

# Expenditure Decentralisation and Outcomes: Some Determinant Factors for Success from Cross-Country Evidence<sup>1</sup>

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*“Decentralisation measures are like some potent medicines. They must be taken at the right time, in the right dose, and for the right illness to have the desired salutary effect. Taken improperly, they can harm rather than heal”.*

Rémy Prud’homme (1995)

## Abstract

This paper attempts to answer the question of whether and in what conditions, assigning more expenditure responsibilities to sub-national governments is better for the achievement of development goals. Using a panel data of developing and transition countries, empirical evidence shows that spending by local governments has helped to foster reduction of infant mortality rate, especially in countries with high level of ethnic diversity and where revenue mobilisation has been decentralised. These results confirm some theoretical predictions of the fiscal federalism literature.

**Keywords:** Decentralisation, heterogeneity, vertical imbalances.

## 1. Introduction

Decentralisation is becoming increasingly important in policy dialogues within the development community. This parallels the failure of many centralised states in developing and transition countries, to ensure high level of welfare to their constituents over the past decades. Devolution of power to sub-national governments is widely believed to improve efficiency in decision-making. It ensures better outcomes in public services provision. However, disappointing experiences in several countries (Prud’Homme

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1995; Tanzi 1996; Cai and Treisman 2004) raise a basic question about the reform: What actually determines the relative efficiency of a decentralised provision of public services over a centralised system?

Starting with Hayek (1945), the fiscal federalism literature invoked the presence of “local knowledge” as a rationale to delegate responsibilities to lower levels of governments<sup>3</sup>. In particular, Oates (1972; 1999) emphasises the advantages of being closer to the people in delivering tailored public services that best suit the needs of the population. Actually, to the extent that local governments are best informed about their regions’ local conditions, they can easily adapt decisions to the local conditions, thereby enhancing the overall public sector’s ability to reach its targets.

Still, authors underline a number of conditions under which a decentralised system may not outperform centralisation (Oates 1972; 1999; Bardhan 2002; Lockwood 2002; and Harstad 2007). Some of these conditions rely on the extent of externalities, or rent capture in local public spending. Also, inter-regional heterogeneity in preferences for public goods and services is deemed to play a crucial role. The empirical predictions of underlying models are numerous, but they are subject to few investigations.

This paper contributes to the literature on the benefits of fiscal decentralisation by clarifying some enabling conditions that allow local governments to achieve better outcomes. First, we delve into the theoretical literature on fiscal federalism to identify some testable hypotheses, which will be examined thereafter using available cross-country data. Second, unlike previous empirical analysis (Robalino *et al.* 2001), we control for potential endogeneity in the analysis using GMM estimator.

The remainder of the paper is organised as follows: The next section reviews the theoretical literature. Section 3 sketches the empirical methodology and section 4 presents the estimation results. Section 5 draws conclusions.

## 2. Theoretical Framework

Public interventions designed to achieve various developmental goals may be carried out either by local governments or the central government. The key policy issue in decentralisation reforms is how to organise responsibilities among these different layers of government so as to maximise the overall level of efficiency and welfare.

One of the core principles of the theory of fiscal federalism is Oates’ (1972) Decentralisation Theorem. It sets out a basic rule for the decentralised provisions of public goods and services to be Pareto-superior to a centralised determination of public outputs. Three inter-related conditions are explicit in the theorem. They are heterogeneity, externalities, and economies of scale.

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3. The quotation is borrowed from Alonso *et al.* (2008).

According to Oates (1972), welfare is maximised under decentralisation when regions are heterogeneous in their preferences for public goods and do not exhibit inter-regional spill-overs or cost saving from a centralised provision. The presence of externalities and economies of scale give some rationale for centralisation and thus, creates a basic trade-off between centralisation and decentralisation.

However, Besley and Coates (2003) indicate that even though a critical level of spill-overs above which centralisation produces a significant surplus exists, this critical level is particularly higher, thereby implying a weaker case for centralisation. Turning to economies of scale, Prud'Homme (1995) argues that for most local public services, the provision in a given city is independent of the provision in other cities, thereby implying minimal welfare losses under decentralisation.

Finally, the core idea expressed in the Oates' theorem has not been challenged fundamentally. The recent literature is coherent with the initial presumption of Oates (1972) that decentralisation increases efficiency when regions exhibit heterogeneous preferences for public goods (Lockwood 2005). Therefore, a centralised provision would lead to welfare losses that will likely be correlated with the extent of heterogeneity.

However, a proper transfer of expenditure responsibilities to sub-national governments, following the Oates (1972)' rule, is not enough to achieve welfare gains. In fact, the standard theory of fiscal federalism lay out a normative framework for the appropriate fiscal policies needed to ensure the effectiveness of decentralisation. The main focus is to provide local governments with adequate revenues, typically through local taxes, intergovernmental grants, and debt instruments, so that they carry the responsibility of their expenditures.

Expenditure assignment needs to be matched with adequate revenues assignment. While the structure of local revenues may vary across countries, it generally has consequences on the success of expenditure decentralisation. First, controlling important tax bases give local governments more legitimacy over the use of resources, hence the leeway to manage them according to their own preferences and needs (De Mello 2006). Second, vertical imbalances may induce irresponsible fiscal behaviours by local governments<sup>4</sup> (Rodden 2002; Kornai *et al.* 2003).

This calls for fundamental institutional reforms to ensure that local public revenues are directed properly towards the satisfaction of demonstrated citizen's needs. Contrary to what is assumed in the standard fiscal federalism framework, local governments are not always benevolent. Besides, they may lack the necessary competences to perform their assigned responsibilities effectively.

Accountability and adequate capacities at local level are necessary to prevent inefficient outcomes in the use of local public revenues. It may be

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4. This is known in the literature as the soft budget constraints syndrome (Kornai *et al.* 2005).

argued that corruption and inadequate capacities are likely to be more pronounced at local rather than at the central level (Prud'Homme 1995; Tanzi 1996). Nevertheless, nothing should prevent local and central governments from taking appropriate measures to upgrade the quality of local bureaucracies. Poor accountability of local officials is not insuperable (Bardhan 2002).

There is no universal blueprint however. A review of several country experiences shows that local accountability mechanisms have been successfully enforced through regular and fair elections, and institutionalised systems of periodic hearings on items of major public expenditures, etc. But, what works varies widely across regions and countries (Bardhan 2002). This suggests that the proper handling of the issue surely depends on the specificities in each country (Oates 2005).

Therefore, whether and to what extent decentralisation reforms have helped to improve outcomes turns out to be an empirical issue. The theoretical framework generates several predictions. In particular, decentralisation of expenditure responsibilities improves efficiency, especially in countries with inter-regional heterogeneity in terms of preferences for public goods. Also, the more the local revenues are independent, the higher the benefits of decentralising expenditures, and the better the quality of governance at local level.

The next section sketches the empirical methodology to be used to evaluate the aforementioned predictions.

### 3. Empirical Methodology

On the basis of the empirical model used in Robalino *et al.* (2001), the following equation is specified:

$$Y_{it} = \alpha \left( \frac{CGS}{GDP} \right)_{it} + \beta_0 \left( \frac{LGS}{GDP} \right)_{it} + \beta_1 \left( \frac{LGS}{GDP} \right)_{it} * X_{it} + \lambda X_{it} + \varphi C_{it} + \eta_{it} \quad (1)$$

- $Y_{it}$  is the Infant Mortality Rate in country  $i$  at time  $t$ .

This outcome deserves particular attention in development, especially as far as the MDGs are concerned.

- $\left( \frac{CGS}{GDP} \right)_{it}$  is the Central Government Expenditures as a percentage of GDP.

Unlike Robalino *et al.* (2001), this variable is introduced to assess the impact of central government spending on outcomes, and more importantly, to analyse the relative efficiency of a dollar when it is spent by central government as compared to when the local government spends it. Such comparison is important in answering the policy question of how scarce resources should be allocated along different levels of government.

- $\left(\frac{LGS}{GDP}\right)_{it}$  is the sub-national expenditures as a percentage of GDP.

This measure is preferred to the sub-national share of expenditure as a percentage of total expenditures, or of central government expenditures. The later can only inform on whether spending by local governments has a positive impact on outcomes, and cannot inform on whether transferring more expenditure responsibilities to local government would improve outcomes above that which results from a given level of centralisation. The above specification offers the advantage of being able to shed light on the issue.

- $X_{it}$  represents a variable that, by hypothesis, conditions the effectiveness of expenditure decentralisation. We have stated two hypotheses. Accordingly, two different regressions will be considered, each with one of the following variables as interaction term:

- a) Heterogeneity of preferences, which we measured by the extent of ethnic diversity within the country (ELF).

In fact, an assortment of political economy models suggest that ethnic diversity impedes agreement about the provision of public goods and creates incentives for growth-reducing policies in a centralised system of planning (Alesina and Spoloare 1997; Easterly and Levine 1997). Therefore, the more a society is polarised, the more decentralisation is likely to reduce conflicts of interest between the different groups and improve economic performances.

- b) The extent of revenue decentralisation, which is measured by vertical imbalance (VI).

VI is the degree to which sub-national governments rely on the central government to support their expenditures. Still, this proxy does not distinguish what proportion of transfers is conditional versus general purpose, and the GFS data do not provide this information.

- $C_{it}$  is a set of control variables: GDP per capita, index of corruption, and index of bureaucracy quality<sup>5</sup>. These variables have been identified as important determinants of mortality infant rates<sup>6</sup>.

- $\eta_{it}$  is the error term to account for all other factors influencing outcomes that are not integrated in the model. It is specified as follows:  $\eta_{it} = \omega_i + \gamma_t + \varepsilon_{it}$ , where  $\omega_i$  represents time-invariant unobserved country-specific effects, which adjust for any mean differences in outcomes across countries.  $\gamma_t$  stands for time-specific effects that are strictly identical across countries, while  $\varepsilon_{it}$  is the component of the error term, which is assumed orthogonal to  $\omega_i$  and  $\gamma_t$ , and satisfy the classical assumptions.

5. The measure we use are computed by the International Country Risk Guide (ICRG). Details can be found in the appendix.

6. As indicated by a referee, there are other health related factors that determine infant mortality rates. However, due to data limitations, the role of such variables can not be accounted for in our regressions. Still, the consequences could be minimised with the use of fixed effects estimator.

The rationale to interact  $X_{it}$  with  $\left(\frac{LGS}{GDP}\right)_i$  is to provide a better description of the relationship between expenditure decentralisation and outcomes. A significant interaction term ( $\beta_1$ ) means that the effects of  $\left(\frac{LGS}{GDP}\right)_i$  on  $Y_{it}$  vary with the value of  $X_{it}$ . This effect is given by  $\beta_0 + \beta_1\bar{X}$ , where  $\bar{X}$  is the mean of  $X_{it}$ .

The first approach to obtain coefficients of interest is to estimate equation [1] using Ordinary Least Squares (OLS).

However, this approach is prone to two potential problems. One, an error on the measurement of expenditure decentralisation will most likely produce inconsistent estimates of its effects. This is likely, since sub-national expenditure figures do not distinguish between autonomous spending (the true measure of expenditure decentralisation) and the spending on the behalf of the central government. The database used does not provide such information.

Two, omitted variables or reverse causation may cause OLS estimates to reflect only simple correlation rather than true causal relationships from expenditure decentralisation to better outcomes. It is not possible to control for every important variables that affect both decentralisation and outcomes, such as cross-national differences in the items of public spending. This problem causes bias and inconsistency in OLS estimates, thereby confounding the influence of decentralisation on outcomes.

The use of generalised method of moment (GMM) provides the means for dealing with these problems by instrumenting the endogenous variables in equation [1]. GMM estimators take first differences to eliminate unobserved country-specific effects, and use lagged (endogenous) variables-in-level as instruments in first-differenced equation, to correct for potential endogeneity.

However, these instruments may be weakly correlated with the endogenous variables so that the parameters are only faintly identified (largely inconsistent and biased). In this case, Arellano and Bond (1998) suggest using an extended GMM estimator (SYS-GMM), in which lagged first-differences of the endogenous variables are used as instruments for equations-in-levels, in addition to the usual lagged levels as instruments for equations in first-differences.

The SYS-GMM uses more instruments to improve the efficiency of estimates, provided that the error term is not serially correlated, and that the difference in the explanatory variables and the error term is not correlated either (Blundell and Bond 2000; Hayakawa 2007). Therefore, the validity of those assumptions is determining for the validity of GMM estimates.

When GMM-SYS is used, a Sargan Difference test should be examined to see if there is evidence that the additional moment-conditions are valid. If

not, first difference GMM estimates may be preferred<sup>7</sup>. Under the null hypothesis that moment-conditions are valid, the test statistic is asymptotically distributed as chi-squared. In addition, the LM test of serial correlation should be examined. There should be significant first order correlation of the first order residuals, and no second order correlation.

#### 4. Data and Descriptive Statistics

The sample consists of country-level data over the period 1985–2000. It covers 76 countries, of which 14 are from Africa, eight from East Asia and Pacific (EAP), 15 from Europe and Central Asia (ECA), 15 from Latin America and Caribbean (LAC), two from South Asia Region, and 22 from OECD. The detailed list is given in Table 1 in the appendix, where detailed definitions and sources of variables are also presented as Table 2.

The paucity of sub-national data is worth pointing out. For instance, in the Government Finance Statistics (GFS) database, which is the main source of cross-country data of fiscal flows at different levels of governments, data on decentralisation for 1996 is available for only 46 countries.

The general descriptive statistics of the variables used are presented in Table 3 in the appendix. The table below reports the simple correlations between outcomes variables and the main dependent variables:

**Table 1. Fiscal Decentralisation and Outcomes:  
Simple Correlations**

	Log (mir)
Log (sgs_gdp)	-0.5938***
Log (cgs_gdp)	-0.4697***
Log (gdp_cap)	-0.8993***
Corruption	-0.6686***
Bureaucracy	-0.5627***
Ethnic fractionalization	0.5646***

\*\*\*: Significance at 1%

These bi-variate correlations provide *prima facie* evidence of a statistical association between outcomes and fiscal decentralisation and as suggested by the theoretical literature. Also, the correlations with the other variables behave as expected. A striking fact is that correlations with expenditures by local governments are stronger than with expenditures by central governments, as suggested by the theoretical literature.

However, these correlations might be misleading because decentralisation is correlated with other country-characteristics, such as ethnic fractionalisa-

7. Blundell and Bond (2000) reported that in many contexts, additional moment restriction exploited by the GMM-SYS estimator appear to be valid though, and they appear to be useful in reducing biases associated with first-difference.

tion or GDP per capita (Panizza 1999; Cerniglia 2003; Arzaghi and Henderson 2005). They could simply reflect own direct impact on outcomes, rather than a sign of decentralisation having a positive impact on outcomes. Therefore, the statistically significant correlations obtained might reverse into (statistically significant) negative ones as soon as other relevant variables are controlled for in multivariate regressions.

## 5. Estimation Results

This section reports and discusses the multivariate regression results on the relationship between outcomes and fiscal decentralisation.

The baseline regressions take the logarithm of outcomes, GDP per capita, and spending variables. The choice of the functional form was guided by the graphical analysis of the original data as presented in figures 1-3 in the appendix. They portray inverse functions between mortality infant rates and GDP per capita and spending variables. Linearisation of inverse functions gives the log-log functional form retain in our analysis.

Table 2 reports the results on the infant mortality rates and public spending at different levels of government, using fixed effects estimator and successively adding controls variables.

**Table 2. OLS results with mortality infant rate as dependent variable<sup>8</sup>**

	I	II	III
Log (sgs—gdp)	-0.247*** (-4.59)	-0.061 (-1.45)	-0.030 (-0.90)
Log (cgs—gdp)	-0.427*** (-5.37)	-0.077 (-1.41)	-0.106*** (-2.99)
Bureaucracy		-0.056* (-1.68)	-0.038* (-1.67)
Corruption		0.035** (2.32)	0.016 (1.23)
Log (gdp—cap)		-0.830*** (-9.14)	-0.360*** (-4.85)
10-year dummy		***	
1-year dummy			***
Constant	4.400*** (17.49)	10.325*** (12.60)	5.680*** (5.13)
R-sq Within	0.0878	0.7206	0.8457
Observations	718	368	368

\*\*\*, \*\*, \*: Significance at 1%, 5% and 10%.

The first column includes only spending at central and local government as percentages of GDP. The elasticity of central government spending appears significant and almost two times higher than the elasticity of local government spending. It shows that even if sub-nationals expenditures have a significant positive impact on the reduction of infant mortality rates, other things being equal, spending at central level would be more efficient.

8. In the results tables, figures in brackets are the t-student.

**Table 3. OLS results on sub-samples with mortality infant rates as dependent variable**

	High-Incomes Countries		Low-Incomes Countries	
Log (sgs_gdp)	0.057 (0.90)	0.039 (0.55)	-0.08 (-1.41)	-0.0872* (-1.66)
Log (cgs_gdp)	-0.655*** (-5.58)	-0.531*** (-7.36)	0.216*** (3.26)	-0.048 (-0.76)
Bureaucracy	-0.079 (-0.85)	-0.131** (-2.09)	-0.710 (-1.39)	-0.016 (-0.51)
Corruption	0.040** (2.130)	0.016 (0.84)	0.013 (0.50)	-0.046* (-1.87)
Log (gdp_cap)	-1.959*** (-4.37)	-1.144*** (-11.07)	-0.855*** (-7.60)	-0.418*** (-3.69)
Time- dummy		***		***
Constant	23.285*** (16.35)	18.226 (13.68)	9.446 (10.13)	7.064*** (8.58)
R-sq Within	0.7770	0.8212	0.5400	0.7914
Observations	228	228	140	140

\*\*\*, \*\*, \*: Significance at 1%, 5% and 10%.

Adding control variables (column II and III), including GDP per capita, corruption, bureaucracy quality and year-dummies<sup>9</sup>, makes the estimates decrease. But they remain large and significant for central government spending. That is, the initial positive correlation between spending variables and the outcome was simply driven by the fact that countries with higher GDP per capita and less bureaucracy tend to have higher share of local government spending in GDP.

*Ceteris paribus*, expenditure decentralisation is no better at reducing infant mortality rates. However, these results are more applicable for high-income countries than for low-income countries. Indeed, dividing the sample into two sub-sets according to the level of development<sup>10</sup> demonstrates that for high-income countries, spending at local level has a significant impact on outcomes.

Table 3 shows that the coefficient of local government spending is significant and negative in low-income countries, but not significant in developed countries. On the contrary, central government spending appears negative and statistically significant in developed countries, but not significant in low-income countries.

This result suggests that decentralisation improves welfare, particularly in poor countries. Robalino *et al.* (2001) obtained a similar result. Moreover,

9. Time dummies variables are introduced as control variables to account for any time-varying systematic influence on mortality infant rates omitted in the model. For example, the quality of public spending that is likely to vary across time in each country influences outcomes. A measure of that variable is not available.

10. We put developing and transition countries together to form the group of low-income countries because these countries are comparable regarding their level of economic development.

**Table 4. GMM results with Infant Mortality Rates as dependent variable**

	I	II	III
Log (sgs—gdp)	-0.089*** (-2.24)	0.0404*** (2.64)	-0.857*** (-12.34)
Log (sgs—gdp)*ethnic		-0.486** (-1.95)	
Log (sgs—gdp)*vi			0.014*** (11.40)
Log (cgs—gdp)	-0.132*** (-2.25)	-0.074 (-0.92)	-0.261*** (-4.91)
Corruption	-0.043** (-6.66)	-0.021 (-1.09)	-0.069** (-2.42)
Bureaucracy	-0.017 (-0.58)	0.005 (0.11)	-0.003 (-0.06)
Log (gdp—cap)	-0.043 (-6.66)	-1.091*** (-9.63)	-0.478*** (-13.49)
VI			-0.0127*** (-7.94)
Time- dummy	***	***	***
Constant			
Observations	140	127	118
Sargan test	0.3236	0.5093	0.0531

\*\*\*, \*\*, \*: Significance at 1%, 5% and 10%.

these findings imply that the previous results (Table 2) were simply driven by the predominance of Developed Countries within the total sample.

OLS estimates could be interpreted as a sign of endogeneity. Table 4 reports the GMM results, which control better, for potential endogeneity problems as discussed above (section 3.2). Only low-income countries are considered. Results are obtained using the *xtgmm* command on Stata 10.

The first column suggests a positive and significant impact of local government spending on the outcome considered. It suggests also that the central government spending has a positive and significant impact on the outcome, and that this impact is slightly higher than that of local government spending.

However, this does not imply that in any case, spending at central level will be better to achieve the development goal. As discussed in the theoretical framework, the level of heterogeneity of preferences could be determinant.

Results in column II suggest that the impact of decentralisation does depend on the extent of ethnic heterogeneity. The elasticity of local spending is (-0.178)<sup>11</sup>. There seems to be a threshold level of heterogeneity, above which decentralisation is better to achieve development goal.

Column III explores whether revenue decentralisation is determinant for the success of expenditure decentralisation. The coefficient of local spending interacted with a measure of fiscal imbalances appears positive and significant. That is, the more local governments are relying on grants from central governments to finance their spending, the less they can foster reduction of mortality infant rates.

11.  $0,0404 + (0,45)*(-0,486) = -0,178$

## 6. Conclusion

This paper sought to answer the question of whether and in what conditions, assigning more expenditure responsibilities to sub-national governments was better in achieving development goals.

The theoretical literature suggests that spending at local level speeds up the achievement of development goals, especially in countries where higher ethnic diversity impedes agreement about the provision of public goods and creates incentives for rent-seeking by the different groups. The theory also suggests that local governments are more efficient at improving welfare when they control a broad share of their revenue. It further highlights the importance of adequate governance to prevent opportunistic or inefficient behaviours at local level.

The empirical evidence based on a panel data of developing and transition suggests that spending at local level does indeed reduce mortality infant rate. More importantly, the highest impact of decentralisation is obtained in countries with high level of ethnic fractionalisation and with high level of revenue decentralisation, thereby corroborating theoretical predictions of the fiscal federalism literature.

It is important to stress that cross-country data is hiding important within-country disparities in outcomes and decentralisation of fiscal responsibilities. Therefore, an empirical study on data at sub-national level could shed more light on the impact of decentralisation on outcomes and on the determinant factors for success. That could be the next step of this research.

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**Annex****Table 1. Sample coverage**

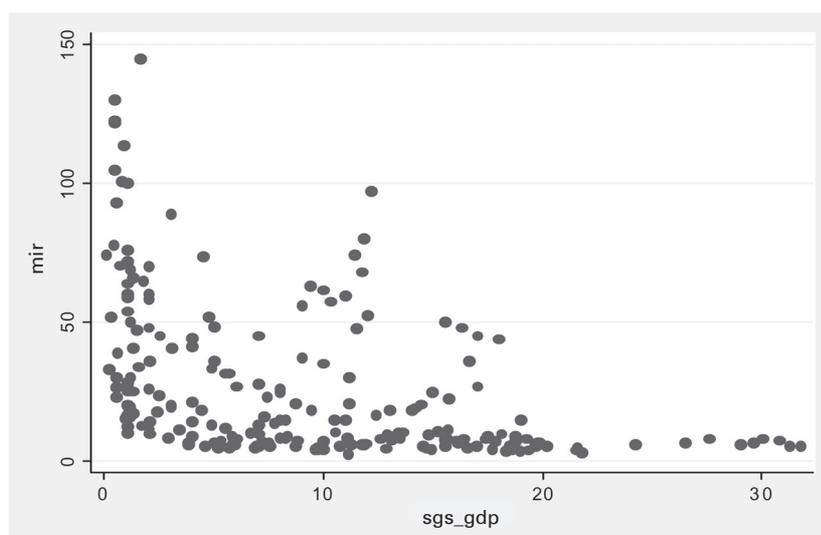
AFR	EAP	ECA	LAC	OECD	SAR
Botswana	China	Belarus	Argentina	Australia	India
Burkina Faso	Fiji	Bulgaria	Bolivia	Austria	Sri Lanka
Congo, Rep.	Indonesia	Croatia	Brazil	Belgium	
Ethiopia	Malaysia	Czech Rep.	Chile	Canada	
Gambia, The	Mongolia	Estonia	Colombia	Denmark	
Kenya	Papua N. G.	Hungary	Costa Rica	Finland	
Madagascar	Philippines	Kazakhstan	Dominican	France	
Malawi	Thailand	Kyrgyz Rep.	Rep.	Germany	
Mauritius		Latvia	Guatemala	Greece	
Senegal		Moldova	Mexico	Ireland	
South Africa		Poland	Nicaragua	Israel	
Swaziland		Romania	Panama	Italy	
Uganda		Russia	Paraguay	Luxembourg	
Zimbabwe		Slovak Rep.	Peru	Netherlands	
		Slovenia	Trinidad & T.	New Zealand	
			Uruguay	Norway	
				Portugal	
				Spain	
				Sweden	
				Switzerland	
				U.K	
				USA	

**Table 2. Definition and sources of variables**

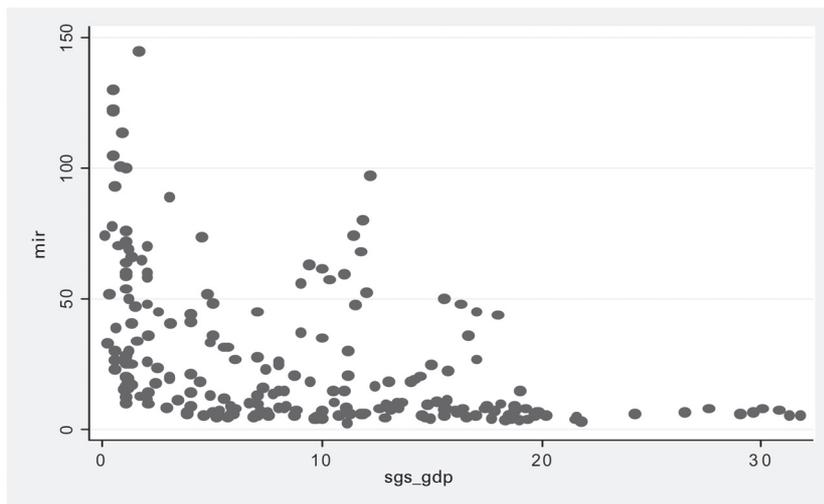
Variables	Description and Sources
Mortality rate under -5 (per 1000)	The probability (expressed as a rate per 1000) that a newborn baby will die before reaching age 5, if subject to current age-specific mortality rates. <i>Source: World Development Indicators (WDI).</i>
Mortality infant rate	The number of infants dying before reaching one year of age, out of 1000 live births in a given year. <i>Source: WDI</i>
Primary completion rates	The percentage of students completing the last year of primary school. It is calculated by taking the total number of students in the last grade of primary school, minus the number of repeaters in that grade, divided by the total number of children of official graduation age. <i>Source: WDI.</i>
Central Government spending (%GDP)	Total expenditure accounted for by central government, excluding intergovernmental transfers, defence expenditures and interest payments, as a percentage of GDP. <i>Source: compiled from the WBFDI Country database of the World Bank.</i>
Sub-national spending (% GDP)	Sum of local and provincial total expenditures, excluding current and capital transfers to other levels of governments, as a percentage of GDP. <i>Source: WBFDI Country database, World Bank.</i>
Heterogeneity	There are three possibilities: a) the size of land area (AREA), b) the size of the population (POP), or c) the extent of ethno-linguistic differences within the country (ELF). <i>Sources: WDI for AREA and POP and Roeder (2001) for ELF.</i>
Vertical imbalances	It is calculated as the total amount of grants paid to sub-national governments, divided by the sum of local and provincial total expenditure, excluding current and capital transfers to other levels of government. <i>Source: WBFDI County database, World Bank.</i>
Governance quality	a) Index of bureaucracy quality (4- point scale) gives a high score to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruption in government services, and where it has an established mechanism for recruitment and training. <i>Source: International Country Risk Guide (ICRG).</i> b) Index of Corruption (6- point scale) proxies actual or potential corruption in the form of excessive patronage, nepotism, job reservation, etc. <i>Source: ICRG</i>
GDP per capita	Gross Domestic Product per capita based on purchasing power parity (PPP). <i>Source: WDI.</i>
Ethnic fractionalisation	Ranges from 0 to 1. Measures the probability that two randomly selected individuals differing in their native language and ethnic groups. <i>Source: Roeder (2001).</i>

**Table 3. Summary statistics of the main variables**

Variables	Obs.	Mean	Std. Dev.	Min	Max
Infant Mortality rate	1531	34.61	39.67	2.2	199
Under-5 mortality rate	1235	56.72	68.61	3.22	345
Primary completion rate	1007	76.54	27.451	10.47	127.15
Sub-national expenditures (% of GDP)	1437	8.83	7.91	0.10	48.27
Central government expenditures (% of GDP)	1258	22.13	9.22	1.60	50.42
Per capita GDP	3934	5512.68	7810.67	56.47	48655.21
Vertical imbalance	1357	36.22	23.10	0	130.27
Index of ethnic-fractionalisation	4327	0.45	0.26	0.10	0.93
Index of corruption (least corrupt =6)	2000	3.33	1.43	0	6
Index of bureaucracy quality (highest=4)	2018	2.21	1.25	0	4

**Figure 1. Infant Mortality Rates and GDP per capita**

**Figure 2. Infant Mortality Rates and Sub-national share of expenditures**



**Figure 3. Infant Mortality Rates and central government expenditures**

