

Fiscal policy responsiveness, persistence, and discretion

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Abstract This paper analyzes the different characteristics of fiscal policy using a two-step estimation procedure. First, we decompose both government spending and government revenue into three components: responsiveness, persistence and discretion. Second, we assess the determinants of these characteristics. Using data from 132 countries, our results show that fiscal policy is more persistent than responsive to economic conditions, which implies that the authorities may have less leeway in the short-run notably to curb spending behavior. In addition, countries characterized by greater fiscal persistence have less discretion and responsiveness. Finally, macroeconomic, institutional and geographic variables explain cross-country variation in fiscal characteristics.

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1 Introduction

In the last decade, several studies in the economics literature have assessed fiscal policy characteristics. Most of these studies analyze the responsiveness of fiscal policy—captured by the elasticity of government spending and government revenue to output—as well as its determinants. The conventional wisdom that emerges from such literature is that fiscal policy is countercyclical or a-cyclical in most developed countries (Fiorito and Kollintzas 1994; Galí 1994; Fiorito 1997; Hallerberg and Strauch 2002; Sorensen et al. 2001; Afonso and González Alegre 2008; Afonso 2008) while it is pro-cyclical in developing countries (Gavin and Perotti 1997a, 1997b; Braun 2001; Kaminsky et al. 2004; Talvi and Vegh 2005). This evidence is corroborated by Lane (2003) who finds that governmental capacity to implement fiscal control procedures is positively correlated with the level of development (measured by output per capita). This implies that richer countries enjoy less pro-cyclical government spending.

Several explanations have been put forward to explain the cross-country variation in the degree of fiscal responsiveness to macroeconomic conditions. A large number of studies show that the main factors explaining the difference between developed and developing countries are political and institutional ones. In particular, while Persson (2001) and Persson and Tabellini (2001) find that, in general, parliamentary and majority based systems are related to cyclicity of fiscal policy, Alesina et al. (2008) found that most of the pro-cyclicity of fiscal policy in developing countries can be explained by higher levels of corruption. Interestingly, Lane (2003) shows that OECD countries with dispersed political power are the most likely to run pro-cyclical fiscal policies.

A second fiscal policy characteristic that has been considered in the literature is discretion, that is, the component of fiscal policy that does not respond systematically to output conditions, but is instead the consequence of exogenous political processes or extraordinary non-economic circumstances. Fatás and Mihov (2003, 2006) analyze the determinants of fiscal policy discretion and its impacts on the macroeconomic environment. In particular, Fatás and Mihov (2003) examine the political and institutional determinants of discretionary government spending as well as its effects on output volatility and economic growth. Using data from 91 countries, they find that highly volatile discretionary fiscal policy exerts a strong destabilizing effect on the economy. Additionally, fiscal policy is explained to a large extent by such variables as the characteristics of electoral and political systems and the lack of political constraints. They conclude that institutional arrangements that constrain discretionary spending allow nations to achieve higher rates of economic growth and reduce macroeconomic instability.¹

More recently, Fatás and Mihov (2006), using data from 48 US states, explore the role that “rules” and institutions play in determining discretionary fiscal policy and look at whether the same rules and institutions influence the responsiveness of fiscal policy. They

¹Regarding the relationship between output volatility, growth and welfare, see, for example, Ramey and Ramey (1995), Epaulard and Pommeret (2003), Fatás and Mihov (2003, 2006), Barlevy (2004), Furceri (2007, 2009a) and Imbs (2007).

find that strict budgetary restrictions lead to less policy volatility and reduce the responsiveness of fiscal policy to output shocks. These two results should have opposite effects on output volatility. While less discretion should reduce volatility, less responsiveness of fiscal policy might amplify business cycles.

Interestingly, no empirical studies thus far have assessed the relevance of a third fiscal policy characteristic: persistence.² Generally speaking, fiscal persistence can be considered as a measure of the degree of dependence of current fiscal behaviour, spending and revenue, on its own past developments. In this paper, we contribute to the literature by providing evidence that also accounts for this third fiscal policy characteristic.

In particular, the aim of this paper is to disentangle fiscal policy (both government spending and revenue) into three components: responsiveness, persistence and discretion, and to assess which variables make these components vary across countries. Thus, compared to existing work in the literature, we provide a more comprehensive approach to assess the behaviour of fiscal policy (in terms of responsiveness, persistence and discretion) and its determinants.

From a methodological point of view, we extend the analysis of Fatás and Mihov (2003, 2006) in several ways: (i) the above mentioned three fiscal components are obtained for both government revenue and government spending;³ (ii) we cross-check responsiveness, persistence and discretion; (iii) we analyze the determinants of all three fiscal components with a set of macroeconomic, political, institutional and geographic variables; and (iv) finally we also use several datasets.

Our analysis covers a set of 132 developed and developing countries over the period 1980–2007, as well as data for the EU-15 countries over the period 1960–2007. The main results of the paper can be summarized as follows: (a) fiscal policy is a-cyclical in most of the countries in the sample (i.e., responsiveness generally is low and in most of the cases not statistically significant) while persistence is the dominant component; (b) while government revenue reacts relatively more to output than government spending, government revenue seems to be less persistent; (c) more interestingly, there exists a significant trade-off between persistence and discretion, and between persistence and responsiveness. Indeed, both for government revenue and government spending, the persistence component is negatively correlated with both the discretion and the responsiveness components, thereby suggesting that countries with higher persistence have lower discretion and responsiveness. (d) We provide evidence that macroeconomic, institutional and geographic variables (even with differentiated effects) explain different cross-country behaviour in terms of the discretionary, responsiveness and persistence components of fiscal policy.

The rest of the paper is organized as follows. Section 2 explains the empirical strategies used: (i) to identify the responsiveness, the persistence and the discretion components of both government spending and revenue; and (ii) to identify the determinants of fiscal characteristics within a set of economic, institutional and political variables. Section 3 presents and discusses the results. Section 4 concludes with the main findings and policy implications.

²In a related context Crain (2001) addresses the relevance of political durability for the effectiveness of public policies and to which extent they are maintained, and also (Crain 2003) analyzing economic performance with and emphasis on the role of volatility.

³While it could be argued a priori that most of the fluctuations on the revenue side of the budget come from the automatic reaction of tax revenues to the economic cycle—and, therefore, endogeneity could be an important econometric issue—we find empirical evidence that, although government revenue is more responsive than government spending, it is more persistent than responsive.

2 Empirical strategy

Following Fatás and Mihov (2003, 2006), in order to differentiate between the components of responsiveness, persistence and discretion in government spending and revenue we estimate for each country i (with $i = 1, \dots, N$) the following regressions:

$$\log(G_{i,t}) = \alpha_i^G + \beta_i^G \log(Y_{i,t}) + \gamma_i^G \log(G_{i,t-1}) + \delta_i^G \mathbf{Z}_{i,t} + \varepsilon_{i,t}^G \quad (1)$$

$$\log(R_{i,t}) = \alpha_i^R + \beta_i^R \log(Y_{i,t}) + \gamma_i^R \log(R_{i,t-1}) + \delta_i^R \mathbf{Z}_{i,t} + \varepsilon_{i,t}^R \quad (2)$$

where G is real government spending, R is real government revenue, Y is real GDP, and \mathbf{Z} is a set of controls including also a time trend.⁴

The estimates of the country-specific coefficients β_i , γ_i and σ_i in (1) and (2) (where σ_i is the standard deviation of the residuals of the above regressions) will represent respectively our measures of responsiveness, persistence, and a quantitative estimate of the discretionary component of fiscal policy. In order to get these estimates, we include as control variables (i.e., the vector \mathbf{Z}_i) the current and the lagged value of real oil prices, the current inflation rate and a linear time trend. Oil prices are included since they affect the state of the economy and more importantly because they contribute significantly to total revenue for some of the countries in the sample. We include inflation to ensure that our results are not driven by high inflation episodes. We also consider a time trend in our specifications, since government spending and revenue can also have a deterministic time trend in addition to a stochastic one.

Compared to Fatás and Mihov (2006), our specification considers the level of GDP, rather than its first difference. The reason for doing so is due to the fact that once the lagged dependent variable is used in levels, and given that the series employed are not stationary,⁵ the inclusion of output expressed in first differences may lead to a situation where the coefficient of the lagged variable converges to one and the coefficient of the stationary series (output expressed in differences) converges to zero (see Wirjanto and Amano 1996).

Finally, in order to control for the possible endogeneity of both government spending and revenue with respect to GDP, we apply the Instrumental Variables estimator (IV), and we instrument for current output with two lags of real GDP.⁶

Once we obtain the estimates for the components of responsiveness ($\hat{\beta}_i^{G,R}$), persistence ($\hat{\gamma}_i^{G,R}$) and discretion ($\hat{\sigma}_i^{G,R}$) of fiscal policy we can explain cross-country variations in fiscal policy behaviour, regressing those estimates on a set of explanatory variables that the literature has found to be related to fiscal policy.

We estimate the following three cross-country equations (six considering both estimations for the spending and the revenue equations):

$$\hat{\beta}_i^{G,R} = \alpha_1 + \sum_j \theta_j E_{ij} + \sum_j \phi_j P_{ij} + \sum_j \delta_j D_{ij} + \omega_i \quad (3)$$

⁴The results are qualitatively unchanged if we enter the variables in differences.

⁵The time series properties of government spending, government revenue and GDP show that the series are integrated of order one and, at the same time, inspection of autocorrelation of the residuals of (1) and (2) and unit root tests, indicate that they are stationary. This implies that our estimates are super-consistent. Moreover, from a theoretical point of view, G and Y , and R and Y , should be co-integrated given that the spending-to-GDP and revenue-to-GDP ratios are bounded and strictly greater than zero.

⁶See also Fatás and Mihov (2003) for a similar approach. Overidentifying restriction tests (notably Wooldridge's 1995 score test), indicate that the selected set of instruments is valid. However, to conserve space they are not reported.

$$\hat{\gamma}_i^{G,R} = \alpha_2 + \sum_j \theta_j E_{ij} + \sum_j \phi_j P_{ij} + \sum_j \delta_j D_{ij} + \nu_i \quad (4)$$

$$\log(\hat{\sigma}_i^{G,R}) = \alpha_3 + \sum_j \theta_j E_{ij} + \sum_j \phi_j P_{ij} + \sum_j \delta_j D_{ij} + \xi_i \quad (5)$$

for $i = 1, \dots, N$ and where: E denotes macroeconomic variables; P denotes political and institutional variables; D denotes demographic and geographic variables; ω , ν , and ξ are well-behaved residuals; α s are nuisance coefficients; θ , ϕ , and δ are our coefficients of interest.

In more detail, the set of controls consists of the following variables:⁷

- (i) Macroeconomic variables (E): (a) GDP per capita; (b) openness; (c) GDP deflator-based inflation rate; (d) government size, and (e) country size.⁸
- (ii) Political and institutional variables (P): (a) an index of the level of democracy; (b) an index for political stability; (c) an index for presidential versus parliamentary electoral systems; (d) an index that accounts for constitutional limits on the number of years the executive can serve before new elections; (e) an index of government effectiveness; (f) the Herfindahl index of party concentration in the government; (g) a dummy if the chief executive is a military officer.⁹
- (iii) Geographic variables (D):¹⁰ (a) the log of absolute latitude (kilometers from the equator); (b) regional dummies for developing countries from (b1) Latin America, (b2) Sub-Saharan Africa, (b3) East Asia, (b4) South Asia, (b5) Europe-Central Asia, (b6) Middle East-North Africa; (c) dummy for EU countries.¹¹

Since our dependent variables are based on estimates, the regression residuals can be thought of as having two components. The first component is sampling error (the difference between the true value of the dependent variable and its estimated value). The second component is the random shock that would have been obtained even if the dependent variable was observed directly as opposed to estimated. This would lead to an increase in the standard deviation of the estimates, which would lower the t -statistics. This means that any correction to the presence of this un-measurable error term will increase the significance of our estimates. Related to this problem would be the possibility of heteroskedasticity. In most of our estimations heteroskedasticity turns out not to be a problem, and when it does, we correct for that using White standard errors.¹²

⁷See the [Appendix](#) for a detailed description of the variables and sources.

⁸As found in Alesina and Wacziarg (1998), Rodrick (1998), Fatás and Mihov (2001, 2003) and Furceri and Poplawski (2008), economic variables are correlated with automatic stabilizers as well as with persistence and spending volatility. Among others, see these papers for a more detailed discussion.

⁹The economic literature has generally focused on political and institutional characteristics to explain cross country differences in government spending (Drazen 2000; Persson 2001; Persson and Tabellini 2001). See Fatás and Mihov (2003) for a more detailed discussion.

¹⁰Alesina and Wacziarg (1998) have found that geographical variables are important to explain cross country differences in government spending.

¹¹As suggested by La Porta et al. (1998), it is likely that latitude from the equator, income and regional dummies are related to the quality of government and institutions.

¹²In contrast, it does not seem that a serious problem of endogeneity occurs with respect to the second stage. In fact, it is unlikely that measures of persistence, discretion and responsiveness can alter geographical, institutional and macroeconomic variables as well. The only concern may arise for the government size variable, but given the difficulty of finding a valid instrument and the lack of theory and empirical evidence suggesting that fiscal characteristics can significantly affect government size, we did not address this issue.

We estimate (3) and (4) by Weighted Least Squares (WLS). This choice takes account of the fact that the dependent variables are measured with different degrees of precision across countries, and that some of the estimated values of our dependent variables are not statistically significant from zero.¹³

3 Results and discussion

3.1 How important are fiscal characteristics?

We use data from the *IMF World Economic Outlook* for a set of 132 countries and the period 1980 to 2007 (see the data Appendix for further details).¹⁴ Moreover, we perform a similar exercise for the 15 “old” members of the European Union (EU-15) using data from the European Commission annual macro-economic (AMECO) database for the period 1960 to 2007.

We start our empirical analysis by estimating the coefficients of the components of responsiveness, persistence and discretion of fiscal policy. The results for both government spending and revenue, over the full set of countries are reported in Table 1. Looking at the table it is possible to see that in terms of magnitude the coefficient of persistence in the great majority of the cases is larger than the one of responsiveness. This is also confirmed by the fact that while the coefficient of persistence is statistically significant in most of the cases (73 times for spending and 68 times for revenue) the coefficient used as our measure of fiscal responsiveness is statistically significant for fewer cases (42 times for spending and 48 for revenue). Thus, it seems that, in general, fiscal policy tends to be more persistent than to respond to current output conditions. In addition, it is also worthwhile noting that while government revenue reacts relatively more to output than government spending, spending overall seems to be more persistent than revenue.

We remark that our estimates for discretion are computed as the standard deviation of the residuals from both government spending and revenue equations. Thus, it is clear that the smaller and less significant are the coefficients of responsiveness and persistence the higher will be the component of discretion.¹⁵ This argument, together with the fact that fiscal policy seems to be more persistent than responsive, suggests a negative relation between the measures of persistence and discretion. This intuition is empirically confirmed. Figure 1 provides the scatter plot of our measure of persistence against the measure of discretion and shows that they exhibit a negative relationship. In particular, the estimate of this simple bivariate relation for the spending equation is:

$$\hat{\gamma}_i^G = \underset{(-0.89)}{-0.09} - \underset{(-5.39)}{0.190} \log(\hat{\sigma}_i^G)$$

¹³See Lane (2003) for a similar approach. All of the results presented do not change qualitatively when we estimate (3)–(5) by OLS.

¹⁴We have also analyzed data from the World Development Indicator CD-ROM 2007. The results with this data set are broadly similar and available upon request. However, for the IMF we had more data availability, especially for government revenue, and for many countries a longer time span was also available, which was needed for a meaningful estimation of the time-series regression. The results are reported only for those (111) countries from which time series data for the variables specified in (1) and (2) exceed 25 observations.

¹⁵Indeed, the lower the significance of the coefficients, the lower the *R*-square of the regression and the higher the variance of the residuals will be.

Table 1 Estimates of responsiveness (β), persistence (γ) and discretion (σ)

Country	Parameter estimates (1980–2007)					
	$\hat{\beta}_i^G$	$\hat{\beta}_i^R$	$\hat{\gamma}_i^G$	$\hat{\gamma}_i^R$	$\hat{\sigma}_i^G$	$\hat{\sigma}_i^R$
Angola	0.02	0.07	-0.29	0.56**	0.16	0.19
Albania	0.92	-0.50	0.63**	0.69	0.06	0.22
United Arab Emirates	1.74**	2.38	0.04	0.14	0.09	0.15
Argentina	1.48**	1.22	0.11	0.13	0.13	0.10
Australia	0.36	2.17***	0.81***	0.49***	0.03	0.03
Austria	-0.05	2.10***	0.75***	-0.12	0.02	0.03
Burundi	1.49***	2.83***	0.06	-0.12	0.11	0.11
Belgium	-0.42	-0.38	-0.10	0.57***	0.02	0.02
Burkina Faso	2.29	-0.71	-0.38	-0.19	0.12	0.22
Bulgaria	1.30***	2.15***	0.09	-0.23	0.06	0.07
Bahamas	-0.02	0.11	-0.02	0.47*	0.04	0.05
Belize	1.50***	0.02	0.22	0.79	0.09	0.10
Bolivia	1.79	-1.05	0.09	0.16	0.09	0.28
Brazil	0.52	-0.62	0.63	0.47	0.10	0.09
Barbados	0.83**	0.41**	0.33	0.24	0.07	0.03
Brunei	2.83	8.61	-0.01	0.06	0.10	0.16
Bhutan	0.30	0.23	0.24	0.23	0.14	0.13
Botswana	0.98**	0.33	0.24	0.64***	0.06	0.09
Central African Republic	0.04	0.30	0.32**	0.24	0.17	0.23
Canada	0.18	0.38**	0.91***	0.44**	0.02	0.02
Switzerland	-0.97	0.11	0.55**	0.36***	0.02	0.02
Chile	0.31	0.00	0.77***	0.29*	0.04	0.05
China	1.32***	1.32***	0.97***	0.93***	0.04	0.04
Cote d'Ivoire	0.09	0.34	0.64***	0.79***	0.08	0.08
Cameroon	1.39***	2.61***	0.09	-0.27	0.09	0.20
Congo, Rep.	2.21**	1.08*	0.18	0.15	0.13	0.09
Colombia	1.54***	0.91***	0.61***	0.42**	0.05	0.04
Comoros	5.65	7.27	0.28	0.27	0.16	0.17
Cape Verde	-1.26	-0.51	0.8***	0.58***	0.14	0.10
Costa Rica	0.66	-0.64	-0.09	0.10	0.11	0.15
Cyprus	0.17	-0.38	0.35**	0.58	0.04	0.04
Czech Republic	1.11***	1.63***	0.62***	0.4**	0.04	0.04
Germany	0.80***	0.85***	0.44***	0.38***	0.02	0.01
Dominica	0.24	-0.77	0.51***	0.75**	0.07	0.09
Denmark	-0.55**	0.77**	0.85***	0.37**	0.01	0.02
Dominican Republic	1.26*	0.15	0.40	0.28	0.12	0.12
Ecuador	4.48	0.33	0.31	0.34	0.17	0.15
Egypt, Arab Rep.	1.78***	0.17	0.31	0.48**	0.11	0.10
Spain	0.61***	0.71***	0.9***	0.73***	0.02	0.02
Ethiopia	2.73***	1.50	0.45***	0.58*	0.13	0.12
Finland	0.02	0.60***	0.85***	0.47***	0.03	0.03

Table 1 (Continued)

Country	Parameter estimates (1980–2007)					
	$\hat{\beta}_i^G$	$\hat{\beta}_i^R$	$\hat{\gamma}_i^G$	$\hat{\gamma}_i^R$	$\hat{\sigma}_i^G$	$\hat{\sigma}_i^R$
France	0.45*	-0.07	1.07***	0.71***	0.01	0.01
United Kingdom	-0.16	0.82	0.76***	0.51**	0.02	0.02
Guinea	4.22	3.55	0.24	0.21	0.15	0.15
Gambia, The	-0.79	-1.68	-0.12	0.58***	0.12	0.16
Guinea-Bissau	0.48	-0.04	-0.03	-0.02	0.17	0.29
Equatorial Guinea	0.23	0.47**	0.52***	0.4**	0.27	0.27
Greece	0.20	-0.70	0.39	0.88***	0.04	0.04
Guyana	-0.21	0.15	0.63***	0.06	0.13	0.14
Hong Kong, China	0.59	-0.81	0.76*	0.23	0.07	0.12
Haiti	-3.74	-5.82	0.97***	0.93***	0.28	0.36
Hungary	0.23	1.42***	0.71***	0.15	0.04	0.03
Indonesia	0.00	0.33	0.25	0.18	0.09	0.06
India	1.23**	0.63**	0.28*	-0.07	0.03	0.03
Ireland	0.26	0.31*	0.51***	0.33*	0.03	0.03
Iran, Islamic Rep.	0.57	0.51	0.48**	0.64**	0.15	0.17
Iceland	0.56**	0.82***	0.63***	0.32**	0.03	0.03
Israel	0.77***	0.33	0.48***	0.37*	0.02	0.05
Italy	1.15***	0.68*	0.81***	0.80***	0.02	0.02
Jamaica	-1.10	-1.24	0.40**	0.57**	0.07	0.10
Jordan	0.42	0.07	0.36	0.24	0.11	0.09
Japan	0.40**	1.10***	0.83***	0.42	0.02	0.03
Kenya	0.96**	0.47*	0.26	0.62***	0.08	0.05
Cambodia	-11.96*	-9.63**	-0.72	-0.37	0.22	0.27
Kiribati	0.97**	0.15	0.14	0.25	0.14	0.18
Korea, Rep.	0.25	0.03	0.88***	0.51***	0.04	0.04
Kuwait	-0.01	1.21***	0.60***	0.29**	0.09	0.12
Lao PDR	-0.77	2.71**	-0.27	-0.11	0.14	0.14
Lebanon	-0.26	1.31	0.94***	-0.04	0.18	0.23
Libya	0.24	-0.47	0.54*	0.34	0.12	0.13
St. Lucia	0.35	0.98**	0.38**	-0.08	0.08	0.07
Sri Lanka	0.78	0.05	0.30*	0.70***	0.05	0.05
Lesotho	0.16	0.45	0.50***	0.76**	0.09	0.08
Luxembourg	0.66*	0.37	0.56**	0.44*	0.05	0.04
Morocco	0.28	1.73**	0.51**	0.47**	0.05	0.07
Madagascar	-2.93	23.26	0.18	-1.51	0.19	0.69
Maldives	1.32	3.27	0.15	0.22	0.13	0.22
Mexico	0.86	-0.20	0.19	0.19	0.18	0.15
Mali	-0.22	-0.74	0.30	-0.12	0.08	0.22
Malta	0.39	0.00	0.55*	0.65**	0.07	0.07
Myanmar	1.21***	0.57	-0.02	0.36*	0.10	0.13
Mozambique	1.22**	1.44**	0.40***	0.62***	0.14	0.16

Table 1 (Continued)

Country	Parameter estimates (1980–2007)					
	$\hat{\beta}_i^G$	$\hat{\beta}_i^R$	$\hat{\gamma}_i^G$	$\hat{\gamma}_i^R$	$\hat{\sigma}_i^G$	$\hat{\sigma}_i^R$
Mauritania	-2.61	-3.05	0.75***	0.17	0.16	0.31
Mauritius	0.33	-1.14	0.60***	0.81*	0.05	0.07
Malawi	2.46*	3.65	-0.75	-0.35	0.20	0.23
Malaysia	-0.04	0.76**	0.11	0.23	0.05	0.06
Niger	-0.16	1.99*	0.66	-0.17	0.15	0.24
Nigeria	0.24	0.84	0.51*	0.55***	0.25	0.20
Nicaragua	3.37**	3.09**	0.18	0.23	0.17	0.17
Netherlands	0.81	0.69*	1.09***	0.59***	0.02	0.03
Norway	-0.92***	0.99***	0.27	0.55***	0.02	0.02
New Zealand	0.22	-0.49	0.79**	0.62**	0.05	0.05
Oman	0.47	0.64**	0.47**	0.59***	0.05	0.05
Pakistan	1.78	0.72	0.40	0.67**	0.06	0.06
Panama	0.39	0.63	0.27	0.22	0.06	0.10
Peru	-0.59	-1.16**	1.07*	0.77***	0.12	0.16
Philippines	-0.09	-0.49	0.59***	0.94***	0.07	0.08
Poland	0.75***	0.34	0.34***	0.65**	0.04	0.05
Portugal	0.41	0.28	0.47**	0.49**	0.07	0.07
Paraguay	1.37***	1.87***	0.54***	0.44**	0.08	0.06
Qatar	0.50	0.47*	0.33*	0.20	0.10	0.12
Romania	0.52	0.58	0.54***	0.59***	0.06	0.07
Senegal	2.19***	1.15*	0.34*	0.45	0.07	0.05
Singapore	2.92**	2.73	0.39	0.17	0.12	0.10
Sierra Leone	0.57	1.14	0.40**	0.30	0.21	0.28
El Salvador	1.58**	2.72***	0.75***	0.85***	0.10	0.11
Sao Tome and Principe	2.14	5.99*	0.36	0.11	0.25	0.43
Suriname	0.36	0.08	0.22	0.13	0.10	0.14
Sweden	-0.21	0.94***	0.68***	0.32	0.02	0.02
Swaziland	0.48	1.24***	0.50***	0.29**	0.08	0.06
Seychelles	1.27***	-0.44	0.02	0.83***	0.07	0.07
Syrian Arab Republic	0.11	0.93	0.64***	0.32*	0.08	0.09
Chad	-0.05	0.78	0.55***	0.77***	0.14	0.18
Togo	0.30	-0.18	0.55***	0.56	0.11	0.22
Thailand	0.78***	1.65***	0.91***	-0.21	0.06	0.05
Tonga	2.05***	0.73	-0.01	0.49	0.14	0.10
Trinidad and Tobago	1.09***	0.55**	0.27	0.27	0.06	0.06
Tunisia	2.06	3.72	0.04	0.13	0.06	0.08
Turkey	0.06	0.28	0.40	0.14	0.09	0.08
Taiwan	1.75*	1.38	0.19	-0.01	0.07	0.05
Tanzania	0.95	0.85	0.23	0.04	0.11	0.09
Uganda	1.28	2.02*	0.16	0.08	0.17	0.18

Table 1 (Continued)

Country	Parameter estimates (1980–2007)					
	$\hat{\beta}_i^G$	$\hat{\beta}_i^R$	$\hat{\gamma}_i^G$	$\hat{\gamma}_i^R$	$\hat{\sigma}_i^G$	$\hat{\sigma}_i^R$
Uruguay	0.84***	1.05**	0.47**	0.41*	0.05	0.06
United States	0.27	1.05***	0.83***	0.51**	0.01	0.03
St. Vincent and the Grenadines	-0.07	-1.31	0.58*	0.59*	0.09	0.08
Venezuela, RB	1.07	-0.29	-0.04	0.63	0.11	0.11
Vietnam	-1.15	-1.27	0.28	0.83***	0.14	0.10
Vanuatu	0.95	1.21**	0.47**	0.35**	0.13	0.12
Samoa	-1.40	0.37	0.49**	0.36*	0.10	0.14
South Africa	-0.59	0.69*	0.68***	0.49**	0.03	0.03
Zambia	0.90	-0.27	0.30	-0.21	0.11	0.14
Zimbabwe	0.08	-0.35	0.63*	0.88***	0.16	0.13

Notes: G—expenditure; R—revenue

*Significant at 10%; **Significant at 5%; ***Significant at 1%

with $R^2 = 0.18$ (t -statistics are in parentheses). The negative relationship also holds for the revenue equation (see also Fig. 2):

$$\hat{\gamma}_i^R = -0.00 - 0.143 \log(\hat{\sigma}_i^R)$$

(-0.01)
(-4.16)

with $R^2 = 0.12$ (t -statistics are in parentheses). Thus, it seems that countries with greater persistence have a lower discretionary component of fiscal policy.

Analyzing jointly responsiveness and persistence we can see also that a significant negative relation between these two fiscal characteristics exists (see Figs. 3 and 4). In particular, the estimate of this simple bivariate relation (excluding outliers) for the spending equation is:

$$\hat{\gamma}_i^G = 0.486 - 0.096 \hat{\beta}_i^G$$

(16.11)
(-4.32)

while for the revenue equation is:

$$\hat{\gamma}_i^R = 0.426 - 0.071 \hat{\beta}_i^R$$

(16.33)
(-4.76)

Finally, we did not find any significant relation between responsiveness and discretion (see Figs. 5 and 6).

In order to check the robustness of our results, we consider another data source for both revenues and government spending: the AMECO dataset comprising data from 1960 to 2007 for European Union countries. Therefore, we have considered the “old” EU-15 countries, with exception of Luxemburg, for which data are not available for the period 1988–1989. For comparative purposes, we have decided to include also the United States and Japan.

Table 2 reports parameter estimates of responsiveness, persistence and discretion from the estimation of (1)–(2). We note that, while parameter estimates $\hat{\gamma}_i^G$ and $\hat{\gamma}_i^R$ are always statistically significant (at 1% for all countries), estimates of β s are significant only for 62% of the cases (10 countries out of 16 for both revenues and spending).

Finally, in Table 3 we also report a rank analysis for our measures of responsiveness, persistence and discretion (IMF and AMECO datasets). The results corroborate the negative

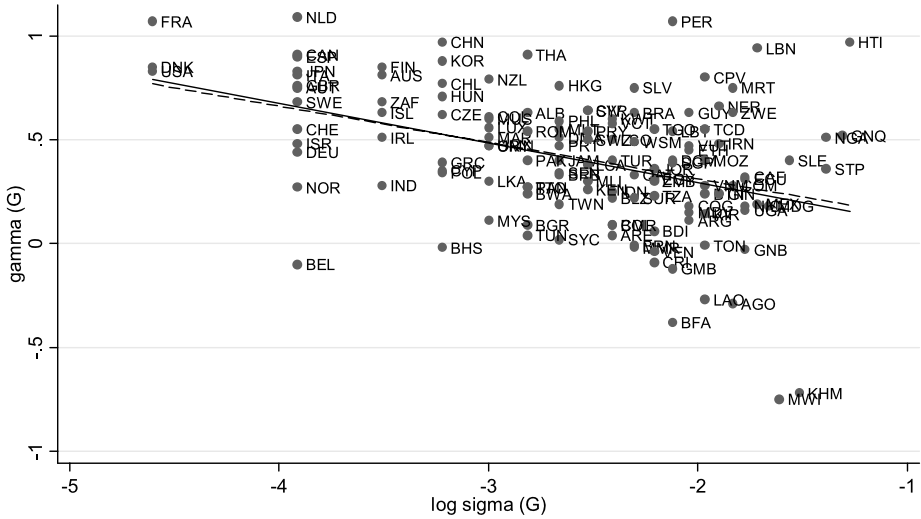


Fig. 1 Scatter plot of $\hat{\gamma}_i^G$ vs. $\hat{\sigma}_i^G$ from country-specific spending equation. Note: *The solid line denotes the trend and the dashed line is the trend computed excluding Cambodia (KHM) and Madagascar (MDG)*

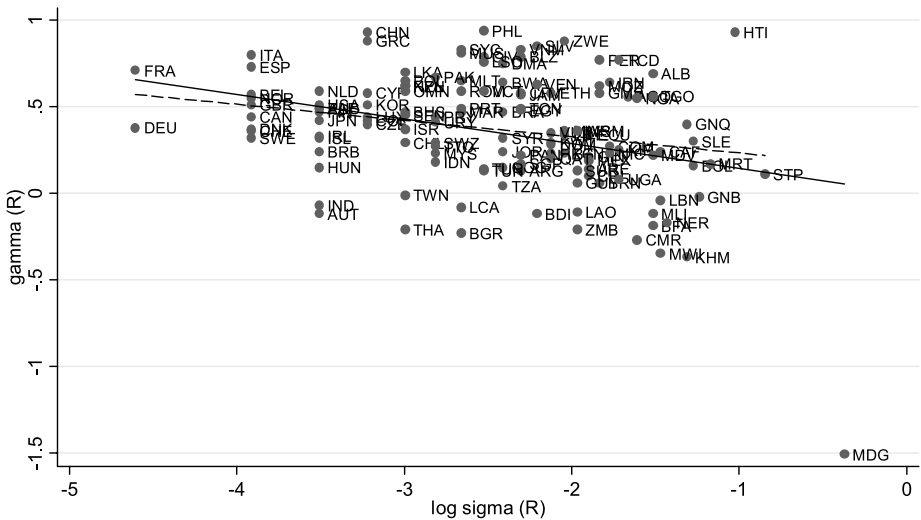


Fig. 2 Scatter plot of $\hat{\gamma}_i^R$ vs. $\hat{\sigma}_i^R$ from country-specific revenue equation. Note: *The solid line denotes the trend and the dashed line is the trend computed excluding Cambodia (KHM) and Madagascar (MDG)*

relation between persistence and responsiveness, and between persistence and discretion of both government spending and revenue.

3.2 What are the determinants of fiscal characteristics?

In the previous section we found a significant and negative relation between the fiscal components of discretion and persistence, and persistence and responsiveness. However, it has

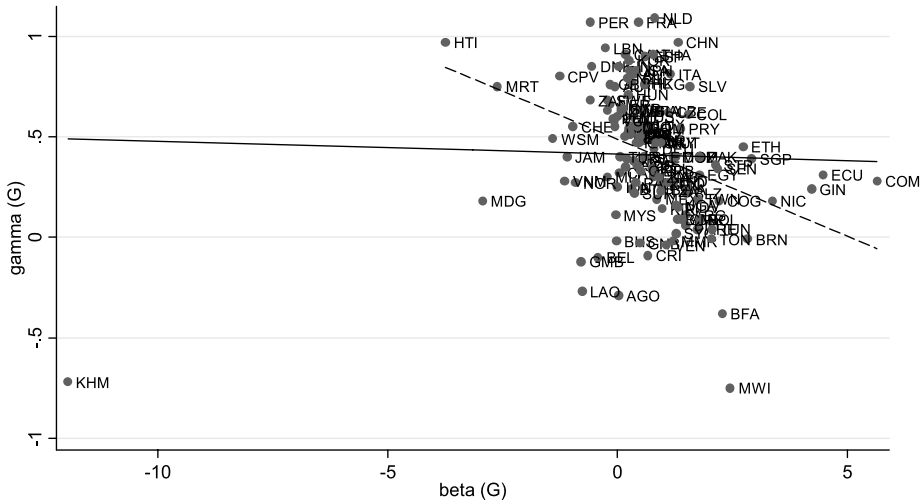


Fig. 3 Scatter plot of $\hat{\gamma}_i^G$ vs. $\hat{\beta}_i^G$ from country-specific spending equation. Note: *The solid line* denotes the trend and *the dashed line* is the trend computed excluding outlier, namely Cambodia (KHM)

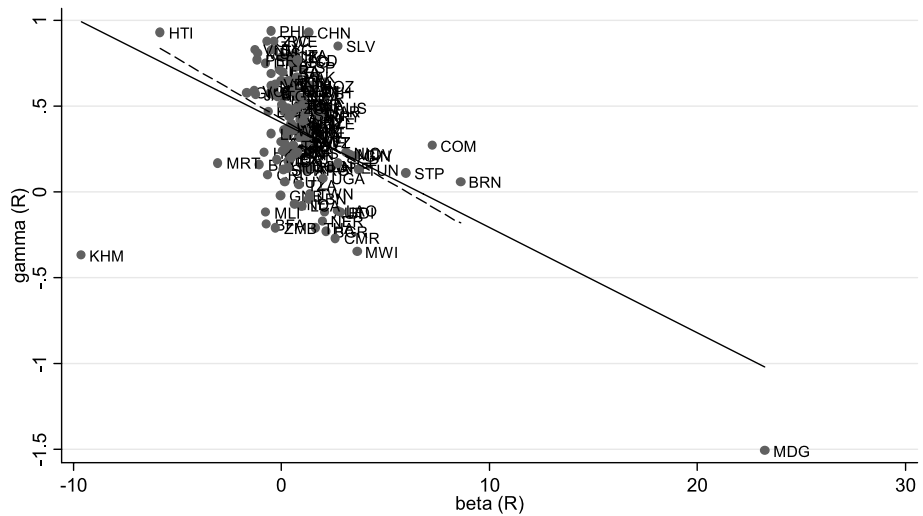


Fig. 4 Scatter plot of $\hat{\gamma}_i^R$ vs. $\hat{\beta}_i^R$ from country-specific revenue equation. Note: *The solid line* denotes the trend and *the dashed line* is the trend computed excluding outliers, namely Cambodia (KHM) and Madagascar (MDG)

to be kept in mind that we cannot infer any causal relation between these three components of fiscal policy since they are simultaneously determined by macroeconomic, institutional, political and geographic variables. Thus, it is also likely that the sign of some of these variables will be different in the econometric specification for our measures of persistence, responsiveness, and discretion.

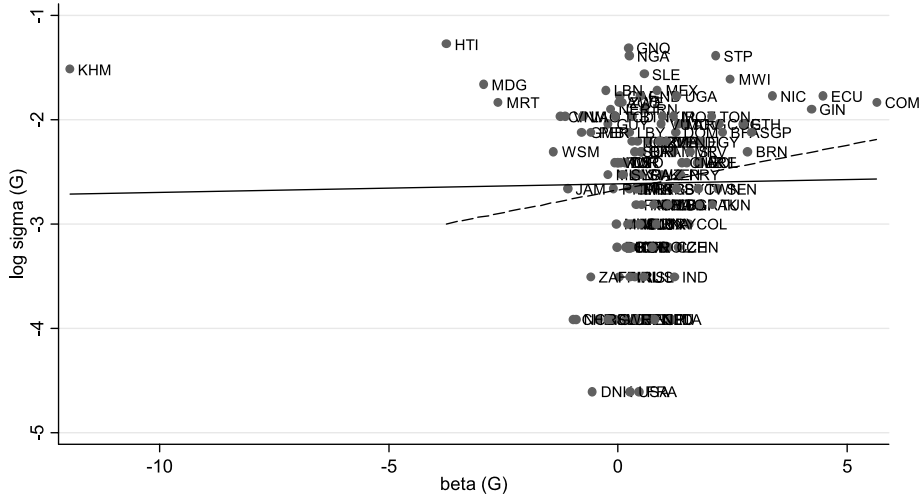


Fig. 5 Scatter plot of $\hat{\sigma}_i^G$ vs. $\hat{\beta}_i^G$ from country-specific spending equation. Note: *The solid line* denotes the trend and *the dashed line* is the trend computed excluding outlier, namely Cambodia (KHM)

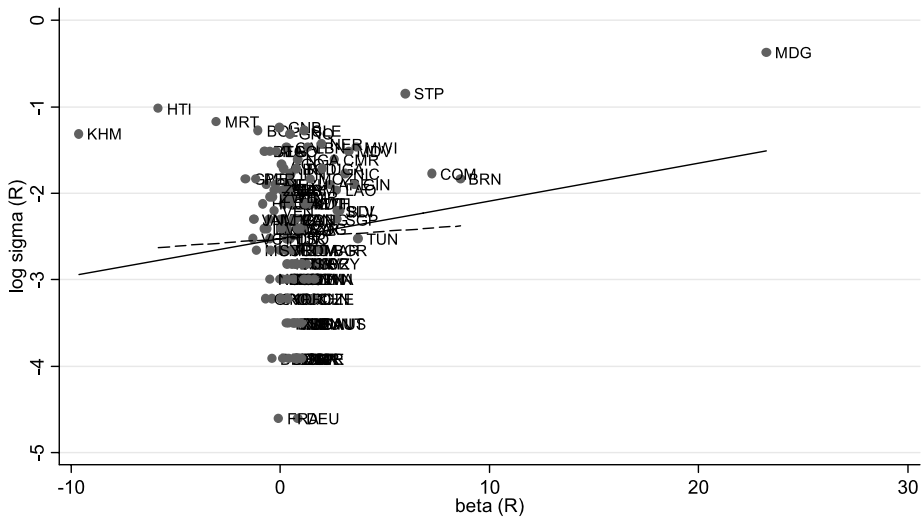


Fig. 6 Scatter plot of $\hat{\sigma}_i^R$ vs. $\hat{\beta}_i^R$ from country-specific revenue equation. Note: *The solid line* denotes the trend and *the dashed line* is the trend computed excluding outliers, namely Cambodia (KHM) and Madagascar (MDG)

3.2.1 Government spending

We start our analysis by assessing the cross-country determinants of responsiveness of fiscal policy. In Table 4 we report the results of estimating (3) for government spending. From the first column of the table, we can see that the only variable that is highly statistically significant is income, while openness is relevant to a lesser extent. This result is in line with other evidence in the literature (such as Lane 2003). However, when we include the other set

Table 2 Results with AMECO dataset

Country	Parameter estimates (1980–2007)					
	$\hat{\beta}_i^G$	$\hat{\beta}_i^R$	$\hat{\gamma}_i^G$	$\hat{\gamma}_i^R$	$\hat{\sigma}_i^G$	$\hat{\sigma}_i^R$
Austria	0.59***	0.52**	0.78***	0.76***	0.02	0.02
Belgium	0.97***	0.39*	0.66***	0.79***	0.03	0.01
Germany	0.51**	0.42*	0.73***	0.73***	0.02	0.03
Denmark	0.36	1.15*	0.90***	0.68***	0.03	0.04
Spain	0.28*	0.39	0.99***	0.93***	0.02	0.03
Finland	0.24*	0.39***	0.93***	0.80***	0.04	0.04
France	0.06	−0.15	0.90***	1.03***	0.01	0.02
United Kingdom	0.47*	0.54**	0.85***	0.81***	0.04	0.03
Greece	0.08	0.16	0.88***	0.77***	0.04	0.03
Ireland	−0.01	−0.02	0.69***	0.65***	0.04	0.03
Italy	0.59***	0.14	0.75***	0.89***	0.02	0.03
Netherlands	0.46***	0.55***	0.85***	0.81***	0.02	0.02
Portugal	0.44***	0.5***	0.86***	0.67***	0.04	0.04
Sweden	−0.39	0.03	0.77***	0.79***	0.03	0.03
United States	0.28	0.76***	0.83***	0.59***	0.02	0.02
Japan	0.32***	0.27***	0.77***	0.78***	0.04	0.03

Note: Luxembourg is excluded from the AMECO dataset because of lack of data during the period 1988–1989

*Significant at 10%; ** Significant at 5%; *** Significant at 1%

Table 3 Spearman correlation matrix

	IMF dataset (111 obs.)					
	β^G	β^R	γ^G	γ^R	σ^G	σ^R
β^G	1					
β^R	0.413	1				
γ^G	−0.352	−0.051	1			
γ^R	−0.157	−0.367	0.395	1		
σ^G	0.111	0.005	−0.391	−0.279	1	
σ^R	0.084	−0.062	−0.388	−0.309	0.900	1
	Ameco dataset (16 obs.)					
	β^G	β^R	γ^G	γ^R	σ^G	σ^R
β^G	1					
β^R	0.574	1				
γ^G	−0.366	0.117	1			
γ^R	−0.061	−0.383	0.395	1		
σ^G	−0.204	−0.070	−0.013	−0.318	1	
σ^R	−0.228	0.020	0.376	−0.166	0.577	1

Note: Luxembourg is excluded from the AMECO dataset because of lack of data during the period 1988–1989

Table 4 Determinants of spending responsiveness ($\hat{\beta}_i^G$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	-0.069 (-0.66)	-0.045 (-0.42)	-0.050 (-0.39)	-0.202 (-1.42)	-0.197 (-1.43)
Income	-0.176 (-4.68)***	-0.086 (-1.29)	-0.048 (-0.66)	-0.155 (-1.53)	-0.046 (-0.57)
Openness	-0.145 (-1.81)*	-0.128 (-1.59)	-0.098 (-1.14)	-0.170 (-1.57)	-0.238 (-2.46)**
Inflation	-0.000 (-0.65)	-0.001 (-1.38)	-0.001 (-1.32)	-0.000 (-0.06)	-0.001 (-0.64)
Country size	-0.000 (-0.02)	0.012 (0.53)	0.008 (0.32)	0.042 (1.25)	0.020 (0.76)
Institutional					
Government effectiveness		-0.106 (-1.59)	-0.158 (-1.95)**	0.015 (0.16)	0.021 (0.23)
Political					
Political system			-0.003 (-0.06)	0.038 (0.74)	0.025 (0.48)
Parties concentration			0.000 (0.76)	0.000 (0.20)	0.000 (0.93)
Veto drops			0.045 (0.34)	-0.038 (-0.28)	0.005 (0.03)
Special interests			-0.187 (-1.53)	-0.212 (-1.64)	-0.263 (-2.10)**
Military officer			-0.000 (-0.52)	-0.001 (-1.15)	-0.001 (-1.01)
Finite term			0.001 (0.99)	0.001 (1.18)	0.001 (1.06)
Geographic					
Distance from Equator				0.011 (3.82)***	0.012 (3.92)***
East Asia & Pacific				0.082 (0.36)	
Europe & Central Asia				0.316 (1.66)*	
Latin America & Caribbean				0.462 (3.00)***	
Middle East & North Africa				0.240 (0.95)	
South Asia				0.473 (1.33)	
Sub-Saharan Africa				0.035 (0.15)	
Developing countries					0.407 (2.98)***
EU countries					-0.020 (-0.21)
Goodness of fit χ^2	220.48***	215.40***	204.56***	176.77***	183.53***
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. WLS estimates

*Significant at 10%; **Significant at 5%; ***Significant at 1%

of variables (column 4), we find that none of the macro, political and institutional variables is statistically significant. In contrast, as argued by Gavin and Perotti (1997a), we find that government spending is highly pro-cyclical in Latin America. Moreover, we also find that developing countries tend to be more pro-cyclical (column 5).

We now proceed to analyze the determinants of the persistence and discretion of government spending. In Table 5 we report the WLS results of estimating (4) and in Table 6 we report the OLS results of estimating (5). In particular, as we did for the estimate of our responsiveness equation, we report five columns each presenting a different specification of the set of controls.

Looking at the first column of Table 5, we can see that most of the macroeconomic variables are statistically significant. In particular, we found that spending persistence is positively related to government size, income and country size, while it is negatively related to inflation. In addition, we also found that institutional variables (such as veto players who drop from the government in any given year, special interest, military officer and finite chief executive term) have a significant impact on the component of fiscal persistence. Finally we also see that government spending in developing countries is less persistent, which could be explained by the fact that they are characterized by a larger responsiveness component.

The results for the determinants of spending discretion are reported in Table 6. Looking at the five columns of the table we can see that macroeconomic variables, institutional, political and geographic variables significantly explain cross-country variation in discretionary spending. Starting with the first column, we can observe that all of the macro variables (with the exception of openness) are significantly related to the discretionary component of spending and with the expected sign. The discretionary component of spending is negatively related to government size, since usually bigger governments have more stable spending and more automatic stabilizers in place (Fatás and Mihov 2001 and Furceri 2009b). Income (GDP per capita) is negatively related to the discretionary component of spending, since it is likely that poorer countries have a more volatile business cycle due to less developed financial markets, and at the same time may resort more often to discretionary fiscal policy (Rand and Tarp 2002). Inflation is positively related to a larger discretionary component of spending volatility, since higher inflation corresponds to greater price volatility affecting thereby the discretionary component of spending.

Moreover, the discretionary component tends to be larger in smaller countries (government spending tends to be more volatile). In fact, as argued by Furceri and Poplawski (2008) a negative relationship between government spending volatility and country size can be explained by two arguments: (i) to the extent that government spending is used for fine-tuning purposes, smaller economies, characterized by more volatile output and more exposure to idiosyncratic shocks, may use government spending more aggressively; (ii) to the extent that public goods are of a non-rival nature, increasing returns to scale in government spending may originate from the greater ability to spread the cost of financing it over a larger pool of taxpayers. Interestingly, comparing the results regarding macroeconomic variables in Table 5 (persistence) and Table 6 (discretion), we find that these variables enter in the estimation of the two components of fiscal policy with opposite signs. This could be explained by the fact that these components are negatively correlated. Thus, it seems that macro-economic variables are significant in shaping the behavior in terms of fiscal persistence and discretion and leading to a negative relation between these two components.

In the second column of Table 6 we present the results obtained when institutional variables are taken into account. While the macroeconomic variables continue to be significant, we find that also that government effectiveness is significantly and negatively related to the discretionary component of spending. This is in line with previous results in the literature

Table 5 Determinants of spending persistence ($\hat{\gamma}_i^G$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	0.083 (2.29)***	0.080 (2.19)***	0.146 (2.93)***	0.133 (2.61)***	0.155 (3.04)***
Income	0.108 (7.78)***	0.124 (5.07)***	0.126 (4.94)***	0.098 (2.84)***	0.085 (2.97)***
Openness	-0.444 (-1.15)	-0.043 (-1.10)	-0.012 (-0.29)	0.013 (0.28)	0.031 (0.68)
Inflation	-0.003 (-4.07)**	-0.003 (-4.12)**	-0.003 (-3.85)**	-0.003 (-3.72)**	-0.003 (-3.36)**
Country size	0.039 (4.01)***	0.039 (3.96)***	0.041 (3.78)***	0.047 (3.46)***	0.048 (4.16)***
Institutional					
Government effectiveness		-0.022 (-0.78)	-0.019 (-0.61)	-0.024 (-0.68)	-0.018 (-0.49)
Political					
Political system			0.008 (0.38)	-0.009 (-0.41)	0.006 (0.25)
Parties concentration			-0.000 (-0.10)	0.000 (0.64)	0.000 (0.14)
Veto drops			0.113 (2.03)**	0.119 (2.08)**	0.138 (2.44)**
Special interest			-0.125 (-2.42)**	-0.150 (-2.86)***	-0.155 (-2.97)**
Military officer			0.001 (3.49)***	0.000 (3.62)***	0.001 (3.73)***
Finite term			-0.000 (-3.32)***	-0.000 (-3.07)***	-0.000 (-3.44)***
Geographic					
Distance from Equator				0.001 (0.91)	0.001 (1.31)
East Asia & Pacific				-0.095 (-1.03)	
Europe & Central Asia				-0.132 (-1.51)	
Latin America & Caribbean				-0.088 (-1.36)	
Middle East & North Africa				-0.248 (-2.78)***	
South Asia				-0.363 (-3.18)***	
Sub-Saharan Africa				-0.059 (-0.66)	
Developing countries					-0.168 (-2.82)***
EU countries					-0.095 (-1.82)*
Goodness of fit χ^2	214.63***	213.73***	182.85***	160.93***	171.16***
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. WLS estimates

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Table 6 Determinants of spending discretion ($\hat{\sigma}_i^G$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	-0.198 (-2.49)***	-0.206 (-2.69)***	-0.177 (-2.00)**	-0.180 (-1.86)*	-0.160 (-1.67)*
Income	-0.497 (-12.48)***	-0.298 (-5.72)***	-0.262 (-5.06)***	-0.332 (-5.44)***	-0.232 (-4.15)***
Openness	0.016 (0.15)	0.072 (0.76)	0.094 (0.93)	0.089 (0.78)	0.085 (0.79)
Inflation	0.005 (7.85)***	0.002 (3.23)***	0.002 (1.92)*	0.002 (3.27)***	0.002 (2.05)**
Country size	-0.103 (-4.54)***	-0.090 (-4.27)***	-0.103 (-4.50)***	-0.091 (-3.05)***	-0.093 (-3.77)***
Institutional					
Government effectiveness		-0.327 (-5.32)***	-0.326 (-5.73)***	-0.192 (-2.42)**	-0.237 (-3.40)***
Political					
Political system			-0.135 (-2.85)***	-0.100 (-1.93)*	-0.099 (-2.16)**
Parties concentration			0.001 (3.99)***	0.000 (2.22)**	0.001 (3.98)***
Veto drops			-0.191 (-1.62)	-0.194 (-1.52)	-0.207 (-1.36)
Special interest			0.072 (0.60)	0.127 (1.13)	0.092 (-0.78)
Military officer			0.001 (3.90)***	0.000 (1.81)*	0.001 (3.03)***
Finite term			-0.000 (-2.81)***	-0.000 (-2.25)**	-0.001 (-3.32)***
Geographic					
Distance from Equator				0.000 (0.01)	0.000 (0.09)
East Asia & Pacific				0.333 (1.94)*	
Europe & Central Asia				0.074 (0.47)	
Latin America & Caribbean				0.470 (2.48)**	
Middle East & North Africa				0.279 (1.22)	
South Asia				-0.028 (-0.14)	
Sub-Saharan Africa				0.113 (0.66)	
Developing countries					0.285 (1.74)*
EU countries					-0.130 (-1.04)
R-square	0.67	0.73	0.78	0.82	0.80
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. OLS estimates

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

(Persson and Tabellini 2001 and Fatás and Mihov 2003). Moreover, we find that considering alternatively different proxies for the quality of institutions (voice and accountability; political stability; regulatory quality; rule of law; and control of corruption) the results are almost unchanged (due to the high correlation among these indicators).¹⁶

In the third column of Table 6, we show the results when political variables are also included. We can see that the following variables are also related to our discretionary component measure: political system proxy variables, parties' concentration, the dummy for military officer and for a finite chief executive term. In particular, in line with Persson and Tabellini (2001), we find that the presidential system is associated with a larger discretionary component of spending. Indeed, in a parliamentary system the executive is supported by the parties in the parliament and therefore is constrained in the implementation of policy by the threat of a no-confidence vote. On the other hand, in a presidential system the president does not face such a requirement and hence can alter more easily policy either for opportunistic or partisan reasons. Therefore, presidential regimes may be associated with more volatile discretionary spending policies.

We also find that a lower level of political party concentration in the government leads to greater discretion, since proportional systems lead to coalitions and fiscal deadlocks which delay stabilizations and increase the discretionary component of spending (as argued by Alesina and Perotti 1994).

Finally, the presence of a finite chief executive term (a dummy variable that assumes the value 1 if the number of mandates is limited, and the value 0 otherwise) makes the government more accountable and constrains discretionary measures (Ferejohn 1986), while a military officer at the head of government (dummy assumes 1 if this is the case) tends to result in the use of fiscal policy in a more activist way. The results are robust when we include geographic and regional variables.

3.2.2 Government revenue

The results for the revenue responsiveness component are obtained when we estimate (3) for government revenue (see Table 7). In particular, looking at the columns 4 and 5 of the table, we can see that government size, government effectiveness, special interests, East Asia & Pacific, Europe & Central Asia, and developing countries dummies are positively associated with revenue responsiveness. This different behaviour in the responsiveness of government spending and revenue is coherent with the fact that countries with pro-cyclical (counter-cyclical) spending may not have necessarily pro-cyclical (counter-cyclical) revenue, and vice versa.

In Tables 8 and 9, we report the estimates of (4) and (5) for government revenue. Analyzing first the results for the component of revenue persistence (Table 8) we can see that, as for the spending specification, macroeconomic variables, such as income and country size, are statistically significant and they have opposite signs with respect to the revenue discretion equation. In contrast, government effectiveness, political system and party concentration have the same sign in both the persistence and discretion equation (Tables 8 and 9). Other variables, such as military officer and finite chief executive term, are significant only in the persistence specification, and the signs of their coefficients are the same as in the spending specification.

Focusing on the revenue discretion equation (Table 9), we can observe that, similarly to the volatility of government spending discretion, government size, country size, income,

¹⁶Results are not reported, but are available upon request.

Table 7 Determinants of revenue responsiveness ($\hat{\beta}_i^R$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	0.219 (1.95)**	0.206 (1.78)*	0.413 (3.18)***	0.235 (1.63)*	0.390 (2.82)***
Income	-0.011 (-0.28)	0.014 (0.21)	-0.025 (-0.33)	0.006 (0.06)	0.012 (0.14)
Openness	-0.028 (-0.31)	-0.031 (-0.34)	-0.060 (-0.62)	-0.395 (-3.19)***	-0.155 (-1.49)
Inflation	-0.002 (-1.96)**	-0.002 (-1.92)**	-0.003 (-2.40)**	-0.002 (-1.26)	-0.003 (-2.16)**
Country size	0.000 (0.04)	-0.003 (-0.12)	0.003 (0.10)	-0.049 (-1.44)	0.014 (0.51)
Institutional					
Government effectiveness		-0.032 (-0.48)	0.045 (0.49)	0.214 (2.09)**	0.174 (1.72)*
Political					
Political system			-0.023 (-0.43)	-0.053 (-0.89)	-0.006 (-0.10)
Parties concentration			-0.000 (-2.03)**	-0.000 (-1.74)*	-0.001 (-1.87)*
Veto drops			0.089 (0.69)	0.081 (0.61)	0.062 (0.48)
Special interests			0.317 (2.65)***	0.275 (2.20)**	0.285 (2.34)**
Military officer			0.000 (0.25)	-0.000 (-0.25)	-0.000 (-0.13)
Finite term			0.000 (0.49)	0.000 (0.78)	0.000 (0.38)
Geographic					
Distance from Equator				0.009 (2.56)***	0.008 (2.24)**
East Asia & Pacific				0.770 (3.30)***	
Europe & Central Asia				0.906 (3.75)***	
Latin America & Caribbean				0.050 (0.30)	
Middle East & North Africa				0.345 (1.46)	
South Asia				0.259 (0.84)	
Sub-Saharan Africa				0.334 (1.26)	
Developing countries					0.323 (2.14)**
EU countries					-0.045 (-0.43)
Goodness of fit χ^2	262.78***	262.32***	237.07***	212.55***	228.08***
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. WLS estimates

*Significant at 10%; **Significant at 5%; ***Significant at 1%

Table 8 Determinants of revenue persistence ($\hat{\gamma}_i^R$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	0.063 (1.62)*	0.064 (1.66)*	0.098 (1.96)**	0.067 (1.28)	0.078 (1.53)
Income	0.021 (1.32)	0.069 (2.36)**	0.068 (2.28)**	0.066 (1.62)*	0.046 (1.41)
Openness	0.023 (0.50)	0.018 (0.39)	0.113 (2.23)**	0.059 (0.98)	0.078 (1.45)
Inflation	-0.000 (-0.20)	-0.000 (-1.03)	-0.000 (-0.94)	-0.000 (-0.67)	-0.000 (-0.60)
Country size	0.039 (3.85)***	0.040 (3.89)***	0.045 (4.03)***	0.052 (3.49)***	0.054 (4.52)***
Institutional					
Government effectiveness		-0.063 (-1.95)**	-0.027 (-0.71)	-0.002 (-0.05)	-0.004 (-0.10)
Political					
Political system			-0.071 (-2.71)***	-0.060 (-2.10)**	-0.074 (-2.64)***
Parties concentration			0.000 (2.55)***	0.000 (2.73)***	0.000 (2.61)***
Veto drops			0.184 (3.00)***	0.184 (2.93)***	0.156 (2.49)**
Special interests			-0.008 (-0.16)	-0.031 (-0.57)	-0.017 (-0.31)
Military officer			0.001 (2.89)***	0.000 (2.64)***	0.001 (2.63)***
Finite term			-0.000 (-2.89)***	-0.000 (-2.94)***	-0.000 (-2.92)***
Geographic					
Distance from Equator				0.004 (3.42)***	0.004 (3.32)***
East Asia & Pacific				0.102 (0.98)	
Europe & Central Asia				-0.109 (-0.94)	
Latin America & Caribbean				0.016 (0.20)	
Middle East & North Africa				0.002 (0.02)	
South Asia				-0.210 (-1.67)*	
Sub-Saharan Africa				0.088 (0.77)	
Developing countries					-0.006 (0.08)
EU countries					0.039 (0.61)
Goodness of fit χ^2	254.04***	250.07***	219.30***	195.74***	206.74***
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. WLS estimates

*Significant at 10%; **Significant at 5%; ***Significant at 1%

Table 9 Determinants of revenue discretion ($\hat{\sigma}_i^R$)

Explanatory variables	1	2	3	4	5
Macro					
Government size	-0.254 (-2.63) **	-0.288 (-2.96) **	-0.282 (-2.86) ***	-0.286 (-2.92) ***	-0.256 (-2.54) **
Income	-0.521 (-11.29) ***	-0.298 (-3.81) ***	-0.244 (-3.12) ***	-0.306 (-3.45) ***	-0.229 (-2.74) ***
Openness	-0.072 (-0.59)	-0.021 (-0.20)	-0.042 (-0.43)	-0.069 (-0.59)	-0.019 (-0.17)
Inflation	0.005 (11.65) ***	0.002 (2.04) **	0.001 (1.69) *	0.002 (2.18) **	0.002 (1.82) *
Country size	-0.130 (-4.52) ***	-0.129 (-4.63) ***	-0.162 (-6.33) ***	-0.166 (-4.90) ***	-0.151 (-5.92) ***
Institutional					
Government effectiveness		-0.356 (-4.24) ***	-0.366 (-4.62) ***	-0.276 (-3.00) ***	-0.314 (-3.72) ***
Political					
Political system			-0.163 (-3.39) ***	-0.171 (-3.43) ***	-0.132 (-2.64) ***
Parties concentration			0.001 (2.47) **	0.000 (1.84) *	0.001 (2.13) **
Veto drops			-0.233 (-1.82) *	-0.244 (-1.79) *	-0.228 (-1.58)
Special interest			-0.091 (-0.80)	-0.049 (-0.46)	-0.089 (-0.82)
Military officer			0.000 (0.77)	-0.000 (-0.02)	-0.000 (-0.77)
Finite term			-0.000 (-0.88)	-0.000 (-0.52)	-0.000 (-1.20)
Geographic					
Distance from Equator				-0.000 (-0.12)	-0.000 (-0.07)
East Asia & Pacific				0.241 (1.30)	
Europe & Central Asia				0.112 (0.64)	
Latin America & Caribbean				0.217 (1.22)	
Middle East & North Africa				0.043 (0.19)	
South Asia				-0.196 (-0.77)	
Sub-Saharan Africa				-0.032 (-0.16)	
Developing countries					0.084 (-0.59)
EU countries					-0.218 (-2.11) **
R-square	0.63	0.68	0.77	0.78	0.78
Observations	111	110	106	106	106

Notes: *t*-statistics are in brackets. Numbers 1–5 denote different specifications. OLS estimates

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

Table 10 Panel regressions, EMU and OECD

Country group	Observations		Parameter estimates (1980–2007)					
	G	R	Responsiveness		Persistence		Discretion	
			$\hat{\beta}^G$	$\hat{\beta}^R$	$\hat{\gamma}^G$	$\hat{\gamma}^R$	$\hat{\sigma}^G$	$\hat{\sigma}^R$
EMU	312	312	0.20***	0.22***	0.82***	0.76***	0.035	0.035
OECD	760	760	0.25***	0.23***	0.80***	0.82***	0.054	0.055
Non-OECD	2974	2974	0.25***	0.21***	0.72***	0.72***	0.138	0.194

Notes: G —the government spending, R —revenue

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

government effectiveness, political system and veto drops are negatively associated with the discretionary component of revenue. In contrast, countries with higher inflation and characterized by lower concentration of parties tend to have more government revenue discretion.

Given the high correlation between spending and revenue in our sample (0.9) it is likely to that the determinants of discretion and persistence have a similar effect on spending and revenue. However, as we discussed in Sect. 3.1, government revenue tends to be relatively less persistent than government spending. Thus, the fact that the discretionary and persistent components of government revenue both are affected in a similar way by our set of explanatory variables cannot be taken for granted.

3.3 Robustness analysis

The behaviour of fiscal policy varies across countries. Thus, it is interesting to see whether our estimated measures of responsiveness, persistence and discretion are different across groups of countries. To this end, we consider three groups of countries: EMU, OECD and non-OECD countries. Looking at the panel results reported in Table 10, it is possible to see that the responsiveness component of both expenditure and revenue to output is smaller than the measure of persistence for all three sets of countries. Moreover, it does not seem that groups differ systematically in terms of responsiveness. In contrast, country groups systematically differ in terms of discretion and persistence of both expenditure and revenue. In particular, EMU countries are those characterized by the smallest estimated discretion coefficient for spending and revenue, while non-OECD countries are those with the highest (lowest) level of discretion (persistence).

It is also possible to argue that most of the variation in many determinants of government spending and revenue, and its persistence, responsiveness and discretionary components (such as political constraints, income, inflation, etc.), occur between developed and developing groups. Thus, both from a theoretical perspective and, especially, from a policy point of view it is important to assess whether our analysis is robust within developed and developing country groupings. Table 11 reports the results both for the discretion, persistence and responsiveness equations for government spending.¹⁷ Columns 1 and 2 refer to the results relative to fiscal discretion respectively for developed and developing countries. Looking at these two columns, it seems that there is not much discrepancy between the two groups. For both sets of countries, spending discretion is negatively related to GDP per capita, country

¹⁷It has to be acknowledged that results for developed countries should be taken with caution, given the limited number of degrees of freedom.

Table 11 Developed and developing countries (government expenditure)

Explanatory variables	Discretion		Persistence		Responsiveness	
	$\hat{\sigma}_{\text{developed}}^G$	$\hat{\sigma}_{\text{developing}}^G$	$\hat{\gamma}_{\text{developed}}^G$	$\hat{\gamma}_{\text{developing}}^G$	$\hat{\beta}_{\text{developed}}^G$	$\hat{\beta}_{\text{developing}}^G$
	1	2	3	4	5	6
Macro						
Government size	-0.720 (-2.23)**	-0.160 (-1.61)	-0.102 (-0.55)	0.174 (3.22)***	-0.131 (-0.35)	0.035 (0.23)
Income	-0.464 (-4.34)***	-0.206 (-3.50)***	0.145 (1.51)	0.117 (3.37)***	0.312 (1.27)	0.142 (1.24)
Openness	0.097 (0.62)	0.009 (0.09)	-0.049 (-0.61)	0.185 (0.31)	0.132 (0.86)	-0.576 (-4.07)***
Inflation	0.016 (0.28)	0.002 (2.25)**	-0.018 (-0.54)	-0.003 (-3.88)***	-0.022 (-0.37)	-0.002 (-1.23)
Country size	-0.198 (-4.26)***	-0.070 (-2.56)***	-0.040 (-1.11)	0.047 (3.83)***	-0.084 (-1.30)	0.011 (0.35)
Institutional						
Government effectiveness	-0.414 (-2.22)**	-0.193 (-2.61)***	-0.029 (-0.27)	-0.069 (-1.59)	-0.439 (-1.93)**	-0.087 (-0.66)
Political						
Political system	0.224 (1.83)*	-0.118 (-2.52)***	0.037 (0.56)	-0.005 (-0.20)	0.004 (0.03)	0.097 (1.38)
Parties concentration	0.960 (1.48)	0.000 (3.35)***	0.874 (1.77)*	0.000 (0.16)	1.422 (1.85)*	-0.000 (-0.38)
Veto drops	-0.210 (-1.04)	-0.461 (-2.76)***	0.169 (-1.99)**	0.023 (0.27)	0.268 (1.22)	-0.425 (-2.21)**
Special interests	-0.140 (-0.75)	0.044 (0.33)	-0.375 (-2.44)***	-0.124 (-1.98)**	-0.761 (-2.65)***	0.119 (0.72)
Military officer	(dropped)	0.000 (2.37)**	(dropped)	0.000 (3.85)***	(dropped)	-0.001 (-1.04)
Finite term	-1.074 (-5.21)***	-0.000 (-2.80)***	-0.248 (-1.19)	-0.000 (-3.21)***	0.288 (0.76)	0.001 (1.20)
R-square	0.79	0.59	-	-	-	-
Goodness of fit χ^2	-	-	28.63***	134.28***	55.44***	109.07***
Observations	27	79	27	79	27	79

Notes: *t*-statistics are in brackets. Goodness of fit: χ^2 statistics for persistence and responsiveness, *R*-square for discretion

* Significant at 10%; ** Significant at 5%; *** Significant at 1%

size, government effectiveness and the dummy for finite terms. In contrast, other political variables and inflation seem to affect spending discretion only for developing countries.

Columns 3 and 4 report the results of the persistence equation for both developed and developing countries. In contrast to what was obtained for the equation regarding the discretionary component, it seems that while macroeconomic variables have been more relevant for fiscal persistence in developing countries, political and institutional variables in general

played a role in affecting fiscal persistence in both developed and developing countries, even if with some differences.

Finally, analyzing columns 5 and 6 we can see that the determinants of responsiveness of government spending vary between developed and developing countries. In particular, while government effectiveness and special interests are essentially the only variables found to be significant in the specification for developed countries, openness and veto drops are the only variables that have a statistically significant impact on spending responsiveness in developing countries. This result suggests that not only the measure of responsiveness and cyclicity varies between developing and developed countries, but that this also is true for its determinants.

4 Conclusion

By making use of a two-step estimation procedure, we have pursued a twofold objective in this paper. First, we provide an empirical study on the decomposition of fiscal policy into three characteristics: responsiveness, persistence and discretion. Second, we analyzed the determinants of these components. We extended the analysis of Fatás and Mihov (2003, 2006) by obtaining the above mentioned three fiscal components for both government revenue and government spending. Moreover, we cross-checked responsiveness, persistence and discretion; analyzed the determinants of all three fiscal components with a set of macroeconomic, political and institutional variables, and geographic variables; and also used several datasets.

The key conclusions of our analysis are as follows. We find that, for most of the 132 countries in our sample, fiscal policy is rather more persistent than responsive to current economic conditions. More interestingly, we find that, for both revenue and spending, persistence is negatively correlated to the discretion and responsiveness components thereby suggesting that countries with greater persistence have less discretion and responsiveness. The above conclusions are found to be robust by considering the AMECO dataset for EU countries, for a longer time span. In the second part of our analysis, we carried out a cross-country estimation approach to identify the source of fluctuations of persistence, responsiveness and discretion components. From our results, we find that macroeconomic, institutional and geographic variables explain cross-country variation in fiscal characteristics.

From a policy perspective, the fact that fiscal policy is rather persistent implies that the fiscal authorities have less leeway in the short-run notably to curb spending behaviour. This result is also more relevant given our findings that government spending is overall more persistent than government revenue. Therefore, and apart from the fact that there is also less room for discretion, it may be more difficult for policy makers to implement temporary fiscal activism, and, more importantly, successfully to reverse it quickly when no longer needed.

Another relevant policy implication stems from the fact that government effectiveness contributes to reduce the discretionary component of fiscal policy, which can be seen as recommendation for governments to improve their related governance procedures and frameworks.

In addition, the pursuit of low inflation can also be seen as a contribution to more stable fiscal developments, given the empirical evidence that we uncovered showing that price moderation decreases the discretionary component in both government spending and revenue.

Our study also suggests possible extensions. In fact, comparing for each country the estimates of the degree of persistence from government expenditure and revenue equations

and the starting value of these two variables, one could be able to detect signals of potential fiscal deterioration and possible problems regarding fiscal sustainability. Some related work in that direction was provided by Afonso et al. (2009). Moreover, another avenue for future research would be to apply spatial econometric techniques to the problem at hand. Finally, the possibility of fiscal policy interdependence could also be envisaged for some country groups. For instance, Giuliadori and Beetsma (2009) report on the existence of fiscal policy interdependence in the EU.

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Appendix: Data and sources

Data series used in the country-specific regressions are: (a) Real GDP, (b) Inflation: calculated as annual percentage change of the GDP deflator, (c) Index of oil prices: computed as the logarithm of real petroleum annual average spot price. Source: *International Financial Statistics* (IFS).

Data series used in the cross-sectional regressions are:

Government size: Logarithm of the ratio of government spending to GDP. Source: *Penn World Tables 6.1* (PWT).

Income: Logarithm of per-capita income. Source: *Penn World Tables 6.1* (PWT).

Openness: The ratio of exports plus imports to GDP at constant prices. Source: *Penn World Tables 6.1* (PWT).

Table 12 Descriptive statistics

Variable	Observations	Mean	Std. dev.	Min	Max
Government size (log)	130	2.97	0.51	1.09	4.12
Income (log)	123	8.64	1.22	6.24	10.78
Openness (log)	122	4.31	0.52	3.00	5.66
Inflation	123	9.47	31.60	-3.85	325.00
Country size (log)	131	15.68	2.02	11.18	20.96
Government effectiveness	130	0.18	1.03	-1.90	2.48
Political system	125	0.84	0.95	0.00	2.00
Parties concentration	112	0.42	0.22	0.01	1.00
Veto drops	125	0.09	0.24	0.00	1.00
Special interest	125	0.15	0.36	0.00	1.00
Military officer	118	0.16	0.37	0.00	1.00
Finite term	118	0.88	0.32	0.00	1.00
Distance from equator	131	8.74	15.03	0.00	53.00

- Inflation*: Calculated as the difference in the logarithm of the GDP deflator. Source: *International Financial Statistics* (IFS).
- Country size*: Calculated as the logarithm of the population. Source: *World Development Indicators* (WDI).
- Government effectiveness*: Measuring the quality of public services. Source: *Worldwide Governance Indicators* (WGI).
- Political system*: Dummy variable that takes a value of zero for Presidential regime, the value one for the Assembly-elected Presidential regime and two for Parliamentary regime. Source: *Database of Political Institutions* (DPI 2004).
- Parties concentration*: The Herfindahl Index calculated as the sum of the squared set shares of all parties in the government. Source: *Database of Political Institutions* (DPI 2004).
- Veto drops*: This variable counts the percent of veto players who drop from the government in any given year. Source: *Database of Political Institutions* (DPI 2004).
- Special interests*: Dummy variable that takes the value one if the party of the largest government party represents any special interests and zero otherwise. Source: *Database of Political Institutions* (DPI 2004).
- Military chief executive officer*: Definition of the variable depends on the following question: Is Chief Executive a military officer? It takes the value one if the source (Europa or Banks) includes a rank in their title, 0 otherwise. If chief executives were described as officers with no indication of formal retirement when they assumed office, they are always listed as officers for the duration of their term. If chief executives were formally retired military officers upon taking office, then this variable gets a 0. Source: *Database of Political Institutions* (DPI 2004).
- Finite term*: Dummy variable that takes the value one if there exists a constitutional limit on the number of years the executive can serve before new elections must be called and zero otherwise. Source: *Database of Political Institutions* (DPI 2004).
- Set of regional variables*: (a) Distance from Equator, computed as the vertical distance of parallels from the equator, (b) set of six binary variables (East Asia & Pacific, Europe and Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia and Sub-Saharan Africa) which take value one if the country belongs one of the above regions. Variables are taken from Andy Rose's site: <http://faculty.haas.berkeley.edu/aroze/>.

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