

Towards a Fiscal Illusion Index

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Abstract

In this paper it is built an index of value for Fiscal Illusion in democratic countries. This approach uses a cautioned methodology recurring to a comprehensive database. The index measured the Fiscal Illusion dimensions in 68 countries since 1960. It evidenced that the situation varies greatly around the world. It was verified that the countries with the highest average values are Mali, Pakistan, Russia and Sri Lanka. Conversely, Austria, Luxembourg, Netherlands and New Zealand are some of the countries with the lowest average values. The periods of more significant decrease (roughly, periods of less recurrence to Fiscal Illusion practices) were those between 1980 and 1995. The existence of institutions in each country and in each group of countries that maintain unchangeable the fiscal and political practices leads to the stabilisation of Fiscal Illusion at certain slightly unaltered values.

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1. Introduction

The government conditions of democracies around the world have gained increasing recognition across the academic staff. Young democracies, for example, have been named as target groups in several studies in order to robustly set their establishment. But while some states are strong on monitoring the well-being of democratic institutions and the realisation of citizens' rights, there are still cases of processes that are hardly to watch and if conveniently studied provide a comparable picture of the progress made across the globe.

Many studies present the status of transparency in the democracies. They are concerned with specific regions (Alesina *et al.*, 1996), with the bureaucratic quality (Kaufmann, Kraay and Zoido-Lobaton, 1999), with particular codes of good practices (Hameed, 2005), or with previously selected political dimensions (Bernoth and Wolff, 2006). While these various indicators are useful to understand the status of governance for a single indicator or, at best, in a single perspective (rulers/incumbents/politicians), they cannot be summed to give us a measure of the overall well being of a democracy because they are absent of considering the quality of the other side institutions – voters, lobbying groups, and society as a whole.

This warning for observing “rulers” and “ruled” groups had been first enunciated by Puviani (1903), the pioneer of the “Fiscal Illusion” question. Some years after the Scottish Enlightenment in Italy, Amilcare Puviani (1903) intended to answer the question “*How can a politician best use his powers of the purse to promote his political projects?*” with his work “The Theory of Fiscal Illusion.” Puviani (1903) introduced the hypothesis of “Fiscal Illusion” as an observable answer to the reported question. With these terms, Puviani (1903) wanted to point out the opacity that could be administered by public decision-makers in the imposition of taxes or in public spending management. These kinds of *illusions* are the product of a relationship between electors and rulers; therefore they can only be studied considering both sides.

This paper builds an index for Fiscal Illusion to provide a clear benchmark. Such a benchmark is useful for evaluating the political performance of democratic countries, for evaluating their performance across periods, for comparing the performance of groups of countries, for determining the efforts in order to replicate good governance practices and to eradicate “Fiscal Illusion” practices.

There are several problems in constructing such an index. First, the correct dimensions related to the methodological sense of Fiscal Illusion shall be selected. Therefore, it is time to discuss data availability, the processes of minimizing the lack of data for the observations, the extraction of efficient information with the provided values not forgetting the nature of the values (time-series-cross-section data ones), and to find the correct method of combining the variables into a single index. Additionally, this index shall be useful and readable.

This paper is a response to the lack of a convenient methodology to measure the Fiscal Illusion phenomenon across the democratic world. Drawing on 68 democracies observed for more than 40 years it has provided a picture of democratic quality and persistence of illusory practices across the sample.

In Section 2 the rationale behind the construction of indexes for evaluating political and economic realities is described. Section 3 provides a detailed description of a theoretical framework around the Fiscal Illusion theme. Section 4 reports our principal discussion on data and methodological issues. Section 5 explores the results of this analysis. Section 6 is a brief conclusion and discussion of future work.

2. The rationale behind an index for the Fiscal Illusion

As observed by Mourao (2006), the phenomenon of *Fiscal Illusion* is rather complex. It is complex because nowadays there is a large set of authors who contributed to its study with different senses; it is complex because it refers to a wide range of economic realities; finally, its complexity is also derived from the methodological use that is given to *Fiscal Illusion* itself. As Mourao (2006a) states, sometimes authors use *Fiscal Illusion* as an assumption; other researchers employ the terms relating them to hypotheses of solving previous problems and other economists identify *Fiscal Illusion* with consequences of fiscal manipulation.

In these cases the construction of an Index that combines the many different dimensions of the studied phenomenon is strongly suggested, as mentioned in Kaufmann, Kraay and Zoido-Lobaton (1999), Nardo *et al.* (2005) or Mourao (2005).

Kaufmann, Kraay and Zoido-Lobaton (1999) recognized that aggregate fiscal indicators are useful because they allow countries to be sorted into broad groupings according to levels of governance, and they can be used to study the causes and consequences of fiscal movements in a much larger sample of countries than usually observed.

Nardo *et al.* (2005) also recognize that indexes, as composite indicators, provide simple comparisons of countries that can be used to illustrate complex and sometimes elusive issues in wide ranging fields. These indicators often seem easier to interpret by the general public than finding a common trend in many separate indicators and have proven useful in benchmarking country performance.

Finally, Mourao (2005) stated that working with analytical indexes is better for understanding the economic phenomenon instead of its particularized components. Working with indexes also avoids the introduction of redundant variables in econometric models, with the common trouble of losing degrees of freedom and, finally, it is more suitable to truly approach the involved methodological complexity.

Additionally, evidence also suggests that studying indexes of complex political and economic realities is more efficient than analyzing isolated variables (Alesina *et al.*, 1996; Kaufmann, Kraay and Zoido-Lobaton, 1999; Hameed, 2005; Bernoth and Wolff, 2006; Alt and Lassen, 2006).

Alesina *et al.* (1996) collected information on the budget institutions of Latin American countries. They classified those countries as a function of the values returned from their Index of Budgetary Institutions and also as depending on the presence of budgetary practices of control. Their Index incorporated ten basic dimensions: constitutional constraints, legal requirement for the approval of a macro program, borrowing constraints, authority of minister of finances, amendments by the Congress, consequences of Congress' rejection of the Budget, opportunity to modify the Budget after Congress' approval, opportunity to cut spending by the Government after Congress' approval, assumption by the Government of other political

Agencies' debt, and autonomy of these other Agencies to borrow. They concluded that transparent procedures were associated with more fiscal discipline.

Kaufmann, Kraay and Zoido-Lobaton (1999) used a simple variant of an unobserved components model to combine the information from different sources into aggregate governance indicators, intending to provide better information for further empirical studies. These authors illustrated the methodology by constructing aggregate indicators of bureaucratic quality, rule of law, and graft for a sample of 160 countries.

Hameed (2005) developed indices of fiscal transparency for a broad range of countries based on the IMF's Code of Good Practices on Fiscal Transparency, using data derived from published fiscal transparency modules of the Reports on the Observance of Standards and Codes. The indices cover four clusters of fiscal transparency practices: data assurances, medium-term budgeting, budget execution reporting, and fiscal risk disclosures. Hameed (2005) concluded that more transparent countries are shown to have better credit ratings, better fiscal discipline, and less corruption, after controlling for other socioeconomic variables.

Alt and Lassen (2006) constructed a transparency index based on 19 advanced industrialized OECD economies in the 1990s on four distinct categories: independent verification (for example, independently audited in-year financial reports); easy access and monitoring governance practices by external agents; clear and pre-defined budget syntax; and the presence of more justification of decisions which solidifies the basis for decision making. The index was comprised of 11 items, and most of them were taken from OECD's *Best Practices for Budget Transparency* (OECD 2001). Then, Alt and Lassen (2006) aggregated the 11 items additively into an index, whose values range from a minimum of zero (Japan) to a maximum of 11 (New Zealand). They concluded that electoral cycles exist in low transparency countries and that such cycles are statistically and economically significant.

Bernoth and Wolff (2006) captured the concept of governmental informational transparency with two measures. One is an index of auditing that they developed, called *Audit*. This index is calculated on the basis of the answers collected by an OECD and World Bank survey conducted in 2003, also used by Alt and Lassen (2006). Their index *Audit* measures whether governments are financially audited externally, how independent the auditing can be performed and how well the obtained information is disseminated. To each question from the OECD and World Bank survey conducted in 2003, Bernoth and Wolff (2006) assigned a value between zero and four, where four indicates the response most conducive to fiscal "transparency." This index was computed as the simple sum of the responses to all individual questions. The second index is based on a part of the indicator developed in the seminal paper by von Hagen (1992), and updated in Hallerberg, Strauch, and von Hagen (2005). Bernoth and Wolff (2006) called this indicator *Transparency*, though it is a measure of being informative and transparency of the budget draft and includes an assessment of transparency given by government officials, the degree to which special funds are included in the budget draft, the information of whether the budget consists of one document, whether it is linked to national accounts and finally whether government loans are included. Bernoth and Wolff (2006) concluded that fiscal transparency is connected with lower risk premia in their posterior estimations.

However, Alesina *et al.* (1996), Hameed (2005), and Alt and Lassen (2006), among others, specially studied the *reverse of Fiscal Illusion* – the Fiscal Transparency. Consequently, they

selected the analyzed dimensions recurring to the nearest ones of the Governance practices fields. As the authors who specifically studied the *Fiscal Illusion* notice, this phenomenon is not restricted to the ruler agents but it is also verified in the ruled ones, electors and firms. Therefore, a good Index for Fiscal Illusion must contemplate this variety of agents with their behaviour.

3. A Theoretical Framework

As observed in the previous section, Manning, Kraan and Malinska (2006) also state that aggregate indicators offer substantial advantages. First, they span a larger set of countries than any individual source. Second, they provide more precise measures of governance than single indicators. Third, they allow for formal hypothesis tests regarding cross-country differences. However, these authors also recognize that the main problem in aggregating single indicators is the absence of an acknowledged “theoretical framework”.

Therefore, this section tries to highlight the deep complexity behind the studies around the *Fiscal Illusion* thematic, suggesting a vast related theoretical framework. For those interested in more theoretical developments, Mourao (2006) is a work that expands these issues.

In 1967, James Buchanan signed the work *Public Finance in Democratic Process: Fiscal Institutions and Individual Choice*. In Chapter 10, the term *The Fiscal Illusion* appears as the title. He confesses that, at the time, the discussion of Amilcare Puviani’s (1903) main theoretical contribution – the original *Illusione Finanziaria* – that he has already promoted in *Fiscal Theory and Political Economy*, edited in 1960, remained the only available summary in English. After Buchanan’s quotes, other authors have recurred to *Fiscal Illusion* for many purposes and with many different senses, as noticed in Mourao (2006). This sub-section intends to highlight the most prominent of these studies on *Fiscal Illusion*.

According to Puviani’s original idea, the objective of the ruling group becomes that of arranging or organizing the fiscal structure so that the resistance of the dominated class is effectively minimized. Consequently, the rulers ask: “If we desire to minimize taxpayer resistance for any given level of revenues collected, how will it set out to organize the fiscal system?” The answer recurs to both sides of the budget – “illusions” are created through taxes and through public spending programs.

The most relevant side is the branch of public revenues. This branch can be subdivided into seven means of introducing fiscal illusion: Obscuration of the individual shares in the opportunity cost of public outlays; utilization of institutions of payments that are planned so as to bind the requirement to a time period or an occurrence which the taxpayer seems likely to consider cheering; charging of explicit *fees* for nominal services provided upon the occurrence of impressive or pleasant events; levying taxes that will capitalize on sentiments of social fear, making the burden appear less than might otherwise be the case; use of “scare tactics” that have a propensity to make the alternatives to particular tax proposals appear worse than they are; fragmentation of the total tax weight on an entity into numerous small levies; and opacity of the final incidence of the tax.

In his seminal book, Downs (1957) recognized that politicians have little incentive to correct *fiscal illusion* – their incentive is to spend more on public investment projects that pay off within a four-to-five-year electoral cycle.

Galbraith (1958) also identified a not very usual image of the traditional case of *Fiscal Illusion*. As a consequence, Galbraith (1958) identified that governments would opt for a “sub-optimally low” value of public provision of services. Galbraith (1958) argues that public spending is less than optimal and notes that advertising and marketing are greater in the private sector.

In recent times, Twight (1994) and Alesina and Perotti (1996) outline several means by which politicians may make public budgets less transparent, thereby raising the transaction costs of monitoring fiscal conditions for a public subject to *fiscal illusion* or incomplete information: biased macroeconomic forecasts, biased estimates of the effects of policy changes on budgetary outcomes, strategic use of on- and off-budget expenditures and receipts, manipulation of budgetary baselines, and multiyear budgeting.

Von Hagen and Harden (1994) developed a framework in which there is a failure to fully internalise the true economic costs of public expenditure – another kind of *fiscal illusion*. The narrow interests of individual spending ministers dominate over the collectivist concerns of the Minister of Finances. Consensus is arrived at in cabinet on the basis of the spending ministers, either explicitly or implicitly, backing each other’s bids and resulting in “something for everyone” and thus a sub-optimal overall level of spending. If this framework accurately reflects the actual process of public expenditure determination then intra-governmental institutional reform may be required to redress the situation.

The opportunity to expand the assumption of (full) rationality in models of Public Economics prompted a reaction from a diversity of authors synthesized in Wittman (1995). Wittman (1995) does not believe in models assuming homogeneous misinformed electors or consumers. The costs of decision making are either ignored or assumed not to distort choice. When outcomes do not take place with certainty then economists typically assume that individuals maximize expected utility. In this neoclassical framework, anomalies (of the individual perception) are the exception rather than the rule. For instance, in numerous social areas, individuals do not have the “requisite skills”, yet they are able to make the correct decision. Also if voters have specific interests or concerns, they can consult special interest groups for information on the candidates’ positions on the issues in question.

Cohen and Percoco (2004) state that the most recent macroeconomic literature has focused on the effect of public spending contraction and has provided two alternative theories: the theory of asymmetric effects of public spending and the theory of *fiscal illusion*. Besides Easterly (1999), the impact of downward in public investment in the lack of competitiveness and a consequent worsening of fiscal deficit has also been studied by Calderón, Easterly and Servén (2003) who develop a theoretical framework aiming to explain of what is called *fiscal illusion*. In particular, fiscal adjustment can be thought as an illusion when it reduces the budget deficit but the government net worth remains unaffected. Easterly (2001) shows that, under certain conditions, a government will lower the conventional deficit while leaving its path of net worth unchanged and when required to lower its debt accumulation, the government will lower its asset accumulation or increase its hidden liability accumulation by an equal amount, which follows the structural argument from Easterly (1999).

Jensen and Vestergaard (1999) define *fiscal illusion* as a situation where public decision-makers (namely, the European Union, EU) only incorporate a part of the costs incurred by the constituents (the Member States). *Fiscal illusion* means that EU does not full take into account the tax costs of the Member States when maximizing the benefit. The degree of the

fiscal illusion may also be interpreted as compliance and enforcement costs associated with letting the EU tax the Member States on the basis of individual producers (in their study, the fishermen).

Wagner (2001) also recognized that Puviani (1903) gave most of his attention to taxation - it is there where the term *Fiscal Illusion* precisely obtains its meaning. Consequently, the politician should make taxes become less of a burden than they really are. In his work, Wagner (2001) identifies trade taxes as a good form of taxation due to its bad perceptibility by voters.

Searching for the psychological foundations of *fiscal illusion*, Sanandaji and Wallace (2003) reported the Theory of Mental Accounting. The Theory of Mental Accounting studies the set of cognitive operations used by individuals and households to organize, evaluate and keep track of financial activities. According to this theory, physical money is more valuable than electronic checks and there is evidence for a kind of *public hedonic editing* – electors actually prefer not to be reminded of the costs of public programs. Therefore, this perspective offers both arguments that the underestimation of tax levels could be beneficial to a *hedonist* society but also arguments that support the predictions from the Public Choice thought – *tax illusion* can be used to facilitate rent seeking and be harmful to the same society.

Some examples of illusions that arise by a nexus between monetary and fiscal factors are provided by Forte (2004): i) fiscal drag due to the automatic increase of real tax rates, in a personal income tax, due to the loss of value of monetary income subject to the progressive rates and of the lump sum deductions from the taxable income; ii) taxation of revenues of capital, in the income tax, at their face value, which normally includes a compensation for the loss of value of the capital invested; iii) taxation of profits due to the fact that depreciations allowances are based on the book value of the assets and this value in most cases is not the actual value but this historical one; iv) the Maastricht rules based on nominal deficits rather than real deficits (that is identified to the formula $Index\ of\ Consumer\ Prices * Debt/GDP + Nominal\ Deficit$) which works for countries with an higher *Debt/GDP* and a greater propensity to inflation (the obtained results from the imposition of budgetary restrictions of the Maastricht and Amsterdam Pacts are not sufficiently strong to improve the performances of those countries).

For Garcia-Alegre and Lopez-Casasnovas (2004), the topic of *financial illusion* and its relevance in public management has been traditionally discussed in the context of *fiscal illusion* and public expenditure growth. They had described the existence of *financial illusion* in public accounting since it allows for larger public expenditure increases and managerial slack. Therefore, three strategies can be pursued to manipulate the citizen (or the modelled median voter): i) political actors and bureaucrats may try to show that the tax-price of public sector services appear to be lower than it actually is; ii) politicians may find it desirable to foster the idea that the median voter is in receipt of larger real income increases as a result of tax/expenditure decisions; iii) politicians and bureaucrats can attempt to alter the preferences of the voters to raise the absolute value of the marginal rate of substitution between public supplied goods and the rest.

Finally, for P. Jones (2006), *fiscal illusion* is asymmetric. Within overall government budgets, domestic programs are very likely to crowd out international programs. This asymmetric *fiscal illusion* is also evident in questionnaire responses on public expenditure priorities. In some polls (like the mentioned *British Social Attitudes Survey*), health care and education are

invariably considered first or second priority for additional expenditure. Overseas aid has remained at the bottom with defense expenditure just a little higher. While the relative benefits of international programs are underestimated, the relative costs are exaggerated, according to P. Jones (2006).

Following the previous paragraphs, Table 3.1 provides a basis for the theoretical framework behind the construction of an index related to the phenomenon of *Fiscal Illusion*. From the original suggestion of Puviani (1903) and his lecture by Buchanan (1960) to some of the most recent authors, like Wagner (2001), Sanandaji and Wallace (2003) or Jones (2006), we clearly identify that the focused dimensions are numerous. Besides the traditional dimensions (Composition of Public Revenues, Money creation, Composition of Public Debt, or Relevance of certain revenue sources), we also find the Governmental discourse manipulation and electorate beliefs, the Immaturity level of the democracies and the interaction between interest groups and political behaviour, among others.

TABLE 3.1 – Authors and their focus on Fiscal Illusion

Authors	Purpose of discussing Fiscal Illusion	Focused Dimensions
Puviani (1903) Buchanan (1960 and 1967)	To explain the budgetary behaviour of the rulers	Composition of Public Revenues; Money creation; Composition of Public Debt; Relevance of certain revenue sources
Downs (1957)	To understand the reproduction of bad governance practices	Political strategies of the ruler group
Galbraith (1958) Downs (1960)	To understand the under-provision of public goods	Public expenditures manipulation
Twight (1994) Alesina and Perotti (1996)	To discuss means by which public budgets are less transparent	Governmental discourse manipulation and electorate beliefs
Von Hagen and Harden (1994)	To explain sub-optimal overall levels of public spendings	Number of governmental Ministries; Different objectives of governmental agents
Wittman (1995)	To cover systematic public decisions	Immaturity level of the democracies
Easterly (1999 and 2001) Calderón <i>et al.</i> (2003) Cohen and Percoco (2004)	To understand some budgetary practices like the preference for cutting certain kind of less visible investment outlays	Composition of Public Capital outlays
Jensen and Vestergaard (1999)	To discuss the European Union Politics	Governmental rent-seeking
Wagner (2001)	To explain the public preference for certain types of taxation	Relevance of trade taxes
Sanandaji and Wallace (2003)	To understand the opacity of the design of the taxes	Interaction between interest groups and political behaviour
Forte (2004)	To discuss the efficacy of Maastricht Rules	Real Public Budget (considering inflation rates and public debt)
Garcia-Alegre and Lopez-Casasnovas (2004)	To discuss the relevance of public reports in the public management	Composition of Public Expenditures
P. Jones (2006)	To explain the crowding-out on financing international programs	Electorate preferences on national issues (poor societies prefer 'economic growth' as a main issue, also following Maslow, 1970)

4. Data and Methodology

In this section, the main steps behind the construction of the Fiscal Illusion Index will be revealed.

As Nardo *et al.* (2005) state, economic or social indexes can send misleading policy messages if they are poorly constructed or misinterpreted. Therefore, it is very relevant to follow prudent steps in order to reach significant aims and to avoid simplistic lectures.

After the identification of the theoretical framework, it is time to find the equivalent variables and to select data. Table A1 (in Annexes) provides a synthesis of this effort. Finding variables in order to fulfil the requirements of the focused dimensions was very painstaking work, combining different data sources and discussing the best way to reduce the count of missing values of the provided databases. The range of twenty-six variables (confirm all of them in Table A1) was selected considering their use in the cited literature, analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and relationship to each other. The data are related to 68 democracies, including developing and developed countries. These countries² were selected using *Polity IV* filter, following Brender and Drazen (2004) who have chosen only those democracies with positive values from the filter.

In the cases of data scarcity of some variables, Shi and Svensson (2002) and Nardo *et al.* (2005) were followed, when they suggest substituting the missing values with the national average values of the variables.

Therefore, let X_{iT} be the random variable associated to country i to be analyzed for T years, *i.e.*, $X_{iT} = \{x_{i1}, x_{i2}, \dots, x_{iT}\}$. Let r be the number of recorded or non-missing values on X_{iT} , and $T-r$ the number of missing values. The *unconditional mean* is then given by

$$\bar{x}_i = \frac{1}{r} \sum_{\text{recorded}} x_{it} \quad (4.1)$$

The literature on the analysis of missing data is extensive and it is in rapid development. More comprehensive surveys can be found in Little and Schenker (1994), Little (1997), and Little and Rubin (2002). As Nardo *et al.* (2005) refer, the *unconditional mean imputation* is a well-recurred method classified in the single imputation group with explicit modelling. In the single imputation group, the predictive distribution must be generated by employing the observed data either through implicit or explicit modelling. The implicit modelling uses past or similar observations and the explicit modelling makes the distribution based on a formal statistical model with explicit assumptions.

² Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Cyprus, Czech Republic, Denmark, Dominican, Ecuador, El Salvador, Estonia, Fiji, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Korea, Lithuania, Luxembourg, Madagascar, Malaysia, Mali, Mauritius, Mexico, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Trinidad and Tobago, Turkey, United Kingdom, United States of America, Uruguay, and Venezuela.

Nguyen, Wang and Carroll (2004) also recognized that the *unconditional mean imputation* is a simple method that is statistically better than some naïve methods, like replacing the missing values with zeros (or a positive constant) in line with Alizadeh *et al.* (2000).

But if simplicity is its main appeal, an important limitation of this single imputation method is its systematic underestimation of the variance of the estimates. Therefore, this method cannot be considered as a panacea that will solely solve the problem of missing values. As Nguyen, Wang and Carroll (2004) or Nardo *et al.* (2005) observe, the researcher must solidify the analysis with sensitivity and uncertainty checks carried on the final products (final indexes), proceedings followed in this research as later described. Additionally, the researcher must be aware that the *unconditional mean imputation* fits better when it is used with a large number of variables (like the number of variables here used), variables related to large cross-sectional data samples (and, of course, with a few of the missing points) that, when combined, will substantially minimize the pointed biases.

The main sources of data in this work were Barro and Lee (2000), Cross-National Time-Series Data Archive (2006), Database of Political Institutions (2004), Government Finance Statistics (2006), International Country Risk Guide (2006), International Financial Statistics (2006), International Labour Organization Statistics (2006), *Voter Turnout since 1945* (2002), and World Development Indicators (2006). The Web sites <http://www.worldpublicopinion.org> and <http://www.idealists.org> also provided data. Table A.1 particularizes the sources for each variable.

The panel starts in 1960 and the data goes to 2006. Almost all the variables were used with their provided values or were enriched with the previously discussed suggestions (*unconditional mean imputation*) of Shi and Svensson (2002) and Nardo *et al.* (2005) in this step.

The exceptions were the variables built upon *Herfindahl Indexes* or growth rates.

In the former case, the Herfindahl Index of a referred fiscal dimension (public expenditures or public revenues) followed Pommerehne and Schneider (1978) or Becker (1983) and it was defined in the simplest way, as the sum of the squares of the shares of each individual component of that fiscal dimension³. In the latter case, the growth rates were computed as the difference of two consecutive observations of the logarithmized variable, yearly observed.

When there are many variables to be combined into one posterior indicator, Nardo *et al.* (2005) write metaphorically that the researcher must avoid “adding up apples and oranges.” Therefore, an effort of normalization is required prior to any data aggregation as the indicators in a data set often have different measurement units. Freudenberg (2003) and Jacobs *et al.* (2004) point out the existence of a large range of normalization methods.

Considering the nature of the data previously described, and the limitations of the alternative methods (see Nardo *et al.*, 2005), it was chosen for each (country-year) observation the

³ Although the use of Herfindahl indexes has intuitive appeal, it is far from being a perfect measure of tax or public spending complexity, since it assumes that different types of taxes have the same potential to deceive individuals and create illusions, as clearly enunciated by Ovaska (2003) among others. Therefore, a measure of *fiscal illusion* should combine the different dimensions proposed by the Literature, minimizing the bias induced by recurring to isolated (raw) variables that are identified with the phenomenon itself.

percentile rank⁴ (as a normalisation method) taking into account all observations from each variable and the expected effect on Fiscal Illusion by a rise of the variable⁵. This method allows one to express prior units with different measures into normalised (and more likely comparable) variables. Additionally, Zimmerman and Zumbo (2005) showed that using percentiles markedly increased the power of "t" tests for skewed distributions and percentiles were also effective for symmetric distributions (as already pointed out in Ferguson, 1976).

The percentile rank is classified as a categorical scale normalization method. In this case, the top 1% received a score of 1, the top 2% received a score of 0.99 and so on. This method is very useful in economic and social research because it supplies results that allow a kind of lecture pointing out the effort of convergence among the cases, from the worst (year-case observation) to the best, rewarding the best performing countries and penalising the worst (check Angell, 2005, or Kaufmann, Kraay and Mastruzzi, 2006, for elucidative examples on governance and fiscal institutions quality).

For instance, suppose that the normalised variable X for country C and year Y has the value 0.840 and suppose that X for C and year Y+5 has the value 0.780. Therefore, we are able to suggest that during the period from Y to Y+5, the country C has enlarged its distance ("it has diverged from") to the country-year observation with the highest value of X. In spite of its notorious advantages, categorical scales exclude non-negligible amounts of information about the variance of the transformed indicators, which reinforce the need of a re-normalization of the combined values (Musgrove and Walsh, 2005) and the exigency of recurring to the posterior sensitivity and uncertainty examinations.

To avoid the common criticism, "indicator rich but information poor," when there is the use of indicators selected in an arbitrary manner with little attention paid to the interrelationships between them, the data were observed through multivariate analysis. When there are arbitrary weights given to the indicators in order to constitute an index (usually, all indicators have the same weight), this can lead to indices which overwhelm, confuse and mislead decision-makers and the general public.

Although there are some available methods (see Nardo *et al.*, 2005), the chosen method to explain the variance of the observed data through a few linear combinations of the original data was a specific technique belonging to the group of the Multivariate Analysis – the *Multiway Principal Components Analysis (MPCA)*.

Before explaining what MPCA is, first, it is important to understand the concept about *Principal Components Analysis (PCA)*. Some interesting references on this method are Hair *et al.* (2005), Kent, Bibby and Mardia (2006), and Johnson and Wichern (2007). PCA is a dimensionality reduction technique. It produces a lower dimensional representation in a way that preserves the correlation structure between the process variables and is optimal in terms of capturing the variability in the data, as argued by Russell, Chiang and Braatz (2000).

⁴ The percentile rank of a country-year observation (*it*) of variable *x* is $\tilde{pc}_{xit} = 100 * \frac{cf_{it} + 0,5f_{it}}{N_{it}}$, where cf_{it} is the cumulative frequency for all scores lower than the country-year score of interest, f_{it} is the frequency of the score of interest, and N_{it} the number of country-year observations (N_{it} is the product between the number of countries and the number of annual observations).

⁵ If the expected effect was negative, then the rank was re-ordered, considering the difference between 1 and the (raw) percentile rank. Otherwise, the rank was not modified.

Even though there are Q variables, much of the data's variation can often be accounted for by a small number of variables – *principal components*, or linear relations of the original data that are uncorrelated, Z_1, Z_2, \dots, Z_Q . At this point there are still Q principal components, *i.e.*, as many as there are variables, x_1, x_2, \dots, x_Q . The next step is to select the first, say $P < Q$ principal components (*factors*) that preserve a “high” amount of the cumulative variance of the original data.

$$\begin{aligned}
 Z_1 &= a_{11}x_1 + a_{12}x_2 + \dots + a_{1Q}x_Q \\
 Z_2 &= a_{21}x_1 + a_{22}x_2 + \dots + a_{2Q}x_Q \\
 &\dots \\
 Z_Q &= a_{Q1}x_1 + a_{Q2}x_2 + \dots + a_{QQ}x_Q
 \end{aligned}
 \tag{4.2}$$

The lack of correlation in the principal components is a useful property. It indicates that the principal components are measuring different “statistical dimensions” in the data. The weights a_{ij} (also called components or factor loadings) applied to the variables x_j in the system of equations (4.2) are chosen so that the principal components Z_i satisfy the following conditions⁶:

- i) they are uncorrelated (orthogonal);
- ii) the first principal component accounts for the maximum possible proportion of the variance of the set of x 's, the second principal component accounts for the maximum of the remaining variance and so on until the last of the principal component absorbs all the remaining variance not accounted for by the preceding components.

PCA involves finding the *eigenvalues* $\lambda_j, j = 1, \dots, Q$ of the sample covariance matrix (4.3)

$$CM = \begin{bmatrix} cm_{11} & cm_{12} & \dots & cm_{1Q} \\ cm_{21} & cm_{22} & \dots & cm_{2Q} \\ \dots & & & \\ cm_{Q1} & cm_{Q2} & & cm_{QQ} \end{bmatrix}
 \tag{4.3}$$

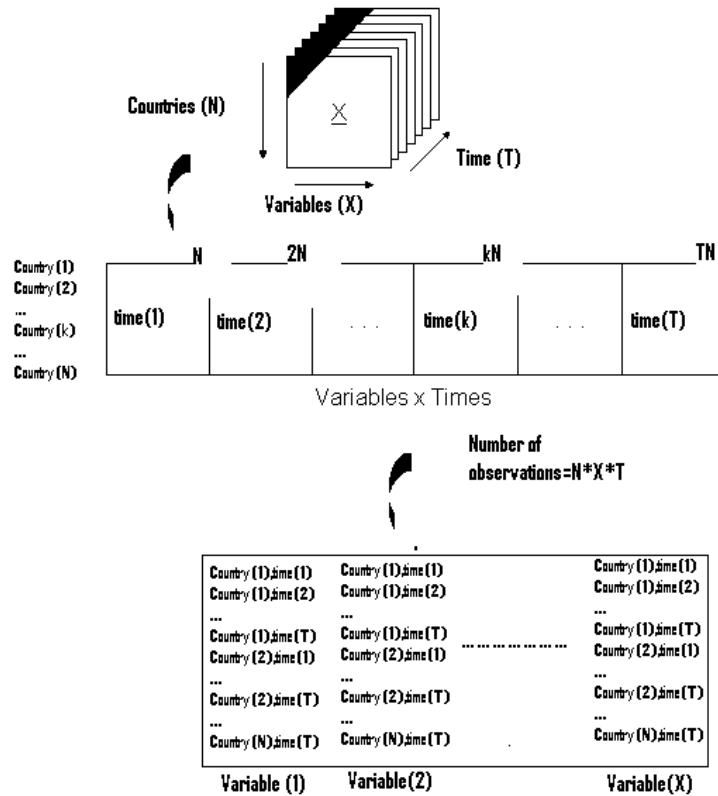
where the diagonal element cm_{ii} is the variance of x_i and cm_{ij} is the covariance of variables x_i and x_j . The eigenvalues of the matrix (4.3) are the variances of the principal components and can be found by solving the characteristic equation $|CM - \lambda I| = 0$ where I is the identity matrix with the same order as CM , and λ is the vector of eigenvalues.

When the process involves more than two dimensions (for instance, variables observed for some countries in various periods), the PCA method generates the *Multiway Principal Components Analysis (MPCA)*. This can be achieved considering a situation in which $x=1, 2, \dots, X$ variables are recorded at $t=1, 2, \dots, T$ periods throughout the sample of N countries. This results in a three-way data matrix M ($X * T * N$). As Nomikos and MacGregor (1994)

⁶ An implicit assumption is $\sum_{j=1}^Q (a_{ij})^2 = 1, i = 1, 2, \dots, Q$.

showed, *MPCA* is therefore equivalent to performing ordinary *PCA* on a large two-dimensional matrix constructed by unfolding the three-way data matrix. Several methodologies to unfolding have been suggested in the previous literature. For this work the most efficient process of unfolding was selected as is illustrated in Figure 4.1.

FIGURE 4.1 – Disposition and unfolding of three-way data matrix



The previous process allows decomposing the three-way data matrix M into a series of principal components consisting of score vectors and loading matrices as previously explained.

Using SPSS v. 15.0.1, we first have obtained Table 4.1 that shows that five factors were retained, using the method of principal component factors (for economy of space, the other factors, non-significant, were omitted). These five factors account for more than 80% (84.46% to be precise) of the total variation⁷.

⁷ The usual procedures were carried to evaluate the quality of the results derived from the PCA. The KMO measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. Looking at the related table (available under request), the KMO measure is 0.641. From the same table, we can see that the Bartlett's test of sphericity is significant. That is, its associated probability is less than 0.05 ($\chi^2 = 12049,28$). This means that the correlation matrix is not an identity matrix.

TABLE 4.1 - Component loadings for Fiscal Illusion variables

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	12.64945	4.17212	0.4080	0.4080
2	8.47733	6.02921	0.2735	0.6815
3	2.44812	0.88984	0.0790	0.7605
4	1.55827	0.50874	0.0503	0.8107
5	1.04953	0.17508	0.0339	0.8446

Table 4.2 reveals the Rotated Factor Loadings for Fiscal Illusion variables, a powerful suggestion of the weights that will calibrate each variable in the aggregate index⁸. These results were achieved through the Principal Components Extraction Method with varimax normalised variation.

TABLE 4.2 - Rotated Factor Loadings for Fiscal Illusion variables

Variable	1	2	3	4	5	Uniqueness
trd	0.92504	-0.15369	0.12477	0.15922	0.00746	0.07971
icrg	-0.43434	0.38172	0.71098	0.00244	-0.02269	0.15962
inv_vot	-0.78653	-0.55043	0.08307	0.01592	-0.06039	0.06760
pub_employ	0.18532	0.93288	-0.25430	-0.06257	-0.00565	0.02678
pres_parl	-0.52962	-0.16898	-0.34620	0.28901	-0.32231	0.38369
checks	-0.62336	-0.01468	0.11139	0.36003	0.36115	0.33875
highedu	0.06366	0.74337	0.51790	0.11634	0.18080	0.12891
gov_confid	-0.98835	-0.05771	-0.02640	0.03472	-0.07200	0.01275
higprefer	0.27676	0.89509	-0.31793	-0.00737	-0.00324	0.02107
npopmilli	0.59355	0.77254	-0.18554	-0.04467	0.05065	0.01190
mediacs	-0.08509	0.52399	0.58645	-0.22323	-0.32325	0.21995
cabin_size	-0.69747	-0.25477	0.26530	-0.23952	0.04595	0.31876
money	0.65390	0.50930	0.36216	-0.22573	0.09536	0.12182
shortdebt	0.09845	0.46136	0.26501	0.51703	0.33816	0.32556
pccaptransf	0.80430	-0.28685	0.06437	0.27005	-0.06888	0.18901
pctranspart	-0.16092	0.94149	-0.26535	-0.02251	-0.00277	0.01677
pegood	0.79165	0.46705	-0.10527	-0.09330	0.05073	0.13279
pcintrade	0.83732	-0.44819	0.14381	0.18450	-0.03746	0.04189
txherfind	0.84163	0.14843	-0.03391	0.25341	-0.00365	0.20425
pceduc	0.86191	-0.43404	0.17245	0.07932	-0.01953	0.03232
herfdesp	-0.84717	0.26357	-0.05646	-0.11338	0.04697	0.19458
ratcurcap	-0.78792	0.26162	-0.07167	-0.20566	0.09487	0.25431
pcprofit	0.56727	-0.59957	0.14311	-0.24502	0.20214	0.19734
pcinherita	0.43490	-0.45362	0.15586	-0.42078	0.26486	0.33360
realbud	-0.11555	-0.56247	-0.44526	0.17898	0.45313	0.23466
gnidebt	0.22851	0.83302	-0.22043	-0.15045	-0.05071	0.18007

⁸ See, please, for a full explanation of the factor loadings Hair *et al.* (2005), Kent, Bibby and Mardia (2006), or Johnson and Wichern (2007).

High and moderate loadings (>0.50) indicate how the sub-indicators are related to the principal components. The first factor has high positive coefficients (loadings) with *trd* (0.93), *pccaptransf* (0.80), *pcgood* (0.79), *pcintrade* (0.84), *txinddir* (0.71), *txherfind* (0.84), *pceduc* (0.86) and *pcprofit* (0.57), indicating that Factor 1 may be due to Fiscal Illusion in its *strictus sensu*, motivated by fiscal manipulation. Factor 2 is mainly dominated by political-economic variables: *pub_employ* (0.93), *highedu* (0.74), *higprefer* (0.90), *npopmilli* (0.77), *mediacs* (0.52), *money* (0.51), *pctransfpart* (0.94), *txinddir* (0.66) and *gnidebt* (0.83). Factors 3, 4 and 5 are mainly subject to the government's ability to persuade economic agents and to the budget restrictions.

In the last step of the production of the Fiscal Illusion Index, it is time to deal with the construction of the weights from the matrix of factor loadings after rotation, given that the squares of factor loadings represent the proportion of the total unit variance of the indicator which is explained by the factor. The approach used by Nicoletti, Scarpetta and Boylaud (2000) is that of grouping the sub-indicators with the highest factor loadings in *intermediate* composite indicators, whose number is equal to the number of factors. Therefore, each normalised variable with a significant factor loading (greater than 0.7) will have a weight equal to the square of the factor loading divided by the explained variation by the factor⁹. At the end, each intermediate composite indicator will have a weight equal to its proportion of the variance explained by all the factors¹⁰.

In our case, the final value given to each country-year observation is re-scaled, using again the percentile rank but considering now all weighted values. Therefore, the Fiscal Illusion Index, as a percentile ranking, indicates how a country-year observation performs compared to the other country-year observations at its position. The *Fiscal Illusion Index* ranges from a low of 0.01 (lowest level of *Fiscal Illusion*)¹¹ to a high of 0.99 (highest level of *Fiscal Illusion*)¹². A 0.50 ranking is an average performance. Table A.2 shows two values (1960 and 2006, the first

⁹ Using data from Tables 4.1 and 4.2, the Factor 1 Intermediate Indicator (F1) for country *i* at year *t* is $F1_i = \frac{0.925^2}{0.408} \text{trd}_i + \dots + \frac{0.862^2}{0.408} \text{pceduc}_i$, and so on until F5. Therefore $F1_i$ is a weighted average of the normalised variables with a significant factor loading (greater than 0.7) for each country-year observation.

¹⁰ The (raw, not re-scaled) *Fiscal Illusion Indicator* (\tilde{FI}) is $\tilde{FI}_i = \frac{0.408}{0.845} F1_i + \dots + \frac{0.034}{0.845} F5_i$.

¹¹ This observation is for New Zealand, 2002. Some of the variables' values are: Herfindahl Index of Public Revenues (0.449); Percentage of taxes on goods and services in total taxes revenues (19.4%); Ratio between indirect and direct taxes revenues (0.360); Percentage of taxes on corporate profits in total taxes revenues (9.30%); Average value of radio receptors, TV sets and newspapers per capita (30450); Percentage of education expenditures in the total expenditures (13.9%); Percentage of higher school completed in the total population (16.0%); Percentage of invalid votes in parliamentary elections (0.66%); International Country Risk (13.65); Number of non-profit organizations per million people (29.58); Percentage of public employees in the total active population (5.1%); and Herfindahl Index of Public Expenditures (0.715).

¹² This observation is for Sri Lanka, 1988. Some of the variables' values are: Herfindahl Index of Public Revenues (0.209); Percentage of taxes on goods and services in total taxes revenues (35.2%); Ratio between indirect and direct taxes revenues (2.501); Percentage of taxes on corporate profits in total taxes revenues (7.62%); Average value of radio receptors, to sets and newspapers per capita (1987); Percentage of education expenditures in the total expenditures (8.50%); Percentage of higher school completed in the total population (0.8%); Percentage of invalid votes in parliamentary elections (5.45%); International Country Risk (0.00); Number of non-profit organizations per million people (2.76); Percentage of public employees in the total active population (8.23%); and Herfindahl Index of Public Expenditures (0.228).

and the last years) of the Fiscal Illusion Index for each one of the studied countries. The all sample is available under request.

At the end of the production of the Fiscal Illusion index, it is time to apply uncertainty and sensitivity analysis, an essential step in finding out about composite indicators. This step is widely applied for the robustness assessment of composite indicators and has proven to be useful in dissipating some of the controversy that may surround the interpretation. For this purpose, Giglioli and Saltelli (2000) and Nardo *et al.* (2005) were followed in their three-step methodology.

In the first step, for the Fiscal Illusion Index case study, five main uncertainty inputs have been focused: inclusion-exclusion of one variable at-a-time, imputation of missing data, different distribution functions characterising the variables for each country during the sample period, different weighting schemes and different aggregation schemes. For more details, see a clear explanation in Nardo *et al.* (2005).

The second step is the moment to generate randomly N combinations of uncertainties. For each trial sample, the computational model can be evaluated, generating values for the scalar output variable (the value of the rank assigned by the composite indicator to each country-year observation or the averaged shift in that rank).

In the third step, close the loop over the combinations and analyse the resulting output vector. The sequence of this final output vector, such as the variance and higher order moments, can be estimated with an arbitrary level of precision that is related to the size of the simulation.

Observing the previous steps and recurring to the software SimLab 1.1, we got a final output vector that evidences the simulated distribution for each country-year observation embodying the described uncertainty factors. Figure A.1 shows the correlation between the raw values of the reference Fiscal Illusion Index and the central values of the output generated by SimLab 1.1. As it can be observed, there is a high pattern of correlation, indicating robustness of the Fiscal Illusion Index values. Figure A.1 shows only the cases for two years (1960 and 2006), although the simulation was carried out for all samples, and is available upon request.

The margins of error for the aggregate Fiscal Illusion indicator are displayed in the two panels of Figure A.2, where countries are organized in ascending order according to their point estimates of Fiscal Illusion Index in 1960 and in 2006 on the horizontal axis, and on the vertical axis we plot the raw values of the index and the associated 90% confidence intervals (right label) and the amplitude of the intervals (left label). These intervals indicate the range in which it is 90 percent likely that the true score falls. As observed, the ranges are not significantly large, indicating reasonable estimates. It is also observed that the amplitude of the intervals tends to diminish between 1960 and 2006.

Composite indicators, like the Fiscal Illusion Index, often measure concepts that are linked to well-known and measurable phenomena or to other indexes. These links can be used to test the explanatory power of a composite. Simple cross-plots are often the best way to illustrate such links.

Figure A.3 illustrates this aspect. There, we can confirm that higher GDP per capita, government transparency and good governance practices are negatively associated with Fiscal Illusion, while a higher international risk is positively associated with Fiscal Illusion, being in

accordance with prior expectations (that Fiscal Illusion reduces the economic growth, it happens more in countries with low levels of development and with less transparent governance practices and it worsens the competitiveness of a country in the international markets).

5. *Fiscal Illusion* around the democracies – some comments on the Results

As stated, Table A.2 shows two values (1960 and 2006, the first and the last years) of the Fiscal Illusion Index for each one of the studied countries. Following the construction steps, higher values of the Index reveal higher patterns of Fiscal Illusion. Table A.2 also identifies the national improvement (third column, difference between the percentile rank of 1960 to that of 2006) and each country's average and standard deviation values (fourth column).

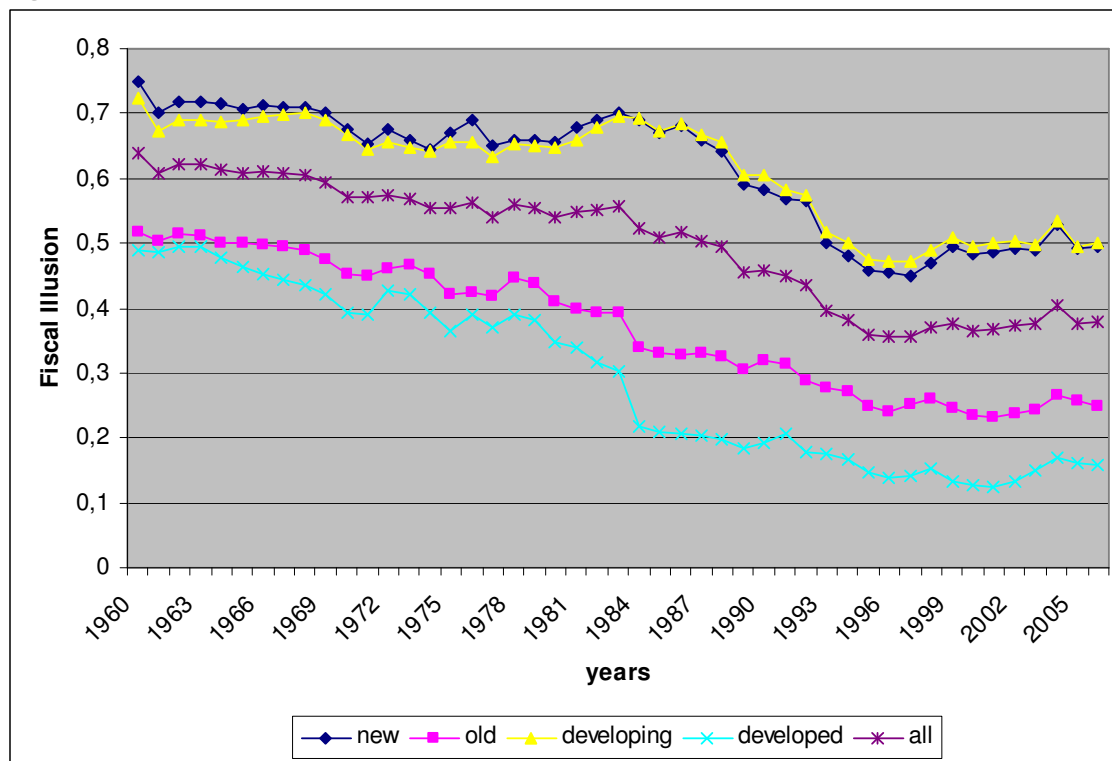
According to Table A.2, we confirm that there has been a generalized movement of convergence to the observation with the lowest level of *Fiscal Illusion*. The decreasing values for all countries between 1960 and 2006 certify this statement. Therefore, we can reach the assumption that democratic maturity tends to improve good governance practices, consequently reducing *Fiscal Illusion* levels.

However, this effort was not equal among the countries. The most significant improvements have been verified in countries like Belgium, Mexico or Portugal, with a decrease of more than fifty percent. Although an important work must be done in order to clarify the particular reasons behind this diversity of behaviours, there are some general determinants that can be pointed out. These determinants are related to the deep changes in the educational pattern (necessary for an assertive electorate) and to the significant integration into the world markets (which promote an additional need of evidencing better fiscal results as a source of competitiveness). These were especially noticed in the last years of the sample (end of 1990s and beginning of the 21st century).

Therefore it is also interesting to analyze the central value for each country, which reduces the effects due to the most recent improvements. Observing the fourth column from Table A.2, it is verified that the countries with the highest values are El Salvador, Guatemala, Honduras, India, Madagascar, Mali, Pakistan, Philippines, Russia and Sri Lanka. Conversely, Austria, Luxembourg, Netherlands and New Zealand are some of the countries with the lowest average values.

Trying to identify group patterns, Figure 5.1 was obtained with the average value for each year using different selections. Countries were grouped according to two divisions: old/new democracies and developed/developing countries. Following Brender and Drazen (2004), developed countries include the OECD Economies that were members of the organization during the entire sample period, plus Spain, Portugal, Greece and Turkey, examples of “new” democracies. Twenty-four countries in our sample belong to this group and the other 44 are classified as developing countries. Old democracies include the established democracies (that is, all countries which were in a sample of democracies using the POLITY filter, *excluding* the new democracies). In our sample and following Brender and Drazen (2004), 32 countries were considered as “old” democracies and the other 36 as “new” ones. Table A.3 identifies this selection.

Figure 5.1 – Fiscal Illusion across the democracies



Following Figure 5.1, we confirm the downtrend of the *Fiscal Illusion* level for the all sample. However, at the end of the analyzed period, a very suggestive observation is imposed – the 2006 level characterising new democracies or developing countries is equivalent to the 1960 level that characterises old democracies or developed countries (0.50). This fact suggests that new democracies or developing countries, on average, are exhibiting the fiscal illusion dimensions that the developed world had forty years ago.

Briefly analyzing the series, we observe that the *Fiscal Illusion* level of new democracies-developing countries remained stable until 1984/1985, years that signal the beginning of a period of diminishing values. After a period of a more significant decrease (1984-1995), the level of *Fiscal Illusion* stabilised until the last temporal observation.

A different pattern is verified with old democracies-developed countries. In these cases, the convergence with the best country-year observation had kept a permanent rhythm from 1960 until 1990, when a period of stabilisation had begun. These periods of slightly constant levels can be interpreted as periods of unchanging patterns in the dimensions that produced the *Fiscal Illusion index*. This reveals that in spite of the national and international economic, social and political convulsions there are institutions in each country and in each group of countries that maintain the fiscal and political practices leading to a certain value of Fiscal Illusion.

Given these achievements obtained prudently, we can expect that Fiscal Illusion is not an irrelevant phenomenon in the political and economic dimensions, namely in the political budget cycle of the democracies, as Mourao (2007) had already noticed. Mourao (2007)

showed that without considering the effects of *Fiscal Illusion* as a complex process of hiding the real fiscal situation from the political agents (policymakers and voters), election-year government balance shifts downward and post-election year government surplus shifts upward. Considering the Fiscal Illusion phenomenon, it was observed that countries with higher values of a Fiscal Illusion Index show worse budget deficits and their budget cycle is more negatively pronounced (more significant negative differences to the average national budget deficit). Evidence further shows that these effects are contingent on the economic development level and on the maturity of the democratic system.

6. Conclusion

This paper reports a method for building an index of Fiscal Illusion that can be used in much the same manner as the recently cited Transparency Indexes. Because the original sense of Fiscal Illusion embodies both electoral sides (voters and politicians) this suggestion is clearly more relevant to measure the democratic status of the countries.

The approach is used to estimate an index for Fiscal Illusion using a very comprehensive database, which enables the development of a large portrait of the vitality of the 68 democracies studied since 1960.

After the identification of the theoretical framework, twenty-six variables have been chosen according to their use in the cited literature. In the cases of data scarcity of some variables, Shi and Svensson (2002) and Nardo *et al.* (2005) were followed, when they suggested substituting the missing values with the national average values of the variables.

Considering the nature of the data and the limitations of the alternative methods, it was chosen for each (country-year) observation the percentile rank (as a normalisation method) taking into account all observations from each variable and the expected effect on Fiscal Illusion by a rise of the variable. The chosen method to explain the variance of the observed data through a few linear combinations of the original data was a specific technique belonging to the group of the Multivariate Analysis – the *Multiway Principal Components Analysis (MPCA)*. Therefore, each normalised variable with a significant factor loading (greater than 0.7) had a weight equal to the square of the factor loading divided by the explained variation by the factor. At the end, each intermediate composite indicator had a weight equal to its proportion of the variance explained by all the factors.

In our case, the final value given to each country-year observation is re-scaled, using again the percentile rank but considering now all weighted values. Therefore, the Fiscal Illusion Index, as a percentile ranking, indicates how a country-year observation performs compared to the other country-year observations at its position. The *Fiscal Illusion Index* ranges from a low of 0.01 (lowest level of *Fiscal Illusion*) to a high of 0.99 (highest level of *Fiscal Illusion*).

Although it was confirmed that there has been a generalized movement of convergence to the observation with the lowest level of *Fiscal Illusion*, The Fiscal Illusion Index shows that the situation varies greatly around the world. It was verified that the countries with the highest average values are Mali, Pakistan, Russia and Sri Lanka. Conversely, Austria, Luxembourg, Netherlands and New Zealand are some of the countries with the lowest average values. It was also observed that the *Fiscal Illusion* level of new democracies-developing countries remained stable until 1984/1985, years that signal the beginning of a period of diminishing values. After a period of a more significant decrease (1984-1995), the level of *Fiscal Illusion* stabilised until the last temporal observation. A different pattern was verified with old

democracies-developed countries. In these cases, the convergence with the best country-year observation had kept a permanent rhythm from 1960 until 1990, when a period of stabilisation had begun. These periods of slightly constant levels reveal that in spite of the national and international economic, social and political convulsions there are institutions in each country and in each group of countries that maintain the fiscal and political practices leading to a certain value of Fiscal Illusion.

The Fiscal Illusion index does permit some investigation of the role of illusory practices by politicians to achieve their particular aims deceiving specific electorates. It additionally shows that despite being an old idea, primarily suggested in 1903, Fiscal Illusion is a phenomenon that perseveres in democratic countries, conditioning their economies, mainly their fiscal aggregates. A further step is deserved and it is related to investigate these interlinkages among Fiscal Illusion, economic conditions and political realities.

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ANNEXES

Table A.1 – Dimensions of Fiscal Illusion, related variables and databases

Focused Dimensions	Variable, [short denomination]	Expected effect on national Fiscal Illusion (by a rising of the variable)	Source	Notes on missing values
Composition of Public Revenues	<i>Herfindahl Index</i> of Public Revenues, [txherfind]	-	GFS	a)
	Percentage of taxes on goods and services in total taxes revenues, [pcgood]	+	GFS	a)
	Ratio between indirect and direct taxes revenues, [ratcurcap]	+	GFS	a)
Money creation	Growth rate of M2 aggregate, [money]	+	IFS	
Public Debt	Percentage of Public Debt in the Gross National Income, [gnidebt]	+	WDI	
Composition of Public Debt	Percentage of short-term public debt in the national public debt, [shortdebt]	-	WDI	
Relevance of certain revenue sources	Percentage of taxes on transfers, on inheritances and gifts in total taxes revenues, [pcinherita]	+	GFS	a)
	Percentage of taxes on corporate profits in total taxes revenues, [pcprofit]	+	GFS	a)
Political strategies of the ruler group	Average value of radio receptors, tv sets and newspapers per capita, [mediacs]	-	CNTSDA	
Public expenditures manipulation	Percentage of capital and current transfers in the total expenditures, [pctranspart]	+	GFS	a)
Governmental discourse manipulation and electorate believes	Percentage of education expenditures in the total expenditures, [pceduc]	-	GFS	a)
	Percentage of higher school complete in the total population, [highedu]	-	Barro and Lee (2000)	b)
	Number of governmental checks and balances, [checks]	-	DPI	a)
Different objectives of governmental agents	Size of cabinets, [cabin_size]	+	CNTSDA	
	Parliamentary power in the Democracy, [pres_parl]	-	DPI	a)
Immaturity of the democracies	Percentage of invalid votes in parliamentary elections, [inv_vot]	+	VTS1945	a)
Composition of Public Capital	Percentage of expenditures on	+	GFS	a)

outlays	capital transfers in the total expenditures, [pccaptransf]			
Governmental rent-seeking	Government confidence (in public polls), [gov_confid]	+	http://www.worldpublicopinion.org	a)
	International country risk, [icrg]	-	ICRG	a)
Relevance of trade taxes	Openness of the economy, [trd]	-	IFS	
	Percentage of trade taxes in total taxes revenues, [pcintrtrade]	+	GFS	a)
Interaction between interest groups and political behaviour	Number of nonprofit organizations per million of people, [NPOpmilli]	-	http://www.idealists.org	
	Percentage of public employees in the active population, [pub_employ]	+	ILO	
Real Public Budget	Real Public Budget, according to Forte (2004), [realbud]	+	IFS	c)
Composition of Public Expenditures	<i>Herfindahl Index</i> of Public Expenditures, [herfdesp]	-	GFS	a)
Electorate preferences on national issues	Percentage of answers stating 'economic growth' as the most important national issue, [higprefer]	+	http://www.worldpublicopinion.org	a)

Legend – CNTSDA: Cross-National Time-Series Data Archive (2006); DPI: Database of Political Institutions (2004); GFS: Government Finance Statistics (2006); ICRG: International Country Risk Guide (2006); IFS: International Financial Statistics (2006); ILO: International Labour Organization Statistics (2006); VTS1945: *Voter Turnout since 1945* (2002); WDI: World Development Indicators (2006).

Notes – a) Due to the scarcity of data in some of the variables provided by the databases, the missing values were substituted by the national average values of the pointed variable, following previous proceedings of Shi and Svensson (2002) or Nardo *et al.* (2005). b) Barro and Lee (2000) database provides data in each five years since 1960; therefore, the interstitial missing values were substituted by the value from the previous provided year. c) According to Forte (2004), the *Real Public Budget* is equal to $Index\ of\ Consumer\ Prices * Debt / GDP + Nominal\ Deficit$.

Table A.2 – Fiscal Illusion (FI) Index, 1960 and 2006

Country	year	FI	FI06-FI60	FI (Mean/sd)
ARGENTINA	1960	0,841		0,492
ARGENTINA	2006	0,401	-0,44	(0,2041)
AUSTRALIA	1960	0,496		0,362
AUSTRALIA	2006	0,220	-0,226	(0,1465)
AUSTRIA	1960	0,481		0,173
AUSTRIA	2006	0,088	-0,393	(0,1386)
BELGIUM	1960	0,754		0,360
BELGIUM	2006	0,250	-0,504	(0,205)
BOLIVIA	1960	0,776		0,647
BOLIVIA	2006	0,564	-0,212	(0,130)
BRAZIL	1960	0,551		0,459
BRAZIL	2006	0,366	-0,185	(0,113)
BULGARIA	1960	0,477		0,325
BULGARIA	2006	0,283	-0,194	(0,092)
CANADA	1960	0,439		0,203
CANADA	2006	0,116	-0,323	(0,127)
CHILE	1960	0,848		0,501
CHILE	2006	0,327	-0,521	(0,166)
COLOMBIA	1960	0,875		0,654
COLOMBIA	2006	0,598	-0,277	(0,129)
COSTA_RICA	1960	0,532		0,324
COSTA_RICA	2006	0,152	-0,38	(0,161)
CYPRUS	1960	0,770		0,565
CYPRUS	2006	0,474	-0,296	(0,155)
CZECH_REP	1960	0,474		0,396
CZECH_REP	2006	0,243	-0,231	(0,196)
DENMARK	1960	0,339		0,183
DENMARK	2006	0,121	-0,218	(0,093)
DOMINICAN	1960	0,845		0,615
DOMINICAN	2006	0,311	-0,534	(0,212)
ECUADOR	1960	0,600		0,475
ECUADOR	2006	0,349	-0,251	(0,115)
EL_SALVADOR	1960	0,979		0,836
EL_SALVADOR	2006	0,569	-0,41	(0,137)
ESTONIA	1960	0,421		0,401
ESTONIA	2006	0,380	-0,041	(0,041)
FIJI	1960	0,523		0,457
FIJI	2006	0,395	-0,128	(0,173)
FINLAND	1960	0,438		0,155
FINLAND	2006	0,070	-0,368	(0,115)
FRANCE	1960	0,897		0,612
FRANCE	2006	0,433	-0,464	(0,197)
GERMANY	1960	0,496		0,222
GERMANY	2006	0,117	-0,379	(0,155)
GREECE	1960	0,912		0,674
GREECE	2006	0,447	-0,465	(0,178)
GUATEMALA	1960	0,963		0,837
GUATEMALA	2006	0,799	-0,164	(0,080)
HONDURAS	1960	0,913		0,886
HONDURAS	2006	0,859	-0,054	(0,047)
HUNGARY	1960	0,756		0,635
HUNGARY	2006	0,551	-0,205	(0,091)
ICELAND	1960	0,441		0,187
ICELAND	2006	0,147	-0,294	(0,106)
INDIA	1960	0,928		0,876
INDIA	2006	0,833	-0,095	(0,056)
IRELAND	1960	0,580		0,339
IRELAND	2006	0,105	-0,475	(0,172)
ISRAEL	1960	0,492		0,399
ISRAEL	2006	0,306	-0,186	(0,119)
ITALY	1960	0,811		0,489
ITALY	2006	0,312	-0,499	(0,196)
JAPAN	1960	0,619		0,424
JAPAN	2006	0,346	-0,273	(0,188)
KOREA	1960	0,878		0,625
KOREA	2006	0,426	-0,452	(0,163)
LITHUANIA	1960	0,668		0,487
LITHUANIA	2006	0,294	-0,374	(0,106)
LUXEMBOURG	1960	0,170		0,174
LUXEMBOURG	2006	0,177	0,007	(0,026)
MADAGASCAR	1960	0,906		0,857
MADAGASCAR	2006	0,849	-0,057	(0,047)
MALAYSIA	1960	0,678		0,568
MALAYSIA	2006	0,480	-0,198	(0,136)
MALI	1960	0,929		0,936
MALI	2006	0,943	0,014	(0,024)
MAURITIUS	1960	0,817		0,692
MAURITIUS	2006	0,649	-0,168	(0,079)
MEXICO	1960	0,797		0,543
MEXICO	2006	0,255	-0,542	(0,212)
NEPAL	1960	0,550		0,623
NEPAL	2006	0,696	0,146	(0,102)
NETHERLANDS	1960	0,368		0,122
NETHERLANDS	2006	0,062	-0,306	(0,103)
NEW_ZEALAND	1960	0,227		0,052
NEW_ZEALAND	2006	0,022	-0,205	(0,055)
NICARAGUA	1960	0,886		0,752
NICARAGUA	2006	0,594	-0,292	(0,116)
NORWAY	1960	0,551		0,249
NORWAY	2006	0,145	-0,406	(0,154)
PAKISTAN	1960	0,967		0,951
PAKISTAN	2006	0,935	-0,032	(0,064)
PANAMA	1960	0,698		0,608
PANAMA	2006	0,518	-0,18	(0,117)
PAPUA	1960	0,588		0,617
PAPUA	2006	0,646	0,058	(0,091)
PARAGUAY	1960	0,990		0,824
PARAGUAY	2006	0,712	-0,278	(0,169)
PERU	1960	0,935		0,778
PERU	2006	0,768	-0,167	(0,123)
PHILIPPINES	1960	0,889		0,817
PHILIPPINES	2006	0,685	-0,204	(0,076)
POLAND	1960	0,986		0,890
POLAND	2006	0,767	-0,219	(0,092)
PORTUGAL	1960	0,791		0,461
PORTUGAL	2006	0,276	-0,515	(0,199)
ROMANIA	1960	0,863		0,738
ROMANIA	2006	0,646	-0,217	(0,257)
RUSSIA	1960	0,999		0,931
RUSSIA	2006	0,830	-0,169	(0,091)
SLOVAKIA	1960	0,422		0,412
SLOVAKIA	2006	0,337	-0,085	(0,092)
SLOVENIA	1960	0,479		0,536
SLOVENIA	2006	0,592	0,113	(0,110)
SOUTH_AFRICA	1960	0,627		0,563
SOUTH_AFRICA	2006	0,396	-0,231	(0,129)
SPAIN	1960	0,617		0,278
SPAIN	2006	0,090	-0,527	(0,199)
SRI_LANKA	1960	0,992		0,970
SRI_LANKA	2006	0,927	-0,065	(0,031)
SWEDEN	1960	0,370		0,163
SWEDEN	2006	0,069	-0,301	(0,128)
SWITZERLAND	1960	0,242		0,125
SWITZERLAND	2006	0,102	-0,14	(0,090)
TRINIDAD	1960	0,162		0,095
TRINIDAD	2006	0,066	-0,096	(0,068)
TURKEY	1960	0,838		0,590
TURKEY	2006	0,401	-0,437	(0,199)
UK	1960	0,633		0,328
UK	2006	0,232	-0,401	(0,183)
US	1960	0,381		0,221
US	2006	0,219	-0,162	(0,087)
URUGUAY	1960	0,933		0,780
URUGUAY	2006	0,760	-0,173	(0,120)
VENEZUELA	1960	0,796		0,583
VENEZUELA	2006	0,487	-0,309	(0,143)

Table A.3 - Countries and values from variables "Old" and "Developed"

Country	Old	Developed
ARGENTINA	0	0
AUSTRALIA	1	1
AUSTRIA	1	1
BELGIUM	1	1
BOLIVIA	0	0
BRAZIL	0	0
BULGARIA	0	0
CANADA	1	1
CHILE	0	0
COLOMBIA	1	0
COSTA_RICA	1	0
CYPRUS	1	0
CZECH_REP	0	0
DENMARK	1	1
DOMINICAN	0	0
ECUADOR	0	0
EL_SALVADOR	0	0
ESTONIA	0	0
FIJI	0	0
FINLAND	1	1
FRANCE	1	1
GERMANY	1	1
GREECE	0	1
GUATEMALA	0	0
HONDURAS	0	0
HUNGARY	0	0
ICELAND	1	1
INDIA	1	0
IRELAND	1	1
ISRAEL	1	0
ITALY	1	1
JAPAN	1	1
KOREA	0	0
LITHUANIA	0	0
LUXEMBOURG	1	1
MADAGASCAR	0	0
MALAYSIA	1	0

MALI	0	0
MAURITIUS	1	0
MEXICO	0	0
NEPAL	0	0
NETHERLANDS	1	1
NZ	1	1
NICARAGUA	0	0
NORWAY	1	1
PAKISTAN	0	0
PANAMA	0	0
PAPUA	1	0
PARAGUAY	0	0
PERU	0	0
PHILIPINES	0	0
POLAND	0	0
PORTUGAL	0	1
ROMANIA	0	0
RUSSIA	0	0
SLOVAKIA	0	0
SLOVENIA	0	0
SOUTH_AFRICA	1	0
SPAIN	0	1
SRI_LANKA	1	0
SWEDEN	1	1
SWITZERLAND	1	1
TRINIDAD	1	0
TURKEY	0	1
UK	1	1
US	1	1
URUGUAY	0	0
VENEZUELA	1	0

Note: Coefficient of correlation between "Old" and "Developed" = 0,537.

Figure A.1: Fiscal Illusion Index and simulated values, 1960 and 2006

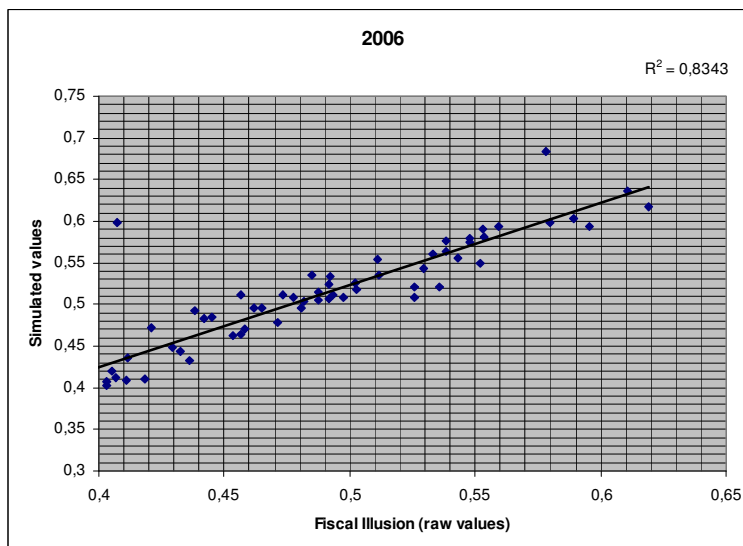
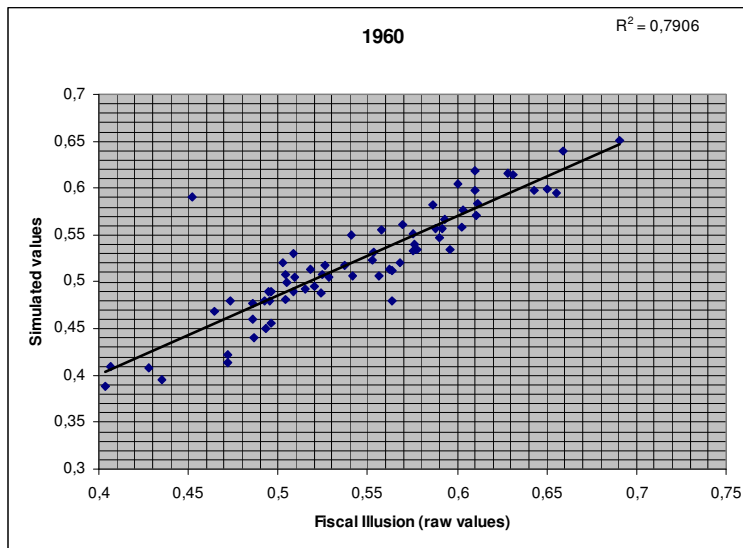


Figure A.2 – 90% confidence intervals of the Fiscal Illusion Index

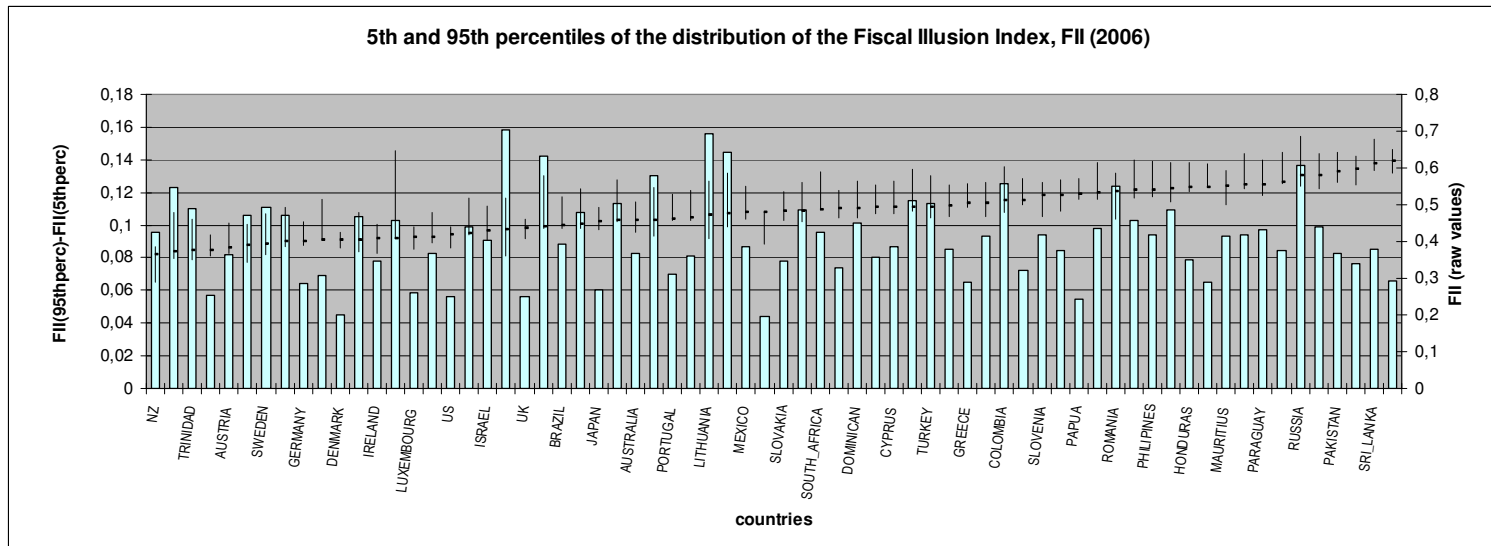
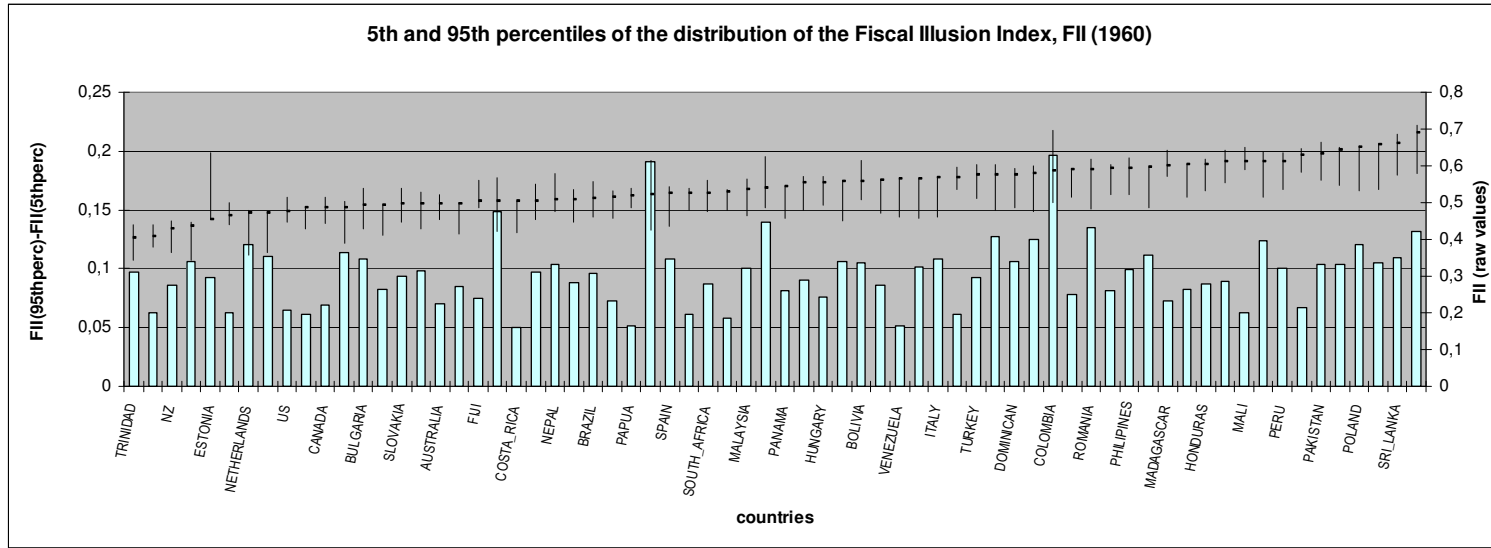


Figure A.3 – Links between Fiscal Illusion Index values and GDP per capita, Country risk, Corruption Perception and Governance Indicators (year: 2000)

