THE RELATIONSHIP BETWEEN FISCAL DECENTRALIZATION AND GOVERNANCE

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Abstract

The research studies the empirical relationship between fiscal decentralization and governance. Two analytical strategies are employed. Through the use of OLS regression, a cross-country analysis is carried out using traditional operational definitions of fiscal decentralization and data from a balanced set of countries. Through the use of a fixed effect model and a stricter dataset, a panel analysis is performed with alternative operational definitions of fiscal decentralization that focus on the autonomy of local governments. For both the analyses, multiple definitions of governance are studied. The results show fiscal decentralization to be not significantly related to the quality of governance.

Introduction

In recent years, research has found again interest in how the political institutions and their setting affect the well-being of their own country. This trend is well exemplified by the great interest that the work of Acemoglu and Robinson (2012) has received regarding its main thesis, which focuses on the often neglected role that political institutions play in shaping the nations' fortunes. The resurgence of this topic forces modern research to verify whether proposed institutional features which have been argued in the past to stimulate good governance have retained their impact on modern nations.

In the past, fiscal decentralization, which can be conceptualized as the assignment of the responsibility for the fiscal budget to the lower body of government, has often been argued to increase the quality and the efficiency of the governmental action. Different reasons have been identified as the main drivers of such a relationship. Among these, the classical theories of fiscal decentralization emphasize the more accurate information acquired by local politicians on their district's specific preferences (Oates, 1972), and the positive effects that competition for resources between districts would have brought on the efficiency of the governance (Tiebout, 1956). More recently, theoretical research has focused on the positive effect that fiscal decentralization brings on the electoral accountability of local politicians, exerting a disciplining effect towards their behavior (Porcelli, 2009).

Despite the theoretical literature mainly affirms the positive nature of the relationship between governmental quality and decentralization, the empirical body of the literature on the topic does not provide a general consensus. One of the main issues found in this body of literature relates to the definition of a multifaceted concept such as quality of governance, whose complex nature led to the use of different operational definitions among the different studies. Moreover, past

research employs data that do not portray in a consistent way the concept of fiscal decentralization, therefore limiting their power in providing an accurate description of the relationship (Blochlinger, 2013). Giving the ambiguous results found in the literature, and the availability of new data, a new empirical study on the topic could shed additional light on this complex relationship.

Given these considerations, the research question that will be explored in this paper is:

"What is the relationship between fiscal decentralization and the quality of governance?"

This study will try to contribute to the past literature in different ways. First of all, it will try to use modern data and to apply the analysis to a diverse set of countries. Moreover, it will make use of more precise data that can better define the concept of fiscal decentralization. Moreover, the study will employ different operational definitions of governmental quality, which refer to the different strategies used in past studies. In this way, it will be possible to compare how the definition of governmental quality might affect the conclusions of the study. Finally, also different shapes of such a relationship will be studied.

The paper will be structured in the following way: the first section will briefly review the main theoretical considerations regarding the relationship of interest, with a critical outlook on the shortages of these theories. This section will be used in order to devise the hypotheses that will be tested with the empirical analysis. The following section will briefly look at the empirical works that analyzed the relationship between decentralization and governance in the past, trying to summarize the main results and to compare the different methodologies and operational definitions. Then, the data used for the empirical study will be presented, along with a preliminary analysis of their properties. The methodology used for the analyses of the data will be presented, followed by a brief exposition of the result. The paper will continue with a discussion of the results, focusing on how they relate to the past literature. Finally, the paper will devote a final section to the discussion of the limitations of the study, along with some proposition for future research.

Theoretical Framework

This section will be devoted to the exploration of the different theories that can provide an answer to the research question. Through these, it will be possible to devise some hypotheses to

be tested in the study. According to Porcelli (2009), it is possible to identify three main theories that historically identify fiscal decentralization as having a positive influence on the quality of government.

The first of such theories was developed and exposed by Charles Tiebout (1956). Tiebout (1956) focused his theory on the idea that the assignation of the power of supplying public goods to the local governments would have made the citizens ultimately better off, as the public provision of goods would be more efficient at local rather than at central level. In his model, Tiebout (1956) considers that, when dealing with public goods, central governments have structural inefficiencies as they have difficulties regarding the understanding of the preferences of their citizens, since these are not revealed in the same way as in a market. This leads to an inefficient provision of goods and to inefficient tax rates. According to Tiebout (1956), this issue could be solved by assigning the task of providing public goods to local governments. Assuming that different local districts offer a variety of different baskets of public goods and tax rates, Tiebout (1956) sustains that citizens can adequately satisfy their preferences simply by moving to the district that offers their preferred bundle of public goods and tax rates. From this choice process, it is evident how Tiebout (1956) proposes that the empowerment of local governments would augment the perceived quality of governance. However, his theory goes beyond this first point, by arguing that fiscal decentralization is able to enhance efficiency as well (Tiebout, 1956). In fact, assuming a hypothetical "optimal district size" which would maximize the economies of scales involved in the provision of public goods, districts would have an incentive to compete for citizens. This competition would force local governments to drive down their tax rates to their minimum to attract citizens, and thus improve the efficiency of their governance. The Tiebout's model relies on multiple assumptions, some of which are problematic. Although it appears plausible that economies of scales are involved in providing public goods, thus generating an optimal size of district, the model assumes as well that citizens have no cost involved in moving from one district to another. This assumption might be more plausible in some countries, but in general it seems problematic.

The second main theoretical argument found in the literature that theorizes a positive relationship between fiscal decentralization and governance has been proposed by Oates (1972). In his first formulation of the theorem, Oates (1972) proposes that public goods should be

provided at a decentralized level in the case that these goods do not provide spill-over effects on other local governments (Oates, 1972). The reason for such a proposition is that central governments fail to differentiate their policy among different districts, whereas local governments have an advantage in doing so. Oates (1999) proposes two reasons for such a different behavior. The first one concerns information asymmetries: local governments are more able to get information about local districts' preferences, since they are physically closer to the their citizens. Therefore, they are capable to act in accordance to these preferences. Secondly, central governments fail to treat districts differently because of political constraints, as there are political pressures that make it unacceptable for central governments to provide higher quality of public services in some districts with respect to others. The theory of Oates (1972) does not establish an unambiguous relationship between governance and decentralization. In fact, the positive effects of decentralization strictly depend on the amount of public services that does not have a spill over effect on other districts, and on the degree of the difference in preferences between districts. Thus, this relationship might be very different from country to country.

Besides these two main theories, Porcelli (2009) identifies a more recent stream of theoretical literature that focuses on how a higher fiscal decentralization positively affects governance by enhancing the electoral accountability of politicians. Whereas the theories of Oates (1972) and Tiebout (1956) assumed local officers to aim at maximizing the citizens' welfare, this stream of literature conceptualizes politicians as facing a principal-agent problem, where the electorate does not observe directly the true nature and effort of the politicians, which in turn aims at maximizing his own welfare (Porcelli, 2009). In this context, a higher fiscal decentralization would stimulate better governance through two main mechanisms. First, the tax competition among local governments in order to attract the tax base would force politicians to be more efficient and to divert their rent extraction towards the provision of public goods (Besley and Smart, 2007). Second, with a fiscally decentralized state it would be possible for citizens to compare the quality of governance of their district to the one of other local governments (Besley and Smart, 2007). This would allow citizens to have a better parameter of the performance of their incumbent, rendering the electorate better at punishing inefficient politicians (Besley and Smart, 2007). Although these two effects have some similarity with Tiebout's theory, they do not require perfect mobility of citizens as an assumption, but they focus on the electoral punishment of bad politicians. Persson and Tabellini (2000) and Inman and Rubinfeld (1997) propose other

reasons that identify the electoral punishment as the channel through which a higher decentralization improves governance. According to Persson and Tabellini (2000), under a decentralized regime politicians have tasks that have an impact to a single jurisdiction, whereas in centralized systems politicians' impact spreads over multiple jurisdictions. Therefore, in centralized states the quality of the work of the politicians is more difficult to observe by the citizens. This would make politicians in decentralized systems more accountable. Finally, Inman and Rubinfeld (1997) note that the level of decentralization may improve political participation. Ideally, as the responsibilities of local governments increase, also the benefits of electing better politicians do. Thus, a higher decentralization would improve the quality of elected politicians, and hence governance, through more informed and committed electors.

To sum up, past theoretical work show several processes through which a higher fiscal decentralization can actually improve governmental quality. Still, these theories do not agree in the mechanisms involved in such a relationship, and they do not agree on the magnitude of such a relationship either. Moreover, some models employ assumptions that are questionable in their validity. However, the literature stresses the importance that both decentralized taxes and government expenditures have in improving governance, through competition among districts, electoral punishment of inefficient politicians, and better information of politicians. Therefore, it seems relevant to test the following two hypotheses:

H1: "*there is a positive relationship between decentralization of taxes and quality of the governance*"

H2: "*there is a positive relationship between decentralization of government expenses and quality of the governance*"

Literature Review

The body of the empirical literature regarding the relationship between fiscal decentralization and the quality of governance is formed by a relatively small amount of studies, which do not provide a consensus on the topic. Moreover, these studies are different in their choice of operational definition of governmental quality, with specific studies focusing on corruption, and others proposing a multifaceted vision of governance.

The first of these empirical works is relatively recent. Huther and Shah (1998) find a positive correlation between the level of decentralization in government expenditures and different aspects of quality of governance, including economic stability and performance and the respect of political rights. However, this study can be seen as preliminary and rudimental, as it does not control for other determinants of governmental quality but only draws simple correlations (De Mello & Barenstein, 2001). Fisman and Gatti (2000) find a higher fiscal decentralization to be linked to lower levels of corruption. In their cross-country study, they employ a limited set of control variables, and still omitted variable biases can be present. Another study that focuses on the effects of decentralization on corruption is made by Arikan (2004). In his cross-country analysis, several concepts of decentralization are tested, but the decentralization of government expenditures is not found significantly related to corruption (Arikan, 2004).

Treisman (2000a; 2000b) produced different studies on the topic. However, his works differ with respect to the other researches as they focus on political decentralization, and not on fiscal decentralization. Nevertheless, it is worth to note that through the use of cross-country analyses he empirically found that politically decentralized governments are worse in fighting corruption and providing public services than centralized ones (Treisman, 2000a; Treisman, 2000b).

De Mello and Barenstein (2001) produced the first work that studies the effect of fiscal decentralization on different aspects of governance in a thorough fashion. Using both corruption and the World Bank Governance Indicators as proxies for governance in a cross-country analysis, they find a nonlinear positive effect of decentralization of government expenditures on governance (De Mello & Barenstein, 2001). However, they find that this positive effect exists only when those subnational expenditures are financed through the use of intergovernmental grants, and not subnational taxes (De Mello & Barenstein, 2001). The same dynamic is found in a following study by De Mello (2004): he finds that decentralized expenditures have a positive effect on social capital, measured through surveys questioning citizen's confidence in government and civic engagement (De Mello, 2004). However, this positive effect is again significant only when subnational expenditures are financed through non-tax revenues (De Mello, 2004).

More recent studies use panel analysis as preferred methodology, given the increased availability of data. Among these, Enikolopov and Zhuravskaya (2007) find that fiscal decentralization, both

for tax revenue and for government expenditure, has a positive effect on corruption and on the provision of public services. However, this effect depends on the relative strength of national parties: the reason seems to be that local politicians act in an optimal way when they have strong incentives linked to national politics (Enikolopov & Zhuravskaya, 2007). Another interesting study has been performed by Kyriacou and Roca-Segales (2014): using a panel dataset of OECD countries, they find that fiscal decentralization is significant in improving the quality of governance, measured by the World Bank Governance Indicators. Again, this positive effect is significantly affected by the presence of political elections: in the years without elections, there is not such an effect. This study is particularly important as it confirms the theory that decentralization helps governance by stimulating political competition. On the other hand, it limits the beneficial effect of such a competition only to election years. Another recent study, which made use of panel data, has been performed by Adam, Delis and Kammas (2014). Their study is unprecedented as they operationalize governmental quality as the efficiency in the provision of public services: what they find is that there is an inverse U-shaped relationship between decentralization and the efficiency of the provision of public services (Adam et al., 2014).

To sum up, there is little consensus regarding the empirical relationship between fiscal decentralization and the quality of governance. The first studies on the topic had to cope with a limited amount of data. Therefore, they relied on methodologies that do not protect their studies from the issue of omitted variable biases. Moreover, the total body of literature significantly differs with their operational definition of the quality of governance, and some of them even on the operational definition of fiscal decentralization. Given these issues, it is not a surprise that these different studies have contradictory results. In general, it seems that a positive relationship between the decentralization of governmental expenses and governance has been found. However, this relationship is heavily affected by the arrangement of other political institutions besides the level of fiscal decentralization. Moreover, it is not clear the shape of such a relationship. On the other hand, few conclusions can be drawn regarding the effect that the decentralization of tax revenues has on governance, even if some studies suggest this relationship to be negative.

Data

This section presents the data used for the research. The analysis will make use of data at national level. First, the main variables that are used as indicators of fiscal decentralization will be presented, followed by a description of all the variables used to describe the quality and the efficiency of governance. This will be followed by a brief exposition of the control variables employed in the research. Finally, a preliminary analysis of the data will be presented.

Fiscal Decentralization Indicators

As it was briefly highlighted in the theoretical framework, the concept of fiscal decentralization inherently requires the use of two different measures. Fiscal decentralization can be conceptualized as the situation where local and regional governments are assigned fiscal funding's and fiscal budgeting's responsibilities (Akai, 2013). Thus, given that the main fiscal duties of government entail the twofold task of raising and spending money, in order to define successfully the concept of fiscal decentralization two measures are needed: the decentralization in tax levying and the decentralization in government spending. This approach has been widely used in the past literature, where two main indicators are employed for the two different tasks. Past research typically identifies the level of fiscal decentralization with the percentage of taxes or expenditures which are raised or spent by local governments with respect of the total amount of taxes or government expenditures in a given country (Akai, 2013).

These data are available in two databases: the Government Financial Statistics (GFS) database produced by the IMF, and the Financial Decentralization Database (FDD) published by the OECD. The use of each of these databases entails a trade-off: the GFS presents data for a larger and diverse set of countries, whereas the FDD contains data only for OECD countries. Therefore, the sole use of the FDD would significantly diminish the external validity of the study. On the other hand, the FDD contains more detailed data than the GFS, with the important implication of allowing for a creation of a more precise indicator. Considering the unique advantages provided by the adoption of each of the two databases, both the databases are used in the analysis.

Tax Autonomy Indicator

With the use of the data from the GFS, it is possible to build an indicator of the decentralization of taxes in a simple and straightforward fashion. In fact, the GFS presents its data distinguishing

between the different levels of government. In this way, the indicator of the decentralization of taxes can be computed by dividing the amount of taxes collected at non-central level by the total amount of taxes, both expressed as a percentage of GDP. Therefore, this ratio will assume a value between 0 and 1 and it will be used as the first indicator of the decentralization of taxes. These data are available for an extended set of 70 countries for selected years. This set of countries seems to be diverse and heterogeneous, as it includes countries with different degree of development such as US and Norway with respect to Congo and Cabo Verde (Appendix A). The database presents yearly observations. Thus, it has a panel form. However, this panel set is extremely unbalanced, with most of the countries having few observations available and only for the most recent years. This problem applies especially to underdeveloped countries. As a result, the use of a panel analysis would require the exclusion of a significant number of countries from the sample. However, this would severely conflict with the reason for which this specific database is used in this study, which is to extend the external validity of the study through the inclusion of a wider range of countries. Therefore, a panel analysis can hardly be applied to this dataset. Therefore, the fiscal decentralization for taxes will be computed only for 70 countries for the year 2013, taking the average value of the precedent 5 years.

Moreover, the GFS database has another crucial limitation. In fact, it does not provide any information on the actual autonomy that local governments have on the taxes that they collect. This is extremely problematic, as the indicator using GFS data does not take into account the fact that some taxes might be collected by local government, but levied by a decision of the central government (Blochlinger, 2013). In this case, such a tax can hardly be described as decentralized, as local authorities do not have actual autonomy over them. Moreover, most of the theories that advocate for fiscal decentralization envision local government's autonomy as the crucial element towards better governance, as local officers are thought to make a better use of resources only if given freedom to do so (Blochlinger, 2013). Therefore, the sole use of the GFS database has a severe limitation for the scope of our analysis.

In order to overcome this, the OECD created an indicator of tax autonomy, which provides specific details on the levying of taxes for different local governments in OECD countries (Blochlinger, 2013). This indicator has been used in past research to build a better indicator of fiscal decentralization, by including only taxes for which local governments had complete

discretion (Stegarescu, 2005). In fact, the tax autonomy indicator classifies the share of taxes collected by local governments in different categories, named from A to F, depending on which governmental body sets the specific tax (Appendix B). A tax of category A is considered as a tax which is set solely through the authority of local governments, whereas a tax of category F is described as being levied directly by the central government. The categories in between represent taxes whose levying entailed different degrees of decision power of the local governments. Using this specific classification, and the rest of the data present in in the FDD, it is possible to build a more precise indicator for the decentralization of taxes: the share of taxes collected at sub-central level over total taxes has to be multiplied for the share of those local taxes for which local governments are actually autonomous. In order to be consistent with past research on the topic (Stegarescu, 2005), only taxes of categories A, B and C are considered autonomous and used for the computation of the indicator. A special case is constituted by the tax sharing agreements (category D). These special taxes are levied through an agreement between central and local government, and there is some discordance in the literature whether they should be considered autonomous (Kim, 2013). However, in order to be more conservative, in this study tax sharing agreements are not considered as "autonomous taxes".

The problem with the use of such an indicator for fiscal decentralization is that data are available only for selected countries and for selected years. In fact, data are available only for years 2002, 2005, 2008 and 2011. However, even if there are missing years in the dataset, the gap between the observations is constant. Therefore, it is still possible to do a panel analysis. Moreover, in order to create a balanced panel, only 34 countries are included in the dataset, mostly highly developed and European (Appendix A). Therefore, the external validity of the analysis using these data is limited to developed countries. The total number of observations is 136.

Government Expenditure Indicator

In order to build an indicator for the decentralization of government expenditures, in past research the standard approach was to compute the ratio of the expenditures of local governments over total government expenditure. The GFS database provides the necessary data to compute such an indicator. Similarly to the indicator for the decentralization of taxes, the use of this indicator provides the advantage that data are available for a heavy unbalanced panel of 70 countries of heterogeneous development and geographic disposition (Appendix A). On the

other hand, the unbalanced nature of the panel renders difficult the use of a panel analysis. Therefore, this variable will be collected and used in a similar way to the GFS' decentralization of taxes.

Moreover, this operational definition of the concept of decentralization of expenditures neglects the fact that often resources are assigned to local governments from central government through grants that are earmarked for specific uses (Lotz, 2013). The use of intergovernmental grants is very common in modern states, because local governments are generally assigned significantly lower responsibilities in tax collecting than in government spending (Lotz, 2013). This imbalance is usually offset through the use of intergovernmental grants, which transfer money from the balance sheet of central governments to the one of local governments (Lotz, 2013). Intergovernmental grants are usually a significant source of financing for local governments, as they amount to almost a quarter of total tax revenues on average in OECD countries (Lotz, 2013). For some local governments, they are the only source of money. However, the use of such instruments in order to finance local expenditure may severely hamper local government's discretion in spending the received money, as these grants can be earmarked and directed to specific uses at central government's will (Lotz, 2013). As the discretion of local authorities is crucial for the theories of decentralization, it is extremely important to find data that might help to cope with such a limitation.

The only source that provides data on the amount of earmarked intergovernmental grants is the OECD's Fiscal Decentralization Database. In fact, along with data on local governments' expenditure and intergovernmental grants, also data regarding the share of earmarked grants is present. Thus, it is possible to compute an indicator of the amount of earmarked grants, by multiplying the share of earmarked intergovernmental grants over the total amount of intergovernmental grants.

The inclusion of such a variable in the analysis as a control variable for the indicator of the decentralization of government expenditures is crucial. Moreover, it constitutes a novelty in the empirical literature on the topic. Probably, these data were not used in the past as they are available only for a very tiny set of countries, which are mainly European and developed countries. Moreover, the data are available only for a short time span, from 2000 to 2010, and missing data are present. The largest balanced panel dataset that is possible to use would include

only 11 countries, with data available from 2002 to 2010. Thus, the external validity of such an analysis is significantly limited and sample selection bias is a serious threat. Nevertheless, the inclusion of a model with such a control variable is important, as it might shed a different light on the effect of decentralization in spending towards governance. Moreover, it constitutes a technical advancement in the literature and it answers some critics of past research on the topic (Lotz, 2013). Moreover, the panel nature of the dataset still produces a discrete number of observations, for which the analysis can still be valuable. However, it has to be acknowledged that the number of countries for which the specific data on grant are available is particular small. Therefore this part of the study has to be seen mostly as a preliminary step towards better models trying to capture the effects of fiscal decentralization.

Quality of Governance

This research will use multiple operational definitions of different measures of the quality of governance. The reason for this choice is that the quality of governance is a multifaceted concept which gives rise to multiple interpretations. Therefore, the paper tries to address the most important interpretations of the concept that have been used in past research. Three different approaches to quantify such a concept are explored and used in this study. The first approach involves the use of a quantitative measure of six different aspects of governance that are provided by the World Bank through special surveys. The second approach follows the work on decentralization by Treisman (2000b). In his work, Treisman (2000b) considers the quality of governance to be high if it stimulates good societal outcomes. Thus, good governance will be measured by looking at the results of government in providing societal goods such as education and health. Finally, the third approach focuses on the efficiency in provision rather than on outcomes. Following the work of Adam, Delis and Kammas (2014: in addition to the provision of the public goods, also the amount of resources used by the government will be considered.

World's Bank Government Indicators

The first and main operational definition of the quality of governance that will be used in this study is the World Bank's Governance Indicators (WBGI), which are yearly produced by researchers Kraay and Kaufmann and standardly used in research regarding the quality of

governance (Kaufmann et al., 2010). One of the main advantages of such indicators is that they provide a multifaceted and comprehensive view of the task of governance.

The WBGIs judge the value of a country's governance along six different dimensions. Three of these dimensions refer to the ability of a government to conduct his affairs fairly with respect to the laws. These dimensions measure respectively the perceived level of corruption, of political violence and stability, and of confidence and quality in the law and the judicial system (Kaufmann et al., 2010). Moreover, the WBGIs report data on the quality of the regulations (Kaufmann et al., 2010). The fifth dimension is named "Voice and Accountability", and it quantifies the perception of the ability of people to select their own government and voice their rights, considering as well freedom of expression and of association (Kaufmann et al., 2010). Finally, the WBGIs also provide quantitative data on the perceived quality of the public services (Kaufmann et al., 2010).

The scores given to these six dimensions are estimated through the aggregation of more than 30 data reports, which attempt to describe the views and the perceptions of different actors of civil societies, such as citizens, entrepreneurs, NGOs and public sector experts. From these sources, a normalized score is given regarding the six dimensions, ranging from 2.5 to -2.5, with 0 as the median value and 1 as standard deviation. It is important to note that WBGIs provide data for multiple countries for a discrete time span. In fact, these indicators of governance have been published yearly since 1996, and the scores are available for all the countries present in the decentralization datasets.

To conclude, the WBGIs are deemed as a suitable and optimal proxy for the quality of governance in this research, both for the availability of data and for the breadth of his conceptualization. This is also confirmed by the fact that the WBGIs have been used extensively in the research and as well in past literature on fiscal decentralization (Porcelli, 2009).

Treisman's Outcome Approach

In order to provide a more comprehensive analysis, this research will make use of an alternative operational definition of quality of governance, which takes inspiration from the work of Treisman (2000b) and his research on the effects of political decentralization on governance. In his work, Treisman (2000b) focuses on societal outcomes as the main tool to analyze the quality

of governance. The intuition is simple: good governments have ultimately positive effects on their countries. The main issue for this approach is constituted by the choice of the "outcomes" which are seen as effects of good governance.

Treisman (2000b) overcomes this issue by selecting the aspects to be considered according to one principle: the value of these "outcomes" has to be acknowledged as valuable universally, independently of political, religious or ideological belief. Using these criteria, the study partially avoids making a normative judgment on what governments should do, and it keeps its normative status. Using this condition, Treisman (2000b) identifies three areas that constitute the results of good governance: health, education and infrastructures.

In this research this approach is followed, trying to quantify the governmental quality using data on these domains. However, in this work other operational measures will be used for these concepts. The reason for this is that the proxies used by Treisman (2000b) were particularly suitable to describe developing countries, whereas our sample is more varied, and in some case it includes only developed ones. Therefore, the use of Treisman's chosen variables would lose informative power in this context. Moreover, this study will not include data on the quality of infrastructures, as the proxy that Treisman used (the length of the road network) is not available to us, and no close substitute was found.

The proxy chosen for health is life expectancy at birth for the total population, with data retrieved from the World Bank and available for the entire dataset. The identification of a suitable operational definition proved to be more difficult for education. Treisman's use of the net enrolment rate in primary education is rather uninformative in developed countries. Therefore, in this study the gross enrolment rate in tertiary education is considered. However, the use of this variable alone has the limitation that it neglects the relative quality of the tertiary education provided, focusing only on the quantity. In order to overcome this issue, it has been computed a ranking of the countries with respect to the quality of their universities and applied to the enrolment rates. The precise way of this procedure is indicated in Appendix D.

Governance efficiency

This study applies a third and final conceptualization of the quality of governance, which has been found in past literature regarding the effects of decentralization on governance and which

can be seen as an expansion of Treisman's approach. In their study, Adam, Delis and Kammas (2014) argue that the levels of fiscal decentralization have an impact not on the quality of governance, but on the efficiency of the public goods it provides. This idea expands Treisman's (2000b) approach by considering not only the outcomes, but as well the amount of resources needed to achieve those outcomes. A conceptual advantage of this approach is that it completely neglects any normative stance on the government's role, but it simply judges the efficiency with which it provides public services.

In their study, the efficiency of the public sector is computed with a relatively new estimation procedure, Data Envelopment Analysis (DEA). From a set of inputs and outputs, this linear programming technique, often used in management studies, estimates a convex production frontier from a pool of observations. The most efficient governments will be on the frontier, and the distance from such a frontier will be used to calculate an efficiency score. The main advantage in the use of such a technique is that it does not require the assumption of a production function, but it directly estimates one from the observations. On the other hand, the standard DEA needs some modification in order to adapt to this object of study. Specifically, the DEA analysis has to be made with the assumption for variable returns to scales across the observations, because of countries' different size, development and financial constraints (Corelli, 2005).

This research will use the same public goods considered by Adam, Delis and Kammas (2014)' in their research. The reason is that they analyze the impact of government spending only on education and health, in a consistent way to Treisman's approach. This agreement confirms the importance and the validity of using these two dimensions as the ones for which governmental quality can have an impact. For the analysis regarding health, this study adheres strictly to the measures employed by Adams, Delis and Kammas (2014): the level of public health expenditure as a percentage of GDP is used as an input, whereas the output considered is the inverse of the mortality rate during infancy. Moreover, the public health expenditure is corrected in order to take into account the impact of private health expenditure, by multiplying it for the share of public to total health expenditure. In order to estimate the efficiency scores for education, the government spending on education is used as input, whereas the enrolment rate in tertiary education, corrected for quality, as computed in the precedent section, is used as output. The

entire set of data needed for the computation of the efficiency scores is retrieved from the World Bank Databank. The data for health are available for the entire dataset. On the other hand, there is a number of missing countries and observations for the data on education, as the percentage of government expenditure devoted to education was not available for each of the countries studied.

Control Variables

In order to correctly identify the causal effect of decentralization on the quality of governance, several control variables will be included in the model. The first two of these, which are standardly used in the literature on this topic, are the GDP per capita and the size of the population. The reason for the inclusion of such variables is that the GDP per capita has been linked to decentralization in different researches, whereas it seems plausible that countries with more people are more likely to be more decentralized. Moreover, other variables that try to describe the amount of population and its distribution have been included, as they intuitively affect the degree of decentralization and might be linked as well to the quality of governance. These are population density and the percentage of urban population. All these variables have been retrieved from the World Bank, and they are available for all the dataset.

Another set of control variables that has been included tries to quantify the degree of fractionalization in a country. Linguistic, religious and ethnic fractionalizations are theoretically linked with the level of decentralization, and they might have an impact on the quality of governance as well. For this reason, they are standardly used in the literature on the topic as control variables. These data have been produced in a study of 2003, and they do not contain yearly observations and might seem outdated (Alesina et al., 2003). However, as fractionalization can be seen as a relatively constant state, it will be still included in the study, but not used for the panel analysis.

Another important control variable included in the study is the level of political decentralization. There are several difficulties in providing a quantitative measure of such an aleatory concept. As it is proposed by Schneider (2003:39), “decentralized political systems are those in which political actors and issues are significant at the local level and are at least partially independent from those at the national level”. A simple operational definition of this concept would be to observe if local officers are locally elected or appointed by parties (Schneider, 2003). Such data are provided by the database of Political Institutions by the World Bank. The data provided are

two dummy variables that indicate if regional and municipal political officers are elected or appointed, referring only to year 2012.

Other control variables that have been used in past studies on the same topic have been employed as well, such as the size of government, as estimated by the Economic Freedom Indicator published by the Fraser Institute. This measure for the size of government has the advantage to be linked with the dynamics through which size affects governance, as the indicator tries to "indicate the extent to which countries rely on the political process to allocate resources and goods and services" (Gwartney et al., 2015:16). An additional control variable adopted in the study is the openness to trade of a country, measured as the level of trade in percentage of GDP. This last variable has been included in other studies, and it is retrieved from the World Bank. To conclude, it is included as a control variable the colonial past of the country, in the form of a dummy variable that assumes value 1 if the country was indeed colonized in the past. Each of these control variables is available for all the dataset

Preliminary Analysis

In this section, a preliminary analysis of the data is conducted. First of all, it will be checked if the cross-country and the panel dataset are effectively different. Secondly, the consistency of the output from the DEA analysis will be evaluated. Finally, through the use of scatterplots, it will be evaluated the exclusion of possible outliers.

Regarding the first point, Table 1 presents the mean values of the World Bank Indicators for the two main datasets: the cross-country dataset and the panel dataset (more specifically, the one used for tax decentralization, as it is more extended). The aim of this table is to compare the median values, in order to evaluate if the two dataset actually represent two different typologies of countries, with the panel dataset representing only developed countries and the cross-country one representing a more balanced set of countries. The WBGI indicators are built in such a way that the median country receives a score of 0. Thus, by comparing the median values of the two different datasets for the six dimension of governance, it will be possible to check if the two datasets are actually different.

Table 1: Median values of the two datasets

WBGI dimension	Median value panel set (taxes)	Median Value cross-country
Control corruption	1.42715	.2642584
Governm. Effectiv.	1.51692	.5265121
Political Stab.	.9381015	.3136716
Rule of Law	1.378982	.4720199
Regulat. Qual.	1.384059	.6431205
Voice and Accountability	1.275087	.4523994

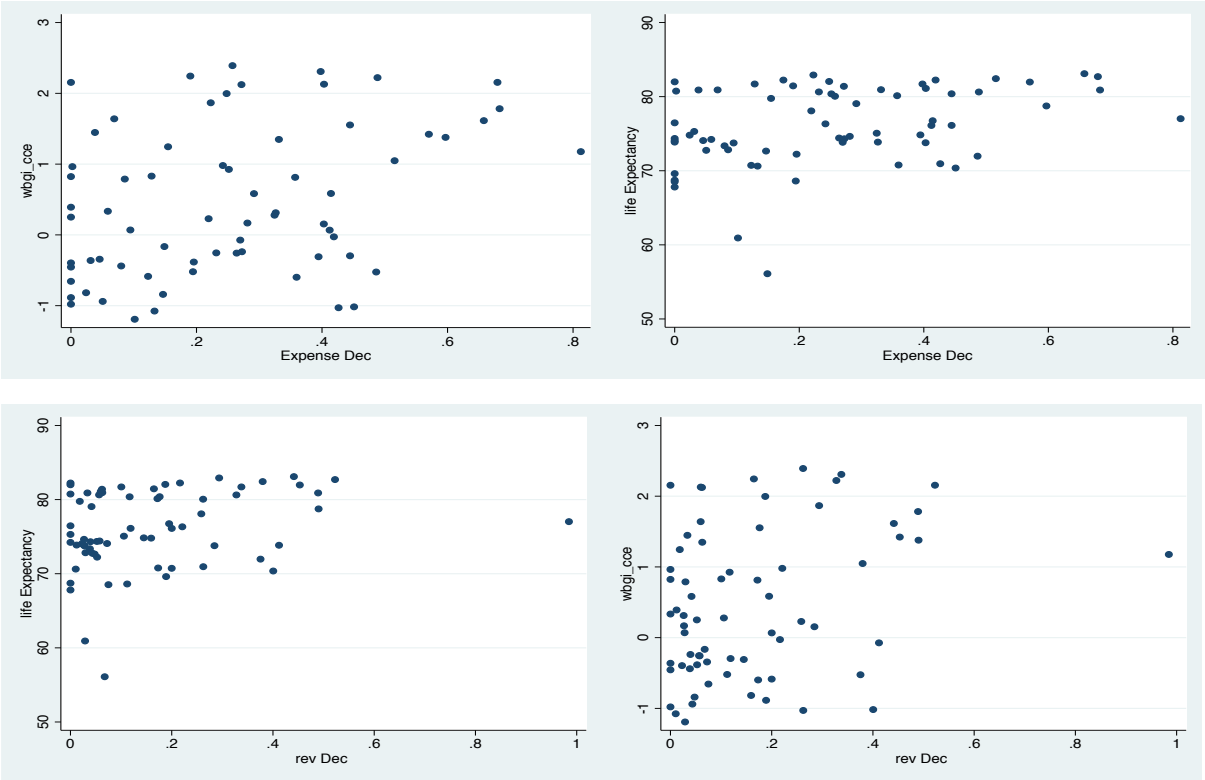
At first glance, it is evident how the median scores between the two dataset are consistently different in the expected direction: the scores for the cross-country dataset are always lower than the ones of the panel dataset. The maximum difference between the two scores is for corruption, and the lowest is for political stability. Moreover, the difference for government effectiveness is high as well. This is important as government effectiveness relates with the quality of public services, a concept of quality of governance that is also applied in the other operational definitions of governance. To conclude, these differences give strong evidence for the two datasets being different, even if the cross-country dataset still includes more developed that underdeveloped countries.

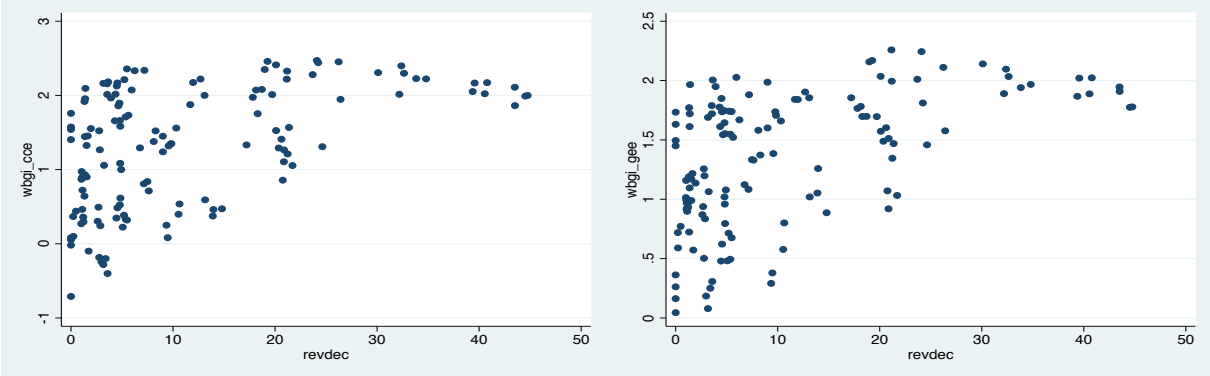
Table 2: Correlogram alternative measures of governance

	WBGI-gov effectiveness	Inverse mortality	Health Efficiency	Education Score	Education Efficiency
WBGI_ge	1.0000				
Life Expectancy	0.7721	1.0000			
Health Eff	0.5758	0.5906	1.0000		
Edu Score	0.7119	0.6470	0.6027	1.0000	
Edu Eff	0.5313	0.5573	0.4837	0.8700	1.0000

Regarding the second point, Table 2 shows the degree of correlation between the DEA indicators, the public service output indicators and the World Bank's government effectiveness indicator. The DEA and the governance output indicators will be considered consistent if the scores are positively correlated with governance effectiveness, which is the dimension of

governance by World Bank, which actually measures the quality of public services provided. Table 2 shows that the two output indicators are highly correlated with governance effectiveness, namely 0.77 for life expectancy and 0.71 for education score. Of course, the correlation is not superior because these variables aim at measuring different concepts, with government effectiveness aiming at measuring the whole set of the services provided by the government, whereas the other two aimed at measuring only certain aspects selected through the approach by Treisman (2000b). The correlation between governance effectiveness and the DEA's results are lower, just north of 0.5. This is expected as these concepts are rather different. Still, it is a good indication that there is a strong positive correlation, giving evidence that the estimated values of the DEA have some logic behind.





Finally, the two-way graphs shown in Table 3 can provide some insights regarding possible outliers and functional forms to be applied in the analysis. The first four graphs represent the relationship between two forms of quality of governance (corruption and life expectancy), and respectively, the decentralization in taxes and in expenses for the cross-country data set. At first glance, it is not noticeable any significant trend and functional form to be applied. On the other hand, it is noticeable the presence of an outlier for both decentralization in taxes and expenditures, which takes a value north of 0.9 for tax decentralization and of 0.8 in decentralization in expenditures. This observation is United Arab Emirates, and the peculiar characteristics of this country, along with its extreme values, give legitimate reasons to exclude it from the formal analysis. Regarding the panel data set, it is not noticeable any outlier at first sight. Moreover, the panel nature of the dataset does not allow for any inference regarding the functional form from such a bi-dimensional representation.

Methodology

This section will be devoted to the presentation of the methodology used for the study. As it was evidenced in the data section, the limited availability of the data regarding fiscal decentralization requires the use of different methodologies of analysis. For the dataset collected from the GFS, which has the advantage of disposing data for a considerable amount of countries, a simple cross-country analysis will be carried out, as the dataset is extremely unbalanced. On the other hand, the data retrieved from the OECD's Fiscal Decentralization Database is more balanced, making a panel analysis possible. This is of great importance for the validity of the research, as the panel analysis allows for the control of country specific aspects that might affect the

relationship. Thus, the risks of omitted variable biases are a lower, limiting a serious threat in this typology of research.

Cross-country analysis

For the cross-country analysis, two main typologies of model will be estimated: one having as main independent variable of interest the decentralization of taxes, the other having instead the decentralization of expenses. The values used for the independent variables will be the average values of the 5 years before 2012, as it was done in precedent studies (Fisher and Gatti, 2000). The main idea is that past values of fiscal decentralization might contain information on the quality of governance, as its impact might not be immediate. For each of these two independent variables, several models will be estimated using the entire set of proxies for the quality of governance as dependent variables. The models will include the whole set of control variables which was presented in the data section.

Different typologies of model will be estimated with respect to the functional forms employed, given that the past literature and the theoretical framework highlighted how the shape of the relationship between governance and decentralization is controversial. Thus, both logarithmic and polynomial transformation will be applied to the model. The analysis will be carried out with a simple OLS regression. However, the model will control for possible heteroskedasticity of the error terms, by applying White standard errors. For the inference testing, a level of 5% of significance will be used.

Therefore, the estimated model for the cross-section analysis will be:

$$\begin{aligned}\boldsymbol{Quality\ of\ Governance\ Indicator} &= \boldsymbol{\beta_0} + \boldsymbol{\beta_1} * \boldsymbol{Decentraliz.Tax\ or\ Expen.} + \boldsymbol{\beta_2}(\boldsymbol{GDPperCapita}) \\ &+ \boldsymbol{\beta_3 PopulationSize_t} + \boldsymbol{\beta_4 PopDensity} + \boldsymbol{\beta_5}\%\boldsymbol{UrbanPop} \\ &+ \boldsymbol{\beta_6 SizeofGovernment} + \boldsymbol{\beta_8 Trade} + \boldsymbol{\beta_9 Colony} \\ &+ \boldsymbol{\beta_{10} MunicipalElect} + \boldsymbol{\beta_{11} RegionalElect} + \boldsymbol{\beta_{12} LinguisticFrac} \\ &+ \boldsymbol{\beta_{13} EthnicFrag} + \boldsymbol{\beta_{14} ReligFrac} + \boldsymbol{u_t}\end{aligned}$$

Panel analysis

A different methodology will be used for the analysis that employs the data from the OECD dataset. The reason is that the data collected from the OECD are heavily balanced, in the sense that there is not missing information among the countries and the years in the sample. Therefore, it is possible to perform a panel analysis. Specifically, the relationship between governance and decentralization will be estimated through the use of a fixed effects model. This typology of analysis is particularly useful, as it manages to exploit for the estimation not only the variation among countries, but also the variation among the different observations of the same country in the dataset. As a result of this methodology, the fixed effect model is able to control for country specific and time invariant omitted variables, such as cultural or institutional characteristics. Moreover, the fixed effect model is able to control for time-varying influences that affect in a uniform fashion the countries in the sample, such as the technologic development. Given these important characteristics, fixed effect models are considered as a particularly suitable methodology. In fact, fixed effect models severely limit the risk of OVB.

The same typologies of models of the cross-country analysis will be estimated using the OECD data, combining the whole set of proxies for quality of governance with the two different measures of fiscal decentralization. On the other hand, these estimated models will not include part of the control variables employed in the cross-country analysis. Specifically, dummy variables on political decentralization, on the different fractionalizations and on colonial past will not be included. In fact, the data available for these variables is not time-varying and therefore the effect of these variables is already controlled by the fixed effect model. Still, the other control variables used for the cross-country analysis will be included. In addition to this, the models that test the effect of the decentralization of expenses will also include the amount of earmarked grants as a control variable.

Furthermore, in a consistent way to the cross-section analysis, different functional forms of the possible relationship will be tested, employing both polynomial and logarithmic transformations. The models will make use of heteroskedasticity-robust standard errors. For inference testing a significance level of 5 percent will be used. To sum up, the estimated models will take the following form:

$$\boldsymbol{Quality\ of\ Governance\ Indicator_{i,t}}$$
$$= \boldsymbol{\alpha + C_i + C_t + \beta_1 * Decentraliz.Tax\ or\ Expen_{i,t}}$$
$$+ \boldsymbol{\beta_2 GDPperCapita_{i,t} + \beta_3 PopulationSize_{i,t} + \beta_4 PopDensity_{i,t}}$$
$$+ \boldsymbol{\beta_5 \%UrbanPop_{i,t} + \beta_6 SizeofGovernment_{i,t} + \beta_7 Trade_{i,t} + u_{i,t}}$$

Results

In this section, the results obtained through the estimation of the models will be presented. The tables, which present the estimated outputs of the regressions, are situated in the appendix C. In general, the results show that the relationship between the decentralization in tax revenue and in government expenditures and the quality of governance is not significant. These results are consistent through the different methodologies of analysis employed, and they are generally robust among the different operational definitions of the concepts of interest. As it was highlighted in the precedent section, the models have been estimated for different functional forms, including the logarithmic and the polynomial ones. However, for the sake of parsimony, in the tables presenting the results only the most significant result among the different functional forms is provided.

In Appendix C, Table 1 and Table 2 show the output of the models analyzing the tax revenue decentralization for the cross-country analysis. When using the World Bank Governance Indicators as the indicator for governance (Table 1), the tax revenue decentralization is significant only against one of the six dimensions of governance: political stability (wbgi_pse). In this case the relationship is positive, meaning that a higher degree of decentralization leads to a more stable political environment. On the other hand, the degree of tax decentralization does not have a significant relationship with any of the remaining five dimensions of governance and with any of the other indicators of governance. Another important feature of the results is that each of the models have a high R-squared, between 0.71 and 0.83. Thus, through the use of a vast set of control variables, the models seem to be highly able to explain the variations in the quality of the governance among countries, diminishing the probability of problems of OVB. Finally, it is interesting to note the significance of the positive relationship between political

decentralization and governance: the dummy variable for municipal election is significant for four of the six dimensions of governance.

Tables 3 and 4 show the results for the cross-country analysis concerning the decentralization of government expenses. The results of these two tables are highly similar to the ones concerning decentralization in taxes. In fact, similarly to the results regarding tax decentralization, the main pattern is that the relationship between decentralization and governmental quality is not significant. Still, the estimated models show a relatively high r-squared, between 0.68 and 0.81. Moreover, it is interesting to note the significance of the positive effect of political decentralization on five of the six World Bank's dimensions of governance

The remaining tables show the results of the panel analysis. Table 5 and Table 6 show the results concerning the panel analysis for tax decentralization. This relationship is slightly more controversial than the ones found in the cross-country analysis. In fact, two of the six dimensions of governance are found to be negatively and significantly influenced by tax revenue decentralization, either in the normal or in the logarithmic form. These two dimensions are control of corruption (wbgi_cce) and voice and accountability (wbgi_vae). On the other hand, the indicators of public sector's output (wbgi_gee, life expectancy and education score) and efficiency are not found to be significant. The R-squared of the models seems relatively low with respect to the cross-country analysis.

The final two tables, 7 and 8, show the relationship estimated through the panel analysis between the decentralization in expenses and governance. Again, the results are univocally found to be not significant for each of the operational definitions of governance. The amount of non-earmarked grants is found to be positively associated with governance in two cases: education efficiency and regulatory quality (wbgi_rqe). The r-squared of the models are generally higher than those of the panel analysis of tax decentralization, possibly because of the inclusion of the variables for grants.

Discussion

The result section can be summarized by acknowledging that the results are generally not significant. This finding applies to each of the different operational definitions of governmental quality that have been proposed and it remains consistent along the different models employing

the different measures of fiscal decentralization. Only the level of tax decentralization, corrected with tax autonomy indicators, seems to be influencing some aspects of governance, although in a negative way. However, statistically insignificant results do not mean that the results are not significant from an economic point of view, as the study provides answers to some theoretical consideration and adds evidence to the empirical discussion. Thus, a discussion of what was found out in the analysis constitutes an important step of the study.

First of all, the finding that the degree of fiscal decentralization does not influence the quality of governance contradicts the theories proposed in the theoretical framework, which mainly championed for a positive relationship between the two. The main theoretical channels for such a relationship relied on the better information that decentralized governments are able to obtain regarding the citizen's preferences. Moreover, the competition for resources among districts and the enhanced political accountability would have disciplined politicians and motivated them toward the improvement of their efficiency. These channels do not seem to work as theorized. Reasons for such a behavior might be found in the sample of the countries studied (mostly developed) and the time horizon taken in consideration. It is possible that the modern information technology and the availability of data have diminished the asymmetry of information between the different level of government: preferences can be voiced more easily and the physical distance between electors and governments is no more as relevant as before. Another reason for the failure of Tiebout (1956)'s model might be found in the assumption of perfect mobility, which is unlikely to hold, especially in the time of economic crisis that has been analyzed. Oates (1972)' model can still explain the insignificant impact of decentralization on governance. In fact, it can be argued that the tasks of governmental policy involve many issues that have effects on large scale. Thus, they are more properly handled by central governments, as they internalize every relevant factor in their decisions. In a world that seems to tend towards more complexity and interdependency, this reasoning might have some logical foundation. Finally, the results give some evidence that the level of political accountability plays a significant role towards governmental quality, as it is shown by the positive significant effect of the presence of municipal elections on governance. However, it seems that fiscal decentralization simply is not enough to increase electoral accountability.

With its methodology, the study makes a valuable contribution to the present empirical literature on the topic in several ways. First of all, the study has the great merit to test a variety of definitions of quality of governance, with the purpose of unifying the different past works on the topic. In fact, the different operational definitions try to retrace in one study the most important approaches used in the past, in order to insert the study in the literature. Moreover, with regard to the cross-country analysis, the study adds to the present literature by proposing a study that uses modern data and employs a comprehensive set of control variables. The high explanatory power of the model provides evidence for the validity of the study. The results show a disagreement with Treisman's (2000a) study, which finds political decentralization to be able to stimulate corruption. In our study, the direction of the relationship is of opposite sign, and it encompasses different aspects of governance. However, such a result might derive from the different operational definitions of political decentralizations used in the two studies. With regard to the panel analysis, this study advances the study on fiscal decentralization by proposing alternative approaches for the operational definition of fiscal decentralization. Following the work of Stegarescu (2005), the tax decentralization indicator is corrected considering the level of tax autonomy of local governments. Regarding the decentralization of government expenses, the paper proposes the inclusion of the amount of earmarked grants as a control variable for the first time in the literature. Finally, the methodology, which employs panel analysis, tries to retrace recent studies that introduce this technique to this topic.

With its results, the study agrees with some of the papers in the literature. The paper confirms the studies of Arikan (2004), Enikolopov and Zhuravskaya (2007) and Kyriacou and Roca-Segales (2014), which do not find an independent effect of fiscal decentralization towards governance. Moreover, the partial finding from the panel analysis that the tax decentralization can be negatively linked to some aspects of governance can be seen as in accordance with the results of DeMello and Barenstein (2001), which find a positive effect on governance of the vertical imbalance (difference between own expenditures and own taxes) of local governments. On the other hand, the paper is in complete disagreement with the study of Adam, Delis and Kammas (2014), which find an U-shaped relationship between decentralization and efficiency. Moreover, it disagrees with the study of Fisman and Gatti (2000), that finds a negative relationship between fiscal decentralization and corruption.

Limitations

In this section, the limits of the validity of the study will be acknowledged. Among the different issues affecting the study, the one that severely threatens the value of the research regards the sample selection. In fact, the dataset includes a limited amount of countries, especially the panel analysis regarding decentralization of governmental expenses. As it was specified in the data section, the results obtained from the panel analysis have to be interpreted with significant caution, and the external validity of that analysis is applicable only to developed countries. Specifically, it is important to restate that the panel analysis regarding the decentralization of expenses can be intended as a preliminary and pioneering approach to the topic, which makes use of specific but rare data. Thus, the result obtained should be taken as strongly limited, and only as an indication for future studies. On the other hand, the cross-country analysis contains a more balanced set of countries in the dataset, even if the data section showed how developed countries still constitute the majority of observations. Therefore, the external validity of that part of results seems more extended. To conclude, it has to be stressed that these limitations arise as the result of the lacking of specific data for fiscal decentralization, which is one of the main issue that research on the topic has to face (Blochlinger, 2013). Therefore, this study can be seen as a preliminary answer to the different exhortations in the literature towards the creation of better data on the topic, as the research has shown the importance of better operational definition for fiscal decentralization (Blochlinger, 2013; Akai, 2013).

Other issues can severely hamper the validity of the study. However, these problems are considered minor, and partially solved. One of the threats for the internal validity of the results is represented by the possibility of omitted variable biases. Regarding this point, the methodology of the panel analysis is considered as suitable to control for this issue, as the fixed-effects models employed are able to control for country specific and time variant effects. This diminishes significantly the possibility of OVBs. Regarding the cross-country analysis, the particularly high R-squared of these models suggests that the possibility of OVB is low. This result is obtained with the inclusion of a vast set of control variables in the models.

Finally, reverse causality is an important issue, which affects the few significant relationships that the study has found. In fact, there is the strong possibility that the quality of governance itself might influence some characteristics of political institutions. For future research, the easiest

approach to cope with such an issue would require the use of instrumental variables. Past research seems to have done that succesfully, using instrumental variables such as the heterogeneity of preferences among the population or country size. Still, given the few significant relationship found in our study, the issue of reverse causality is not addressed.

Conclusion

This study regarding fiscal decentralization tried to explore the impact that such an institutional arrangement has on the quality of governance. The paper tries to provide empirical evidence to a body of theoretical literature that argues for a positive impact of fiscal decentralization on the governmental quality of a country. Despite the presence of other empirical studies on the topic, the conflicting results found in this body of literature render this study still relevant.

The research tries to define the relationship between the decentralization of taxes and government expenses with the use of two different typologies of analysis. First of all, a cross-country analysis is carried out, with an extensive use of control variables in order to correctly identify the causal relationship. This analysis has the strong advantage to include to a vast set of countries, which differ for their degree of development. However, the data used in order to operationalize fiscal decentralization, standardly used in economic literature, do not fully capture the underlying theoretical concept of fiscal decentralization. In order to obviate to this issue, a panel analysis is carried out as well, using more detailed data that try to account for the degree of autonomy of local governments. For both the analyses, different operational definitions for the concept of quality of governance are employed.

The results show the relationship of interest to be insignificant. This finding has some validation with part of the present literature. However, the validity of such results could be questioned, considering the limited sample used in parts of the analysis. Therefore, the results should be considered with caution. Nevertheless, the strength of this study is that it can be seen as a preliminary and in some ways pioneering study, which tries to stimulate the academic debate regarding the operational definition of fiscal decentralization. Moreover, this contribution tries to stimulate the production of better data on fiscal decentralization, showing that this is needed for better studies regarding this specific institutional arrangement.

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APPENDIXES

APPENDIX A- DATASETS

DATASET	LIST OF COUNTRIES	Number of Countries	Years Available	Total Observations
Cross- Country Dataset	Australia Austria Azerbaijan Belarus Belgium Bhutan Bosnia and Herzegovina Brazil Bulgaria Cabo VerdeCongo Costa Rica Cyprus Czech Republic Denmark Egypt El Salvador Estonia Finland France Georgia Germany Greece Honduras Hungary Iceland Indonesia Iran Ireland Israel Italy Jamaica Japan Jordan Kazakhstan Latvia Lithuania Luxembourg Maldives Malta Mauritius Moldova Mongolia Morocco Netherlands Norway Paraguay Peru Poland Portugal Romania Russian Federation San Marino Serbia Seychelles Singapore Slovak Republic Slovenia South Africa Spain Sweden Switzerland Thailand Timor Leste Turkey Ukraine United Arab Emirates United Kingdom United States	70	2013	70
Tax Autonomy dataset	Australia Austria Belgium Canada Chile Czech Republic Denmark Estonia Finland France Germany Greece Hungary	34	2002, 2005, 2008, 2011	136

	Iceland Ireland Israel Italy Japan South Korea Luxembourg Mexico Netherlands New Zealand Norway Poland Portugal Slovak Republic Slovenia Spain Sweden Switzerland Turkey United Kingdom United States			
Intergovernmental grants dataset	Czech Republic Denmark Finland Hungary Luxembourg Mexico The Netherlands Norway Slovenia Spain Switzerland	11	2002 to 2010	99

APPENDIX B- Definition Tax Autonomy (source: Fiscal Decentralization Database)

Taxonomy of taxing power

a.1	- The recipient SCG sets the tax rate and any tax reliefs without needing to consult a higher level government.
a.2	- The recipient SCG sets the rate and any reliefs after consulting a higher level government.
b.1	- The recipient SCG sets the tax rate, and a higher level government does not set upper or lower limits on the rate chosen.
b.2	- The recipient SCG sets the tax rate, and a higher level government does sets upper and/or lower limits on the rate chosen. **c.1** The recipient SCG sets tax reliefs – but it sets tax allowances only.
c.2	- The recipient SCG sets tax reliefs – but it sets tax credits only.
c.3	- The recipient SCG sets tax reliefs – and it sets both tax allowances and tax credits.
d.1	- There is a tax-sharing arrangement in which the SCGs determine the revenue split.
d.2	- There is a tax-sharing arrangement in which the revenue split can be changed only with the consent of SCGs.
d.3	- There is a tax-sharing arrangement in which the revenue split is determined in legislation, and where it may be changed unilaterally by a higher level government, but less frequently than once a year.
d.4	- There is a tax-sharing arrangement in which the revenue split is determined annually by a higher level government.
e	- Other cases in which the central government sets the rate and base of the SCG tax.
f	- None of the above categories a, b, c, d or e applies

APPENDIX C- TABLES RESULTS

TABLE 1

	wbgi_cce	***wbgi_gee***	***wbgi_pse***	***wbgi_rle***	***wbgi_rqe***	***wbgi_vae***
Tax Rev. Dec.	*0.865*	*0.536*	*1.253*	*0.377*	*0.182*	*0.726*
	(1.38)	*(1.01)*	*(2.29)**	*(0.68)*	*(0.34)*	*(1.25)*
Intergov grants	*0.202*	*0.506*	*1.142*	*0.108*	*1.187*	*1.286*
	(0.29)	*(0.80)*	*(1.71)*	*(0.15)*	*(1.81)*	*(1.80)*
GDP per capita	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
	*(7.73)***	*(6.63)***	*(3.00)***	*(6.16)***	*(5.48)***	*(4.81)***
Population	*-0.003*	*-0.002*	*-0.002*	*-0.002*	*-0.002*	*-0.002*
	*(2.26)**	*(1.84)*	*(1.26)*	*(1.61)*	*(1.93)*	*(0.90)*
Pop. Density	*-0.000*	*0.000*	*-0.000*	*-0.000*	*-0.000*	*-0.000*
	(0.01)	*(0.36)*	*(0.70)*	*(0.17)*	*(0.33)*	*(1.76)*
Ethn. Fraction.	*-0.324*	*-0.238*	*-0.669*	*0.020*	*-0.481*	*-1.087*
	(0.52)	*(0.37)*	*(1.16)*	*(0.03)*	*(0.96)*	*(1.59)*
Ling. Fraction.	*-0.058*	*0.017*	*-0.775*	*-0.470*	*-0.337*	*-0.123*
	(0.12)	*(0.04)*	*(1.50)*	*(1.16)*	*(1.00)*	*(0.25)*
Relig. Fraction.	*0.022*	*0.195*	*0.571*	*0.169*	*0.506*	*0.337*
	(0.06)	*(0.68)*	*(1.70)*	*(0.57)*	*(1.76)*	*(0.99)*
Size of Gov.	*-0.051*	*-0.015*	*-0.051*	*-0.050*	*0.072*	*-0.044*
	(0.62)	*(0.19)*	*(0.82)*	*(0.61)*	*(0.92)*	*(0.50)*
% Urban Pop	*0.006*	*0.003*	*-0.003*	*0.003*	*0.002*	*-0.002*
	(1.24)	*(0.60)*	*(0.54)*	*(0.52)*	*(0.52)*	*(0.34)*
Trade (%GDP)	*-0.001*	*-0.000*	*0.006*	*0.001*	*0.002*	*0.003*
	(0.32)	*(0.14)*	*(3.78)***	*(0.31)*	*(0.99)*	*(2.03)**
Colony	*0.501*	*0.257*	*0.447*	*0.233*	*0.182*	*0.528*
	*(2.38)**	*(1.18)*	*(2.11)**	*(1.10)*	*(0.95)*	*(2.37)**
Munic. Elect.	*0.451*	*0.659*	*0.550*	*0.502*	*0.562*	*0.829*
	*(2.07)**	*(2.64)**	*(1.46)*	*(1.87)*	*(2.34)**	*(3.00)***
Region. Elect.	*-0.156*	*-0.238*	*0.045*	*-0.042*	*-0.222*	*-0.108*
	(0.82)	*(1.43)*	*(0.17)*	*(0.23)*	*(1.74)*	*(0.57)*
_cons	*-1.172*	*-1.166*	*-0.998*	*-0.947*	*-1.459*	*-0.936*
	(1.68)	*(1.69)*	*(1.39)*	*(1.43)*	*(2.49)**	*(1.21)*
R^2	*0.82*	*0.82*	*0.72*	*0.81*	*0.80*	*0.73*
N	*69*	*69*	*69*	*69*	*69*	*69*

** p<0.05; ** p<0.01*

TABLE 2

	Life expectancy	*Efficiency health*	*Education Score*	*Efficiency Education*
Tax Rev. Dec.	*2.631*	*0.296*	*24.988*	*0.015*
	(0.87)	*(1.82)*	*(0.59)*	*(0.09)*
Intergov. Grants	*-4.193*	*0.117*	*32.115*	*0.318*
	(0.90)	*(0.96)*	*(0.71)*	*(1.91)*
GDP per capita	*0.000*	*0.000*	*0.001*	*0.000*
	*(4.25)***	*(1.66)*	*(1.73)*	*(1.84)*
Population	*-0.015*	*-0.000*	*-0.007*	*0.001*
	(1.82)	*(0.75)*	*(0.06)*	*(1.46)*
Pop. Density	*0.000*	*0.000*	*-0.007*	*-0.000*
	(0.47)	*(1.63)*	*(0.79)*	*(0.77)*
Ethn. Fraction.	*-3.289*	*-0.182*	*-22.236*	*0.058*
	(1.17)	*(1.43)*	*(0.69)*	*(0.41)*
Ling. Fraction.	*-2.576*	*0.096*	*-7.574*	*-0.131*
	(1.13)	*(1.07)*	*(0.30)*	*(1.32)*
Relig. Fraction.	*-3.667*	*-0.043*	*3.787*	*0.086*
	(1.60)	*(0.68)*	*(0.21)*	*(1.38)*
Size of Gov.	*0.656*	*-0.019*	*2.607*	*0.029*
	(1.25)	*(1.39)*	*(0.79)*	*(1.98)*
% Urban pop	*0.025*	*0.002*	*0.545*	*0.002*
	(0.77)	*(1.19)*	*(1.54)*	*(1.24)*
Trade (%of GP)	*-0.009*	*0.000*	*-0.122*	*0.000*
	(0.81)	*(1.23)*	*(0.82)*	*(0.00)*
Colony	*-1.396*	*0.022*	*-44.366*	*-0.184*
	(0.90)	*(0.59)*	*(3.93)***	*(4.18)***
Munic. Elect.	*1.410*	*-0.026*	*16.671*	*-0.071*
	(1.30)	*(0.58)*	*(1.07)*	*(1.02)*
Region. Elect.	*0.001*	*-0.009*	*-5.542*	*-0.012*
	(0.00)	*(0.28)*	*(0.50)*	*(0.26)*
_cons	*69.257*	*0.092*	*17.730*	*-0.023*
	*(18.79)***	*(0.71)*	*(0.47)*	*(0.13)*
R^2	*0.75*	*0.71*	*0.72*	*0.74*
N	*69*	*69*	*69*	*53*

** p<0.05; ** p<0.01*

TABLE 3

	wbgi_cce	*wbgi_gee*	*wbgi_pse*	*wbgi_rle*	*wbgi_rqe*	*wbgi_vae*
expensedec	*0.118*	*-0.182*	*0.734*	*-0.086*	*-0.121*	*0.247*
	(0.28)	*(0.46)*	*(1.84)*	*(0.22)*	*(0.29)*	*(0.54)*
Intergov grants	*-0.084*	*0.371*	*0.788*	*0.014*	*1.400*	*1.315*
	(0.12)	*(0.59)*	*(1.16)*	*(0.02)*	*(2.24)**	*(2.05)**
GDP per Capita	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
	*(7.79)***	*(6.96)***	*(3.39)***	*(6.74)***	*(5.22)***	*(4.83)***
Population	*-0.003*	*-0.002*	*-0.002*	*-0.002*	*-0.002*	*-0.001*
	*(2.36)**	*(1.78)*	*(1.31)*	*(1.70)*	*(1.70)*	*(0.63)*
Pop. Density	*-0.000*	*0.000*	*-0.000*	*-0.000*	*0.000*	*-0.000*
	(0.28)	*(0.27)*	*(1.27)*	*(0.20)*	*(0.08)*	*(2.04)**
Ethnic Fraction.	*-0.120*	*-0.154*	*-0.412*	*0.147*	*-0.461*	*-0.965*
	(0.20)	*(0.25)*	*(0.68)*	*(0.27)*	*(1.07)*	*(1.47)*
Ling. Fraction.	*-0.082*	*-0.085*	*-0.731*	*-0.506*	*-0.450*	*-0.215*
	(0.17)	*(0.18)*	*(1.39)*	*(1.30)*	*(1.41)*	*(0.43)*
Relig. Fraction.	*0.093*	*0.187*	*0.646*	*0.149*	*0.342*	*0.182*
	(0.28)	*(0.63)*	*(1.90)*	*(0.51)*	*(1.11)*	*(0.53)*
Size of Governm.	*-0.068*	*-0.028*	*-0.060*	*-0.064*	*0.077*	*-0.047*
	(0.75)	*(0.32)*	*(0.83)*	*(0.77)*	*(1.07)*	*(0.51)*
% Urban Pop.	*0.004*	*0.001*	*-0.004*	*0.001*	*0.003*	*-0.003*
	(0.77)	*(0.15)*	*(0.66)*	*(0.19)*	*(0.56)*	*(0.45)*
Trade (%GDP)	*-0.001*	*-0.000*	*0.005*	*0.000*	*0.002*	*0.003*
	(0.66)	*(0.13)*	*(2.88)***	*(0.19)*	*(1.16)*	*(2.16)**
Colony	*0.553*	*0.310*	*0.502*	*0.265*	*0.134*	*0.543*
	*(2.70)***	*(1.54)*	*(2.34)**	*(1.43)*	*(0.71)*	*(2.50)**
Municip. El.	*0.523*	*0.741*	*0.529*	*0.651*	*0.737*	*0.991*
	*(2.60)**	*(3.09)***	*(1.73)*	*(2.79)***	*(2.54)**	*(3.56)***
Regional El.	*-0.192*	*-0.204*	*-0.000*	*-0.029*	*-0.036*	*0.042*
	(0.96)	*(1.26)*	*(0.00)*	*(0.17)*	*(0.21)*	*(0.23)*
cons	*-0.952*	*-0.989*	*-0.876*	*-0.862*	*-1.788*	*-1.109*
	(1.29)	*(1.46)*	*(1.17)*	*(1.33)*	*(2.94)***	*(1.26)*
R^2	*0.80*	*0.80*	*0.68*	*0.81*	*0.78*	*0.73*
N	*69*	*69*	*69*	*69*	*69*	*69*

** p<0.05; ** p<0.01*

TABLE 4

	Life Expectancy	*Efficiency Health*	*Education Score*	*Efficiency Education*
Expense Dec.	*2.443*	*0.131*	*30.683*	*0.055*
	(0.99)	*(1.15)*	*(1.10)*	*(0.51)*
Interg. Grants	*-4.460*	*0.081*	*29.895*	*0.312*
	(0.97)	*(0.68)*	*(0.67)*	*(1.89)*
GDP per capita	*0.000*	*0.000*	*0.001*	*0.000*
	*(4.27)***	*(1.99)*	*(1.76)*	*(1.75)*
Population	*-0.014*	*-0.000*	*-0.007*	*0.001*
	(1.66)	*(0.50)*	*(0.07)*	*(1.48)*
Pop. Density	*0.000*	*0.000*	*-0.007*	*-0.000*
	(0.50)	*(1.54)*	*(0.74)*	*(0.73)*
Ethn. Fraction.	*-3.083*	*-0.156*	*-20.438*	*0.051*
	(1.15)	*(1.21)*	*(0.64)*	*(0.36)*
Ling. Fraction.	*-2.563*	*0.081*	*-6.601*	*-0.122*
	(1.10)	*(0.89)*	*(0.26)*	*(1.22)*
Relig. Fraction.	*-3.851*	*-0.033*	*0.441*	*0.074*
	(1.65)	*(0.52)*	*(0.02)*	*(1.19)*
Size of Govern.	*0.689*	*-0.016*	*2.949*	*0.030*
	(1.32)	*(1.17)*	*(0.86)*	*(1.89)*
% Urban Pop.	*0.027*	*0.002*	*0.554*	*0.002*
	(0.83)	*(1.42)*	*(1.54)*	*(1.21)*
Trade (%GP)	*-0.010*	*0.000*	*-0.133*	*0.000*
	(0.96)	*(0.86)*	*(0.86)*	*(0.01)*
Colony	*-1.337*	*0.011*	*-42.880*	*-0.179*
	(0.86)	*(0.26)*	*(4.05)***	*(4.46)***
Municip. Elect.	*1.071*	*-0.060*	*13.261*	*-0.076*
	(1.00)	*(1.15)*	*(0.86)*	*(1.10)*
Regional Elect.	*0.176*	*0.010*	*-3.842*	*-0.007*
	(0.16)	*(0.31)*	*(0.36)*	*(0.16)*
_cons	*69.030*	*0.077*	*15.005*	*-0.028*
	*(19.35)***	*(0.61)*	*(0.39)*	*(0.16)*
R^2	*0.76*	*0.70*	*0.73*	*0.74*
N	*69*	*69*	*69*	*53*

** p<0.05; ** p<0.01*

TABLES 5 AND 6

	wbgi_cce	*wbgi_gee*	*wbgi_pse*	*wbgi_rle*	*wbgi_rqe*	*wbgi_vae*
Auton. Tax Rev.	*-0.029*	*-0.023*			*-0.022*	
	*(2.09)**	*(1.15)*			*(1.42)*	
GDP per Capita	*0.000*	*0.000*	*-0.000*	*0.000*	*0.000*	*0.000*
	(0.66)	*(1.45)*	*(0.95)*	*(1.05)*	*(0.18)*	*(1.38)*
Population	*-0.019*	*-0.005*	*0.008*	*0.001*	*-0.004*	*-0.012*
	*(2.06)**	*(0.89)*	*(0.48)*	*(0.18)*	*(0.79)*	*(5.97)***
Pop. Density	*-0.004*	*-0.000*	*0.004*	*-0.001*	*0.006*	*0.004*
	(1.18)	*(0.01)*	*(1.19)*	*(0.41)*	*(3.05)***	*(2.36)**
Size of Gov.	*-0.013*	*-0.000*	*-0.034*	*0.011*	*0.042*	*0.012*
	(0.44)	*(0.01)*	*(1.76)*	*(0.61)*	*(2.06)**	*(0.94)*
Trade(% of GDP)	*-0.001*	*-0.002*	*-0.001*	*0.001*	*-0.003*	*-0.002*
	(0.51)	*(1.39)*	*(0.56)*	*(0.61)*	*(2.99)***	*(1.29)*
% Urban Pop.	*0.028*	*-0.011*	*-0.062*	*-0.006*	*0.011*	*-0.006*
	(1.12)	*(0.48)*	*(2.61)**	*(0.47)*	*(0.45)*	*(0.70)*
Ln (Aut. Tax. Rev.)			*-0.028*	*-0.034*		*-0.045*
			(0.47)	*(1.52)*		*(2.62)**
_cons	*0.716*	*2.487*	*5.341*	*1.472*	*0.040*	*1.354*
	(0.39)	*(1.43)*	*(3.21)***	*(1.83)*	*(0.02)*	*(2.41)**
R^2	*0.12*	*0.11*	*0.23*	*0.08*	*0.14*	*0.23*
N	*136*	*136*	*136*	*136*	*136*	*136*

** p<0.05; ** p<0.01*

	Life Expectancy	***Health Efficiency***	***Education Score***	***Education Efficiency***
Aut. Tax Revenue	*0.051*		*0.410*	*0.002*
	(0.72)		*(0.52)*	*(0.85)*
GDP per capita	*0.000*	*-0.000*	*0.001*	*-0.000*
	*(2.48)**	*(1.55)*	*(1.36)*	*(0.30)*
Population	*0.051*	*-0.002*	*0.666*	*0.003*
	(1.76)	*(1.27)*	*(2.20)**	*(2.33)**
Pop. Density	*0.036*	*0.001*	*0.252*	*-0.000*
	*(4.56)***	*(1.31)*	*(2.15)**	*(0.21)*
Size of Governm.	*0.096*	*-0.002*	*1.353*	*0.020*
	(0.93)	*(0.26)*	*(1.09)*	*(3.67)***
Trade (% of GDP)	*0.031*	*0.002*	*0.323*	*0.001*
	*(3.56)***	*(4.17)***	*(3.18)***	*(2.94)***
% Urban Pop.	*0.147*	*0.016*	*1.423*	*0.003*
	(1.80)	*(2.60)**	*(2.75)**	*(0.80)*
Ln (Aut. Tax Rev.)		*-0.008*		
		(1.79)		
_cons	*56.495*	*-1.066*	*-123.723*	*-0.103*
	*(10.41)***	*(2.74)***	*(2.76)**	*(0.44)*
R^2	*0.71*	*0.64*	*0.44*	*0.38*
N	*136*	*136*	*96*	*96*

**** p<0.05; ** p<0.01***

TABLES 7 AND 8

	wbgi_cce	*wbgi_gee*	*wbgi_pse*	*wbgi_rqe*	*wbgi_rle*	*wbgi_vae*
Expense Dec.	*-0.003*		*-0.025*	*-0.006*	*0.010*	*-0.010*
	(0.21)		*(1.37)*	*(0.76)*	*(0.99)*	*(1.16)*
Non Ear. Grants	*0.022*	*0.029*	*0.008*	*0.035*	*0.002*	*-0.009*
	(1.88)	*(1.70)*	*(1.20)*	*(6.38)***	*(0.26)*	*(0.93)*
GDP per Capita	*-0.000*	*-0.000*	*-0.000*	*-0.000*	*-0.000*	*-0.000*
	(1.78)	*(0.98)*	*(2.01)*	*(0.32)*	*(1.96)*	*(0.94)*
Population	*-0.008*	*-0.002*	*-0.044*	*-0.014*	*-0.018*	*-0.014*
	(0.86)	*(0.11)*	*(5.02)***	*(3.04)**	*(6.11)***	*(3.36)***
Size of Governm.	*-0.007*	*-0.001*	*-0.038*	*-0.002*	*0.018*	*0.031*
	(0.27)	*(0.04)*	*(1.40)*	*(0.07)*	*(1.02)*	*(4.37)***
Trade (% of GDP)	*0.002*	*0.001*	*0.001*	*-0.002*	*-0.001*	*-0.001*
	(1.83)	*(0.34)*	*(1.07)*	*(1.60)*	*(0.77)*	*(1.26)*
% Urban Pop.	*-0.073*	*-0.094*	*-0.114*	*0.001*	*-0.017*	*-0.044*
	*(2.48)**	*(2.74)**	*(2.47)**	*(0.04)*	*(1.34)*	*(2.11)*
Pop. Density	*0.008*	*-0.009*	*0.008*	*-0.002*	*0.003*	*0.014*
	(1.49)	*(0.78)*	*(1.53)*	*(0.67)*	*(0.92)*	*(5.27)***
Ln Expense Dec.		*-0.140*				
		(0.28)				
_cons	*6.778*	*10.354*	*10.932*	*2.078*	*2.670*	*4.019*
	*(3.13)**	*(2.16)*	*(3.48)***	*(1.16)*	*(2.78)**	*(2.60)**
R^2	*0.25*	*0.32*	*0.60*	*0.26*	*0.35*	*0.31*
N	*99*	*99*	*99*	*99*	*99*	*99*

	Life Expectancy	***Health Efficiency***	***Education Score***	***Education Efficiency***
Ln(ExpenDec)	*5.668*	*0.251*		
	(2.11)	*(1.77)*		
Non ear. Grants	*0.035*	*-0.002*	*-0.719*	*0.007*
	(1.01)	*(0.40)*	*(0.61)*	*(4.75)***
GDP per capita	*0.000*	*-0.000*	*0.001*	*0.000*
	(1.73)	*(0.84)*	*(1.25)*	*(0.75)*
Population	*-0.038*	*-0.008*	*-0.967*	*-0.002*
	(1.65)	*(3.78)***	*(1.68)*	*(1.15)*
Size Governm	*0.085*	*-0.003*	*3.419*	*0.019*
	(0.49)	*(0.41)*	*(1.69)*	*(4.24)***
Trade (% GDP)	*0.013*	*0.001*	*0.417*	*0.003*
	(1.54)	*(1.96)*	*(4.73)***	*(10.25)***
% Urban Pop.	*0.338*	*0.022*	*-1.775*	*-0.012*
	(2.05)	*(2.75)**	*(1.13)*	*(3.00)**
Pop. Density	*0.054*	*0.007*	*3.118*	*0.007*
	*(2.34)**	*(3.55)***	*(2.93)**	*(2.37)**
Expense Dec.			*-1.451*	*-0.002*
			(0.75)	*(0.42)*
_cons	*28.356*	*-2.788*	*29.194*	*0.544*
	*(3.03)**	*(3.86)***	*(0.30)*	*(2.71)**
R^2	*0.68*	*0.74*	*0.46*	*0.71*
N	*99*	*99*	*73*	*73*

** p<0.05; ** p<0.01*

APPENDIX D – Educational score

This appendix will be devoted to the explanation of the operational definition of the education score. In the paper, it has been applied a complete novel approach which has no history in the literature on the topic. Past works, such as Treisman (2000b), measured education using measures of the percentage of enrolled students at different schooling level. Adam, Delis and Kammas (2014) note a strong limitation of this approach: it observes the quantity, but not the quality of the education provided. Therefore, they use the scores of standard cognitive tests that are used to evaluate the educational systems across countries. The problem entailed with the use of such data is that they are available only for a very limited set of countries, and for selected years. Thus, they can be used only in particularly strict samples.

In order to have data that have a sufficient number of observations available, the best choice seems to make use of enrolment rates. In this sense, tertiary education seems to be more informative, as the countries in the datasets are mostly developed and they hardly differ in their enrolment rates in lower levels of education. However, the score has to reflect the quality of education as well, and therefore the enrolment rates are corrected for some indicators of the quality of the tertiary education of a country. In order to do so, a ranking of the countries of the sample has been made, assigning them scores based on the number of local universities that are present on top of academic rankings. An issue is related to the choice of the academic ranking to be used, as there are a discrete number of them and they all differ for arbitrary reason. QS Ranking has been chosen, as it is regarded as one of the most important ones. The scores are assigned to countries in the following way: for every university in the top 50 of the ranking, a country gets assigned 5 points. Then, 4 points are assigned for each university in the top 50-100, 3 for those in the top 100-200, 2 for each in the top 200-400 and one for each in the top 400-800. Then, these scores are summed up, in order to make a ranking of the countries. However, this scoring method has the issue that it favors larger countries, has they have more universities. Therefore, the overall score is corrected by dividing the score for the square root of the population. After this correction, the countries can be ranked. Then, this rank has been divided into quintiles, with each of the quintiles being assigned a score between 1 and 1.8 (with the lowest quintile having 1, the second lowest 1.2 etc). Then, this score is used as weight for the enrolment rates. The final result is that quality of educational institution corrects the enrolment rates, following the basic intuition that providing a student the education of a top university is more valuable than providing him the education of a poor one.

This way of operationalize education has some limitations, which are linked to the arbitrary choices that had to be made. Initially, the source of university rankings has been chosen arbitrarily. However, at first glance the results might seem consistent. In fact, Table A shows the quintiles, and at intuition they seem consistent with the general perception related to the quality of university in different countries. However, the main limitation occurs in the assignation of the weights to the quintile. With the system that has been applied, students in universities in the highest quintile are valued with 80% more than students in universities in the lowest quintile. This is highly arbitrary, and can been challenged. Despite of these limitations, this scoring process seems to provide consistent results, as the computed educational score has a a correlation coefficient north of 0.7 with World Bank's government effectiveness, as explained in the preliminary analysis of the data.

TABLE I

1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Australia	Austria	Azerbaijan	Bhutan	Bosnia and Herzegovina
Belgium	Brazil	Belarus	Cabo Verde	Bulgaria
Denmark	Estonia	Costa Rica	Cyprus	Congo, Rep.
Finland	Greece	Czech Republic	Iceland	El Salvador
France	Israel	Hungary	Latvia	Georgia
Germany	Italy	Indonesia	Luxembourg	Honduras

Ireland	Kazakhstan	Jordan	Maldives	Iran, Islamic Rep.
Japan	Lithuania	Poland	Malta	Jamaica
Netherlands	Norway	Romania	Peru	Mauritius
Sweden	Portugal	South Africa	San Marino	Moldova
Switzerland	Russian Federation	Thailand	Serbia	Mongolia
United Kingdom	Singapore	Turkey	Seychelles	Morocco
United States	Spain	Ukraine	Slovak Republic	Paraguay
Korea	Arab Emirates		Slovenia	Timor-Leste