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Designing Composite Entrepreneurship Indicators

An Application Using Consensus PCA

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June 2009

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In order to suggest a consistent methodology for measuring entrepreneurship, we review some of the most well-known theoretical dimensions of entrepreneurship and a selection of associated indicators is proposed. Indicators and measures are grouped under theoretical categories and a set of entrepreneurship indicators is constructed using multivariate statistical analysis (Consensus PCA based on NIPALS, with an extension of Probability PCA for dealing with missing values) for a panel of developed and developing countries.

Keywords: entrepreneurship, index, principal components analysis

JEL classification: L26, M13, C82

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December 7, 2008

Abstract

Existing indicators of entrepreneurial activity (such as Global Entrepreneurship Monitor, Entrepreneurship Barometer, FORA's Entrepreneurship Index, OECD and Economic Commission's sets of indicators, among others) and several variables that have been considered good proxies for entrepreneurship during last decades seem to be not suitable to capture the complex relationship among economic, social, and demographic factors driving entrepreneurial activity.

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1 Introduction

For more than two hundred and fifty years we have been using the expression "Entrepreneurship" but without a single, unambiguous meaning that adequately describes its nature. Furthermore, ideas associated with entrepreneurship are continuously evolving, so it depends on the historical context we are analyzing it. And if we do not agree on what it is, we could difficultly achieve a consensus on how to measure it. In 1933, J. A. Schumpeter wrote:

> *"... as long as we are unable to put our arguments into figures, the voice of our science, although occasionally it may help to dispel gross errors, will never be heard by practical men."* (Schumpeter, 1933)

Schumpeter stated the general problem of measuring, here we bring it to the field of entrepreneurial activity. Entrepreneurship has been understood as an "invisible force" leading economic efforts, generating knowledge, innovating, attracting employees, improving economic growth, and so on. These ideas come together with several definitions and concepts that highlight different dimensions of entrepreneurship. The problem is that none of them fully achieve the aim to define entrepreneurship. Such a rich expression poses also a major problem from the measurement point of view, preventing the adequate communication of this important phenomenon. "Practical men" like to have numbers to show and to think about. Without measuring entrepreneurial activity, we will hardly communicate the relevance of policy-making on an entrepreneurship-oriented base to policy- and decision-makers.

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Literature on entrepreneurship comes from different areas, and each author highlights different features of the phenomenon. Our proposal consists of capturing the main and widely-accepted common features and constructing measures of entrepreneurship based on robust statistical methods. The final outcome of our work is the Composite Entrepreneurship Indicator (CEI) that is obtained applying a set of theoretical and empirical rules developed in Avanzini (2008), and its methodological framework. We also discuss the use of Consensus Principal Component Analysis (CPCA) in this context. One additional problem relates to data scarcity. This problem is particularly hard to overcome in developing countries. In what follows, we suggest the use of an extension of Probability Principal Component Analysis (PPCA) by Roweis (1998) to deal with missing values, and we also discuss other alternatives to strengthen the dataset quality (Section 4).

Beyond the introduction (Section 1) and the concluding remarks (Section 8), the document is organized according to the six stages detailed in Avanzini (2008), namely setting a definition of entrepreneurship (Section 2), selecting indicators (Section 3), arranging data (Section 4), designing the composite indicator (Section 5), estimating the set of indicators (Section 6), and discussing the outcomes (Section 7). In those sections, we review the relevant literature on entrepreneurship and tackle the problem of its measurement. We give the theoretical background of the statistical tools in the Appendix, together with a description of the database we use in estimations.

2 Defining Entrepreneurship

> "Scholars have dedicated almost three centuries to the attempt to define the concept of entrepreneurship. The lack of consensus may, in part, be due to the fact that entrepreneurship is not neatly contained within any single academic domain. Indeed, many disciplines have contributed their perspectives on the concept of entrepreneurship, including Psychology (Shaver and Scott, 1991), Sociology (Reynolds, 1991; Thorton, 1999), Economics (Cantillon, 1755; Marshall, 1890; Knight, 1921; Schumpeter, 1934, 1949) and Management (Stevenson, 1985). Given the heightened interest in entrepreneurship in recent years, it is unlikely this multi-disciplinary interest will diminish any time soon." (OECD, 2006).

This paragraph gives us a clear picture of the problem we are facing: *Entrepreneurship is a multifaceted and heterogeneous activity* (Audretsch and Thurik, 2001; Audretsch, 2002).

The French economist Richard Cantillon is generally accredited as being the first to coin the term "entrepreneurship" circa 1730[1]. Loosely, he defined entrepreneurship as *self-employment* of any sort involved in a process of *bearing the risk* to *organize* factors of production to deliver a product or service demanded by the market. Knight (1921) also stressed the *risk-bearing* dimension of entrepreneurship. Alfred Marshall (1890) identified entrepreneurship as a crucial factor of production alongside land, capital and labour. Other authors have stressed the importance of the entrepreneur in different roles: manager (Say, 1803), speculator (Von Mises, 1949), coordinator and arbitrageur (Walras, 1954). Kirzner (1973) stressed the *profit-seeking* activity through *market arbitrage*, while Penrose (1959) highlights the *opportunity identification* activity. These ideas can be grouped under the *"old school"* with the following features: risk-bearing, organization / management, arbitrage / coordination / speculation, profit-seeking, and self-employment.

Joseph Schumpeter (1934) opened a new dimension of what we consider entrepreneurship: *innovation*. Entrepreneurship is thus seen as the process of identifying, developing, and bringing forward new innovative ways of doing things for the exploitation of commercial opportunities. And this is the definition that gains major acceptance in last decades. Since Schumpeter, entrepreneurship is equated with the concept of innovation applied to a business context. He defined entrepreneurs as *innovators* who implement entrepreneurial change within markets, where entrepreneurial change has five manifestations: (i) the introduction of a new (or improved) good; (ii) the introduction of a new method of production; (iii) the opening of a new market; (iv) the conquest of a new source of supply of new materials or parts; and (v) the re-engineering or re-organization of business management processes, or the carrying out of the new organization of any industry. Drucker (1985) built his idea of entrepreneurship on Schumpeter's entrepreneurial innovation process posing that entrepreneurship is the act of innovation involving endowing existing resources with

[1] The word *entrepreneur* itself derives from the French verb *"entreprendre"*, meaning "to undertake". There is a general belief that the first drafts of R. Cantillon date from 1730 approximately, but the first edition of his manuscripts was published in 1755 (Cantillon, 1755).

new wealth-producing capacity. Although Schumpeter's view of entrepreneurship is a tempting one and is widely accepted nowadays, it still retains some ambiguity that has meant the debate regarding a definition of entrepreneurship continues. Indeed some authors (Drucker, 1985; Lumpkin and Dess, 1996) have argued that entrepreneurship reflects merely the creation of a new organization, or that the essential act of entrepreneurship is new entry. This new entry can be accomplished by entering new or established markets with new or existing goods or services. New entry is the act of launching a new venture, either by a start-up firm, through an existing firm, or via "internal corporate venturing". We may say that these ideas involving innovation and the "old school" characteristics can be put together under a *"second generation"* concept.

In recent years, many national governments and international organizations have been encouraging analysts and researchers to unify criteria and try to set up a general framework to study and evaluate entrepreneurship. This *"third generation"* of studies on entrepreneurship tries to integrate three dimensions: (i)entrepreneurship, as it is defined by the "second generation" literature; (ii) the integration of activities in a process (not just separate activities but complete plans of action aimed to seek certain goals including the organization survival), and (iii) the need for its measurement. For example, Shane and Venkataraman (2000) said that the field of entrepreneurship involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them. Ireland et al. (2003) posed that entrepreneurship is a context-dependent social process through which individuals and teams create wealth by bringing together unique packages of resources to exploit marketplace opportunities. Finally, and without exhausting the list of examples, the Commission of the European Communities (2003) arrived to the conclusion that entrepreneurship is the mindset and process to create and develop economic activity by blending risk-taking, creativity and / or innovation with sound management, within a new or an existing organization.

Ahmad and Seymour (2008) said that all these kind of concepts and definitions can be analyzed from a philosophical perspective, the so-called "top-down approach". Under this approach, entrepreneurship is studied with little concern for measurement. On the other extreme, the "bottom-up approach" devoted all its effort to equate entrepreneurship to a specific empirical measure or set of measures, avoiding the discussion of entrepreneurship definitions altogether. The problem with this approach is that provided there is no relevant concept or definition that guides the selection of the indicators, the chosen measures are those based on the most readily available statistics, and only rarely do authors attempt to justify or explain how the measures represent entrepreneurship.

The definition of entrepreneurship we will adopt for our composite indicator is the one developed by Ahmad and Seymour (2008). For them the *entrepreneur* is an economic agent that "[...] is simultaneously looking back to the resources (and combining them in new and creative ways) and forward to markets (and perceiving new or unmet opportunities). The entrepreneur perceives and recognizes a fit between the two, a capability and process referred to as innovating. The entrepreneur's activities occur within a business context, which includes industry structures, competition, and national economic structures. This business context is impacted in turn by wider environmental considerations, which include the economic, political, legal, social, cultural, and natural settings. In undertaking such *entrepreneurial activities*, the entrepreneur is endeavouring to create value" (Ahmad and Seymour, 2008, pp. 5). The entrepreneurship definition we adopt is the following:

> *"Entrepreneurship is the phenomenon associated with the entrepreneurial activity, i.e. the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets."* (Ahmad and Seymour, 2008).

This definition does not encompass all the possible dimensions that are discussed in the specialized literature, but it constitutes a good approximation in order to guide our procedure. Depending on the definition the analyst adopts the outcomes and the questions she can answer will differ. This definition is very suitable for our application specially because it was developed thinking in the necessity of measuring entrepreneurship, something that would facilitate the selection of sub-indicators in the next stage.

3 Selecting Dimensions and Indicators

Policy-makers are interested in the determinants and impacts of entrepreneurship: they need to know what fosters entrepreneurial activity, and which are the effects and spillovers it causes. We assume policies are driven by certain goals related to entrepreneurship and policy-makers need indicators to inform them how these policies affect entrepreneurship and achieve the goals. Provided the multifaceted nature of entrepreneurship, even in cases where a fairly clear definition has been enunciated, it is difficult to find a measurement tool that matches the terminology that has been chosen[2]. Existing indicators of entrepreneurial activity (such as Global Entrepreneurship Monitor, Entrepreneurship Barometer, FORA's Entrepreneurship Index, OECD and Economic Commission's sets of indicators, among others) and several variables that have been considered good proxies for entrepreneurship during last decades seem to be not so adequate to capture the complex relationship between economic, social, and demographic factors driving entrepreneurial development.

The wide range of concepts involved in the entrepreneurship definition (that in short constitute its determinants and impacts), and the variety of policy goals and the way in which they can be measured force us not to measure the phenomenon by mean of a lonely indicator but rather a set of them. The chosen practical measure of entrepreneurship will ultimately depend on the nature of the policy objective[3]. Provided there is neither fully objective way of selecting the relevant sub-indicators, nor a certain way to group them if it would be necessary, we start designing a *scoreboard,* an idea that has appealed to many managers and policy-makers in recent years[4] and that we adopt here[5]. One of the advantages of the scoreboard is that it is a guide to select and collect available data, and a checklist for not yet available data that should be collected. On the other hand, one of its disadvantages is that it has so many indicators that the likelihood of 'garbage in-garbage out' curse is accentuated. Also having many indicators may be as bad as having a few provided measurement errors are more likely, the relationship among them would be less clear, their own variability could lead us to misunderstand the phenomenon variability, etc. Variables and sub-indicators have been selected[6] on the basis of (i) their analytical soundness, (ii) measurability, (iii) relevance to the phenomenon being measured, and (iv) relationship to each other.

We find helpful to disaggregate the problem in several dimensions following the way literature have treated them[7], and we propose the following Scoreboard as the basis for measuring entrepreneurship. Its basic structure is presented in Figure 1. This scoreboard captures the main dimensions of the entrepreneurial activity, facilitating issues and determinants, and its manifestations and impacts. We focus our attention in

[2] For example, the European Commission has defined entrepreneurship as "the mindset and process needed to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or existing organization". While conceptually appealing, it would be difficult to convey this notion on a questionnaire in a way that would invite consistent interpretation by all respondents (Ahmad and Seymour, 2008).

[3] For example, if policy-makers are interested in employment creation, they may focus on a measure that seems most directly linked to jobs, such as self-employment or new firm creation, no matter what the size or growth rate of the firm. If the policy objective is competitiveness or productivity growth, however, a measure of entrepreneurship that distinguishes high growth or innovative firms may be preferred. In this case, the firm population of interest may exclude zero-employee firms (self-employment), or even very small firms, from the population of young businesses in order to get a better count of the growth business population. Relevant measures will also depend on the national context and the structure of the business population.

[4] See Kaplan and Norton (1992, 1993, 1995, 1996a, 1996b) for managerial applications. Kaplan and Norton are considered the fathers of the so-called Balanced Scorecard, a scoreboard-based methodology created to manage enterprises on a strategy-oriented base. Related to policy-making applications: see Nilsson (1987, 2000, 2003), OECD (1998) and Petit et al. (1996), among others, for composite leading indicators for the OECD members; SEIFA (2001, 2006), for Australian social policies; VaLUENTIS (2006), for UK human development policies; Hung (2003) for Hong Kong leading indicators; OECD/Eurostat (2003, 2007), for regional entrepreneurship policies; Fukuda and Onodera (2001), for composite coincident economic indicators for Japan; and United Nations (2001) for sustainable development indicators, among many others.

[5] Our Scoreboard uses some ideas that can be found in the *entrepreneurship* (see Leitão da Silva Martins, 2007; Behrens, 2007; OECD/Eurostat, 2007; Ahmad and Seymour, 2008; Ahmad and Hoffmann, 2008), *innovation* (see Zabala-Iturriagagoitia et al., 2007), and *investment* literature (see Statistics Netherlands, 2007).

[6] See Freudenberg (2003).

[7] The approach is not new: Leitão (2007) proposes a scoreboard for measuring entrepreneurship that defines six categories: enterprises, human resources, innovation, social economy, initiative, and knowledge. These categories have sub-indicators aimed to measure different aspects of each category. Some of them are not directly measurable but instead proxy variables can be used. OECD's Entrepreneurship Indicators Programme (EIP) is another example of multilevel categorization in such a scoreboard layout (see Davis, 2007; Ahmad and Seymour, 2008; Ahmad and Hoffmann, 2008). The EIP has settled out a scoreboard (the "OECD-Eurostat EIP Indicator Framework, 2007") that divides the variables and indicators under three aggregates, namely determinants, entrepreneurial performance, and impact. Each of these aggregates are divided in a multi-level multi-block structure. For example, the scoreboard proposes to order determinants under six categories: regulatory framework, market conditions, access to finance, R&D and technology, entrepreneurial capabilities, and culture.

seven dimensions:

1. *Entrepreneurial Activity*: this category includes three dimensions, namely (i) Firm Dynamics, (ii) Firm Survival, and (iii) Ownership. The indicators included under Firm Dynamics and Firm Survival are the mostly recognized entrepreneurial activity proxies. Ownership is included to avoid confusion between entrepreneurship and management: both concepts are very closely related, given entrepreneurship involves management, but a key difference between them is the ownership (that can be translated into a *risk-bearing* activity).

2. *Employment*: describes the impact of entrepreneurship on employment, measured by the number of employees associated with new enterprises creation and exit. Employment is one of the universally claimed beneficial effects of entrepreneurship and should be an important manifestation of its existence.

3. *Economic Activity*: beyond employment, other areas of the economic activity may be reflecting the entrepreneurship development: increasing sales amount, small and medium enterprises creation, international trade, number and capitalization of enterprises in the stock market, etc.

4. *Entrepreneurship Spirit, Culture, and Initiative*: people engaged in entrepreneurial activities have some particular characteristics that make them unique, e.g. entrepreneurial potential and propensity, particular skills, reasons to becoming an entrepreneur, and contact with other entrepreneurs.

5. *Barriers to Entrepreneurial Activity and Business Environment*: entrepreneurship arises in a certain time-location coordinate and by its nature involves the integration of many aspects that lead it to a successful performance. The pro-entrepreneurship characteristics of the business environment, the available resources (financial, physical, human, etc.), and the institutions supporting entrepreneurship play a decisive role in entrepreneurial success.

6. *Knowledge Procurement*: following the Schumpeterian association between entrepreneurship and knowledge generation, we attempt to include here those activities oriented to support the knowledge procurement system (human resources, investment in R&D, R&D activities, etc.).

7. *Innovation*: the final outcome of the knowledge procurement system, that may show up in a variety of ways: new products, new markets, new processes, new uses of existing products, etc. This is the way Schumpeterian's entrepreneurship should manifest.

These categories are not exhaustive, and adopting them is in no way a restricting characteristic of our approach provided the techniques proposed in this paper are intended to allow modifications, improvements, and widening, to set up better measures. Nonetheless we have to get a reasonably-sounded and reliable dataset to estimate the CEI and this is our proposal[8].

4 Data Selection and Description

First of all, we need to associate each dimension selected in the previous stage with a set of variables reflecting its nature. Then we need to add variables to characterize (pros and cons) and influence the particular dimension. Data selection is a hard job: data is wide-spread (websites, books, yearbooks, outlooks, papers, and other documents), and its quality and reliability are difficultly determined. In most of the cases, there exists several well-known data repositories[9] that are the usual data sources in entrepreneurship studies.

[8] As was previously discussed, there are many ways for characterizing and grouping characteristics and dimensions of entrepreneurship; some of them, due to lack of relevant data, have been avoided, e.g. social economy activities, entrepreneurial talent development and mobility, and the disaggregation of the referenced categories in more specific ones.

[9] Perhaps the most well-known is the GEM (*Global Entrepreneurship Monitor*) Project (since 1998). In Europe there are several information sources: Eurostat's "*Factors of Business Success*" (FoBS) survey; the European Commission´s *Eurobarometer* (Gallup Europe, 2002), OECD/Eurostat Entrepreneurship Indicators Programme (2007-2008). There are also some governmental projects: Canada's periodic survey of small and medium enterprises (SME) access to finance; the United States Federal Reserve's periodic survey of small business finances (SSBF); the University of Warwick's first major study of SME finances in the United Kingdom; FORA (the Centre for Business and Economic Research under the Danish Ministry for Economic and Business Affairs); Statistics Netherlands (2007). Finally, data repositories such as The World Bank's World Development

While few, if any, meet all the requirements of analysts and policymakers for internationally-comparable data, there are numerous statistics relating to entrepreneurship already produced by governmental, quasi-governmental and private institutions. Many of these data sets are purely national and some focus only on special niche activities or a specific subset of the population[10].

We have selected a set of more than 70 variables coming from several sources, for a sample of 69 countries (see Table 1 for a list of countries, and Tables 3 and 7 for a list of variables). The list of variables and its description, separated by source, can be found in Appendix A. These variables present some problems such as periodicity, availability, "outlying" observations, clumping, truncation, and relationship among them, that are discussed in what follows.

4.1 Dealing with Data Scarcity

Data availability is an important issue in the design of any indicator. Usually, developing countries are less represented in datasets, biasing the estimation results towards developed countries. Also there is a problem with the periodicity: not all variables are collected on the same time base, or they have time gaps, if not for all countries, at least for some of them. Basically, the datasets are unbalanced (different number of observations for each country) but the statistical methods we will implement need balanced datasets.

From a practical perspective, we use a combination of two approaches to deal with data scarcity: the *first approach* consists of averaging variables for each country over two periods, namely 1998-2001 and 2002-2005. In this way we summarize the gathered information in order to obtain more complete data series and to avoid the effects of possible changes in measures and methods – something that often occurs when implementing surveys in their initial stages, such is the case of most of the entrepreneurship surveys. Averaging over a four years period seems not to cause a large bias in our estimations. We verified that there were not very important changes in scale or growth rate of the variables, and that aggregating information in other periodical base (e.g. three or five years) did not change drastically the outcomes. We found that the separation in these two periods is relatively stable and gave us a more complete data set.

4.2 Dealing with Missing Values

The *second approach* is the estimation of the missing values using the PPCA procedure suggested by Roweis (1998). Despite the averaging procedure previously discussed, available statistical series are not complete for all periods and all observations so our dataset may be plagued by problems of missing values. Various "solutions" have been applied in social sciences (Freudenberg, 2003) such as:

- dropping observations (data deletion), as in Cortinovis et al. (1993);
- replacing missing values with their means (mean substitution), as in Gwatkin et al. (2000), and Vyas and Kumaranayake (2006);
- replacing missing values with estimated or predicted values, i.e. using regressions based on other variables to estimate the missing values;
- multiple imputation using a large number of sequential regressions with indeterminate outcomes, which are run multiple times and averaged;
- nearest neighbor imputation, i.e. identifying and substituting the most similar case for the one with a missing value;
- simply, ignore them and take the average index of the remaining indicators within the component; and the list goes on.

Indicators (WDI), the International Monetary Fund (IMF)'s International Financial Statistics (IFS) and Government Finance Statistics (GFS), the OECD.Stats integrated system of databases for OECD countries and some benchmark economies, and United Nations' Statistical Database, are some well-known reliable sources of information that have in common the advantage that they gather and offer a lot of information that has been controlled for its reliability and comparability.

[10] This is the case of Ewing Marion Kauffman Foundation that collects information on entrepreneurial activity in the United States, at state-level. With this information they construct the *Kauffman Index of Entrepreneurial Activity* for the USA.

All of these methods have advantages and disadvantages. The advantages are generally associated with the simplicity or transparency of the procedure. The disadvantages are harder to deal with. For example, deleting observations that have missing data would significantly lower our sample size and the statistical power of our estimation would fall drastically. In fact, when constructing the entrepreneurship indicator, provided that it is more likely that developed countries have complete sets of statistics than developing countries, the indicators would be probably biased towards the relationships associated with the former countries, preventing us from learning about entrepreneurship in developing countries. On the other hand, replacing the missing values with the indicator's mean will reduce variation among countries and increase the probability of clumping and truncation (see below). Substituting absent data with estimated or predicted values (regression approach) can introduce additional variability that is not related with the remaining indicators.

Nevertheless, statistical literature has recently centered its attention on the estimation of missing values conditional on available information for the rest of the sample in the context of principal components. Particularly appealing is the method called Probability PCA (PPCA) developed by Tipping and Bishop (1999). This model suggests that PCA can be considered a linear aggregation of Gaussian processes and that a maximum likelihood approach can be used to estimate its unknowns, namely the set of PCs. Roweis (1998) uses the Expectation-Maximization algorithm to obtain the PCs, and propose a simple extension to account for missing data (see the details in Appendix D). This is the statistical approach we adopt in this paper. Several simulations have been done to test out whether changes in the way the data set is completed has major impact on our CEI. Generally we have found that the outcomes vary little.

4.3 Outliers

Although in this work we do not deal with outliers, there are several methods to account for this problem. Chen (2002) makes a review of some of the most well-known methods to deal with outliers including

- Robust PCA by robustifying the covariance matrix;
- Robust PCA by Projection Pursuit;
- Robust PCA by Self-Organizing Neural Networks;
- Robust PCA by Weighted Singular Value Decomposition (SVD); and
- Torre and Black's Algorithm.

Here we do not include the treatment of this problem, leaving it for future implementation of our entrepreneurship indicators.

4.4 Clumping and Truncation

As is discussed below, our weighting procedure is based on Principal Components Analysis (PCA) and a major challenge for PCA-based weighting is to ensure the range of variables is broad enough to avoid problems such as clumping and truncation. *Clumping* or *clustering* refers to the case in which countries present block-behavior, i.e. they behave as if they were put together in small clusters. This data characteristic generates strange behaviors of the variance-covariance matrix that is our basic piece of information.[11] *Truncation* implies that the observations are spread over a narrow range loosing variability and biasing the outcomes towards more even distributions. We can detect these features through a good description of indicators (particularly, their ranges) and summary statistics (mean, standard deviation, interquartilic range, maximum and minimum, etc.). One way to overcome these pitfalls is to add more variables to the analysis in order to capture full variability through other indicators. This is one of the reasons for using many variables to represent a certain category. Truncation may be very important in the case of developing countries given they are usually underrepresented in datasets. In our sample of 69 countries, they constitute about a half of the sample, in order to avoid the oversampling of developed countries.

[11] As will be discussed below, we are working on the implementation of multi-level multi-block PCA that might improve the estimation of weights in presence of data clumping.

4.5 Relationship among indicators

To get a general idea on how the indicators relate to each other, and the appropriateness of their grouping, we analyze a simplified representation of the correlation matrix for the two sets of 65 indicators and 69 countries, distinguishing the grouping categories. Figure 2 shows the simplified correlations for the period 1998-2001, and Figure 3, for the period 2002-2005. As can be seen most of the significant correlations (more than 0.5 in absolute value) lie inside the shaded areas telling us that the grouping is at least reasonable. This does not mean that this is the only arrangement of indicators but it makes sense. Of course, we find several significant correlations outside the shaded areas, but they are generally weak. However the correlations outside the groups are consistent with the idea that all of these indicators have common behavior which we assume is due to an agglomerative concept, namely entrepreneurship.

5 Designing the Composite Indicator

A Composite Indicator (CI) is the mathematical combination of individual indicators that represent different dimensions of a concept whose description is the objective of the analysis (see Saisana and Tarantola, 2002). Composite Indicators are appealing due to their usefulness, flexibility, and simplicity. They constitute suitable tools for exploring less-known phenomena, and for benchmarking performances. Saisana and Tarantola (2002) highlight their usefulness to provide experts, stakeholders and decision-makers with:

- the direction of developments;
- comparison across places, situations and countries;
- assessment of state and trend in relation to goals and targets;
- early warning;
- identification of areas for action;
- anticipation of future conditions and trends; and
- communication channel for general public and decision-makers.

Constructing a CI is a good way to acquire knowledge at a relatively low cost provided CIs are also easily implemented, without requiring deep *a priori* knowledge or assumptions about the studied phenomenon, and generally they are not so computationally expensive. That is why they are extensively used in exploratory analysis, or for describing complex structures.

Our CEI shares all these properties and its weighting methodology accommodates a set of eight axioms (see Avanzini, 2008)[12]. The highest hierarchical level of analysis is the *dimension* and indicates the scope of objectives, individual indicators and variables. Our indicator has seven dimensions (see Section 3). An *objective* indicates the direction of desired change, i.e. in what direction (upper or lower values) would an improvement in the indicator be reflected. *Individual Indicators* are the basis for evaluation in relation to a given objective (any objective may imply a number of different individual indicators). It is a function that associates each single country with a variable indicating its desirability according to expected consequences related to the same objective. A *Variable* is a constructed measure stemming from a process that represents, at a given point in space and time, a shared perception of a real-world state of affairs consistent with a given individual indicator[13]. In this context, the composite indicator or synthetic index is an aggregate or a function of all dimensions, objectives, individual indicators and variables used. This implies that what formally defines a composite indicator is the set of properties underlying its aggregation convention. The set of axioms ensures that our CEI will behave successfully for benchmarking and exploratory purposes.

[12] The weighting rule is built in order to incorporate the following axioms: Rationality, Weak Pareto Rule, Non-Dictatorship, Unrestricted Domain, Independence of Irrelevant Alternatives, Neutrality, Monotonicity, Reinforcement.

[13] Quoting Munda and Nardo (2005), "To give an example, in comparing two countries, inside the economic dimension, one objective can be 'maximization of economic growth'; the individual indicator might be R&D performance, the indicator score or variable can be 'number of patents per million of inhabitants'."

6 Estimating the Composite Indicator

From a practical perspective, it is very difficult to integrate individual indicators and variables in such a way that its outcome gives us a meaningful overview of the phenomenon, even more when we are interested in making inference based on that indicators. But given we have already defined the subject, its characteristics and how they can be captured through suitable variables, and we also have a theoretical framework that tell us which conditions the weighting procedure should accomplish (see Avanzini, 2008), we are ready to deal with the weighting problem itself, i.e. we are ready to construct the composite indicator.

We are interested in obtaining a weighting procedure with two additional characteristics beyond the axioms: first, we want the technique to be as *independent as possible from the analyst*, and second, that the procedure *extracts the maximum information* from available data. Taking into account these two characteristics we begin by discarding *ad-hoc* and subjective weightings, and concentrate in statistical and econometrical tools. In the literature many approaches have been used, most of them labeled under multivariate analysis methods, and aimed to extract information from several sort of data under different assumptions[14].

In what follows we use Principal Component Analysis[15] (PCA) to solve the weighting scheme. PCA is a powerful and relatively simple technique for extracting hidden structures from possibly high-dimensional datasets. Generally it is readily performed by solving an eigenvalue problem (standard PCA), or by using iterative algorithms which estimates the principal components, such as non-linear iterative partial least squares (NIPALS) and EM algorithm (Probabilistic PCA and Non-Linear PCA with EM algorithms). The intuition behind PCA is simple: suppose we have a dataset with a high number of variables (i.e. indicators) for various observations. One can think that these indicators are measuring the same object or episode from different perspectives so all of them contain common information about the object. PCA is an orthogonal transformation of the coordinate system in which we describe our data. The new coordinate values by which we represent the data are called *principal components*. It is often the case that a small number of such principal components is enough to account for the most of the structure in the data. These are sometimes called *factors* or *latent variables* of the data.

There are several ways for computing PCA depending on the underlying structure we have assumed. We concentrate in the comparison of the outcomes of four alternative PCA methods: standard PCA, NIPALS-based PCA, Multi-block PCA (Consensus PCA), and an extension of Probabilistic PCA with an EM algorithm for data reconstruction. Each method have particular characteristics that give rise to different set of weights, and of course, to different CEI. Here we develop four alternative weighting methods for estimating our CEI, discuss their strengths and weaknesses, and make reference to other relevant features.

6.1 Method (I): Overall Entrepreneurship Index

It consists of taking the whole set of variables (dataset) for each period and computing a standard PCA. There are two well-known variants for obtaining it: using covariance (with standardized indicators) or correlation matrix eigen-decomposition (see Jolliffe, 2002), or using iterative algorithms such as NIPALS (see Wold et al., 1987). The outcomes of both methods are the same though the eigen-decomposition approach is quicker. The square of the eigenvector associated to the first (bigger eigenvalue) principal component gives us the weighting matrix that multiplied by the dataset produces the weighted matrix of indicators, i.e. the CEI under this approach. We use this index as our benchmark and for the sake of comparability.

The indexes obtained with this approach are reported in Table 1 for the period 1998-2001, and in Table 5 for the period 2002-2005, and analyzed below (see next section). The theoretical background can be found in Appendix B.

6.2 Method (II): Disaggregated Entrepreneurship Index

This set of seven indexes per period, one for each dimension, is constructed using standard PCA on each group of standardized indicators. Each index ranks the country performance on the respective dimension,

[14] Just to mention some of them: discriminant analysis, correspondence analysis, multidimensional scalling, multivariate regression, etc.

[15] The origins of the method can be found in Pearson (1901), who coined the name and the mathematical principles; Hotelling (1933), that studied its properties; and Karhunen (1946). Recent literature reviews are contained in Diamantaras and Kung (1996) and Jolliffe (2002).

and is a useful tool to get a deeper insight on the driving forces behind entrepreneurship. Nonetheless, as with Method (I), it is difficult to assert the degree of entrepreneurship development provided that it is using only the information inside each dimension, so the remaining information (outside the shaded areas in Figures 2 and 3) is lost for the analysis. To get each index, we squared the eigenvector corresponding to the first principal component (largest eigenvalue) calculated over the set of indicators of each dimension solely, and then we multiply it by the dimensions' block of indicators to get a CI for each dimension.

The results for each dimension are shown in Table 2 (period 1998-2001) and Table 6 (period 2002-2005). Detailed explanations on the mathematical background for the PCA methodology used here can be found in Appendix B.

6.3 Method (III): Aggregated Entrepreneurship Index

Once we get the first principal component of each dimension, and the associated index from Method (II), a natural extension might be to group the seven principal components (i.e. we accommodate the PCs containing the maximum common information of each dimension) in a single matrix. Each PC represents an important proportion of the information contained in that dimension, so the matrix containing such PCs is our best set of common knowledge about the behavior of the entrepreneurship dimensions, constrained to use just one PC per dimension. Additionally, PCs are standardized random variables given they are constructed as a weighted sum of standardized random variables. If we then apply standard PCA to this matrix we would get the Aggregated Entrepreneurship Index. This composite indicator is a summary of the most relevant information of each dimension.

Although we have gathered together all the dimension-related information, much of the interactions among variables of different dimensions is only captured through their impact on the dimensional PCs: indicators that are weak within a dimension, but highly correlated with other indicators in the remaining dimensions, could be underweighted in the aggregate index[16]. Again the explanations related to the mathematical procedure are given in Appendix B, and the indexes are shown in Table 2 (period 1998-2001) and Table 6 (period 2002-2005).

6.4 Method (IV): Multi-Dimensional Entrepreneurship Index

Finally we arrive to the key proposal of this paper. We would like to get a composite indicator capable of accounting for particular intra-dimensional structures, but also inter-dimensional relationships, and overall behavioral patterns. The Consensus PCA (CPCA) is a method that can account for all these problems and still gives us a consistent, meaningful set of weights[17]. The intuition behind CPCA is explained in Wold et al. (1987) in the context of the analysis of sensory data: suppose that a certain number of referees are judging the sensory quality of a number of wines. Each referee gives his judgement on various quality characteristics of the wines (body, bitterness, color, etc.). The results on all the tests for each judge are placed in separate blocks conforming the sub-level. The *summary scores* of each judge are the *block scores*, and the consensus of all judges is represented by a *super score* summarizing individual scores. The weights given to each block in this *super-level* show the relative importance of each judge in the *consensus score* (for details on its computation see Appendix C).

One of the advantages of CPCA is that it uses all the available information in each iteration: it weights block indicators to get the block scores (in the spirit of Method II), then it uses these scores to construct a super-level block of information and estimates its score (in the spirit of Method III), and finally it re-weights the sub-level indicators with the overall weights (in the spirit of Method I), and iterates this procedure until convergence. Two additional advantages of CPCA are: (i) it has the same objective function as standard PCA, i.e. maximization of the variance of the dataset; and (ii) it automatically adjust relative variance of different indicators by virtue of its block scaling procedure (Westerhuis et al., 1998). Also notice that Method (IV) overcomes the drawbacks posed for each of the other methods. First, Method (I) was not able to focus in certain areas of the correlation matrix, those related with the dimension blocks, and uses all the available

[16] In a certain way we are violating the Reinforcement Axiom. See Avanzini (2008) on this point.

[17] Borrowed from chemical and batch processes monitoring, this method is based in non-linear iterative partial least squares (NIPALS) and it was introduced by Wold et al. (1987). As was previously discussed, NIPALS is one of the alternatives to estimate PCs by means of an iterative weighting algorithm. This weighting algorithm allows the differentiation of multiple layers of information aggregation through successive re-weighting of indicators under a hierarchical categorization.

information without discriminating. Second, Method (II) accounted for each dimension behavior but was unable to integrate the information remaining out of the shaded areas in Figures 2 and 3. Finally, Method (III) captured variability at dimensional level, and used the reduced information dataset to estimate the relationship among dimensions. However, there were no possibility to capture more complex relationships (possibly represented by higher order principal components). The three drawbacks are elegantly managed in the context of CPCA through the NIPALS algorithm that allows the integration of dimensional (block) and overall information through an iterative procedure.

The set of weights (at dimensional level and at variable/indicator level) are shown in Tables 3 and 7, and indexes are shown in Tables 4 and 8, for period 1998-2001 and 2002-2005, respectively. Appendix C develops the mathematical background.

6.5 Some Comments on the Estimation Strategy

Although we have made a big effort to rely as much as possible upon statistical methods to construct our CEI, we have been forced to use our own judgement repeatedly. Provided the outcomes of the CEI depend largely on the selected approach, we conducted sensitivity tests to analyze the impact of including or excluding variables, changing the weighting scheme, using different standardization techniques, selecting alternative base years, excluding cases with unreliable data, etc., on the results of the CEI. We used bootstrapping methods to account for these issues, and generally we found no significant (95% confidence level) variations in the outcomes.

We also realize that the quality of our dataset prevent us from doing categorical assertions: averaging over periods makes us lose some of the dynamics of the entrepreneurship process; the methodology we adopt to deal with missing data –though being quite reliable– has been forced to deal with many missing values, weakening the outcomes[18]. Although the dataset we finally use seems to be quite stable and reliable, we know that countries showing originally more complete datasets are those more developed, with higher per capita income, with better life standards, with higher mean levels of education, etc., while developing countries have more incomplete datasets, so the outcomes referring to developed countries might be more robust than those involving developing countries.

Now we turn back to our CEI. We start stating that our idea of grouping the set of variables in nine categories, finally reduced to 7 to robustify the estimation of block scores, is a good approximation for the set of available data. Indeed, Figure 4 shows the Scree plots, i.e. the plot of the eigenvalues, and is hard to detect such an "elbow" as is suggested under this approach. Using estimations of the intrinsic dimensionality (van der Maaten, 2007) we find that for bootstrapped samples, the dimensions roughly vary among 8 and 10. So our categorization (as showed in Tables 3 and 7) are a good grouping strategy. Moreover, observing the correlation patterns in Figures 2 and 3, it seems to be the case that the most significant relationships between indicators are located inside the shaded areas that correspond to the correlation matrixes of each block variables. However, to get more robust results we regroup the first three categories (Firm Dynamics, Firm Survival, and Ownership) in a single category to strengthen block scores estimation. We perform some simulations to evaluate how the results change, and the final distribution of indexes seems to remain unchanged with this procedure.

7 Analyzing Entrepreneurship using the CEI

The Overall Entrepreneurship Index, our benchmark technique, shows that less developed countries improve their performance in the second period. The indexes are reported in Table 1 for the period 1998-2001, and in Table 5 for the period 2002-2005. They are calculated over standardized variables so their means are zeroes, and the standard deviations are about 0.30 for 1998-2001, and 0.22 for 2002-2005. The range of the indexes narrows from 1998-2001 to 2002-2005 showing that countries are making efforts to improve the entrepreneurial activity. Those efforts narrow entrepreneurial gaps among countries. Little can be said about the index itself: as was discussed, the way the index weights all the attributes prevent us from using

[18]Roweis (1998) tested out the algorithm with a dataset that have one missing dimension on each observation, and he considered the algorithm performed successfully under that constraint. Here, we are forcing it to deal with many missing indicators for every observation.

it to infer which are the driving forces behind entrepreneurial development, and in what areas it has major impact. Nevertheless we can still exploit it as a benchmarking tool that gives us some information on the way different countries are performing. But we necessarily need to compare the behavior of each indicator to know more about the reasons of these behavior. This index, even though simple, is restrictive for inference purposes, and is difficult to get more information than the ranking of countries.

The second CEI, the Disaggregated Entrepreneurship Index, explores the behavior of each of the seven categories. They are reported in Tables 2 and 6 for periods 1998-2001 and 2002-2005, respectively. The behavior is more erratic at this level of aggregation. Results are difficult to interpret: for example, in 2002-2005, the disconnection between Knowledge Procurement and Innovation (something that can be seen in the correlation matrix, Figure 3) produces rankings under these categories that are very different[19]. On the side of the ease of entrepreneurial activity, at the end of the '90s, Japan and the USA appeared as the most opened economies to this sort of activities. But with Brazil, Paraguay, Bolivia and other developing countries entering the international scene, the classically entrepreneurial countries were relegated to secondary places. Entrepreneurial vocation is stronger in countries such as New Zealand and Australia, but less developed economies like Mexico and Brazil appear to have the necessary intention to get more involved in entrepreneurship development. This is consistent with the evidence that GEM's TEA index shows when it is drawn against GDP per capita: less developed countries are more likely to develop entrepreneurial activities, and are well disposed towards entrepreneurship than more developed countries. But the driving forces are different for both groups of countries: while less developed countries are performing entrepreneurial activities by *necessity* (generally associated with high rate of unemployment in the formal sector), high-income economies focus on *opportunity entrepreneurship*, mostly linked to product innovation, new markets, and improved production processes. The *necessity entrepreneurship* is more related to "economic survival". Within our dataset, Mexico and Brazil are good examples of this situation, as can be inferred from the impact of entrepreneurship in the Employment dimension.

When we aggregate the seven dimensions on a single CEI, the Aggregated Entrepreneurship Index (first ranking in Tables 2 and 6), we find that the USA, China and Japan are consolidated as leading entrepreneurial economies. Nonetheless, the indexes are very different between them, with abrupt changes in rankings that are not so convincing. The Employment dimension have a strong weight (see the weights on the top of each dimension) and it is dominant in the 2002-2005 period. But differences in the range of other less relevant dimensions contribute to generate some important distortions, for example, placing Finland in the 63th in 2002-2005 after being in the 10th position in 1998-2001.

An interesting feature of this CEI, is the way it weights different dimensions[20]: in 1998-2001, the dimensions were weighted in three ranges: less than 5%, between 11% and 13% and beyond 20%. In 2002-2005, the dimensions Employment and Economic Activity account for almost 66% of the total variability being the leading ones. Surprisingly, Knowledge Procurement and Innovation only account for 20% in 2002-2005 while in 1998-2001 those dimensions constituted about 55% of the variability. Also the weak role of Entrepreneurial Activity in 2002-2005 is suspicious. With the current dataset, this weighting process seems to be very unstable and its outcome is not very sounding. However we have to recognize that during 2002-2005 many developing economies presented amazing economic growth rates and improvements in their employment, both phenomenons captured by an increased weighting of Employment and Economic Activity dimensions.

Beyond some particular problems arising probably due to data quality, from a methodological perspective, one of the advantages of the composite index obtained in this way is that it is able to capture the areas or dimensions where there is still "action", in the sense that the highly-weighted dimensions are the most relevant differences between countries, and are the areas where major improvements can be done.

Finally we turn our attention to the Multidimensional Entrepreneurship Index that is our starred CEI. Tables 3 and 7 report the relative weighting of variables and dimensions, and Tables 4 and 8 report scores and rankings. The novelty of this index, as was previously discussed, is its capability to capture information inside and outside the specific dimension, through an iterative weighting process that gives us deeper insight on entrepreneurship behavior. The driving forces in 1998-2001 (Table 3) were related with economic activity (particularly the creation of small and medium enterprises). Entrepreneurship spirit and business

[19] As an example: Indonesia is assigned the third place under the Innovation dimension, and the last place under the Knowledge Procurement dimension.

[20] Each dimension's weight can be found in the top of the dimension's disaggregate index. These weights correspond to the importance each dimension has in the aggregate index.

environment were almost equally weighted as were knowledge procurement and innovation dimensions. The number of technicians in R&D, and the submission of patent applications and trademarks were relevant aspects of the entrepreneurial development. Also domestic credit played an important role in the strengthen of the entrepreneurial activity.

In 2002-2005 (Table 7), countries have improved those dimensions and they have lost their importance. Innovation is now more important and the contribution of entrepreneurial development to employment appears as the major impact. Barriers to entrepreneurship and a suitable environment for business developments have lost their importance given that most of the countries made major reforms and efforts to support entrepreneurial activity. Again the number of technicians in R&D, and the submission of patent applications and trademarks have been important determinants of entrepreneurial performance. The impact on economic activity has been diminished to highlight the employment dimension instead.

In both periods, the dimension reflecting entrepreneurial activity itself has not been important. We find that this is consistent with the fact that information related with firm dynamics and ownership is more scarce as is less represented in the dataset than other information. Perhaps in the future, with improved datasets, this dimension would become more dominant in the determination of the index value. With our current dataset, many of the characteristics measured under Entrepreneurial Activity have been measured under different dimensions with proxies that present a more complete record for the sample.

Developing countries have generally improved their positions in the rankings. Many reforms were conducted at the end of the '90s and during the first years of this century. Simplified taxes schemes, easier business registration, and more available financial information (that speed the credit market up) contributed to the generation of a supporting system for the entrepreneurial activity. Also the economic prosperity driven by the boom of commodity prices generated a market for new small and medium enterprises that hired new employees. China, Mexico, Brazil, Indonesia, and Argentina are good examples of high growth rates that were accompanied by new employment, new small and medium enterprises, and technological development. These improvements in the economy and particularly in the entrepreneurial sector in developing countries do not mean that developed countries have worsened their policies: it only means that developing countries have made changes at a quicker rhythm, and the impact of their reforms and economic changes have had major impact on the economy than it was the case in developed countries.

Recall that the most important characteristic of this index is the way it selects the determinants of entrepreneurship, providing us with a closer insight into how policies and efforts should be oriented. And this is the central message of this approach: the suggested methodology helps us to direct policies towards weak determinants to improve them, and towards strong impacts to ensure they will be maintained or improved. This approach to the estimation of the CEI has the following advantages that make it an "ideal" device (among the ones we know) for entrepreneurship analysis:

- it provides us with the traditional benchmarking tool: all countries are compared on the same bases;
- it allows us to rank countries' performance;
- it informs about intensity: the index tells us up to what degree countries differ in entrepreneurial development;
- and finally, it gains an insight into the importance of entrepreneurship determinants and impacts.

8 Concluding Remarks

However much relevant issues have been pointed out, a lot of work has to be done: improving data collection and its reliability is the first step. Continue exploring robust methodologies to account for variations in entrepreneurship performance is another task, that in some way we tried to tackle here, but it needs closer attention. Finally, researchers should be more involved in determining the driving forces behind entrepreneurship and how those ones relate to economic growth and welfare, while policy- and decision-makers should be more opened to the possibility of changing policy directions to account for this arising phenomenon.

A communicational issue needs to be addressed: it might be very tempting for politicians to show how countries satisfactorily evolve in international benchmarks, but as was explained previously, the way the CEI reports changes (specially that based on Consensus PCA) makes it less attractive because when all countries get the message and improve their policies in a certain direction, differences arising from that dimension are not still relevant for the problem, and politicians might feel that being equated to other countries is perhaps not enough to capture voters attention. We recognize that this can be a pitfall of this CEI though its ease of communication.

We have to be aware of the way we should use the tools explained in this document: the CEIs tell us where we stand in the global economy (benchmarking purpose), and inform us which might be the principal reasons of our situation and how far are we from the best performers (inference purpose), allowing policy-makers to change policies direction to support entrepreneurship (policy purpose). However, weak datasets or careless use of the methodologies discussed in this paper may result in misleading interpretations and perverse policies that might block rather than encourage entrepreneurial activity. Here we discussed some of the problems with datasets and suggested ways of fixing them. We also discussed the problems of inference and interpretation of results. But as always, the art of dealing with an intrincate subject such as entrepreneurship is in the hands of the analyst.

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A Data Sources and Variables Description

Following is a list of the used indicators and variables, are they are listed in Tables 4 and 10, gathered under each data source.

A.1 From COMPENDIA:

COMPENDIA (Comparative Entrepreneurship Data for International Analysis) is an across-countries and -time comparable dataset for 23 developed countries covering information from 1970 onwards. The data series taken from this database enter Table 4 as indicators 7-9, and Table 10 as indicators 9-11. The indicators are:

Business Ownership Rates: This is the number of business owners divided by total labour force. Only persons who are self-employed as their main occupation are included in the figures. The owners are classified depending on the sector they develop their entrepreneurial activity: private or public sector, and in private sector, agricultural and non-agricultural sub-sectors.

A.2 From GEM:

The New Entrepreneurship International (GEM) dataset contains annual harmonized data on early-stage entrepreneurial activity for 43 countries since 1998. The abbreviation GEM stands for Global Entrepreneurship Monitor and is the common name for this international survey. The data series taken from this database enter Table 4 with indicators 5, 6, 29-32, 34, 35, 37, and 38, and Table 10 with indicators 6-8, 34-39, and 41-43. All the indicators are taken relative to the adult population 18-64 years. The selected indicators are:

Total Entrepreneurial Activity (TEA) Index: number of people currently setting up a business or owning/managing a business existing up to 3,5 years.

Necessity Entrepreneurial Activity Index: number of people involved in entrepreneurial activity (TEA) out of necessity.

Opportunity Entrepreneurial Activity Index: Measures the number of people involved in entrepreneurial activity (TEA) out of opportunity.

Female Total Entrepreneurial Activity Index: Measures the number of women involved in entrepreneurial activity (TEA).

Nascent Entrepreneurial Activity Index: Measures the number of people currently setting up a business.

Young Firm Entrepreneurial Activity Index: Measures the number of people owning/managing a business that exists up to 3,5 years.

Established Businesses Activity Index: Measures the number of people owning/managing a business that exists over 3,5 years.

Future Entrepreneur Index: Share of people expecting to start a business within three years.

Know Entrepreneur Index: Share of people that personally know someone who started a business in the past two years.

Potential Entrepreneur Index: Share of people indicating to have the required skills and knowledge for setting up a business themselves.

Fear of Failure Index: Share of people that would abstain from setting up a business when they would sense a fear of failure.

Informal Investors Index: Measures the number of people investing own money to start-ups.

A.3 From EIM:

The dataset International Benchmark of Entrepreneurs from Entrepreneurship International Monitor (EIM) contains data about firm entries, firm exits and bankruptcies. Therefore, 9 countries from the EU and additionally the USA and Japan, are included in this set. The figures in this set are comparable across countries and over time. Additionally, the set has data of fast growing firms with a high employment growth and/or a high sales growth, measured for periods of three years. The performances of these companies are compared to companies with an 'average growth pattern'. The indicators 1-4, 10-17, and 19-24 in Table 4, and 1-4, 13-21, and 24-29 in Table 10 are based on the following:

Entry rate: number of new 'activities' started by entrepreneurs, divided by the total number of companies in a certain country.

Exit rate: number of 'activities' that finished their activities, divided by the total number of companies in a certain country.

Average size of firm entries: average number of workers in the new 'activities'.

Share of entries in employment: number of new 'activities', divided by the total number of workers in a certain country.

Share of exits in Employment: number of companies that stopped their activities, divided by the total number of workers in a certain country.

Bankruptcy rate: number of bankruptcies, divided by the total number of companies in a certain country.

Share of bankruptcies in firm exits: number of bankruptcies, divided by the total number of companies that stopped their activities.

Average sales for all enterprises - last year of period: for a certain 3-years period, average sales (in regard to companies) for the last year.

Average sales for all enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the average sales over the whole period.

Average sales for not fast growing enterprises - last year of period: for a certain 3-years period, average sales (in regard to not-fast growing companies) for the last year.

Average sales for not fast growing enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the average sales over the whole period (not-fast growing companies).

Average sales for fast growing enterprises - last year of period: for a certain 3-years period, average sales (fast growing companies) for the last year.

Average sales for fast growing enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the average sales over the whole period (fast growing companies).

Average number of workers for all enterprises - last year of period: for a certain 3-years period, average number of employees (in regard to companies) for the last year.

Average number of workers for all enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the number of employees over the whole period.

Average number of workers for not-fast growing enterprises - last year of period: for a certain 3-years period, average number of employees (not-fast growing companies) for the last year.

Average number of workers for not fast growing enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the average number of employees over the whole period (not-fast growing companies).

Average number of workers for fast growing enterprises - last year of period: for a certain 3-years period, average number of employees (fast growing companies) for the last year.

Average number of workers for fast growing enterprises - growth rate over whole period: for a certain 3-years period, growth rate of the average number of employees over the whole period (fast growing companies).

A.4 From Freudenberg (2003):

The dataset covers innovation- and knowledge-procurement-related indicators for the last years of the '90s. The indicators enter Table 4 with numbers 47-54, and 58-61. Their description follows:

R&D performed by the non-business sector as a percentage of GDP: is a proxy for a country's relative efforts to create new knowledge, though it should be noted that new knowledge can also originate in firms or in partnership with firms. Public R&D activities also disseminate new knowledge and exploit existing knowledge bases in the public sector. It is reported as a ratio for 1995-99.

Number of non-business researchers per 10,000 labour force: (self-explanatory).

Expenditures on basic research as a percentage of GDP: Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Ratio of science, engineering and health PhDs per population aged 25 to 34 years: This age group was chosen because it is the only one for which there are internationally comparable data.

Number of scientific and technical articles per million population: article counts of scientific research are based on scientific and engineering articles published in approximately 5.000 of the world's leading scientific and technical journals.

Business-financed R&D performed by government or higher education as a percentage of GDP: R&D expenditure financed by industry but performed by public research institutions or universities.

Number of scientific papers cited in US-issued patents per million population: This indicator is based on US patent data and may favour English-speaking countries.

Ratio of publications in the 19 most industry-relevant scientific disciplines per million population: between 1980 and 1995.

Business enterprise R&D (BERD) as a percentage of GDP: between 1996 and 1999. This covers R&D activities carried out in the business sector regardless of the origin of funding. R&D data are often underestimated, especially in small and medium-sized enterprises (SMEs) and in service industries.

Number of business researchers per 10 000 labour force in 1999: researchers are defined as professionals engaged in the conception and creation of new knowledge, products, processes, methods and systems and are directly involved in the management of projects.

Number of patents in "triadic" patent families per million population: Patent families, as opposed to patents, are a set of patents taken in various countries for protecting a single invention.

Share of firms having introduced at least one new or improved product or process on the market over a given period of time: Is an indicator of the output of innovative activities. This indicator is taken from the Community Innovation Survey (CIS2) managed by Eurostat. It is weighted here by number of employees in order not to underestimate the weight of large firms (unweighted results would give an unduly large weight to the mass of small firms). Data is available only for 21 OECD countries.

A.5 From The World Bank's WDI:

The WB's World Development Indicators are a huge database covering country-level annual indicators for more that 180 countries and aggregates, since 1960. The indicators numbered 25-28, 39-46, 55-57, and 62-65 in Table 4, and 5, 30-33, and 44-65 in Table 10. Their descriptions are the following:

Cost of business start-up procedures (% of GNI per capita): Cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita.

Domestic credit provided by banking sector (% of GDP): Domestic credit provided by the banking sector (monetary authorities, deposit money banks, and other banking institutions) includes all credit to various sectors on a gross basis, except the central government.

Domestic credit to private sector (% of GDP): refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

Highest marginal tax rate, corporate rate (%): highest rate shown on the schedule of tax rates applied to the taxable income of corporations.

Highest marginal tax rate, individual (on income exceeding, US$): highest rate shown on the schedule of tax rates applied to the taxable income of individuals.

Interest rate spread (lending rate minus deposit rate): (self-explanatory).

Labor force with primary / secondary / tertiary education (% of total labor force): (self-explanatory).

Management time dealing with officials (% of weekly management time): time dealing with requirements imposed by government regulations (taxes, customs, labor regulations, licensing and registration).

Patent applications, nonresidents / residents: applications filed with a national patent office for exclusive rights for an invention.

Procedures to enforce a contract (number): number of independent actions, mandated by law or courts, that demand interaction between the parties of a contract or between them and the judge or court officer.

Procedures to register property (number): number of procedures required for a businesses to secure rights to property.

Physicians (per 1,000 people): Physicians are defined as graduates of any facility or school of medicine who are working in the country in any medical field (practice, teaching, research).

Start-up procedures to register a business (number): number of required actions to start a business, including interactions to obtain necessary permits and licenses and to complete all inscriptions, verifications, and notifications to start operations.

Time required to start a business (days): number of calendar days needed to complete the procedures to legally operate a business.

Technicians in R&D (per million people): Technicians in R&D and equivalent staff are people whose main tasks require technical knowledge and experience in engineering, physical and life sciences (technicians), or social sciences and humanities (equivalent staff). They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers.

Trademarks, nonresidents / residents: applications for registration of a trademark with a national or regional trademark office.

Taxes on exports (% of tax revenue): (self-explanatory).

Micro, small and medium enterprises (number): (self-explanatory).

Listed domestic companies, total: domestically incorporated companies listed on the country's stock exchanges at the end of the year.

B Brief Overview of Standard PCA

"The central idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the dataset. This is achieved by transforming to a new set of variables, the principal components (PCs), which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables." (Jolliffe, 2002, chapter 1).

There are many ways for getting the PCs. Here we present the eigen-decomposition of the covariance matrix. Suppose we have a set of high-dimensional datapoints x_i, where x_i is the i^{th} row of the D-dimensional data matrix X. The low dimensional counterpart of x_i is denoted by y_i, where y_i is the i^{th} row of the d-dimensional data matrix Y. Without loss of generality, assume X has zero empirical mean. PCA attempts to find a linear transformation T that maximizes

$$T'cov(X)T$$

under the constraint that $|T| = 1$, and where $cov(X) = E(XX')$ is the covariance matrix of the zero mean data X. This constraint can be enforced by introducing a Lagrange Multiplier λ. Hence, an unconstrained maximization of

$$T'E(XX')T + \lambda(1 + T'T)$$

is performed with respect to T and λ. The first order conditions give us the eigenproblem that PCA solves:

$$E(XX')v = \lambda v$$

The eigenproblem is solved for the d principal eigenvalues λ. The corresponding eigenvectors form the columns of the linear transformation matrix T. The low-dimensional data representations y_i of the data points x_i are computed by mapping them onto the linear basis T, i.e.

$$Y = XT.$$

The weights we are looking for are the square eigenvectors, i.e., for each eigenvalue λ_i, starting with the largest one, there exists an eigenvector T_i that denotes the i^{th} column of T, and the weights corresponding to the i^{th} PC are

$$W_i = (T_i)^2$$

These are the weights we will use to get the standard PCA-based composite indicator:

$$CI_i = X \cdot W_i'$$

If we order the eigenvalues from bigger to smaller, and order the corresponding eigenvectors in T, then choosing the first PC implies choosing the one that accounts for the largest portion of the dataset variance. If we choose the second, we obtain the second largest PC, accounting for the second largest portion of the dataset variance, an so on. The PC is obtained as

$$PC_i = X \cdot T_i'$$

and its variance is the i^{th} eigenvalue, i.e.

$$var\left[PC_i\right] = T_i'E(XX')T_i = \lambda_i$$

An additional property is that the sum of the variance of each PC, namely the sum of the eigenvalues, equals the sum of the variance of the elements of X. So if the variance of each element in X is one (as it would be the case if all variables were standardized) then the sum of the eigenvalues should equal the number of elements in X. Furthermore,

$$t_i = \frac{\lambda_i}{\sum_{j=1}^{D} var(x_j)}$$

is the general expression for the proportion of the overall variance capture by the i^{th} principal component, PC_i.

How many and which components (eigenvectors) should be retained in the analysis without losing too much information is a delicate matter. There is no unified opinion on this[21] but criteria cover subjective or theoretically-comprehensible ones[22], rules-of-thumb[23], graphical analysis[24], and other more complex such as bootstrapped eigenvalues and eigenvectors[25], cross-validatory criteria[26], and intrinsic dimensionality estimation (van der Maaten, 2007).

We use the latter to test out how many eigenvalues adequately represents our datasets, both for the aggregated dataset and for each set of sub-indicators. In general the results vary between 8 and 10 eigenvalues for the overall set of indicators, and between 1.5 and 3 for each dimension, using the Maximum Likelihood intrinsic dimensionality estimator. The relevant principal components for the full set of indicators are in line with the way the dataset was originally constructed, i.e., using 9 categories, with the current first dimension divided in three ones (see Table 3 and 7, sub-dimensions 1.1, 1.2, and 1.3). We also report the classical Scree Plot (see Figure 4) for the full set of indicators, for both periods, for the 10 largest PCs to get an idea on PCs order selection using a well-known method. In spite of these results we will use just the largest PC, in order to obtain a single set of weights.

The estimations of standard PCA have been performed with the Data Reduction Toolbox for Matlab (van der Maaten's DRToolbox, 2007) which is freely available online. Code was adapted to fit our problem.

C The Multi-block Weighting Approach: Consensus PCA

Consensus PCA was introduced by Wold et al. (1987) as a method for comparing several blocks of descriptor variables measured on the same objects or observations.

Following Westerhuis et al. (1998) and using the notation of the standard PCA, the method can be described in the following way: the data are divided into B blocks $X_1, ..., X_B$. A *consensus direction* among all the blocks is sought (i.e. a starting consensus or *super-score* is selected as a column of one of the blocks). This vector is regressed on all blocks X_b, i.e. for each block $X_b, b = 1, ..., B$, we compute

$$p_b = (X_b' \cdot t_T)/(t_T' t_T)$$

where t_T is the super-score and p_b are the loadings of variables in block X_b. The p_b are normalize to $\|p_b\| = 1$, where $\|\cdot\|$ stands for the Euclidean norm for multidimensional spaces.

From the block variable loadings, block scores t_b for all blocks are calculated, namely

$$t_b = (X_b \cdot p_b) \cdot (m_{X_b})^{-\frac{1}{2}}$$

where $(m_{X_b})^{-\frac{1}{2}}$ is a scaling factor for each block, and m_{X_b} is the number of variables in block X_b. All block scores are combined into a super block T. The super score t_T is then regressed on the super block to give the super weight w_T of each block score to the super score, i.e.

$$\begin{aligned} T &= [t_1 ... t_B] \\ w_T &= (T' \cdot t_T)/(t_T' t_T) \end{aligned}$$

Then w_T is normalized to $\|w_T\| = 1$ and a new super score is calculated:

$$t_T = T \cdot w_T$$

[21] See Jolliffe (2002, chapter 6). Discussions can also be found in Giri (2004), Jobson (1992), Manly (1994), and in many texts on multivariate analysis and PCA. For an application to social science see Bartholomew et al. (2002, chapter 5).

[22] See, for example, Houweling et al. (2003) and Filmer and Pritchett (2001).

[23] The most well-known criteria based on the eigenvalues rule-of-thumb (i.e. size of variances of principal components) are the Guttman-Kaiser Criterion (Guttman, 1954; Kaiser, 1960, 1961, Yeomans and Golder, 1982), the broken stick model (Legendre and Legendre, 1983), and the Jolliffe Criterion (Jolliffe, 1972, 1973, 1987). There exists also criteria related to the size of explained variance, cummulative percentage of total variation, and partial correlations.

[24] Two popular graphical methods are the scree graph, discussed by Cattell (1966), and the log-eigenvalue or LEV diagram (see Farmer, 1971). These methods are very simple but the main drawback is the subjective judgement the analyst has to do to get the number of components to keep.

[25] See Jackson (1993) and Yu et al. (1998).

[26] See Wold (1978), and Eastment and Krzanowski (1982). These methods are characterized by their high computationally intensity.

The procedure is iterated until t_T converges to a predefined precision (in our example, we use $1e^{-12}$).

The super score is derived using all variables, whereas the block scores are derived using only the variables within the corresponding block. The super weight w_T gives the relative importance of the different blocks X_b for each dimension. After convergence, all blocks are deflated using the super score. Following this algorithm we get two set of weights that are reported in Tables 6 and 12, last two columns.

A brief comment must be done on other method, the Hierarchical PCA or HPCA, that is sometimes confused with CPCA. HPCA was introduced by Wold et al. (1987) as a variant of CPCA, with other normalization rules (namely, t_b and t_T are normalized instead of w_T and p_b). These little differences makes them totally different. In fact, we analyzed the viability of HPCA for our problem of constructing the CEI and we found that many of the highlighted drawbacks of the method apply to us. First, HPCA is sensible to dominant directions: in both algorithms the super score will be the direction most dominant in the consensus block T. However, because in HPCA the block scores are normalized to length one, the algorithm searches for the most dominant direction in these normalized scores. In CPCA the block scores enter T as they are calculated for each block and therefore the super score will just be the direction most dominant in the block scores. Differences between the methods can be expected when a strong direction exists in only a single block, which can be the case of entry or exit rates in the entrepreneurship context. When the directions are spread among the blocks, the methods are expected to give similar results. Clearly, this characteristic violates the Non-Dictatorship Axiom previously stated. Second, HPCA converges to different solutions depending on the starting vector. Moreover, if the starting vector is highly correlated to a dominant direction in one of the blocks, the algorithm cannot escape from this direction and will select it as the direction of the super score t_T. Finally, HPCA has no clear objective function to be maximized, and this prevents to force the algorithm to achieve a "specific solution". All of these drawbacks led us two reject these procedure for estimating our CEI.

The estimations of Consensus PCA have been performed with the Multi-Block Toolbox for Matlab (van den Berg's MBToolbox, 2001) which is freely available online. Code was adapted to fit our problem.

D Probability PCA as a Tool for Dealing with Missing Values

To overcome the problem of missing data we used Probability Principal Components Analysis (PPCA) based on the Expectation-Maximization (EM) algorithm, as developed by Sam Roweis (1998). Roweis stated that PCA can be viewed as a limiting case of a particular class of linear-Gaussian models. The goal of such models is to capture the covariance structure of an observed D-dimensional variable X using fewer than $D(D+1)/2$ free parameters required in a full covariance matrix. Linear-Gaussian models do this by assuming that X was produced as a linear transformation of some d-dimensional latent variable Y plus additive Gaussian noise. Denoting the transformation by the $D \times d$ matrix C, and the (D-dimensional) noise by v (with covariance matrix R) the generative model can be written as

$$Y = CX + v$$

with $x \sim \mathcal{N}(0, I)$ and $v \sim \mathcal{N}(0, R)$. The latent or cause variables Y are assumed to be independent and identically distributed according to a unit variance spherical Gaussian. Since v are also independent and normally distributed (and assumed independent of Y), the model reduces to a single Gaussian model for X which can be written explicitly:

$$X \sim \mathcal{N}(0, CC' + R).$$

Then the proposed EM algorithm has the following steps:

$$\begin{aligned} \textbf{E-step} &: \quad Y = (C'C)^{-1}C'X \\ \textbf{M-step} &: \quad C^{new} = YX'(XX')^{-1} \end{aligned}$$

where X is a $D \times n$ matrix of all the observed data and Y is a $d \times n$ matrix of the unknown states. The columns of C will span the space of the first d principal components.

To arrange the missing data we have to modify the E-step. Instead of estimating only Y as the value which minimizes the squared distance between the point and its reconstruction we can generalize the E-step in the following way:

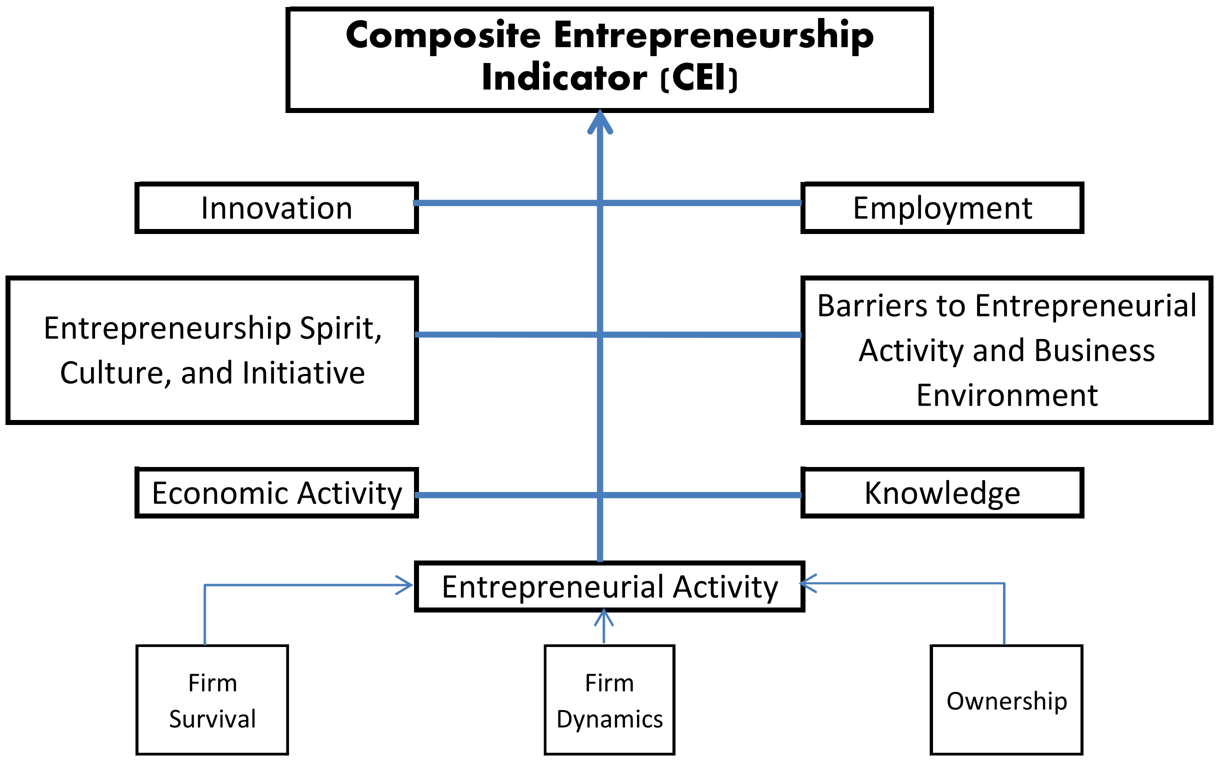
Generalized E-step: For each (possibly incomplete) point X find the unique pair of points Y^* and X^*(such that Y^* lies in the current principal subspace and X^* lies in the subspace defined by the known information about X) which minimize the norm $\|CY^* - X^*\|$. Set the corresponding column of Y to Y^* and the corresponding column of X to X^*.

If X is complete, then $X^* = X$ and Y^* is found exactly as before. If not, then Y^* and X^* are the solution to a least squares problem and can be found by, for example, QR factorization of a particular constraint matrix.

The estimations of missing data based on PPCA have been performed with the PPCA_MV procedure implemented in Matlab (Verbeek's PPCA_MV Matlab code, 2006) which is freely available online. Code was adapted to fit our problem.

E Tables and Figures

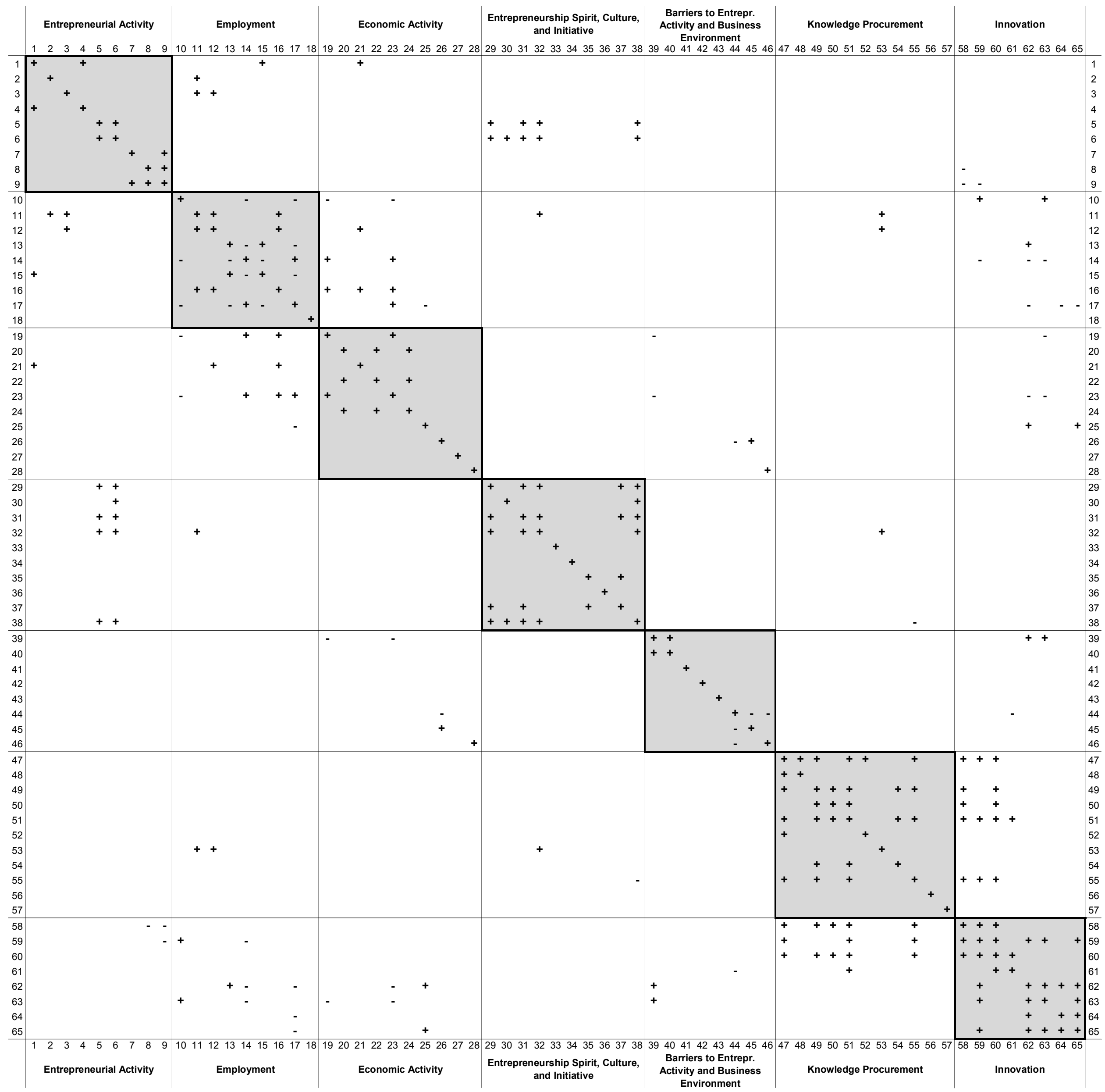
Figure 1.- The Composite Entrepreneurship Indicator's (CEI) Scoreboard



Source: Own elaboration.

Figure 2.- Correlation Matrix for the Whole Set of Indicators

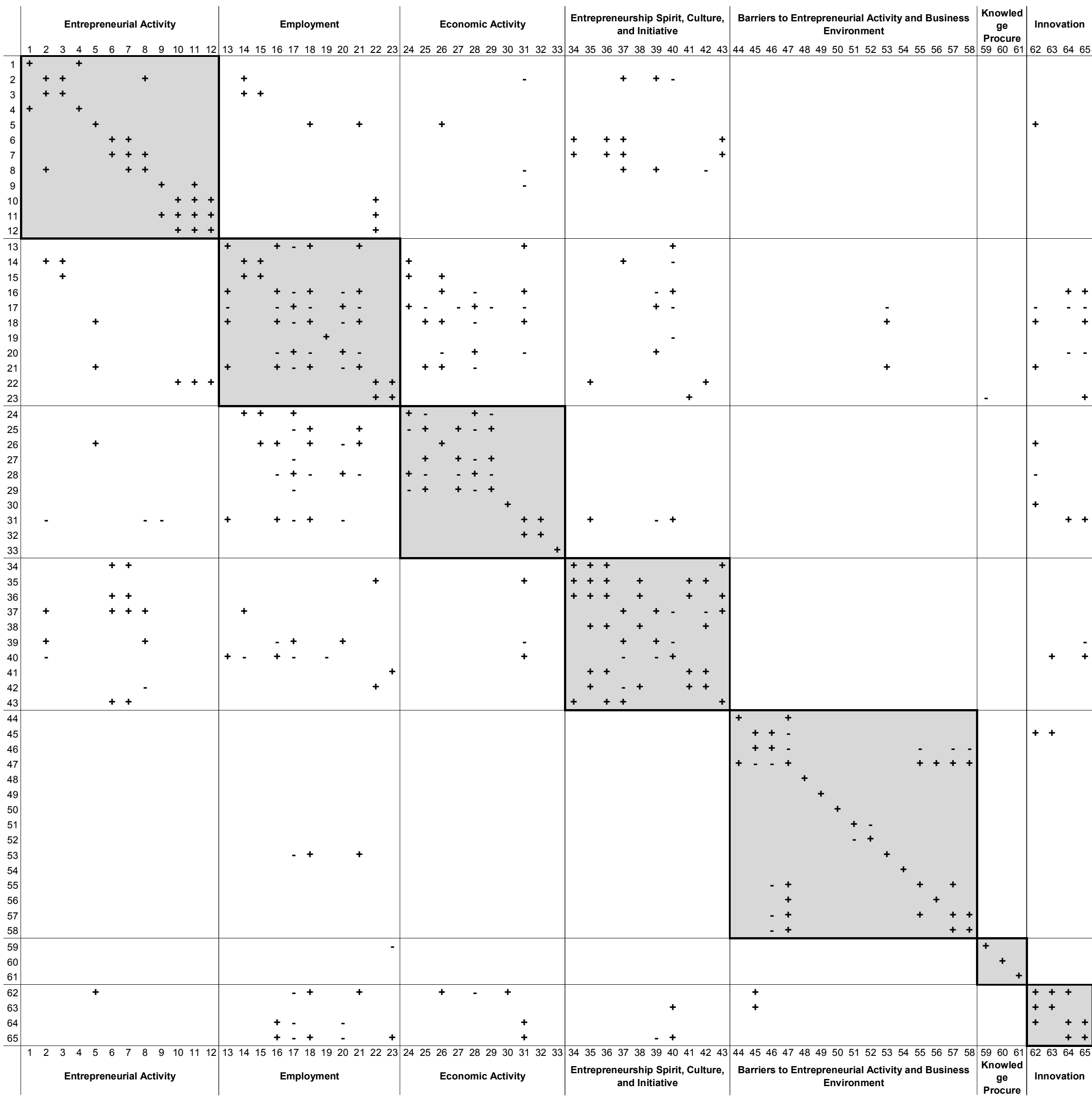
Period 1998-2001



Notes: (+) means correlation above +0.5, and (-) means correlation below -0.5. Shaded areas indicate cross-correlation for each group of variables according to the Scoreboard grouping. Numbers 1 through 65 identify variables as they appear in the Scoreboard.
Source: Own calculations. See Appendix A on Data Sources and Variables Description for details.

Figure 3.- Correlation Matrix for the Whole Set of Indicators

Period 2002-2005

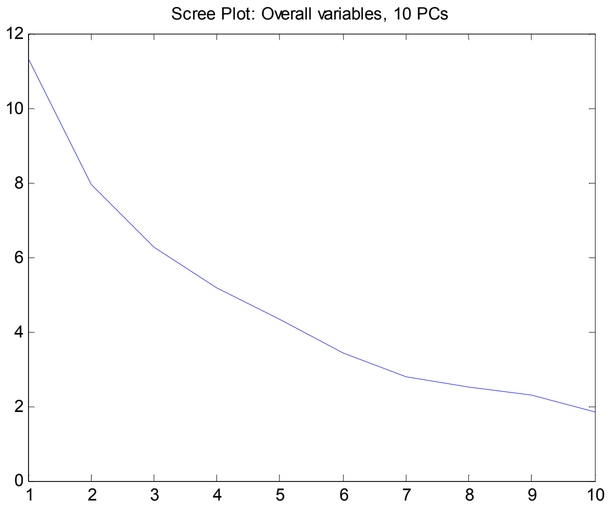


Notes: (+) means correlation above +0.5, and (-) means correlation below -0.5. Shaded areas indicate cross-correlation for each group of variables according to the Scoreboard grouping. Numbers 1 through 65 identify variables as they appear in the Scoreboard.

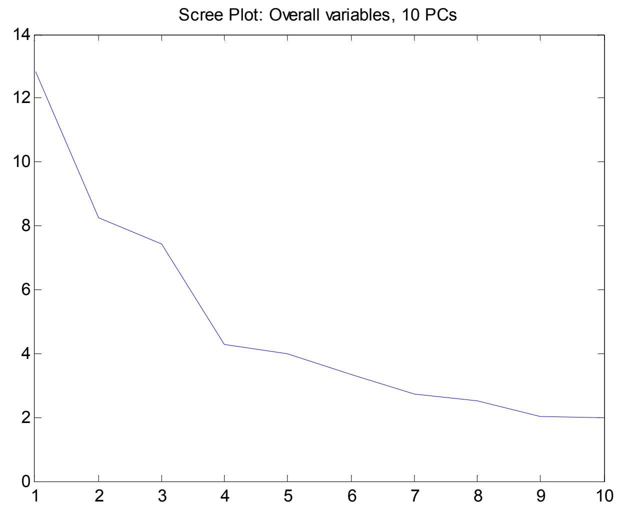
Source: Own calculations. See Appendix A on Data Sources and Variables Description for details.

Figure 4.- Eigenvalues for Overall-Variables Standard-PCA Estimation

Period 1998-2001



Period 2002-2005



Source: Own calculations. See Appendix B for details.

Table 1.- Overall Entrepreneurship Index

Method I – period 1998-2001

Ranking	Country	Country Code	Index
1	United States	USA	0.9966
2	Switzerland	CHE	0.8925
3	Sweden	SWE	0.8065
4	Finland	FIN	0.6078
5	China	CHN	0.5502
6	Japan	JPN	0.4758
7	Australia	AUS	0.4714
8	Germany	DEU	0.4062
9	Korea, Rep.	KOR	0.3362
10	Canada	CAN	0.3223
11	Iceland	ISL	0.2283
12	Netherlands	NLD	0.2074
13	United Kingdom	GBR	0.1608
14	France	FRA	0.1577
15	New Zealand	NZL	0.1512
16	Malaysia	MYS	0.1235
17	Brazil	BRA	0.0727
18	Hong Kong, China	HKG	0.0688
19	Lebanon	LBN	0.0455
20	Thailand	THA	0.0417
21	Egypt, Arab Rep.	EGY	0.0256
22	Argentina	ARG	0.0122
23	Jordan	JOR	0.0006
24	Italy	ITA	-0.0017
25	Chile	CHL	-0.0119
26	India	IND	-0.0169
27	Kuwait	KWT	-0.0173
28	Mexico	MEX	-0.0224
29	Israel	ISR	-0.0359
30	Bolivia	BOL	-0.0388
31	Saudi Arabia	SAU	-0.0444
32	United Arab Emirates	ARE	-0.0447
33	Costa Rica	CRI	-0.0612
34	South Africa	ZAF	-0.0678
35	Austria	AUT	-0.0696

Ranking	Country	Country Code	Index
36	Ireland	IRL	-0.0709
37	Paraguay	PRY	-0.0724
38	Syrian Arab Republic	SYR	-0.0779
39	Panama	PAN	-0.0804
40	El Salvador	SLV	-0.0862
41	Peru	PER	-0.0866
42	Colombia	COL	-0.0896
43	Romania	ROM	-0.0932
44	Indonesia	IDN	-0.0980
45	Ecuador	ECU	-0.1004
46	Denmark	DNK	-0.1033
47	Nicaragua	NIC	-0.1054
48	Singapore	SGP	-0.1067
49	Ukraine	UKR	-0.1073
50	Dominican Republic	DOM	-0.1180
51	Uruguay	URY	-0.1189
52	Bulgaria	BGR	-0.1230
53	Honduras	HND	-0.1350
54	Kazakhstan	KAZ	-0.1433
55	Norway	NOR	-0.1443
56	Venezuela, RB	VEN	-0.1497
57	Guatemala	GTM	-0.1536
58	Greece	GRC	-0.1564
59	Russian Federation	RUS	-0.1685
60	Estonia	EST	-0.1712
61	Belgium	BEL	-0.1946
62	Luxembourg	LUX	-0.1986
63	Portugal	PRT	-0.3746
64	Spain	ESP	-0.3796
65	Czech Republic	CZE	-0.4665
66	Slovak Republic	SVK	-0.5015
67	Hungary	HUN	-0.5106
68	Poland	POL	-0.5590
69	Turkey	TUR	-0.6831
Mean	**0.0000**	**Std. Dev.**	**0.3064**

Source: Own estimations. See Appendix for details.

Table 2.- Aggregated and Disaggregated Entrepreneurship Index

Methods II and III – Period 1998-2001

Aggregated Entrepreneurship Index			Entrepreneurial Activity (Weight: 13.23%)			Employment (Weight: 11.54%)			Economic Activity (Weight: 2.97%)			Entrepreneurship Spirit, Culture, and Initiative (Weight: 4.25%)			Barriers to Entrepreneurial Activity and Business Environment (Weight: 13.65%)			Knowledge Procurement (Weight: 23.52%)			Innovation (Weight: 30.85%)		
Ranking	Country	Index	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking
1	CHN	2.7655	CHN	-0.2426	55	CHN	-0.0053	52	CHN	0.5862	2	CHN	0.7783	5	CHN	0.6640	5	CHN	0.6574	9	CHN	1.5801	3
2	CHE	2.5880	CHE	-0.4952	61	CHE	-0.0054	53	CHE	-0.0011	33	CHE	0.0826	15	CHE	0.7311	4	CHE	2.4029	2	CHE	0.7605	7
3	JPN	2.4328	JPN	-1.3118	68	JPN	-0.6328	68	JPN	-1.1895	68	JPN	-2.0847	69	JPN	1.5337	1	JPN	0.1323	17	JPN	2.9160	2
4	SWE	2.3246	SWE	-1.0313	66	SWE	-0.0086	57	SWE	-0.0011	32	SWE	-0.5603	60	SWE	0.0794	28	SWE	2.6067	1	SWE	1.1185	4
5	USA	2.2967	USA	-0.3049	57	USA	-0.5338	67	USA	0.4406	3	USA	1.7076	4	USA	1.0509	2	USA	0.2199	15	USA	3.7077	1
6	AUS	1.5160	AUS	1.2418	4	AUS	-0.0047	51	AUS	-0.0105	48	AUS	1.7431	3	AUS	0.2141	21	AUS	0.9074	6	AUS	0.3030	13
7	DEU	1.3168	DEU	-1.0236	65	DEU	-0.3053	64	DEU	-0.5018	64	DEU	-0.4915	59	DEU	0.5066	8	DEU	0.6418	10	DEU	0.8660	6
8	NLD	1.2347	NLD	-0.7329	63	NLD	0.1230	4	NLD	5.3922	1	NLD	-1.2943	65	NLD	0.6034	6	NLD	0.8810	7	NLD	0.1586	16
9	CAN	1.1085	CAN	0.1725	11	CAN	-0.0081	56	CAN	-0.0005	15	CAN	0.7016	7	CAN	0.5097	7	CAN	0.3934	13	CAN	0.4988	8
10	FIN	0.8221	FIN	-0.3878	59	FIN	1.8165	1	FIN	-1.0218	67	FIN	-0.1957	56	FIN	-0.1147	39	FIN	1.6879	3	FIN	0.4052	10
11	ISL	0.7867	ISL	0.2220	9	ISL	-0.0013	48	ISL	-0.0115	52	ISL	-0.0008	42	ISL	0.1188	24	ISL	1.2599	4	ISL	-0.2214	46
12	NZL	0.7539	NZL	1.4679	3	NZL	0.0017	16	NZL	-0.0011	30	NZL	3.3628	1	NZL	0.0976	26	NZL	0.3445	14	NZL	-0.6954	62
13	KOR	0.7449	KOR	0.5687	8	KOR	0.0185	7	KOR	0.0009	12	KOR	0.5427	10	KOR	0.0937	27	KOR	-0.5672	58	KOR	0.8786	5
14	DNK	0.5091	DNK	-1.3765	69	DNK	-1.1310	69	DNK	-0.0013	44	DNK	-0.4890	58	DNK	0.3156	13	DNK	0.9709	5	DNK	-0.1727	42
15	ITA	0.4738	ITA	1.0614	5	ITA	-0.2793	63	ITA	-1.5118	69	ITA	0.5382	11	ITA	0.1221	23	ITA	-0.8790	61	ITA	-0.6018	61
16	GBR	0.4382	GBR	-0.6784	62	GBR	0.3997	3	GBR	-0.6187	65	GBR	-0.6214	61	GBR	0.3345	11	GBR	0.6046	11	GBR	0.4126	9
17	ISR	0.2171	ISR	-0.0706	50	ISR	-0.0069	55	ISR	-0.0012	39	ISR	-1.5185	68	ISR	0.2736	17	ISR	0.4106	12	ISR	-0.1578	40
18	EGY	0.1939	EGY	-0.0218	48	EGY	-0.0004	47	EGY	0.0516	7	EGY	0.0700	16	EGY	0.0375	29	EGY	0.0586	19	EGY	0.0282	19
19	MYS	0.1659	MYS	0.0002	33	MYS	0.0004	36	MYS	0.0046	11	MYS	-0.0005	32	MYS	0.7505	3	MYS	-0.0490	43	MYS	-0.0325	30
20	LBN	0.1081	LBN	0.0000	43	LBN	0.0004	35	LBN	-0.0007	23	LBN	0.0001	27	LBN	0.2751	16	LBN	0.0021	20	LBN	0.0016	21
21	ARG	0.0975	ARG	-0.0263	49	ARG	0.0006	24	ARG	-0.0131	53	ARG	0.2334	12	ARG	-0.3392	53	ARG	-0.0303	34	ARG	0.2074	14
22	HKG	0.0928	HKG	0.0002	32	HKG	0.0004	30	HKG	-0.0011	29	HKG	-0.0005	34	HKG	0.2787	15	HKG	-0.0311	35	HKG	0.0476	17
23	FRA	0.0401	FRA	-0.2228	54	FRA	1.2753	2	FRA	-0.8527	66	FRA	-1.2407	64	FRA	0.1506	22	FRA	0.7281	8	FRA	0.3386	12
24	JOR	0.0245	JOR	0.0000	41	JOR	0.0004	32	JOR	-0.0006	17	JOR	0.0001	22	JOR	-0.0038	31	JOR	0.0013	21	JOR	0.0016	22
25	THA	0.0208	THA	0.0002	35	THA	0.0004	44	THA	-0.0010	28	THA	-0.0003	31	THA	0.4020	10	THA	-0.0468	40	THA	-0.0786	35
26	BRA	-0.0785	BRA	0.1908	10	BRA	0.0184	9	BRA	-0.0095	46	BRA	0.7186	6	BRA	-0.3533	55	BRA	-0.1263	53	BRA	0.4033	11
27	CHL	-0.1075	CHL	0.0001	36	CHL	0.0045	12	CHL	-0.0007	20	CHL	0.0001	24	CHL	-0.0069	32	CHL	-0.0298	33	CHL	-0.0751	34
28	SGP	-0.1506	SGP	-0.2532	56	SGP	0.0004	41	SGP	-0.0011	31	SGP	-1.3167	66	SGP	0.1101	25	SGP	-0.0251	32	SGP	0.0358	18
29	BEL	-0.1528	BEL	-0.3950	60	BEL	-0.4487	66	BEL	0.0856	5	BEL	-1.4930	67	BEL	0.4118	9	BEL	-0.0194	30	BEL	-0.1380	38
30	SYR	-0.1633	SYR	0.0000	45	SYR	0.0004	43	SYR	0.0075	10	SYR	0.0001	20	SYR	-0.4436	64	SYR	-0.0071	26	SYR	-0.0310	29
31	ZAF	-0.1843	ZAF	-0.1503	52	ZAF	0.0004	42	ZAF	-0.0006	18	ZAF	-0.1601	55	ZAF	-0.0014	30	ZAF	-0.1532	54	ZAF	0.0016	28
32	ARE	-0.1925	ARE	0.0000	46	ARE	0.0004	46	ARE	-0.0007	27	ARE	0.0001	29	ARE	-0.4977	67	ARE	-0.0039	23	ARE	0.0016	23
33	NOR	-0.2187	NOR	-0.9834	64	NOR	-0.0113	59	NOR	-0.0012	40	NOR	-0.2493	57	NOR	-0.0140	34	NOR	0.0805	18	NOR	0.0154	20
34	SAU	-0.2245	SAU	0.0001	38	SAU	0.0004	40	SAU	-0.0007	26	SAU	0.0000	30	SAU	-0.3057	50	SAU	-0.0071	25	SAU	-0.0903	36
35	IRL	-0.2326	IRL	0.6255	7	IRL	-0.3356	65	IRL	0.0288	8	IRL	0.6047	8	IRL	0.2791	14	IRL	-1.0816	65	IRL	-0.2753	49
36	COL	-0.2353	COL	0.0003	25	COL	0.0004	27	COL	-0.0012	35	COL	-0.0006	35	COL	-0.2015	44	COL	-0.0472	41	COL	-0.1800	44
37	KWT	-0.2427	KWT	0.0000	42	KWT	0.0004	34	KWT	-0.0007	22	KWT	0.0001	26	KWT	-0.4185	61	KWT	-0.0421	39	KWT	0.0016	26
38	AUT	-0.2636	AUT	-0.3817	58	AUT	-0.0056	54	AUT	-0.0012	34	AUT	-0.0019	43	AUT	0.3198	12	AUT	-0.2170	56	AUT	-0.2859	51
39	RUS	-0.2667	RUS	-0.1556	53	RUS	-0.0129	62	RUS	0.0931	4	RUS	-1.0988	63	RUS	-0.0676	37	RUS	-0.0947	49	RUS	-0.0356	31
40	PRY	-0.2895	PRY	0.0000	44	PRY	0.0004	37	PRY	-0.0007	25	PRY	0.0001	28	PRY	-0.4817	66	PRY	-0.0412	37	PRY	0.0016	25
41	PER	-0.2979	PER	0.0002	34	PER	0.0004	38	PER	-0.0012	41	PER	-0.0006	36	PER	-0.1942	43	PER	-0.0087	28	PER	-0.1800	43
42	LUX	-0.3018	LUX	-1.2080	67	LUX	-0.0115	61	LUX	-0.0007	24	LUX	-0.0005	33	LUX	0.2215	20	LUX	0.2113	16	LUX	-0.2951	53
43	SLV	-0.3289	SLV	0.0196	23	SLV	0.0012	23	SLV	-0.0362	54	SLV	-0.0625	44	SLV	-0.3359	52	SLV	-0.0635	44	SLV	-0.1286	37
44	BOL	-0.3406	BOL	0.0000	39	BOL	0.0004	25	BOL	-0.0007	19	BOL	0.0001	23	BOL	-0.0636	36	BOL	-0.0475	42	BOL	0.0016	27
45	BGR	-0.3428	BGR	0.0003	24	BGR	0.0004	26	BGR	-0.0112	50	BGR	0.0285	17	BGR	-0.3679	56	BGR	-0.0056	24	BGR	-0.2981	54
46	EST	-0.3638	EST	0.0003	26	EST	-0.0103	58	EST	-0.0013	45	EST	-0.0008	40	EST	-0.3458	54	EST	-0.1727	55	EST	-0.3020	56
47	CRI	-0.3773	CRI	0.0000	40	CRI	0.0004	28	CRI	-0.0007	21	CRI	0.0001	25	CRI	-0.3810	57	CRI	-0.0074	27	CRI	0.0016	24
48	IDN	-0.3781	IDN	0.0001	37	IDN	0.0004	31	IDN	-0.0005	16	IDN	0.0001	21	IDN	-0.5866	68	IDN	-0.0131	29	IDN	-0.0656	32
49	PAN	-0.4174	PAN	0.0342	16	PAN	0.0018	14	PAN	-0.0928	61	PAN	-0.1096	52	PAN	-0.0725	38	PAN	-0.1117	52	PAN	-0.2340	47
50	ROM	-0.4217	ROM	0.0003	28	ROM	0.0004	39	ROM	-0.0004	14	ROM	-0.0007	38	ROM	-0.3869	58	ROM	-0.0221	31	ROM	-0.2934	52
51	ECU	-0.4253	ECU	-0.0007	47	ECU	0.0004	29	ECU	0.0161	9	ECU	0.0023	18	ECU	-0.4092	59	ECU	-0.0413	38	ECU	-0.2146	45
52	KAZ	-0.4526	KAZ	0.0003	27	KAZ	0.0004	33	KAZ	-0.0100	47	KAZ	-0.0008	41	KAZ	-0.4694	65	KAZ	-0.0336	36	KAZ	-0.3123	57
53	IND	-0.4535	IND	0.0857	13	IND	0.0014	21	IND	-0.0746	57	IND	-0.6466	62	IND	-0.2518	46	IND	-0.2639	57	IND	-0.0695	33
54	UKR	-0.4565	UKR	0.0003	30	UKR	0.0004	45	UKR	-0.0112	51	UKR	-0.0006	37	UKR	-0.1264	40	UKR	0.0001	22	UKR	-0.2604	48
55	VEN	-0.4610	VEN	0.0352	15	VEN	0.0018	15	VEN	-0.0949	62	VEN	-0.1127	54	VEN	-0.4338	63	VEN	-0.1045	50	VEN	-0.1636	41
56	NIC	-0.5199	NIC	0.0301	18	NIC	0.0016	18	NIC	-0.0736	56	NIC	-0.0963	50	NIC	-0.2226	45	NIC	-0.0883	47	NIC	-0.3308	59
57	DOM	-0.5835	DOM	0.0233	22	DOM	0.0013	22	DOM	-0.2804	63	DOM	-0.0744	45	DOM	-0.6439	69	DOM	-0.0708	45	DOM	-0.1533	39
58	GRC	-0.5878	GRC	2.6899	1	GRC	0.0232	6	GRC	-0.0012	37	GRC	0.0014	19	GRC	-0.0115	33	GRC	-0.7801	59	GRC	-1.0697	67
59	GTM	-0.6048	GTM	0.0296	19	GTM	0.0016	17	GTM	-0.0821	60	GTM	-0.0946	49	GTM	-0.4306	62	GTM	-0.0935	48	GTM	-0.3009	55
60	HND	-0.6419	HND	0.0267	21	HND	0.0015	20	HND	-0.0624	55	HND	-0.0852	47	HND	-0.4184	60	HND	-0.0868	46	HND	-0.3219	58
61	URY	-0.6893	URY	0.0306	17	URY	0.0016	19	URY	-0.0761	58	URY	-0.0981	51	URY	-0.1772	41	URY	-0.1050	51	URY	-0.2832	50
62	MEX	-0.7708	MEX	0.8363	6	MEX	0.0185	8	MEX	-0.0107	49	MEX	2.5684	2	MEX	-0.3019	49	MEX	-2.1465	69	MEX	0.1873	15
63	ESP	-1.0695	ESP	0.1338	12	ESP	0.0020	13	ESP	0.0005	13	ESP	-0.1097	53	ESP	0.2519	19	ESP	-0.9515	63	ESP	-0.5867	60
64	CZE	-1.1104	CZE	0.0002	31	CZE	-0.0042	50	CZE	-0.0012	36	CZE	-0.0816	46	CZE	-0.1804	42	CZE	-0.9281	62	CZE	-0.7243	63
65	SVK	-1.1773	SVK	0.0003	29	SVK	-0.0113	60	SVK	-0.0012	43	SVK	-0.0007	39	SVK	-0.0359	35	SVK	-0.9738	64	SVK	-0.8481	64
66	POL	-1.3587	POL	-0.0953	51	POL	0.0049	11	POL	0.0568	6	POL	0.0850	14	POL	-0.2884	47	POL	-0.8728	60	POL	-0.9977	66
67	HUN	-1.4186	HUN	0.0767	14	HUN	-0.0035	49	HUN	-0.0012	38	HUN	0.5808	9	HUN	-0.3283	51	HUN	-1.0941	66	HUN	-0.9470	65
68	PRT	-1.5399	PRT	1.9154	2	PRT	0.0082	10	PRT	-0.0012	42	PRT	0.1336	13	PRT	0.2646	18	PRT	-1.3079	67	PRT	-1.3002	69
69	TUR	-2.1782	TUR	0.0283	20	TUR	0.0397	5	TUR	-0.0773	59	TUR	-0.0905	48	TUR	-0.2885	48	TUR	-1.3088	68	TUR	-1.1293	68
Mean: 0.0000			Mean: 0.0000			Mean: 0.0000			Mean: 0.0000			Mean: 0.0000			Mean: 0.0000			Mean: 0.0000			Mean: 0.0000		
Std.Dev.: 0.9507			Std.Dev.: 0.6356			Std.Dev.: 0.3333			Std.Dev.: 0.7263			Std.Dev.: 0.8018			Std.Dev.: 0.4086			Std.Dev.: 0.7447			Std.Dev.: 0.7577		

Source: Own estimations. See Appendix for details.

Table 3.- Multidimensional Entrepreneurship Index

Method IV – Distribution of Weights among Indicators and Dimensions – Period 1998-2001

Dimension	Dimension's Weight		Indicators	Indicator's Weight (intra-area)	Indicator's Weight (overall)
1.- Entrepreneurial Activity	0.48%	**1.1.- Firm Dynamics**			
		1	Bankruptcy Rate (%)	0.08%	0.00%
		2	Entry Rate (%)	10.96%	0.05%
		3	Exit Rate (%)	0.00%	0.00%
		4	Share Of Bankruptcies In Firm Exits (%)	43.97%	0.21%
		1.2.- Firm survival			
		5	Young Firm Entrepreneurial Activity Index (Index)	14.55%	0.07%
		6	Total Entrepreneurial Activity Index (Index)	30.43%	0.15%
		1.3.- Ownership			
		7	Business Ownership Rate (agriculture, hunting, forestry and fishing, rate)	0.00%	0.00%
		8	Business Ownership Rate (private sector excluding agriculture, hunting, forestry and fishing, rate)	0.00%	0.00%
		9	Business Ownership Rate (total private sector, rate)	0.00%	0.00%
2.- Employment	2.50%	10	Average Size Of Firm Entries (number)	0.04%	0.00%
		11	Share Of Entries In Employment (%)	0.00%	0.00%
		12	Share Of Exits In Employment (%)	0.00%	0.00%
		13	Aver. Mumber Workers For Fast Growers; Last Year Period (x 1)	12.47%	0.31%
		14	Aver. Number Workers For All Enterpr.; Growth Rate Period (%)	7.68%	0.19%
		15	Aver. Number Workers For All Enterpr.; Last Year Period (x 1)	1.44%	0.04%
		16	Aver. Number Workers For Fast Growers; Growth Rate Period (%)	0.17%	0.00%
		17	Aver. Number Workers For Not Fast Growers; Growth Rate Period (%)	7.62%	0.19%
		18	Self-employment rates: total, as a percentage of total civilian employment	70.57%	1.77%
3.- Economic Activity	33.02%	19	Average Sales For All Enterprises; Growth Rate Period (%)	0.00%	0.00%
		20	Average Sales For All Enterprises; Last Year Period (x € 1000)	0.00%	0.00%
		21	Average Sales For Fast Growers; Growth Rate Period (%)	0.00%	0.00%
		22	Average Sales For Fast Growers; Last Year Period (x € 1000)	0.00%	0.00%
		23	Average Sales For Not Fast Growers; Growth Rate Period (%)	0.00%	0.00%
		24	Average Sales For Not Fast Growers; Last Year Period (x € 1000)	0.00%	0.00%
		25	Listed domestic companies, total	0.00%	0.00%
		26	Micro, small and medium enterprises (number)	100.00%	**33.02%**
		27	Micro, small and medium enterprises (per 1,000 people)	0.00%	0.00%
		28	Taxes on exports (% of tax revenue)	0.00%	0.00%
4.- Entrepreneurship Spirit, Culture, and Iniciative	18.13%	29	Female Total Entrepreneurial Activity Index (Index)	0.63%	0.11%
		30	Necessity Entrepreneurial Activity Index (Index)	0.55%	0.10%
		31	Opportunity Entrepreneurial Activity Index (Index)	0.11%	0.02%
		32	Potential Entrepreneur Index (Index)	0.00%	0.00%
		33	High-skilled self-employment rates	0.00%	0.00%
		34	Fear Of Failure Index (Index)	0.00%	0.00%
		35	Know Entrepreneur Index (Index)	0.00%	0.00%
		36	Latent entrepreneurship	98.69%	**17.89%**
		37	Informal Investors Index (Index)	0.00%	0.00%
		38	Nascent Entrepreneurial Activity Index (Index)	0.02%	0.00%
5.- Barriers to Entrepreneurial Activity and Business Environment	14.79%	39	Domestic credit provided by banking sector (% of GDP)	51.90%	**7.68%**
		40	Domestic credit to private sector (% of GDP)	36.31%	**5.37%**
		41	Highest marginal tax rate, corporate rate (%)	0.07%	0.01%
		42	Highest marginal tax rate, individual rate (%)	0.78%	0.12%
		43	Interest rate spread (lending rate minus deposit rate)	0.14%	0.02%
		44	Labor force with primary education (% of total)	5.08%	0.75%
		45	Labor force with secondary education (% of total)	4.78%	0.71%
		46	Labor force with tertiary education (% of total)	0.93%	0.14%
6.- Knowledge Procurement	17.53%	47	R&D performed by the non-business sector as a percentage of GDP	0.00%	0.00%
		48	Non-business researchers per10 000 labour force	0.00%	0.00%
		49	Basic research as a percentage of GDP	0.00%	0.00%
		50	PhD graduation rates in science, engineering and health	0.00%	0.00%
		51	Scientific and technical articles per million population	0.98%	0.17%
		52	Business-financed R&D performed by governmentor higher education as a percentage of GDP	0.00%	0.00%
		53	Scientific papers cited in US-issued patents	0.00%	0.00%
		54	Publications in the 19 most industry-relevant scientific disciplines per million population	0.00%	0.00%
		55	Gross domestic expenditure on R&D (% of GDP)	0.00%	0.00%
		56	Physicians (per 1,000 people)	0.00%	0.00%
		57	Technicians in R&D (per million people)	99.01%	**17.36%**
7.- Innovation	13.55%	58	BERD as a percentage of GDP	0.00%	0.00%
		59	Business researchers per10 000 labour force	0.00%	0.00%
		60	Number of patents in "triadic" patent families per million population	0.00%	0.00%
		61	Share of firms with new or technologicallyimproved products or processes	0.00%	0.00%
		62	Patent applications, nonresidents	7.51%	1.02%
		63	Patent applications, residents	31.16%	**4.22%**
		64	Trademarks, nonresidents	0.83%	0.11%
		65	Trademarks, residents	60.49%	**8.20%**

Source: Own estimations. See Appendix for details.

Table 4.- Multidimensional Entrepreneurship Index

Method IV – Period 1998-2001

Multidimensional Entrepreneurship Index			*Entrepreneurial Activity*			*Employment*			*Economic Activity*		
			Weight: 10.27%			Weight: 13.29%			Weight: 9.00%		
Ranking	Country	Index	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking
1	USA	1.1863	USA	-0.4686	57	USA	-0.7708	67	USA	-0.2723	68
2	CHE	0.7991	CHE	-0.5596	58	CHE	-0.0400	54	CHE	-0.0440	32
3	JPN	0.7424	JPN	-1.0700	63	JPN	-0.7865	68	JPN	-3.9166	69
4	SWE	0.7317	SWE	-1.1976	66	SWE	-0.0634	58	SWE	-0.0405	30
5	CHN	0.6296	CHN	-0.2885	54	CHN	0.1955	6	CHN	0.3660	9
6	FIN	0.5787	FIN	-0.6626	61	FIN	1.4805	1	FIN	0.6992	3
7	DEU	0.4533	DEU	-1.1608	65	DEU	-0.0716	59	DEU	0.4983	7
8	AUS	0.3864	AUS	1.3924	5	AUS	-0.0347	53	AUS	0.0380	16
9	KOR	0.3720	KOR	0.6208	8	KOR	0.1368	8	KOR	0.0671	15
10	CAN	0.3370	CAN	0.1908	11	CAN	-0.0597	57	CAN	0.0824	13
11	NLD	0.2197	NLD	-0.5976	59	NLD	-0.3572	66	NLD	0.9220	2
12	FRA	0.2135	FRA	-1.3029	67	FRA	0.6684	2	FRA	0.6424	4
13	GBR	0.1978	GBR	-0.6103	60	GBR	0.2165	5	GBR	0.1143	12
14	MYS	0.1554	MYS	0.0003	32	MYS	0.0030	34	MYS	0.0310	18
15	ISL	0.1530	ISL	0.2561	9	ISL	-0.0095	40	ISL	-0.0946	62
16	HKG	0.0916	HKG	0.0003	31	HKG	0.0030	33	HKG	0.0128	20
17	LBN	0.0569	LBN	0.0000	45	LBN	0.0032	25	LBN	-0.0696	55
18	THA	0.0541	THA	0.0002	36	THA	0.0031	29	THA	-0.0277	26
19	BRA	0.0477	BRA	0.2406	10	BRA	0.1362	10	BRA	-0.0485	36
20	EGY	0.0237	EGY	-0.0259	49	EGY	0.0178	14	EGY	0.0706	14
21	NZL	0.0144	NZL	1.6932	3	NZL	0.0122	16	NZL	-0.0564	41
22	ITA	0.0131	ITA	1.6128	4	ITA	0.3635	3	ITA	1.5982	1
23	JOR	0.0007	JOR	0.0000	43	JOR	0.0032	23	JOR	-0.0537	39
24	ARG	-0.0062	ARG	0.0114	24	ARG	0.0002	39	ARG	-0.0642	47
25	KWT	-0.0153	KWT	0.0000	44	KWT	0.0032	24	KWT	-0.0627	45
26	CHL	-0.0157	CHL	0.0001	37	CHL	0.0333	13	CHL	-0.0412	31
27	ISR	-0.0182	ISR	-0.1804	52	ISR	-0.0509	56	ISR	0.0000	21
28	IND	-0.0232	IND	0.1211	13	IND	-0.0138	44	IND	0.5237	6
29	MEX	-0.0246	MEX	1.0125	7	MEX	0.1362	9	MEX	-0.0811	57
30	BOL	-0.0413	BOL	0.0000	41	BOL	0.0032	21	BOL	-0.0685	53
31	IRL	-0.0483	IRL	1.0184	6	IRL	-0.0119	42	IRL	-0.0863	58
32	ZAF	-0.0495	ZAF	-0.1409	51	ZAF	0.0032	28	ZAF	-0.0002	22
33	ARE	-0.0538	ARE	0.0000	47	ARE	0.0032	27	ARE	-0.0664	51
34	SGP	-0.0543	SGP	-0.3090	55	SGP	0.0030	38	SGP	-0.0304	27
35	SAU	-0.0564	SAU	0.0001	39	SAU	0.0032	19	SAU	-0.0628	46
36	AUT	-0.0723	AUT	-0.4273	56	AUT	-0.0413	55	AUT	-0.0601	44
37	CRI	-0.0736	CRI	0.0000	42	CRI	0.0032	22	CRI	-0.0665	52
38	PRY	-0.0842	PRY	0.0000	46	PRY	0.0032	26	PRY	-0.0648	49
39	PAN	-0.0883	PAN	0.0407	16	PAN	-0.0198	49	PAN	-0.1282	67
40	SYR	-0.0963	SYR	0.0001	40	SYR	0.0032	20	SYR	0.0239	19
41	SLV	-0.1011	SLV	0.0233	23	SLV	-0.0099	41	SLV	-0.0867	60
42	COL	-0.1109	COL	0.0003	29	COL	0.0030	32	COL	-0.0559	40
43	PER	-0.1132	PER	0.0003	33	PER	0.0030	35	PER	-0.0454	33
44	IDN	-0.1170	IDN	0.0001	38	IDN	0.0032	18	IDN	-0.0380	28
45	NOR	-0.1178	NOR	-1.1163	64	NOR	-0.0834	62	NOR	-0.0496	37
46	ROM	-0.1242	ROM	0.0003	34	ROM	0.0030	36	ROM	0.5434	5
47	ECU	-0.1257	ECU	-0.0008	48	ECU	0.0036	17	ECU	-0.0583	42
48	NIC	-0.1270	NIC	0.0358	18	NIC	-0.0170	47	NIC	-0.0460	34
49	RUS	-0.1317	RUS	-0.2166	53	RUS	-0.0950	64	RUS	0.2327	10
50	BEL	-0.1361	BEL	-0.8412	62	BEL	-0.3173	65	BEL	0.3816	8
51	URY	-0.1396	URY	0.0364	17	URY	-0.0174	48	URY	-0.1214	65
52	UKR	-0.1407	UKR	0.0003	35	UKR	0.0030	37	UKR	-0.0866	59
53	DOM	-0.1418	DOM	0.0277	22	DOM	-0.0124	43	DOM	0.1731	11
54	DNK	-0.1475	DNK	-1.3693	68	DNK	-0.7974	69	DNK	-0.0462	35
55	BGR	-0.1599	BGR	0.0003	28	BGR	0.0030	31	BGR	-0.0258	25
56	HND	-0.1648	HND	0.0317	21	HND	-0.0147	45	HND	-0.0974	63
57	VEN	-0.1731	VEN	0.0419	15	VEN	-0.0205	50	VEN	-0.1140	64
58	KAZ	-0.1814	KAZ	0.0004	26	KAZ	0.0030	30	KAZ	-0.0945	61
59	GTM	-0.1850	GTM	0.0352	19	GTM	-0.0167	46	GTM	-0.1267	66
60	EST	-0.1866	EST	0.0004	25	EST	-0.0764	60	EST	-0.0688	54
61	GRC	-0.1927	GRC	3.0711	1	GRC	0.1708	7	GRC	-0.0384	29
62	LUX	-0.2021	LUX	-1.3727	69	LUX	-0.0844	63	LUX	-0.0654	50
63	ESP	-0.3231	ESP	0.1472	12	ESP	0.0154	15	ESP	0.0311	17
64	PRT	-0.3732	PRT	2.1947	2	PRT	0.0601	11	PRT	-0.0584	43
65	CZE	-0.4584	CZE	0.0003	30	CZE	-0.0314	52	CZE	-0.0533	38
66	SVK	-0.4880	SVK	0.0004	27	SVK	-0.0833	61	SVK	-0.0074	23
67	HUN	-0.5258	HUN	0.1071	14	HUN	-0.0262	51	HUN	-0.0647	48
68	POL	-0.5777	POL	-0.0820	50	POL	0.0574	12	POL	-0.0150	24
69	TUR	-0.6705	TUR	0.0337	20	TUR	0.2652	4	TUR	-0.0806	56
Mean: 0.0000			**Mean: 0.0000**			**Mean: 0.0000**			**Mean: 0.0000**		
Std.Dev.: 0.3200			**Std.Dev.: 0.7459**			**Std.Dev.: 0.2754**			**Std.Dev.: 0.5577**		

Entrepreneurship Spirit, Culture, and Initiative			*Barriers to Entrepreneurial Activity and Business Environment*			*Knowledge Procurement*			*Innovation*		
Weight: 4.81%			Weight: 15.74%			Weight: 13.27%			Weight: 33.61%		
Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking	Country	Index	Ranking
USA	0.6239	10	USA	1.3105	2	USA	0.5016	12	USA	3.1493	1
CHE	0.0009	31	CHE	0.8463	4	CHE	2.4588	2	CHE	1.2093	5
JPN	-1.3624	66	JPN	2.0233	1	JPN	0.4489	14	JPN	2.9665	2
SWE	-0.9661	63	SWE	0.1532	25	SWE	2.6915	1	SWE	1.5829	3
CHN	-0.7849	58	CHN	0.5819	8	CHN	0.6333	11	CHN	1.3760	4
FIN	-0.8201	60	FIN	-0.1375	37	FIN	1.6415	3	FIN	0.6853	8
DEU	-0.5437	56	DEU	0.5034	10	DEU	0.8943	6	DEU	1.0874	6
AUS	1.2646	4	AUS	0.1841	24	AUS	0.7479	10	AUS	0.1651	14
KOR	1.1513	6	KOR	0.1517	26	KOR	-0.2523	55	KOR	0.7087	7
CAN	0.5373	11	CAN	0.7652	5	CAN	0.4016	15	CAN	0.3522	10
NLD	-1.5393	67	NLD	0.6449	6	NLD	0.8079	7	NLD	0.3302	11
FRA	-0.8849	62	FRA	0.2049	22	FRA	0.7993	8	FRA	0.3123	12
GBR	-0.7262	57	GBR	0.4340	11	GBR	0.4554	13	GBR	0.3797	9
MYS	0.0008	35	MYS	1.0847	3	MYS	-0.0580	42	MYS	-0.0324	31
ISL	0.0011	27	ISL	0.1960	23	ISL	1.1194	4	ISL	-0.1276	41
HKG	0.0008	36	HKG	0.6284	7	HKG	-0.0438	36	HKG	-0.0093	28
LBN	0.0002	49	LBN	0.4004	12	LBN	-0.0044	22	LBN	0.0010	20
THA	0.0007	38	THA	0.5555	9	THA	-0.0526	38	THA	-0.0722	35
BRA	1.4255	3	BRA	-0.7055	69	BRA	-0.2198	54	BRA	0.2404	13
EGY	-0.0703	54	EGY	0.0172	33	EGY	0.0574	18	EGY	0.0319	18
NZL	2.2213	2	NZL	0.1455	27	NZL	0.0274	19	NZL	-0.8615	63
ITA	0.3483	12	ITA	0.0414	31	ITA	-0.8512	59	ITA	-0.7590	61
JOR	0.0002	43	JOR	0.0280	32	JOR	0.0027	20	JOR	0.0010	19
ARG	0.9796	7	ARG	-0.4565	57	ARG	-0.0429	35	ARG	0.0856	16
KWT	0.0002	44	KWT	-0.0203	35	KWT	-0.0543	40	KWT	0.0010	24
CHL	0.0003	40	CHL	0.0615	28	CHL	-0.0345	34	CHL	-0.0640	34
ISR	-2.0353	69	ISR	0.2720	19	ISR	0.7623	9	ISR	-0.1155	40
IND	1.2097	5	IND	-0.3731	48	IND	-0.4067	58	IND	-0.0790	37
MEX	3.2419	1	MEX	-0.4226	54	MEX	-1.9749	69	MEX	0.0982	15
BOL	0.0002	48	BOL	-0.1779	40	BOL	-0.0598	44	BOL	0.0010	25
IRL	0.3166	13	IRL	0.3307	16	IRL	-1.0116	62	IRL	-0.2279	54
ZAF	0.0535	23	ZAF	-0.0009	34	ZAF	-0.2884	56	ZAF	0.0010	26
ARE	0.0002	46	ARE	-0.3052	44	ARE	-0.0044	23	ARE	0.0010	21
SGP	-1.2501	65	SGP	0.3205	17	SGP	-0.0299	33	SGP	-0.0195	29
SAU	0.0003	41	SAU	-0.1618	38	SAU	-0.0045	26	SAU	-0.0749	36
AUT	-0.0072	53	AUT	0.2167	20	AUT	-0.0154	30	AUT	-0.1463	45
CRI	0.0002	47	CRI	-0.4308	55	CRI	-0.0044	24	CRI	0.0010	22
PRY	0.0002	45	PRY	-0.4604	58	PRY	-0.0506	37	PRY	0.0010	23
PAN	0.1109	15	PAN	0.0441	30	PAN	-0.1124	51	PAN	-0.2252	53
SYR	0.0002	42	SYR	-0.5557	62	SYR	-0.0044	25	SYR	-0.0324	30
SLV	0.0634	22	SLV	-0.3275	46	SLV	-0.0598	45	SLV	-0.1128	39
COL	0.0009	33	COL	-0.3419	47	COL	-0.0582	43	COL	-0.1332	42
PER	0.0009	32	PER	-0.4067	52	PER	-0.0050	28	PER	-0.1337	43
IDN	0.0003	39	IDN	-0.5986	64	IDN	-0.0045	27	IDN	-0.0572	33
NOR	-0.7864	59	NOR	0.0507	29	NOR	0.1084	17	NOR	0.0832	17
ROM	0.0010	28	ROM	-0.6754	67	ROM	-0.0285	32	ROM	-0.1891	49
ECU	-0.0020	50	ECU	-0.4006	50	ECU	-0.0534	39	ECU	-0.1507	46
NIC	0.0975	17	NIC	-0.1763	39	NIC	-0.0897	49	NIC	-0.2658	58
RUS	-1.2350	64	RUS	-0.1982	41	RUS	-0.1939	53	RUS	-0.0042	27
BEL	-1.5505	68	BEL	0.3960	14	BEL	0.0024	21	BEL	-0.0887	38
URY	0.0992	16	URY	-0.2387	43	URY	-0.1225	52	URY	-0.2411	55
UKR	0.0009	34	UKR	-0.4926	59	UKR	-0.0051	29	UKR	-0.1643	47
DOM	0.0754	21	DOM	-0.6848	68	DOM	-0.0703	46	DOM	-0.1343	44
DNK	-0.8588	61	DNK	0.2157	21	DNK	0.9232	5	DNK	-0.0351	32
BGR	0.0010	30	BGR	-0.5790	63	BGR	-0.0160	31	BGR	-0.1929	50
HND	0.0863	20	HND	-0.4145	53	HND	-0.0799	47	HND	-0.2549	57
VEN	0.1140	14	VEN	-0.6045	65	VEN	-0.1042	50	VEN	-0.1813	48
KAZ	0.0011	26	KAZ	-0.6270	66	KAZ	-0.0545	41	KAZ	-0.2008	52
GTM	0.0958	18	GTM	-0.5382	60	GTM	-0.0882	48	GTM	-0.2476	56
EST	0.0011	25	EST	-0.3829	49	EST	-0.3305	57	EST	-0.1971	51
GRC	0.0132	24	GRC	-0.0788	36	GRC	-0.9207	60	GRC	-1.1709	67
LUX	-0.0029	51	LUX	0.2894	18	LUX	0.2957	16	LUX	-0.3824	59
ESP	-0.3051	55	ESP	0.3768	15	ESP	-1.0345	64	ESP	-0.7451	60
PRT	-0.0055	52	PRT	0.3977	13	PRT	-1.1715	67	PRT	-1.5122	69
CZE	0.0008	37	CZE	-0.4065	51	CZE	-0.9526	61	CZE	-0.7708	62
SVK	0.0010	29	SVK	-0.2040	42	SVK	-1.0900	65	SVK	-0.8915	64
HUN	0.7544	8	HUN	-0.4348	56	HUN	-1.1384	66	HUN	-1.0243	65
POL	0.7461	9	POL	-0.5454	61	POL	-1.0280	63	POL	-1.1579	66
TUR	0.0917	19	TUR	-0.3072	45	TUR	-1.4996	68	TUR	-1.3658	68
Mean: 0.0000			**Mean: 0.0000**			**Mean: 0.0000**			**Mean: 0.0000**		
Std.Dev.: 0.8051			**Std.Dev.: 0.5154**			**Std.Dev.: 0.7563**			**Std.Dev.: 0.7611**		

Source: Own estimations. See Appendix for details.

Table 5.- Overall Entrepreneurship Index
Method I – period 2002-2005

Ranking	Country	Country Code	Index	Ranking	Country	Country Code	Index
1	Indonesia	IDN	0.9061	36	Panama	PAN	-0.0325
2	United States	USA	0.7928	37	Ukraine	UKR	-0.0364
3	China	CHN	0.5728	38	Kuwait	KWT	-0.0430
4	Finland	FIN	0.4601	39	Kazakhstan	KAZ	-0.0491
5	Korea, Rep.	KOR	0.4162	40	Guatemala	GTM	-0.0524
6	Mexico	MEX	0.2943	41	Spain	ESP	-0.0528
7	Brazil	BRA	0.2800	42	Thailand	THA	-0.0534
8	United Kingdom	GBR	0.2322	43	Japan	JPN	-0.0554
9	India	IND	0.2014	44	Jordan	JOR	-0.0601
10	Argentina	ARG	0.1387	45	Turkey	TUR	-0.0679
11	Greece	GRC	0.1031	46	Czech Republic	CZE	-0.0720
12	New Zealand	NZL	0.0864	47	Luxembourg	LUX	-0.0728
13	Australia	AUS	0.0576	48	Costa Rica	CRI	-0.0768
14	Venezuela, RB	VEN	0.0572	49	Uruguay	URY	-0.0771
15	Israel	ISR	0.0534	50	Chile	CHL	-0.0957
16	Russian Federation	RUS	0.0244	51	Bulgaria	BGR	-0.0980
17	Dominican Republic	DOM	0.0171	52	Austria	AUT	-0.1025
18	Bolivia	BOL	0.0164	53	Hong Kong, China	HKG	-0.1056
19	Canada	CAN	0.0084	54	Malaysia	MYS	-0.1083
20	Switzerland	CHE	0.0064	55	Hungary	HUN	-0.1121
21	Egypt, Arab Rep.	EGY	0.0056	56	Colombia	COL	-0.1180
22	Syrian Arab Republic	SYR	0.0045	57	South Africa	ZAF	-0.1282
23	El Salvador	SLV	0.0043	58	Romania	ROM	-0.1356
24	Lebanon	LBN	0.0026	59	Estonia	EST	-0.1359
25	United Arab Emirates	ARE	0.0007	60	Norway	NOR	-0.1456
26	Paraguay	PRY	-0.0055	61	Poland	POL	-0.1468
27	Ireland	IRL	-0.0157	62	France	FRA	-0.1595
28	Iceland	ISL	-0.0202	63	Slovak Republic	SVK	-0.1662
29	Saudi Arabia	SAU	-0.0203	64	Singapore	SGP	-0.2136
30	Ecuador	ECU	-0.0234	65	Italy	ITA	-0.2558
31	Sweden	SWE	-0.0234	66	Belgium	BEL	-0.2705
32	Nicaragua	NIC	-0.0268	67	Denmark	DNK	-0.3477
33	Peru	PER	-0.0296	68	Netherlands	NLD	-0.3921
34	Portugal	PRT	-0.0304	69	Germany	DEU	-0.4761
35	Honduras	HND	-0.0319	**Mean**	**0.0000**	**Std. Dev.**	**0.2248**

Source: Own estimations. See Appendix for details.

Table 6.- Aggregated and Disaggregated Entrepreneurship Index

Methods II and III – Period 2002-2005

Aggregated Entrepreneurship Index			Entrepreneurial Activity		
			Weight: 0.12%		
Ranking	Country	Index	Country	Index	Ranking
1	USA	7.8874	USA	-0.3104	57
2	IDN	6.8605	IDN	-0.0632	53
3	NLD	1.9445	NLD	-0.4881	58
4	KOR	1.6307	KOR	0.0613	13
5	JPN	1.4976	JPN	-1.1484	67
6	CHN	1.2288	CHN	-0.0008	20
7	IND	0.9924	IND	0.0749	12
8	BRA	0.9634	BRA	0.2742	9
9	MEX	0.9109	MEX	-0.0507	51
10	RUS	0.5227	RUS	-0.1542	56
11	ARG	0.4167	ARG	0.2223	10
12	CAN	0.0833	CAN	0.1651	11
13	VEN	0.0706	VEN	-0.0020	31
14	TUR	0.0594	TUR	-0.0014	22
15	SYR	0.0543	SYR	-0.0079	45
16	DOM	0.0473	DOM	-0.0020	23
17	ARE	0.0277	ARE	-0.0020	30
18	BOL	0.0261	BOL	-0.0077	43
19	EGY	0.0136	EGY	-0.0070	39
20	GTM	-0.0029	GTM	-0.0075	40
21	SLV	-0.0073	SLV	-0.0077	44
22	LBN	-0.0105	LBN	-0.0076	42
23	NZL	-0.0149	NZL	1.4651	4
24	AUS	-0.0233	AUS	1.2544	5
25	PAN	-0.0250	PAN	-0.0020	28
26	KWT	-0.0351	KWT	-0.0020	26
27	NIC	-0.0368	NIC	-0.0020	27
28	SAU	-0.0495	SAU	-0.0020	29
29	ECU	-0.0511	ECU	-0.0020	24
30	HND	-0.0645	HND	-0.0020	25
31	GRC	-0.0778	GRC	3.3792	1
32	ESP	-0.1117	ESP	0.5267	6
33	CZE	-0.1130	CZE	-0.0050	37
34	KAZ	-0.1371	KAZ	-0.0076	41
35	ZAF	-0.2074	ZAF	-0.1042	55
36	ISR	-0.2252	ISR	-0.0490	50
37	POL	-0.2314	POL	-0.0392	49
38	PRY	-0.2811	PRY	0.0001	19
39	HUN	-0.2838	HUN	-0.0821	54
40	THA	-0.2896	THA	0.0076	14
41	PER	-0.3104	PER	-0.0030	33
42	CHL	-0.3143	CHL	-0.0138	47
43	ROM	-0.3471	ROM	0.0019	15
44	CHE	-0.3572	CHE	-1.0149	65
45	PRT	-0.3589	PRT	1.9048	3
46	CRI	-0.3689	CRI	-0.0009	21
47	URY	-0.3705	URY	0.0006	16
48	UKR	-0.3737	UKR	-0.0025	32
49	JOR	-0.3820	JOR	-0.0042	35
50	HKG	-0.3839	HKG	-0.0245	48
51	MYS	-0.4233	MYS	0.0001	18
52	COL	-0.4382	COL	-0.0054	38
53	BGR	-0.4390	BGR	0.0005	17
54	LUX	-0.4413	LUX	-1.8056	69
55	ISL	-0.4461	ISL	0.2952	8
56	AUT	-0.5054	AUT	-0.5260	60
57	SGP	-0.6061	SGP	-0.0604	52
58	SWE	-0.6254	SWE	-0.9282	64
59	SVK	-0.6261	SVK	-0.0042	36
60	EST	-0.6367	EST	-0.0039	34
61	NOR	-0.6800	NOR	-1.1469	66
62	IRL	-0.7468	IRL	0.3249	7
63	FIN	-1.0192	FIN	-0.6487	62
64	BEL	-1.0539	BEL	-0.0112	46
65	GBR	-1.2425	GBR	-0.5261	61
66	FRA	-1.9344	FRA	-0.4946	59
67	DEU	-2.0395	DEU	-0.8650	63
68	DNK	-2.4353	DNK	-1.3891	68
69	ITA	-3.0526	ITA	2.0882	2
Mean: 0.0000			Mean: 0.0000		
Std.Dev.: 1.5100			Std.Dev.: 0.7259		

Employment			Economic Activity		
Weight: 42.29%			Weight: 23.54%		
Country	Index	Ranking	Country	Index	Ranking
USA	1.6598	1	USA	1.7692	2
IDN	1.0445	3	IDN	-0.4881	67
NLD	-0.4944	65	NLD	2.5107	1
KOR	0.0596	9	KOR	0.0112	22
JPN	-0.0871	64	JPN	-0.4730	66
CHN	0.0401	11	CHN	0.0132	16
IND	0.0014	17	IND	0.1050	6
BRA	0.0900	7	BRA	-0.0408	61
MEX	0.0608	8	MEX	-0.0212	60
RUS	0.1053	6	RUS	-0.0684	62
ARG	0.0014	16	ARG	-0.0151	47
CAN	-0.0179	36	CAN	0.0699	7
VEN	0.0014	24	VEN	-0.0161	50
TUR	0.0561	10	TUR	-0.0105	44
SYR	0.0013	34	SYR	-0.0011	40
DOM	0.0014	18	DOM	-0.0012	41
ARE	0.0014	23	ARE	-0.0164	53
BOL	0.0014	26	BOL	-0.0166	54
EGY	0.0013	31	EGY	0.0041	37
GTM	0.0013	32	GTM	-0.0173	59
SLV	0.0014	27	SLV	-0.0166	55
LBN	0.0014	25	LBN	-0.0171	58
NZL	-0.0439	43	NZL	0.0107	23
AUS	-0.0328	38	AUS	0.0304	10
PAN	0.0014	21	PAN	-0.0169	57
KWT	0.0014	19	KWT	-0.0149	46
NIC	0.0014	20	NIC	-0.0012	42
SAU	0.0014	22	SAU	-0.0157	48
ECU	0.0013	29	ECU	-0.0167	56
HND	0.0013	30	HND	-0.0011	39
GRC	0.0072	14	GRC	0.0095	30
ESP	0.0276	12	ESP	0.0476	8
CZE	0.0030	15	CZE	-0.0160	49
KAZ	0.0013	33	KAZ	-0.0162	51
ZAF	0.0014	28	ZAF	-0.0012	43
ISR	-0.0546	52	ISR	0.0192	13
POL	0.0104	13	POL	-0.0121	45
PRY	-0.0456	45	PRY	0.0061	35
HUN	-0.0063	35	HUN	-0.0163	52
THA	-0.0377	40	THA	0.0106	25
PER	-0.0426	42	PER	0.0072	33
CHL	-0.0329	39	CHL	0.0080	32
ROM	-0.0497	47	ROM	0.1066	5
CHE	-0.0579	56	CHE	0.0131	18
PRT	-0.0231	37	PRT	0.0039	38
CRI	-0.0591	57	CRI	0.0104	27
URY	-0.0569	55	URY	0.0095	31
UKR	-0.0510	48	UKR	0.0103	28
JOR	-0.0564	53	JOR	0.0131	17
HKG	-0.0532	50	HKG	0.0323	9
MYS	-0.0464	46	MYS	0.0262	11
COL	-0.0425	41	COL	0.0050	36
BGR	-0.0544	51	BGR	0.0161	15
LUX	-0.0840	63	LUX	0.0117	20
ISL	-0.0604	58	ISL	0.0121	19
AUT	-0.0661	59	AUT	0.0098	29
SGP	-0.0566	54	SGP	0.0226	12
SWE	-0.0525	49	SWE	0.0067	34
SVK	-0.0724	61	SVK	0.0162	14
EST	-0.0689	60	EST	0.0105	26
NOR	-0.0761	62	NOR	0.0114	21
IRL	-0.0444	44	IRL	0.0107	24
FIN	1.5529	2	FIN	-0.3295	65
BEL	-0.5219	66	BEL	0.6534	3
GBR	0.4168	4	GBR	0.3324	4
FRA	0.1498	5	FRA	-1.3418	68
DEU	-0.7481	67	DEU	-2.3139	69
DNK	-0.8729	68	DNK	-0.3291	64
ITA	-1.1391	69	ITA	-0.3145	63
Mean: 0.0000			Mean: 0.0000		
Std.Dev.: 0.3779			Std.Dev.: 0.5138		

Entrepreneurship Spirit, Culture, and Initiative			Barriers to Entrepreneurial Activity and Business Environment		
Weight: 11.95%			Weight: 2.47%		
Country	Index	Ranking	Country	Index	Ranking
USA	0.6180	8	USA	-0.2231	47
IDN	0.9700	7	IDN	0.7444	5
NLD	-1.0821	67	NLD	-0.2256	48
KOR	3.3733	1	KOR	-0.0896	39
JPN	-1.3118	69	JPN	0.3978	12
CHN	0.3975	9	CHN	0.3968	13
IND	2.8769	2	IND	0.6269	7
BRA	1.0304	6	BRA	1.3663	1
MEX	2.0041	3	MEX	-0.1545	42
RUS	-0.4093	56	RUS	-0.1987	46
ARG	1.1262	5	ARG	0.0732	29
CAN	-0.0855	49	CAN	-0.4281	58
VEN	-0.0002	19	VEN	0.7066	6
TUR	-0.0002	16	TUR	-0.0313	35
SYR	-0.0003	24	SYR	0.2314	19
DOM	-0.0002	14	DOM	0.1625	24
ARE	-0.0002	20	ARE	-0.0621	37
BOL	-0.0003	27	BOL	0.8189	3
EGY	-0.0003	22	EGY	0.7646	4
GTM	-0.0003	31	GTM	0.3053	17
SLV	-0.0003	28	SLV	0.4072	10
LBN	-0.0003	30	LBN	0.3987	11
NZL	1.2958	4	NZL	-0.6073	64
AUS	0.3602	10	AUS	-0.6624	66
PAN	-0.0002	21	PAN	0.1033	26
KWT	-0.0002	17	KWT	0.0945	27
NIC	-0.0002	15	NIC	-0.0231	34
SAU	-0.0002	18	SAU	0.0758	28
ECU	-0.0003	29	ECU	0.5186	8
HND	-0.0003	23	HND	0.3425	15
GRC	-0.0384	32	GRC	0.3706	14
ESP	-0.8357	62	ESP	0.0256	31
CZE	-0.0003	25	CZE	-0.4263	57
KAZ	-0.0003	26	KAZ	-0.1444	41
ZAF	-0.5552	57	ZAF	0.0006	33
ISR	0.1183	13	ISR	-0.2598	51
POL	-0.2423	54	POL	-0.0698	38
PRY	-0.0439	35	PRY	0.8567	2
HUN	-0.1973	53	HUN	-0.4368	59
THA	0.1521	12	THA	-0.3559	53
PER	-0.0412	34	PER	0.1858	23
CHL	0.3162	11	CHL	-0.1828	44
ROM	-0.0478	37	ROM	-0.2398	49
CHE	-0.1361	50	CHE	-0.2594	50
PRT	-0.0403	33	PRT	0.2276	20
CRI	-0.0565	45	CRI	0.2273	21
URY	-0.0544	42	URY	0.2865	18
UKR	-0.0490	38	UKR	0.3096	16
JOR	-0.0540	41	JOR	0.4313	9
HKG	-0.0612	48	HKG	-0.4982	62
MYS	-0.0446	36	MYS	0.0142	32
COL	-0.1576	52	COL	0.2190	22
BGR	-0.0521	40	BGR	-0.1167	40
LUX	-0.0569	46	LUX	0.0716	30
ISL	-0.0589	47	ISL	-0.4386	60
AUT	-0.0513	39	AUT	-0.1957	45
SGP	-0.6563	58	SGP	-0.5411	63
SWE	-1.0648	66	SWE	-0.7530	68
SVK	-0.0558	43	SVK	-0.3669	55
EST	-0.0559	44	EST	-0.6325	65
NOR	-0.3896	55	NOR	-0.8423	69
IRL	-0.1568	51	IRL	-0.4534	61
FIN	-0.8767	63	FIN	-0.7136	67
BEL	-1.2049	68	BEL	-0.2785	52
GBR	-0.8011	59	GBR	-0.3873	56
FRA	-1.0282	65	FRA	-0.1819	43
DEU	-0.8088	60	DEU	-0.0609	36
DNK	-0.8332	61	DNK	-0.3577	54
ITA	-0.9391	64	ITA	0.1375	25
Mean: 0.0000			Mean: 0.0000		
Std.Dev.: 0.7819			Std.Dev.: 0.4350		

Knowledge Procurement			Innovation		
Weight: 5.50%			Weight: 14.13%		
Country	Index	Ranking	Country	Index	Ranking
USA	-0.2415	46	USA	3.6191	1
IDN	-2.8648	69	IDN	2.6597	3
NLD	0.9697	7	NLD	-0.2998	45
KOR	-0.4076	54	KOR	0.9922	5
JPN	0.3681	16	JPN	2.2289	4
CHN	-0.4932	57	CHN	3.5254	2
IND	-0.9805	65	IND	-0.0832	28
BRA	-0.5106	58	BRA	0.2814	8
MEX	-1.1073	67	MEX	0.3333	7
RUS	0.3341	17	RUS	-0.0993	29
ARG	-0.2036	43	ARG	0.2312	10
CAN	0.4467	14	CAN	0.5375	6
VEN	0.0185	33	VEN	-0.0264	16
TUR	-1.1392	68	TUR	-0.3595	50
SYR	0.0187	32	SYR	-0.0266	22
DOM	0.0185	34	DOM	-0.0264	17
ARE	0.1160	24	ARE	-0.0264	15
BOL	-0.3958	51	BOL	-0.0266	24
EGY	-0.0069	36	EGY	-0.1913	34
GTM	0.0187	31	GTM	-0.1978	36
SLV	-0.3994	53	SLV	-0.0266	25
LBN	-0.0300	37	LBN	-0.0266	23
NZL	-0.1903	42	NZL	-0.1700	31
AUS	0.0738	25	AUS	0.2809	9
PAN	-0.1628	39	PAN	-0.0264	18
KWT	-0.5781	59	KWT	-0.0264	20
NIC	-0.6865	60	NIC	-0.0264	21
SAU	-0.2577	47	SAU	-0.1942	35
ECU	0.0188	29	ECU	-0.4303	54
HND	0.0188	30	HND	-0.4631	56
GRC	0.4820	12	GRC	-0.4606	55
ESP	0.0663	26	ESP	-0.2868	42
CZE	0.3811	15	CZE	-0.4727	57
KAZ	0.0173	35	KAZ	-0.5282	66
ZAF	-0.2939	49	ZAF	-0.0264	19
ISR	1.5969	4	ISR	-0.3182	48
POL	-0.7460	62	POL	-0.4179	53
PRY	-0.7543	63	PRY	-0.1718	32
HUN	-0.1652	40	HUN	-0.4877	58
THA	-0.2134	45	THA	-0.1598	30
PER	0.1389	23	PER	-0.3272	49
CHL	-1.0480	66	CHL	-0.2883	43
ROM	-0.3961	52	ROM	-0.4963	59
CHE	1.8851	2	CHE	-0.2856	41
PRT	-0.2850	48	PRT	-0.5114	62
CRI	0.1841	22	CRI	-0.2137	38
URY	0.0527	27	URY	-0.3012	46
UKR	0.2716	20	UKR	-0.4171	52
JOR	0.0319	28	JOR	-0.2054	37
HKG	-0.1231	38	HKG	0.0223	14
MYS	-0.9184	64	MYS	-0.0806	26
COL	-0.7031	61	COL	-0.3169	47
BGR	0.2831	19	BGR	-0.5155	64
LUX	1.9303	1	LUX	-0.3650	51
ISL	1.6774	3	ISL	-0.5495	69
AUT	0.9364	8	AUT	-0.5014	60
SGP	-0.4533	56	SGP	0.1487	12
SWE	1.1575	5	SWE	-0.2221	39
SVK	-0.3468	50	SVK	-0.5123	63
EST	-0.4116	55	EST	-0.5320	68
NOR	0.2594	21	NOR	-0.2908	44
IRL	-0.1677	41	IRL	-0.5033	61
FIN	0.7915	10	FIN	-0.5293	67
BEL	1.0510	6	BEL	-0.2242	40
GBR	-0.2127	44	GBR	-0.0821	27
FRA	0.4779	13	FRA	-0.1848	33
DEU	0.8524	9	DEU	0.0438	13
DNK	0.6503	11	DNK	-0.5183	65
ITA	0.2989	18	ITA	0.1536	11
Mean: 0.0000			Mean: 0.0000		
Std.Dev.: 0.7513			Std.Dev.: 0.8146		

Source: Own estimations. See Appendix for details.

Table 7.- Multidimensional Entrepreneurship Index

Method IV – Distribution of Weights among Indicators and Dimensions – Period 2002-2005

Dimension	Dimension's Weight		Indicators	Indicator's Weight (intra-dim)	Indicator's Weight (overall)
1.- Entrepreneurial Activity	6.01%	1.1.- Firm Dynamics			
		1	Bankruptcy Rate (%)	5.21%	0.31%
		2	Entry Rate (%)	20.95%	1.26%
		3	Exit Rate (%)	1.03%	0.06%
		4	Share Of Bankruptcies In Firm Exits (%)	9.82%	0.59%
		5	New businesses registered (number)	11.11%	0.67%
		1.2.- Firm survival			
		6	Young Firm Entrepreneurial Activity Index (Index)	2.18%	0.13%
		7	Total Entrepreneurial Activity Index (Index)	0.38%	0.02%
		8	Established Businesses Activity Index (Index)	20.43%	1.23%
		1.3.- Ownership			
		9	Business Ownership Rate (agriculture, hunting, forestry and fishing, rate)	18.27%	1.10%
		10	Business Ownership Rate (private sector excluding agriculture, hunting, forestry and fishing, rate)	10.43%	0.63%
		11	Business Ownership Rate (total private sector, rate)	0.12%	0.01%
		12	Non-agricultural business ownership rate	0.07%	0.00%
2.- Employment	22.01%	13	Average Size Of Firm Entries (number)	9.22%	2.03%
		14	Share Of Entries In Employment (%)	1.95%	0.43%
		15	Share Of Exits In Employment (%)	0.50%	0.11%
		16	Aver. Number Workers For Fast Growers; Last Year Period (x 1)	17.87%	3.93%
		17	Aver. Number Workers For All Enterpr.; Growth Rate Period (%)	18.13%	3.99%
		18	Aver. Number Workers For All Enterpr.; Last Year Period (x 1)	13.44%	2.96%
		19	Aver. Number Workers For Fast Growers; Growth Rate Period (%)	0.81%	0.18%
		20	Aver. Number Workers For Not Fast Growers; Growth Rate Period (%)	17.53%	3.86%
		21	Aver. Number Workers For Not Fast Growers; Last Year Period (x 1)	11.82%	2.60%
		22	Non-agricultural self-employment rate	3.01%	0.66%
		23	Self-employment rates: total, as a percentage of total civilian employment	5.73%	1.26%
3.- Economic Activity	13.21%	24	Average Sales For All Enterprises; Growth Rate Period (%)	5.64%	0.74%
		25	Average Sales For All Enterprises; Last Year Period (x € 1000)	6.83%	0.90%
		26	Average Sales For Fast Growers; Growth Rate Period (%)	13.80%	1.82%
		27	Average Sales For Fast Growers; Last Year Period (x € 1000)	2.13%	0.28%
		28	Average Sales For Not Fast Growers; Growth Rate Period (%)	21.82%	2.88%
		29	Average Sales For Not Fast Growers; Last Year Period (x € 1000)	6.08%	0.80%
		30	Listed domestic companies, total	5.70%	0.75%
		31	Micro, small and medium enterprises (number)	29.90%	3.95%
		32	Micro, small and medium enterprises (per 1,000 people)	7.34%	0.97%
		33	Taxes on exports (% of tax revenue)	0.75%	0.10%
4.- Entrepreneurship Spirit, Culture, and Iniciative	12.42%	34	Female Total Entrepreneurial Activity Index (Index)	7.71%	0.96%
		35	Necessity Entrepreneurial Activity Index (Index)	17.72%	2.20%
		36	Opportunity Entrepreneurial Activity Index (Index)	1.16%	0.14%
		37	Potential Entrepreneur Index (Index)	4.11%	0.51%
		38	Fear Of Failure Index (Index)	2.33%	0.29%
		39	Know Entrepreneur Index (Index)	19.54%	2.43%
		40	Innovative entrepreneurship	20.24%	2.51%
		41	Future Entrepreneur Index (Index)	10.44%	1.30%
		42	Informal Investors Index (Index)	15.84%	1.97%
		43	Nascent Entrepreneurial Activity Index (Index)	0.91%	0.11%
5.- Barriers to Entrepreneurial Activity and Business Environment	3.05%	44	Cost of business start-up procedures (% of GNI per capita)	10.64%	0.32%
		45	Domestic credit provided by banking sector (% of GDP)	2.25%	0.07%
		46	Domestic credit to private sector (% of GDP)	0.50%	0.02%
		47	Ease of doing business index (1=most business-friendly regulations)	9.30%	0.28%
		48	Highest marginal tax rate, corporate rate (%)	0.77%	0.02%
		49	Highest marginal tax rate, individual rate (%)	0.75%	0.02%
		50	Interest rate spread (lending rate minus deposit rate)	0.30%	0.01%
		51	Labor force with primary education (% of total)	4.17%	0.13%
		52	Labor force with secondary education (% of total)	8.50%	0.26%
		53	Labor force with tertiary education (% of total)	27.23%	0.83%
		54	Management time dealing with officials (% of management time)	2.12%	0.06%
		55	Procedures to enforce a contract (number)	3.01%	0.09%
		56	Procedures to register property (number)	1.14%	0.03%
		57	Start-up procedures to register a business (number)	8.21%	0.25%
		58	Time required to start a business (days)	21.11%	0.64%
6.- Knowledge Procurement	15.86%	59	Gross domestic expenditure on R&D (% of GDP)	24.54%	3.89%
		60	Physicians (per 1,000 people)	40.39%	6.41%
		61	Technicians in R&D (per million people)	35.08%	5.56%
7.- Innovation	27.44%	62	Patent applications, nonresidents	16.19%	4.44%
		63	Patent applications, residents	9.01%	2.47%
		64	Trademarks, nonresidents	36.63%	10.05%
		65	Trademarks, residents	38.17%	10.47%

Source: Own estimations. See Appendix for details.

Table 8.- Multidimensional Entrepreneurship Index

Method IV – Period 2002-2005

Multidimensional Entrepreneurship Index

Ranking	Country	Index
1	CHN	1.1502
2	USA	1.1075
3	IDN	1.0372
4	KOR	0.4491
5	JPN	0.2922
6	FIN	0.2584
7	BRA	0.2314
8	MEX	0.1970
9	CHE	0.1790
10	ISR	0.1567
11	CAN	0.1473
12	ARG	0.1380
13	AUS	0.1099
14	LUX	0.0978
15	GBR	0.0897
16	GRC	0.0786
17	SWE	0.0700
18	ISL	0.0699
19	RUS	0.0643
20	IND	0.0226
21	NZL	0.0194
22	VEN	0.0172
23	DOM	0.0014
24	SYR	-0.0045
25	ARE	-0.0147
26	LBN	-0.0172
27	EGY	-0.0302
28	PAN	-0.0462
29	BOL	-0.0542
30	GTM	-0.0565
31	AUT	-0.0570
32	HKG	-0.0635
33	ITA	-0.0659
34	FRA	-0.0773
35	THA	-0.0784
36	PER	-0.0786
37	ESP	-0.0796
38	CZE	-0.0821
39	SLV	-0.0826
40	BEL	-0.0834
41	URY	-0.0867
42	SAU	-0.0876
43	CRI	-0.0881
44	UKR	-0.0944
45	JOR	-0.1032
46	ECU	-0.1099
47	KWT	-0.1144
48	HND	-0.1202
49	ZAF	-0.1261
50	BGR	-0.1290
51	NOR	-0.1293
52	KAZ	-0.1334
53	PRT	-0.1442
54	NIC	-0.1445
55	IRL	-0.1573
56	SGP	-0.1744
57	PRY	-0.1763
58	HUN	-0.1824
59	NLD	-0.2241
60	MYS	-0.2302
61	DEU	-0.2329
62	TUR	-0.2370
63	ROM	-0.2413
64	CHL	-0.2423
65	COL	-0.2507
66	SVK	-0.2508
67	EST	-0.2570
68	POL	-0.2675
69	DNK	-0.2778
Mean: 0.0000		
Std.Dev.: 0.2783		

Entrepreneurial Activity — Weight: 6.01%

Country	Index	Ranking
CHN	0.0183	27
USA	0.8171	5
IDN	-2.8137	69
KOR	-0.1754	57
JPN	-1.4612	68
FIN	0.3017	11
BRA	0.2151	12
MEX	-0.1193	51
CHE	-0.0176	38
ISR	-0.1319	54
CAN	-0.0225	39
ARG	0.5140	7
AUS	0.4573	9
LUX	-0.3630	65
GBR	0.6083	6
GRC	1.0899	1
SWE	-0.1640	56
ISL	0.5028	8
RUS	-0.3029	61
IND	-0.1215	53
NZL	0.8933	4
VEN	0.0042	37
DOM	0.0042	32
SYR	-0.0670	48
ARE	0.0042	36
LBN	-0.0637	45
EGY	-0.0564	41
PAN	0.0042	35
BOL	-0.0654	47
GTM	-0.0628	43
AUT	0.0495	26
HKG	-0.2073	59
ITA	-0.4162	66
FRA	-0.2004	58
THA	0.2141	13
PER	0.0800	24
ESP	0.3554	10
CZE	-0.0323	40
SLV	-0.0651	46
BEL	-0.5443	67
URY	0.1519	15
SAU	0.0043	31
CRI	0.1378	17
UKR	0.1023	20
JOR	0.0923	23
ECU	0.0045	29
KWT	0.0042	33
HND	0.0045	30
ZAF	-0.3505	63
BGR	0.1457	16
NOR	-0.0828	50
KAZ	-0.0637	44
PRT	0.9650	2
NIC	0.0042	34
IRL	0.9128	3
SGP	-0.1196	52
PRY	0.1233	19
HUN	-0.2430	60
NLD	-0.3361	62
MYS	0.1253	18
DEU	-0.1581	55
TUR	0.0118	28
ROM	0.1533	14
CHL	-0.0744	49
COL	0.0499	25
SVK	0.0962	22
EST	0.0998	21
POL	-0.3627	64
DNK	-0.0580	42
Mean: 0.0000		
Std.Dev.: 0.5064		

Employment — Weight: 22.01%

Country	Index	Ranking
CHN	0.1987	9
USA	0.8428	2
IDN	0.5433	3
KOR	0.1991	8
JPN	-0.2422	64
FIN	1.3675	1
BRA	0.1374	10
MEX	0.2177	6
CHE	-0.0642	56
ISR	-0.0627	55
CAN	-0.0883	58
ARG	-0.0007	19
AUS	-0.0486	54
LUX	-0.1502	63
GBR	0.3952	4
GRC	0.2041	7
SWE	-0.1000	61
ISL	-0.0391	53
RUS	-0.0350	51
IND	-0.0007	27
NZL	0.0060	17
VEN	-0.0007	26
DOM	-0.0007	21
SYR	-0.0008	37
ARE	-0.0007	25
LBN	-0.0008	34
EGY	-0.0008	31
PAN	-0.0007	24
BOL	-0.0008	36
GTM	-0.0008	32
AUT	-0.0890	59
HKG	-0.0292	45
ITA	-0.6724	68
FRA	0.1315	11
THA	-0.0211	38
PER	-0.0237	40
ESP	0.0244	15
CZE	0.0046	18
SLV	-0.0008	35
BEL	-0.4337	65
URY	-0.0311	49
SAU	-0.0007	20
CRI	-0.0323	50
UKR	-0.0281	44
JOR	-0.0309	47
ECU	-0.0008	29
KWT	-0.0007	22
HND	-0.0008	30
ZAF	-0.0007	28
BGR	-0.0299	46
NOR	-0.1455	62
KAZ	-0.0008	33
PRT	0.0675	12
NIC	-0.0007	23
IRL	0.0260	14
SGP	-0.0310	48
PRY	-0.0252	41
HUN	-0.0390	52
NLD	-0.5924	66
MYS	-0.0256	42
DEU	-0.6513	67
TUR	0.2718	5
ROM	-0.0274	43
CHL	0.0223	16
COL	-0.0236	39
SVK	-0.1000	60
EST	-0.0871	57
POL	0.0490	13
DNK	-0.6950	69
Mean: 0.0000		
Std.Dev.: 0.2815		

Economic Activity — Weight: 13.21%

Country	Index	Ranking
CHN	0.0013	17
USA	0.5900	4
IDN	2.3330	1
KOR	0.1111	11
JPN	-0.4417	68
FIN	0.2695	5
BRA	0.0516	12
MEX	-0.0568	44
CHE	-0.1268	49
ISR	-0.0478	43
CAN	0.1939	10
ARG	-0.0104	24
AUS	0.0223	14
LUX	-0.1349	50
GBR	1.0758	2
GRC	-0.0384	41
SWE	0.0471	13
ISL	-0.0458	42
RUS	0.2503	7
IND	0.2114	9
NZL	-0.0363	39
VEN	-0.0312	29
DOM	-0.0039	22
SYR	-0.0008	20
ARE	-0.0316	31
LBN	-0.0334	37
EGY	0.0056	16
PAN	-0.0327	36
BOL	-0.0324	34
GTM	-0.0379	40
AUT	-0.1847	58
HKG	-0.1157	47
ITA	0.6419	3
FRA	-0.2523	66
THA	-0.1898	59
PER	-0.1772	55
ESP	0.2274	8
CZE	-0.0313	30
SLV	-0.0324	33
BEL	0.2621	6
URY	-0.1794	56
SAU	-0.0304	28
CRI	-0.2579	67
UKR	-0.2446	65
JOR	-0.1977	60
ECU	-0.0326	35
KWT	-0.0286	27
HND	-0.0009	21
ZAF	-0.0007	19
BGR	-0.1833	57
NOR	-0.0730	46
KAZ	-0.0350	38
PRT	-0.0655	45
NIC	-0.0007	18
IRL	-0.2126	62
SGP	-0.1637	53
PRY	0.0165	15
HUN	-0.0319	32
NLD	-0.2314	63
MYS	-0.1621	52
DEU	-1.1256	69
TUR	-0.0198	25
ROM	-0.0088	23
CHL	-0.1200	48
COL	-0.2067	61
SVK	-0.2341	64
EST	-0.1488	51
POL	-0.0234	26
DNK	-0.1652	54
Mean: 0.0000		
Std.Dev.: 0.3829		

Entrepreneurship Spirit, Culture, and Initiative — Weight: 12.42%

Country	Index	Ranking
CHN	0.3405	8
USA	0.0194	17
IDN	1.3196	4
KOR	1.9456	1
JPN	0.2234	11
FIN	-0.2580	57
BRA	0.8841	5
MEX	1.7476	2
CHE	0.0669	14
ISR	0.3290	9
CAN	-0.4364	61
ARG	0.4350	7
AUS	0.1421	12
LUX	-0.0830	49
GBR	-0.7312	64
GRC	-0.1662	54
SWE	-0.0667	40
ISL	-0.1783	55
RUS	0.0432	16
IND	1.4216	3
NZL	0.4841	6
VEN	-0.0055	23
DOM	-0.0055	19
SYR	-0.0056	27
ARE	-0.0055	24
LBN	-0.0056	31
EGY	-0.0056	26
PAN	-0.0055	25
BOL	-0.0056	29
GTM	-0.0056	32
AUT	-0.0204	36
HKG	-0.0837	50
ITA	-0.7552	65
FRA	-0.6933	63
THA	0.1086	13
PER	-0.0615	37
ESP	-0.7879	66
CZE	-0.0057	34
SLV	-0.0056	28
BEL	-0.9405	69
URY	-0.0796	45
SAU	-0.0055	22
CRI	-0.0824	48
UKR	-0.0722	42
JOR	-0.0790	44
ECU	-0.0056	30
KWT	-0.0055	21
HND	-0.0057	33
ZAF	-0.4567	62
BGR	-0.0765	43
NOR	-0.3021	59
KAZ	-0.0057	35
PRT	-0.2202	56
NIC	-0.0055	18
IRL	-0.1082	52
SGP	-0.8102	67
PRY	-0.0652	38
HUN	0.0594	15
NLD	-0.8766	68
MYS	-0.0662	39
DEU	-0.4034	60
TUR	-0.0055	20
ROM	-0.0705	41
CHL	0.2495	10
COL	-0.1626	53
SVK	-0.0814	46
EST	-0.0816	47
POL	-0.0947	51
DNK	-0.2676	58
Mean: 0.0000		
Std.Dev.: 0.5106		

Barriers to Entrepreneurial Activity and Business Environment — Weight: 3.05%

Country	Index	Ranking
CHN	0.2912	16
USA	0.1758	24
IDN	1.9728	1
KOR	-0.1731	38
JPN	0.2472	18
FIN	-0.3836	53
BRA	1.0635	2
MEX	-0.1378	37
CHE	-0.3810	52
ISR	0.0703	28
CAN	-0.0585	32
ARG	0.0825	27
AUS	-0.5572	66
LUX	-0.1166	36
GBR	-0.4462	59
GRC	0.0477	29
SWE	-0.5173	64
ISL	-0.5038	62
RUS	0.2152	22
IND	0.5702	9
NZL	-0.5911	67
VEN	0.9587	3
DOM	0.3249	13
SYR	0.2602	17
ARE	0.1604	25
LBN	0.3020	15
EGY	0.4000	11
PAN	-0.2514	43
BOL	0.7279	6
GTM	-0.3981	57
AUT	-0.4271	58
HKG	-0.6540	69
ITA	-0.5000	61
FRA	-0.3281	49
THA	-0.3469	50
PER	0.5960	8
ESP	0.1966	23
CZE	-0.3885	54
SLV	0.6272	7
BEL	-0.0847	34
URY	-0.2450	42
SAU	0.2437	19
CRI	0.0121	30
UKR	0.8071	4
JOR	0.2346	21
ECU	0.4835	10
KWT	-0.0839	33
HND	0.3826	12
ZAF	-0.0086	31
BGR	-0.1891	39
NOR	-0.3925	55
KAZ	0.3154	14
PRT	-0.3701	51
NIC	0.2359	20
IRL	-0.2670	46
SGP	-0.4827	60
PRY	0.7921	5
HUN	-0.2560	45
NLD	-0.3954	56
MYS	-0.1960	40
DEU	-0.2010	41
TUR	-0.5465	65
ROM	-0.6269	68
CHL	-0.2819	47
COL	0.1568	26
SVK	-0.2954	48
EST	-0.1126	35
POL	-0.2517	44
DNK	-0.5070	63
Mean: 0.0000		
Std.Dev.: 0.4793		

Knowledge Procurement — Weight: 15.86%

Country	Index	Ranking
CHN	-0.5541	58
USA	-0.2401	49
IDN	-2.8290	69
KOR	-0.4912	55
JPN	0.2224	21
FIN	0.6670	11
BRA	-0.4592	54
MEX	-1.0901	65
CHE	1.8064	1
ISR	1.5118	4
CAN	0.3434	18
ARG	-0.1870	43
AUS	0.0627	27
LUX	1.7802	2
GBR	-0.2351	47
GRC	0.7880	10
SWE	1.0701	6
ISL	1.6193	3
RUS	0.5357	13
IND	-1.0944	66
NZL	-0.1988	45
VEN	0.0155	32
DOM	0.0155	33
SYR	0.0157	30
ARE	-0.0314	36
LBN	-0.0469	38
EGY	-0.0172	35
PAN	-0.1498	42
BOL	-0.3622	52
GTM	0.0157	31
AUT	0.9349	8
HKG	-0.1029	39
ITA	0.5043	15
FRA	0.5204	14
THA	-0.1882	44
PER	0.1339	26
ESP	0.1548	24
CZE	0.4827	16
SLV	-0.5214	56
BEL	1.1201	5
URY	0.1830	22
SAU	-0.3393	51
CRI	0.1783	23
UKR	0.2968	20
JOR	-0.0150	34
ECU	0.0157	29
KWT	-0.6154	59
HND	0.0158	28
ZAF	-0.2393	48
BGR	0.3824	17
NOR	0.3100	19
KAZ	0.1504	25
PRT	-0.1246	40
NIC	-0.8902	63
IRL	-0.1258	41
SGP	-0.5428	57
PRY	-0.8643	62
HUN	-0.0397	37
NLD	0.9778	7
MYS	-1.0633	64
DEU	0.8491	9
TUR	-1.1458	68
ROM	-0.4404	53
CHL	-1.0961	67
COL	-0.7879	61
SVK	-0.2022	46
EST	-0.3294	50
POL	-0.6711	60
DNK	0.6515	12
Mean: 0.0000		
Std.Dev.: 0.7549		

Innovation — Weight: 27.44%

Country	Index	Ranking
CHN	4.1623	1
USA	3.0082	3
IDN	3.6560	2
KOR	0.8845	5
JPN	1.5346	4
FIN	-0.5775	68
BRA	0.4081	8
MEX	0.4511	7
CHE	-0.2636	41
ISR	-0.3575	51
CAN	0.5248	6
ARG	0.2982	9
AUS	0.2900	10
LUX	-0.3573	50
GBR	-0.1247	28
GRC	-0.4830	55
SWE	-0.1826	37
ISL	-0.6014	69
RUS	-0.1452	33
IND	-0.0665	26
NZL	-0.1508	34
VEN	-0.0359	15
DOM	-0.0359	16
SYR	-0.0361	22
ARE	-0.0359	17
LBN	-0.0361	23
EGY	-0.1317	30
PAN	-0.0359	18
BOL	-0.0361	24
GTM	-0.1356	32
AUT	-0.5422	61
HKG	0.0632	13
ITA	0.1874	12
FRA	-0.1723	35
THA	-0.1263	29
PER	-0.3155	48
ESP	-0.2515	39
CZE	-0.5141	57
SLV	-0.0361	25
BEL	-0.1753	36
URY	-0.2806	44
SAU	-0.1333	31
CRI	-0.2682	42
UKR	-0.4548	53
JOR	-0.2579	40
ECU	-0.4455	52
KWT	-0.0359	20
HND	-0.4871	56
ZAF	-0.0359	19
BGR	-0.5555	63
NOR	-0.3001	47
KAZ	-0.5744	66
PRT	-0.5464	62
NIC	-0.0359	21
IRL	-0.5403	59
SGP	0.2284	11
PRY	-0.2162	38
HUN	-0.5406	60
NLD	-0.2809	45
MYS	-0.1013	27
DEU	-0.0357	14
TUR	-0.3490	49
ROM	-0.5307	58
CHL	-0.2748	43
COL	-0.2943	46
SVK	-0.5556	64
EST	-0.5770	67
POL	-0.4647	54
DNK	-0.5618	65
Mean: 0.0000		
Std.Dev.: 0.8605		

Source: Own estimations. See Appendix for details.