

Fiscal Transparency, Government Effectiveness and Government Spending Efficiency: A Panel Data Approach for Developed and Developing Countries

Ana Jordânia de Oliveira^{a, *}, **Gabriel Caldas Montes**^b, **Júlio Cesar Albuquerque Bastos**^c

^a Fluminense Federal University, Department of Economics. Email: anajordaniaoliveira@gmail.com

* Corresponding author

^b Fluminense Federal University, Department of Economics and National Council for Scientific and Technological Development (CNPq), Brazil. E-mail: gabrielmontesuff@yahoo.com.br

^c Fluminense Federal University, Department of Economics. Email: julio_bastos@globo.com

Abstract The global financial crisis and the debt crisis of the EU countries revealed serious weaknesses in fiscal reporting. As a consequence, uncertainties regarding the real situation of the public accounts of the countries raised doubts in relation to the effectiveness of government policies. Since then, countries are undertaking reforms in order to improve fiscal transparency. The present paper analyzes whether countries are making efforts to enhance fiscal transparency, and whether fiscal transparency affects government effectiveness as well as government spending efficiency. We consider two channels through which this effect happens. The first channel is indirect and it works through public debt. The second channel is the direct effect that transparency has on government effectiveness once transparency enhances accountability and thus the task of resource allocation. We use a sample of 82 countries (68 developing and 14 developed) for the period 2006-2014, and panel data analysis. Comparing the scores of fiscal transparency between 2006 and 2014, we observe that approximately 80 per cent of the countries made efforts to improve fiscal transparency. The results suggest fiscal transparency is important to improve government effectiveness and government spending efficiency.

Keywords: fiscal transparency; government effectiveness; public debt; efficiency.

JEL classification E62, H11, H63, H83

Resumo A crise financeira global e a crise da dívida dos países da UE revelaram graves deficiências nos relatórios fiscais. Como consequência, as incertezas quanto à situação real das contas públicas dos países levantaram dúvidas em relação à eficácia das políticas governamentais. Desde então, os países estão realizando reformas para melhorar a transparência fiscal. O presente artigo analisa se os países estão fazendo esforços para aumentar a transparência fiscal e se a transparência fiscal afeta a eficácia do governo e a eficiência do gasto público. Consideramos dois canais pelos quais esse efeito acontece. O primeiro canal é indireto e funciona através da dívida pública. O segundo canal é o efeito direto que a transparência exerce sobre a eficácia do governo, uma vez que a transparência aumenta a responsabilidade e a prestação de contas dos governos, e, portanto, a tarefa de alocação de recursos. Utilizamos uma amostra de 82 países (68 em desenvolvimento e 14 desenvolvidos) para o período 2006-2014, e a análise é feita pela metodologia de dados de painel. Comparando as pontuações da transparência fiscal entre 2006 e 2014, observamos que aproximadamente 80% dos países se esforçaram para melhorar a transparência fiscal. Os resultados sugerem que a transparência fiscal é importante para melhorar a eficácia do governo e a eficiência dos gastos públicos.

Palavras-chave: transparência fiscal; eficácia do governo; dívida pública; eficiência.

Área 5 - Economia do Setor Público

1. Introduction

Fiscal transparency makes the formulation of policies and the management of fiscal risks more effective, and ensures that governments provide more accurate information to the public (IMF 2012). Empirical studies have found that transparency in the management of public accounts improves fiscal performance and fiscal sustainability, as well as it reduces corruption and markets volatility, and enhances the economic outlook (e.g., Kopits and Craig 1998; Islam 2006; Alt and Lassen 2006a, b; Glennerster and Shin 2008; Kolstad and Wiig 2009; Peat et al. 2015; Arbatli and Escolano 2015).

As the adoption of more transparent practices represents a trend in the management of public accounts, the following questions arise: Are countries making efforts to enhance fiscal transparency? Countries with higher fiscal transparency also present increased government effectiveness and higher levels of government spending efficiency? This last question is important since uncertainties regarding the real situation of countries' public accounts raise doubts in relation to the effectiveness of government policies, and because the effectiveness of government policies is essential for the development of countries.

In the present paper, we assess the efforts made by 82 countries in terms of increasing fiscal transparency, and based on panel data methodology, we analyze the effect of fiscal transparency on both government effectiveness and government spending efficiency. As far as we know, this study is the first to present such empirical evidences, representing a contribution to the literature. Based on the argument that a more transparent fiscal system provides policymakers with incentives to adopt better policies (Arbatli and Escolano 2015), we suggest fiscal transparency improves government effectiveness and efficiency.

Recently, Montes and Pachoal (2016) provided empirical evidence for the determinants of government effectiveness for a set of 130 countries (30 developed and 100 developing). Based on cross-country analysis, they find evidence that countries with the most indebted governments, on average, have less government effectiveness. Nevertheless, Montes and Pachoal (2016) do not address the effect of fiscal transparency on government effectiveness. In turn, Arbatli and Escolano (2015) find evidence that higher levels of fiscal transparency are associated with lower debt to GDP ratio.

Similar to the study of Arbatli and Escolano (2015) that addressed direct and indirect channels through which fiscal transparency affect credit ratings, we consider two channels through which fiscal transparency affect government effectiveness (and government spending efficiency). The first channel is indirect and it works through the effect of fiscal transparency on public debt. The second channel is the direct effect that transparency has on government effectiveness: due to higher transparency, the society is more vigilant and more active in monitoring the accurate accountability of the government, which induces governments to be more effective.

As a measure of government effectiveness, we use the "government effectiveness" indicator from The Worldwide Governance Indicators (WGI) project – provided by The World Bank Group. Besides, in order to check robustness, we build an indicator of government spending efficiency based on Data Envelopment Analysis (DEA).

Regarding fiscal transparency, we use the fiscal transparency index of the International Budget Partnership (IBP) – the Open Budget Index (OBI).¹ The use of the OBI is due to its wide country coverage, public availability, and acceptance in the literature (Peat et al. 2015; Arbatli and Escolano 2015). Besides, according to Wehner and de Renzio (2013, pp. 99), *the thoroughness and independence of the OBI research process, including the publication of peer reviews and editorial decisions, make it far less susceptible to government manipulation.*²

Comparing the scores of fiscal transparency for the 82 countries between 2006 and 2014, we observe that approximately 80 per cent of the countries made efforts to improve fiscal transparency. Besides, the results indicate, for the three samples, that fiscal transparency plays an important role to improve government effectiveness. Furthermore, the results suggest the following implication for economic policy: developing countries aiming at amplifying the effects of fiscal transparency on government effectiveness should adopt inflation targeting.

2. Data and Methodology

We use a set of 82 countries (14 developed economies and 68 developing economies)³ grouped in three samples: the first sample contains all 82 countries (full sample), the second sample is formed by 68 developing countries, and the third sample is formed by 54 developing countries that do not adopt Inflation Targeting (IT). The IT framework requires absence of fiscal dominance, and thus mechanisms that might be able to enhance fiscal discipline. The study of Minea and Tapsoba (2014) find evidence that the adoption of IT improved fiscal discipline, especially in developing countries. In this sense, fiscal transparency represents an aspect able to increase fiscal discipline, and therefore, a necessary condition that countries must meet in order to increase the effectiveness of the IT regime. Hence, the idea of analyzing developing countries that do not adopt IT is to check whether these countries improve government effectiveness when they enhance fiscal transparency – even if they do not adopt a commitment technology to inflation stability that demands fiscal discipline (such as IT).

The period under analysis is from 2006 to 2014 with annual frequency. The choice of the period is due to data availability – data for the OBI (the indicator of fiscal transparency), for example, begins in 2006. Below, we describe the variables used in the analysis.⁴

The dependent variable is the indicator of “Government Effectiveness” (GOV_EFF) which is obtained from the World Bank WGI data base (The Worldwide Governance

¹ The IBP conducts surveys that cover the availability of key budget documents, which relate to budget formulation, budget execution and budget audit processes, the legislative strength and the strength of the supreme audit institution. The main OBI survey covers the availability, clarity and quality of different budget documents. The main OBI is based on questions that cover the quality and comprehensiveness of eight key budget documents: pre-budget statement, executive’s budget proposal, enacted budget, citizen’s budget, in-year reports, mid-year review, year-end report and audit report. The Open Budget Survey is an initiative of the International Budget Partnership, an independent organization that evaluates the extent to which governments make their budget information accessible to the public in a timely manner. For our analysis, OBI represents a better measure of fiscal transparency than other measures – such as, the International Monetary Fund’s Reports on the Observance of Standards and Codes (ROSC) and stock-flow adjustments (SFA). The arguments follow Peat et al. (2015).

² Wehner and de Renzio (2013) present several features that make the OBI data superior to those provided by the IMF.

³ Table A.1 in the appendix presents the list of countries. The classification as developed and developing countries follows the International Monetary Fund (World Economic Outlook – WEO).

⁴ Table A.2 presents the descriptive statistics for all variables used in the analysis.

Indicators).⁵ The indicator ranges from -2.5 (weak effectiveness) to 2.5 (strong effectiveness). This indicator is used in several empirical studies as regressor and as dependent variable. As dependent variable, the indicator was used, for example, in the studies of Garcia-Sanchez *et al.* (2013) and Montes and Paschoal (2016).

In turn, the main explanatory variable is fiscal transparency. As a measure of fiscal transparency (named TRANSPARENCY), we use the “Open Budget Index” (OBI).⁶ In relation to the OBI, de Renzio and Masud (2011) point out that the index is effective and governments around the world are increasingly interested in their scores, and that civil society groups had been using their recommendations to pressure governments to improve the transparency related to budgetary decisions. According to Seifert *et al.* (2013), the OBI contributes in an exclusive and independent manner, providing objective data regarding the transparency related to budgetary procedures of a number of countries over time. This independent process guarantees the reliability of the presented data (Seifert *et al.* 2013). The OBI ranges from 0 to 100, where 100 is the maximum of fiscal transparency, and zero represents total opacity.

Besides the direct effect of fiscal transparency on government effectiveness, we also analyze its indirect effect. The idea of this indirect effect comes from Arbatli and Escolano (2015). Therefore, following Alt and Lassen (2006b) and Arbatli and Escolano (2015), we check the effect of fiscal transparency on the debt to GDP ratio (DEBT); and, following Montes and Paschoal (2016), we check the effect of the DEBT on GOV_EFF. The series of DEBT is obtained from the International Monetary Fund.

In turn, according to Montes and Paschoal (2016), corruption causes resource leaks that undermine government effectiveness. In addition, since corruption creates waste, it leads governments to spend more, and therefore, to become more indebted. Cooray *et al.* (2017) suggest that an increase in corruption leads to an increase in public debt. Thus, the corruption variable is used in the analysis explaining both DEBT and GOV_EFF. As a proxy for corruption, we use the Control of Corruption Perception Indicator (named CORRUPTION) – obtained from the World Bank WGI data base. CORRUPTION varies between -2.5 and 2.5, in which the greater the indicator the greater is the control of corruption.

The control variables used to explain the DEBT comes from the literature (e.g., Alt and Lassen, 2006b; Arbatli and Escolano, 2015). In this sense, we use: the GDP growth rate (GROWTH)⁷, the government expense as a percentage of GDP (EXPEND)⁸, and, following IMF (2007), we include the degree of globalization (GLOBAL)⁹.

In addition to using DEBT and TRANSPARENCY to explain GOV_EFF, we follow the literature (e.g., Garcia-Sanchez *et al.* 2013; Montes and Paschoal 2016) and use the following

⁵ According to its definition, the indicator reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.

⁶ The OBI is obtained from the International Budget Partnership (IBP). For the IBP, fiscal transparency is central and should be translated into greater access of the society to information about different types of expenditures, and how tax revenues and other public resources are used by governments. In this sense, the IBP launched the “Open Budget Initiative” through the Open Budget Survey – a comprehensive analysis and survey that assesses whether governments give the public access to budget information and opportunities to participate in the budget process at the national level. From this initiative, in order to measure the global commitment of the countries surveyed with transparency and to allow cross-country comparisons, the IBP created – based on the research – the OBI.

⁷ GROWTH is the annual percentage growth rate of GDP at market prices based on constant local currency – aggregates are based on constant 2005 U.S. dollars – obtained from the World Bank Data.

⁸ Obtained from the World Bank Data.

⁹ The overall globalization index is the index of globalization proposed by Dreher (2006), obtained from <http://globalization.kof.ethz.ch/>. The idea is that globalization enhances fiscal discipline, once it reinforces market discipline of fiscal policies, bringing improvements in debt structures (IMF, 2007).

control variables: the inflation rate (INFLATION)¹⁰, GDP per capita (GDP_PC)¹¹, trade openness (TRADE)¹², the indicator of rule of law (RULE)¹³, and CORRUPTION.

Regarding fiscal transparency, following Wehner and de Renzio (2013), countries can be divided into five groups based on their overall index scores, distinguishing governments that disclose extensive (81–100; Group 1), significant (61–80; Group 2), some (41–60; Group 3), minimal (21–40; Group 4), and scant or no information on the budget (0–20; Group 5). Considering the sample of all countries, figure 1 shows the graph with this groups and reveals the countries that presented improvement in fiscal transparency in terms of changing from one group to another over time (comparing 2006 to 2014). The graph uses darker colors to denote groups of countries with more fiscal opacity, and as the regions become clearer this means more fiscal transparency. The results reveal the following changes: from Group 5 to Group 4 (Angola and Burkina Faso); from Group 4 to Group 3 (Albania, Nicaragua, Honduras, Ecuador, Azerbaijan, El Salvador, Mongolia, Bangladesh and Uganda); from Group 3 to Group 2 (Philippines, Malawi, Mexico, Bulgaria and Russian Federation); from Group 2 to Group 1 (Norway and Sweden).

FIGURE 1
Comparison of fiscal transparency index (OBI) in 2006 and 2014

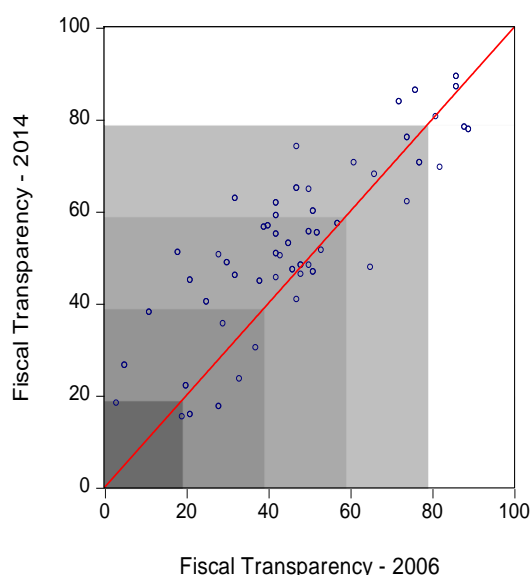


Figure 1 shows that 66 countries improved their fiscal transparency (corresponding to 80 percent of the sample). When we consider the 68 developing countries, we observe that 56 countries improved their fiscal transparency (which corresponds to approximately 82 percent of the sample of developing countries); and, when we consider the 54 developing countries that do not adopt IT, we observe that 44 countries improved their fiscal transparency (which corresponds to approximately 81 percent of the sample of developing countries that do not adopt IT).

In order to analyze the influence of fiscal transparency on government effectiveness, we consider two different channels through which fiscal transparency affects government

¹⁰ This series is the inflation of consumer price index obtained from World Bank Data.

¹¹ Data are in current U.S. dollars (obtained from World Bank Data).

¹² TRADE is the sum of exports and imports of goods and services measured as a share of GDP. All series were obtained from World Bank Data.

¹³ RULE is obtained from the World Bank WGI data base. The indicator has values between -2.5 (lowest level of rule of law) and 2.5 (highest level of rule of law).

effectiveness. The first channel is indirect. Following Alt and Lassen (2006b) and Arbatli and Escolano (2015), the idea is that fiscal transparency is strongly associated with lower debt levels because a more transparent fiscal system provides policymakers with incentives to adopt responsible fiscal policies. Therefore, the first channel is analyzed through equation (1) below:

$$DEBT_{i,t} = \delta C_{1i,t} + \gamma TRANSPARENCY_t + \theta_i + \vartheta_t + \epsilon_{i,t} \quad (1)$$

where the subscript $i=1,2,\dots,82$ is the country and $t=1,2,\dots,9$ is the period. The set of control variables ($C_{1i,t}$) consists of: GROWTH, EXPEND, CORRUPTION and GLOBAL. The set of control variables follows the literature (e.g., Alt and Lassen 2006b; IMF 2007; Arbatli and Escolano 2015). In turn, θ_i captures country specific effect, ϑ_t takes into account the relevant time effect and $\epsilon_{i,t}$ is a random error term that captures the effect of all omitted variables.

The second channel is the direct channel, and it is analyzed through equation (2) below:

$$GOV_EFF_{i,t} = \beta C_{2i,t} + \eta DEBT_t + \varphi TRANSPARENCY_t + \alpha_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

where α_i captures country specific effect, μ_t takes into account the relevant time effect and $\varepsilon_{i,t}$ is a random error term that captures the effect of all omitted variables. The term $C_{2i,t}$ represents a vector of control variables. In order to define the set of control variables, we follow Montes and Paschoal (2016) and Garcia-Sanchez et al. (2013), which analyze the determinants of government effectiveness. Thus, the set of control variables ($C_{2i,t}$) consists of: INFLATION, GDP_PC, TRADE, RULE and CORRUPTION. Different from Garcia-Sanchez et al. (2013) and Montes and Paschoal (2016), our analysis includes the effect of fiscal transparency.

We use panel data analysis. Besides usual OLS method for panel data analysis, we make use of dynamic panel data framework (D-GMM and S-GMM). As pointed out by Arellano and Bond (1991), an advantage of using the dynamic panel data method (GMM) is that it eliminates the non-observed effects on the regressions and the estimates are reliable even in the case of omitted variables. In particular, the use of instrumental variables allows the estimation of parameters more consistently, even in the case of endogeneity in explanatory variables and the occurrence of measurement errors (Bond et al. 2001).

Although D-GMM and S-GMM estimation approaches are suitable for a small number of time periods (t) and a large number of individuals (i), in the case of small samples, when the instruments are too many, they tend to over-fit the instrumented variables creating a bias in the results (Roodman 2009). Therefore, with the objective of avoiding the use of an excessive number of instruments in the regressions and thus lose the power of tests, we report the number of instruments (as suggested by Roodman 2009) through the number of instruments/number of cross-sections ratio, which must be less than 1 in each regression. Moreover, in order to confirm the validity of the instruments in the models, the test of over-identifying restrictions (J-test) was used as suggested by Arellano (2003). In addition, tests of first-order (AR1) and second-order (AR2) serial correlation were performed.

3. Results

Tables 1, 2 and 3 show the results of the estimates for equation 1, for the full sample, the sample of developing countries, and the sample of developing countries that do not adopt IT, respectively. The results for all the samples indicate that there is a significant effect of fiscal transparency on DEBT, i.e., an increase in fiscal transparency reduces the debt to GDP ratio.

TABLE 1
Estimates for the effect of fiscal transparency on debt to GDP ratio (full sample): 2006-2014

Estimator	EFc		EFct		D-GMM		S-GMM	
	I	II	I	II	I	II	I	II
GROWTH	-0.32070** (0.13079)	-0.29358** (0.14251)	-0.18246 (0.13517)	-0.25315** (0.11423)	-0.29875*** (0.09271)	-0.28957*** (0.10106)	-0.24745*** (0.04670)	-0.34396*** (0.08398)
EXPEND	0.63842 (0.49290)	1.04321 (0.86636)	0.31401 (0.56900)	0.89203 (0.82066)	0.84645*** (0.19875)	1.10301*** (0.24260)	0.60102*** (0.13818)	0.54996*** (0.14057)
CORRUPTION	-12.55416** (5.12573)	-16.45205 (10.12037)	-8.72235* (5.11108)	-14.82150 (9.08881)	-30.09000*** (6.74415)	-34.7887*** (6.94982)	-7.13525*** (2.32094)	-6.39469*** (2.30437)
GLOBAL		-1.17538 (0.71725)		-1.17041** (0.60653)		-0.31099** (0.12107)		-0.33573*** (0.10976)
TRANSPARENCY	-0.31482 (0.22570)	-0.46791 (0.42618)	-0.43526* (0.22229)	-0.50551* (0.26615)	-0.15031** (0.06892)	-0.31984*** (0.09913)	-0.14140*** (0.05233)	-0.12821*** (0.05113)
Observations	650	490	650	490	269	271	266	266
Adjusted R ²	0.745	0.744	0.754	0.743				
N.Instrum./N. Cross-Section					0.367	0.380	0.397	0.423
J-Stat					29.297	27.545	35.204	35.60214
p-value (I)					0.209	0.280	0.107	0.124
AR(1)					-2.306	-2.297	-0.496	-0.499
p-value					0.021	0.022	0.000	0.000
AR(2)					-1.185	-1.423	-0.025	-0.042
p-value					0.236	0.155	0.754	0.617

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. EFc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged debt to GDP ratio are omitted for convenience.

Source: Authors' calculations and estimations.

TABLE 2
Estimates for the effect of fiscal transparency on debt to GDP ratio (developing countries): 2006-2014

Estimator	EFc		EFct		D-GMM		S-GMM	
	I	II	I	II	I	II	I	II
GROWTH	-0.33560** (0.13572)	-0.29091* (0.15748)	-0.26090* (0.13349)	-0.30911** (0.12020)	-0.25174*** (0.06913)	-0.31254*** (0.05630)	-0.26617*** (0.04497)	-0.26246*** (0.04435)
EXPEND	0.66965 (0.51746)	1.02187 (0.95206)	0.49960 (0.58812)	1.02821 (0.86238)	1.35527*** (0.26577)	0.83213*** (0.16726)	0.60201*** (0.12690)	0.62321*** (0.12803)
CORRUPTION	-5.02769 (5.51076)	-13.22198 (11.10119)	-2.91418 (5.86398)	-12.72329 (10.36016)	-10.20365** (4.04371)	-9.23859** (3.90828)	-4.89229*** (1.82558)	-4.76370** (1.89830)
GLOBAL		-0.97180 (0.73060)		-0.91650 (0.61590)		-0.19106* (0.10964)		-0.14700* (0.08226)
TRANSPARENCY	-0.30877 (0.23545)	-0.49995 (0.45301)	-0.37593 (0.22978)	-0.49763* (0.28346)	-0.10115** (0.05115)	-0.14904*** (0.05593)	-0.05378* (0.03027)	-0.05396* (0.02928)
Observations	545	410	545	410	220	220	223	223
Ajusted R ²	0.690	0.702	0.694	0.698				
N.Instrum./N. Cross-Section					0.469	0.484	0.422	0.422
J-Stat					25.176	26.714	29.161	29.528
p-value (I)					0.453	0.370	0.140	0.102
AR(1)					-1.720	-1.705	-0.522	-0.519
p-value					0.085	0.088	0.000	0.000
AR(2)					-0.403	-0.887	-0.085	-0.094
p-value					0.687	0.375	0.243	0.209

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. EFc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged debt to GDP ratio are omitted for convenience.

Source: Authors' calculations and estimations.

TABLE 3
Estimates for the effect of fiscal transparency on debt to GDP ratio (developing countries that do not adopt IT): 2006-2014

Estimator	EFc		EFct		D-GMM		S-GMM	
	I	II	I	II	I	II	I	II
GROWTH	-0.36855** (0.15603)	-0.32382* (0.19251)	-0.29748** (0.14794)	-0.35102** (0.13820)	-0.41994* (0.23958)	-0.30378*** (0.08202)	-0.21967*** (0.05371)	-0.21977*** (0.05274)
EXPEND	0.49113 (0.61288)	0.90478 (1.07691)	0.38829 (0.69742)	0.94357 (0.99420)	0.65205* (0.23600)	0.80659*** (0.19541)	0.71956*** (0.17069)	0.71234*** (0.16056)
CORRUPTION	-2.90371 (7.49872)	-14.0755 (14.03119)	-2.04238 (7.99452)	-14.57244 (13.07090)	-29.08727** (12.79956)	-3.48158* (2.01677)	-6.55856*** (2.29068)	-6.63127*** (2.24221)
GLOBAL		-1.15561 (0.78328)		-1.08302 (0.71064)		-0.27556*** (0.09941)		-0.09928 0.08592
TRANSPARENCY	-0.32249 (0.25282)	-0.51858 (0.49004)	-0.39642 (0.24846)	-0.50993 (0.30584)	-0.24453** (0.10801)	-0.14560*** (0.04839)	-0.07232** (0.02796)	-0.07075** (0.02783)
Observations	426	319	426	319	260	201	172	172
Adjusted R ²	0.682	0.692	0.685	0.688				
N.Instrum./N. Cross-Section					0.40	0.490	0.540	0.54
J-Stat					11.631	21.854	27.613	28.225
p-value (I)					0.707	0.239	0.189	0.134
AR(1)					-1.654	-1.737	-0.513	-0.510
p-value					0.098	0.082	0.000	0.000
AR(2)					-1.191	-0.946	-0.115	-0.118
p-value					0.233	0.344	0.107	0.101

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. EFc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged debt to GDP ratio are omitted for convenience.

Source: Authors' calculations and estimations.

Arbatli and Escolano (2015) found that fiscal transparency, in advanced economies, has a significant effect on the debt to GDP ratio, but regarding the full sample and the sample of developing economies, they found evidence that the effect of fiscal transparency on debt is small and it does not present statistical significance. Our results support the idea that fiscal transparency is important to fiscal performance, no matter the sample we are considering.

In terms of control variables, the estimates show (for all the three samples) that low economic growth leads to higher debt accumulation – this result corroborates the evidence presented by Ogawa et al. (2016). In turn, the estimated coefficients for EXPEND present the expected positive sign and statistical significance in all GMM estimates for the three samples, implying that the higher the government expenditure, the higher the public debt to GDP ratio – this result corroborates Cooray and Schneider (2017). Moreover, the estimates for the three samples reveal that the effect of globalization on public debt was found to be negative – this result is in line with the ideas presented by IMF (2007): globalization enhances fiscal discipline once it reinforces market discipline of fiscal policies, bringing improvements in debt structures.

Regarding the relationship between CORRUPTION and DEBT, the findings reveal that countries with higher scores in terms of control of corruption also present lower public debt. Therefore, the control of corruption is an important aspect to improve fiscal performance. This finding is consistent with the evidence provided by Elgin and Uras (2013) and Cooray and Schneider (2013).

In turn, tables 4, 5 and 6 show the results of the estimates of equation 2, for the full sample, the sample of developing countries, and the sample of developing countries that do not adopt IT, respectively.

In relation to the direct effect, the results indicate that countries with higher scores of fiscal transparency also present higher levels of government effectiveness. Therefore, more transparent fiscal procedures are important to improve government effectiveness. Comparing the coefficients obtained from the three samples through GMM estimates (D-GMM and S-GMM), the findings suggest that the effect of fiscal transparency on government effectiveness is higher in the sample of developing countries. However, the estimates reveal that IT is important, i.e., the estimated coefficients through D-GMM and S-GMM for the effect of TRANSPARENCY on GOV_EFF for the sample of developing countries that do not adopt IT are smaller than those for the sample of developing countries (which also contains IT developing countries). In this sense, the results offer an interesting insight that suggests the following implication for economic policy: developing countries that seek to achieve amplified effects of fiscal transparency on government effectiveness should adopt a commitment technology, such as the inflation targeting regime.

In turn, the estimates reveal (for the three samples) that DEBT affects GOV_EFF. In line with the findings presented by Montes and Paschoal (2015), the results indicate that countries with the most indebted governments, on average, have lower government effectiveness. In this sense, the results indicate the existence of a transmission mechanism and thus the indirect effect that fiscal transparency has on GOV_EFF through DEBT.

In terms of control variables, the findings for the three samples suggest that countries with higher inflation rates present lower levels of GOV_EFF. Besides, the evidence points – with statistical significance for all samples – that, an increase in rule of law represents a good strategy to improve GOV_EFF. Moreover, estimates for the effect of TRADE had positive coefficients for all samples, and statistical significance was found for all the three samples. All these results are in accordance with the findings of Montes and Paschoal (2015).

Regarding the effect of corruption, the evidence points that corruption affects GOV_EFF – statistical significance is found for the three samples. Thus, the reduction of corruption is an important condition to improve GOV_EFF.

TABLE 4
Estimates for the effect of fiscal transparency on government effectiveness (full sample): 2006-2014

Estimator	EFc				EFct				D-GMM				S-GMM			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
DEBT	-0.00040* (0.00021)	-0.00044*** (0.00016)	-0.00043*** (0.00015)	-0.00073** (0.00030)	-0.00037* (0.00021)	-0.00033** (0.00014)	-0.00034** (0.00014)	-0.00067** (0.00030)	-0.00538*** (0.00147)	-0.00163* (0.00099)	-0.00469*** (0.00152)	-0.00388*** (0.00140)	-0.00160*** (0.00060)	0.00256*** (0.00090)	-0.00197** (0.00100)	-0.00209** (0.00106)
INFLATION	-0.00604*** (0.00145)	-0.00541*** (0.00123)	-0.00530*** (0.00114)	-0.00427*** (0.00097)	-0.00695*** (0.00152)	-0.00678*** (0.00119)	-0.00641*** (0.00112)	-0.00549*** (0.001048)	-0.01699*** (0.00266)	-0.00754*** (0.00254)	-0.00891** (0.00349)	-0.00670** (0.00286)	-0.00657*** (0.00068)	0.00421** (0.00139)	-0.00534*** (0.00100)	-0.00516*** (0.00103)
GDP_PC	3.87E-06 (2.16E-06)	-4.73E-07 (1.71E-06)	-4.56E-07 (1.69E-06)	0.000000233 (1.80E-06)	3.65E-06 (2.48E-06)	-6.51E-07 (1.95E-06)	-1.72E-06 (1.89E-06)	-0.00000136 (1.93E-06)	1.28E-07 (3.09E-06)	1.08E-06 (3.54E-06)	-3.60E-06 (3.52E-06)	-0.00000283 (3.24E-06)	2.26E-06 (2.24E-06)	1.65E-06 (3.81E-06)	3.08E-07 (3.39E-06)	0.00000145 (3.77E-06)
TRADE	0.00136** (0.00041)	0.00152*** (0.00035)	0.00148*** (0.00033)	0.00165*** (0.00038)	0.00127*** (0.00046)	0.00125*** (0.00036)	0.00127*** (0.00034)	0.00143*** (0.00040)	0.00375*** (0.00072)	0.00179*** (0.00068)	0.00332*** (0.00101)	0.00273*** (0.00078)	0.00123*** (0.00016)	0.00112** (0.00047)	0.00136*** (0.00046)	0.00128*** (0.00046)
RULE		0.52650*** (0.04170)	0.45875*** (0.04331)	0.39411*** (0.04201)		0.54421*** (0.04273)	0.47025*** (0.04686)	0.39422*** (0.04641)		0.43526*** (0.06228)	0.31587*** (0.07921)	0.28793*** (0.08413)		0.64294*** (0.09360)	0.35398*** (0.07789)	0.35887*** (0.08192)
CORRUPTION			0.17341*** (0.03644)	0.19596*** (0.03882)			0.16563*** (0.03835)	0.19459*** (0.04058)			0.29764** (0.12370)	0.40392*** (0.13324)		0.20688*** (0.03569)	0.23665*** (0.04326)	
TRANSPARENCY				0.00028 (0.00053)				0.00031 (0.00060)				0.00254* (0.00137)				0.00139* (0.00074)
Observations	683	683	683	618	683	683	683	618	302	324	300	298	313	299	296	296
Ajusted R ²	0.983	0.987	0.987	0.988	0.983	0.987	0.987	0.988								
N.Instrum./N. Cross-Section									0.551	0.487	0.532	0.558	0.730	0.382	0.446	0.446
J-Stat									42.88	35.082	39.737	37.443	61.035	30.496	33.573	32.060
p-value (I)									0.269	0.324	0.230	0.358	0.117	0.136	0.146	0.156
AR(1)									-1.951	-2.694	-1.896	-1.905	-0.395	-0.187	-0.209	-0.155
p-value									0.051	0.007	0.058	0.057	0.000	0.021	0.007	0.050
AR(2)									-1.176	-0.191	-0.648	-0.920	0.041	-0.056	-0.125	-0.147
p-value									0.239	0.848	0.517	0.358	0.649	0.612	0.247	0.183

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. EFc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged government effectiveness are omitted for convenience.

Source: Authors' calculations and estimations.

TABLE 5
Estimates for the effect of fiscal transparency on government effectiveness (developing countries): 2006-2014

Estimator	Efc				EFct				D-GMM				S-GMM			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
DEBT	-0.00053** (0.00024)	-0.00055*** (0.00017)	-0.00058*** (0.00017)	-0.00084*** (0.00032)	-0.00059** (0.00024)	-0.00051*** (0.00016)	-0.00054*** (0.00016)	-0.00078** (0.00030)	-0.00511*** (0.00136)	-0.00775*** (0.00134)	-0.00337*** (0.00124)	-0.00283* (0.00164)	-0.00057* (0.00034)	-0.00042* (0.00023)	-0.00044* (0.00024)	-0.00071* (0.00040)
INFLATION	-0.00582*** (0.00136)	-0.00534*** (0.00117)	-0.00509*** (0.00105)	-0.00427*** (0.00098)	-0.00673*** (0.00139)	-0.00668*** (0.00110)	-0.00617*** (0.00103)	-0.00530*** (0.00106)	-0.00849*** (0.00225)	-0.01010*** (0.00203)	-0.01227*** (0.00202)	-0.00893*** (0.00263)	-0.00759*** (0.00199)	-0.00671*** (0.00160)	-0.00790*** (0.00132)	-0.00740*** (0.00170)
GDP_PC	1.80E-05*** (4.50E-06)	7.17E-06* (4.00E-06)	8.76E-06** (3.73E-06)	1.04E-05** (4.10E-06)	2.85E-05*** (6.24E-06)	1.42E-05*** (5.41E-06)	1.30E-05*** (4.88E-06)	9.76E-06* (5.21E-06)	2.31E-05** (9.90E-06)	1.51E-05* (8.76E-06)	2.37E-05** (1.14E-05)	2.99E-05** (1.38E-05)	3.09E-05*** (4.80E-06)	1.22E-05** (6.00E-06)	2.20E-05*** (3.48E-06)	2.30E-05*** (3.76E-06)
TRADE	0.00185*** (0.00046)	0.00193*** (0.00037)	0.00188*** (0.00034)	0.00196*** (0.00039)	0.00196*** (0.00053)	0.00178*** (0.00039)	0.00179*** (0.00036)	0.00184*** (0.00041)	0.00166*** (0.00058)	0.00220*** (0.00058)	0.00431*** (0.00063)	0.00258*** (0.00090)	0.00198*** (0.00044)	0.00247*** (0.00064)	0.00228*** (0.00035)	0.00239*** (0.00040)
RULE		0.53267*** (0.04382)	0.44286*** (0.04687)	0.37842*** (0.04565)		0.54322*** (0.04399)	0.45722*** (0.04860)	0.38315*** (0.04852)		0.45187*** (0.05634)	0.33013*** (0.06899)	0.19959*** (0.07561)		0.33897*** (0.11141)	0.30275*** (0.06039)	0.26754*** (0.08056)
CORRUPTION			0.22473*** (0.03685)	0.22879*** (0.04036)			0.20114*** (0.03870)	0.22011*** (0.04263)			0.35224*** (0.09993)	0.51926*** (0.11642)			0.12118*** (0.03495)	0.25395*** (0.05508)
TRANSPARENCY				0.00017 (0.00056)				0.00027 (0.00062)				0.00267** (0.00129)				0.00206** (0.00103)
Observations	566	566	566	519	566	566	566	519	202	212	255	274	296	235	288	287
Ajusted R ²	0.961	0.970	0.972	0.972	0.962	0.971	0.972	0.972								
N.Instrum./N. Cross-Section									0.644	0.629	0.698	0.625	0.523	0.453	0.677	0.619
J-Stat									32.964	31.554	37.441	34.221	36.324	31.427	44.151	35.562
p-value (I)									0.469	0.539	0.449	0.361	0.164	0.113	0.138	0.262
AR(1)									-1.902	-1.835	-2.395	-1.781	-0.299	-0.404	-0.321	-0.209
p-value									0.057	0.067	0.017	0.075	0.000	0.000	0.000	0.010
AR(2)									0.210	0.192	-1.219	-1.500	0.039	-0.014	0.0143	-0.087
p-value									0.834	0.848	0.223	0.134	0.671	0.933	0.884	0.409

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. Efc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged government effectiveness are omitted for convenience.

Source: Authors' calculations and estimations.

TABLE 6
Estimates for the effect of fiscal transparency on government effectiveness (developing countries that do not adopt IT): 2006-2014

Estimator	Efc				EFct				D-GMM				S-GMM			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
DEBT	-0.00045** (0.00022)	-0.00048*** (0.00015)	-0.00051*** (0.00015)	-0.00055* (0.00031)	-0.00051** (0.00023)	-0.00046*** (0.00014)	-0.00049*** (0.00015)	-0.00047 (0.00029)	-0.00515*** (0.00116)	-0.00784*** (0.00207)	-0.00408** (0.00204)	-0.00534*** (0.00181)	-0.00067*** (0.00022)	-0.00040* (0.00024)	-0.00085*** (0.00014)	-0.00043* (0.00025)
INFLATION	-0.00597*** (0.00144)	-0.00556*** (0.00118)	-0.00528*** (0.00105)	-0.00441*** (0.00101)	-0.00686*** (0.00148)	-0.00669*** (0.00113)	-0.00626*** (0.00105)	-0.00543*** (0.00112)	-0.00384** (0.00160)	-0.00784*** (0.00268)	-0.00740*** (0.00217)	-0.00732*** (0.00182)	-0.00712*** (0.00216)	-0.00671*** (0.00193)	-0.00638*** (0.00070)	-0.00442** (0.00183)
GDP_PC	1.47E-05*** (5.53E-06)	7.95E-06* (4.73E-06)	8.48E-06** (4.23E-06)	8.26E-06* (4.75E-06)	2.58E-05*** (7.18E-06)	1.56E-05** (6.09E-06)	1.33E-05** (5.38E-06)	8.72E-06 (5.81E-06)	1.41E-05** (6.12E-06)	1.97E-05** (7.60E-06)	1.67E-05** (6.57E-06)	3.89E-06 (6.80E-06)	8.99E-06* (4.97E-06)	1.03E-05 (4.64E-06)	1.99E-05*** (4.28E-06)	1.85E-06 (5.48E-06)
TRADE	0.00172*** (0.00048)	0.00193*** (0.00037)	0.00182*** (0.00035)	0.00180*** (0.00041)	0.00182*** (0.00055)	0.00183*** (0.00039)	0.00176*** (0.00037)	0.00168*** (0.00042)	0.00084* (0.00050)	0.00342*** (0.00115)	0.00353*** (0.00106)	0.00229** (0.00111)	0.00275*** (0.00062)	0.00266*** (0.00063)	0.00281*** (0.00027)	0.00229*** (0.00064)
RULE		0.56518*** (0.04903)	0.46377*** (0.05319)	0.39334*** (0.05143)		0.56117*** (0.04890)	0.46926*** (0.05369)	0.39358*** (0.05256)		0.49961*** (0.08280)	0.29768*** (0.09194)	0.34572*** (0.08484)		0.31280** (0.12934)	0.44375*** (0.05450)	0.30656*** (0.08959)
CORRUPTION			0.23873*** (0.04500)	0.25009*** (0.05127)			0.21773*** (0.04620)	0.24069*** (0.05336)			0.39814*** (0.09095)	0.41759*** (0.07855)			0.23823*** (0.05649)	0.31021*** (0.09768)
TRANSPARENCY				0.00040 (0.00058)				0.00062 (0.00065)				0.00243*** (0.00077)				0.00159* (0.00093)
Observations	444	444	444		444	444	444	399	152	167	167	166	184	184	277	208
Ajusted R ²	0.966	0.966	0.969		0.956	0.967	0.969	0.968								
N.Instrum./N. Cross-Section									0.826	0.660	0.660	0.700	0.592	0.592	0.692	0.735
J-Stat									32.465	26.666	32.738	31.208	29.141	27.816	33.360	26.229
p-value (I)									0.494	0.482	0.170	0.263	0.215	0.223	0.263	0.560
AR(1)									-1.980	-2.241	-1.868	-1.747	-0.528	-0.508	-0.212	-0.306
p-value									0.048	0.025	0.062	0.081	0.000	0.000	0.002	0.001
AR(2)									0.944	0.673	0.069	-0.285	0.102	0.010	-0.125	-0.184
p-value									0.345	0.501	0.945	0.776	0.620	0.631	0.123	0.112

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. Efc – OLS fixed effects (cross-section) and EFct – OLS fixed effects (cross-section and period). D-GMM – uses two-step of Arellano and Bond (2001) without time period effects. S-GMM – uses two-step of Arellano and Bover (1995) without time period effects. D-GMM estimator - tests for AR (1) and AR (2) check that the average autocovariance in first order and second-order residuals, respectively, is zero. S-GMM estimator - tests for AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged government effectiveness are omitted for convenience.

Source: Authors' calculations and estimations.

4. Fiscal transparency and government spending efficiency: robustness analysis

In this section, we check the robustness of our empirical results by analyzing the effect of fiscal transparency on the efficiency of government spending. For this, we use an indicator of government spending efficiency (GSE) that we build for each of the 75 countries¹⁴ of our sample for the period 2006-2014. Following Gupta and Verhoeven (2001) and Chan et al. (2017), government spending efficiency is defined as the ability of the government to produce more outputs for a given level of resources. In this sense, the indicator of GSE is build based on Data Envelopment Analysis (DEA).

DEA is a non-parametric statistical technique used to assess public sector efficiency. Hence, to construct the indicator of GSE we follow the literature that uses DEA to assess public sector efficiency and government spending efficiency (e.g., Smith and Mayston 1987; Afonso et al. 2005, 2010; Afonso and Aubyn 2005; Afonso and Fernandes 2006; Rayp and De Sijpe 2007; Hauner 2008; Chan et al. 2017). The indicator of GSE, besides providing robustness to the results obtained in the previous section, contributes to the literature once an analysis for the influence of fiscal transparency on government spending efficiency has never been done.

DEA is a linear programming method that had been popularized by Charnes et al. (1978).¹⁵ DEA is based on Pareto-efficiency, where the most efficient decision-making unit (DMU) is said to operate on the frontier and the DMUs below the frontier are considered as inefficient as compared to the benchmark bank. In the present study, the DMUs refer to the countries where we assume that the government uses an input (Government Expenditure) to achieve goals.

DEA was originally based on the assumption of constant returns to scale (Charnes et al. 1978), where the DMU is assumed to proportionately increase their inputs and outputs in their production process to achieve efficiency. Banker et al. (1984) further revised the DEA model to account for variable return to scale (VRS) situation. According to Chan et al. (2017), VRS is more realistic for real-world application, where the DMUs are constraint with market imperfection such as imperfect competition, government regulations and financial constraint, which leads to a disproportionate increase in inputs and outputs in the production process. Thus, such as Chan et al. (2017), we adopt the DEA model based on the VRS assumption.

Below we present the analytical description of the linear programming problem to be solved in the VRS hypothesis. The DEA estimation based on VRS assumption is presented in Equation (3).

$$\begin{aligned}
 & \max_{(\eta, \mu)} \eta & (3) \\
 & st: x_i - X\mu \geq 0, \\
 & Q\mu - \eta q_i \geq 0 \\
 & I1'\mu = 1 \\
 & \mu \geq 0.
 \end{aligned}$$

¹⁴ Initially, the sample consisted of 82 countries. However, due to availability of data for the construction of the indicator, the following countries were taken from the sample: Congo Dem. Rep., Algeria, Iraq, Niger, Papua New Guinea, Sudan and Tuvalu.

¹⁵ Using linear programming, a frontier of best-practice countries is constructed based on input-output data, which is then used as a benchmark against which the performance of less efficient units can be assessed. The estimated frontier thus “envelops” all available observations, and each deviation from that frontier is interpreted as an inefficient combination of inputs and/or outputs. Farrell (1957) first suggested that such linear convex hull approach could be used for estimating the frontier of production possibilities and measuring efficiency. Charnes et al. (1978) then formalized the DEA methodology using linear programming to construct the frontier.

where η is the efficiency for each country i with $1/\eta$ as the technical efficiency scores which range between 0 and 1.¹⁶ $\eta - 1$ is the proportional increase in outputs that could be achieved by the i th country at a given level of input, and $1 \leq \eta < \infty$. The vector x_i is the input for country i th and the vector q_i represents the output for country i th. In turn, μ is a $I \times 1$ vector constant, which measures the weights used to compute the location of an inefficient DMU if it were to become efficient. The restriction $I1'\mu = 1$ imposes convexity of the frontier, accounting for variable returns to scale. Dropping this restriction would be tantamount to admitting that returns to scale were constant. X is a matrix formed by the transpose vectors of outputs of all DMUs in the sample; Q is a matrix formed by the transpose vectors of inputs of all DMUs in the sample.

The input and outputs used in the DEA follow Afonso et al. (2005, 2010). We use as input the General Government Final Consumption Expenditure (% of GDP)¹⁷, and as outputs we use indicators of public sector performance divided into two types: “opportunity indicators” and “Musgravian indicators”¹⁸. Regarding opportunity indicators, we use three variables of the administrative dimension (corruption, red tape and quality of judiciary)¹⁹, one variable of the educational dimension (quality of math and science education)²⁰, and two variables for the dimension of health (life expectancy at birth and infant survival rate)²¹. For the Musgravian indicators, we use one variable to capture distribution (Gini coefficient)²², two variables for the stability dimension (inflation and stability of GDP growth)²³, and two variables for the dimension of economic performance (unemployment and GDP growth rate)²⁴. To build the indicator of GSE, we used the software R – package “Benchmarking” developed by Bogetoft and Otto (2011).

After constructing the indicator for the 75 countries, we estimate equation 4 below through S-GMM.

$$GSE_{i,t} = \lambda C_{3i,t} + \phi DEBT_t + \rho TRANSPARENCY_t + k_i + \varpi_t + \xi_{i,t} \quad (4)$$

where the subscript $i=1,2,\dots,75$ is the country; $t=1,2,\dots,9$ is the period, k_i captures country specific effect, ϖ_t takes into account the relevant time effect and $\xi_{i,t}$ is a random error term that captures the effect of all omitted variables. $C_{3i,t}$ is a vector of control variables formed by the same control variables of equation (2). Again, the estimates are made for the full sample, the sample of developing countries, and for the sample of developing countries that do not adopt IT.

Table 7 reports the results of the estimates related to equation 4 for the three samples. All estimated coefficients for the effect of fiscal transparency on the indicator of GSE present

¹⁶ We change the scale of the indicator by multiplying it by 100 so that it varies between 0 and 100.

¹⁷ Obtained from the World Bank national accounts data.

¹⁸ According to Musgrave (1959), the government has three basic functions: allocative, distributive and stabilizing.

¹⁹ Data for “corruption” obtained from the Worldwide Governance Indicators (WGI). Data for “red tape (burden of regulation)” and “quality of judiciary” are both obtained from Global Competitiveness Report.

²⁰ Obtained from Global Competitiveness Report.

²¹ Data for “life expectancy at birth” is obtained from the World Bank (WDI). The series of “infant survival rate” (ISR) is calculated using the “infant mortality rate” (IMR) obtained from the World Bank, where, $ISR = (1000 - IMR) / 1000$.

²² For this series, we used the construction $(100 - \text{Gini})$. The data is obtained from the World Bank.

²³ The series of “inflation” is calculated using the Consumer Price Index (annual percentage change) obtained from the World Bank data – and to build the indicator of GSE, we use its inverse. For the series of “stability of GDP growth”, we use the inverse of the coefficient of variation of “per capita GDP growth” (obtained from the World Bank (WDI)).

²⁴ Both “unemployment” and “GDP growth rate” are obtained from the World Bank data.

the expected signs, and statistical significance (in the three samples), indicating that an increase in fiscal transparency increases government spending efficiency. Once again, the estimates reveal that IT is important, i.e., the estimated coefficients for the effect of TRANSPARENCY on GSE for the sample of developing countries that do not adopt IT are smaller than those for the full sample and for the sample of developing countries (which also contains IT developing countries). Therefore, developing countries aiming at amplifying the effects of fiscal transparency on government spending efficiency should adopt IT.

In relation to the effect of public debt on the indicator of GSE, the estimates show (for the three samples analyzed) that countries with higher public debt tend to have less efficiency in government spending. As a consequence, the results also indicate the existence of a transmission mechanism and, therefore, the indirect effect that fiscal transparency has on GSE through public debt. Therefore, the results highlight the importance of fiscal transparency for keeping governments accountable in relation to their debts and spending, and thus to increase efficiency.

Regarding the control variables, the results obtained for the three samples suggest higher inflation rates are related to lower GSE. Therefore, inflation is harmful to the process of resource allocation and makes governments less efficient. In addition, estimates for the effect of GDP per capita and trade openness on GSE present positive coefficients for all samples, and with statistical significance, corroborating the findings previously reported, and some findings in the literature (e.g., Afonso et al. 2010).

The results also suggest an increase in the rule of law improves the efficiency of public spending, with statistical significance for all samples. In turn, an important result concerns the effect of the control of corruption on the efficiency of government spending. Since corruption distorts the process of resource allocation, it makes governments less efficient. The results indicate, with statistical significance for the three samples, the control of corruption positively affects government spending efficiency.

TABLE 7
System GMM estimation for the effect of fiscal transparency on GSE

Groups of Countries Regressors:	Total Countries				Developing Countries				Developing Countries without IT			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
DEBT	-0.0065*** (0.00181)	-0.0077*** (0.0018)	-0.0083*** (0.0017)	-0.0094*** (0.0022)	-0.016*** (0.0035)	-0.027*** (0.0042)	-0.021*** (0.0036)	-0.019*** (0.0025)	-0.0029*** (0.0008)	-0.0031** (0.0014)	-0.0023* (0.0013)	-0.020*** (0.0031)
INFLATION	-0.055*** (0.00373)	-0.060*** (0.0044)	-0.061*** (0.0053)	-0.0005*** (0.0066)	-0.041*** (0.014)	-0.025*** (0.0082)	-0.062*** (0.0086)	-0.057*** (0.0061)	-0.037*** (0.010)	-0.051*** (0.0085)	-0.042*** (0.012)	-0.063*** (0.013)
GDP_PC	0.00002*** (0.000008)	0.00002** (0.000008)	0.00002* (0.00001)	0.000018* (0.000009)	0.00015*** (0.00005)	0.00008* (0.00005)	0.00005* (0.00003)	0.00006* (0.00003)	0.00005** (0.00002)	0.00004** (0.00002)	0.000001 (0.000014)	0.000005 (0.00003)
TRADE	0.0084*** (0.0008)	0.011*** (0.0007)	0.016*** (0.0007)	0.009*** (0.0015)	0.011*** (0.0041)	0.021*** (0.0022)	0.017*** (0.0032)	0.0095*** (0.0014)	0.0075*** (0.0022)	0.0063** (0.0024)	0.011*** (0.0022)	0.011*** (0.0015)
RULE		0.999*** (0.16)	2.625*** (0.238)	0.931*** (0.196)		1.640*** (0.242)	2.062*** (0.313)	0.992*** (0.232)		1.277*** (0.256)	0.723** (0.331)	0.652** (0.282)
CORRUPTION			0.538** (0.249)	0.581** (0.290)			0.980*** (0.197)	0.377* (0.206)			2.560*** (0.451)	2.626*** (0.3868)
TRANSPARENCY				0.0083*** (0.0016)				0.0083*** (0.0014)				0.0081*** (0.0028)
Observations	165	165	165	165	215	215	237	141	164	164	156	135
N.Instrum./N. Cross-Section	0.800	0.800	0.800	0.800	0.536	0.625	0.714	0.941	0.622	0.7111	0.744	0.875
J-Stat	41.99	41.30	41.93	40.50	29.61	32.07	33.07	42.25	24.36	28.18	23.17	26.32
p-value (I)	0.515	0.506	0.430	0.448	0.240	0.317	0.464	0.374	0.384	0.350	0.567	0.501
AR(1)	-0.623	-0.627	-0.627	-0.629	-0.568	-0.600	-0.480	-0.617	-0.403	-0.418	0.473	-0.434
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.209	0.206	0.003	0.037	-0.030	0.012	0.046	-0.914	-0.166	-0.171	0.183	-0.193
p-value	0.712	0.690	0.995	0.938	0.869	0.945	0.602	0.241	0.202	0.197	0.177	0.200

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denote s 0.1. White's heteroskedasticity consistent covariance matrix was applied in regressions. Standard errors between parentheses. Estimates use two-step of Arellano and Bover (1995) without time period effects. AR (1) and AR (2) check for the presence of first order and second-order serial correlation in the first-difference residuals. Constant and lagged GSE are omitted for convenience.

Source: Authors' calculations and estimations.

5. Concluding remarks

This study aims at showing the efforts made by countries in order to increase fiscal transparency, and as a consequence, it aims at capturing the relationship between fiscal transparency and government effectiveness. Based on a sample of 82 countries (14 developed countries and 68 developing countries) grouped in three samples, the results suggest (for all the samples) that fiscal transparency has a statistically significant influence on both government effectiveness and government spending efficiency. The positive effect is relevant, and robust to different specifications and the inclusion of control variables.

Based on the findings, fiscal transparency has a direct effect on government effectiveness (and efficiency), and an indirect effect through its role in promoting better fiscal policies. The results indicate that both developed and developing countries can benefit significantly in terms of lower public debt by increasing their fiscal transparency.

We can draw the following policy conclusion from our findings. Governments seeking to improve effectiveness and efficiency should increase fiscal transparency. Besides, if governments of developing countries aim at amplifying the effect of fiscal transparency on effectiveness and efficiency, they should adopt IT.

References

- Afonso A, Aubyn MSt (2005) Non-Parametric approaches to education and health efficiency in OECD countries. *Journal of Applied Economics* 8(2): 227-246.
- Afonso A, Fernandez S (2006) Measuring local government spending efficiency: evidence for the Lisbon region. *Regional Studies* 40(1): 39-53.
- Afonso A, Schuknecht L, Tanzi V (2005) Public sector efficiency: an international comparison. *Public Choice* 123(3): 321-347.
- Afonso A, Schuknecht L, Tanzi V (2010) Public sector efficiency - evidence for new EU member states and emerging markets. *Applied Economics* 42(17): 2147-2164.
- Alt JE, Lassen DD (2006a) Transparency, political polarization, and political budget cycles in OECD countries. *American Journal of Political Science* 50(3): 530-550.
- Alt JE, Lassen DD (2006b) Fiscal transparency, political parties, and debt in OECD countries. *European Economic Review* 50: 1403-39.
- Arbatli E, Escolano J (2015) Fiscal transparency, fiscal performance and credit ratings. *Fiscal Studies* 36(2): 237-270.
- Arellano M (2003) *Panel Data Econometrics*. Oxford University press.
- Arellano M, Bond S (1991) Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58(2): 277-297.
- Arellano M, Bover O (1995). Another look at the instrumental variable estimation of error-components model. *Journal of Econometrics* 68(1): 29-51.
- Banker RD, Charnes A, Cooper WW (1987) Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science* 30(9): 1078-1092.
- Bogetoft P, Otto L (2011) *Benchmarking, with DEA, SFA and R*. New York: Springer.
- Bond SR, Hoeffler A, Temple J (2001) GMM estimation of empirical growth models. *CEPR Discussion Paper* 3048 (London).
- Chan SG, Ramly Z, Karim MZA (2017) Government spending efficiency on economic growth: roles of value-added tax. *Global Economic Review* 46(2): 162-188.
- Charnes A, Cooper W, Rhodes E (1978) Measuring the efficiency of decision makers units. *European Journal of Operational Research* 2: 429-444.

- Cooray A, Dzhumashev R, Schneider F (2017) How does corruption affect public debt? An empirical analysis. *World Development* 90: 115-127.
- de Renzio P, Masud H (2011) Measuring and promoting budget transparency: the Open Budget Index as a research and advocacy tool. *Governance: An International Journal of Policy, Administration, and Institutions* 24(3): 607-616.
- Elgin C, Uras BR (2013) Public debt, sovereign default risk and shadow economy. *Journal of Financial Stability* 9(4): 628–640.
- Farrell M (1957) The measurement of productive efficiency. *Journal of the Royal Statistical Society Series A (General)* 120(3): 253-281.
- Garcia-Sanchez IM, Cuadrado-Ballesteros B, Frias-Aceituno J (2013) Determinants of Government Effectiveness. *International Journal of Public Administration* 36: 567–577.
- Glennster R, Shin Y (2008) Does transparency pay? IMF Staff Papers 55: 183-209.
- Gupta S, Verhoeven M (2001) The efficiency of government expenditure: Experiences from Africa. *Journal of Policy Modeling* 23(4): 433-467.
- Hauer D (2008) Explaining differences in public sector efficiency: evidence from Russia regions. *World Development* 36(10): 1745-1765.
- IMF (2007) Globalization, financial markets, and fiscal policy. Prepared by the Fiscal Affairs Department, November 2007.
- IMF (2012) Fiscal transparency, accountability, and risk. International Monetary Fund, Prepared by the Fiscal Affairs Department in collaboration with the Statistics Department, August.
- Islam R (2006) Does more transparency go along with better governance? *Economics and Politics* 18(2): 121-67.
- Kolstad I, Wiig A (2009) Is transparency the key to reducing corruption in resource-rich countries? *World Development* 37(3): 521-532.
- Kopits G, Craig JD (1998) Transparency in government operations. *IMF Occasional Paper* 158.
- Lindstedt C, Laurin D (2010) Transparency is not enough: making transparency effective in reducing corruption. *International Political Science Review* 31(3): 301-322.
- Minea A, Tapsoba R (2014) Does inflation targeting improve fiscal discipline? *Journal of International Money and Finance* 40: 185-203.
- Montes GC, Paschoal PC (2016) Corruption: what are the effects on government effectiveness? Empirical evidence considering developed and developing countries. *Applied Economics Letters* 23(2): 146-150.
- Musgrave RA (1959) *The Theory of Public Finance: a study in public economy*. New York McGraw-Hill.
- Ogawa K, Sterken E, Ichiro T (2016) Public debt, economic growth and the real interest rate: a panel VAR approach to EU and OECD countries. Discussion Paper No. 955, The Institute of Social and Economic Research, Osaka University.
- Peat M, Svec J, Wang J (2015) The effects of fiscal opacity on sovereign credit spreads. *Emerging Markets Review* 24: 34-45.
- Rayp G, de Sijpe NV (2007) Measuring and explaining government efficiency in developing countries. *The Journal of Development Studies* 43(2): 360-381.
- Roodman DM (2009) A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics* 71(1): 135-158.
- Seifert J, Carlitz R, Mondo E (2013) The Open Budget Index (OBI) as a Comparative statistical tool. *Journal of Comparative Policy Analysis: Research and Practice* 15(1): 87-101.

- Smith, P., & Mayston, D. (1987). Measuring efficiency in the public sector. *Omega*, 15 (3), 181-189.
- Staiger D, Stock JH (1997) Instrumental variables regression with weak instruments. *Econometrica* 65(3): 557-586.
- Wehner J, de Renzio P (2013) Citizens, legislators, and executive disclosure: the political determinants of fiscal transparency. *World Development* 41: 96-108.

Appendix

TABLE A.1
List of countries

All Countries

Albania; Algeria; Angola; Argentina; Azerbaijan; Bangladesh; Burkina Faso; Bulgaria; Bolivia; Brazil; Botswana; Cameroon; ; Chile; China; Colombia; Congo Dem. Rep; Costa Rica; Croatia; Czech Republic; Dominican Republic; Ecuador; Egypt, Arab Rep; El Salvador; France; Ghana; Guatemala; Germany; Honduras; Indonesia; Pakistan; India; Iraq; Italy; Jordan; Kenya; Kazakhstan; Lebanon; Liberia; Malaysia; Mali; Malawi; Mexico; Morocco; Mongolia; Mozambique; Namibia; Niger; Nigeria; Nicaragua; Norway; Peru; Papua New Guinea; New Zealand; Philippines; Poland; Portugal; Romania; Russian Federation; Saudi Arabia; Senegal; Serbia; Sierra Leone; Slovak Republic; Slovenia; Spain; Sri Lanka; South Africa; Senegal; Sweden; Sudan; Thailand; Tunisia; Turkey; Tuvalu; Tanzania; Ukraine; Uganda; United Kingdom; United States; Venezuela, RB; Vietnam; Yemen, Rep.; Zimbabwe.

Developing countries

Albania; Algeria; Angola; Argentina; Azerbaijan; Bangladesh; Burkina Faso; Bulgaria; Bolivia; Brazil; Botswana; Congo Dem. Rep; Chile; Cameroon; Colombia; Costa Rica; Croatia; Dominican Republic; Ecuador; Egypt, Arab Rep; El Salvador; Ghana; Guatemala; Honduras; Indonesia; Pakistan; India; Iraq; Jordan; Kenya; Kazakhstan; Lebanon; Liberia; Malaysia; Mali; Malawi; Mexico; Morocco; Mongolia; Mozambique; Namibia; Niger; Nigeria; Nicaragua; Peru; Papua New Guinea; Philippines; Poland; Romania; Russian Federation; Saudi Arabia; Senegal; Serbia; Sierra Leone; Sri Lanka; South Africa; Senegal; Sudan; Thailand; Tunisia; Turkey; Tuvalu; Tanzania; Ukraine; Uganda; Venezuela, RB; Vietnam; Yemen, Rep.; Zimbabwe.

Developing countries without Inflation Targeting

Albania; Algeria; Angola; Argentina; Azerbaijan; Bangladesh; Burkina Faso; Bulgaria; Bolivia; Botswana; Congo Dem. Rep; Cameroon; Costa Rica; Croatia; Dominican Republic; Ecuador; Egypt, Arab Rep; El Salvador; Honduras; India; Iraq; Jordan; Kenya; Kazakhstan; Lebanon; Liberia; Malaysia; Mali; Malawi; Morocco; Mongolia; Mozambique; Namibia; Niger; Nigeria; Nicaragua; Pakistan; Papua New Guinea; Russian Federation; Saudi Arabia; Senegal; Serbia; Sierra Leone; Sri Lanka; Sudan; Thailand; Tunisia; Tuvalu; Tanzania; Ukraine; Uganda; Venezuela, RB; Vietnam; Yemen, Rep.; Zimbabwe.

TABLE A.2
Descriptive statistics

Full Sample											
	GOV_EFF	DEBT	INFLATION	GDP_PC	TRADE	CORRUPTION	RULE	TRANSPARENCY	GROWTH	EXPENDE	GLOBAL
Mean	-0.09	44.78	6.43	10148.3	78.52	-0.22	-0.19	45.98	4.30	15.79	59.64
Median	-0.23	37.60	5.10	4377.2	69.87	-0.43	-0.39	48.00	4.37	15.45	58.65
Maximum	2.05	593.50	62.17	102832.3	321.63	2.46	2.05	93.00	34.50	87.10	89.33
Minimum	-1.77	1.60	-10.07	178.5	19.12	-1.58	-1.92	0.00	-15.09	5.04	26.68
Std. Dev.	0.82	38.70	6.15	15211.1	36.49	0.86	0.86	22.42	4.03	7.49	14.20
Observations	738	737	705	731	717	738	738	660	737	729	567

Full Sample - Robustness analysis											
	GSE	DEBT	INFLATION	GDP_PC	TRADE	CORRUPTION	RULE	TRANSPARENCY	GROWTH	EXPENDE	GLOBAL
Mean	98.98	44.95	6.27	10652.0	78.10	-0.15	-0.12	48.03	4.23	15.26	61.13
Median	99.94	38.15	5.10	4647.3	69.55	-0.39	-0.34	49.00	4.35	15.40	59.46
Maximum	100.00	593.50	62.17	102832.3	321.63	2.46	2.05	93.00	34.50	26.33	89.33
Minimum	89.23	1.60	-2.25	178.5	22.14	-1.55	-1.89	0.25	-15.09	5.04	29.98
Std. Dev.	1.73	39.44	5.61	15724.1	36.54	0.86	0.85	21.39	4.04	4.59	13.59
Observations	675	674	651	668	658	675	675	609	674	670	525

Source: Authors' calculations.