EU AND GLOBALIZATION: SOME STYLIZED FACTS

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Most of the people all over the world claim that globalization is a result of dynamic interactions between economic, technological, social and political factors. The aim of this paper is to document some stylized facts on this phenomenon in order to take a further step forward in implementing a multidimensional framework as an overall assessment of the level of integration of European countries in the international community. In this connection we implement a k-means Clustering Algorithm to classify 73 countries into four groups (leaders, potential leaders, dynamic followers and marginalized) by considering a data set of 16 selected variables as indicators of the main dimensions of a sustainable globalization in 2006.

Keywords: globalization, cluster analysis, k-means algorithm, international ranking.

JEL Classification: E60, F0,F15,F43,O1

Introduction.
There is a large consensus in the international community on the idea that studies on globalization require a careful analysis of numerous factors, not just economic integration, which are likely to affect development dynamics.
This paper stems from the need to take a further step forward in the construction of a multidimensional framework combining different elementary dimensions of globalization in order to achieve an overall assessment of integration across countries.
When the research goal is to define a composite index, which summarizes the extension of the phenomenon under investigation in each dimension, it may be appropriate to proceed in three different and complementary phases: *descriptive phase, aggregation phase* and *inference phase* (Chiappero Martinetti 2005). The first phase concerns the selection of those variables which are representative of the phenomenon; the aggregation phase is a crucial step that requires to deal with technical aspects of aggregation, for each unit of analysis, across the dimensions or domains of globalization in order to make the implications in the underlying theoretical concepts explicit. The inference phase refers to the possibility of inferring a logical conclusion starting from the results of the previous steps.
In their earlier works the authors (Mattoscio N., Castagna A. and Furia D. 2007, Furia D. and Castagna A. 2008) focused on the second phase, giving attention to the need to overcome some controversial problems linked with multidimensional approach, e.g. weight system definition. There is another focal point about indicators which has been underestimated by the authors: the choice of variables in the descriptive phase may have a *value judgment* which affects the measure. Trying to resolve this latter matter, this paper follows in the previous footsteps and focuses on the measurement of European countries integration in the global community. This goal will be achieved by providing an implementation of k-means Clustering Algorithm to classify 73 Countries into four groups

(*leaders, potential leaders, dynamic followers and marginalized*) taking into account a data set of 16 selected and distinctive variables in 2006.

The paper is structured as follows: the first section introduces the role of globalization in economic growth across countries and its measures proposed in the literature to provide appropriate criteria for the choice of variables. The second section presents the main results of the data analysis. Section three concludes.

1. Globalization: its dimensions and measurement.

In spite of its frequent use, globalization is an unclear term, and it is not easily distinguishable from *internalization*. Ravallion M. (2004) argues that the selection of indicators is a crucial point in the debate between globalization supporters and its discontents because the effects that globalization generates on inequality may be affected by inherent *value judgment* of measurements and each opposing thesis may be sustained by data evidence.

This paper will focus on this point, i.e. in the selection of indicators and their assessment, as a preliminary step in building a composite index.

Over the last few years, there have been globalization measures concerning economic indicators analysis which make a distinction between *prerequisites* and *outcomes,* i.e. reduction of transaction barriers and results of integration dynamics (Brahmbhatt M. 1998). The economic dimension, which was a crucial element of integration in the past centuries, becomes a means of diffusion of ideals able to affect growth dynamics followed by people's capabilities and improvement of their way of life. Economic integration has produced benefits to those countries which have expanded their commercial borders, especially where governments have played a central role in this process. The other face of the medal are the millions of people for whom globalization has been ran without control and whose living conditions are nowadays worsen off (Stiglitz J.E. 2002). The easy way by which people get in touch with other cultures, and the awareness of lifestyles and living conditions different from their own, shift the focus of debate about inequality and poverty from a local point of view to a global level analysis and the related issues begin to gain the same weight of national ones (Milanovic B. 2002). Studies about globalization effects on per capita income inequality between countries show a convergence evolution over the past two centuries attributable to complex mechanisms at various levels of income hierarchy of citizens all over the world. When *life expectancy at birth* has been taken into account to examine *lifelong income* inequality in order to explain this kind of dynamics the result is a current divergence in the living conditions which has reached levels like two centuries ago (Bouguignon F. and Morrison C. 2002). Ben-David D. (1993) provides evidence that income convergence among specific industrialized[146] countries may be related to movement toward free trade. Focusing on countries'comparative advantage and its implication for trade, Venables A. J. (2003) yields predictions about the formation of custom unions leading to the conclusion that initial income levels may be determinant in driving convergence between members. Starting point conditions are crucial in the ongoing debate whether poor countries are or not able to take up the opportunities provided by an expanding economy. In is work, Ravillon M. (2001) argues that there are lots of factors, like location, social exclusion, exposure to insured risk, and not just endowments of physical and human capital, which need more attention. Different long run growth paths, therefore, have produced a divergence between rich and poor countries because idiosyncratic characteristics

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146 France, West Germany, Belgium, The Netherlands, Luxemburg and Italy during the transition period which lasted from 1959 until 1968 (Ben-David D. 1993, p. 654)

regarding not just their distance from the technological frontier but also desegregation of social and institutional milieu may conduce to an implosion of the system which may lose growth opportunities (Pritchett L. 1997). Olson M.J. (1996) has come to similar conclusions drawing on the fact that a subset of the lower income countries, those countries who have adopted relatively good economic policy along with solid institutions, are growing faster than higher income countries. Stiglitz J. E. (2002) sustains that the role of globalization in the development process is not clear and that a number of elements which are the basis of the democracy, such as poor people interest, environment preservation, free trade and human rights, has to be taken into account to reach its *beneficial potentials*.

From a methodological point of view, there are few studies dealing with multidimensional frameworks of globalization and most of them concern criticisms and improvements (Andersen M. 2003, Lockwood B. 2004) of a pioneer work about this argument, the *A.T. Kearney Foreign Policy Magazine Index* (Kearney A.T. 2001a, 2001b). This index is an assessment of globalization as a result of economic, technological and political integration. However, there are lots of international organizations that use synthetic indexes to monitor global and complex phenomena which represent some different expressions of integration, like human development, global competitiveness, human rights and environment preservation. In the present work the following five elementary globalization domains underlining its sustainable features are selected: economic integration[147], technological potential[148], social awareness[149], environment sustainability[150]. The next section will present an original data application.

2. Integration level of European countries and the rest of the world.

This section presents some stylized facts concerning globalization as a main result of a cluster analysis based on *k*-means algorithm used to investigate the role of 16 variables[151] in the description of integration level between European countries[152] and the rest of the world. The aim of *k*-means algorithm (Hartigan J.A. 1975, Hartigan J. A. and Wong, M. A. 1979) is to divide the selected *73* countries in *16* domains into four (*k*) clusters so that the within-cluster sum of squares is minimized[153]. The implementation yielded as distinct as possible clusters, which are shown in Fig 1. Fig 2 is useful in going over the differences in means between groups and their accomplishments.

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147 The variables, all expressed as percentages of GDP, are: Trade, FDI (net outflows plus inflows), Income payments and receipts.

148 The selected variables are: Internet users (per 100 people), Secure Internet servers (per 1 million people), High-technology exports as % of manufactured exports, Ict expenditure as % of GDP, R&D expenditure as % of GDP.

149 The indicators are: International voice traffic out and in min pro capita, life expectancy at birth (years), international tourism (number of departures plus arrivals as % of population), workers' remittances and compensation of employees, received as % of GDP, international migration as % of population.

150 Indicators has been chosen with reference to MDGs: Marine and Nationally protected areas as % of surface area, CO2 emissions (metric tons per capita), forest as % of total land area.

151 Data source is WDI.

152 Lack of lots of data for Luxemburg and Netherlands has caused their exclusion from the analysis.

153 The general procedure is to search for a k-partition with locally optimal within-cluster sum of squares by moving the objects from a cluster to another, with the purpose to minimize the variance of elements within the cluster and to maximize the variance of elements outside the clusters.

Fig.1: Countries grouped in clusters

Cluster-1: Hong Kong, Singapore.
Cluster-2. Australia, Austria*, Belgium*, Canada, Czech Republic*, Denmark*, Estonia*, Finland*, France*, Germany*, Israel, Japan, Korea Rep., Malaysia, New Zealand, Norway, Slovenia*, Spain*, Sweden*, Switzerland, United Kingdom*, United States.
Cluster-3. Iceland, Ireland*, Malta*.
Cluster-4: Argentina, Bangladesh, Botswana, Brazil, Bulgaria*, Cyprus*, Chile, China, Colombia, Costa Rica, Croatia, Egypt Arab Rep., Ghana, Greece*, Hungary*, India, Indonesia, Italy*, Jordan, Kenya, Latvia*, Lithuania*, Mexico, Morocco, Nigeria, Pakistan, Panama, Peru, Philippines, Poland*, Portugal*, Romania*, Russian Federation, Saudi Arabia, Senegal, Slovak Rep.*, South Africa, Sri Lanka, Tanzania, Thailand, Tunisia, Turkey, Uganda, Ukraine, Venezuela, Vietnam

*EU members

Most of the analyzed European countries demonstrate good levels of global integration, as well as North America and Pacific high income countries do, accordingly these countries can be classified as *dynamic followers* of *leaders* in the process of global integration . Ireland and Malta, along with Iceland are better performing than other members being far away from the rest of EU with reference to *FDI* and *income*, internet indicators and *High-tech exports*, but they falls down for *Ict expenditure* (cfr. Fig.2). Moreover, this group is a good performer with reference to the domains considered as a whole and they may be named *potential leaders*. Bulgaria, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania and Slovak Rep. reveal poor achievements related to those of middle and low income countries. In this descriptive representation these countries may be referred to as a *marginalized* group.

There are no EU members in the first cluster, the *leaders*, which scores highly on economic integration with the main difference on *trade*. This indicator is not useful in distinguishing the remaining groups as the cluster means are very close. Hong Kong and Singapore present, however, good achievements with reference to *FDI* and *income*, similar to cluster 3. Group 4 is ranking below the other groups due to lower achievements in each dimension with the exception of *expenditure on Ict*, *forest* land, marine and national *protected areas*. The clusters perform differently in terms of technological dimension, which is a proxy of a country's ability to be up to global competitiveness. Marked divergence between cluster 4 and the competitors is recorded with respect to *R&D expenditure* as percentage of GDP.

Fig.2: means plot for clusters

279
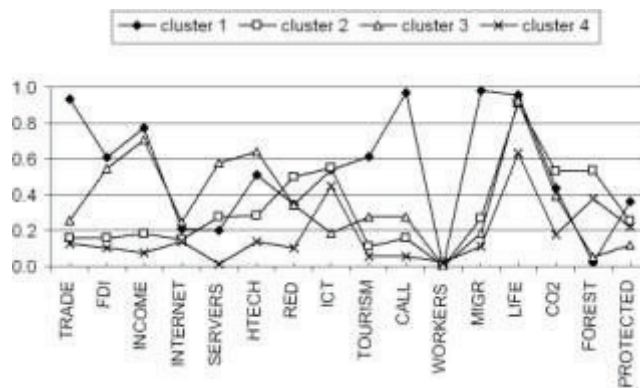
Living condition means are very close for first three groups, while lower and middle income and development countries incidence in the last cluster puts its e*xpectancy life at birth* mean down as a consequence of starvation, illness, lack of freshwater and generalized poor standards of living. Social indicators may be considered good markers since they catch the variances among groups with the exception of workers' remittances that show very close means. Cluster 2 presents the highest level of CO2 emissions and is a good performer on the environment dimension. The two groups of leaders devote similar attention to environment preservation, and fall behind the marginalized group on percentage of land covered by *forest*. The interest in the *protection* of threatened marine and national areas seems not to be useful in distinguishing the clusters.

Economic integration is a crucial dimension of globalization. An exhaustive measure of this phenomenon has to include several other indicators. The analysis shows differences across countries in technological potential and the selected variables may be considered good indicators, as they are a fair representation of different achievements in global competitiveness. With reference to social awareness, workers' remittances could be eliminated from the selected variables due to analogous performances registered across countries. The group of variables representing environment sustainability may be expanded by adding other indicators, e.g. global ecological *overshoot*, depleting the very resources on which human life and biodiversity depend.

3. Concluding remarks

Policymakers and social activists are in agreement with scientists in claiming that globalization is not a result of explicit political choices, with a specific reference to poor economies. Western countries give the impression of being performers in a play where the market may produce different effects with respect to raw materials distribution, human capital characteristics and institutional performances. The role of European countries in the globalization process cannot be considered as a uniform block: most of them are good performers but some others need to improve their potential to meet the global challenge. From a methodological point of view, the analysis has been helpful in justifying the selection of relevant variables through a critical review of some of the most important studies on globalization and its effects on growth. In addition, the cluster application has allowed us to evaluate the suitability of data to understand the implications of the methodological choices during the *aggregation* phase. Next steps will concern the implementation of the second phase of a multidimensional framework, dealing with the aggregation of information across dimensions for each units of analysis. This is necessary to deepen the analysis of winners and losers from the process of global integration.

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