

# Cyclicalities of Fiscal Policy and the Shadow Economy

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## Abstract:

A survey of recent literature on cyclical properties of fiscal policy reveals that fiscal policy is procyclical in many developing countries whereas it is countercyclical in developed ones. However, there is no consensus on what drives the difference in this specific cyclical property of fiscal policy. Using cross-section and panel data sets for 78 countries we document that procyclicality of fiscal policy is more pronounced in countries with a larger size of the shadow economy. We also show that policies reducing the size of the shadow economy lead to a less (more) procyclical (countercyclical) fiscal response to shocks.

**Keywords:** fiscal policy, informal sector, cyclicity

**JEL Classification Numbers:** E26, H30

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# 1 Introduction

Economic theory generally suggests that optimal fiscal policy should follow a counter-cyclical pattern with respect to the business cycles. Namely, if a government respected these prescriptions, the optimal fiscal policy involves a budget surplus in “good times” and a budget deficit in “bad times”.

Contrary to the theory, a number of recent contributions found evidence that even though fiscal policy in most high-income countries is countercyclical, in many developing countries it is procyclical<sup>1</sup>. However, there is no consensus on what might be driving this specific difference among countries in the cyclical property of fiscal policy. On the one hand, Lane and Tornell (1998), Talvi and Vegh (2005) and Alesina, Campante and Tabellini (2008) attribute this difference to differences in the degree of political pressures and control of corruption, whereas Ilzetzki (2008) claims that varying degree of political stability among countries is the cause. On the other hand, Aizenman, Gavin, and Hausmann (1996) and Gavin and Perotti (1997), and Riascos and Vegh (2003) claim that, the fact that most of the developing countries loss access to international credit markets in ”bad times” and other types of borrowing constraints and credit market imperfections provides the key.

In this study we hypothesize that the presence of quite large shadow economies in developing countries also plays a role in this difference in policy across countries. First, we review the theoretical literature and argue that the presence of large shadow economies<sup>2</sup> affect the cyclical properties of fiscal policy by increasing the variation of the tax base. Following this, we set up our hypothesis and ask whether a larger shadow economy would increase the procyclicality of the fiscal policy. Regressions results using both panel and cross-section data support our hypothesis. Moreover, we also list some policy recommendations, such as enhancing tax enforcement and improving bureaucratic quality and law and order, that can reduce the size of the shadow economy and thereby reducing the procyclicality of fiscal policy.

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<sup>1</sup>Some of the recent studies are Gavin and Perotti (1997), Lane and Tornell (1998), Lane (2003), Riascos and Vegh (2003), Kaminsky, Reinhart and Vegh (2004), Talvi and Vegh (2005), Alesina, Campante and Tabellini (2007), Battaglini and Coate (2008), Ilzetzki (2008)

<sup>2</sup>Throughout the paper we use the terms shadow economy and informal sector interchangeably.

We also extend our empirical analysis to provide support for those policy prescriptions.

The rest of the article is organized as follows. Section II reviews the theoretical framework and presents the theoretical link of the influence of the shadow economy on cyclicity. Section III outlines the econometric model and states our hypothesis. Section IV describes the data and reports the empirical results. Finally, section V concludes.

## 2 Theoretical Framework

In the neoclassical models of dynamic economies, balance in government budget constraint must be attained in present value rather than in period-by-period basis. Thus, government policies in these economies can involve deficits and surpluses. This enables the government to distribute tax distortions over time and state of the economy in a welfare-maximizing way. This problem of smoothing tax distortions is the focus of the theory of optimal taxation. Since the optimal tax revenue in a given period is not in general equal to the government expenditure in that period, the theory of optimal taxation is also the theory of optimal debt policy.

Lucas and Stokey (1983) and Chari et al. (1991), among others in the literature, show that government debt should have the role of a shock absorber for the economy. The optimal policy involves budget surpluses in "good times", which are associated with above-average national income and below-average government spending, and budget deficits in "bad times", which are associated with the converse. Thus, unless government spending necessarily has a strong positive correlation with national income, a policy that does not imply a strong negative correlation between budget deficit and national income is unlikely to be optimal. One theoretical way to explore such a seemingly suboptimal policy is by introducing distortions, such as additional policy constraints and government objectives, into the theory of optimal taxation.

Talvi and Vegh (2005), for instance, study the optimal fiscal policy in a model in which running budget surplus creates pressures to increase government spending. Although this distortion is not sufficient to produce procyclical budget deficit (i.e., countercyclical budget

surplus), the results are still interesting for our purpose. The results imply that, when tax base fluctuates, the distortion makes budget deficit less countercyclical. Furthermore, the more variable the tax base, the less countercyclical budget deficit is.

This result can provide a theoretical basis for our empirical finding as well. A well established fact in the literature studying the shadow economy is that the share of the shadow economy in total economic activity exhibits a countercyclical pattern. That is, the relative size of the shadow economy expands during recessions and shrinks in booms. (See Roca, Moreno and Sanchez (2001)) This movement contributes to the expansion of the tax base during booms and contraction of it during recessions. Our conjecture is that by amplifying the fluctuations in the tax base, the presence of the shadow economy can diminish countercyclicality of budget deficits through the mechanism suggested by Talvi and Vegh (2005). Therefore, one should expect budget deficit to be less countercyclical in the countries with larger shadow economies.

### 3 Hypothesis

To test whether a larger informal sector is associated with a higher degree of procyclicality of the fiscal policy, we set up the following equation using a panel data:

$$FP_{i,t} = \beta_0 + \beta_1 IS_{i,t} + \sum_{k=2}^n \beta_k X_{k,i,t} + \epsilon_{i,t} \quad (1)$$

Here,  $FP_{i,t}$  denotes the cyclicity of fiscal deficits, to be defined below,  $IS_{i,t}$  is the size of the shadow economy relative to official GDP and  $X_{k,i,t}$  stands for various control variables. Lastly,  $\epsilon_{i,t}$  is an error term. For all variables  $i$  represents the country and  $t$  the year of the data.

In the above expression  $FP_{i,t}$  stands for the correlation between de-trended GDP and the ratio of fiscal surplus to GDP. Given this definition, a positive (negative) correlation between the fiscal surplus-to-GDP ratio and de-trended GDP implies that fiscal policy is countercyclical. (procyclical) Therefore,  $FP_{i,t}$  gets smaller as fiscal policy becomes more procyclical.

<sup>3</sup> In other words, one can interpret FP as a measure of the degree of countercyclicality of fiscal policy.

Moreover, we include certain variables among  $X_{k_i,t}$  to control for other explanations for the cyclicity of fiscal policy. Particularly, we control for the volatility of output, financial development, financial risk, corruption, political stability, GDP per capita and level of democracy.<sup>4</sup>

Moreover, we also pool our data set and also estimate the following cross-country regression equation:

$$FP_i = \beta_0 + \beta_1 IS_i + \sum_{k=2}^m \beta_k X_{k_i} + \epsilon_i \quad (2)$$

In both cases, what we want to check from our estimation results is that whether  $\beta_1$ 's are significantly negative or not. In other words we want to understand whether procyclicality of fiscal policy escalates due to the existence of a large shadow economy or not.

## 4 Empirical Results

In this section we present the estimation results hypothesized in the previous section. First, we present panel regressions and then cross-country estimation results:

### 4.1 Panel Regressions

Since we are testing for cyclicity of fiscal policy, we want to observe at least a couple of cycles in each country. Therefore, we include a country in our sample only if at least 16 years of fiscal deficit and GDP data is available for this country. Moreover, we limit our sample to countries with at least 1 million inhabitants. These two criteria and availability of data leave us with 78 countries over the period 1960 to 2007. Fiscal surplus-to-GDP ratio is from

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<sup>3</sup>Following Alesina, Campante and Tabellini (2008) we could have estimated cyclicity by regressing the change in the fiscal policy indicator to the de-trended GDP. In fact, we have done the analysis with the estimated coefficient of procyclicality from this paper and our results did not change.

<sup>4</sup>Our choice of the control variables is not arbitrary. They all are related to previous mechanisms suggested by the existing literature to account for the difference in the cyclical properties of the fiscal policy between different countries.

**Table 1. Summary Statistics for the Panel**

	Mean	Std. Dev.	Minimum	Maximum
Cyclicalilty	0.05	0.32	-0.81	0.88
Shadow Economy Size (in %)	0.34	0.14	0.09	0.68
Political Stability	7.57	0.99	5.1	10.64
GDP per-capita(in thousand GK\$)	17.16	16.10	0.268	77.6
Output Volatility	5.99	4.02	2.94	7.15
Investment Profile	9.08	2.09	2.62	11.78
Corruption Control	3.42	1.21	1.32	6
Financial Risk	0.09	0.07	0.04	0.5
Democracy	4.44	1.39	0.98	6

Government Finance Statistics and GDP data is taken from the Total Economy Database of the Groningen Growth and Development Centre.

Unfortunately, informal sector size estimates are not available for such a long time span. Informal sector size estimates range from 1999 to 2007 and are obtained from Schneider, Buehn and Montenegro (2010).

In addition to the informal sector size we also include various explanatory variables in our regressions. One explanatory variable we use is GDP per-capita which, as mentioned above for GDP, is obtained from the Total Economy Database of the Groningen Growth and Development Centre. Moreover, we also use standard deviation of growth of GDP per-capita to control for volatility of output. Furthermore, we use corruption control, political stability, and democratic accountability<sup>5</sup> indices which are taken from Political Risk Services's (PRS) International Country Risk Guide (ICRG) and they are available from 1984 to 2007.<sup>6</sup> Quality of the financial system is proxied by the investment profile index of the ICRG.<sup>7</sup> In addition

<sup>5</sup>In an earlier draft of this paper following Alesina, Campante and Tabellini (2008), we defined a dummy variable Democracy in the following way: We subtracted the countrys score in an Autocracy index from its score in a Democracy index (resulting in a range from -10 to 10) from the Polity IV Project database. Next, we then defined our dummy variable Democracy which is equal to 1 if the result of the subtraction is strictly positive and zero otherwise. However, this index does not have any variation from 1999 to 2007 for the countries in our data set. Therefore, we have decided to use the democratic accountability index provided by the PRS which experiences some variation from 1999 to 2007 and therefore is more suitable for a panel regression. Cross-country regressions using the former definition of the democracy variable provide very similar results.

<sup>6</sup>For all the institutional control variables including political stability, democracy, investment profile, and corruption control a higher value means better institutions.

<sup>7</sup>In an earlier draft of this paper we used legal rights of borrowers and lenders index from the World Development Indicators to proxy for financial development. However, this index is not available as a panel data. Nevertheless, it is highly positively correlated with pooled investment profile index and therefore our results are robust to the choice of financial development index.

**Table 2: Panel Regressions**

Dep. Var.: FP	OLS		IV		OLS		IV	
IS	-0.67***	-0.49***	-0.52**	-0.77**	-0.67**	-0.68**	-0.69**	-0.64**
	(-3.01)	(-2.15)	(-2.29)	(-2.21)	(-2.18)	(-2.21)	(-2.14)	(-2.29)
GDP per-capita			0.006**	0.005**	0.005**	0.002**	0.003*	0.004*
			(2.17)	(2.33)	(2.19)	(2.18)	(1.91)	(1.89)
Democracy					0.06	0.05	0.05	0.05
					(1.10)	(0.94)	(1.27)	(0.89)
Inv. Prof.							0.005	0.003
							(0.17)	(0.11)
Pol. Stab.								
Volatility								
Financial Risk								
Corruption								
<i>R</i> -squared	0.29	0.28	0.34	0.34	0.35	0.35	0.36	0.35
Observations	702	702	702	702	702	702	702	702
F-Test	29.08	24.11	27.55	24.01	10.01	9.97	6.09	5.49

All panel regressions include year and country fixed effects. Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

to the investment profile index which is an institutional variable, we also use risk premium<sup>8</sup> among the independent variables to control for actual financial risk faced by a country that is not covered by institutional quality.

We should also notice that the estimates of the size of the shadow economy, by their very nature, are imperfect. Moreover, when we include institutional variables such as corruption, political stability, democracy and financial development in  $X_{k_i}$  the estimation may become prone to endogeneity issues. Therefore, we also estimate the model with two-stage least squares by using various instrumental variables, namely latitude (Hall and Jones (1999)), an indicator variable for presidential vs. parliamentary regimes (Lederman et. al. (2005)), indicator variables for the legal system (La Porta et al. (1999)) which might be based on

<sup>8</sup>This we obtain both from Moody's and Aswath Damodaran's website: <http://pages.stern.nyu.edu/~adamodar/>

**Table 3: Panel Regressions (cont'd)**

Dep. Var.: FP	OLS	IV	OLS	IV	OLS	IV	OLS	IV
IS	-0.71** (-2.27)	-0.78** (-2.32)	-0.80** (-2.49)	-0.81** (-2.34)	-0.84** (-2.33)	-0.79** (-2.31)	-0.57** (-2.09)	-0.74** (2.28)
GDP per-capita	0.004* (1.89)	0.005* (1.91)	0.005 (1.15)	0.004 (1.39)	0.004 (1.05)	0.004 (0.97)	0.005 (0.94)	0.004 (0.87)
Democracy	0.06 1.09	0.05 (0.83)	0.03 (0.87)	0.04 (1.00)	0.05 (0.91)	0.05 (0.77)	0.06 (0.71)	0.04 (0.49)
Inv. Prof.	-0.003 (-0.27)	-0.003 (-0.21)	0.01 (0.18)	0.005 (0.03)	0.003 (0.14)	-0.003 (-0.11)	0.004 (0.09)	-0.002 (0.07)
Pol. Stab.	0.11 (1.00)	0.14 (0.92)	0.14* (1.89)	0.09 (0.49)	0.17 (0.31)	0.08 (0.99)	0.07 (0.81)	0.05 (1.09)
Volatility			-0.21** (-2.22)	-0.17* (-1.93)	-0.24** (-2.45)	-0.33** (-2.44)	-0.35** (-2.31)	-0.32** (-2.31)
Financial Risk					-0.13 (-0.23)	-0.23 (0.21)	-0.38 (-0.71)	-0.16 (-0.37)
Corruption							0.21** (2.47)	0.17** (2.25)
<i>R</i> -squared	0.37	0.35	0.41	0.38	0.41	0.38	0.46	0.42
Observations	702	702	702	702	702	702	702	702
F-Test	4.98	4.59	5.71	5.07	4.41	4.17	5.04	4.89

All panel regressions include year and country fixed effects. Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

one of the British, French, Scandinavian, German or Socialist legal systems.

Since we are limited by the informal sector size estimates which range from 1999 to 2007 our panel regressions have a time span of 9 years and are estimated for 78 countries. Summary statistics of the cross-country pool obtained after averaging the data for each country over 9 years are provided in table 1.

Estimation results of our panel regression conducted for 78 countries in a time span ranging from 1999 to 2007 are provided in tables 2 and 3. In these tables, in addition to the size of the shadow economy (IS), we add the control variables one by one. In each case we report results of both the OLS and IV estimation using the above specified instrumental variables. The coefficient of interest is the one of the informal sector size. As one can observe from tables 2 and 3 the estimate of this coefficient is significantly different from zero in all panel regressions no matter which control variable is added to the regression. Moreover,



**Table 4: Pooled Regressions**

Dep. Var.: FP	OLS		IV		OLS		IV	
IS	-0.83*** (-4.71)	-0.99*** (-3.12)	-0.62** (-2.29)	-0.87** (-2.34)	-0.57** (-2.10)	-0.62** (-2.15)	-0.58** (-2.39)	-0.64** (-2.27)
GDP per-capita			0.005** (2.27)	0.002* (1.93)	0.004* (1.95)	0.002** (2.28)	0.002 (1.05)	0.002 (1.24)
Democracy					0.01 (1.22)	0.02 (0.82)	0.04 (1.15)	0.05 (1.23)
Inv. Prof.							-0.003 (-0.27)	-0.004 (-0.43)
Pol. Stab.								
Volatility								
Financial Risk								
Corruption								
<i>R</i> -squared	0.25	0.21	0.35	0.27	0.35	0.27	0.36	0.28
Observations	78	78	78	78	78	78	78	78
F-Test	22.08	21.19	22.55	18.29	8.79	7.19	5.99	5.19

Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

the negative sign of the estimates are also not unexpected as we hypothesized that the an increase in size of the shadow economy should reduce the degree of countercyclicality of fiscal policy. Other variables which yield to consistently significant coefficients are volatility of GDP as in Lane (2003) and corruption control as in Alesina, Campante and Tabellini (2008). The sign of these coefficients are also not surprising as Lane (2003) documents that higher volatility of GDP produce more procyclical fiscal policy and Alesina, Campante and Tabellini (2008) show that more corruption (a lower value of the corruption control index) is associated with more more procyclical fiscal policy.

## 4.2 Cross-Country Regressions

In addition to the panel estimates reported in tables 2 and 3 we also report results of cross-sections estimates obtained by pooling data on each country from 1999 to 2007. These are documented in tables 4 and 5. Again, similar to the previous two tables, in addition to the size of the shadow economy (IS), we add the control variables one by one and in each case we report results of both the OLS and IV estimation using the above specified instrumental variables.

Similar to the panel regression results pooled regressions produce significantly negative estimates for the coefficient of the shadow economy. And again, volatility of GDP and corruption control index are the only significant control variables.

**Table 5: Pooled Regressions (cont'd)**

Dep. Var.: FP	OLS		IV		OLS		IV	
IS	-0.61**	-0.72**	-0.81***	-0.71***	-0.51**	-0.85**	-0.47**	-0.74**
	(-2.19)	(-2.21)	(-2.99)	(-3.04)	(-2.71)	(-2.21)	(-2.27)	(2.37)
GDP per-capita	0.005	0.005	0.005	0.004	0.002	0.003	0.002	0.004
	(0.87)	(0.91)	(0.71)	(0.89)	(1.37)	(0.37)	(0.34)	(1.01)
Democracy	0.03*	0.03	0.04	0.03	0.05	0.02	0.06	0.01
	1.89	(0.90)	(0.81)	(0.92)	(0.75)	(1.11)	(0.39)	(0.95)
Inv. Prof.	-0.003	0.001	0.003	0.004	0.002	0.003	-0.003	0.002
	(-0.23)	(0.39)	(0.55)	(0.15)	(0.21)	(0.51)	(-0.29)	(0.26)
Pol. Stab.	-0.09	-0.14	-0.10	-0.09	-0.13	-0.15	-0.09	-0.07
	(-0.77)	(-0.92)	(-1.03)	(-0.19)	(-0.23)	(-1.07)	(-0.92)	(-0.89)
Volatility			-0.17**	-0.19**	-0.16**	-0.22**	-0.15**	-0.13*
			(-2.33)	(-2.17)	(-2.05)	(-2.34)	(-2.21)	(-1.91)
Financial Risk					-0.13	0.31	-0.17	-0.14
					(-0.44)	(0.09)	(-0.99)	(-0.21)
Corruption							0.12*	0.12**
							(1.97)	(2.25)
<i>R</i> -squared	0.37	0.29	0.41	0.33	0.41	0.33	0.44	0.37
Observations	78	78	78	78	78	78	78	78
F-Test	5.15	4.90	5.37	4.97	4.21	4.07	5.05	4.95

Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

In addition to the cross-country regressions reported in tables 4 and 5 we report some

more cross-section estimation results. Data for these estimations are obtained, somewhat differently than the previous case, as follows: Instead of pooling the data only from 1999 to 2007, we take the time-series average of each variable using all data whenever it is available. For example, for the FP data, to obtain  $FP_i$  for a country  $i$ , we average  $FP_{it}$  not from 1999 to 2007 only, but to utilize a higher time span for cyclicity, we now average it out from 1960 to 2007.

Results of these cross-section regressions are reported in tables 6 and 7. They are not different than the previous pooled regression results and again a higher size of the shadow economy is associated with a more procyclical fiscal policy.

**Table 6: Pooled Regressions with Different Time Span**

Dep. Var.: FP	OLS		IV		OLS		IV	
IS	-0.89***	-1.23***	-0.52**	-0.89*	-0.48**	-0.52**	-0.48**	-0.54**
	(-5.49)	(-4.45)	(-2.54)	(-1.91)	(-2.30)	(-2.05)	(-2.29)	(-2.19)
GDP per-capita			0.004*	-0.002	0.004	0.002	0.003	0.001
			(1.90)	(0.30)	(1.48)	(0.28)	(1.35)	(0.54)
Democracy					0.03	0.01	0.04	0.04
					(1.52)	(0.02)	(1.50)	(1.43)
Inv. Prof.							-0.004	-0.004
							(-0.22)	(-0.23)
Pol. Stab.								
Volatility								
Financial Risk								
Corruption								
$R$ -squared	0.23	0.19	0.25	0.24	0.27	0.24	0.27	0.27
Observations	78	78	78	78	78	78	78	78
F-Test	22.08	21.19	12.55	11.29	9.09	7.44	6.75	6.19

Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

**Table 7: Pooled Regressions with Different Time Span (cont'd)**

Dep. Var.: FP	OLS		IV		OLS		IV	
IS	-0.54***	-0.82**	-0.61***	-0.79**	-0.57**	-1.15*	-0.28**	-0.54**
	(-2.63)	(-2.09)	(-3.13)	(-2.04)	(-2.85)	(-1.91)	(-2.13)	(2.18)
GDP per-capita	0.004	0.002	0.006*	0.005	0.003	0.001	0.001	0.0003
	(1.53)	(0.62)	(1.91)	(1.29)	(1.30)	(0.22)	(0.29)	(0.95)
Democracy	0.03	0.03	0.02	0.04	0.02	0.03	-0.03	-0.17
	1.12	(0.90)	(0.76)	(0.73)	(1.05)	(0.85)	(-0.59)	(0.85)
Inv. Prof.	-0.0002	0.0002	0.003	0.004	0.004	0.01	-0.004	0.005
	(-0.01)	(0.009)	(0.06)	(0.05)	(0.20)	(0.46)	(-0.19)	(0.16)
Pol. Stab.	-0.03	-0.04	-0.08	-0.01	-0.03	-0.05	-0.04*	-0.06
	(-0.76)	(-0.90)	(-0.43)	(-0.75)	(-0.63)	(1.07)	(-1.92)	(-1.10)
Volatility			-0.1**	-0.15**	-0.13**	-0.18*	-0.17**	-0.13*
			(-2.23)	(-2.13)	(-2.09)	(-1.94)	(-2.11)	(-1.89)
Financial Risk					0.23	0.46	-0.10	-0.16
					(0.74)	(1.07)	(-0.25)	(-0.27)
Corruption							0.12**	0.12*
							(2.40)	(1.95)
<i>R</i> -squared	0.27	0.27	0.30	0.31	0.32	0.31	0.35	0.34
Observations	78	78	78	78	78	78	78	78
F-Test	5.45	4.90	5.47	4.99	4.30	4.00	5.25	4.85

Heteroscedasticity-consistent t-statistics are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively.

## 5 Policy Implications

In this section we examine various policy implications of our results presented in the previous section. As documented in the introduction and in the second section of the paper where we have reviewed the theoretical framework behind the literature on optimal fiscal policy over the business cycle, optimal (or social welfare maximizing) fiscal response to business cycles should be countercyclical. However, as we have shown in the previous section, countries with a larger size of the shadow economy follow less countercyclical (or more procyclical) fiscal policy. Therefore, one interesting question one might ask here what the policy implications of this result are.

Particularly, we ask whether there are any policy recommendations we can prescribe to policymakers which would reduce the size of the shadow economy thereby also reducing the

degree of procyclicality of fiscal policy. To do this we will estimate the following system using panel data where we also include factors affecting the size of the shadow economy:

$$FP_{i,t} = \beta_0 + \beta_1 IS_{i,t} + \sum_{k=2}^n \beta_k X_{k,i,t} + u_{i,t} \quad (3)$$

$$IS_{i,t} = \alpha_0 + \sum_{k=1}^n \alpha_k Z_{k,i,t} + v_{i,t} \quad (4)$$

In the above specified system we will specifically look at values of  $\alpha_k$  which aim to measure effects of  $Z_{k,i,t}$  on the size of the shadow economy. Here we include three variables in  $Z_{k,i,t}$ . One of them is the degree of tax enforcement which when increases we expect to reduce the size of the shadow economy as mentioned in Ihrig and Moe (2004). The other two variables that potentially might affect the size of the shadow economy are the level of law and order and the level of bureaucratic quality according to Johnson, Kaufman and Zoido-Lobaton (1998). Here, we obtain the law and order index and the bureaucratic quality from PRS's ICRG similar to the institutional variables used in previous regressions and the level of tax enforcement from Ihrig and Moe (2004).

Results of these regressions are reported in table 8. Notice that we use three different methods to do the estimations: Ordinary Least Squares (OLS), Generalized Method of Moments (GMM), and Full Information Maximum Likelihood (ML). All methods yield to qualitatively similar results. As we can observe from table 8 higher levels of law and order, tax enforcement and bureaucratic quality are all associated with a smaller size of the shadow economy which, since  $\beta_1$  is significant and estimated to be negative, in turn reduces the procyclicality of fiscal policy.

According to these results, we can confidently say that improving enforcement of tax policy, quality of state bureaucracy and enhancing law and order within an economy have all significant effects on the cyclical behavior of fiscal policy through their effects on the size of the shadow economy.

**Table 8: Systems Estimations**

Dep. Var.	OLS		GMM		ML	
	FP	IS	FP	IS	FP	IS
IS	-0.57** (-2.26)		-0.65** (-2.29)		-1.61** (-2.08)	
GDP per-cap	0.003 (1.16)		0.002 (0.05)		0.003 (0.07)	
Democracy	0.03 (1.12)		0.02 (0.65)			0.005 (0.14)
Inv. Prof.	0.004 (0.18)		0.01 (0.88)		-0.006 (-0.21)	
Pol. Stab.	-0.03 (-0.70)		-0.02 (-0.30)		-0.05 (-1.08)	
Volatility	-0.32** (-2.37)		-0.21** (-2.39)		-0.11** (-2.07)	
Financial Risk	0.23 (0.38)		-0.04 (-0.12)		0.12 (0.13)	
Corruption	0.15** (2.44)		0.21* (1.89)		0.14** (2.10)	
Enforcement		-0.03** (-2.45)		-0.05** (-2.29)		-0.04*** (-2.99)
Law and Order		-0.03** (-2.44)		-0.08** (-2.21)		-0.03* (-1.87)
Bur. Qual.		-0.04*** (-3.36)		-0.17*** (-3.99)		-0.03** (-2.28)
<i>R</i> -squared	0.43	0.67	0.45	0.47	0.40	0.67
Observations	702	702	702	702	702	702

Heteroscedasticity-consistent t-statistics (z-statistic in the case of ML) are reported in parentheses below the coefficients. \*\*\*, \*\*, \* denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is also included but not reported.

## 6 Concluding Remarks

It is a well documented fact that cyclical properties of fiscal policy differs across countries. Economic theory on fiscal policy tells us that optimal fiscal policy over the business cycle should be countercyclical. However, a large number of countries experience exactly the opposite.

Using both panel and cross-country evidence, our study establishes the association between the size of the shadow economy and the procyclicality of fiscal policy. We found

that countries with a larger size of the shadow economy tend to have a highly procyclical fiscal policy. Our results are robust even after controlling for various variables used in the literature to explain differences in the cyclical properties of fiscal policy.

Following our results, policy implications complement those of the existing papers in literature. More specifically, according to our study, the public policy should focus more on taking measures to reduce the size of the shadow economy. Increasing tax enforcement, enhancing institutional environment through law and order and improving the quality of state bureaucracy are among the steps needed to be taken by governments.

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