

THE LISBON STRATEGY: AN EMPIRICAL ANALYSIS

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This paper investigates the European economic integration within the frame work of the 2000 Lisbon Council with the aim of studying the dynamics affecting the social and economic life of European Countries. Such a descriptive investigation focuses on certain significant variables of the new theories highlighting the importance of technological innovation and human capital. To this end the multivariate statistic technique of Principal Component Analysis has been applied in order to classify Countries with regard to the investigated phenomenon.

Keywords: Knowledge Economics, European Integration, Human Capital, Principal Component Analysis (PCA).

JEL codes: F40, I20, O10

1. Introduction.

Globalization and the challenges of the new knowledge-based economics mark a watershed in the history of the European Union. The subsequent changes affected all sides of common life and have modified European economy, also because of the recent enlargement. Therefore the Union should perceive and efficiently pattern such changes so to promote the best integration of the member States. To this end a shared strategic target and a common program shall necessarily be set among European Countries, allowing the creation of the infrastructures needed for the best knowledge production, spread of innovation and a broader cooperation, so to initiate the due reforms for an integrated social and economic development of all the Countries. By means of the multivariate statistic technique of Principal Component Analysis (PCA), this preparatory analysis describes the current conditions of the production and social structure of the EU-27 Countries further to the 2000 Lisbon Council directives. The key principles of such a strategy have been here retraced also with reference to the literature highlighting the impact of technological and knowledge processes on economic development (par.2). In the second part of this paper the principal components analysis is introduced in order to show the Countries' performances with regard to the reference phenomenon (par.3). Lastly, the main results of the analysis are shortly summarized (par.4).

2. The new challenges of the EU.

The European integration has led - and still leads today - to fundamental changes both in the production structure and in the way of conceiving the production process. This is clearly a direct and inescapable consequence of the development and the rapid spread of globalization and internationalization starting from the late '80s and the early '90s, as never before in human history. Therefore it is important to focus the attention on the processes of space concentration of Research and Development and innovating activities, as well as on the production and spreading of knowledge processes among and inside each Country. This is why there is a broad literature

strongly supporting the idea that the mechanisms for the production and spreading of knowledge play an important role in affecting the economic development¹⁶⁸. The technological process, strictly connected to knowledge processes, thus becomes a key element in understanding the micro and macro fundamentals of economic growth, of industrial structures development and of the concentration of economic activities in the European Countries. Consequently, knowledge economics aims at studying knowledge as an economic good, applied by virtue of the properties of such an atypical resource which also regulate its production, spread and reproduction. Apart from historic economists such as Smith, Marx and Schumpeter, who in a way have investigated knowledge, there are many significant writers who contributed to the development of knowledge economics, among others (Hayek, 1945; Arrow, 1962; Simon, 1982; Machlup, 1984; Foray, 2000). The idea of knowledge from an economic point of view has been changing year after year; indeed from complementary (exogenous) resource of the economic growth it turned into a basic and endogenous input of the economy itself (Solow, 1956; Romer, 1990). So, a knowledge-based economics can be defined as such only if knowledge itself is produced, distributed and innovated within institutions and social structures. It is necessary to underline that, in order to foster development in a competitive socio-economic environment there shall be adequate institutions supporting the promotion of innovative actions. Furthermore, it is necessary to encourage the training of innovation-oriented professionals with the right mix of basic and advanced skills, supporting lastly the most dynamics and competitive economic parties. The economic reforms agenda set out in the 200 Lisbon strategy is of the utmost importance in this sense. It has been clearly stated the target of making European Union the most competitive and dynamic knowledge economy before 2010, and for the first time knowledge has been detected as a pillar issue, despite the strategy opens onto all fields of the economic policy¹⁶⁹.

3. Dataset and method of analysis.

This paragraph introduces the analysis of the data which, by means of the multivariate statistic technique of Principal Component Analysis, it is possible to lead a preparatory and descriptive investigation of the studied phenomenon¹⁷⁰. Regarding the reference dataset (dataset World Bank, 2007), the following EU-27 variables have been chosen EU-27: GDP per capita (GDP); Foreign direct investment, net outflows (FDIno); Foreign direct investment, net inflows (FDIni); ICT expenditures (ICTexp); Internet users (Intusers); telecommunication revenues (Telecom); ICT goods (ICT exports – ICT imports); School enrollment tertiary (Education); Patent applications (Patent); Labor force with III education (Adlabor); R&D expenditures (RDexp); Percentage of enterprises using e-learning applications for training and education of employees (elearning)¹⁷¹. These variables have been chosen on the basis of the ideas stated and shared by a broad theoretical and empirical literature (Becker, 1964; Krugman, 1991; Kessels, 2001; Mason, 2005; Mattoscio *et* Colantonio, 2006) and according to the issues this paper aims at examining. The results of such an analysis are referred to hereafter (Tab.1). The main contribution of the three first components is thought to be enough to explain 74% of the total information¹⁷².

168 It is commonly thought that stimulating knowledge processes through technological change and human capital, both factors affecting productivity, generates virtuosities.

169 The strategic targets of the Lisbon Council are listed below: innovation and entrepreneurship; welfare reform and social inclusion; human capital and labor retraining; equality of opportunities for women employment; labor and products market liberalization; sustainable development.

170 For a thorough understanding of such a technique see Vitali (1991) and Fabbris (1997).

171 The source for e-learning applications is Eurostat (2007).

172 This study has been performed using the heuristic criterion of global variance, although the same results have been obtained with the two other criteria (screen plot and Kaiser's decision rule).

Table 6- principal components; 12 components retained

Component	Eigenvalue	Proportion	Cumulative
1	3.832315	31.93596	31.93596
2	3.247632	27.06360	58.99956
3	1.680528	14.00440	73.00396
4	1.148609	9.571742	82.5757
5	0.665355	5.544624	88.12033
6	0.443592	3.696603	91.81693
7	0.350664	2.922202	94.73913
8	0.246862	2.057187	96.79632
9	0.165956	1.382967	98.17928
10	0.147640	1.230330	99.40961
11	0.068685	0.572377	99.98199
12	0.002161	0.018009	100.0000

Source: our elaboration

The next table (Tab.2) highlights the variables with the greatest impact on each principal components. The first one is mainly affected by purely economic variables thus it can be explained in the sense of openness to international market. The second one, on the contrary, can be interpreted as the contribution of technology to economic development. Lastly, the third one could stand for a synthetic index of the level of human capital.

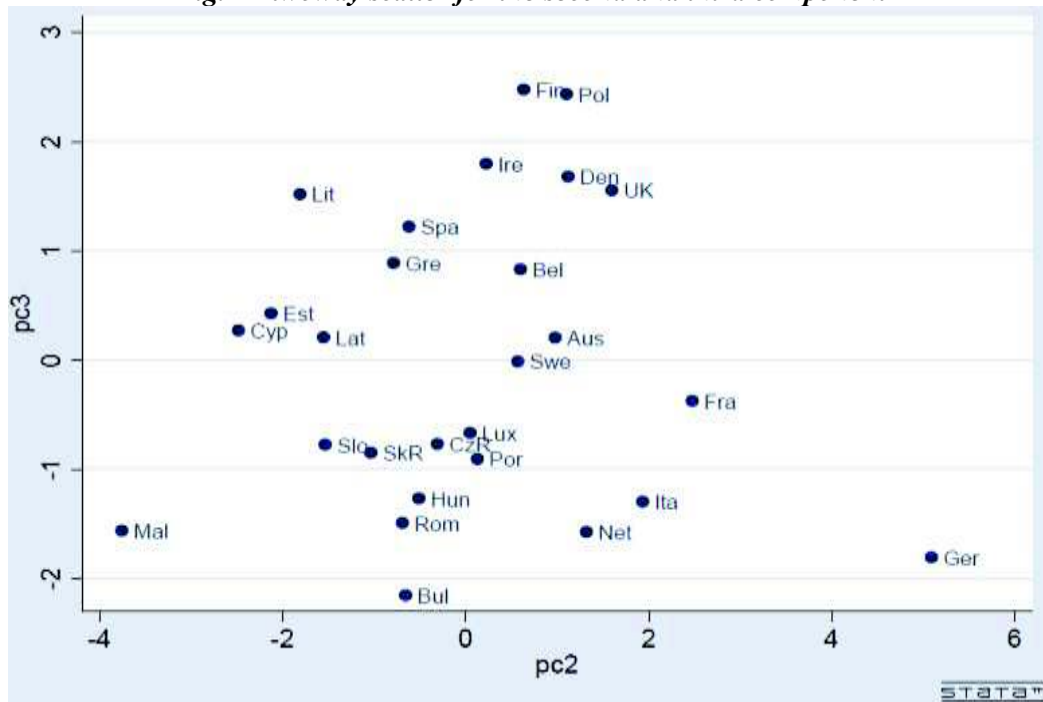
Table 7 - Scoring coefficients

Variables	pc1	pc2	pc3
gdp	0.904	-0.297	0.059
fdino	0.557	-0.780	-0.110
fdini	0.523	-0.805	-0.117
ictexp	0.154	0.521	-0.691
intusers	0.835	0.220	0.168
ictgoods	-0.819	-0.044	-0.187
education	-0.252	-0.312	0.314
telecom	-0.072	0.785	0.234
patent	0.619	0.616	0.038
adlabor	0.329	0.045	0.648
rdexp	0.526	0.689	0.121
elearning	-0.448	-0.095	0.721

Source: our elaboration

In order to achieve a global assessment of the socio-economic development of European Countries, and specifically of the dynamics of technological innovation (consequent to a raise in knowledge processes) and of capital, the classification resulting from the analysis and drawn according to the second and third components are also shown. The scores of the principal components referring to the studied Countries have been marked on a bi-dimensional scatterplot for a greater information visibility and so to point out their distribution with reference to the information given by the two components.

Fig. 2 - twoway scatter for the second and third component



Source: our elaboration

4. Conclusions.

As far as knowledge and human capital investments (and the subsequent development of technological innovation) are concerned, this analysis has given the following results: first, Finland, Poland and Ireland represent a greater investment in human capital. Second, the trend of Deutschland, followed by France, Italy and Holland, due to a better level of technological skills. Third, Denmark and the United Kingdom have the best balance among the components. Lastly, a group of Countries (Greece, Spain, Lithuania, Cyprus, Latvia and Estonia) shows a negative result in terms of technological development. The remaining Countries studied have a negative outcome for both components.

It is worth to underline that this analysis is only a first step in such an investigation and shall not be considered as exhaustive in order to thoroughly understand the reference dynamics, it can simply be useful for further and more detailed investigation.

Bibliography.

1. Arrow K. (1962), *The economic implication of learning by doing*, Review of economic studies, n.29, pp 155-173
2. Becker S. (1964), *Human capital*, University of Chicago Press, Chicago.
3. Fabbris L. (1997), *Statistica Multivariata-. Un'analisi esplorativa dei dati*, Mc Graw-Hill, libri Italia.
4. Foray D. (2000), *L'économie de la connaissance*, La Découverte, Paris (ed. it. 2006, L'economia della conoscenza, Il Mulino, Bologna).
5. Hayek F:A. von (1945), *The use of knowledge in society*, American Economic Review, 35, 4, pp. 519-530.
6. Kessels J.W.M. (2001), *Learning in organisations: a corporate curriculum for the knowledge*
7. *economy*, Future n. 33 – 2001, pp. 497-506
8. Krugman P.R. (1991), *Geography and Trade*, Cambridge, Mass., the MIT Press.

9. Machlup F, (1962), *The Production and Distribution of Knowledge in the United States*, Princeton University Press.
 10. Mason J. (2005), *From e-learning to e-knowledge, Knowledge Management Tools and Techniques*, Elsevier, London, pp. 320-328.
 11. Mattoscio N. and Colantonio E. (2006), *Crescita, sviluppo e globalizzazione nell'economia della conoscenza: un modello di MDS analysis*, *Global & Local Economic Review*, IX, 3-39.
 12. Romer P. (1990), *Endogeneous Technological Change*, *Journal of Political Economy*, 98(2), 71-102.
 13. Simon H.A. (1982), *Models of Bounded Rationality: Behavioural Economics and Business Organization*, vol.2.2, Cambridge, MA, MIT Press.
 14. Solow R.M. (1956), *A Contribution to the Theory of Economic Growth*, *Quarterly Journal of Economics*, 70, 65-94
- Vitali O. (1991), *Statistica delle scienze applicate*, Carocci Editore.