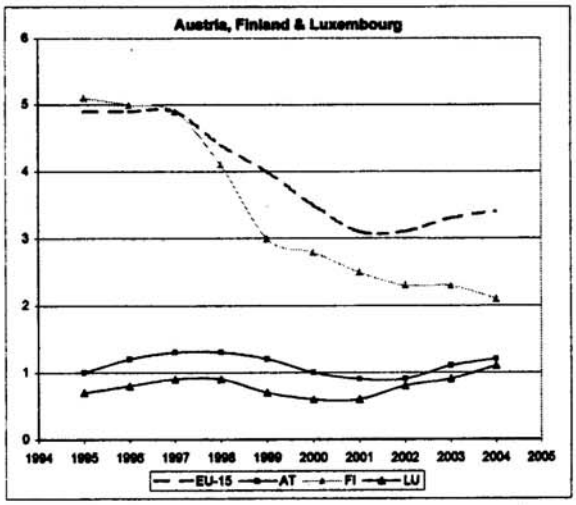


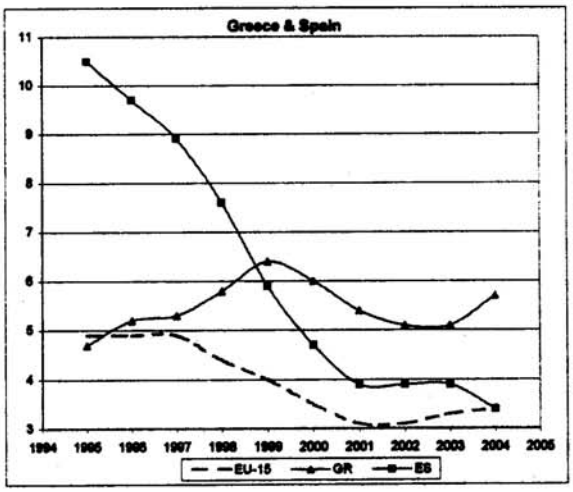
10. Total Long-Term Unemployment Rate (12 months or more, as a % of the total active population)

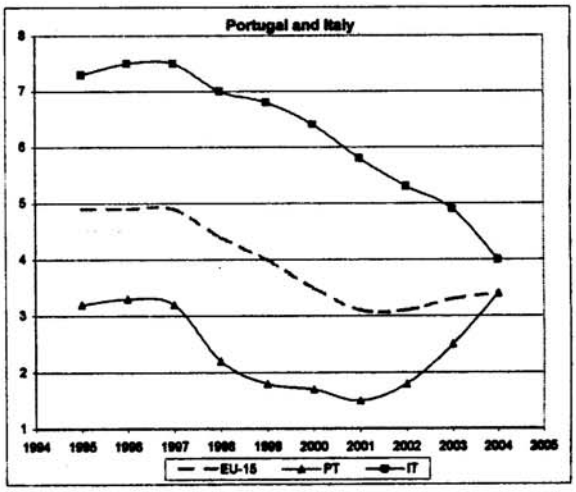




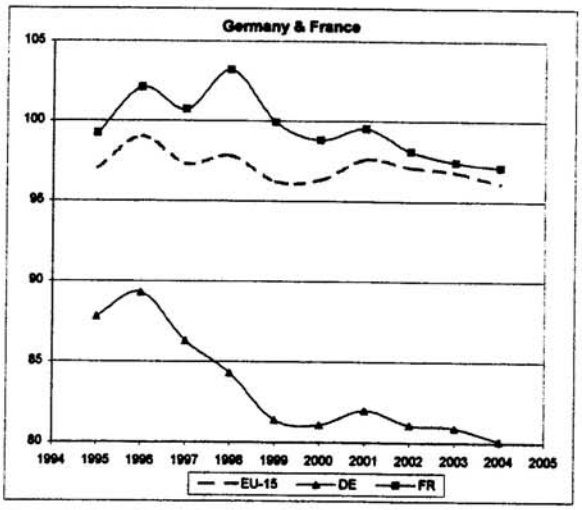


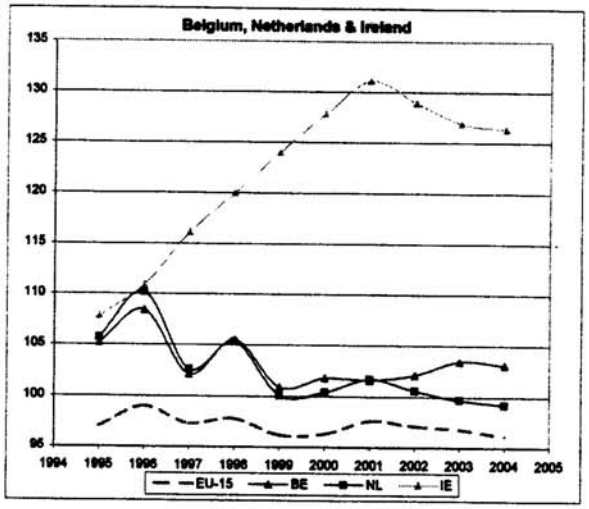


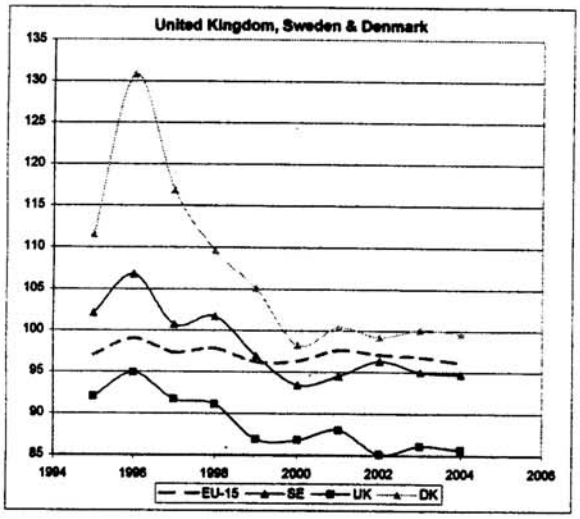


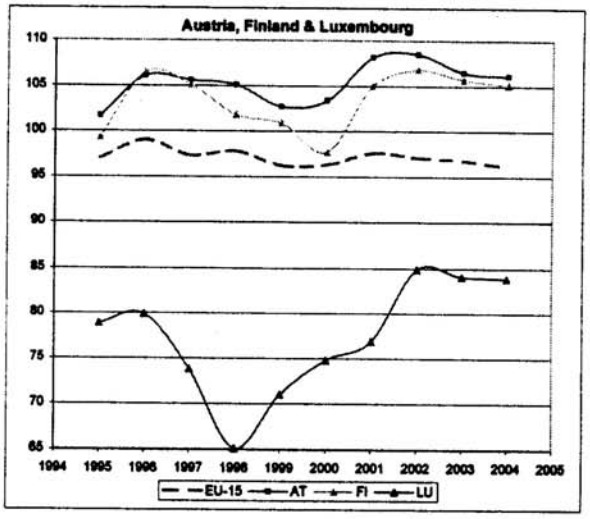


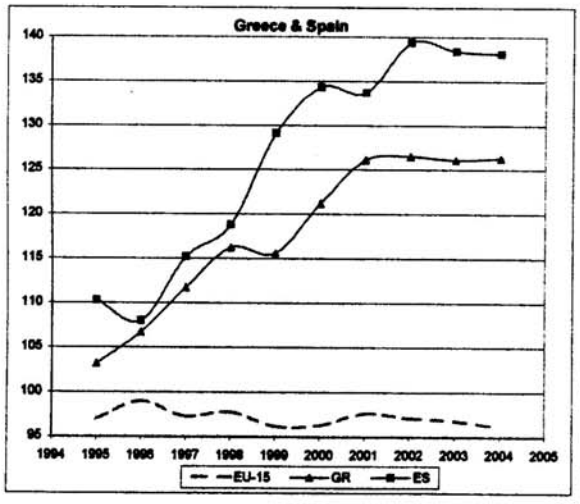
11. Total Greenhouse Gas Emission (% change in 6 main gases, according to Kyoto Protocol)

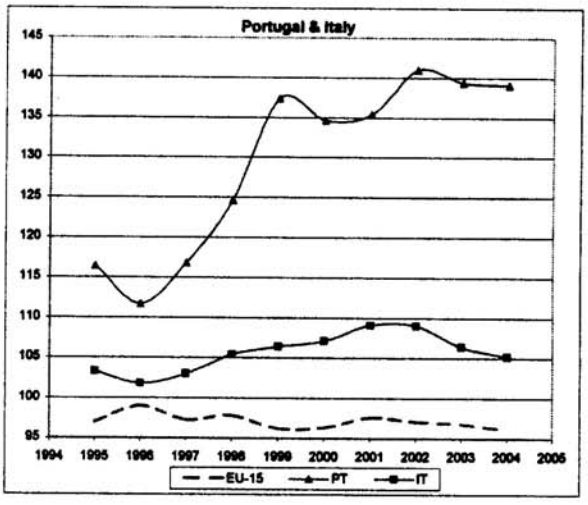




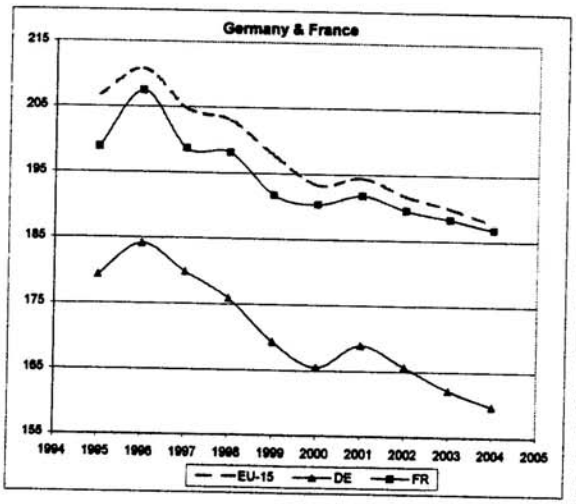


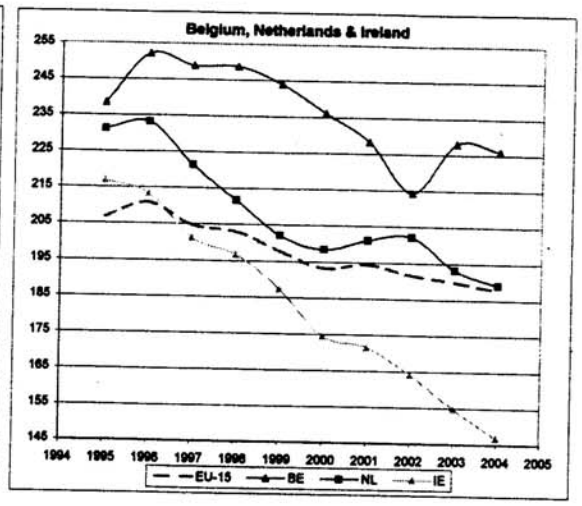


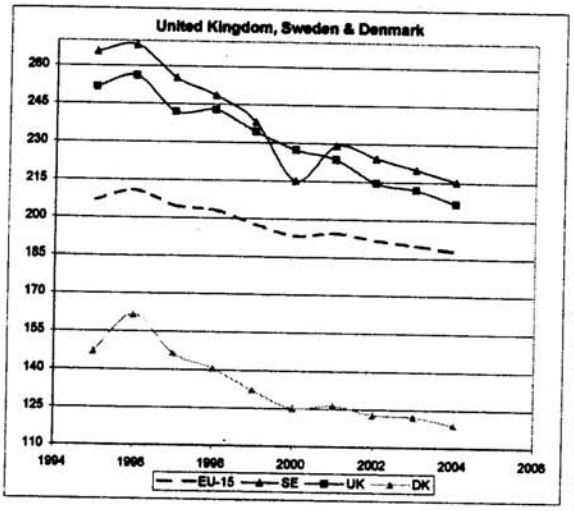


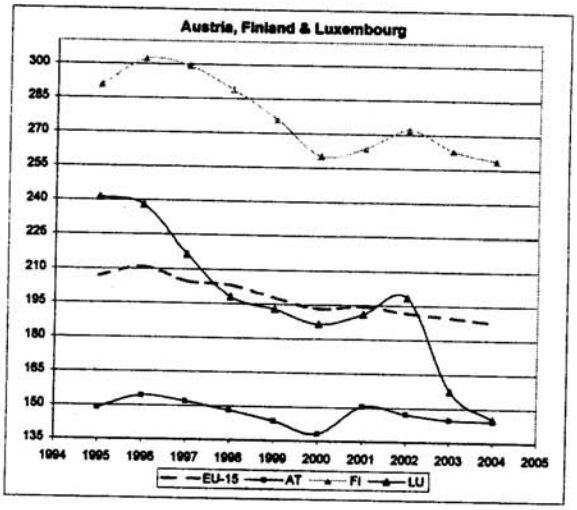


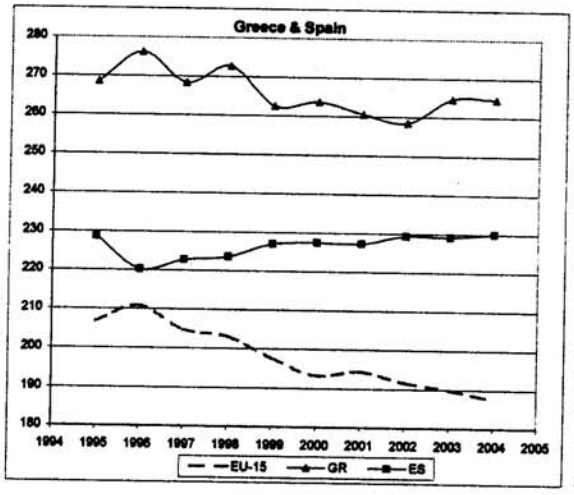
12. Energy Intensity of the Economy (Gross Inland Consumption of Energy Divided by GDP)

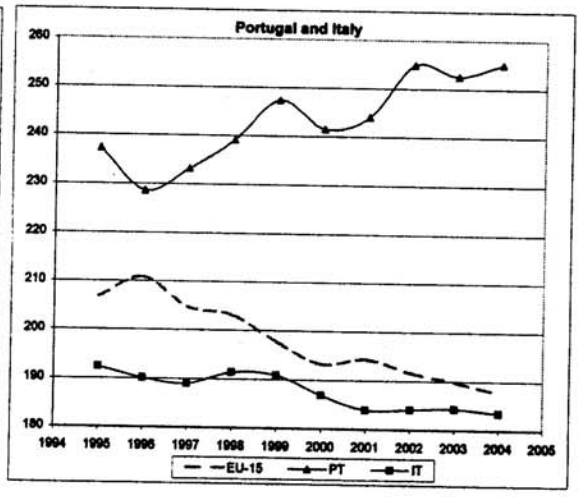












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