Procyclicality of Fiscal Policy in Emerging Countries: The Cycle is The Trend

Michel Strawczynski
Bank of Israel

Joseph Zeira
Hebrew University

Economic research on fiscal policy has shown that while developed economies tend to run countercyclical fiscal policies, Latin American countries have been characterized by procyclical policies. One of the explanations given to this phenomenon is that high external debt causes severe constraints on the ability to secure new loans, which forces countries to cut their budget deficits. Another explanation is related to optimal behavior under political constraints (Talvi and Végh, 2005). In this paper, we test a different channel, related to the characteristics of business cycles. Aguiar and Gopinath (2007) find that in developing countries, the cycle is the trend—that is, business cycles tend to become persistent and thus to determine the fundamentals of economic performance in these countries. One possible channel is fiscal policy: in times of recession, the erratic character of the crisis forces developing economies to cut expenditures, while the opposite occurs during booms. This procyclical behavior may characterize other sectors of the economy, far beyond the fiscal policy reaction (Kaminsky, Reinhart, and Végh, 2005).

The recent renewed interest in cyclicality of fiscal policy has mainly taken an empirical focus. This new empirical literature began with Galí (1994), Fiorito and Kollintzas (1994), and Fiorito (1997), who find that fiscal expenditures are countercyclical or acyclical in developed countries. In contrast, Gavin and Perotti (1997) finds

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that fiscal policy is highly procyclical in Latin American countries. These findings led to much research that largely corroborated the earlier studies.

Lane (2003) shows that the cyclicality of fiscal policy varies significantly across categories and also across the member countries of the Organization for Economic Cooperation and Development (OECD), but most advanced economies implement countercyclical fiscal policies. Arreaza, Sørensen, and Yosha (1999), Galí and Perotti (2003), and Strawczynski and Zeira (2009) find further support for countercyclical fiscal policy in the European Union and in OECD countries. Galí (2005) even finds that fiscal policy is countercyclical in all industrialized countries and that countercyclicality intensified after 1991. Darby and Mélitz (2007) find that social expenditures account for the vast majority of countercyclical fiscal policies. Fatás and Mihov (2001) find that most of the countercyclicality of deficits in developed countries is a result of the automatic stabilizers. As mentioned above, the findings for developing countries are very different. Talvi and Végh (2005) show that government spending and taxes are highly procyclical in a large sample of less developed countries. This finding is corroborated by Akitoby and others (2004), Alesina and Tabellini (2005), and Ilzetzki and Végh (2008). The main explanation for this difference in fiscal policy between developed and less developed countries is that governments in less developed countries face credit constraints, which force them to cut expenditures during recessions. Other explanations are based on political economy, as in Talvi and Végh (2005), Alesina and Tabellini (2005) and Ilzetzki (2011).

The paper is organized as follows. In section 1, we characterize procyclicality of government expenditure under a shock to per capita gross domestic product (GDP) and describe the methodology for assessing whether the cycle is the trend. In section 2, we show empirical results on the relationship between "the cycle is the trend" variable and government expenditure, expenditure cuts during recessions, and the composition of government expenditure (consumption, transfers, and investment). We also test for a change in behavior after the 1990s and check whether procyclicality is milder for countries with high foreign direct investment (FDI), high international reserves, low public debt, and inclusion in the emerging markets stock exchange index. Section 3 concludes, and the appendixes present our method for choosing the length of the random walk component and the moving averages of GDP

per capita, the sensitivity of our findings to the use of different instrumental variables under generalized methods of moments (GMM) estimation, Granger causality tests, the sensitivity to country fixed effects, an Arellano-Bond specification, and a summary of our sources and definitions.

1. Procyclicality of Government Expenditure under Permanent Shocks

To study the impact of permanent shocks on fiscal policy variables, we concentrate mainly on expenditure. We would also like to test the impact on taxes and the deficit, but the straight interaction between the cycle and tax revenues, and thus the deficit, makes this mission difficult. Furthermore, the unavailability of data on statutory tax rates deters us from studying the impact on taxes.

Similarly to Barro (1979), we consider output and the real interest rate to be exogenous. Unlike Barro's model, however, we take the tax rate as given and assume that government expenditure is endogenous. The government chooses its real expenditure, G_t, in all periods ($t = 1, 2, \ldots$) so as to maximize a utility function, with decreasing marginal utility in government consumption:

$$\max \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} \left[-(g^* - g_t)^2 \frac{Y_t}{2} \right], \tag{1}$$

where r is an exogenous interest rate, Y is the exogenous output level, g^* is the maximum level of government expenditure over output (G/Y), and g is its actual level.[1] The intertemporal budget constraint is given by

$$\sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} (\tau_t - g_t) Y_t + (1+r) Y_0 b_0 = 0, \tag{2}$$

where τ is the exogenous statutory tax rate and b_0 is the ratio of initial general government debt to output. The Lagrangian of this problem is

1. This specification is parallel to Barro (1979), who stresses the tractability of choosing a homogeneous function for maximization, since g is expressed as a percentage of GDP.

$$\ell = \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} \left[-(g^* - g_t)^2 \frac{Y_t}{2} \right] - \lambda \left[\begin{array}{l} \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} (\tau_t - g_t) Y_t \\ + (1+r) Y_0 b_0 \end{array} \right], \tag{3}$$

and the first-order conditions are

$$\begin{aligned} & g^* - g_1 = \lambda; \\ & \ldots \\ & g^* - g_\infty = \lambda. \end{aligned} \tag{4}$$

The optimal solution deriving from equation (4) is to choose a smooth g in all periods.

Before writing the solution, let us define the permanent value of a variable X (with supra-index ~) as follows:

$$\sum_{i=1}^{\infty} \frac{\tilde{X}}{(1+r)^{i-1}} = X_1 + \frac{X_2}{1+r} + \frac{X_3}{(1+r)^2} + \ldots. \tag{5}$$

Plugging the optimal smooth value of G into the intertemporal budget constraint and taking the permanent value of output as defined in equation (5), we get

$$\tau \tilde{Y} = \tilde{G} + (1+r) B_0 \tag{5'}$$

This equation states that the tax rate is set to finance the permanent level of expenditure and the initial debt using the permanent level of output as the tax base.

If there is an exogenous permanent shock on output, and given that debt and the real interest rate are exogenous, the single way of restoring the equality would be to adjust government expenditure.[2] In a recession (expansion), the equality requires cutting (rising) expenditure; that is, it requires a procyclical fiscal policy. This policy will be similar for both developed and emerging economies, but the outcome is different based on the degree of the permanent shock and the economy's response to it. With regard to the degree of the shock, cycles may become persistent in emerging markets (that is, the cycle is the trend), while they may be purely transitory in

2. Hercowitz and Strawczynski (2004) consider the case in which both the tax rate and government expenditure are endogenous.

developed economies. In this case, we would expect fiscal policy to be acyclical (or countercyclical) in developed economies and procyclical in emerging markets.[3] With regard to the economy's response to the shock, developed and emerging countries may differ as a consequence of the risk perception by economic agents.

To calculate the variable representing the phenomenon of the cycle being the trend, we use the methodology adopted by Aguiar and Gopinath (2007) for Canada and Mexico. We extend the calculation to 22 developed economies and to 23 emerging countries.[4]

The methodology is based on looking at the variability of output over long horizons:

$$\sigma^2_{\Delta K} = K^{-1}\,\mathrm{var}(y_t - y_{t-K}), \tag{6}$$

where $y_t = \log$ (GDP per capita) at time t and K is the amount of lagged differences.

We then correct the sample variance for small-sample bias by including a degree-of-freedom correction term, T / $(T - K + 1)$:

$$\sigma^2_{\Delta K} = \frac{T}{K(T-K+1)}\mathrm{var}(y_t - y_{t-K}). \tag{7}$$

For each K, we calculate

$$C_K = \frac{\sigma^2_{\Delta K}}{\sigma^2_{\Delta y}}, \tag{8}$$

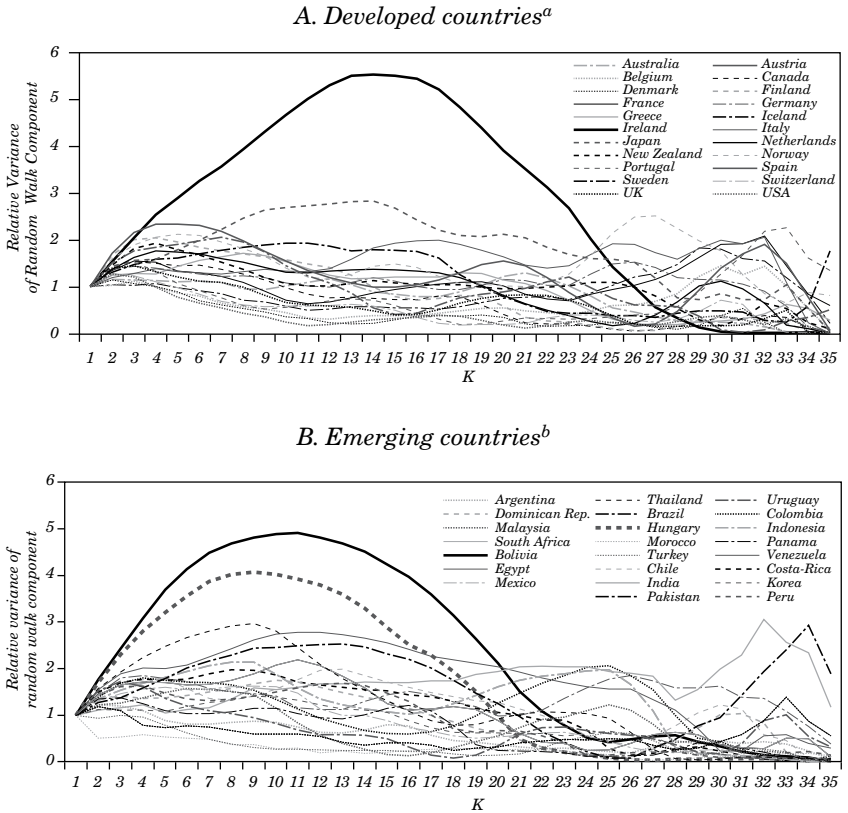
where $\sigma^2_{\Delta y}$ is the value of $\sigma^2_{\Delta K}$ when $K = 1$. Thus, for all countries, the value of equation (8) at $K = 1$ is one.

This value gives the ratio between the long-term variability of output and the short-term variability, thereby providing a measure of the extent to which the cycle is the trend. The higher this coefficient, the more strongly countries are expected to be affected by changes in output. Figure 1 shows the result of this measure for the different countries.

3. When shocks are transitory, a countercyclical policy acts as an optimal device for smoothing, as shown formally in Strawczynski and Zeira (2009).

4. The countries in the sample are listed in appendix F. There is no single accepted definition for emerging markets. Some well-known definitions are based on indexes (MSCI and FTSE) and *The Economist*. In our sample, 17 of the 22 countries are included in these lists.

Figure 1. The Cycle is the Trend: Developed and Emerging Countries, 1960–2006



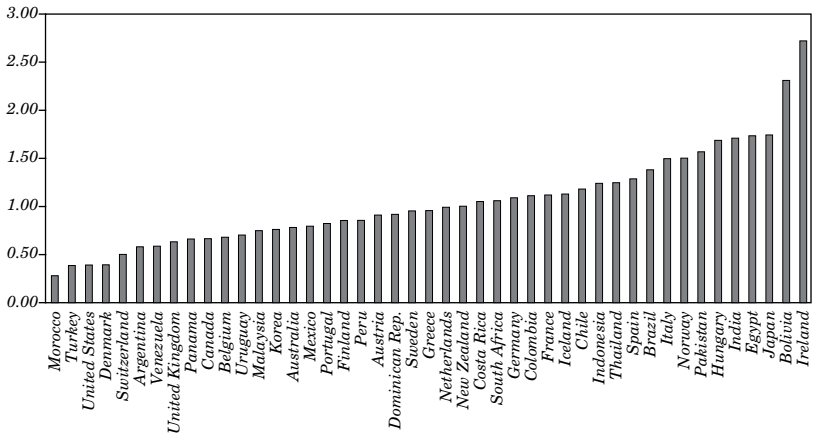
Source: Authors' elaboration.
a. The outlier is Ireland.
b. The outliers are Bolivia and Hungary.

To compare the results internationally, we take the average value of this measure for each country (see appendix A for a discussion of this choice). We expect the value for developed markets to be lower than for emerging markets.[5] In general, emerging countries have a

5. In figure 1, the pattern of procyclicality changes with K, and the pattern of procyclicality in emerging markets is very pronounced when K is between 9 and 11 (see figure A1 in appendix A for $K = 11$).

higher value of the random walk component: 12 countries are over the median (which equals 0.957), while 11 countries are below (see figure 2). In developed countries, 12 countries are below the median and 10 are above it. The average of all developed countries is 1.01 (0.95 excluding Ireland), compared with 1.07 for emerging countries.

Figure 2. Relative Variance of Random Walk component at $K = \bar{K}$



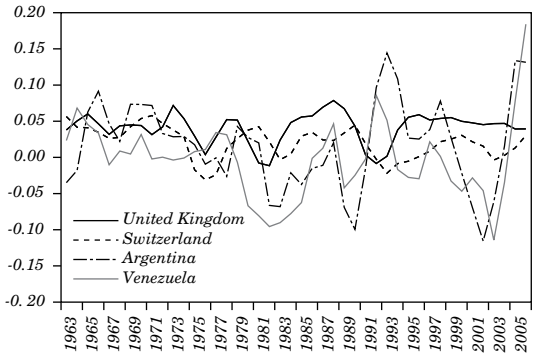
Source: Authors' elaboration.

Next, we multiply this value by the sum of growth over three years (the reason for choosing three years is explained in appendix A):

$$\mathrm{CIIT}_t = (C_{K=\bar{K}}) \sum_{n=t}^{t-3} \mathrm{dlog}(y_t). \tag{9}$$

Figure 3 shows this formula applied to two developed countries and two emerging countries. All four countries have a similar, relatively low variance of the random walk component. Nevertheless, the erratic behavior in emerging markets is evident in the graph.

Figure 3. The Cycle is the Trend and Three-Year Changes in Output



Source: IMF, *World Economic Outlook* database.

In the next section, we use CITT as an independent variable in regressions on total government expenditure, government consumption, social transfers and subsidies, and capital expenditure.

2. Data and Empirical Results

For estimating the CITT variable, we use per capita GDP at constant prices. Data for developed countries were taken from OECD Economic Outlook and OECD Historical Statistics. Data for emerging markets are taken from the Government Financial Statistics published by the International Monetary Fund (IMF). Data relate to the general government. See appendix F for a detailed description of our sources and definitions.

2.1 Empirical Specifications for Total Expenditure

We estimate the following types of regression:

$$\begin{aligned}\mathrm{dlog}(G) = {} & \beta_1 + \beta_2 \mathrm{CITT} + \beta_3 \mathrm{RATIO} + \beta_4 \mathrm{dlog(POP)} \\ & + \beta_5 (\mathrm{POP15} + \mathrm{POP65}) + \beta_6 \bar{K} + \beta_7 \mathrm{HyperInfl} + \varepsilon\end{aligned}$$

and

$$\begin{aligned}\text{dlog}(G) = {} & \beta_1 + \beta_2\text{CITT} + \beta_3\text{EMERGING} + \beta_4\text{CITT} \times \text{EMERGING} \\ & + \beta_5\text{RATIO} + \beta_6\text{dlog(POP)} + \beta_7(\text{POP15} + \text{POP65}) \\ & + \beta_8\bar{K} + \beta_9\text{HyperInfl} + \varepsilon,\end{aligned}$$

where G is real government expenditure, deflated by GDP prices; CITT is "the cycle is the trend" variable, as defined above; dlog(POP) is the population growth rate; POP15 and POP65 are the populations under 15 and over 65 years old, respectively, as a percentage of total population; $\bar{K}$ is the average of the random walk component, as explained above; RATIO refers to the ratio between the country's GDP per capita and the GDP per capita of the United States, both in purchasing power parity (PPP) values; EMERGING is a dummy variable that equals one for emerging countries and zero otherwise; and HyperInfl is a dummy variable that equals one when yearly inflation is over 100% for two or more consecutive years and zero otherwise.

We repeat these regressions in the framework of three panel models: a simple ordinary least squares (OLS) regression with period fixed effects, an autoregressive (AR) model, and a generalized methods of moments (GMM) model with an AR process. We examine these models for different lengths of the moving average of output (one to four periods). For space considerations, the tables below show only the results for three-period moving average of output using the GMM approach.

The implementation of a GMM model requires choosing an instrumental variable that is correlated with the CITT variable and is not correlated with government expenditure. For this purpose, we use real exports and also check the sensitivity of the results to other instrumental variables (see appendix C).

2.1.1 Budget cuts

Cutting the budget in hard times is particularly painful, since it has a negative impact on economic activity. Thus, it is interesting to study the procyclicality of fiscal policy in recession periods. Table 1 summarizes the number of budget cuts and whether they followed a recession period (which would indicate procyclical behavior), the amount of persistent budget cuts, and the depth of the budget cuts.

Table 1. Budget Cuts

Measure	*Developed economies*	*Emerging economies*[a]
Average number of observations with a government budget cut	5.7	6.8
Average number of events (when real government expenditure was cut) as percent of total years available	12.7	25.6
Average number of persistent events (when government expenditure was cut two consecutive years or more) as percent of total years available[b]	5.5	10.2
Average number of persistent events (two years or more) as percent of total number of events	43.2	39.9
Average number of persistent events (when government expenditure was cut three consecutive years or more) as percent of total years available	2.4	4.1
Average number of persistent events (three years or more) as percent of total number of events	19.2	16.1
Average number of events with parallel reduction in growth as percent of total number of events	6.4	30.1
Average number of events with one-period lagged reduction in growth as percent of total number of events	15.2	20.3
Average cut in government expenditure (percent)	–2.2	–6.8
Average cut in government expenditure when there was a parallel reduction in growth (percent)	–4.0	–10.3
Parallel reduction in growth – average percent of change in GDP	–2.0	–5.2

Source: OECD and Government Financial Statistics.

a. The table reports the number of emerging countries in which data for total government expenditure is available and consistent.

b. Each year in the group of consecutive years is counted as an event.

We estimate the following regression:

$$\begin{aligned}\mathrm{dlog}(G) = {} & \beta_1 + \beta_2 \mathrm{CITT} + \beta_3 \mathrm{EMERGING} + \beta_4 (G^- \times Y^-) \\ & + \beta_5 \mathrm{EMERGING} \times \mathrm{CITT} + \beta_6 (\mathrm{CITT} \times \mathrm{EMERGING} \times G^- \times Y^-) \\ & + \beta_7 \mathrm{RATIO} + \beta_8 \mathrm{dlog(POP)} \\ & + \beta_9 (\mathrm{POP15} + \mathrm{POP65}) + \beta_{10} \bar{K} + \beta_{11} \mathrm{HyperInfl} + \varepsilon,\end{aligned}$$

where G^- and Y^- are dummy variables that take the value of one when government consumption and real GDP, respectively, have a negative growth rate.

2.1.2 A Change in policy after the 1990s

The globalization of the 1990s exposed emerging countries to international markets to an unprecedented degree. This created new incentives for governments to change their behavior to avoid being isolated from international financial markets. In particular, in countries that are in trouble but in which the governments succeed in convincing foreign investors that the changes being made in the economy will bring a relatively quick end to the bad times, foreign investors will perceive low stock exchange levels as an investment opportunity. This may provide a new mechanism for a recovery: expectations may change quickly, output may reverse, and governments will be less dependent on performing budget cuts during recessions; that is, the procyclicality of fiscal policy would decline.

To examine whether emerging governments changed their behavior after the 1990s in response to globalization, we define a dummy variable, $D(90)$ that takes the value of one after 1990 and zero otherwise. We multiply this dummy by the fiscal variables explained above.

2.2 Empirical Results for Total Government Expenditure

Results for total government expenditure are shown in table 2. The coefficient of permanent shocks is insignificant for the developed economies, whereas emerging markets have a coefficients of around

Table 2. Total Government Expenditure Regressions[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Constant	0.06 (0.04)	0.03 (0.04)	0.03 (0.04)	0.02 (0.04)	0.03 (0.04)
dlog(POP)	1.64 (0.44)***	1.37 (0.45)***	1.37 (0.45)***	1.38 (0.45)***	1.47 (0.45)***
POP15 + POP65	−0.001 (0.001)	0.00001 (0.001)	−0.00002 (0.001)	0.0002 (0.001)	−0.0001 (0.001)
RATIO	−0.004 (0.01)	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)	0.003 (0.02)
HyperInfl	−0.05 (0.01)***	−0.03 (0.01)***	−0.03 (0.01)***	−0.02 (0.01)*	−0.02 (0.01)
$\bar{K}$	−0.02 (0.01)**	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)*	−0.01 (0.01)
EMERGING		−0.02 (0.01)	−0.02 (0.01)	−0.03 (0.01)*	−0.02 (0.01)
$G^- \times Y^-$				−0.002 (0.01)	−0.01 (0.01)
CITT	0.25 (0.04)***	0.08 (0.05)	0.08 (0.05)	0.09 (0.05)*	0.09 (0.05)*
EMERGING × CITT		0.31 (0.07)***	0.31 (0.09)***	0.35 (0.07)***	0.43 (0.08)***
EMERGING × CITT × $D(90)$			−0.004 (0.07)		−0.15 (0.07)**
EMERGING × CITT × $G^- \times Y^-$				0.22 (0.11)*	0.23 (0.12)*
EMERGING × CITT × $G^- \times Y^- \times D(90)$					−0.51 (0.25)**
Summary statistic					
No. observations	1,221	1,221	1,221	1,221	1,221
Adjusted R^2	0.54	0.56	0.56	0.55	0.56
Durbin-Watson	1.63	1.66	1.66	1.67	1.66

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

0.3 and statistically significant at the 1 percent level (column 2). The coefficient rises during high times (column 4): in periods of parallel reductions in *G* and *Y,* the coefficient increases by 0.2. We take these results as the first evidence of our main hypothesis—namely, that GDP shocks in emerging countries are associated with a procyclical reaction in government expenditure. These results are confirmed using the other methods.

Columns 3 and 5 present our results on whether there was a change in expenditure behavior by emerging government after the 1990s, in response to increasing globalization. In column 3, the coefficient is not significant, but in column 5, it is significant at the 5 percent level. This indicates that government expenditure was significantly less procyclical in emerging countries after the 1990s, especially during hard times.

2.3 Government Expenditure Composition

We perform the same analysis for government consumption, transfers and subsidies, and capital expenditure. In the transfers and subsidies analysis, we additionally control for the difference in the unemployment rate (dU), in order to control for the automatic impact of the cycle on unemployment benefits. Results are shown in tables 3, 4, and 5.

Table 3 reveals that while government consumption is procyclical in both developed and emerging economies, it is considerably more so in emerging economies. This behavior does not change significantly in hard times, in contrast to the results for total government expenditure presented earlier. Table 4 shows that government transfers are procyclical in emerging economies, a pattern that was accentuated after the 1990s.

Table 3. Government Consumption Regressions[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Constant	−0.01	−0.01	−0.01	−0.03	−0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
dlog(POP)	1.03	0.98	0.98	1.15	1.13
	(0.42)**	(0.42)**	(0.42)**	(0.44)***	(0.44)***
POP15 + POP65	0.001	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RATIO	0.01	0.004	0.004	0.01	0.01
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
HyperInfl	−0.05	−0.04	−0.04	−0.03	−0.03
	(0.01)***	(0.01)***	(0.01)***	(0.01)**	(0.01)**
$\bar{K}$	−0.01	−0.01	−0.01	−0.02	−0.02
	(0.01)**	(0.01)	(0.01)	(0.01)**	(0.01)**
EMERGING		−0.02	−0.02	−0.03	−0.03
		(0.01)	(0.01)	(0.01)**	(0.01)**
$G^- \times Y^-$				−0.003	−0.002
				(0.01)	(0.01)
CITT	0.24	0.15	0.15	0.16	0.16
	(0.03)***	(0.05)***	(0.05)***	(0.05)***	(0.05)***
EMERGING × CITT		0.17	0.19	0.28	0.34
		(0.07)**	(0.08)**	(0.07)***	(0.08)***
EMERGING × CITT × $D(90)$			−0.03		−0.10
			(0.07)		(0.07)
EMERGING × CITT × $G^- \times Y^-$				0.08	0.09
				(0.11)	(0.12)
EMERGING × CITT × $G^- \times Y^- \times D(90)$					0.07
					(0.26)
Summary statistic					
No. observations (unbalanced)	1,277	1,277	1,277	1,202	1,202
Adjusted R^2	0.56	0.57	0.57	0.57	0.57
Durbin-Watson	1.73	1.76	1.76	1.76	1.76

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(GC). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

Table 4. Government Transfers and Subsidies Regressions[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Constant	0.05	0.02	0.01	0.02	0.004
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
dlog(POP)	1.61	1.48	1.49	1.22	1.19
	(0.64)**	(0.68)**	(0.7)**	(0.69)*	(0.7)*
POP15 + POP65	–0.0003	0.0004	0.001	0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
RATIO	–0.01	–0.01	–0.01	–0.01	–0.01
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
HyperInfl	–0.07	–0.06	–0.07	–0.05	–0.05
	(0.02)***	(0.02)***	(0.02)***	(0.02)**	(0.02)***
dU	0.01	0.01	0.01	0.01	0.01
	(0.002)***	(0.002)***	(0.002)***	(0.002)***	(0.002)***
$\bar{K}$	–0.01	0.001	–0.003	0.002	–0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EMERGING		–0.02	–0.03	–0.01	–0.02
		(0.02)	(0.02)	(0.02)	(0.02)
$G^- \times Y^-$				–0.02	–0.02
				(0.01)**	(0.01)**
CITT	0.12	–0.02	–0.01	–0.04	–0.03
	(0.06)**	(0.07)	(0.07)	(0.07)	(0.07)
EMERGING × CITT		0.29	–0.01	0.30	0.09
		(0.11)***	(0.13)	(0.11)***	(0.13)
EMERGING × CITT × $D(90)$			0.49		0.33
			(0.13)***		(0.12)***
EMERGING × CITT × $G^- \times Y^-$				0.20	0.34
				(0.2)	(0.22)
EMERGING × CITT × $G^- \times Y^- \times D(90)$					–0.06
					(0.59)
Summary statistic					
No. observations (unbalanced)	1,062	1,062	1,062	1,053	1,053
Adjusted R^2	0.43	0.45	0.43	0.45	0.44
Durbin-Watson	1.60	1.63	1.64	1.62	1.63

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(GT). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

Table 5. Government Capital Expenditure Regressions[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Constant	0.05	0.15	0.15	0.13	0.14
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
dlog(POP)	3.72	4.35	4.35	4.63	4.66
	(1.16)***	(1.19)***	(1.19)***	(1.2)***	(1.21)***
POP15 + POP65	−0.002	−0.002	−0.002	−0.001	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
RATIO	0.06	−0.09	−0.09	−0.10	−0.10
	(0.04)	(0.06)	(0.06)	(0.06)*	(0.06)*
HyperInfl	−0.07	−0.06	−0.06	−0.04	−0.05
	(0.03)**	(0.03)*	(0.03)**	(0.03)	(0.03)
$\bar{K}$	−0.02	−0.03	−0.03	−0.04	−0.04
	(0.02)	(0.02)	(0.02)	(0.02)**	(0.02)**
EMERGING		−0.12	−0.11	−0.15	−0.14
		(0.04)***	(0.04)***	(0.04)***	(0.04)***
$G^- \times Y^-$				−0.01	−0.02
				(0.01)	(0.01)
CITT	0.60	0.48	0.49	0.49	0.49
	(0.09)***	(0.14)***	(0.14)***	(0.14)***	(0.14)***
EMERGING × CITT		0.22	0.15	0.30	0.22
		(0.19)	(0.22)	(0.18)*	(0.22)
EMERGING × CITT × $D(90)$			0.04		0.01
			(0.18)		(0.18)
EMERGING × CITT × $G^- \times Y^-$				0.15	0.07
				(0.31)	(0.33)
EMERGING × CITT × $G^- \times Y^- \times D(90)$					−0.23
					(0.69)
Summary statistic					
No. observations (unbalanced)	1,245	1,245	1,245	1,177	1,177
Adjusted R^2	0.54	0.54	0.54	0.54	0.55
Durbin-Watson	1.81	1.80	1.80	1.79	1.79

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(GI). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

Capital expenditure tends to be procyclical even in developed economies, as documented by Lane (2003) and Ilzetzky and Végh (2008). Lane (2003) summarizes both the macroeconomic and political economy factors that are behind this phenomenon. One possible explanation is that the fruits of investment projects are yielded many years after the initiation of a project; politicians may therefore be tempted to start investment projects only in times of abundant tax revenues, and they may find it natural to cut these projects in difficult times—without any immediate consequences. In table 5, the results of our regressions on government capital expenditure show, as expected, that cuts in capital expenditure are procyclical in both developed and emerging economies. This procyclical behavior is not significantly different in the two sample groups.

2.4 Other Issues to Consider

So far we have found that fiscal policy in emerging countries is procyclical, with some signs of a change in behavior after the 1990s. In this subsection, we explore other issues that may shed light on the mechanisms underlying this process.

2.4.1. Foreign direct investment and international reserves

One possible explanation for the improved performance after the 1990s is that countries are less on their own as a result of globalization: the increased exposure to investors around the world has smoothed governments' financing options, so that emerging countries no longer need to cut expenditure so sharply in hard times. One possible indicator of this exposure is the level of foreign direct investment (FDI). We expect that countries with a high level of FDI will institute milder procyclical fiscal policy. Table 6 shows the average levels of FDI for developed and emerging countries. One clear feature arising from this table is that FDI closely mirrored the globalization process, with a huge increase in the 1990s and 2000s after being stable in the 1970s and 1980s. For developed economies, the FDI level in the 1990s was more than double the level of the 1970s and 1980s, and by the 2000s, it had increased to more than five times the 1970s level. For emerging markets, FDI tripled between the 1970 and the 1990s and had nearly quadrupled by the 2000s. Another interesting feature of FDI flows is their high variance, with some developing countries being discovered by foreign investors only in the last decade.

Table 6. Average Net FDI Inflows as Percent of GDP

Sample group	*1970s*	*1980s*	*1990s*	*2000÷06*
Developed countries	0.74	0.75	1.97	3.78
Emerging countries	0.83	0.84	2.53	2.96
All countries	0.79	0.79	2.26	3.36

Source: U.N. Conference on Trade and Development (UNCTAD), May 2010.

In table 7, we explore whether the FDI level has some explanatory power for procyclical fiscal policies in emerging countries. For this purpose, we performed two regressions, one using an interaction variable between CITT and FDI (column 1) and another using an interaction between CITT and a dummy variable, $\bar{D}$ (FDI), that takes the value of one when FDI is higher than the median for each group of countries in each decade or 0 otherwise (column 2). Results are significant and in the expected direction; for emerging countries with high levels of FDI the coefficient of procyclicality decreases from 0.42 to 0.14 (column 2).

Kandil and Morsy (2010) find that international reserves help for performing countercyclical policy in emerging countries. We use their methodology for testing the role of international reserves and build a dummy variable, D(Reserves), that takes the value 1 if the international reserves at the end of the year are higher than the sum of 3 months of imports (using average monthly imports of the corresponding year). Columns 3 and 4 show that the coefficients have the expected sign and are significant at 10 percent.

Table 7. Total Government Expenditure Regressions with FDI and International Reserves[a]

	1973–2006		*1971–2006*	
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*
Constant	0.06 (0.04)	0.05 (0.05)	0.04 (0.04)	0.04 (0.04)
dlog(POP)	1.55 (0.5)***	1.40 (0.49)***	1.45 (0.45)***	1.45 (0.45)***
POP15 + POP65	–0.001 (0.001)	–0.001 (0.001)	–0.0003 (0.001)	–0.0003 (0.001)
RATIO	–0.003 (0.02)	–0.003 (0.03)	–0.003 (0.02)	–0.003 (0.02)
HyperInfl	–0.03 (0.01)**	–0.03 (0.01)**	–0.03 (0.01)***	–0.03 (0.01)***
$\bar{K}$	–0.01 (0.01)	–0.01 (0.01)	–0.01 (0.01)*	–0.01 (0.01)*
EMERGING	–0.02 (0.01)	–0.02 (0.02)	–0.02 (0.01)*	–0.02 (0.01)*
FDI / GDP	–0.001 (0.001)			
$\bar{D}(FDI)$		–0.0002 (0.01)		
D(Reserves)			0.01 (0.003)*	0.01 (0.003)*
CITT	0.06 (0.05)	0.09 (0.05)	0.10 (0.05)**	0.10 (0.05)**
EMERGING × CITT	0.39 (0.08)***	0.42 (0.09)***	0.38 (0.09)***	0.38 (0.09)***
(FDI / GDP) × EMERGING × CITT	–0.04 (0.02)***			
EMERGING × CITT × $\bar{D}(FDI)$		–0.28 (0.09)***		
EMERGING × CITT × D(Reserves)			–0.13 (0.07)*	–0.13 (0.08)*
EMERGING × CITT × D(Reserves) × D(90)				0.01 (0.08)
Summary statistic				
No. observations (unbalanced)	1,130	1,170	1,195	1,195
Adjusted R^2	0.55	0.54	0.55	0.55
Durbin-Watson	1.68	1.67	1.66	1.66

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is GMM. Standard errors are in parenthesis.

2.4.2 Government debt

As mentioned in the literature survey, government debt is considered one of the main explanatory factors for procyclical fiscal policy in developing countries. Many emerging countries carry high levels of debt, although the debt levels vary substantially among countries.

In table 8, we present the results of regressions that include the debt level as an independent variable, DEBT / GDP, as well as a dummy variable, $\bar{D}$ (DEBT), that takes the value of one when a country's debt is higher than the median for its group in each decade and zero otherwise (column 3). Column 1 shows that the coefficient of debt as a percent of GDP is negative and significant, which means that countries with high debt tend to reduce government expenditure. This means that debt can be considered an alternative explanation for government expenditure. Therefore, we include debt as an additional variable in our basic specification, and we further create an interaction variable between CITT and debt. Ex ante we do not have a clear expectation about the sign of the coefficient: a high level of debt may imply international pressure to cut expenditure, which would result in a negative coefficient, or it could represent a country's ability to access international capital markets, which implies a positive coefficient. In columns 2 and 3, the coefficients tend to be negative, but they are not significant in the second specification.

Table 8. Total Government Expenditure Regressions with Debt[a]

Explanatory variable	*(1)*	*(2)*	*(3)*
Constant	0.07 (0.04)	0.04 (0.04)	−0.01 (0.04)
dlog(POP)	0.46 (0.48)	0.65 (0.46)	1.05 (0.48)**
POP15 + POP65	−0.0002 (0.001)	0.0002 (0.001)	0.0001 (0.001)
RATIO	−0.02 (0.02)	0.002 (0.02)	0.04 (0.02)
HyperInfl	−0.02 (0.02)	−0.01 (0.02)	−0.01 (0.02)
$\bar{K}$		0.01 (0.01)	0.001 (0.01)
EMERGING	0.04 (0.02)**	−0.01 (0.01)	0.02 (0.01)
DEBT / GDP	−0.0004 (0.0001)***	−0.0004 (0.0001)***	
$\bar{D}(Debt)$			−0.003 (0.004)
CITT		0.01 (0.04)	0.05 (0.05)
EMERGING × CITT		0.39 (0.1)***	0.25 (0.08)***
(DEBT / GDP) × EMERGING	−0.001 (0.0002)***		
(DEBT / GDP) × EMERGING × CITT		−0.004 (0.002)**	
EMERGING × CITT × $\bar{D}(Debt)$			−0.13 (0.100)
Summary statistic			
No. observations (unbalanced)	900	894	963
Adjusted R^2	0.59	0.59	0.58
Durbin-Watson	1.66	1.59	1.53

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is GMM, and the sample period is from 1973 to 2006. Standard errors are in parenthesis.

Table 9. Total Government Expenditure Regressions Excluding Five Developing Markets Not Included in the Emerging Markets Index[a]

Explanatory variable	*1*	*2*	*3*	*4*	*5*
Constant	0.07 (0.04)*	0.04 (0.04)	0.05 (0.04)	0.05 (0.04)	0.05 (0.04)
dlog(POP)	1.53 (0.44)***	1.32 (0.46)***	1.32 (0.46)***	1.36 (0.45)***	1.39 (0.44)***
POP15 + POP65	–0.001 (0.001)	–0.0003 (0.001)	–0.0003 (0.001)	–0.0003 (0.001)	–0.0004 (0.001)
RATIO	–0.01 (0.01)	–0.01 (0.02)	–0.01 (0.02)	–0.01 (0.02)	–0.01 (0.02)
HyperInfl	–0.06 (0.01)***	–0.04 (0.01)***	–0.04 (0.01)***	–0.03 (0.01)**	–0.03 (0.01)**
$\bar{K}$	–0.02 (0.01)**	–0.01 (0.01)	–0.01 (0.01)	–0.01 (0.01)	–0.01 (0.01)
EMERGING		–0.02 (0.02)	–0.02 (0.02)	–0.02 (0.01)	–0.02 (0.01)
$G^- \times Y^-$				–0.01 (0.01)	–0.02 (0.01)***
CITT	0.21 (0.04)***	0.06 (0.05)	0.06 (0.05)	0.09 (0.05)*	0.09 (0.05)*
EMERGING × CITT		0.29 (0.08)***	0.28 (0.09)***	0.25 (0.07)***	0.31 (0.08)***
EMERGING × CITT × $D(90)$			–0.01 (0.07)		–0.08 (0.07)
EMERGING × CITT × $G^- \times Y^-$				0.18 (0.13)	0.21 (0.13)
EMERGING × CITT × $G^- \times Y^- \times D(90)$					–0.63 (0.23)***
Summary statistic					
No. observations	1,107	1,107	1,107	1,107	1,107
Adjusted R^2	0.55	0.56	0.56	0.56	0.56
Durbin-Watson	1.73	1.75	1.75	1.75	1.73

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

2.4.3 Emerging versus developing countries

Our sample includes five countries that are not considered emerging markets by either the MSCI or FTSE index (see appendix F for further information on the countries included in these indexes). The countries in question are Bolivia, Costa Rica, the Dominican Republic, Panama, and Uruguay. We repeated the regressions reported in table 3 excluding the five countries; the results are presented in table 9. The coefficient of procyclicality is lower for the restricted sample than for the full sample.

3. Summary and Conclusions

This paper explores whether developed and emerging economies react differently to persistent shocks to output. From a theoretical perspective, we expected to find procyclical behavior in countries that are subject to persistent shocks to per capita GDP—that is, they will increase expenditure during booms and cut it during recessions. To assess the extent to which the cycle is the trend for developed and emerging economies, we adopted Aguiar and Gopinath (2007) definition of shocks to examine how government expenditure and its components (namely, consumption, transfers, and investment) react to these shocks.

We found that while government expenditure in developed economies is not affected by these shocks (with the exception of government investment), emerging countries do tend to pursue procyclical fiscal policy in reaction to persistent shocks to per capita GDP. This is in line with previous findings for investment, which show that both developed and emerging countries act procyclically in this area. However, procyclical policy in emerging countries is particularly evident for total expenditure and is implemented in government investment, consumption and transfers.

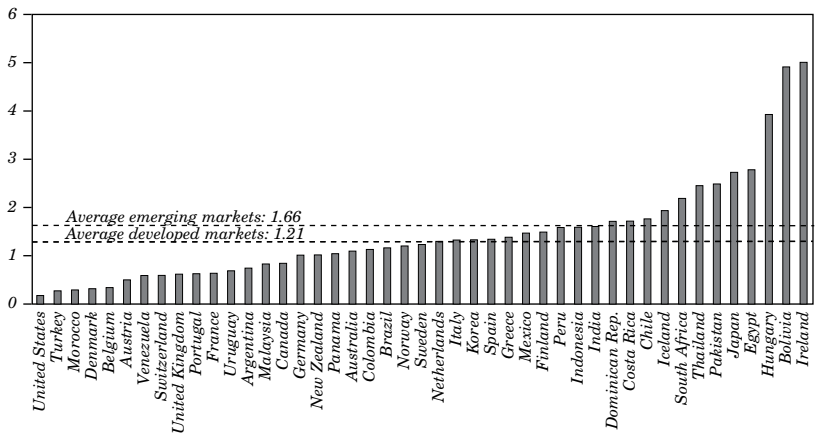
There are signs of a reduction in the extent of procyclical expenditure policy in emerging countries after the 1990s, in response to increasing globalization. Moreover, we found that countries with a high level of FDI implemented milder procyclical policies, as did those included in emerging markets indexes.

Appendix A

The Length of Shocks Affecting Government Expenditure

The interaction between the sum of the three-period shocks and "the cycle is the trend" variable (CITT) is a central explanatory variable in our regressions. As stated in Aguiar and Gopinath (2007), there is a trade off between precision (using a small number for K) and an unbiased sample (using a large K). Choosing different values of K implies a different pattern for the CITT variable. Figure A1 shows the relative variance of the random walk component at $K = 11$, whereas figure 2 in the main text is based on the average K. A comparison of the two figures reveals that there is a sharper distinction between the random walk component of developed and emerging markets with $K = 11$.

Figure A1. Relative Variance of Random Walk Component at $K = 11$



Source: Authors' elaboration.

To check the sensitivity of the results to K, we run the following regression:

$$\text{dlog}(G_t) = \beta_1 + \beta_2 (C_K) \sum_{n=t}^{t-j} \text{dlog}(y_t) + \beta_3 \text{RATIO} + \beta_4 \text{dlog(POP)} + \beta_5 (\text{POP15} + \text{POP65}) + \beta_6 \text{HyperInfl} + \varepsilon,$$

where K takes different values and j ranges from 1 to 4.

Results for the four different possibilities of accumulated shocks show that the best result using the t statistic, adjusted R^2, and Akaike criterion occurs when $K = 2$. At the same time, the differences between the regressions, as measured by the adjusted R^2 and Akaike criterion, are negligible. Since choosing $K = 2$ would clearly increase the potential bias of our estimation, we chose the average K as the option that balances precision and bias. The t statistic for the regression using average K is very high ($t = 9$), and the difference in significance is negligible when compared with the case in which $K = 2$.

Our second choice is related to the length of the moving average of output shocks. In the accumulated three-period shock specification of the above equation, we get a significantly higher t statistic of the CITT variable, a higher adjusted R^2, and a higher Akaike criterion (in absolute value) than in all other options. We therefore chose this option as the benchmark.

To check the sensibility of results to the different values of K, we show in this appendix the results of the following main regression (as presented in table 3, column 2):

$$\text{dlog}(G) = \beta_1 + \beta_2 \text{CITT} + \beta_3 \text{EMERGING} + \beta_4 \text{CITT} \times \text{EMERGING} + \beta_5 \text{RATIO} + \beta_6 \text{dlog(POP)} + \beta_7 (\text{POP15} + \text{POP65}) + \beta_8 K + \beta_9 \text{HyperInfl} + \varepsilon.$$

For space considerations we show only the coefficients and significance of the main variables, the adjusted R^2, and the Durbin-Watson value in table A1. We also run the regressions with a different number of accumulated shocks (using $K = \bar{K}$). Table A2 shows results for the specification described above.

Table A1. Coefficients and Statistics of the Main Variables for Alternative Values of K[a]

K	*CITT*	*CITT* × *EMERGING*	*Adjusted* R^2	*Durbin-Watson*
$K = 2$	0.02 (0.05)	0.29 (0.07)***	0.57	1.67
$K = 3$	0.03 (0.04)	0.24 (0.06)***	0.57	1.67
$K = 4$	0.04 (0.04)	0.2 (0.05)***	0.56	1.66
$K = 5$	0.06 (0.04)	0.17 (0.05)***	0.56	1.66
$K = 6$	0.06 (0.04)*	0.15 (0.05)***	0.55	1.65
$K = 7$	0.07 (0.04)*	0.13 (0.05)***	0.55	1.65
$K = 8$	0.07 (0.03)**	0.13 (0.04)***	0.55	1.65
$K = 9$	0.07 (0.03)**	0.12 (0.04)***	0.55	1.65
$K = 10$	0.06 (0.03)**	0.13 (0.04)***	0.55	1.65
$K = 11$	0.07 (0.03)**	0.15 (0.04)***	0.55	1.65
$K = 12$	0.07 (0.03)**	0.16 (0.04)***	0.55	1.65
$K = 13$	0.07 (0.03)**	0.17 (0.04)***	0.55	1.66
$K = 14$	0.07 (0.03)**	0.19 (0.05)***	0.55	1.67
$K = 15$	0.07 (0.03)**	0.22 (0.05)***	0.56	1.67
$K = 16$	0.08 (0.03)**	0.24 (0.05)***	0.56	1.68
$K = 17$	0.08 (0.03)**	0.27 (0.06)***	0.55	1.67
$K = 18$	0.08 (0.04)**	0.31 (0.07)***	0.55	1.67
$K = 19$	0.08 (0.04)*	0.35 (0.07)***	0.54	1.66
$K = 20$	0.09 (0.05)*	0.36 (0.08)***	0.54	1.64
$K = 21$	0.1 (0.05)*	0.35 (0.08)***	0.53	1.63
$K = 22$	0.1 (0.06)*	0.34 (0.08)***	0.53	1.63
$K = 23$	0.1 (0.06)	0.34 (0.08)***	0.53	1.63
$K = 24$	0.12 (0.07)*	0.32 (0.09)***	0.52	1.62
$K = 25$	0.17 (0.08)*	0.28 (0.1)***	0.51	1.61
$K = 26$	0.22 (0.09)**	0.3 (0.11)***	0.51	1.61
$K = 27$	0.25 (0.1)**	0.39 (0.12)***	0.52	1.63
$K = 28$	0.23 (0.1)**	0.66 (0.14)***	0.55	1.69
$K = 29$	0.17 (0.09)*	0.64 (0.13)***	0.55	1.71
$K = 30$	0.16 (0.08)*	0.55 (0.12)***	0.55	1.72
$K = \bar{K}$	0.08 (0.05)	0.31 (0.07)***	0.56	1.66

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. Standard errors are in parenthesis.

Table A2. Regressions with Accumulated Shocks[a]

No. of accumulated shocks	*CITT*	*CITT × EMERGING*	*Adjusted R^2*	*Durbin-Watson*
1 shock	–0.09 (0.09)	–0.05 (0.13)	0.50	1.65
2 shocks	–0.12 (0.07)*	0.44 (0.1)***	0.54	1.72
3 shocks	0.08 (0.05)	0.31 (0.07)***	0.56	1.66
4 shocks	0.15 (0.04)***	0.18 (0.06)***	0.53	1.71

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
*** Statistically significant at the 1 percent level.
a. Standard errors are in parenthesis.

Appendix B
Granger Causality Test

In this appendix, we use Granger causality tests for the relationship between GDP per capita and government expenditure. We start by testing whether GDP per capita causes government expenditure (with three lags) and then this hypothesis again after adding fixed effects for the different countries. Finally, we run a full regression including all the control variables used in our paper—namely, dlog(POP), POP15 + POP65, HyperInfl, and RATIO. The null hypothesis is that each of the coefficients of GDP per capita up to three lags equals zero. It is rejected in all three specifications.

To check reverse causality, we test all three specifications replacing the dependent variable with GDP per capita. The null hypothesis is that each of the coefficients of government expenditure up to three lags equals zero. The null hypothesis cannot be rejected in any of the three specifications at 5 percent significance. The table B1 summarizes the results.

Table B1. Results of Granger Causality Tests

Causality test and type of regression	*F statistic*	*Significance level*	*Result*
GDP per capita does not cause G			
Simple Granger causality	14.0	Under 1%	The null hypnosis can be rejected
With cross-section fixed effects	11.4	Under 1%	The null hypnosis can be rejected
Full regression	14.2	Under 1%	The null hypnosis can be rejected
G does not cause GDP per capita			
Simple Granger causality	1.87	14%	The null hypnosis cannot be rejected
With cross-section fixed effects	1.96	12%	The null hypnosis cannot be rejected
Full regression	2.19	9%	The null hypnosis cannot be rejected

Source: Authors' elaboration.

Appendix C
Alternative Instruments

In this section, we discuss the sensitivity of the results to our basic instrumental variable—namely, the logarithmic change in countries' exports at constant dollars. Since our instrumental variable is based on a three-year moving average (consistent with the length chosen for the explanatory variable), it is centered at a lag of one and a half years. This feature avoids a contemporary endogeneity with the left-hand variable (the logarithmic change of government expenditure) through the exchange rate channel.[6] However, since the last year of the moving average is contemporary with the left-hand-side variable, we need to check the sensitivity of the results to an alternative instrumental variable, based on the one-period lagged moving average.

Table C1 shows the results for total government expenditure, government consumption, transfers, and capital expenditure, using the regression specification shown in the last column of table 3. The results follow a similar pattern to the results shown in table 3: emerging economies have a clearly more procyclical pattern for total government expenditure and government consumption than developed economies (although here the coefficient of total expenditure for this group of countries is significant), transfers are procyclical in hard times, and capital expenditure is procyclical for both groups.

6. This channel would be relevant to the extent that government expenditure affects the real exchange rate and the real exchange rate affects exports. The existing empirical literature on the relationship between government expenditure and the real exchange rate shows a contemporary correlation between these two variables: see De Gregorio, Giovannini, and Wolf (1994), Lee, Milesi-Ferretti, and Ricci (2008), and Galstyan and Lane (2009). The last two papers use a dynamic specification with one lag and one forward period; that is, they are centered on the contemporaneous correlation.

Table C1. Total Government Expenditure and Its Composition[a]

	Dependent variable			
Explanatory variable	*dlog(G)* *(1)*	*dlog(GC)* *(2)*	*dlog(GT)* *(3)*	*dlog(GI)* *(4)*
Constant	0.04	−0.02	0.003	0.18
	(0.05)	(0.04)	(0.06)	(0.12)
dlog(POP)	1.91	1.42	1.47	5.66
	(0.48)***	(0.45)***	(0.69)**	(1.31)***
POP15 + POP65	−0.0003	0.001	0.001	−0.002
	(0.001)	(0.001)	(0.002)	(0.003)
RATIO	0.002	0.004	−0.004	−0.11
	(0.03)	(0.02)	(0.03)	(0.07)*
HyperInfl	−0.01	−0.01	−0.05	−0.04
	(0.01)	(0.01)	(0.02)***	(0.03)
DU			0.01	
			(0.002)***	
$\bar{K}$	−0.03	−0.03	−0.01	−0.08
	(0.01)***	(0.01)***	(0.01)	(0.02)***
EMERGING	−0.02	−0.03	−0.01	−0.14
	(0.02)	(0.01)**	(0.02)	(0.04)***
$G^- \times Y^-$	−0.01	0.001	−0.02	−0.02
	(0.01)	(0.01)	(0.01)	(0.02)
CITT	0.26	0.27	0.02	0.89
	(0.07)***	(0.06)***	(0.08)	(0.18)***
EMERGING × CITT	0.38	0.36	0.08	0.01
	(0.1)***	(0.09)***	(0.13)	(0.26)
EMERGING × CITT × $D(90)$	−0.18	−0.12	0.16	−0.06
	(0.07)***	(0.07)*	(0.11)	(0.19)
EMERGING × CITT × $G^- \times Y^-$	0.22	0.17	0.52	−0.12
	(0.12)*	(0.12)	(0.2)***	(0.31)
EMERGING × CITT × $D(90) \times G^- \times Y^-$	−0.62	−0.16	−0.08	−0.46
	(0.24)***	(0.24)	(0.57)	(0.64)
Summary statistic				
No. observations (unbalanced)	1,217	1,198	1,049	1,173
Adjusted R^2	0.52	0.54	0.45	0.52
Durbin-Watson	1.63	1.74	1.66	1.76

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The estimation method is GMM. The instrumental variable is constant-dollar exports with a one-year lag. The sample period is from 1971 to 2006. Standard errors are in parenthesis.

In table C2, we use an alternative instrumental variable, introduced by Panizza and Jaimovich (2007) and used also by Ilzetzki and Végh (2008), which is based on the weighted average of real GDP growth of the main export partners.[7] Data restrictions shrink our sample considerably from 1983 onward, so we are constrained to using the regressions shown in column 3 of tables 3, 4 and 5 (that is, excluding the dummy for the period after the 1990s). Here again, results are fairly similar, except for a significant procyclical reaction of total government expenditure in developed countries.

Table C2. Total Government Expenditure and its Composition[a]

	Dependent variable			
Explanatory variable	*dlog(G)* *(1)*	*dlog(GC)* *(2)*	*dlog(GT)* *(3)*	*dlog(GI)* *(4)*
Constant	0.11 (0.05)**	0.05 (0.06)	0.04 (0.08)	0.32 (0.14)**
dlog(POP)	1.63 (0.59)***	1.72 (0.66)***	1.37 (0.89)	4.75 (1.56)***
POP15 + POP65	−0.01 (0.03)	−0.002 (0.03)	−0.01 (0.04)	−0.13 (0.07)*
RATIO	−0.02 (0.01)*	−0.04 (0.01)***	−0.06 (0.02)***	−0.03 (0.04)
d*U*			0.01 (0.002)***	
HyperInfl	−0.02 (0.01)**	−0.02 (0.01)**	−0.002 (0.01)	−0.06 (0.02)***

7. The main export partners of a country are defined as the countries that receive at least 5% of total exports. The second criterion requires that the main export partners together comprise at least 50% of the country's exports. If the countries receiving more than 5% of exports together do not account for 50% of total exports, then smaller trading partners are included. For example, a country that has only one export partner that accounts for over 50 percent of its total exports (such as Canada and Mexico) will have only one main export partner in our calculation. Other countries that have less centralized export characteristics may have six or seven main trading partners, with some of them accounting for less then 5 percent of total exports. The weighted average of the GDP growth rate is based on the export partners' weights in total exports. We normalized the weights so the sum equals one.

Table C2. (continued)

	Dependent variable			
Explanatory variable	*dlog(G)* *(1)*	*dlog(GC)* *(2)*	*dlog(GT)* *(3)*	*dlog(GI)* *(4)*
$\bar{\bar{K}}$	−0.01	−0.004	−0.02	−0.02
	(0.01)	(0.01)	(0.01)	(0.02)
EMERGING	−0.01	−0.03	0.0003	−0.11
	(0.02)	(0.02)	(0.02)	(0.04)***
$G^- \times Y^-$	−0.01	−0.004	−0.02	−0.02
	(0.01)	(0.01)	(0.01)	(0.02)
CITT	0.18	0.24	0.03	0.59
	(0.06)***	(0.07)***	(0.08)	(0.15)***
EMERGING × CITT	0.26	0.27	0.30	0.23
	(0.08)***	(0.09)***	(0.13)**	(0.21)
EMERGING × CITT × $G^- \times Y^-$	−0.06	−0.16	0.11	−0.15
	(0.13)	(0.12)	(0.25)	(0.38)
Summary statistic				
No. observations (unbalanced)	878	863	843	762
Adjusted R^2	0.50	0.55	0.43	0.48
Durbin-Watson	1.60	1.72	1.65	1.84

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The estimation method is GMM. The instrumental variable is the weighted average of the real GDP growth of the main export partners (normalized so that the weights sum to one) multiplied by exports as a percent of GDP. The sample period is from 1983 to 2006. Standard errors are in parenthesis.

Appendix D
Country Fixed Effects

Controlling for the random walk component in the main regressions technically impedes us from using country fixed effects. To check the sensitivity of the results to the use of the random walk, we replaced the random walk component with country fixed effects, using different values of K. This test is performed using the specification in column 5 of table 3; the results confirm our main hypothesis (see table D1).

Table D1. Using Country Fixed Effects[a]

Explanatory variable	$K = 7$ *(1)*	$K = 9$ *(2)*	$K = 11$ *(3)*	$K = \bar{K}$ *(4)*
Constant	−0.11 (0.06)*	−0.12 (0.06)**	−0.14 (0.06)**	−0.13 (0.06)**
dlog(POP)	1.56 (0.63)**	1.49 (0.61)**	1.44 (0.61)**	1.69 (0.65)***
POP15 + POP65	0.002 (0.001)	0.002 (0.001)*	0.003 (0.001)**	0.002 (0.001)*
RATIO	0.08 (0.05)	0.08 (0.05)	0.08 (0.05)*	0.08 (0.05)
HyperInfl	−0.03 (0.01)**	−0.03 (0.01)*	−0.01 (0.02)	−0.02 (0.01)
$G^- \times Y^-$	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)
CITT	0.13 (0.05)**	0.13 (0.05)**	0.11 (0.05)**	0.19 (0.08)**
EMERGING × CITT	0.21 (0.08)***	0.20 (0.07)***	0.29 (0.08)***	0.46 (0.12)***
EMERGING × CITT × $D(90)$	−0.10 (0.04)**	−0.09 (0.04)**	−0.10 (0.04)**	−0.16 (0.07)**
EMERGING × CITT × $G^- \times Y^-$	0.16 (0.07)**	0.16 (0.07)**	0.14 (0.07)**	0.21 (0.12)*
EMERGING × CITT × $G^- \times Y^- \times D(90)$	−0.28 (0.18)	−0.33 (0.17)**	−0.41 (0.18)**	−0.60 (0.25)**

Table D1. (continued)

Explanatory variable	$K = 7$ *(1)*	$K = 9$ *(2)*	$K = 11$ *(3)*	$K = \bar{K}$ *(4)*
Summary statistic				
No. observations	1,217	1,217	1,217	1,217
Adjusted R^2	0.53	0.53	0.52	0.53
Durbin-Watson	1.63	1.63	1.62	1.62

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is GMM, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

Appendix E
Arellano-Bond Regressions

The regressions could be affected by possible endogeneity arising from the effect of government expenditure on GDP. To verify whether this is the case, we estimate the regressions presented in table 3 with a dynamic Arellano-Bond method, using the dynamic instrument for the CITT variable—namely, dlog(RealExports)—with a two-year lag. The results are shown in table A7, and they confirm our main results.

Table E1. An Arellano-Bond Specification

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
dlog(POP)	1.71	1.61	1.49	1.59	1.95
	(0.08)***	(0.1)***	(0.1)***	(0.12)***	(0.36)***
POP15 + POP65	0.004	0.004	0.003	0.004	0.003
	(0.0004)***	(0.0003)***	(0.0003)***	(0.001)***	(0.001)***
RATIO	0.08	0.06	0.06	0.07	0.07
	(0.02)***	(0.04)*	(0.04)*	(0.04)*	(0.09)
HyperInfl	–0.14	–0.09	–0.09	–0.05	–0.17
	(0.1)	(0.04)**	(0.04)**	(0.04)	(0.79)
CITT	0.12	0.01	–0.001	0.01	–0.01
	(0.01)***	(0.01)	(0.01)	(0.01)	(0.02)
EMERGING × CITT		0.26	0.31	0.20	0.22
		(0.02)***	(0.02)***	(0.02)***	(0.02)***
EMERGING × CITT × $D(90)$			–0.06		–0.28
			(0.01)***		(0.77)
EMERGING × CITT × $G^- \times Y^-$				0.58	0.53
				(0.06)***	(0.01)***
EMERGING × CITT × $D(90) \times G^- \times Y^-$					–1.83
					(3.0)
Summary statistic					
No. observations	1,240	1,223	1,223	1,223	1,223
Hansen J statistic	37.32	36.47	34.62	37.44	35.71
Null hypothesis: the model is valid			Cannot be rejected		

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.
a. The dependent variable is dlog(G). The estimation method is dynamic Arellano-Bond, and the sample period is from 1971 to 2006. Standard errors are in parenthesis.

Appendix F

Classification of Emerging Markets, Data Coverage, and Sources

In the regressions, we base our analysis on 22 developed economies (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden Switzerland, the United Kingdom, and the United States) and 23 emerging markets (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Pakistan, Panama, Peru, South Africa, Thailand, Turkey, Uruguay, and Venezuela). The choice of emerging markets is based on two indexes (as defined at the end of our sample period, in 2006): MSCI and FTSE.

The MSCI Emerging Markets Index includes the following countries (the countries in bold are included in our sample): **Argentina, Brazil**, **Chile,** China, **Colombia**, the Czech Republic**, Egypt, Hungary, India, Indonesia,** Israel, Jordan, **Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, the** Philippines**,** Poland**,** Russia**, South Africa,** Taiwan**, Thailand, Turkey, and Venezuela.** The countries that are not in bold (excluding Israel) are not included because they have insufficient data on government expenditure for the full sample period. Israel is excluded from the sample because it has since been upgraded to a developed market classification.[8] Argentina, Pakistan, and Venezuela have been downgraded from the MSCI index in 2006, but they are still included in our sample.

The FTSE Emerging Markets Index is similar to the MSCI index except that it does not include Korea and Venezuela. Five countries are included in the sample that are not officially classified as emerging markets: Bolivia, Costa Rica, the Dominican Republic, Panama, and Uruguay.

Three countries were dropped from some of the regressions. Mexico was dropped from transfers and subsides and from total expenditure because local government data were not available. Data are available for government consumption and capital expenditure,

8. Strawczynski and Zeira (2007) show that fiscal policy in Israel has evolved from strongly procyclical to mildly procyciclical since 1985.

however, so the country was not dropped in those regressions. Chile was dropped from regressions on government total expenditure and on transfers and subsidies because data on transfers between governments are not available. Finally, Colombia was dropped from the transfers and subsidies regressions since we did not have enough observations.

The data used in this research are taken from several databases. Table F1 summarizes the sources for the different variables used.

Table F1. Data Coverage and Sources

Variable name	*Coverage*[a]	*Source*
Total government expenditure and composition		
Developed markets	1960–2006	OECD Historical Statistics; OECD Economic Outlook
Emerging markets	1972–2006	IMF Government Finance Statistics (GFS)
GDP: Gross domestic product	1960–2006	OECD Historical Statistics; IMF International Financial Statistics (IFS); and World Bank World Development Indicators (WDI)
RATIO	1960–2006	The Conference Board and Groningen Growth and Development Centre, Total Economy Database (except for Panama, which is based on WDI data for the period 1980–2006)
POP15: Population under 15 years old	1960–2006	WDI
POP65: Population over 65 years old	1960–2006	WDI
FDI	1970–2006	U.N. Conference on Trade and Development (UNCTAD), with supplemental data from IFS for Indonesia and Panama

Table F1. (continued)

Variable name	*Coverage*[a]	*Source*
Government debt: total, domestic and foreign		
Developed markets	1970–2006	GFS; OECD Historical Statistics
Emerging markets in Latin America, South Africa, and Pakistan.		
Rest of emerging markets	1972–2006	GFS, with supplemental data from Panizza (2008)
International reserves and imports	1960–2006	IFS
Export data		
Exports as % of GDP and in constant dollars.	1960–2006	WDI
Export partners.	1980–2006	IMF Direction of Trade Statistics (DOTS)

Source: Authors' elaboration.
a. For some countries, coverage is partial.

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