



**HAL**  
open science

# Cyclical Expenditure Policy, Output Volatility, and Economic Growth

Harald Badinger

► **To cite this version:**

Harald Badinger. Cyclical Expenditure Policy, Output Volatility, and Economic Growth. *Applied Economics*, 2011, pp.1. 10.1080/00036846.2010.524630 . hal-00664015

**HAL Id: hal-00664015**

**<https://hal.science/hal-00664015>**

Submitted on 28 Jan 2012

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



## Cyclical Expenditure Policy, Output Volatility, and Economic Growth

Journal:	<i>Applied Economics</i>
Manuscript ID:	APE-2009-0036.R1
Journal Selection:	Applied Economics
Date Submitted by the Author:	09-Sep-2010
Complete List of Authors:	Badinger, Harald; Institute for International Economics, Department of Economics
JEL Code:	E30 - General < E3 - Prices, Business Fluctuations, and Cycles < E - Macroeconomics and Monetary Economics, E60 - General < E6 - Macro Policy Formation, Macro Public Finance, Macro Policy, etc < E - Macroeconomics and Monetary Economics, H30 - General < H3 - Fiscal Policies and Behavior of Economic Agents < H - Public Economics
Keywords:	Cyclical Fiscal Policy, Output Volatility, Economic Growth, Institutions

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

SCHOLARONE™  
Manuscripts

For Peer Review

# Cyclical Expenditure Policy, Output Volatility, and Economic Growth

Harald Badinger

Department of Economics,

Vienna University of Economics and Business

and

Austrian Institute of Economic Research (WIFO)

September 2010

**Abstract:** This paper provides an empirical assessment of the relation between the cyclical policy of fiscal expenditure policy, output volatility, and economic growth, using a cross-section of 88 countries over the period 1960 to 2004. Identification of the effects of (endogenous) cyclical expenditure policy is achieved by exploiting the exogeneity of countries' political and institutional characteristics, which we find to be relevant determinants of the cyclical policy of expenditures. There are three main results: First, both pro- and countercyclical expenditure policy amplify output volatility, much in a way like pure fiscal shocks. Second, output volatility, due to variations in cyclical and discretionary fiscal policy, is negatively associated with economic growth. Third, there is no direct effect of cyclical policy on economic growth other than through output volatility.

**JEL Code:** E3, E6, H3, H8

**Keywords:** Cyclical Fiscal Policy, Output Volatility, Economic Growth, Institutions

## I. Introduction

Does fiscal policy affect economic growth? This is clearly one of the most fundamental and policy relevant macroeconomic questions. According to Easterly (2005) there is no robust evidence for a relation between macroeconomic policies (including fiscal policy) and economic growth, once institutions are controlled for. In contrast, Caballero (2008, p. 1) argues that “Good macroeconomic policy helps growth ... I do not think this view is in any dispute in the applied and policy world.”

Notwithstanding the wide agreement that macroeconomic policies can influence economic performance, it remains a challenge for both theory and empirics to identify the channels through which economic policy affects growth. The emergence of new endogenous growth theory, overcoming the traditional dichotomy between business cycle and growth theory, has laid the ground for such an analysis. It is hardly questioned that economic policy affects economic activity in the short run. If business cycle volatility and economic growth are related as suggested by endogenous growth theory, economic policy can indirectly affect growth through its effect on volatility. Such a finding would also lead to a reassessment of macroeconomic priorities: The welfare cost of volatility *per se* are widely regarded as negligible since Lucas (1987). But if volatility turns out to have a negative effect on economic growth, its costs – or equivalently, the gains from stabilization – will be substantial (Barlevy, 2004).

Regarding the role of fiscal policy, Fatas and Mihov (2003) suggest introducing fiscal rules as a means to reduce the use of discretionary fiscal policy, defined as fiscal policy unrelated to the business cycle, based on their finding for a large cross-section of 91 countries that aggressive use of discretionary policy lowers growth by increasing output volatility.

This paper highlights the role of another important element of fiscal policy, namely cyclical fiscal policy. So far, there are hardly studies investigating the effects of fiscal cyclicity on economic growth. One notable exception is Aghion and Marinescu (2007), who consider an (unbalanced) panel of annual data for 19 OECD countries from 1960 to 2007. Regressing growth on alternative cyclicity measures (and standard controls for economic growth regressions), they find a positive effect of the ‘countercyclicity’ of fiscal policy on economic growth.

The main goal of the present paper is to shed more light on the role of cyclical fiscal policy and its transmission channels, considering both its effect on output volatility, and – in a second step – its effect on economic growth. Other than previous studies we consider a large cross-section of 88 countries covering the period 1960 to 2004, which is motivated by the use of (de facto) time-invariant variables on the countries’ political and institutional characteristics to identify the causal effect of (endogenous) cyclicity on output volatility. The use of institutional variables as instruments for fiscal policy was first suggested by Fatas

1  
2  
3 and Mihov (2003). The present study extends their analysis in considering the role of cyclical  
4 fiscal policy (as well as that of discretionary fiscal policy). We demonstrate that institutional  
5 variables (such as political of constraints and the average number of elections) provide  
6 considerable information on the variation in fiscal cyclicalities across countries, and we use this  
7 exogenous variation to identify the causal effect of cyclicalities on output volatility and  
8 economic growth.  
9  
10  
11

12  
13 We find that cyclical fiscal (expenditure) policy has a destabilizing effect on the  
14 economy, no matter whether it is pro- or countercyclical. In fact, it amplifies output volatility  
15 much the same way as discretionary fiscal policy. This adds to the widespread scepticism  
16 against the usefulness of fiscal policy as a fine-tuning instrument. We also find that output  
17 volatility, induced by variations in cyclical or fiscal policy, negatively affects economic  
18 growth. Taken together this has an important policy implication: Economic growth could be  
19 enhanced by introducing fiscal rules, designed to restrict both the use of discretionary fiscal  
20 policy (Fatas and Mihov, 2003) as well as the use of cyclical fiscal policy.  
21  
22  
23  
24  
25

26  
27 The remainder of the paper is organized as follows. Section II constructs measures of  
28 fiscal cyclicalities and the aggressiveness of discretionary fiscal policy for a large cross-section  
29 of 88 countries. Section III motivates the identification strategy and provides evidence on the  
30 relation between cyclical (and discretionary) fiscal policy and output volatility. Section IV  
31 considers the effect of cyclicalities on economic growth. Section V summarizes the results and  
32 concludes.  
33  
34  
35

## 36 37 38 **II. Constructing Measures of Cyclical and Discretionary Fiscal Policy**

39  
40 We use government consumption as indicator of fiscal policy. This choice is dictated by data  
41 availability, since there are no internationally comparable data for other measures of fiscal  
42 policy for our large cross-section of countries. On the one hand, this limits the generality of  
43 our results. On the other hand, an advantage is that government expenditures – compared with  
44 revenues – are less responsive to the cycle through stabilizers ‘built-in’ the fiscal system and  
45 can be changed with relative ease. As a consequence, expenditures are more indicative of a  
46 government’s intentional cyclical policy than revenues, whose cyclical behaviour is driven by  
47 automatic stabilizers to a much larger extent. Moreover, previous studies suggest that the  
48 cyclicalities of government consumption reflects the cyclicalities of overall government  
49 expenditures reasonably well.<sup>1</sup>  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59

---

60  
<sup>1</sup> In Lane (2003), for example, who studies the determinants of cyclical fiscal policy using a sample of  
22 OECD countries, the correlation between the cyclicalities of government consumption and that of  
total government expenditures is 0.71.

We follow the standard approach in the literature and estimate cyclical parameters ( $\chi$ ) by regressing growth of real government consumption ( $G$ ) on the growth of real GDP ( $Y$ ), correcting for serial correlation in the error term:

$$\Delta \ln G_{i,t} = \alpha_i + \chi_i \Delta \ln Y_{i,t} + \eta_{i,t}, \quad (1a)$$

$$\eta_{i,t} = \rho_i \eta_{i,t-1} + \varepsilon_{i,t}. \quad (1b)$$

Equation (1) is estimated separately for each of the  $i = 1, \dots, 88$  countries, which is the largest set of countries for which the key variables required in the present study are available. The time dimension  $t$  ranges from 1960 to 2004; for some countries, a slightly shorter time span had to be used (see Appendix A1).

Equation (1) is considered as reduced form equation for government consumption and estimated by ordinary least squares. As a result we obtain a decomposition of the growth of government consumption into a cyclical and a discretionary component. The time series of country  $i$ 's cyclical fiscal policy is given by  $\hat{\chi}_i \Delta \ln Y_{i,t}$ ; and the estimate of the (structural) residual of equation (1), i.e.,  $\hat{\varepsilon}_{i,t}$ , is interpreted as series of discretionary fiscal policy shocks. By least squares algebra these two series are orthogonal.

In the following, we will estimate the effects of cyclical fiscal policy on volatility and growth from a cross-section regression, where we will use the estimates of the parameter  $\chi_i$  as country-specific indicators of the average cyclical policy. A positive (negative) value of  $\chi_i$  is associated with procyclical (countercyclical) fiscal behaviour. Our results indicate substantial cross-country variation in the cyclical parameters, whose estimates range from  $-0.835$  to  $2.698$ . Most of the countries show procyclical fiscal expenditure policy; only 11 of the 88 coefficients are negative (see Appendix A1). In line with Fatas and Mihov (2003), we use as a measure of discretionary fiscal policy ( $DISCR$ ) the standard deviation of the residuals from equation (1), i.e.,  $DISCR_i = sd(\hat{\varepsilon}_i)$ .

Regarding the relevance of cyclical versus discretionary fiscal policy, the  $R^2$  in equation (1), averaged over all 88 countries, amounts to 0.201. This means that roughly one-fifth of the total variation in fiscal policy is due to cyclical fiscal policy. Our estimates are well in line with previous studies. Comparing our cyclical coefficients  $\hat{\chi}_i$  (for period 1960 to 2004) with those of Lane (2003) for 22 OECD countries (for 1960 to 1998), the correlation is 0.872. Our measure of discretionary fiscal policy is very close to that of Fatas and Mihov (for 1960 to 2000); their correlation is 0.887.

### III. Cyclical Policy and Output Volatility

#### 1. The Empirical Model

Our basic empirical framework builds on Fatas and Mihov (2003); as a novel feature the cyclicity of fiscal policy is included as explanatory variable for output volatility:

$$\ln \sigma_i^y = \gamma_0 + \gamma_1 \ln CYC_i + \mathbf{x}_i \boldsymbol{\gamma} + u_i. \quad (2a)$$

The dependent variable is output volatility ( $\sigma^y$ ), defined as standard deviation of the growth rate of (real) output per capita;  $CYC$  is our measure of the cyclicity of fiscal policy, which we construct from the estimates of equation (1) as will be outlined more in detail below;  $\mathbf{x}_i$  is a vector of control variables, and  $u$  is a stochastic error term. The cross-section dimension ( $i$ ) comprises 88 countries, the largest sample for which the required data are available. Unless mentioned otherwise, all data are averages over the period 1960 to 2004 (see Appendix A1).

As it is standard in skedastic regressions, we choose a logarithmic specification to avoid negative predicted values; it is then natural to use the cyclicity measure in log form as well, such that the parameter of our main interest ( $\gamma_1$ ) measures the relative change of output volatility with respect to relative changes in cyclicity.<sup>2</sup>

We define cyclicity ( $CYC$ ) as absolute value of  $\hat{\chi}$  to allow for negative values of the cyclicity coefficients  $\hat{\chi}_i$  in the logarithmic specification (2a). Obviously, the variable  $CYC = |\hat{\chi}|$  then measures only the cyclical responsiveness of fiscal policy, but not whether it is pro- or countercyclical. This could be addressed by properly signing  $\ln CYC$  for the respective observations. But this would assume that – if procyclical policy amplifies business cycles – countercyclical policy smoothes business cycles. This is an assumption we wish to test rather than impose right from the beginning, given the widespread scepticism against the effectiveness of fiscal policy as fine-tuning instrument. Countercyclical fiscal policy might actually turn out destabilizing due to lags in (recognition, implementation, and) materialization, a point prominently made by Friedman (1953).

Consequently, we do not impose any assumption about the relation between the effects of pro- and countercyclical policy. Instead, we define  $CYC_i$  as absolute value of  $\hat{\chi}_i$  ( $CYC_i = |\hat{\chi}_i|$ ) and allow for different parameters of  $\ln CYC_i$ , depending on whether  $\hat{\chi}_i$  is positive or negative for the respective observation  $i$ :

$$\ln \sigma_i^y = \gamma_0 + \gamma_1 \ln CYC_i + \gamma_1^{counter} D_i^{counter} \ln CYC_i + \mathbf{x}_i \boldsymbol{\gamma} + u_i, \quad (2b)$$

where  $D^{counter}$  is a dummy variable taking a value of 1 for ‘countercyclical observations’, i.e.,  $D_i^{counter} = 1$  for all  $i$  where  $\hat{\chi}_i < 0$  and 0 otherwise. The parameter  $\gamma_1^{counter}$  then measures the

<sup>2</sup> While the logarithmic specification yields a slightly better fit, it is not crucial for the results.



1  
2  
3 difference between the effect of countercyclical fiscal policy and the effect of procyclical  
4 fiscal policy on output volatility ( $\gamma_1$ ).  
5  
6

7  
8 We start from a simple regression of output volatility on cyclicalness ( $CYC$ ) and then add  
9 three standard controls: Government size ( $GSIZE$ ), openness ( $OPEN$ ), measured as imports  
10 plus exports as a share of GDP, and real GDP per capita ( $GDPPC$ ), i.e.,  $\mathbf{x}_i = [GSIZE_i, OPEN_i,$   
11  $\ln GDPPC_i]$ . Regarding government size, it has been argued that more volatile economies may  
12 have an incentive to set up larger governments as a means to reduce macroeconomic volatility  
13 (Rodrik, 1998). As a consequence,  $GSIZE$  might be endogenous in equation (2). In line with  
14 Fatas and Mihov (2003) we use the standard approach and instrument  $GSIZE$  by the (log of)  
15 population ( $POP$ ), the urbanization rate ( $URBAN$ ), and the dependency ratio ( $DEP$ ).  
16  
17  
18  
19

20  
21 In a final step, we will include the aggressiveness of discretionary fiscal policy as  
22 defined in section II ( $DISCR$ ), yielding our most comprehensive model:  
23  
24

$$25 \ln \sigma_i^y = \gamma_0 + \gamma_1 \ln CYC_i + \gamma_2 \ln DISCR_i + \mathbf{x}_i \boldsymbol{\gamma} + u_i. \quad (3)$$

26  
27  
28 Before turning to the estimation of models (2) and (3), two issues warrant discussion.  
29 First, our variable of main interest, the cyclicalness of fiscal policy ( $CYC$ ), is endogenous with  
30 respect to output volatility as a result of reverse causality. Talvi and Vegh (2005) show in a  
31 political economy model that high output volatility tends to generate procyclical fiscal  
32 behaviour.<sup>3</sup> This would introduce an upward bias in the estimated effect of cyclicalness on  
33 output volatility. In addition, the cyclicalness measure ( $CYC$ ) is an estimate of its true value and  
34 might thus be subject to classical measurement error, causing an attenuation bias.  
35  
36  
37  
38

39 Another issue, related to the fact that our country-specific cyclicalness measures ( $\chi_i$ ) are  
40 generated by model (1), is that the observations on our variable  $CYC_i$  are estimated with  
41 different precision. This is addressed by using a weighted (two stages) least squares  
42 procedure, using the inverse of the variance of  $\hat{\chi}_i$  as weights.<sup>4</sup> This implies that observations,  
43 for which the variable  $CYC$  is measured more precisely, are assigned a higher weight in the  
44 regression. As we show below the weighting improves the fit but it is not crucial for the  
45 results.  
46  
47  
48  
49

## 50 51 **2. Identification, First Stage Regressions, and Instrument Quality:** 52 **Political and Institutional Characteristics as Determinants of Cyclicalness** 53

54  
55 <sup>3</sup> They also provide evidence from a large cross-section of countries that the degree of procyclicalness in  
56 government consumption is positively correlated with output volatility. Lane (2003) obtains a  
57 similar results for a sample of 22 OECD countries.  
58

59 <sup>4</sup> The choice of the weight is not affected by the logarithmic transformation. By the delta method,  
60  $\sigma_{\ln CYC}^2 = 1/\mu_{CYC} \sigma_{CYC}^2$ , i.e. the variances of the level and log of  $CYC$  are equal up to a rescaling by  
the mean of  $CYC$  ( $\mu_{CYC}$ ).

1  
2  
3 In order to identify the causal effect of cyclicity on output volatility, we use countries'  
4 political and institutional characteristics as instruments. We hypothesize that countries'  
5 political and institutional characteristics are not only relevant determinants of discretionary  
6 fiscal policy (as shown by Fatas and Mihov (2003)) but also of cyclical fiscal policy. In  
7 particular, we consider four institutional variables: the average number of elections (*NELEC*),  
8 an index of political constraints (*POLCON*) by Henisz (2000), a dummy for majoritarian  
9 systems (*MAJ*), and a dummy for presidential regimes (*PRES*).  
10  
11  
12  
13  
14

15 To motivate the choice of instruments, notice that the variable *CYC*, defined as absolute  
16 value of cyclicity ( $CYC = |\hat{\chi}|$ ), in the first place measures the aggressiveness (but not the  
17 direction) of cyclical fiscal policy. As a consequence, part of the discussion by Fatas and  
18 Mihov (2003) motivating the use of the institutional variables (*NELEC*, *POLCON*, *MAJ*,  
19 *PRES*) as instruments for the aggressiveness of discretionary policy directly carries over to  
20 our measure of cyclical fiscal policy (*CYC*).  
21  
22  
23  
24

25 The extent of political constraints (*POLCON*) is the instrument with the strongest  
26 theoretical motivation. According to the 'voracity hypothesis' (Tornell and Lane, 1998),  
27 power diffusion among more agents induces procyclicality, since fiscal competition by  
28 multiple power groups for fiscal revenues increases (decreases) in booms (recessions). On the  
29 other hand, governments less constrained in implementing their policy can respond more  
30 flexibly to the business cycle and will thus be better able to translate their 'cyclicity  
31 preferences' into actual policy.  
32  
33  
34  
35

36 Regarding electoral characteristics, the frequency and timing of elections (*NELEC*) and  
37 the induced electoral cycles will not be systematically related to the business cycle. As a  
38 consequence, the observed pattern of fiscal policy will show a smaller association with the  
39 business cycle, the larger the number of elections, i.e., the more the responsiveness of fiscal  
40 policy to the business cycle is diluted by fiscal measures related to the electoral cycle. A  
41 similar point can be made for *MAJ* in light of the argument by Persson and Tabellini (2001)  
42 that majoritarian systems will have more pronounced electoral cycles. Finally, it could be the  
43 case that presidential regimes will not only be associated with a more aggressive use of  
44 discretionary fiscal policy as argued by Fatas and Mihov (2003), but also with a more active  
45 conduct of cyclical fiscal policy.  
46  
47  
48  
49  
50  
51  
52

53 While our choice of the institutional variables *NELEC*, *POLCON*, *MAJ*, and *PRES* is  
54 well motivated, the ultimate question is whether they are also relevant in our empirical model.  
55 Table 1 reports the results of a regression of the log of *CYC* on the four institutional variables  
56 separately (columns (1a) to (1d)) and simultaneously (column (2a)). The number of elections  
57 (*NELEC*) and political constraints (*POLCON*) turn out to have the strongest effect; they are  
58 significant both in a simple regression (columns (1a) and (1b)) of Table 1 and in a multiple  
59 regression on all four political variables (column (2a)). The sign of the coefficient of *NELEC*  
60

1  
2  
3 is negative as expected. The variable *POLCON* also enters with a negative sign; this does not  
4 necessarily reject the voracity hypothesis but suggests that – among the various ways through  
5 which political constraints affect the cyclicity of fiscal (expenditure) policy – the voracity  
6 effect does not appear to be the most dominant force.<sup>5</sup> The variables *MAJ* and *PRES* are  
7 insignificant or only weakly significantly and would thus weaken the quality of our set of  
8 instruments (compare the F-statistic in columns (2a) and (2b)). Hence, we will use only  
9 *NELEC* and *POLCON* as instruments for *CYC* in the two stages least squares regressions  
10 below.  
11  
12  
13  
14

15  
16 < Table 1 >  
17  
18

19 Notice that column (2b) corresponds to the first stage regression for equation (2a) only  
20 in the most parsimonious specification without additional explanatory variables for output  
21 volatility. The first stage regression for the most comprehensive model including all controls  
22 – *GSIZE* (instrumented by *POP*, *URBAN*, and *DEP*), *OPEN*, and *GDPPC* – is given in  
23 column (3). An important result is that the variables *NELEC* and *POLCON* remain significant,  
24 both individually and jointly.  
25  
26  
27  
28

29 Column (4) shows the corresponding first stage regression for discretionary fiscal policy  
30 (*DISCR*). Results are in line with Fatas and Mihov (2003). Notice that – in contrast to the first  
31 stage regression for *CYC* – the two variables *MAJ* and *PRES* turn out significant at the five  
32 and one percent level. At least from an empirical perspective, this suggest that the variation in  
33 the variables *MAJ* and *PRES* may be helpful to identify the separate effect of discretionary  
34 policy in model (3), where both *CYC* and *DISCR* are included.  
35  
36  
37  
38

39 Overall, the results reveal interesting links between institutions and cyclicity.  
40 Exploring these links more in detail is beyond the scope of this paper. For the purpose of the  
41 present study, the most relevant message from the results in Table 1 is that the two variables  
42 *NELEC* and *POLCON* are relevant instruments for cyclicity (*CYC*); this is not the case for  
43 the variables *MAJ* and *PRES*, which are, however, strongly associated with the aggressiveness  
44 of discretionary fiscal policy (*DISCR*).  
45  
46  
47  
48

### 49 3. Estimation Results

50 We start from the most parsimonious specification of model (2), which includes only  
51 cyclicity (*CYC*) as explanatory variable.<sup>6</sup> Columns (1a) and (1b) show the weighted least  
52  
53  
54

---

55  
56 <sup>5</sup> Lane (2003) also finds little support for the voracity hypothesis in his study of the cyclicity of  
57 expenditures in a sample of 22 OECD countries; in particular, the effect of political constraints on  
58 cyclicity is often insignificant or shows the wrong sign.  
59

60 <sup>6</sup> The weighting accounts for the fact that *CYC* is a generated regressor, not for the presence of  
heteroskedasticity in the error term in models (2) or (3) (which is also confirmed by standard tests).  
Hence, we use robust standard errors for inference throughout.

squares estimates (WLS) of equation (2a), which allows the effects of pro- and countercyclical fiscal policy to differ by including an interaction between *CYC* and a dummy for countercyclical policy ( $D^{counter}$ ). The estimated elasticity of output volatility with respect to procyclical fiscal policy is 0.184; the effect of countercyclical policy appears to be even larger (0.278), but the difference is insignificant with a p-value of 0.300. This conclusion holds up when the model is estimated by weighted two stages least squares (WTLS), using the average number of elections (*NELEC*) and the index of political constraints (*POLCON*) as instruments for *CYC* (column (1b)). In that case the elasticities with respect to pro- and countercyclical fiscal policy are 0.595 and 0.501 respectively, but again the difference is insignificant (p-value: 0.618).

< Table 2 >

In light of this result we proceed with a restricted model, imposing parameter equality for pro- and countercyclical fiscal policy. Columns (2a) and (2b) show the WLS and WTLS estimates of the simple regression of volatility on cyclical policy. For comparison, columns (3a) and (3b) show the results of the unweighted LS and TSLS estimates. Notice first, that endogeneity of *CYC* is indeed pronounced: The difference between the (W)LS and (W)TSLS coefficients is sizeable. More formally, a Hausman test rejects that *CYC* is exogenous at the one percent level in all specifications. It is interesting to note that both the weighted and unweighted LS estimates of the effect of *CYC* on volatility show a strong attenuation bias towards zero. This suggests that measurement error is the dominant source of endogeneity rather than reverse causality (causing an upward bias). This view is also supported by a comparison of the weighted and unweighted estimates. In the weighted regressions, less precise estimates are assigned a lower weight, rendering the role of measurement error less relevant. As a consequence, the attenuation bias is less pronounced in the WLS regression, yielding coefficients that are closer to the WTLS estimates.

While we postpone a more comprehensive sensitivity analysis to below, we emphasize that the weighting is not crucial for the results: A comparison of columns (2b) and (3b) shows that the weighted and unweighted TSLS estimates are virtually identical, pointing to an elasticity of output volatility with respect to cyclical policy of around 0.6. The choice of the logarithmic form of *CYC* is not essential for the qualitative conclusions as well: The corresponding results for the specification in levels (columns (4a) and (4b)) are in line with the logarithmic specification (columns (1b) and (2b)).

A final observation is that the tests for overidentifying restrictions reject the null hypothesis of valid instruments in some specifications. This is not too surprising, given that several important variables have been omitted from the regression so far. Results for a more comprehensive model, including *G*SIZE, *OPEN* and *GDPPC* as controls are given in Table 3. As already discussed above, government size is likely to be endogenous with respect to

1  
2  
3 volatility, which is addressed by using population (*POP*), the urbanization rate (*URBAN*), and  
4 the dependency ratio (*DEP*) as instruments for *G**SIZE*.  
5  
6

7 < Table 3 >  
8  
9

10 Columns (1a) and (1b) show the unweighted LS and TSLS estimates, whereas column  
11 (1c) gives the results of the WTSLs estimation. As expected the estimated elasticity of  
12 volatility with respect to cyclical policy becomes smaller in magnitude when the control variables  
13 are added (around 0.3) but remains significant. Exogeneity of *CYC* is still clearly rejected in  
14 all models; we thus focus on the (W)TSLS results. The OI tests are insignificant in most  
15 specifications, suggesting that the institutional variables *NELEC* and *POLCON* (as well as  
16 *POP*, *DEP*, *URBAN*) are valid instruments. To reinforce the finding of our parsimonious  
17 specification, we repeat the test for parameter equality between pro- and countercyclical  
18 policy (see columns (2a) and (2b)). The conclusion is the same as before: There is no  
19 evidence for a stabilizing effect of countercyclical fiscal policy. In contrast, it adds to output  
20 volatility, in a way not significantly different from that of procyclical fiscal policy.  
21  
22  
23  
24  
25  
26  
27

28 Of course, the results regarding the role of countercyclical policy should be interpreted  
29 with care. The number of countries which pursued countercyclical fiscal policy on average is  
30 rather small (11 out of the 88). While this might be too little variation to yield a significant  
31 difference in the estimated effect, it does not explain that the effect of countercyclical policy  
32 on volatility is always positive, a finding that is extremely robust. We also emphasize that our  
33 results should be interpreted as averages over countries and time. One cannot rule out that a  
34 highly effective government, which is aware of the relevant lag structures and able to respond  
35 very quickly, might be successful in its fiscal efforts to smooth business cycles. What our  
36 evidence suggest, however, is that such a constellation is rather the exception than the rule.  
37  
38  
39  
40  
41

42 Finally, we consider the results for model (3), which includes both cyclical policy (*CYC*)  
43 and discretionary fiscal policy (*DISCR*). It is a subtle question, whether discretionary fiscal  
44 policy should be controlled for. On the one hand, discretionary fiscal policy is certainly a  
45 relevant determinant of output volatility (Fatas and Mihov (2003), Badinger (2008)).  
46 Moreover, while the time series of discretionary and cyclical fiscal policy measures for a  
47 single country are orthogonal, this does not carry over the cross-country variation in cyclical  
48 and discretionary policy (averaged over time): Countries that are more responsive to the cycle  
49 might also more actively engage in discretionary fiscal policy.  
50  
51  
52  
53  
54

55 Under these two assumptions – *DISCR* matters for volatility and is related to *CYC* – the  
56 estimated effect of *CYC* in model (2) will be upward biased due to the omission of *DISCR*. In  
57 that case, however, we would also expect the OI test to reject instrument validity, since the  
58 instruments used for *CYC* (i.e., *POLCON*, *NELEC*) are also related to discretionary policy  
59 (see section III, subsection 2). But this is not the case in any of the specifications, suggesting  
60 that these two elements of fiscal policy could be (close to) orthogonal in the cross-section.



1  
2  
3 One could still argue that the OID test has small power and *CYC* and *DISCR* should be  
4 regarded as related for theoretical reasons. Even in that case the question remains, whether  
5 discretionary policy should be controlled for: A main reason for a possible association  
6 between *DISCR* and *CYC* is that an active conduct of cyclical fiscal policy might partly result  
7 in (unintentional) discretionary policy (unrelated to the cycle) as a result of lags in  
8 implementation and materialization (again, on average over countries and time). Since these  
9 unintentional consequences of cyclical fiscal policy can hardly be ruled out by policy makers  
10 in practice, it might be reasonable to let the parameter of cyclical policy in model (2) also capture  
11 its indirect effects on volatility through its relation to discretionary fiscal policy.  
12  
13  
14  
15  
16  
17

18 Notwithstanding these arguments that might favour model (2) over model (3), we now  
19 turn to the results when *DISCR* is included (see column (3a)). As expected the coefficient of  
20 *CYC* becomes smaller, pointing to an elasticity of volatility with respect to cyclical policy of  
21 around 0.163, but it remains significant at the 10 percent level. The elasticity with respect to  
22 discretionary fiscal policy is 0.454 but insignificant with a p-value of 0.103. This is not too  
23 surprising; since both variables are instrumented using mainly the same set of institutional  
24 variables (only *MAJ* and *PRES* are added as additional instruments for *DISCR*), the predicted  
25 values for *CYC* and *DISCR* from the first stage regressions will be strongly correlated, causing  
26 a multicollinearity problem in the second stage regression. This is aggravated by the presence  
27 of a third endogenous variable (*GSIZE*).<sup>7</sup>  
28  
29  
30  
31  
32  
33

34 To address this weak instruments problem, we reestimate the model by limited  
35 information maximum likelihood (LIML), which is superior to TSLS estimation in the  
36 presence of weak instruments (Stock and Yogo, 2004). In that case *CYC* and *DISCR* turn both  
37 out significant with elasticities of 0.182 and 0.417 respectively (see column (3b)). Another  
38 route would be to use a compound measure of discretionary and cyclical fiscal policy  
39 ( $\ln CYC + \ln DISCR$ ), which could be justified in light of the fact that the hypothesis of  
40 parameter equality cannot be rejected (F-statistic: 0.704, p-value: 0.403). In the restricted  
41 model, the compound measure of fiscal policy turns out highly significant with a coefficient  
42 of 0.238 (column (4)). The economic interpretation of this restricted model with equal  
43 parameters for cyclical and discretionary fiscal policy carries our finding regarding the  
44 irrelevance of the direction of cyclical policy one step further: Not only has countercyclical policy  
45 the same effect on volatility as procyclical fiscal policy. It also implies that cyclical fiscal  
46 policy (*CYC*) has the same amplifying effect on output volatility as ‘random’ discretionary  
47 fiscal policy shocks, suggesting that the effects of intentional cyclical policy measures – due  
48  
49  
50  
51  
52  
53  
54

---

55  
56 <sup>7</sup> If government size is treated exogenous and population is included as instrument, *CYC* and *DISCR*  
57 turn out significant at the five and one percent level respectively. However, since there are strong  
58 theoretical arguments to regard government size as endogenous, and since the theoretical motivation  
59 for using country size (population) as instrument for *CYC* and *DISCR* is weak (despite the fact that is  
60 highly significant in the first stage regression), we pursue the more conservative approach here and  
treat *GSIZE* as endogenous.

to poor timing and lags in implementation and materialization – spread over time in a way such that the implied average outcome is random with respect to the cycle.<sup>8</sup> A sensitivity analysis of the results is given in Appendix A3.

#### IV. Fiscal Cyclicity, Volatility, and Economic Growth

From a theoretical perspective, the relation between output volatility and economic growth is ambiguous (see Imbs, 2007). Empirically, Ramey and Ramey (1995) found a negative effect of output volatility on economic growth, and – though there is no consensus so far – the evidence that has emerged since then tends to support this finding. While a number of studies have considered the effect of output volatility on growth, there is hardly evidence on the relation between the cyclicity of fiscal policy and growth. One notable exception is Aghion and Marinescu (2007), who find a positive effect of countercyclical measures in a growth regression, using an (unbalanced) panel of annual data for 19 OECD countries from 1960 to 2007. Moreover, no previous study has considered the relations between cyclicity, volatility and growth in a joint empirical framework.

We first consider the effects of cyclicity on growth directly, running a cross-section regression of average growth of real GDP per worker over  $(\overline{\Delta \ln GDPPW})$  on the cyclicity of fiscal policy ( $CYC$ ), again testing for differences in the effect of pro- and countercyclical policy:

$$\overline{\Delta \ln GDPPW}_i = \delta_0 + \delta_1 \ln CYC_i + (\delta_1^{counter} D_i^{counter} \ln CYC_i) + \mathbf{w}_i \boldsymbol{\delta} + \mathcal{E}_i \quad (4)$$

The following standard controls ( $\mathbf{w}_i$ ) are included in our cross-country growth regression: the (log of the) initial level of real GDP per worker ( $GDPPW^{in}$ ), the average level of human capital in terms of educational attainment, i.e., the fraction of males above 25 with primary schooling ( $HC^{prim}$ ) and secondary schooling ( $HC^{sec}$ ). Model (4) refers to the time period from 1960 to 2004 again; the cross-section dimension comprises 80 rather than 88 countries due to missing human capital data.

As in section III, the endogeneity of  $CYC$  is addressed by using the institutional variables  $NELEC$  and  $POLCON$  as instruments; and the fact that  $CYC$  is calculated from fitted values of model (1) is accounted for by a weighted least squares approach, using the inverse of the variance of  $CYC$  as weight.

<sup>8</sup>This argument was already made by Friedman in his informal essay on fiscal policy: “In fiscal as in monetary policy, all political considerations aside, we simply do not know enough to be able to use deliberate changes in taxation and or expenditures as a sensitive stabilization mechanism. In the process of trying to do so, we almost surely make matters worse... by introducing a largely random disturbance that is simply added to other disturbances.” (Friedman, 1962, p. 78).

< Table 4 >

Columns (1a) and (1b) in Table 4 report the unweighted LS and TSLS estimates, allowing the effect of pro- and countercyclicality to differ. Columns (2a) and (2b) report the respective weighted estimates. In all specifications we find a significantly negative effect of cyclical policy on economic growth. As in section II, only the magnitude of cyclical policy seems to matter: We find a negative effect of both pro- and countercyclicality on economic growth, and while the coefficient of countercyclical fiscal policy is smaller in magnitude, the difference in the coefficients is not significantly different from zero. This holds true for both the unweighted and the weighted estimates. According to the Hausman test there is no strong evidence for endogeneity of *CYC*, though the (W)LS estimates of the parameter of *CYC* are always smaller in magnitude than the (W)TSLS estimates.

The results in Table 4 suggest a negative relation between the cyclical policy and economic growth. In the corresponding model (4), which omits output volatility (and further controls), the parameter of *CYC* ( $\delta_1$ ) captures all effects of cyclical policy on economic growth, both through its relation with output volatility (direct and indirect through *DISCR*), through its relation with other variables affecting growth, as well as ‘direct’ effects of cyclical policy on economic growth (if any). From an economic policy perspective, this might in fact be the most relevant question.

Nevertheless, we would like to provide a more detailed picture of the relation between cyclical policy and growth. In particular, we also wish to answer the question whether *CYC* affects growth only through output volatility or also directly.<sup>9</sup> The empirical framework employed to address this question is sketched by Figure 1, which illustrates the interrelationships between the key variables in our empirical models. Potential endogeneity is indicated by reversed arrows (though the source of endogeneity is not necessarily simultaneity); relations between variables of the same equation (such as *CYC* and *DISCR*) are omitted for simplicity here.

< Figure 1 >

To test for a direct effect of cyclical policy on growth, we first consider a model relating growth to output volatility (and controls). We then add cyclical policy as additional regressor (again considering potentially different effects of pro- and countercyclical policy):

$$\overline{\Delta \ln GDPPW}_i = \varphi_0 + \varphi_1 \ln \sigma^y + \mathbf{w}_i \boldsymbol{\varphi} + (\delta_1 \ln CYC_i + \delta_1^{counter} D_i^{counter} \ln CYC_i) + \zeta_i \quad (5)$$

<sup>9</sup> Such a direct link could be motivated through the model by Aghion et al. (2005). They argue that credit constrained firms have a borrowing capacity that depends on current earnings, which are reduced in recessions. Hence, countercyclicality may foster productivity growth by reducing the magnitude of the output loss induced by market failures (as credit market imperfections) in a recession, and one could argue that such an effect should also hold for a given output volatility.



Column (1a) in Table 5 reports the least squares estimates of equation (5), column (1b) the TSLS estimates using the full set of institutional variables (*NELEC*, *POLCON*, *MAJ*, *PRES*) as instruments for volatility.<sup>10</sup> Results of the TSLS estimates point to a negative effect of volatility on growth, consistent with our finding that cyclical increases volatility (models (2) and (3)) and reduces growth (model (4)). The coefficient of output volatility (-2.968) suggests that an increase in volatility by one percent reduces average growth by some 0.3 percentage points. This is close to Fatas and Mihov (2003), who obtain a coefficient of -3.371 in a similar regression. We emphasize that results are very similar when *MAJ* and *PRES* are excluded from the set of instruments, or when *CYC* or *DISCR* are used as instruments directly. This is supportive of the finding in section III that the transmission mechanisms from political institutions to output volatility through cyclical and discretionary fiscal policy are very similar.

< Table 5 >

Although the OID tests, reported at the bottom of Table 5, suggest that there is nothing wrong with our instruments, we use, as a robustness check, an alternative instrument for output volatility ( $Z^\sigma$ ), which is entirely unrelated to the respective country's characteristics. In particular, we use for each country  $i$ , the trade share weighted output volatility of all other countries  $j$  ( $\neq i$ ) in the sample. To ensure exogeneity two modifications are made: actual trade shares are replaced by predicted values from a bilateral gravity model including geographical variables only; actual output volatility is replaced by predicted values from a regression of output volatility on (a constant and) the four institutional variables (*NELEC*, *POLCON*, *MAJ*, *PRES*) (see Badinger (2010)). The variable  $Z^\sigma$  also turns out to be a relevant instrument for output volatility besides the four institutional variables (*NELEC*, *POLCON*, *MAJ*, *PRES*). In the first stage regression for model (5), including all four institutional variables,  $Z^\sigma$  is significant at the one percent level. In fact,  $Z^\sigma$  turns out to be the strongest instrument for output volatility besides political constraints (*POLCON*). This is an important result, since it implies that  $Z^\sigma$  adds variation to identify the effect of output volatility in the growth regression (5) with *CYC* included as regressor, in addition to the identifying variation, which comes from the effects of institutions on volatility through on *DISCR* (which might be too closely associated with the effects of *CYC* on volatility) (see Figure 1).

Column (1c) shows the TSLS estimates of model (4), using only  $Z^\sigma$  as instrument; the estimated effect of volatility is even larger in magnitude, though the estimates are less precise. Nevertheless, output volatility remains significant with a p-value of 0.087. The fit of the model improves, when the four institutional variables are included as additional instruments (see column (1d)). Overall, the estimates of model (5) in columns (1b) to (1d), which differ

<sup>10</sup> Results for specifications without *CYC* are unweighted estimates.

1  
2  
3 only by the set of instruments used, are very similar. This is a reassuring result. In the  
4 following, we will use as instruments for volatility all four institutional variables (*NELEC*,  
5 *POLCON*, *MAJ*, *PRES*) as well as exogenous volatility spillovers ( $Z^\sigma$ ) to provide additional  
6 identifying variation.  
7  
8

9  
10 We next consider the robustness of the results with respect to controlling for  
11 institutional quality, which we measure using the government antidiversion policy (*GADP*)  
12 index by Hall and Jones (1999). Since institutional quality might be endogenous as a result of  
13 reverse causality, we follow Hall and Jones (1999) and use proxies for Western influence as  
14 instruments for *GADP*: distance from equator, the fraction of a country's population speaking  
15 English as mother tongue, and the fraction of a country's population speaking one of the five  
16 European languages (English, French, German, Portuguese, Spanish) as mother tongue.  
17 Results in column (2) show that output volatility remains significant and negatively related to  
18 economic growth, even if institutional quality in terms of *GADP* is controlled for.  
19  
20  
21  
22  
23  
24

25 We now test for a direct effect of cyclical policy on growth. This means, that the variable  
26 *CYC* is included in the main equation (and instrumented by itself), whereas output volatility is  
27 instrumented by the institutional variables (*NELEC*, *POLCON*, *MAJ*, *PRES*) and exogenous  
28 volatility spillover ( $Z^\sigma$ ). Columns (3a), (3b), and (3c) show the LS, TSLS, and WTSLS  
29 estimates of equation (5) including institutional quality as control.<sup>11</sup> The estimates show no  
30 evidence for a direct effect. This holds up for the unweighted and least squares regressions or  
31 when we allow the effect of pro- and countercyclical policy to differ (see column (4)). We  
32 also explored the subsample stability with respect to the cross-country dimension (rich  
33 countries, excluding countries with large volatility or cyclical policy coefficients) and the time  
34 dimension, considering the more recent time span 1980 to 2004. In none of the specifications,  
35 we could identify a direct effect of cyclical policy besides output volatility, irrespective of  
36 whether we allow the effect of countercyclical policy to differ from that of procyclical policy  
37 or not.  
38  
39  
40  
41  
42  
43  
44

45 Overall, the findings in sections III and section IV provide a consistent picture. Cyclical  
46 as well as discretionary fiscal policy amplify output volatility (Tables 2 to 4), which is in turn  
47 negatively related to economic growth (Table 5). This also shows up in direct estimates of  
48 growth on cyclical policy (Table 4). The effects found for rich countries are of the same order of  
49  
50  
51

---

52  
53 <sup>11</sup> Notice that, since *CYC* is included in the main model, the independent variation to identify the effect  
54 of volatility on growth comes from the instrument  $Z^\sigma$  as well as from the effect of institutions on  
55 volatility through discretionary fiscal policy (see Figure 2). The latter is also apparent from the fact,  
56 that in a regression with output volatility as dependent variable, the political variables (*MAJ*, *PRES*,  
57 *NELEC*, *POLCON*) are jointly significant determinants of output volatility when *CYC* is controlled  
58 for, but they become insignificant if *DISCR* is added to the regressions as well. This suggests an  
59 alternative approach, using *DISCR* as instrument for  $\sigma^y$  directly (instead of the instead of the  
60 institutional variables); results turned out almost identical and are not shown here for brevity.

1  
2  
3 magnitude but estimated less precisely, rendering the effects insignificant in some  
4 specifications with p-values slightly above the 10 percent level.  
5  
6  
7

## 8 9 **V. Conclusions**

10 Previous studies found that discretionary fiscal policy, defined as policy unrelated to the  
11 business cycle, lowers output growth by increasing output volatility. Using a large cross-  
12 section of 88 countries over the period 1960 to 2004, the present paper provides  
13 comprehensive empirical evidence that this is also true for cyclical fiscal policy.  
14  
15  
16

17  
18 We estimate simple average measures of cyclical government consumption over  
19 the period 1960 to 2004 for each of the 88 countries of our sample. We find that cyclical fiscal  
20 policy constitutes a non-negligible share of overall fiscal policy, accounting for roughly one  
21 fifth in the total variation of government consumption in our sample. We then demonstrate  
22 that institutional variables (such as political constraints and the average number of elections)  
23 contain considerable information about the cross-country variation of fiscal cyclical policy,  
24 similar as for discretionary fiscal policy (Fatas and Mihov, 2003).  
25  
26  
27  
28

29  
30 Using institutional variables as instruments, we identify a destabilizing effect of cyclical  
31 fiscal policy on economic activity, irrespective of whether fiscal policy is pro- or  
32 countercyclical. This not only confirms the scepticisms against the usefulness of  
33 countercyclical fiscal policy as fine tuning instrument to smooth business cycles. It also  
34 implies that countercyclical policy has the same amplifying effect on volatility as procyclical  
35 fiscal policy; in fact, we find some support for the hypothesis that cyclical fiscal policy affects  
36 volatility much in the same way as pure fiscal shocks. According to this result, the way  
37 towards stabilization does not lead over more active countercyclical fiscal policy, but less  
38 cyclical fiscal policy at all.  
39  
40  
41  
42  
43

44 The gains from this (passive) stabilization policy could be substantial in light of our  
45 finding that aggressive use of cyclical (as well as discretionary fiscal) policy has a negative  
46 effect on economic growth. This result is obtained both in a direct regression of growth on  
47 cyclical policy and in a two stages least squares regression of growth on volatility, using the fiscal  
48 policy-related institutional variables as instrumental variables in the first stage regression.  
49  
50  
51  
52

53 Overall, our results have an important policy implication: Economic growth could be  
54 enhanced by introducing fiscal rules, designed to limit the use of discretionary fiscal policy on  
55 the one hand (as already argued by Fatas and Mihov, 2003) but also the use cyclical fiscal  
56 expenditure policy on the other hand. Notwithstanding the robustness of our results with  
57 respect to subsample stability over the cross-country and time dimension, It should be added,  
58 however, that our cross-section estimates should be interpreted as averages over countries and  
59 time, not as economic laws that apply to every government at any time. Moreover, the use of  
60 government consumption as measure of fiscal policy— a choice required to obtain a relatively

1  
2  
3 large sample of countries – limits the generality of the results. As a consequence, it would be  
4 interesting to investigate the effect of fiscal policy on volatility and growth for smaller groups  
5 of countries with more comprehensive, more detailed and higher frequency data on fiscal  
6 policy. Another question that remains to be addressed in future research is how existing fiscal  
7 rules affect the cyclical responsiveness of governments. Additional evidence on these issues  
8 would be informative about the channels, through which fiscal policy affects economic  
9 growth, and the optimal design of fiscal rules.  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For Peer Review

## References

- Aghion, P., Angeletos, M., Banerjee, A., and Manova, K. (2005). Volatility and growth: credit constraints and productivity-enhancing investment. *NBER Working Paper*, No 11349.
- Aghion, P. and Marinescu, I. (2007). Cyclical budgetary policy and economic growth: what do we learn from OECD panel data? *NBER Macroeconomics Annual*, Cambridge, Mass: MIT Press, 22, 251-278.
- Badinger, H. (2010). Output volatility and economic growth. *Economics Letters*, 106(1), 2010, 15-18.
- Barro, R. J., and Lee, J.-W. (2002). International data on educational attainment: updates and implications. *NBER Working Paper*, No. 7911.
- Barlevy, G. (2004). The costs of business cycles under endogenous growth. *American Economic Review*, 94(4), 964-990.
- Caballero, R.J. (2008). A comment on Aghion-Marinescu's "cyclical budgetary policy and economic growth: what do we learn from OECD panel data?" *NBER Macroeconomics Annual*, Cambridge, Mass: MIT Press, forthcoming.
- Easterly, W. (2005). National policies and economic growth: a reappraisal. In: Aghion, P. and Durlauf, S. (eds.). *Handbook of Economic Growth*, Vol. 1, part 1, 1015-1059.
- Fatas, A. and Mihov, I. (2003). The case for restricting fiscal policy discretion. *Quarterly Journal of Economics*, 4, 1419-1448.
- Friedman, M. (1953). *Essays in Positive Economics*. Chicago: Chicago University Press.
- Friedman, M. (1962). *Capitalism and Freedom*. Chicago: Chicago University Press.
- Hall, R.E. and Jones, C.I. (1999). Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics*, 114(1), 83-116.
- Henisz, W.J. (2000). The institutional environment for economic growth. *Economics and Politics*, 12(1), 1-31.
- Imbs, J. (2007). Growth and volatility. *Journal of Monetary Economics*, 54, 1848-1862.
- Lane, P.R. (2003). The cyclical behaviour of fiscal policy: evidence from the OECD. *Journal of Public Economics*, 87, 2661- 2675.
- Lucas, R.E. (1987). *Models of Business Cycles*. Basil Blackwell, Oxford.
- Persson, T. and Tabellini, G. (2001). Political institutions and policy outcomes: what are the stylized facts? *CEPR Discussion Paper* 2872.
- Ramey, G. and Ramey, V. (1995). Cross-country evidence on the link between volatility and growth. *American Economic Review*, 85(3), 1138-1151.
- Rodrick, D. (1998). Why do more open economies have bigger governments? *Journal of Political Economy*, 106, 997-1032.

1  
2  
3 Talvi, E. and Vegh, C. (2005). Tax base variability and procyclical fiscal policy in developing  
4 countries. *Journal of Development Economics*, 78(1), 156-190,  
5

6  
7 Tornell, A. and Lane, P.R. (1999). The voracity effect. *American Economic Review*, 89, 22–  
8 46.  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For Peer Review



## Appendix

### A1. Sample Description

The largest set of countries for which the required key variables are available comprises 88 countries. The list of countries is reported in Table A1, along with our estimates of the cyclicity parameter  $\chi$  and the aggressiveness of discretionary fiscal policy (*DISCR*) from equation (1).

Table A1. *Sample and Data on Output Volatility, Cyclical and Discretionary Fiscal Policy*

country	time period (obs)	$\sigma^{\Delta \ln y}$		Cyclicity ( $\hat{\chi}$ )		<i>DISCR</i>	
		1960-2004	1980-2004	1960-2004	1980-2004	1960-2004	1980-2004
Argentina	1960-2004 (45)	5.753	6.378	1.540	2.190	29.741	37.765
Australia	1960-2004 (45)	1.840	1.807	-0.375	0.009	3.086	1.965
Austria	1960-2004 (45)	1.777	1.162	0.264	0.493	2.035	1.602
Burundi	1960-2004 (45)	5.798	4.399	1.070	0.875	16.535	17.037
Belgium	1960-2004 (45)	1.833	1.333	-0.080	-0.031	2.396	1.841
Benin	1960-2004 (45)	3.099	3.058	-0.034	0.038	8.456	9.478
Burkina Faso	1960-2004 (45)	3.101	3.338	0.740	1.211	13.896	11.118
Bangladesh	1960-2004 (45)	4.133	1.473	2.698	1.834	12.215	7.613
Bolivia	1970-2004 (35)	3.616	2.650	2.049	2.394	9.886	9.686
Brazil	1960-2004 (45)	3.877	3.453	0.480	0.596	8.490	9.000
Centr. Afr. Rep.	1960-2002 (43)	4.034	4.678	0.891	1.095	11.129	12.311
Canada	1965-2004 (40)	1.982	2.122	-0.464	-0.283	1.871	1.767
Switzerland	1960-2004 (45)	2.247	1.572	0.440	0.446	2.065	1.873
Chile	1960-2004 (45)	4.879	4.565	0.824	0.428	8.088	5.652
Cote d'Ivoire	1960-2004 (45)	5.214	4.104	1.270	1.059	9.886	10.647
Cameroon	1965-2004 (40)	5.818	5.306	0.988	1.004	8.558	10.020
Congo, Rep.	1960-2004 (45)	5.500	6.002	0.461	0.448	17.857	22.703
Colombia	1960-2004 (45)	2.084	2.095	0.686	0.693	9.275	9.074
Costa Rica	1960-2004 (45)	3.241	3.585	1.016	1.177	5.458	6.202
Germany	1960-2004 (45)	1.880	1.441	0.135	0.414	2.443	1.525
Denmark	1960-2004 (45)	2.151	1.624	0.215	-0.342	2.526	1.804
Dom. Republic	1960-2004 (45)	5.080	3.624	0.728	3.369	21.349	19.347
Algeria	1960-2004 (45)	7.147	2.591	0.931	0.551	9.207	7.538
Ecuador	1960-2004 (45)	3.448	3.162	1.365	0.826	11.162	10.418
Egypt	1960-2004 (45)	2.726	1.758	0.662	-0.202	9.407	6.722
Spain	1960-2004 (45)	2.326	1.574	0.656	0.430	2.659	2.223
Finland	1960-2004 (45)	2.838	2.859	-0.054	-0.074	2.958	2.857
Fiji	1960-2000 (41)	4.616	4.594	0.628	0.441	7.567	8.167
France	1960-2004 (45)	1.585	1.138	-0.281	-0.432	1.411	1.186
Gabon	1960-2000 (41)	9.397	5.968	0.616	0.683	20.247	17.257
United Kingdom	1960-2004 (45)	1.735	1.754	-0.262	-0.273	2.320	1.914
Ghana	1960-2004 (45)	4.592	3.603	1.776	3.716	14.358	14.671
Greece	1960-2004 (45)	3.736	2.321	0.437	0.771	5.451	5.355
Guatemala	1960-2004 (45)	2.458	2.178	1.121	2.170	8.607	9.144
Honduras	1960-2004 (45)	2.886	2.423	-0.110	0.596	7.057	7.434
Haiti	1967-2003 (37)	4.469	4.146	1.146	1.134	10.656	10.947
Indonesia	1960-2004 (45)	3.981	4.444	1.560	1.453	14.998	8.224
India	1960-2004 (45)	3.038	1.817	0.518	0.340	5.047	3.237
Ireland	1960-2004 (45)	2.595	2.930	0.602	0.610	3.561	3.373
Iceland	1960-2004 (45)	3.701	2.914	0.860	0.669	3.904	3.244

Table A1 (continued). *Sample and Data on Output Volatility, Cyclical and Discretionary Fiscal Policy*

country	time period (obs)	$\sigma^{\Delta \ln y}$ in percent		Cyclical ( $\hat{\chi}$ )		DISCR in percent	
		1960-2004	1980-2004	1960-2004	1980-2004	1960-2004	1980-2004
Israel	1960-2004 (45)	3.331	2.118	1.181	1.334	9.928	6.283
Italy	1960-2004 (45)	2.148	1.275	0.059	0.293	2.848	2.578
Jamaica	1966-2004 (39)	4.596	3.167	1.150	1.427	9.612	10.284
Japan	1960-2004 (45)	3.453	1.791	0.128	0.123	2.205	0.879
Kenya	1960-2004 (45)	4.562	1.982	1.202	1.789	5.977	4.584
Korea, Rep.	1960-2004 (45)	3.441	3.782	-0.281	-0.121	6.844	3.137
Sri Lanka	1960-2004 (45)	1.901	1.722	0.319	1.089	8.646	9.695
Lesotho	1960-2004 (45)	6.383	3.844	0.239	-0.350	15.132	9.970
Morocco	1960-2004 (45)	4.449	4.796	0.700	0.549	7.568	4.719
Madagascar	1960-2004 (45)	4.266	4.782	1.240	1.220	9.628	10.979
Mexico	1960-2004 (45)	3.312	3.619	1.660	1.760	5.305	5.752
Mali	1967-2004 (38)	5.140	5.154	0.660	1.296	16.133	15.721
Mauritania	1960-2004 (45)	5.890	3.270	0.635	1.900	17.809	18.398
Mauritius	1980-2004 (25)	1.535	1.535	0.583	0.583	3.751	3.751
Malawi	1960-2004 (45)	5.423	5.721	-0.835	-2.066	15.870	16.817
Malaysia	1960-2004 (45)	3.385	3.971	0.229	0.548	8.451	8.308
Niger	1960-2004 (45)	6.253	5.542	0.762	1.270	11.605	11.165
Nigeria	1960-2004 (45)	7.186	5.100	0.429	0.814	19.854	22.460
Nicaragua	1960-2004 (45)	6.895	4.200	0.277	1.633	19.112	22.562
Netherlands	1960-2004 (45)	1.833	1.503	0.350	-0.027	2.177	1.770
Norway	1960-2004 (45)	1.554	1.618	0.631	0.023	3.675	3.982
New Zealand	1971-2004 (34)	2.835	1.946	0.360	0.159	4.133	2.658
Pakistan	1960-2004 (45)	2.187	1.793	0.975	1.308	8.104	7.276
Panama	1960-2004 (45)	4.197	4.832	1.168	1.044	6.571	6.125
Peru	1960-2004 (45)	5.038	6.201	1.248	1.381	9.718	7.948
Philippines	1960-2004 (45)	3.027	3.629	1.261	1.490	5.344	5.665
Pap. New Guinea	1961-1999 (39)	4.610	5.118	1.042	0.893	8.776	9.588
Portugal	1960-2004 (45)	3.295	2.521	0.750	1.261	3.549	2.571
Paraguay	1960-2004 (45)	3.793	3.768	0.469	0.988	9.713	10.104
Rwanda	1960-2004 (45)	11.997	14.623	1.171	1.303	16.300	16.653
Senegal	1960-2004 (45)	4.173	3.777	0.827	0.033	18.002	5.998
Singapore	1960-2004 (45)	4.175	3.832	0.043	-0.339	6.823	7.359
El Salvador	1960-2004 (45)	3.834	4.215	0.561	0.319	5.802	5.548
Sweden	1960-2004 (45)	1.925	1.837	0.032	0.050	2.252	1.828
Syr. Arab Rep.	1960-2004 (45)	7.809	5.298	0.569	-0.005	9.749	9.548
Chad	1960-2004 (45)	8.186	8.773	0.064	0.027	14.689	19.314
Togo	1960-2004 (45)	6.131	6.234	0.174	0.410	17.114	13.173
Thailand	1960-2004 (45)	3.635	4.436	0.519	0.446	4.761	3.667
Trin. and Tobago	1960-2004 (45)	4.749	5.666	1.195	1.269	11.929	13.900
Tunisia	1961-2004 (44)	3.343	2.557	0.443	-0.019	5.614	2.266
Turkey	1968-2004 (37)	4.147	4.637	0.629	0.602	7.737	8.357
Uruguay	1960-2004 (45)	4.744	5.812	0.989	0.974	10.328	5.996
United States	1960-2004 (45)	1.906	1.820	-0.048	-0.091	1.967	1.310
Venezuela	1960-2004 (45)	4.949	5.938	1.616	1.913	16.543	20.776
South Africa	1960-2004 (45)	2.525	2.658	0.892	0.664	4.724	3.700
Congo, Dem. Rep.	1960-2004 (45)	6.079	5.363	1.570	1.425	26.618	32.791
Zambia	1960-2004 (45)	4.703	3.919	1.485	1.928	21.520	24.135
Zimbabwe	1960-2004 (45)	5.828	5.811	0.335	0.339	12.693	15.324
Correlation		0.842		0.766		0.935	



## A2. Variable Definitions and Data Sources

- DEP* dependency ratio, defined as ratio of people younger than 15 and older than 64 to working age population (people from 15 to 64). Source: World Development Indicators (WDI).
- GC* real general government consumption in national currency. Source: WDI.
- GDPPC* real GDP per capita in PPP\$. Source: Penn World Tables (PWT) 6.2.
- GDPPW* real GDP per worker in PPP\$. Source: PWT 6.2.
- GSIZE* ratio of government consumption to GDP.
- HC<sup>prim</sup>* primary educational attainment, defined as fraction of males above 25 with primary schooling. Source: Barro and Lee (2002).
- HC<sup>sec</sup>* secondary educational attainment, defined as fraction of males above 25 with secondary schooling. Source: Barro and Lee (2002).
- MAJ* zero-one dummy for electoral system (1 for majoritarian, 0 for proportional). Sources: Person and Tabellini (2001), Database of Political Institutions.
- NELEC* average number of elections. Sources: Database of Political Institutions.
- OPEN* ratio of imports plus exports to GDP. Source: PWT 6.2.
- POLCON* index of political constraints. Source: Henisz (2000).
- POP* population in million persons. Source: WDI.
- PRES* zero-one dummy for political regime (1 for presidential, 0 for parliamentary). Source: Person and Tabellini (2001), Database of Political Institutions.
- URB* ratio of urban population to total population. Source: WDI.
- y* real GDP in national currency per capita;  $y = Y/POP$ . Source: WDI.
- Y* real GDP in national currency. Source: WDI.

Data source for the geographical variables (such as bilateral distance, area, common border dummies) is the CEPII database (see Mayer and Zignago, 2006).

### A3. Robustness

Table A2 shows that the logarithmic transformation of *CYC* is not crucial for the results (see columns (1a) and (1b)). However, the fit is worse than for the specification in log form. We next consider subsample stability of the results, excluding countries with ‘large’ output volatility or ‘large’ cyclicality from the sample. Columns (2a) and (2b) give the results for models (2) and (3), excluding countries whose output volatility exceeds the sample average by more than one standard deviation. The same exercise is repeated in columns (3a) and (3b), excluding countries whose cyclicality coefficients exceed the sample average by more than one standard deviation. Overall, the results for the full sample hold up, confirming that our results are not driven by a few outlying observations.

< Table A2 >

In columns (4a) and (4b) we focus on a subsample of 28 ‘rich’ countries, constituting the upper third of the income distribution of our sample in terms of GDP per capita. In both models (2) and (3) the variable *CYC* becomes insignificant with p-values of 0.245 and 0.193, respectively. However, if the level of development (*GDPPC*) is excluded, which appears to be justifiable for a group of countries with a similar level of development (in particular in model (3) where *GDPPC* is insignificant), *CYC* becomes significant again in models (2) and (3) at the 10 and 5 percent level respectively.

In a final step we consider the results for the more recent period 1980 to 2004. First note that our estimates of *CYC* and *DISCR* for the full period from 1960 to 2004 and for the period of 1980 to 2004 are fairly similar (see Appendix A1). Many of the countries that pursued countercyclical fiscal policy from 1960 to 2004 on average did so as well in the period from 1980 to 2004. The correlation between *CYC* (*DISCR*) for the two time periods is 0.766 (0.935). This also favours the interpretation that (de facto) time invariant institutional features of countries have a strong impact on the cross-country variation in fiscal policy. A slight difference to the estimation results for period 1960 to 2004 is that the effect of countercyclicality is significantly different from that of procyclical policy in the logarithmic specification (see column (5a)), though its effect on output volatility is still clearly positive. One might argue that countercyclical policy has become more effective (and thus overall less destabilizing). But this appears to be overstressing results a bit, given that there is no significant difference between the effects of pro- and countercyclical policy if the level rather than the log of *CYC* is used; column (5b) shows the (restricted) model using the level of *CYC*.

The estimates of model (3) for the period 1980 to 2004 (columns (6a) and (6b)), where *DISCR* is included along with *CYC*, are in line with the results for the full period 1960 to 2000, in particular when the model is estimated using LIML (column (6b)). As before the hypothesis of parameter equality of *CYC* and *DISCR* cannot be rejected. Finally, the subsample stability with respect to the cross-country dimension for the period 1980 to 2004 is qualitatively very similar to that for the full period.

Table 1. *Political Determinants of Cyclicity and First Stage Regressions*

Dependent variable is:	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)	(4)
	ln <i>CYC</i>	ln <i>CYC</i>	ln <i>CYC</i>	ln <i>CYC</i>	ln <i>CYC</i>	ln <i>CYC</i>	ln <i>CYC</i>	ln $\sigma^{Discr}$
<i>NELEC</i>	-2.674*** (0.774)				-2.566** (1.000)	-2.391*** (0.660)	-2.305*** (0.767)	-0.513 (0.355)
<i>POLCON</i>		-1.905*** (0.334)			-1.704*** (0.569)	-1.822*** (0.313)	-1.489** (0.658)	-0.470** (0.236)
<i>MAJ</i>			0.007 (0.233)		-0.036 (0.197)			-0.139** (0.068)
<i>PRES</i>				0.460* (0.242)	0.112 (0.415)			0.408*** (0.143)
ln <i>POP</i>							-0.196*** (0.064)	-0.082** (0.024)
<i>URBAN</i>							-0.800 (0.753)	0.004 (0.259)
<i>DEP</i>							3.003* (1.549)	0.477 (0.568)
<i>OPEN</i>							-0.577** (0.299)	0.091 (0.102)
ln <i>GDPPC</i>							0.609* (0.359)	-0.283** (0.122)
F-stat. <sup>1)</sup>	11.934***	32.589***	0.001	3.594*	12.312***	25.142***	6.587**	6.289***
F-stat. <sup>2)</sup>							8.472***	8.663***
$R^2$	0.122 (0.007)	0.275 (0.146)	0.000 (0.017)	0.040 (0.018)	0.372 (0.091)	0.372 (0.089)	0.502 (0.13)	0.872 (0.674)
Observations	88	88	88	88	88	88	88	88

Notes: A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; standard errors in parenthesis. Table reports weighted least squares estimates, using the inverse of the variance of *CYC* as weight.  $R^2$  refers to weighted model. <sup>1)</sup> F-test on excluding the institutional variables (*NELEC*, *POLCON*, *MAJ*, *PRES*) from first stage regression for ln *CYC* and ln  $\sigma^{Discr}$ . <sup>2)</sup> F-Test on excluding all instruments (institutional variables, ln *POP*, *URBAN*, *DEP*) from regression.

Table 2. *Cyclicality of Fiscal Policy and Output Volatility – Basic Model*

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	WLS	WTLS	WLS	WTLS	LS	TSL	WTLS	WTLS
$\ln CYC$	0.184** (0.082)	0.595** (0.232)	0.239*** (0.060)	0.600*** (0.207)	0.150*** (0.044)	0.742*** (0.185)		
$D^{counter} \ln CYC$	0.094 (0.083)	-0.094 (0.208)						
$CYC$							1.432*** (0.311)	1.762*** (0.332)
$D^{counter} CYC$							-0.528 (0.517)	
Hausman <sup>1)</sup> (p-val.)		(0.000)		(0.000)		(0.000)	(0.000)	(0.000)
OID <sup>2)</sup> (p-val.)		(0.128)		(0.236)		(0.227)	(0.036)	(0.887)
$R^2$	0.128	0.096	0.108	0.108	0.108	0.108	0.105	0.099
SEE	0.448	0.606	0.454	0.626	0.431	0.731	0.768	0.915
Observations	88	88	88	88	88	88	88	88

Notes: Dependent variable is  $\ln \sigma^y$ . A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; robust standard errors in parenthesis. WLS denotes weighted least squares estimates, using the inverse of the variance of  $CYC$  as weight. (W)TSL denotes (weighted) two stages least squares, using *NELEC* and *POLCON* as instruments for  $CYC$ .  $R^2$  refers to unweighted model, calculated as squared correlation between actual and predicted values. <sup>1)</sup> Heteroskedasticity-robust test for exogeneity;  $H_0$ :  $CYC$  is exogenous. <sup>2)</sup> Heteroskedasticity-robust test of overidentifying restrictions;  $H_0$ : *NELEC*, *POLCON* are valid instruments.

Table 3. *Cyclicality of Fiscal Policy and Output Volatility – Extended Model*

	(1a)	(1b)	(1c)	(2a)	(2b)	(3a)	(3b)	(4)
	LS	TOLS	WTOLS	TOLS	WTOLS	WTOLS	LIML	WTOLS
$\ln CYC$	0.079*	0.676**	0.292**	0.318*	0.324*	0.163*	0.182**	0.238***
	(0.040)	(0.270)	(0.119)	(0.166)	(0.188)	(0.090)	(0.083)	(0.068)
$D^{counter} \ln CYC$				-0.067	-0.084			
				(0.133)	(0.153)			
$\ln DISCR$						0.454	0.417**	restricted
						(0.276)	(0.204)	
$G_{SIZE}$	-0.045	1.840	-3.406	0.635	-6.354	-2.709	-1.299	-3.431
	(0.620)	(4.894)	(3.903)	(0.260)	(4.654)	(2.854)	(0.994)	(2.724)
$OPEN$	0.176**	0.447*	-0.003	0.293*	0.077	-0.118	-0.108	-0.061
	(0.080)	(0.257)	(0.194)	(0.166)	(0.196)	(0.129)	(0.109)	(0.158)
$\ln GDPPC$	-0.239***	-0.096	-0.206	-0.189***	-0.166	-0.004	-0.013	-0.088
	(0.041)	(0.125)	(0.127)	(0.071)	(0.158)	(0.107)	(0.099)	(0.114)
Hausman <sup>1)</sup> (p-val.)		(0.000)	(0.000)	(0.179)	(0.000)	(0.016)		(0.000)
OID <sup>2)</sup> (p-val.)		(0.893)	(0.683)	(0.057)	(0.554)	(0.817)		(0.913)
$R^2$	0.404	0.159	0.279	0.292	0.220	0.479	0.534	0.376
SEE	0.358	0.658	0.507	0.418	0.583	0.469	0.472	0.485
Observations	88	88	88	88	88	88	88	88

Notes: Dependent variable is  $\ln \sigma^y$ . A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; robust standard errors in parenthesis. WLS denotes weighted least squares estimates, using the inverse of the variance of  $CYC$  as weight. (W)TOLS denotes (weighted) two stages least squares, using  $NELEC$  and  $POLCON$  as instruments for  $CYC$  and using  $NELEC$ ,  $POLCON$ ,  $MAJ$ , and  $PRES$  as instruments for  $CYC$  and  $DISCR$  in columns (3) and (4). <sup>1)</sup> Heteroskedasticity-robust Hausman test for exogeneity;  $H_0$ :  $\ln CYC$ ,  $G_{SIZE}$  (and  $\ln DISCR$ ) are exogenous. <sup>2)</sup> Heteroskedasticity-robust test of overidentifying restrictions;  $H_0$ :  $NELEC$ ,  $POLCON$  ( $MAJ$ ,  $PRES$ ) and  $\ln POP$ ,  $DEP$ ,  $URBAN$  are valid instruments.

Table 4. *Cyclicality of Fiscal Policy and Economic Growth*

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(3c)
	LS	TOLS	WLS	WTOLS	LS	TOLS	WTOLS
$\ln CYC$	-0.362** (0.161)	-0.767* (0.441)	-0.341* (0.188)	-0.606* (0.344)	-0.297** (0.118)	-1.149** (0.514)	-0.439* (0.226)
$D^{counter} \ln CYC$	0.151 (0.157)	0.379 (0.331)	0.090 (0.152)	0.173 (0.215)			
$\ln GDPW^{in}$	-0.748*** (0.158)	-0.798*** (0.166)	-1.046*** (0.195)	-1.016*** (0.120)	-0.748*** (0.158)	-0.895*** (0.191)	-1.087*** (0.200)
$\ln HC^{prim}$	0.524** (0.218)	0.568** (0.244)	1.134*** (0.212)	1.180*** (0.236)	0.532 (0.217)	0.688** (0.318)	1.163*** (0.242)
$\ln HC^{sec}$	0.724*** (0.136)	0.646*** (0.185)	0.716*** (0.177)	0.567** (0.279)	0.726 (0.132)	0.515** (0.223)	0.663*** (0.240)
Hausman <sup>1)</sup> (p-val.)		(0.467)		(0.182)		(0.015)	(0.418)
OID <sup>2)</sup> (p-val.)		(0.028)		(0.335)		(0.929)	(0.250)
$R^2$	0.400	0.363	0.370	0.358	0.395	0.268	0.365
SEE	1.051	1.100	1.203	1.121	1.048	1.332	1.107
Observations	80	80	80	80	80	80	80

Notes: Dependent variable is  $\Delta \ln GDPW$ . A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; robust standard errors in parenthesis. WLS denotes weighted least squares estimates, using the inverse of the variance of  $CYC$  as weight. (W)TOLS denotes (weighted) two stages least squares, using  $NELEC$  and  $POLCON$  as instruments for  $CYC$ . <sup>1)</sup> Heteroskedasticity-robust Hausman test for exogeneity;  $H_0$ :  $\ln CYC$  is exogenous. <sup>2)</sup> Heteroskedasticity-robust test of overidentifying restrictions;  $H_0$ :  $NELEC$ ,  $POLCON$  are valid instruments.

Table 5. *Cyclicality of Fiscal Policy, Output Volatility, and Economic Growth*

	(1a)	(1b)	(1c)	(1d)	(2)	(3a)	(3b)	(3c)	(4)
	LS	TOLS	TOLS	TOLS	TOLS	LS	TOLS	WTOLS	WTOLS
$\ln \sigma^y$	-0.994** (0.302)	-2.968*** (0.107)	-3.689* (2.128)	-2.993*** (0.955)	-2.174* (1.196)	-0.662** (0.292)	-2.101* (1.187)	-1.173* (0.083)	-1.416** (0.611)
$\ln CYC$						-0.100 (0.109)	-0.071 (0.158)	-0.194 (0.133)	-0.309 (0.232)
$D^{counter} \ln CYC$									0.182 (0.169)
$\ln GDPPW^{in}$	-0.821*** (0.157)	-1.066*** (0.223)	-1.155*** (0.236)	-1.069*** (0.213)	-1.065*** (0.176)	-0.971*** (0.198)	-1.058*** (0.175)	-1.412*** (0.249)	-1.364*** (0.252)
$\ln HC^{prim}$	0.551** (0.203)	0.697*** (0.230)	0.750*** (0.274)	0.699*** (0.225)	-0.569* (0.292)	0.401*** (0.146)	0.587* (0.297)	1.090*** (0.0186)	1.127*** (0.190)
$\ln HC^{sec}$	0.580*** (0.148)	0.144** (0.305)	-0.015** (0.491)	0.138 (0.270)	0.446 (0.241)	0.598*** (0.001)	0.341 (0.242)	0.671*** (0.149)	0.061*** (0.147)
$GADP$					1.007 (1.562)	2.067 (0.650)	0.861 (1.642)	-0.314 (1.610)	-0.786 (1.463)
Hausman <sup>1)</sup> (p-val.)		(0.023)	(0.026)	(0.011)	(0.251)		(0.302)	(0.187)	(0.041)
OID <sup>2)</sup> (p-val.)		(0.760)	-	(0.771)	(0.644)		(0.607)	(0.692)	(0.673)
$R^2$	0.409	0.316	0.278	0.314	0.430	0.537	0.463	0.417	0.406
SEE	1.036	1.222	1.363	1.227	1.053	0.935	0.484	1.138	1.172
Observations	80	80	80	80	78	78	78	78	78

Notes: Dependent variable is  $\Delta \ln GDPPW$ . A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; robust standard errors in parenthesis. WLS denotes weighted least squares estimates, using the inverse of the variance of  $CYC$  as weight. TOLS denotes (weighted) two stages least squares, using the following instruments for  $\sigma^y$ :  $NELEC$ ,  $POLCON$ ,  $MAJ$ ,  $PRES$  in (1b),  $Z^\sigma$  in (1c), and both the institutional variables and  $Z^\sigma$  in all other columns. <sup>1)</sup> Heteroskedasticity-robust Hausman test for exogeneity;  $H_0$ :  $\ln CYC$ ,  $GSIZE$  (and  $\ln DISCR$ ) are exogenous. <sup>2)</sup> Heteroskedasticity-robust test of overidentifying restrictions;  $H_0$ :  $NELEC$ ,  $POLCON$  ( $MAJ$ ,  $PRES$ ) and  $\ln POP$ ,  $DEP$ ,  $URBAN$ .

Figure 1. Relationships between Key Variables in Empirical Models

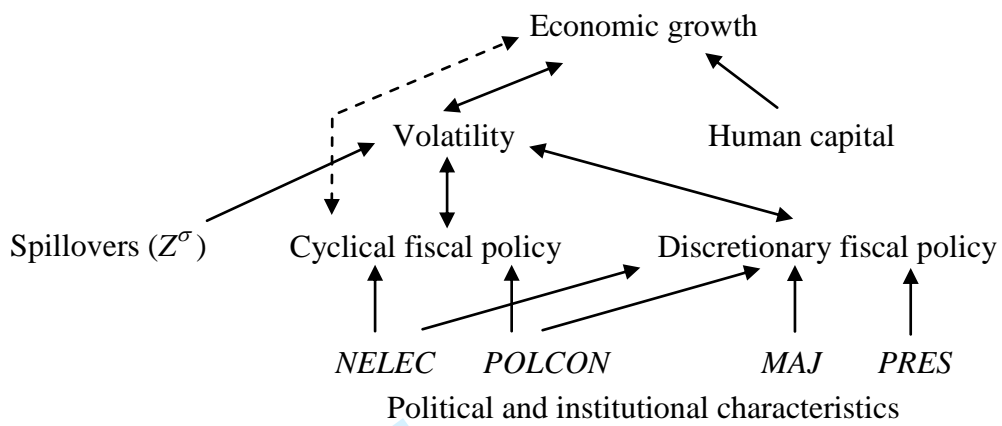




Table A2. Cyclical Policy and Output Volatility – Robustness

	1960-2004								1980-2004			
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
	level of <i>CYC</i>		exl. large volatility		exl. large <i>CYC</i>		Rich		Level of <i>CYC</i>			
	equ. (2b)	equ. (2a)	equ. (2b)	equ. (3)	equ. (2a)	equ. (3)	equ. (2a)	equ. (3)	equ. (2b)	equ. (2a)	equ. (3)	equ. (3)
	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	WTSLs	LIML
<i>ln CYC</i>			0.130 (0.087)	0.071* (0.042)	0.282** (0.116)	0.129** (0.059)	0.131 (0.110)	0.063 (0.047)	0.231*** (0.066)		0.078 (0.056)	0.273* (0.153)
$D^{counter} \ln CYC$									-0.100** (0.043)			
<i>CYC</i>	0.825*** (0.314)	1.034** (0.317)								0.946** (0.459)		
$D^{counter} CYC$	-0.026 (0.630)											
<i>ln DISCR</i>				0.505** (0.170)		0.554** (0.212)		0.488** (0.235)			0.405*** (0.072)	0.408** (0.164)
<i>G SIZE</i>	-4.899 (5.222)	-4.988 (4.202)	-2.389 (3.300)	-2.345 (2.164)	-2.310 (3.598)	-2.199 (0.283)	-2.122 (2.844)	-2.547 (1.936)	-1.369 (1.782)	-4.708 (3.681)	-3.606** (1.676)	-6.977** (3.155)
<i>OPEN</i>	0.037 (0.144)	0.023 (0.149)	0.0063 (0.128)	-0.076 (0.088)	-0.029 (0.210)	-0.157 (0.116)	-0.021 (0.171)	-0.116 (0.110)	-0.039 (0.137)	0.208 (0.231)	-0.089 (0.072)	0.092 (0.216)
<i>ln GDPPC</i>	-0.145 (0.150)	-0.095 (0.145)	-0.187** (0.093)	0.063 (0.090)	-0.237** (0.114)	0.025 (0.090)	-0.502* (0.277)	-0.172 (0.314)	-0.388*** (0.065)	-0.164 (0.194)	-0.105 (0.098)	0.065 (0.186)
Hausman (p-val.)	(0.009)	(0.000)	(0.100)	(0.218)	(0.000)	(0.028)	(0.109)	(0.187)	(0.000)	(0.023)	(0.138)	
OID (p-val.)	(0.696)	(0.949)	(0.075)	(0.122)	(0.544)	(0.609)	(0.336)	(0.247)	(0.206)	(0.309)	(0.200)	
$R^2$	0.204	0.167	0.344	0.520	0.309	0.507	0.309	0.651	0.296	0.175	0.463	0.317
SEE	0.642	0.713	0.335	0.366	0.479	0.433	0.399	0.342	0.654	1.008	0.643	0.673
Observations	89	89	77	77	79	79	28	28	88	88	88	88

Notes: Dependent variable is  $\ln \sigma^y$ . A constant is included in all models. \*, \*\*, \*\*\* denote significance at 10, 5, and 1 percent level respectively; robust standard errors in parenthesis. See also Tables 2 and 3.