Do Good Institutions Promote Countercyclical Macroeconomic Policies?*

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Abstract
The literature has argued that developing countries are unable to adopt countercyclical monetary and fiscal policies due to financial imperfections and unfavorable political-economy conditions. Using a world sample of up to 112 industrial and developing countries for 1984-2008, we find that the level of institutional quality plays a key role in countries' ability and willingness to implement countercyclical macroeconomic policies. Countries with strong (weak) institutions adopt countercyclical (procyclical) macroeconomic policies, reflected in extended monetary policy and fiscal policy rules. The threshold levels of institutional quality at which policies are acyclical are found to be similar for monetary and fiscal policy.

Keywords: Institutional quality, macroeconomic policies, emerging market economies.

*This paper previously circulated under the title 'Institutions and Cyclical Properties of Macroeconomic Policies in the Global Economy'. We thank seminar participants at the International Monetary Fund, the World Bank, the European Central Bank, the Annual Meetings of the Latin American and Caribbean Economic Association, the Annual Meetings of the Chilean Economic Society, and the Workshop for Young Economists at UDEP (Lima) for helpful comments. We are also indebted to the editor, two anonymous referees, and Alberto Humala for very valuable comments and suggestions. Fafali Adanu, Soo Hyun Hwang, and Ke Xu provided able research assistance. Schmidt-Hebbel gratefully acknowledges financial support provided by Fondecyt research project No. 1060175.

JEL Classification numbers: E43, E52, E58, E62, E63.

I. Introduction

Macroeconomic policies are geared in principle toward stabilizing business-cycle fluctuations. Governments and central banks implement countercyclical polices when they adjust their policy instruments to smoothen expansions and recessions. That is, policymakers adopt expansionary (contractionary) policies in recessions (booms).

There is ample evidence about the ability of industrial economies to conduct countercyclical fiscal policies, especially in Europe —see Melitz (2000), and Galí and Perotti (2003). As documented by the estimation of their monetary policy rules, central banks of advanced countries also tend to implement countercyclical policies; e.g., Lubik and Schorfheide (2007), Sack and Wieland (2007). Recently, most OECD countries delivered a strong countercyclical policy response to the 2008-2009 global financial crisis by lowering interest rates, implementing unorthodox monetary and credit easing measures, and deploying fiscal stimulus packages (IMF, 2009; OECD, 2009). However, the cyclical stance of macroeconomic policies in developing countries is more disputed. Earlier research suggests that monetary and fiscal policies in developing countries —and, especially, in Latin America— are predominantly procyclical.[1] Procyclical policies are conducted by governments that cut taxes and increase spending, and by central banks that relax monetary policy during booms while adopting contractionary policies during busts. What drives this (potentially) destabilizing behavior?

[1] See Hausmann and Stein (1996), Gavin and Perotti (1997a), Kaminsky *et al.* (2004), Talvi and Végh (2005), Ilzetzki and Végh (2008).

This paper argues that policy-makers are more likely to stabilize business cycle fluctuations in countries with stronger institutions.[2] Strictly speaking, we argue that there is a robust statistical association between institutional quality and the cyclicality of macroeconomic policies, which might be interpreted as a causality link in the light of existing theoretical models that are reviewed below. Our conjecture is that countries with weak institutions are unable or unwilling to pursue countercyclical policies.[3] Put differently, we anticipate that countries with strong institutions will implement contractionary policies during booms and expansionary policies during recessions. We test this hypothesis using a large panel dataset of up to 112 countries with 25 years of annual data.

This paper expands previous empirical work focused mainly on fiscal policy. Here we examine symmetrically the cyclical properties of both monetary and fiscal policy. Monetary and fiscal policy reaction functions in this paper are extensions of standard policy rules found in the literature on Taylor rules (Taylor, 1993a, b; 1995; 2000), fiscal policy rules (Taylor 2000; Braun, 2001; Lane, 2003) or both (Taylor, 2000; Chadha and Nolan 2007). We extend standard rules by including the interaction between the business cycle and the strength of the institutional framework. Our main focus is on a broad measure of institutional quality as a key determinant of policymakers' ability and willingness to adopt countercyclical fiscal and monetary policies. Therefore, this paper complements and improves upon previous work about

[2] In several developing economies, such as Chile, Korea, Malaysia, and Thailand, expansionary policies were adopted during 2001-2003, a period of cyclical weakness in these economies. More recently, Brazil, Chile, China, India, Korea, and Mexico were among many developing countries that adopted expansionary policies in response to the 2008-2009 global financial crisis and subsequent domestic cyclical weakness.

[3] By unwillingness we refer to the case in which policymakers do not have sufficient incentives to pursue certain policies, even when they are able to do so.

the role of policy credibility (as proxied by the risk premium on sovereign debt) in the cyclical stance of macroeconomic policies for a smaller set of developing countries; see Calderón and Schmidt-Hebbel (2003) and Calderón, Duncan, and Schmidt-Hebbel (2004).

Our empirical assessment is conducted for a sample comprised by 84 emerging and developing countries and 31 developed countries. We use 1984-2007 data from 84 countries for our monetary policy regressions and 1984-2008 data from 112 countries for our fiscal policy regressions. This implies exploiting large panel samples that range from 1084 to 1933 country-year observations. We perform analyses to examine the robustness of our findings to alternative measures of dependent and explanatory variables and to different country samples (with or without developed countries).

Among the main findings are the following: (i) there is a robust relationship between macroeconomic policy stance, business cycle conditions, and the strength of the institutional framework. (ii) Countries with strong institutions are able and willing to implement countercyclical monetary and fiscal policies. Procyclicality is the norm in countries with weak institutions. (iii) Approximately 23% of the countries in our sample have in place an institutional framework that is strong enough to induce countercyclical monetary policy, while 43% of the countries show institutional quality levels that induce them to follow countercyclical fiscal policies.

The paper is organized as follows. Section II presents a brief literature review. Then we describe the data used in our analysis and present some stylized facts about the cross-country relations between policy cyclicality and institutional quality. Section

IV presents an empirical approximation to the augmented monetary and fiscal policy rules and discusses our empirical strategy to assess the relationship between the quality of institutions and the cyclical stance of macroeconomic policies. Our empirical results are reported in Section V. Section VI concludes.

II. Literature review

The literature argues that the inability and unwillingness to adopt countercyclical policies can be attributed to the lack of access to funding or political-economy considerations. Regarding fiscal policy, the ability to implement countercyclical policies is arguably hampered by external borrowing constraints (Gavin and Perotti, 1997b; Calvo and Reinhart, 2000), shallow domestic financial systems (Riascos and Végh, 2003), and lack of financial integration (Yakhin, 2008).

Theoretically, a country's institutional framework plays a crucial role in the design of macroeconomic policies. Common pool problems, political fragmentation, and agency problems tend to affect the fiscal authority's decision-making process (Velasco, 1998; Tornell and Lane, 1999; Perotti and Kontopoulos, 2002). Therefore, the inability to rein in fiscal spending in good times is more likely to be observed in countries with weak institutions, including widespread corruption, lack of enforcement of investor property rights, repudiation of contracts, and predominance of political institutions that do not constrain their politicians (Acemoglu *et al.,* 2003). As a result, fiscal policies tend to be procyclical in countries where political systems have multiple fiscal veto points (Braun, 2001; Talvi and Végh, 2005). Moreover, rent-extracting or corrupt governments that appropriate revenues to serve special

interests —instead of public welfare— exhibit a procyclical policy bias (Alesina *et al.*, 2008; Ilzetzki, 2011). These papers' empirical findings suggest that less corrupt governments are more able and willing to implement countercyclical policies.

Alesina *et al.* (2008) propose a model in which voters do not trust corrupt governments with resources. They can observe the state of the economy but not the rents appropriated by corrupt governments. When they observe a boom, voters optimally demand more public goods ('starve the Leviathan') and this induces a procyclical bias in fiscal policy. Put differently, countries with corrupt institutions or a political environment susceptible to corrupt practices might lead to a procyclical fiscal policy.

According to the model proposed by Ilzetzki (2011), if the political structure is polarized, the incumbent government will not have incentives to save resources as its successor will not necessarily respond to the same constituency. Fiscal savings from the incumbent government may benefit a different political faction. Rent-seeking behavior for the benefit of its own constituency will lead the government to save less and spend more when more tax revenue is available, thus making fiscal policy procyclical. This is the case in which political considerations jointly with rent-seeking behavior or corruption lead to procyclical fiscal policy.

Monetary policy is also expected to behave procyclically in countries with weak institutions (Duncan, 2014). In a New Keynesian environment with foreign investors facing the probability of partial confiscation, lower external liabilities are the result of weaker institutions. This affects the transmission of shocks in the economy. Adverse external demand shocks lead to currency depreciation and inflation. Therefore, price

stabilization requires the central bank to respond by raising the policy rate and adopting a procyclical policy stance. In countries with better institutions, adverse external demand shocks cause disinflation. In the latter countries, central banks adopt countercyclical policy actions by lowering their policy rates.[4]

III. Data and stylized facts

This section describes briefly the definition and sources of the data used in our empirical analysis. Then, prior to our econometric assessment, we report some stylized facts on the relationship between macroeconomic policies and institutions found in the world sample. A more detailed description of data sources and definitions is provided in Appendix A.

We have collected annual data on monetary and fiscal policy indicators, real output, and institutions for a world sample of industrial and developing countries. The sample is restricted to countries with available, reliable data for at least ten consecutive years. Thus, the sample is comprised by: (i) 84 countries for 1984-2007 in our monetary policy regressions, and (ii) 112 countries for 1984-2008 in our fiscal policy regressions.[5]

Our country sample for the estimation of the monetary policy reaction function is significantly smaller due to the fact that we exclude those country-year observations where an independent monetary policy is not possible—that is,

[4] Weak institutions could also affect the choice of monetary and exchange-rate regimes. Huang and Wei (2006) show that the credibility effect associated with hard pegs (e.g., currency board arrangement or full dollarization) may not work in countries with weak institutions.

[5] For the monetary (fiscal) policy equation, the country distribution is 30 (24) industrial and 54 (88) developing countries. In a supplementary appendix available on the journal webpage, we report the list of countries used at least once in our two sets of regressions.

countries that have adopted hard pegs. According to Ilzetzki *et al.* (2009), hard-peg regimes include full-fledged dollarization (e.g., Ecuador, El Salvador, and Panama) and currency boards (e.g., Estonia and Hong Kong). In the same spirit of Kaminsky *et al.* (2004), we still include country-year observations with soft pegs since a certain degree of monetary independence is observed as long as there is imperfect substitution between domestic and foreign currencies.

This paper uses the interest rate relevant for monetary policy decisions (i.e. the reference or policy rate) as our indicator for monetary policy. We use the central bank's discount rate for most countries and, if unavailable, we use the money market or interbank rate. The dependent variable in our monetary policy regression equation is the cyclical component of the policy rate —as defined by the deviation from trend of the (natural log of the) gross nominal interest rate. Our fiscal policy indicator is real government expenditure —as suggested by Kaminsky *et al.* (2004).[6] The dependent variable in the fiscal policy regression equation is the cyclical component of real government expenditure —as defined by the trend deviation of (the natural log of) real public expenditure.

Real output is measured by real GDP (in local currency at constant prices) and its cyclical component —the output gap— is defined as the trend deviation of (the natural log of) real GDP. Domestic inflation is computed as the trend deviation of (the natural log of) the consumer price index (CPI). The long-run trend paths for all relevant variables are obtained by detrending the corresponding series using either

[6] Considering that the automatic stabilizing component of government revenue (taxes) is much more significant than that of government expenditure, we follow the latter authors in using government expenditure as a better indicator of discretionary fiscal policy than the government surplus.

the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997) or the Band-Pass (BP) filter (Baxter and King, 1999).

Institutional quality is measured by the International Country Risk Guide (ICRG) political risk index from the Political Risk Services (PRS) Group. The ICRG index, available for our full sample period, considers a wide array of institutional features. Corruption is one of these features and it is used as a political-economy determinant of fiscal procyclicality in recent research (Alesina *et al.,* 2008; Ilzetzki, 2011). The aggregate ICRG index is the sum of 12 partial measures of institutional quality (points for each ICRG component are reported in parenthesis): (a) Government Stability (with a maximum of 12 points), (b) Socioeconomic Conditions (12 points), (c) Investment Profile (12 points), (d) Internal Conflict (12 points), (e) External Conflict (12 points), (f) Corruption (6 points), (g) Military in Politics (6 points), (h) Religious Tensions (6 points), (i) Law and Order (6 points), (j) Ethnic Tensions (6 points), (k) Democratic Accountability (6 points), and (l) Bureaucracy Quality (4 points). Therefore, the aggregate ICRG index ranges from 0 (lowest level of institutional quality) to 100 (highest level).

In the supplementary appendix we report summary statistics for each country's ICRG index. The full panel's sample average is 65.8 points, a value close to the time-series sample mean of Brazil (65.9), China (66.0), Mongolia (66.1), and Uruguay (67.7). The highest country-year score of institutional quality is 97 (Switzerland, 1984) and the lowest is 21.8 (Ethiopia, 1992).

We depict the unconditional cross-country relationship between the cyclical behavior of macroeconomic policies and the quality of institutions in Figures 1 and 2.

More precisely, these figures show country observations for each country's sample correlation between the cyclical stance of macroeconomic policy and the output gap (on the vertical axis) and the country's sample average of its ICRG institutional index (on the horizontal axis). Figure 1 shows the statistically significant link between the degree of cyclicality of monetary policy —the correlation between the cyclical stance of monetary policy (measured by the interest rate deviation from its long-run value) and the output gap— and the average quality of institutions measured by the ICRG Index.[7] This figure shows that there is a positive link between countries with stronger institutions (higher average ICRG index) and their ability and willingness to perform countercyclical monetary policy (higher correlation between the interest rate deviation and the output gap). Figure 2 illustrates a similar link between the degree of fiscal policy cyclicality and institutional quality in our cross-country sample. This relationship is also statistically significant. The correlation between the cyclical component of government spending and the output gap tends to fall as the quality of institutions rises. Therefore, the ability and willingness of governments to use spending as a countercyclical fiscal tool is positively correlated with the quality of institutions.

In sum, our cross-country scatter plots provide preliminary suggestive evidence in support of our hypotheses. However, the unconditional correlations do not represent conclusive evidence due to the potential omission of relevant variables

[7] This is the correlation for the full sample period covering 1984-2007. In Figure 2, the correlation reported is for the period 1984-2008. The output gap is the cyclical component of actual output obtained from detrended real GDP based on the HP filter. Newey-West HAC corrected standard errors and p-values are reported below each coefficient value in Figures 1 and 2.

that can only be addressed in a full multivariate specification subject to formal testing. This is our next task.

IV. Model and empirical strategy

This section introduces the empirical model and the strategy to test for the cyclical properties of monetary and fiscal policies in the panel dataset of 112 countries over the period 1984-2008. Monetary policy is specified as an extension of a standard policy or Taylor rule. Fiscal policy follows a similar extended-rule specification but omitting the inflation deviation term.[8]

Regarding our main hypothesis, we introduce an interaction term between the business-cycle variable (the output gap) and the measure of institutional quality in both policy equations. At high levels of institutional quality (i.e., higher values of the ICRG index), we expect fiscal and monetary policy to be countercyclical. Therefore, we specify the following structural equations for the cyclical stance of monetary and fiscal policy:

$$\tilde{r}_{i,t} = \alpha_i + \alpha_{rt} + \alpha_1 \tilde{r}_{i,t-1} + \alpha_2 \tilde{\pi}_{i,t} + \alpha_3 \tilde{y}_{i,t} + \alpha_4 \tilde{y}_{i,t} Q_{i,t} + u_{i,t} \quad (1)$$

$$\tilde{g}_{i,t} = \beta_i + \beta_{gt} + \beta_1 \tilde{g}_{i,t-1} + \beta_2 \tilde{y}_{i,t} + \beta_3 \tilde{y}_{i,t} Q_{i,t} + v_{i,t} \quad (2)$$

where $\tilde{r}$ is the deviation from trend of the nominal interest rate, $\tilde{\pi}$ is the deviation of domestic inflation from its trend path,[9] $\tilde{y}$ is the real output gap or business cycle

[8] A standard fiscal policy function that omits inflation is found, for example, in Taylor (2000).

[9] One may argue that expected inflation rather than the current inflation rate should be included as a regressor. To rationalize the inclusion of the latter, we can assume a standard New Keynesian Phillips curve where the current inflation rate depends on expected inflation and the output gap. Using this expression, we can reformulate the interest policy rule as a function of current inflation, the output gap,

measure (as defined by the deviation of real GDP from its trend path), $\widetilde{g}$ is the deviation of real government spending from its trend path, Q is the ICRG index that captures institutional quality, α_i and β_i are fixed effects, and α_{rt} and β_{gt} are time effects. The terms u and v are stochastic disturbances and subscripts i and t denote the country and the time period, respectively.

Regarding our control variables, we expect the coefficients of the lagged dependent variables, α_1 and β_1, to lie between 0 and 1, and α_2 to be positive.

We reported in section II unconditional estimates of cross-country correlations between policy cyclicality and the quality of institutions, shown in Figures 1 and 2. The model introduced in this section allows for estimation of conditional measures of policy cyclicality in full panel samples. Such conditional measures are the coefficient estimates that reflect our main hypothesis. The coefficients α_3 and α_4 in the monetary policy function (see equation 1) should be negative and positive, respectively, and statistically significant. At high (low) levels of institutional quality —a high (low) value of the ICRG index— we anticipate monetary policy to be counter (pro) cyclical. For the fiscal policy reaction function, β_2 and β_3 should be positive and negative, respectively, and statistically significant. At high (low) levels of quality of institutions, we expect fiscal policy to be counter (pro) cyclical.

The specification also allows for calculation of the threshold level of institutional quality that is associated with an acyclical policy stance —*i.e.*, a threshold level at which policy is neither counter nor procyclical.[10] The threshold level is

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and parameters that depend on the coefficients of both the original rule and the Phillips curve.

[10] If α_3 and α_4 are not statistically significant we can also conclude that monetary policy is not only acyclical but also unresponsive to changes in the level of institutional quality. A similar argument

obtained simply by dividing the negative of the output gap coefficient by the interaction term coefficient, a result of setting the partial derivative of the policy instrument with respect to the output gap to zero. In the case of monetary policy equation (1), the institutional quality threshold value, Q_m^*, is given by the following condition:

$$\frac{\partial \widetilde{r}_{i,t}}{\partial \widetilde{y}_{i,t}} = \alpha_3 + \alpha_4 Q_m^* = 0 \qquad (3)$$

Our estimate of Q_m^* is the threshold value of institutional quality beyond which countries adopt countercyclical monetary policies; otherwise they would engage in procyclical policies. It is straightforward to infer the cyclical position of monetary policy, dependent on the observed level of the institutional quality index Q, from the latter expression:

$$\begin{aligned}
&if \quad Q > Q_m^* \equiv -\frac{\alpha_3}{\alpha_4} \quad \Rightarrow \quad \frac{\partial \widetilde{r}_{i,t}}{\partial \widetilde{y}_{i,t}} > 0 \quad \Rightarrow \quad countercyc\,lical \;\; policy \\
&if \quad Q < Q_m^* \equiv -\frac{\alpha_3}{\alpha_4} \quad \Rightarrow \quad \frac{\partial \widetilde{r}_{i,t}}{\partial \widetilde{y}_{i,t}} < 0 \quad \Rightarrow \quad procyclica\,l \;\; policy \qquad (4) \\
&if \quad Q = Q_m^* \equiv -\frac{\alpha_3}{\alpha_4} \quad \Rightarrow \quad \frac{\partial \widetilde{r}_{i,t}}{\partial \widetilde{y}_{i,t}} = 0 \quad \Rightarrow \quad acyclical \;\; policy
\end{aligned}$$

As shown in equation (3), Q_m^* is determined by the coefficient estimates of our monetary policy equation. Therefore, the latter estimates —and hence Q_m^*— are sample-specific. Below we will compare the difference between our Q_m^* estimates and actual country Q levels in order to reveal the cyclical properties of macroeconomic

applies to β_2 and β_3.

policies for specific countries of our sample. We will derive an analogous threshold level Q_f^* from the coefficient estimates of equation (2) for fiscal policy.[11]

Note that we expect $\alpha_3<0$ and $\alpha_4>0$. Otherwise we would obtain the unrealistic case of a negative Q_m^* if both parameters have the same sign, or the counterintuitive case in which higher Q implies procyclical policies if $\alpha_3>0$ and $\alpha_4<0$. A similar reasoning applies to the signs of β_2 and β_3.

We use the Generalized Method of Moments (GMM) estimator with fixed and time effects for dynamic panel data. Our fixed effects models include explanatory variables that are instrumented without the first-differencing step used in Arellano and Bond (1991). This prevents the additional endogeneity problem introduced by first differencing. This simple fixed effects approach is justified because the asymptotic bias in first-order autoregressive models declines with the length of the panel, as shown by Nickell (1981). In addition to fixed effects, we include a full set of time dummies. Even though our rules include the main policy variables, it is sensible to consider time effects to capture common shocks to countries' macroeconomic variables and policy instruments.

We use lags of the dependent variable and the regressors as instruments for each policy equation. To check the validity of the moment conditions specified by our GMM estimator, we perform the Hansen test of overidentifying restrictions. If we fail

[11] It can be argued that institutional quality could also affect how monetary authorities respond to inflation. However, we are unable to find a theoretical model that relates institutional quality and the monetary policy response to inflation. Nonetheless, we estimated regressions where institutional quality interacts with trend deviations of inflation and currency depreciation. However, the results were not statistically significant and the overidentification tests did not validate them. The latter set of regressions is not reported but is available from the authors upon request.

to reject the overidentifying restrictions, we verify a necessary condition for the validity of our specified regression model.

We test the sensitivity of our results by performing alternative estimations along the following dimensions. First, we use alternative measures for our dependent variable in the monetary policy and fiscal policy equations. We derive two different measures for the policy deviations from their corresponding trend paths. The first measure is based on the deviation of the interest rate (or government spending) from its stochastic trend obtained by using the HP filter, while the second is derived by applying the BP filter.

Second, we rerun our regressions for the sample of developing countries, namely, emerging markets and less developed economies (see Appendix A for the country list and source of country classification).

Third, we investigate more deeply the channels of transmission through which institutional quality affects the conduct of macroeconomic policy over the cycle. More specifically, we examine the sensitivity of our results to a subset of components of the overall ICRG index. Given that the overall ICRG index is a statistically robust variable to explain policy cyclicality, as reported in the next section, we proceed to test for different combinations of ICRG subindexes, following a similar grouping criterion as in Bekaert *et al.* (2007).[12] We find that the subindex that comprises information on government stability, investment profile, corruption, law and order, and bureaucracy

[12] Along the lines of Bekaert *et al.* (2007), we grouped the ICRG components in four subindexes that emphasize: (1) quality of institutions (government stability, investment profile, corruption, law and order, and bureaucracy quality), (2) socioeconomic conditions (socioeconomic conditions), (3) conflicts (internal conflict, external conflict, religious tensions, ethnic tensions), and (4) political conditions (military in politics and democratic accountability). The only difference with respect to Bekaert *et al.* (2007) is that we include government stability and investment profile in the first sub-index so that socio-economic conditions coincide with the ICRG component with the same name.

quality, and takes values between 0 and 40, is the most appropriate for our regression analysis discussed in the next section.[13]

IV. Results

This section reports estimation results for our monetary and fiscal policy equations for the world sample of industrial and developing countries for the period 1984-2008. We use the regression results for calculating the threshold values of institutional quality at which policies are acyclical —which we will call 'acyclical-policy-index value' (Q_m^* and Q_f^* in our methodological discussion)— and depict the conditional relationship between macroeconomic policy cyclicality and institutional quality.

Monetary policy cyclicality and institutional quality

Table 1 reports the estimation results for our monetary policy reaction function. Our baseline result is presented in column [1], based on our full sample, using the aggregate ICRG Index, and applying the HP filter as detrending method. [14] We report the sensitivity of our estimated regression to the detrending method by reporting results based on the alternative BP filter (column [2]). In column [3] we report results for a subsample of developing countries and in column [4] we report results for an ICRG subindex. The coefficient estimates of the monetary policy function display

[13] We also tested the sensitivity of our results to different sets of instrumental variables, the inclusion of currency depreciation, and the use of a first-difference filter. The main conclusions remained unaltered. This set of regressions is not reported in the current version but is available from the authors upon request.

[14] The HP filter is widely used in the estimation of policy rules (e.g., see Moura and Carvalho (2010) and Reicher (2012)). More importantly, our HP filter estimates are preferred to those using the Band-Pass filter because the former are based on a larger sample and the coefficients for certain regressors are more precisely estimated.

expected signs and are statistically significant at standard levels. The Hansen test statistic confirms that the specification cannot be rejected at conventional levels of significance.

Now we focus our discussion on the baseline results of column [1] based on the largest country sample, the aggregate measure of institutional quality, and HP-filter detrending. The coefficient estimate for detrended inflation is 0.52, which reflects the contemporaneous response of the (detrended) monetary policy rate to a one-percentage point rise in (detrended) inflation.

In line with the key hypothesis of this paper, our GMM results yield a negative and significant coefficient for the output gap (our proxy for business-cycle conditions), and a positive and significant estimate for the interaction between output gap and institutional quality. These results imply that monetary policy is significantly countercyclical in countries that exhibit high levels of institutional quality, while it is procyclical where institutions exhibit low quality. The sign pattern of the estimates enables us to calculate the threshold level at which monetary policy is acyclical (Q_m^*). Our point estimates imply that Q_m^* is 67.2 points, with a 95% confidence interval between 58.4 and 76.0 points (see column [1] of Table 1). Note that when using the BP filter, our GMM estimate (Table 1, column [2]) provides a slightly higher estimate of Q_m^* (67.7 points) and a narrower confidence interval (between 61.0 and 74.5 points).

We identify countries with acyclical policies as those whose level of institutional quality falls in a range defined by the 95% confidence interval of the estimated Q_m^* threshold —that is, [58, 76]. We find that 43% of the sample countries (49 out of 115) exhibit an average 1984-2007 score of institutional quality that falls

within the 95% confidence interval of our estimated Q_m^*. Countries with levels of institutional quality that are higher (lower) than the upper (lower) bound of the interval tend to conduct counter (pro) cyclical monetary policies. Using the mean values of the ICRG political risk index over the period 1984-2008 (see the supplementary appendix), approximately 27 countries exhibit institutional quality levels above the upper limit of the confidence interval, that is, close to 23% of our 115-country sample. Almost all these countries are developed economies —for example, advanced small open economies such as Singapore (82.7), Australia (83.8), Canada (84.6), New Zealand (86.3), Sweden (86.8), and Norway (86.9)— and Eastern European nations, including the Slovak Republic (77.0) and the Czech Republic (79.0). On the other hand, 39 countries (approximately 34% of our sample) exhibit institutional quality levels below the lower limit of the confidence interval. This group of countries includes low-income countries from Sub-Saharan Africa and Asia, and middle-income countries from Latin America —for example, Ethiopia (44.7), Pakistan (45.4), Uganda (48.8), Indonesia (52.2), Honduras (52.8), Guatemala (54.0), India (55.2), and Bolivia (55.7).

Note that the average ICRG level for our sample increased from 62.2 in 1984-1996 to 70.2 in 1997-2008. Over the last 25 years, some middle-income countries experienced a remarkable improvement in their level of institutional quality. For example, Chile's ICRG index rose from 46 points in 1984 to 79 points in 2008. Large increases over the last quarter century were also experienced in Peru (from 43 to 63), the Philippines (from 39 to 61), and Poland (from 48 to 80). Hence, identifying the countries that are unable or unwilling to conduct countercyclical policies using their

average values over the period 1984-2008 may underestimate the current ability or willingness of countries that have made significant institutional progress. However, our regression results reflect both policy differences across countries and policy changes over time.

When restricting our monetary policy regression to the subsample comprised by developing countries —results reported in column [3] of Table 1— we find again that higher inflation (as proxied by higher deviations of the inflation rate from trend) leads to a hike in the monetary policy rate. Regarding our variable of interest, the output gap enters with a negative and significant coefficient in our regression and the interaction term between the output gap and institutional quality is positive and significant. This result is consistent with that of the full sample and with our hypothesis that developing countries with strong institutions are more likely to conduct countercyclical monetary policy. About 14% of the sample of developing countries shows average ICRG levels above the upper limit of the confidence interval ([56.2 67.4]). That group includes Mexico (69.5), Chile (69.2), Costa Rica (71.8), Croatia (72.2), Poland (70.4), and Uruguay (67.7), among others. Note that even though the point estimate of the threshold level for institutions (Q_m^*) in developing countries, at about 62 points, is lower than the corresponding estimate for the full sample, this point estimate lies within the 95% confidence interval for the full sample ([58.4, 76]).

Next, we examine which aspects of the institutional environment seem most important in determining whether countries adopt countercyclical policies. Since the overall ICRG index is a useful variable to explain monetary policy cyclicality, we tested

for different combinations of ICRG components, similar to those proposed by Bekaert *et al.* (2007) (see footnote 13). In general, however, they do not provide statistically significant estimates with expected signs, or are rejected by Hansen tests of over-identifying restrictions. The exception is a subindex that comprises information on government stability, investment profile, corruption, law and order, and bureaucracy quality. As discussed below, this subindex is also useful to understand the cyclicality of fiscal policies in our study.[15] Hence, we replace the ICRG index (that fluctuates between 0 and 100 points) by the latter subindex (which ranges from 0 to 40 by construction). We find statistically significant estimates that show the expected signs (Table 1, column [4]). These results are consistent with the prior of this paper: central banks are more able and willing to implement countercyclical monetary policies in countries with high-quality institutions. The point estimate of the threshold value of the subindex is 28.8 points, and our regression results yield a 95% confidence interval for the threshold value, ranging from 21.1 to 36.6 points. Alternatively, a 90% confidence interval ranges from 23 to 35. If we use the latter interval, we have very few developing countries (Hungary and Poland) that show values of the ICRG subindex above the upper limit and, hence, were able and willing to conduct countercyclical monetary policy.

We interpret the statistical significance of the subindex as an indication that certain institutions included in the overall ICRG are not relevant in determining cyclicality of monetary policy in many countries that are part of our full sample. It is reasonable to think that for a group of democratic countries that enjoyed

[15] Coincidentally, our subindex is very similar to one recently used by Frankel *et al.* (2013) to explain cyclicality of fiscal policy. They use an index with the same components except government stability.

socioeconomic stability and peace during our period of analysis, institutions related to, for instance, internal or external conflicts, the role of the military in politics, and religious or ethnic tensions —which are overall ICRG components that are omitted from our ICRG subindex— are largely irrelevant for their conduct of monetary policy.

An alternative interpretation of our findings is that institutional quality and macroeconomic policy activism are both determined by a third factor. Although we cannot rule out that possibility, our findings are consistent with predictions of the theoretical models. That is, a causal interpretation of our results does not appear to be implausible. A possible transmission mechanism from institutions to procyclicality of monetary policy is explained in the model proposed by Duncan (2014). Here institutional quality affects the transmission of external demand shocks to the domestic economy. Countries with weaker institutions (e.g., government instability, unfavorable investment climate, corruption, low bureaucratic quality, and lack of respect for the rule of law) tend to attract less foreign financial investment and hence record lower levels of external liabilities. In such countries, adverse external demand shocks lead to currency depreciation and higher inflation. The central bank raises the policy rate to stabilize inflation, thus adopting a procyclical policy stance. In countries with stronger institutions and, therefore, higher external liabilities, another channel dominates. The currency depreciation generates a significant wealth effect that lowers wages and inflation. Inflation stabilization then requires the central bank to adopt a countercyclical stance, reducing its policy rate.[16] As countries improve their

[16] In this model the central bank has a loss function over stabilization of inflation and output but the bank does not face any constraint to adopt a pro or countercyclical policy stance. Although the central bank is able to adopt a countercyclical policy under weak institutions, it is unwilling to do so because it prefers to stabilize inflation when external demand shocks hit the economy.

institutional quality, the transmission of external demand shocks changes and their effects on inflation and output then have the same direction. In this case the central bank is more likely to pursue countercyclical policy.

Fiscal policy cyclicality and institutional quality

Table 2 summarizes the regression results for our fiscal policy specification. As in the case of the monetary policy equation, we estimate the fiscal policy function using different methods to detrend our variables (HP and BP filters), and different samples and institutional quality indexes. The Hansen test verifies that the specification cannot be statistically rejected. Coefficient estimates display expected signs and are statistically significant at standard levels.

As in the case of our monetary policy function, the fiscal policy regression results confirm strongly the existence of a significant relation between the fiscal policy stance, the output gap, and the interaction between output gap and institutional quality. Table 2 shows that fiscal policy is robustly countercyclical in countries that display high levels of institutional quality, while it is procyclical in countries with low-quality institutions. This result is reflected by a positive and significant estimate for the output gap and a negative and significant coefficient for the interaction between output gap and institutional quality.

Our baseline result is presented in column [1], based on our full sample, using the aggregate ICRG Index, and applying the HP filter as detrending method. The point estimate of Q_f^* is 64.7 (column [1], Table 2). Our estimates provide a 95% confidence interval for Q_f^* that ranges from 62.5 to 66.9 points for the ICRG index. Note that when

using the BP filter, our GMM estimate (column [2], Table 2) provides a very similar estimate of Q_f^* (64.6 points).

Using the mean values of institutional quality over the period 1984-2008 (reported in the supplementary appendix), we find that 13 countries fall within the 95% confidence interval for our estimated Q_f^*. Those countries are Bahrain, Brazil, China, El Salvador, Mongolia, Qatar, Romania, Saudi Arabia, South Africa, Thailand, Trinidad and Tobago, Tunisia, and Vietnam. On the other hand, 46% of our sample (53 out of 115 countries) exhibit institutional quality index averages below the estimated lower limit of the confidence interval —for instance, Haiti (45.6), Sri Lanka (49.5), Colombia (56), Egypt (57.5), Venezuela (61), and the Russian Federation (61.5). On the other hand, 43% of the countries in our sample have an average level of institutional quality above the upper limit of the confidence interval. That group of nations includes many industrial economies but also some dynamic middle-income countries such as Chile (69.2), Poland (70.4), Malaysia (71.3), South Korea (72.2), and Singapore (82.7), among others.

As in our empirical analysis of monetary policy, our baseline findings on fiscal policy are confirmed by the regression results based on the alternative cyclical measures based on the BP filter (Table 2, column [2]). Then we analyze fiscal policy in our subsample of developing economies (column [3]). We find that the inference on the cyclicality of fiscal policy for the full sample of countries holds for the group of developing countries, too. The coefficient estimate for the output gap is positive and significant while that of the interaction between the output gap and institutional quality is negative and significant. That is, government spending tends to be

countercyclical in countries with stronger institutions. The point estimate of Q_f^* is 62.7 points (column [3], Table 2), which is two points lower than that obtained for the full country sample. The Q_f^* value for developing economies lies within the 95% confidence interval for the full sample ([62.5, 66.9]). We also note that the Q_f^* estimated for fiscal policy in developing economies is very close to the Q_m^* estimated for monetary policy in the same group of countries (61.8 compared to 62.7).

An investigation of the specific dimensions of institutional quality that matter for fiscal policy cyclicality shows that the estimates hold when replacing the overall ICRG index by the subindex introduced in the previous section on monetary policy. The results (column [4]) confirm that fiscal policy is conducted countercyclically in countries with strong institutions. The point estimate of Q_f^* is approximately 31 points. This threshold estimate is approximately two points above the one obtained for monetary policy and lies within the 95% confidence interval estimated for monetary policy (column [4], Table 1).

Once again, we could interpret our findings as either an interesting statistical association produced by a third factor or as evidence consistent with a causal relationship. It can be argued, for example, that domestic political conditions could change and generate improvements in both institutional indexes and macroeconomic policy quality. While such an interpretation is possible, our findings are consistent with the predictions of some theoretical models. As noted in Section II, Alesina *et al.* (2008) and Ilzetzki (2011) propose transmission mechanisms from institutions to the procyclicality of fiscal policy.

In sum, the statistical significance of our subindex may reflect a wide variety of institutions that are mainly related to corruption or rent-seeking, and the environment that favors them, leading to procyclical fiscal policy through the mechanisms discussed above.

Macroeconomic Policy Cyclicality and the Quality of Institutions

We note that the point estimates of the threshold values (Q_f^*) obtained from our GMM fiscal policy estimations based on the HP and BP filters are close to 65 points (see columns [1]-[2], Table 2), about 2 to 3 points lower than those derived from our monetary policy estimations based on the same filters (columns [1]-[2], Table 1), which are close to 67 points. Therefore, institutional quality could be a constraint or an important determinant of the optimal response for both fiscal and monetary policies. Approximately 27 countries (23% of the sample) exhibit an institutional quality level that is higher than the upper limit of the largest estimated threshold confidence interval (76 points). These countries are in the top quartile of the sample distribution of institutional quality over the period 1984-2008.

Figures 3 and 4 illustrate the response of the cyclical degree of macroeconomic policies to institutional quality, conditional on the influence of other determinants included in the policy equations. Mathematically, the cyclical degrees of monetary and fiscal policy are given by expressions $\partial\tilde{r}/\partial\tilde{y} = \hat{\alpha}_3 + \hat{\alpha}_4 Q$ and $\partial\tilde{g}/\partial\tilde{y} = \hat{\beta}_2 + \hat{\beta}_3 Q$. Using the GMM results reported in tables 1 and 2, we plot the response of macroeconomic policies to the output gap (vertical axis) at different levels of Q proxied by the ICRG index (horizontal axis). For a range of the index that spans from the minimum to the

maximum country value (i.e., up to 75 points), we set a grid of levels of institutional quality. Then we calculate the cyclical degree of macroeconomic policies ($\partial\widetilde{r}/\partial\widetilde{y}$ and $\partial\widetilde{g}/\partial\widetilde{y}$) for every value of the grid. The corresponding results are depicted in Figures 3 and 4 for monetary and fiscal policy. As a reference we also include results using the BP filter (column [2], tables 1 and 2). We note three comparative results. First, while the relations between policy cyclicality and institutional quality based on the HP and BP filters differ somewhat for fiscal policy, they are closer for monetary policy (e.g., when Q=53, the first value on the horizontal axis, the difference between HP and BP results is wider for the case of fiscal policy). Second, as noted above, the Q^* threshold level (at which the corresponding schedule crosses the horizontal line that marks an acyclical policy stance in Figures 3 and 4) is close to 67 points for monetary policy (using HP or BP) and about 65 points for fiscal policy.

V. Conclusions

There is ample evidence on the ability of industrial economies to conduct countercyclical fiscal and monetary policies. In contrast, most developing countries are unable or unwilling to implement countercyclical macroeconomic policies. The literature argues that the inability of developing countries to adopt optimal (countercyclical) stabilization policies is attributed to external borrowing constraints, fragile domestic financial systems, high levels of foreign-currency denominated liabilities, interactions between domestic and external financial imperfections, political-economy constraints, weak policy credibility, corruption, and imperfect information about government programs.

This paper complements and improves upon previous evidence on the cyclicality of fiscal and monetary policies for the world at large —and for developing countries separately— by providing robust evidence that shows that macroeconomic policies play a key role in stabilizing business-cycle fluctuations in countries with stronger institutions. This paper extends previous empirical work —mainly conducted on fiscal policy— by focusing symmetrically on the cyclicality of both fiscal and monetary policies. Our specification of the fiscal and monetary policy regression equations is based on an extension of standard policy rules found in the literature, by including an interaction between the output gap and an indicator of institutional development.

The main goal of this paper is to investigate the role of a broad measure of institutional quality —that includes corruption among many other components— as a key determinant of policymakers' ability and willingness to adopt countercyclical fiscal and monetary policies. To accomplish this task we have assembled a large panel data set of up to 112 countries with annual data over a quarter century spanning from 1984 to 2008. We use GMM estimation techniques to examine empirically our null hypothesis. The results support our priors.

The empirical evidence strongly confirms the existence of a significant relationship between the cyclicality of macroeconomic policy and the quality of institutions. Our findings show that both monetary and fiscal policies are significantly countercyclical in countries that exhibit high levels of institutional quality while they tend to be procyclical in countries with weaker institutions. In addition, the threshold levels of institutional quality at which monetary and fiscal policies are acyclical are

similar for both policies. Our preferred regression results show that the threshold value for monetary policy is close to 67 points while the threshold value for fiscal policy is close to 65 points, on a scale of institutional quality that ranges from 0 to 100 points. Approximately 23% of the sample countries exhibit institutional quality levels that induce countercyclical monetary policies, while 43% of the sample countries have in place an institutional framework that is strong enough to induce them to follow countercyclical fiscal policies. The latter country groups are largely comprised by developed economies. In sum, adopting a countercyclical stance in macro policies is closely related to a high degree of institutional development.

By breaking with their past, some emerging-market economies have conducted countercyclical macroeconomic policies during the recent global financial crisis (De La Torre *et al*., 2011). Some countries were able to lower their monetary policy rates and launch fiscal stimulus packages in the midst of the recent crisis. In fact, recent evidence shows that more than one third of developing countries were able to adopt countercyclical fiscal and monetary policies over the last decade (Frankel *et al*., 2013; Végh and Vuletin, 2013). This change in the cyclical stance of their macroeconomic policies reflects improved monetary and fiscal conditions in emerging-market economies —low and stable inflation, primary fiscal surpluses, lower government debt levels and less risky government debt profiles. In turn, the latter improvements reflect the development of stronger institutions that put a premium on autonomy, transparency, and accountability. The stronger credibility of macroeconomic policy frameworks in emerging market economies was rewarded by the markets as sovereign spreads declined notably. In the light of our findings, the change in the

cyclical stance of macroeconomic policies in developing countries could be a reflection of significant improvements in institutional quality that have been implemented in those countries.

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Appendix A

Data and sources

Nominal interest rate ($\tilde{r}$): Cyclical component of the log of the gross nominal central bank discount rate. When the discount rate is not available, money market or interbank rates are used. Source: authors' calculations using data from the International Financial Statistics (IFS), International Monetary Fund (IMF), codes 60 and 60B.

Government spending ($\tilde{g}$): Cyclical component of the log of real government spending. Source: authors' calculations using data from the national accounts, IFS (IMF).

Output gap ($\tilde{y}$): Cyclical component of the log of real GDP. Source: authors' calculations using data from the IFS (IMF).

Inflation rate ($\tilde{\pi}$): Cyclical component of the log of the gross CPI inflation rate. Source: authors' calculations using data from the IFS (IMF).

Cyclical components are obtained from detrending variables using the Hodrick-Prescott (*HP*) filter and the Band-Pass (*BP*) filter due to Baxter and King (1999). We set the smoothing parameter value of the HP filter using the frequency power rule of Ravn and Uhlig (2002).

Institutional quality (Q): Political risk index from the International Country Risk Guide (ICRG). The ICRG index ranges from 0 (the lowest level of institutional quality) to 100 (the highest level) and comprises 12 components: (a) Government Stability (with a maximum of 12 points), (b) Socioeconomic Conditions (12 points), (c) Investment Profile (12 points), (d) Internal Conflict (12 points), (e) External Conflict (12 points), (f) Corruption (6 points), (g) Military in Politics (6 points), (h) Religious Tensions (6 points), (i) Law and Order (6 points), (j) Ethnic Tensions (6 points), (k) Democratic Accountability (6 points), and (l) Bureaucracy Quality (4 points). Source: Political Risk Service (PRS) Group. The ICRG index is reported at monthly frequency; thus we compute the annual average for the corresponding year. In addition, we construct a subindex of institutional quality (Q_1) composed of Government Stability, Investment Profile, Corruption, Law and Order, and Bureaucracy Quality (ranging from 0 to 40).

Country classification: we follow the International Monetary Fund classification (World Economic Outlook, October 2009).

Emerging and developing countries: Albania, Argentina, the Bahamas, Bahrain, Bangladesh, Belarus, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Chile, China, Colombia, Rep. Congo, Costa Rica, Croatia, Dominican Republic, Ecuador,

Egypt, El Salvador, Estonia, Ethiopia, Ghana, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kenya, Kuwait, Latvia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russian Federation, Saudi Arabia, Senegal, Sierra Leone, South Africa, Sri Lanka, Syrian Arab Republic, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Developed countries: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, Rep., Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, United States.

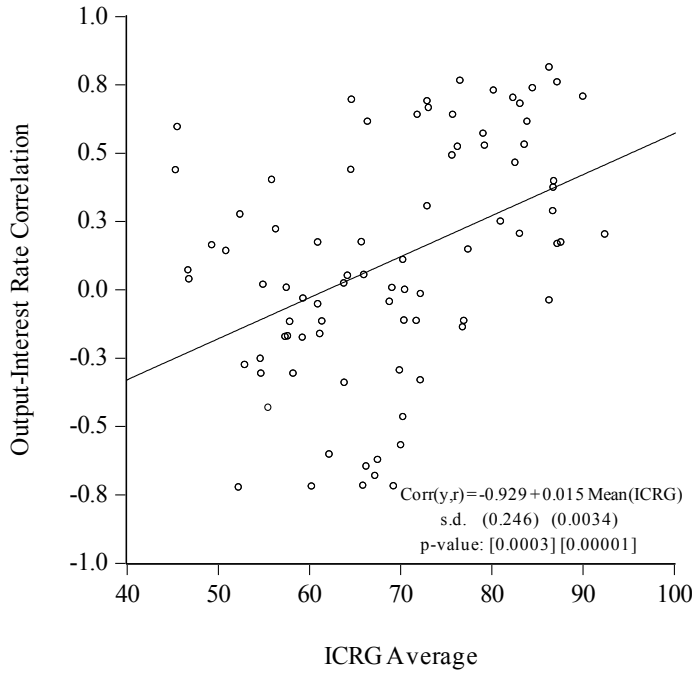

Figure 1. Output - interest rate correlation and ICRG average

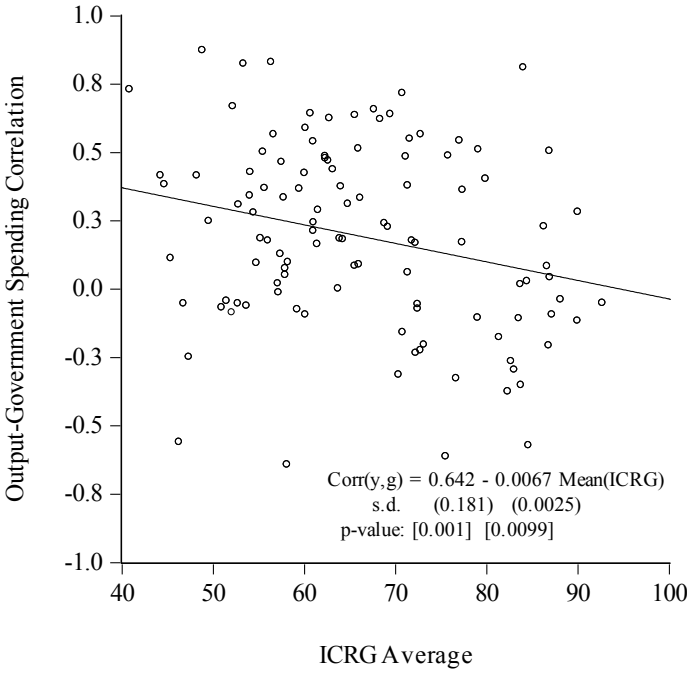

Figure 2. Output - government spending correlation and ICRG average

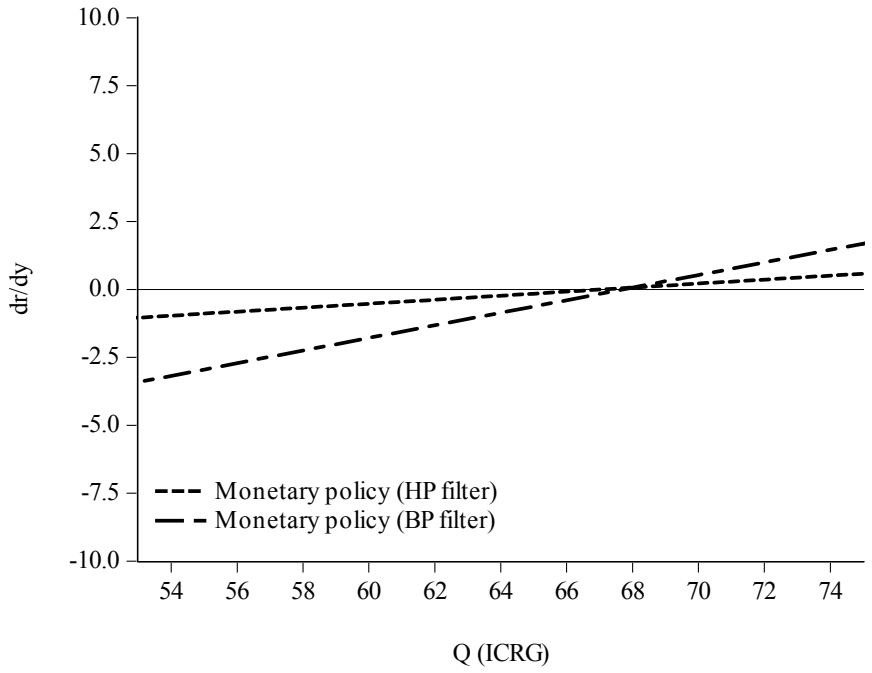

Figure 3. Cyclical behavior of monetary policies (dr/dy as a function of Q, see equation 1)

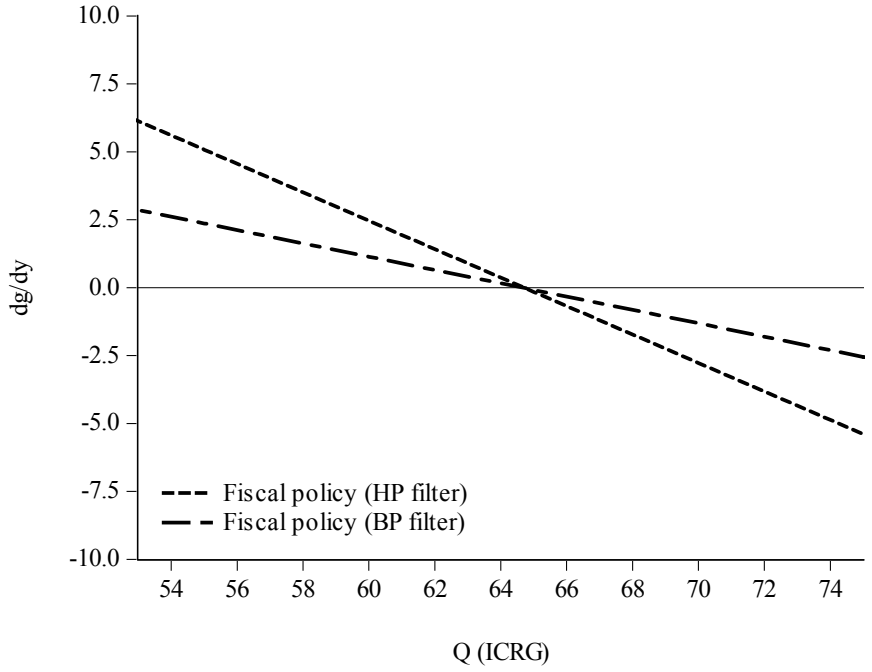

Figure 4. Cyclical behavior of fiscal policies (dg/dy as a function of Q, see equation 2)

TABLE 1

Cyclical degree of monetary policy. Dependent variable: nominal interest rate, deviations from its trend. Sample: 84 countries, 1984-2007 (unbalanced panel)

Regressors	*Full sample ICRG index HP filter [1]*	*Full sample ICRG index BP Fflter [2]*	*Developing countries ICRG index HP filter [3]*	*Full sample subindex BP Fflter [4]*
Lagged dependent variable	-0.349	-0.034	-0.397	-0.671
standard error	0.242	0.133	0.338	0.331
p-value	0.150	0.798	0.241	0.043
Inflation rate, deviations from trend	0.519	0.247	0.665	0.660
standard error	0.166	0.072	0.134	0.238
p-value	0.002	0.001	0.000	0.006
Output gap	-4.953	-15.687	-10.195	-4.498
standard error	1.877	7.245	4.966	1.358
p-value	0.009	0.031	0.041	0.001
Output gap x institutional quality index	0.074	0.232	0.165	...
standard error	0.028	0.110	0.079	...
p-value	0.010	0.035	0.037	...
Output gap x institutional quality subindex	...	...	...	0.156
standard error	...	...	...	0.055
p-value	...	...	...	0.004
Statistics				
Hansen statistic	15.116	5.722	7.271	6.902
(*p-value*)	0.235	0.455	0.401	0.332
N° of observations	1084	1000	644	1077
Cross-sections included	84	84	54	84
Average time span	13	12	12	13
Threshold estimate (Q*m)	67.2	67.7	61.8	28.8
95%-confidence interval	[58.4 76.0]	[61.0 74.5]	[56.2 67.4]	[21.1 36.6]

Notes: GMM estimations were performed including fixed and time effects. White standard errors and covariances were computed. Instrumental variables are sets composed of lagged values of the regressors and Q(t) (see the online supplementary appendix). See main text for the notation of variables. Hodrick-Prescott (HP) and Band-Pass (BP, due to Baxter and King (1999)) filters are used to extract the cyclical components of the dependent variable and regressors (except Q(t)). For the definition of developing country we follow the IMF's classification (World Economic Outlook, 2009). The Subindex is composed of the subindexes of Government Stability, Investment Profile, Corruption, Law and Order, and Bureaucracy Quality (it ranges from 0 to 40). Confidence intervals for the acyclical policy index were computed using analytic derivatives and the delta method.

TABLE 2

Cyclical degree of fiscal policy. Dependent variable: government spending, deviations from its trend. Sample: 112 countries, 1984-2008 (unbalanced panel)

Regressors	*Full sample ICRG index HP filter [1]*	*Full sample ICRG index BP filter [2]*	*Developing countries ICRG index HP filter [3]*	*Full sample subindex BP filter [4]*
Lagged dependent variable	0.837	0.383	0.571	0.352
standard error	0.323	0.118	0.145	0.120
p-value	0.010	0.001	0.000	0.003
Output gap	33.885	15.873	24.348	2.445
standard error	17.000	6.871	11.725	0.818
p-value	0.046	0.021	0.038	0.003
Output gap x institutional quality index	-0.524	-0.246	-0.388	...
standard error	0.264	0.114	0.191	...
p-value	0.047	0.031	0.042	...
Output gap x institutional quality subindex	...	...	...	-0.079
standard error	...	...	...	0.032
p-value	...	...	...	0.015
Statistics				
Hansen statistic	4.155	0.394	8.353	7.620
(*p-value*)	0.656	0.941	0.303	0.573
N° of observations	1933	1821	1541	1927
Cross-sections included	112	112	88	112
Average time span	17	16	18	17
Threshold estimate (Q^*f)	64.7	64.6	62.7	31.1
95%-confidence interval	[62.5 66.9]	[59.7 69.5]	[59.4 66.1]	[24.5 37.8]

Notes: GMM estimations were performed including fixed and time effects. White standard errors and covariances were computed. The set of instrumental variables is listed in the online supplementary appendix. See main text for the notation of variables. Hodrick-Prescott (HP) and Band-Pass (BP, due to Baxter-King (1999)) filters are used to extract the cyclical components of the dependent variable and regressors (except Q(t)). For the definition of developing country we follow the IMF's classification (World Economic Outlook, 2009). The Subindex is composed of the subindexes of Government Stability, Investment Profile, Corruption, Law and Order, and Bureaucracy Quality (it ranges from 0 to 40). Confidence intervals for the acyclical policy index were computed using analytic derivatives and the delta method.

Supplementary appendix

Summary statistics of institutional quality by countries (ICRG index, different periods from 1984 to 2008)

Country	*Mean*	*Median*	*Observations*	*Country*	*Mean*	*Median*	*Observations*
Albania	60.3	60.1	10	Lithuania	72.8	75.5	11
Argentina	70.7	72.1	16	Luxembourg	92.7	93.0	25
Australia	83.8	85.2	25	Madagascar	59.4	59.3	25
Austria	86.6	86.8	25	Malawi	58.1	55.2	22
Bahamas, The	83.5	84.0	12	Malaysia	71.3	72.0	25
Bahrain	64.2	64.9	25	Mali	44.2	40.6	12
Bangladesh	46.3	49.6	22	Malta	76.7	84.2	22
Belarus	61.0	61.3	11	Mexico	69.5	69.5	25
Belgium	81.4	81.3	25	Mongolia	66.1	67.7	23
Bolivia	55.7	57.7	25	Morocco	62.3	68.8	24
Botswana	72.4	73.3	25	Mozambique	54.4	57.0	24
Brazil	65.9	66.0	25	Myanmar	46.8	48.2	13
Bulgaria	71.1	71.6	18	Namibia	71.6	76.5	15
Burkina Faso	55.5	53.8	22	Netherlands	88.1	87.0	25
Cameroon	52.7	51.6	23	New Zealand	86.3	86.7	25
Canada	84.6	85.8	25	Nicaragua	60.7	63.0	18
Chile	69.2	73.1	25	Niger	51.5	53.3	19
China	66.0	67.8	25	Nigeria	46.8	46.9	20
Colombia	56.0	57.2	25	Norway	86.9	87.8	25
Congo, Rep.	50.9	52.4	16	Oman	68.3	72.3	24
Costa Rica	71.8	72.3	25	Pakistan	45.4	44.7	25
Croatia	72.2	74.1	10	Panama	60.1	58.8	24
Cyprus	70.8	75.3	25	Papua New Guinea	60.0	60.1	21
Czech Republic	79.1	78.5	16	Paraguay	59.2	56.9	25
Denmark	87.2	86.2	25	Peru	53.3	59.7	25
Dominican Republic	61.0	63.8	25	Philippines	56.4	63.1	22
Ecuador	58.2	57.8	25	Poland	70.4	75.0	25
Egypt, Arab Rep.	57.9	62.3	24	Portugal	79.9	83.2	25
El Salvador	62.7	67.1	17	Qatar	63.1	68.4	23
Estonia	75.5	75.0	11	Romania	63.7	68.3	25
Ethiopia	44.7	45.1	20	Russian Federation	61.5	64.2	14
Finland	89.9	91.8	25	Saudi Arabia	62.6	66.3	25
France	79.0	79.0	25	Senegal	57.1	57.7	18
Germany	84.0	84.4	25	Sierra Leone	40.8	40.8	19
Ghana	54.8	55.5	14	Singapore	82.7	83.8	25
Greece	71.3	74.6	25	Slovak Republic	77.0	76.7	16
Guatemala	54.0	61.5	25	South Africa	64.8	65.1	25
Guinea-Bissau	47.3	46.0	21	Spain	75.8	76.2	25
Guyana	56.6	63.0	21	Sri Lanka	49.5	53.5	25
Haiti	45.6	45.5	11	Sweden	86.8	87.3	25
Honduras	52.8	55.8	25	Switzerland	90.0	89.3	25
Hong Kong, China	72.7	72.5	25	Syrian Arab Republic	57.2	60.0	24
Hungary	77.4	77.7	25	Tanzania	61.4	61.9	19
Iceland	86.9	88.3	25	Thailand	64.0	65.0	25
India	55.2	56.3	25	Togo	48.2	47.0	21
Indonesia	52.2	50.4	25	Trinidad and Tobago	65.5	65.0	25
Iran	53.7	59.8	24	Tunisia	63.9	67.8	22
Ireland	84.4	86.2	25	Turkey	57.5	58.1	22
Israel	57.7	61.0	25	Uganda	48.8	53.8	25
Italy	77.3	77.9	25	United Kingdom	83.0	81.8	25
Jamaica	68.8	70.5	25	United States	82.3	81.8	25
Japan	83.7	83.6	25	Uruguay	67.7	67.3	25
Jordan	62.3	69.3	25	Venezuela, RB	61.0	62.8	25
Kenya	57.4	56.5	23	Vietnam	65.6	66.5	18
Korea, Rep.	72.2	74.5	25	Yemen, Republic of	60.1	61.3	16
Kuwait	72.4	72.7	16	Zambia	57.9	62.5	25
Latvia	73.1	74.7	11	Zimbabwe	52.1	50.3	21
Libya	54.1	58.2	22	Full sample average	65.8	67.3	22

Source: The PRS Group - "International Country Risk Guide (ICRG)," Various issues. Authors' calculations.

Sets of instrumental variables

Instrument specification in Table 1
Column [1]: $\tilde{\boldsymbol{r}}$ (third to fourth lag), $\tilde{\boldsymbol{\pi}}$ (second to fourth lag), $\tilde{\boldsymbol{y}}$ (second to fourth lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first, second, and fifth lag), $\boldsymbol{Q}$ (first to fifth lag). Column [2]: $\tilde{\boldsymbol{r}}$ (second and fourth lag), $\boldsymbol{\pi}$ (first and third lag), $\tilde{\boldsymbol{y}}$ (second and third lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first to second lag), $\boldsymbol{Q}$ (first to second lag). Column [3]: $\tilde{\boldsymbol{r}}$ (third to fifth lag), $\tilde{\boldsymbol{\pi}}$ (second and fourth lag), $\tilde{\boldsymbol{y}}$ (second and fourth lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first and third lag), $\boldsymbol{Q}$ (first and third lag). Column [4]: $\tilde{\boldsymbol{r}}$ (fourth lag), $\tilde{\boldsymbol{\pi}}$ (first, second and fourth lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q_1}$ (first, second and fifth lag), $\tilde{\boldsymbol{y}}$ (second and fourth lag), $\boldsymbol{Q_1}$ (second lag).

Instrument specification in Table 2
Column [1]: $\tilde{\boldsymbol{g}}$ (second to third lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first to fifth lag), $\boldsymbol{Q}$ (third to fourth lag). Column [2]: $\tilde{\boldsymbol{g}}$ (second lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first to fifth lag), $\boldsymbol{Q}$ (third to fourth lag). Column [3]: $\tilde{\boldsymbol{g}}$ (second to fourth lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q}$ (first to fourth lag), $\boldsymbol{Q}$ (third to fourth lag). Column [4]: $\tilde{\boldsymbol{g}}$ (third lag), $\tilde{\boldsymbol{y}}\boldsymbol{Q_1}$ (first to fourth lag), $\boldsymbol{Q_1}$(first to fourth lag), $\tilde{\boldsymbol{y}}$ (second to fifth lag).

All the sets include a constant term as well.