On graduation from fiscal procyclicality*

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Abstract

In the past, industrial countries have tended to pursue countercyclical or, at worst, acyclical fiscal policy. In sharp contrast, emerging and developing countries have followed procyclical fiscal policy, thus exacerbating the underlying business cycle. We show that, over the last decade, about a third of the developing world has been able to escape the procyclicality trap and actually become countercyclical. We then focus on the role played by the quality of institutions, which appears to be a key determinant of a country's ability to graduate. We show that, even after controlling for the endogeneity of institutions and other determinants of fiscal procyclicality, there is a causal link running from stronger institutions to less procyclical or more countercyclical fiscal policy.

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1 Introduction

The cyclical behavior of fiscal policy differs across countries by income group. In the past, while industrial countries have tended to pursue fiscal policy that is countercyclical or at worst acyclical, developing countries have tended to follow procyclical fiscal policy: they have increased spending (or cut taxes) during periods of expansion and cut spending (or raised taxes) during periods of recession. Many authors have documented that fiscal policy has tended to be more procyclical in developing countries than industrialized countries.[1] Most studies look at the procyclicality of government spending, because tax receipts are endogenous with respect to the business cycle. Indeed, an important reason for procyclical spending is precisely that government receipts from taxes or mineral royalties rise in booms, and the government cannot resist the temptation or political pressures to increase spending proportionately, or even more than proportionately. A similar procyclical pattern can be found on the tax side by focusing on tax rates rather than revenues, though cross-country evidence is harder to come by. Vegh and Vuletin (2012a) find that tax rate policy has been mostly procyclical in developing countries and acyclical in industrialized countries.

In terms of government spending, the contrast between the two groups of countries can be clearly seen in Figure 1, which updates evidence presented in Kaminsky, Reinhart, and Vegh (2004). The figure depicts the correlation between (the cyclical components of) government spending and GDP for 94 countries (21 developed and 73 developing countries) for the period 1960-2009. Black bars represent industrial countries while light bars represent developing countries. A positive (negative) correlation indicates procyclical (countercyclical) government spending.[2] The visual image tells the whole story: light bars lie overwhelmingly on the right hand side (positive correlations) while black bars dominate the left hand side (negative correlations). Indeed, more than 90 percent of developing countries (67 out of 73) show procyclical government spending, while around 80 percent of industrial countries (17

[1] See Gavin and Perotti (1997), Tornell and Lane (1999), Kaminsky, Reinhart, and Vegh (2004), Talvi and Vegh (2005), Mendoza and Oviedo (2006), Alesina, Campante and Tabellini (2008), and Ilzetzki and Vegh (2008).

[2] Needless to say, correlations do not tell us anything about causality which, in principle, could go in either direction. Ilzetzki and Vegh (2008), however, show that, even when properly instrumented, output does cause government spending, as emphasized by the fiscal procyclicality literature.

out of 21) show countercyclical government spending.

Why would policymakers pursue procyclical fiscal policy? After all, such policy cannot be optimal since it will tend to reinforce the business cycle, exacerbating booms and aggravating busts. The most convincing explanations in the literature fall in two, not necessarily inconsistent, camps: (i) imperfect access to international credit markets and lack of financial depth (Gavin, Hausmann, Perotti and Talvi, 1996; Gavin and Perotti, 1997; Riascos and Vegh, 2003; Caballero and Krishnamurthy, 2004) and (ii) political distortions (Velasco, 1997; Tornell and Lane, 1999; Talvi and Vegh, 2005).[3] Lack of access to credit markets in bad times will naturally leave governments with no choice but to cut spending and raise taxes, whereas political pressures for additional spending in good times are hard to resist, particularly when there may exist a genuine need for more government spending in critical social areas. Improving access to credit in bad times (including official financial assistance from multilateral financial institutions such as the IMF) and designing rules and institutions that aim at ensuring that fiscal revenues are saved in good times so that they are available in bad times would go a long way to alleviate the scourge of procyclical fiscal policy.

In fact – and as we will argue in this paper – over the last decade several developing countries have been able to "graduate" in the sense of overcoming the problem of procyclicality and becoming countercyclical.[4] Theoretical work by Christiano, Eichenbaum, and Rebelo (2011) and Nakata (2011) clearly suggests that this shift in the cyclical properties of fiscal policy is welfare improving since the optimal fiscal policy in a stochastic model with sticky prices is countercycical. In fact, both papers show that countercyclical fiscal policy is even more effective when monetary policy has become powerless because the policy interest rate has hit the zero bound. Intuitively, suppose the economy is hit systematically (in a stochastic sense) by, say, shocks to the discount factor. In bad times (when the preference shock induces household to save more), it becomes optimal for the government to increase spending (even to the point of making the zero bound marginally non-binding if it was binding to

[3] Calderón and Schmidt-Hebbel (2008) provide evidence for the empirical relevance of these two channels.

[4] Our work can be viewed as complementing, on the fiscal side, recent work by Reinhart, Rogoff, and Qiang (2010) who study graduation from default, inflation, and banking crises, and Vegh and Vuletin (2012b) who study graduation from monetary procyclicality.

begin with).[5]

Chile is undoubtedly the poster child of this graduation movement. As discussed in Frankel (2012), since 2001 Chile has followed a fiscal rule that has a structural (i.e., cyclically-adjusted) fiscal balance as its target.[6] By construction, such a rule ensures that temporarily high fiscal revenues are saved rather than spent. But, as we will show below, Chile is not the only country that seems to have escaped the procyclicality trap.

Our analysis confirms previous findings in the literature regarding the role of increased financial integration and lower output volatility in reducing fiscal procyclicality. The paper's main focus, however, is on the role played by the quality of institutions. We argue that the quality of institutions seems to be a key determinant of a country's ability to graduate and show evidence that as the quality of institutions increases over time, the level of procyclicality falls.

The paper proceeds as follows. Section 2 shows the shift in fiscal policy in many emerging and developing countries over the last decade. Section 3 traces this shift to the quality of institutions and presents some basic regressions that establish a negative correlation between fiscal procyclicality and the quality of institutions. Moreover, we show that a marked improvement in institutional quality witnessed during the last 25 years in some developing countries seems to be at the root of their "graduation." Sections 4 and 5 go a step further and control for other determinants of procyclicality and address endogeneity concerns. We show that there is a strong case to be made that causality indeed runs from the quality of institutions to less procyclical or countercyclical fiscal policy. Concluding remarks can be found in Section 6.

[5] Christiano, Eichenbaum, and Rebelo (2011) derive this result taking monetary policy as given. Nakata (2011), however, shows that countercyclical fiscal policy is optimal even if monetary policy is chosen optimally.

[6] The original target was a structural surplus of 1 percent, reflecting the need to repay Central Bank debt associated with the bailout of private banks in the 1980s. As this debt was paid off over time, the targeted structural balance was reduced to 0.5 percent in 2008 and 0 percent in 2009.

2 Graduating class

This section documents the important shift in the cyclical behavior of fiscal policy over the last decade in the developing world. To this end, we divided the 1960-2009 sample used in Figure 1 into two sub-samples: 1960-1999 and 2000-2009. Figure 2 replicates Figure 1 for the period 1960-1999 and conveys essentially the same message. Figure 3, on the other hand, focuses on the period 2000-2009. Once again, the visual image conveyed by Figure 3 is striking when compared to Figure 2. Specifically, the number of light bars on the left-side of the picture (i.e., negative correlations) has greatly increased. Around 35 percent of developing countries (26 out of 73) now show a countercyclical fiscal policy, up from 8 percent (6 out of 73) in Figure 2.

To illustrate graduation, Figure 4 presents a scatter plot with the 1960-1999 correlation on the horizontal axis and the 2000-2009 correlation on the vertical axis. By dividing the scatter plot into four quadrants along the zero axes, we can classify countries into four categories:

1. Established graduates (bottom-left): These are countries that have always been countercyclical. Not surprisingly, 87 percent of the countries in this category are industrial countries, including the United States, United Kingdom, and Australia.

2. Still in school (top-right) These are countries that have continued to behave procyclically over the last decade. Again not surprisingly, 96 percent of these countries are developing countries, including Venezuela, Peru, and India.

3. Back to school (top-left): These are countries that were countercyclical during the 1960-1999 period and turned procyclical over the last decade. This small group of countries is split fairly evenly between developed and developing countries. It includes Greece and Jamaica.

4. Recent graduates (bottom-right): These are countries that used to be procyclical and became countercyclical over the last decade. They are mostly represented by developing countries (24 out of 26, or 96 percent) and include Chile, Brazil, and Botswana.

In sum, the evidence suggests that about a third of the developing world (24 out of 73 countries) has recently "graduated" from procyclicality.

The evidence of countercyclicality among many emerging market and developing countries matches up with other criteria for judging maturity in the conduct of fiscal policy: debt-GDP ratios, rankings by rating agencies, and sovereign spreads. Low income and emerging market countries in the aggregate have achieved debt-GDP levels around 40 percent of GDP over the last four years. The IMF estimates the 2011 ratio at 43 percent among emerging market countries and 35 percent among low-income countries. This is the same period during which debt in advanced countries has risen from about 70 per cent of GDP to 102 percent. The financial markets have ratified the historic turnaround. Spreads are now lower for many emerging markets than for some "advanced countries." As of early 2012, Singapore has a higher credit rating than France or the US; Chile has a higher credit rating than Japan; Korea and China have higher credit ratings than Spain; Malaysia, South Africa, Brazil, and Thailand all have higher ratings than Italy; Colombia has a higher rating than Iceland or Ireland; Indonesia and the Philippines have higher ratings than Portugal; and various African countries have higher ratings than Greece.

Largely as a result of their improved fiscal situations during the period 2000-2007, many emerging markets were able to bounce back from the 2008-2009 global financial crisis more quickly than advanced countries.[7]

3 Graduation and institutional quality

What explains the ability of some countries, particularly emerging market and developing countries, to escape the trap of procyclical fiscal policy? Many researchers have pointed to the importance of institutions in determining various aspects of public policy.[8] In this spirit, this section shows that institutional quality (IQ) explains some of the most recent changes in cyclicality of fiscal policy. To

[7] See, for example, Didier, Hevia, and Schmukler (2012).

[8] The importance of institutions for fiscal policy has been emphasized by Buchanan (1967), von Hagen and Harden (1995), Alesina and Perotti (1996), Poterba and Von Hagen (1999), Persson and Tabellini (2004), and Calderón and Schmidt-Hebbel (2008), among others.

this effect, we construct an index of IQ by calculating the average of four normalized variables from the International Country Risk Guide dataset:

- Investment profile: An assessment of factors affecting investment risk that are not covered by other political, economic and financial risk components. The risk rating assigned is the sum of three subcomponents: contract viability/expropriation, profits repatriation, and payment delays.
- Corruption: An assessment of corruption within the political system.
- Law and order: An assessment of the strength and impartiality of the legal system and the popular observance of the law.
- Bureaucratic quality: An assessment of the strength and expertise to govern without drastic changes in policy or interruptions in government services.

The IQ index ranges between 0 (lowest institutional quality) and 1 (highest institutional quality).

We first establish a link between the four way classification in Figure 4 and IQ. To this effect, Column 1 in Table 1 reports the average IQ for each of these groups. As hypothesized, the highest IQ is for the "established graduates" group. Next is the "back to school" group with an average index of 0.6, followed by the "recent graduates" group with an average index of 0.55. The "still in school" countries have the lowest institutional quality (0.48). All these IQ differences are statistically significant at the 1 percent level.

We then construct a scatter plot relating IQ and procyclicality, shown in Figure 5. We can see a clear negative relationship between IQ and cyclicality of fiscal policy. The higher (lower) the IQ in a country, the more countercyclical (procyclical) is fiscal policy. Based on the estimated regression, an IQ level of 0.79 supports acyclicality. A higher (lower) level of IQ supports countercyclicality (procyclicality).

In order to further explore the importance of IQ in the process of graduation from procyclicality, we decompose IQ values in each country into two components; $IQ^{initial}$ and ΔIQ. $IQ^{initial}$ refers to

the initial (or earliest) IQ observed. In most countries this value corresponds to the IQ level in 1984.[9] ΔIQ is then defined as the difference between the current IQ value and $IQ^{initial}$. In other words, $\Delta IQ \equiv$IQ$-IQ^{initial}$. Columns 2 and 3 in Table 1 show the average $IQ^{initial}$ and ΔIQ for each of these groups.

We should take the findings for the "back to school" group with a grain of salt given the small sample included in this group; only 8 countries (see top-left quadrant in Figure 4). Column 2 shows that, as expected, the highest initial IQ (0.84) is for the "established graduates" group. Mean tests support the idea that initial IQ for "established graduates" is statistically higher than for the other graduating categories at the 1 percent level. "Still in school" and "recent graduates" have initial IQ values that are statistically indistinguishable from each other. Column 3 of Table 1 shows that "established graduates" have the highest IQ inertia; i.e., lowest ΔIQ values in absolute terms. Moreover, this group has seen a slight decline in IQ in recent times. On the other hand, "recent graduates" is the group with the highest recent increase in IQ. Mean tests support the idea that ΔIQ for "recent graduates" is statistically higher than for the other graduating categories at the 1 percent level. To sum up, "established graduates" have the highest initial IQ and show no major improvements over time. Both "still in school" and "recent graduates" share similar initial IQ conditions. However, the increase in IQ recently observed is much higher in "recent graduates" than the one observed in "still in school."

Although one thinks of institutions as slow-moving, they can change over time. Figure 6 provides some examples of the within-country relation between IQ and cyclicality of fiscal policy by plotting for three different countries the correlation between government spending and GDP computed over a 20-year rolling window and the level of IQ. Panel A shows the case of Australia, an "established graduate." IQ levels have been consistently around 0.80 and fiscal policy has always been countercyclical. At the other extreme, Panel B shows the case of Venezuela, a "still in school" country. IQ levels have ranged between 0.24 and 0.58 and fiscal policy has been consistently procyclical. Panel C shows the case of Chile, a "recent graduate." The IQ increased from values close to 0.5 in the early 1980s to more

[9] The only exceptions are Rep. of Congo (1985), Gambia (1985), Niger (1985), Sierra Leone (1985), Yemen (1990), and Azerbaijan (1998).

than 0.8 since the mid 2000s. In line with our arguments, fiscal policy shifted from being strongly procyclical – with values close to Venezuela's – to countercyclical.

Chile's experience is a good illustration of how a country with good IQ in the general sense of rule of law can help lock in countercyclical fiscal policy through specific budget institutions. Frankel (2012) analyzes how Chile did it, with the structural budget reforms of 2000 and 2006. Fiscal rules, such as euroland's Stability and Growth Pact, often accomplish little in themselves, because they are not necessarily enforced or credible. Rules can even worsen the general tendency of governments to make overly optimistic forecasts for economic growth and budget balance.[10] Chile's key innovation was to give responsibility for forecasting to independent experts commissions, insulated from politicians' wishful thinking. Its approach could be emulated by others.

Finally, we use panel data regressions to exploit within-country variability as opposed to cross-country variability. Table 2, column 1 shows the estimates for α_2 and α_3 when estimating the following equation

$$g_{it}^c = \alpha_1 + \alpha_2 y_{it}^c + \alpha_3 \left(y_{it}^c \cdot IQ_{it}\right) + \alpha_4 IQ_{it} + \eta_i + \varepsilon_{it}, \tag{1}$$

where g^c and y^c are the cyclical components of government spending and output. Our main result continues to hold: an increase in IQ reduces the degree of procyclicality. In line with our cross-country regression (see Figure 5), we find an IQ threshold of 0.79 for graduation. Our results do not change when we allow each coefficient in equation (1) to vary by graduating class, as reported in Columns 2a-2d. The only case for which our main results are not supported is for "established graduates." This is mainly due to the small sample (15 countries) and, more importantly, to the small within-country variability of IQ described before for this set of countries.

We now decompose the variable IQ into its initial value $IQ^{initial}$, which is constant over time, and ΔIQ, which varies over time. Table 2, column 3 shows the estimates for α_2, α_3 and α_4 when

[10] Frankel (2011).

estimating the following equation

$$g_{it}^{c} = \alpha_1 + \alpha_2 y_{it}^{c} + \alpha_3 \left(y_{it}^{c} \cdot IQ_{it}^{initial} \right) + \alpha_4 \left(y_{it}^{c} \cdot \Delta IQ_{it} \right) + \alpha_5 IQ_{it}^{initial} + \alpha_6 \Delta IQ_{it} + \eta_i + \varepsilon_{it}. \qquad (2)$$

The underlying idea is to find out whether it is the highly inertial/static component of IQ that matters for fiscal policy – à la Acemoglu, Johnson and Robinson (2001) – or the dynamic component of IQ. For the whole sample (column 3) both factors, historical as well as more recent changes in IQ, seem to matter. Our results do not change when we allow each coefficient in equation (2) to vary by graduating class, as reported in Columns 4a-4d. Some interesting asymmetries emerge between the "still in school" and "recent graduate" categories. Column 4b indicates that for the "still in school" group, historical factors dominate. This is consistent with very static IQ measures (compared to those of "recent graduates") during the last 25 years. Instead, for the"recent graduates" group, it is the more recent change in IQ (i.e., ΔIQ) that seems to be mainly driving the results. This suggests that changes in IQ are an important determinant of graduation.

Our analysis so far has suggested that IQ is an important determinant of procyclical fiscal policy. In particular, we have put forward the notion that about a third of developing countries have graduated from fiscal procyclicality due to important improvements in IQ during the last decade. Our analysis, however, could suffer from both omitted variables and endogeneity problems. The next two sections address these concerns.

4 Other determinants of cyclicality

While it seems natural to think that institutions affect the way in which fiscal policy is conducted, our findings so far could reflect the effect of omitted variables that are related to institutions. To address this concern, we include in our panel regressions three sets of control variables aimed at capturing alternative theories regarding cyclicality of fiscal policy.

First, we control for the degree of financial integration and depth. Among others, Gavin, Hausmann,

Perotti and Talvi (1996), Gavin and Perotti (1997), and Riascos and Vegh (2003) have argued that limited access to international capital markets (particularly in bad times) may limit the ability of governments to pursue countercyclical policies. In the same spirit, Caballero and Krishnamurthy (2004) have stressed the role of financial depth. We measure financial integration using the Chinn-Ito financial openness index (Menzie and Ito, 2006) and financial depth using liquid liabilities over GDP (Levine, Loayza and Beck, 2000; Loayza and Ranciere, 2006; Levine, Beck and Demirguc-Kunt, 2010).[11] The panel data correlation between the Chinn-Ito financial openness index and IQ is 0.55; the panel data correlation between liquid liabilities and IQ is 0.53. Table 3, columns 2 and 3 show that more financial integration and depth are indeed associated with more countercyclicality/less procyclicality.

Second, we control for the variability of tax revenues – proxied by output variability – to account for the channel emphasized by Talvi and Vegh (2005) who argue that, in the presence of political distortions, the larger is the variability of tax revenues the more procyclical fiscal policy will be, as policymakers try to reduce the fiscal surplus in good times to prevent wasteful spending. We measure output variability using the square of the cyclical component of real GDP.[12] In Table 3, column 4 shows that, as in Lane (2003), higher output volatility does indeed increase the degree of procyclicality of fiscal policy.

Third, we address political economy arguments that stress common pool problems and fragmented policymaking (Velasco, 1997; Tornell and Lane, 1999). For these purposes, we use a measure of political checks and balances from the Database on Political institutions.[13] Stronger checks and balances constrain politicians in their policy space. Politicians are also held more accountable to the public, relative to an autocratic regime. In a more democratic regime, the expected returns to rent-seeking activities are lower. In Table 3, column 5 shows that stronger checks and balances decrease the degree of procyclicality of fiscal policy.

We also test whether debt-GDP ratios and foreign reserves holdings (in months of imports) matter for fiscal behavior over the business cycle. Recent low debt-GDP ratios and massive foreign reserves

[11] Similar results follow if private credit is used instead of liquid liabilities.
[12] The panel data correlation between output variability and IQ is -0.19.
[13] The panel data correlation between checks and balances and IQ is 0.43.

in emerging markets may have contributed to reduce those countries' default risk, allowing them to run countercyclical fiscal policies. In Table 3, columns 6 and 7 support these presumptions.

In Table 3, column 8 shows that even after accounting for standard determinants of fiscal cyclicality, institutional quality remains a strong determinant. There is no indication that problems related to omitted variables are driving our results.

5 Addressing endogeneity

This section addresses potential endogeneity problems. One could argue that the observed negative relationship between fiscal policy cyclicality and IQ may reflect the fact that countercyclical (procyclical) fiscal policies that tend to stabilize (destabilize) the economy might improve (worsen) institutional quality. That is to say, the causality may run from cyclicality of fiscal policies to institutional quality and not the other way around. For example, procyclical fiscal policies could increase the chances of governments running into debt sustainability problems during busts. These critical financing needs could then lead to expropriation, repudiation of contracts, and/or intervention in independent branches of governments such as the judiciary system or the central bank. Moreover, the turmoil typically associated with debt crises can exacerbate corruption in the political system thus weakening the foundations of an efficient and professional public administration. Similar arguments could also be made regarding the endogeneity of the control variables included in Section 4. For example, one could argue that it is procyclical fiscal policies that ultimately increase output volatility instead of the latter being the cause of procyclical fiscal policies.

We address such endogeneity concerns by instrumenting not only for IQ but also for the other six control variables. The literature on institutions has not found yet time-varying instrumental variables for the quality of institutions. Hence – and as is standard in this literature – we rely on cross-country regressions (Acemoglu, Johnson and Robinson, 2001; Easterly and Levine, 2003; Glaeser, La Porta, Lopez-de-Silanes, and Shleifer, 2004; Rodrik, Subramanian, and Trebbi, 2004; La Porta, Lopez-de-Silanes and Shleifer, 2008).

We follow Acemoglu, Johnson, and Robinson's (2001) approach to instrument average IQ using European settlers' mortality and latitude (absolute value). They argue that European mortality rates (recorded among soldiers, bishops, and sailors stationed in the colonies) between the 17th and 19th centuries shaped, at least in part, the type of settlements and colonization strategy. In places where Europeans faced high mortality rates, they could not settle and they were more likely to set up worse (extractive) institutions. An archetypal example of this strategy is the Belgian colonization of the Congo. On the other hand, low mortality rates supported the development of important European settlements. In these "neo-europe" states, the settlers tried to replicate European institutions, with emphasis on private property, and checks against government power. Primary examples include Australia, New Zealand, Canada, and the United States. Assuming high path dependence, early sound institutions would endure over time until the present.

We instrument financial integration and depth using legal origin (La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997), output volatility using terms of trade volatility, and indebtedness using debt-GDP ratio in 1900. We instrument checks and balances using constraints on the executive and democracy in 1900. The constraints on the executive in 1900 range from cases in which there are no regular limitations on the executive's actions to situations in which accountability groups have effective authority equal to or greater than the executive in most activities. Democracy in 1900 comprises several dimensions of political competitiveness.

It has been argued that, in light of the severe real dislocations resulting from international financial crises, many developing countries accumulate reserves as a form of self-insurance against capital flow volatility (Aizenman and Marion, 2003; Stiglitz, 2006). Following this rationale, we instrument foreign reserves using average frequency of currency crashes in mid 20th century; in particular, for the period 1940-1960.

Table 4 shows the cross-country correlations between all pairs of variables used in the analysis. With the exeption of foreign reserves, the findings support our panel data regressions results reported above in that higher IQ, financial integration and depth, and checks and balances are associated

with countercyclicality, and higher output volatility and debt-GDP ratios are related to procyclicality. Instruments are also correlated as expected, both among themselves and with the variables they will be instrumenting for.

Table 5 shows, as in Lane (2003), OLS cross-country regressions where the dependent variable is the correlation between the cyclical components of real government expenditure and GDP. Columns 1 to 14 analyze the impact of each variable one at a time, both for the sample of 94 countries used so far in the paper as well as for the smaller sample of 52 countries that will be used in our instrumental variables regressions.

Two results are worth noting. First, with the exception of foreign reserves and debt-GDP ratios, cross-country regressions support our panel data regression findings. That is to say, higher IQ, financial integration and depth, and checks and balances increase countercyclicality and output volatility increases procyclicality. Second, the results obtained for the sample of 94 countries also hold for the smaller sample of countries that will be used in our instrumental variables regressions. Columns 15 and 16 include all control variables together. As in our panel regressions, institutional quality is strongly significant in all cases.

Next, we address endogeneity problems. Table 6 shows how the proposed instruments relate to all seven cyclicality regressors. As shown by Acemoglu, Johnson, and Robinson (2001), European settlers' mortality is positively related to IQ. So is latitude. Similar results are obtained for financial integration and depth. Moreover, as suggested by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997), countries with British legal origin show higher development of their financial markets than those of French origin. Terms of trade volatility seems to be a good predictor of output volatility, and constraints on the executive and democracy in 1900 are found to be strongly related to recent checks and balances. Debt-GDP ratios in 1900 and currency crashes in mid 20th century are also strong predictors of debt-GDP ratios and foreign reserves, respectively. Indeed, the suggested instruments have very high predictive power overall: the R^2 ranges from 0.25 and 0.32 for foreign reserves and debt-GDP ratios to almost 0.7 for institutional quality.

Having checked that the proposed instruments seem to be good predictors for the variables they are instrumenting for, we proceed to estimate instrumental variables regressions. Table 7 shows the corresponding regressions. Columns 1 to 7 only instrument for IQ. Column 1 only includes IQ as regressor. Columns 2 to 7 sequencially add other determinants. In all cases we cannot reject the overidentification tests. The instruments are valid instruments (i.e., uncorrelated with the error term) and the excluded instruments are correctly excluded from the estimated equation. As suggested in Table 6, all instrumental variable regressions confirm that the excluded instruments are not weak instruments (i.e., they are strongly correlated with the endogenous regressors). We thus conclude that institutional quality remains a critical determinant of procyclicality even after accounting for possible endogeneity problems.

Finally, the regression shown in Table 7, column 8, corrects for the endogeneity of the rest of the right-hand variables. IQ remains strongly negatively related to the cyclicality of fiscal policy confirming that there is a strong causal link running from better institutions to less procyclical/more countercyclical fiscal policy.

6 Conclusions

We have shown that, over the past decade, a substantial number of emerging and developing countries have "graduated" from fiscal procyclicality in the sense of being able to shift from procyclical to countercyclical fiscal policy. Further, we have argued that a critical determinant of whether a country has been able to graduate or not is institutional quality. We have formally linked the degree of fiscal procyclicality to institutional quality and shown that, even when correcting for endogeneity and other determinants, there is a strong causal link running from better institutions to less procyclical/more countercyclical fiscal policy.

While institutional change is certainly not easy and often occurs only slowly over time, the payoff in terms of enabling countries to escape the fiscal procyclicality trap can be large. Chile is perhaps the best example of a country that has succeeded in developing stronger fiscal institutions over time and,

as result, has been able to conduct countercyclical fiscal policy over the last decade. This graduation process, however, can be a long and arduous road and does require clear economic leadership and a strong political consensus.

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Appendix 1. Definition of variables and sources

Gross Domestic Product

World Economic Outlook (WEO-IMF) and International Financial Statistics (IFS-IMF) were the main data sources. Series NGDP (gross domestic product, current prices) for WEO and 99B for IFS-IMF. For Azerbaijan, Bahrain, Kuwait, Libya, Qatar, and United Arab Emirates data were provided by the Middle East Department at the IMF. Data period covers 1960-2009.

Government expenditure

World Economic Outlook (WEO-IMF) was the main data source, series GCENL (central government, total expenditure and net lending). Due to unavailability of central government data, general government data were used for Azerbaijan, Ecuador, Kuwait, Libya, Qatar, and United Arab Emirates. For Azerbaijan, Bahrain, Kuwait, Libya, Qatar, and United Arab Emirates data were provided by the Middle East Department at the IMF. For Brazil data was from Instituto de Pesquisa Econômica Aplicada (IPEA). Data period covers 1960-2009.

GDP deflator

World Economic Outlook (WEO-IMF) and International Financial Statistics (IFS-IMF) were the main data sources. Series NGDP_D (gross domestic product deflator) for WEO-IMF and 99BIP for IFS-IMF. For Azerbaijan, Bahrain, Kuwait, Libya, Qatar, and United Arab Emirates data were provided by the Middle East Department at the IMF. Data period covers 1960-2009.

Financial depth

Measured as liquid liabilities over GDP. Loayza and Ranciere (2006) and Levine et al (2010) were the main data sources. Data period covers 1960-2006.

Financial integration

Measured with the Chinn-Ito financial openness index; Chinn and Ito (2006). Such index measures a country's degree of capital account openness. Data period covers 1970-2009.

Debt-GDP ratio and Debt-GDP ratio in 1900

World Economic Outlook (WEO-IMF), World Development Indicators (WDI-World Bank), and Reinhart and Rogoff (2011) were the main data sources. Measured as total central government debt over GDP at the beginning of year. For Azerbaijan we used public and publicly guaranteed debt service. For Côte d'Ivoire, Haiti, Italy, Kuwait, Myanmar, Netherlands, New Zealand, Niger, Poland, Qatar, Romania, Singapore, Tanzania, and United Arab Emirates we used total general government debt. If country was not independent in 1900, we used the colonizer's respective ratio when measuring 1900 Debt-GDP ratios.

Foreign reserves

World Development Indicators (WDI-World Bank) and International Financial Statistics (IFS-IMF) were the main data sources. Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices. This item shows reserves expressed in terms of the number of months of imports of goods and services they could pay for [Reserves/(Imports/12)] at the end of previous year.

Currency crashes in mid 20th century

Reinhart and Rogoff (2011) and authors' calculations based on exchange rate data from Global Financial Data were the main data sources. An episode of currency crash is counted for the entire period in which annual depreciations exceed the threshold of 15 percent per annum. We calculate the average frequency of currency crashes for the period 1940-1960.

Terms of trade of goods and services

World Economic Outlook (WEO-IMF) was the main data source. Series TT (terms of trade, goods & services) for WEO. Data period covers 1962-2009.

Institutional quality

International Country Risk Guide (ICRG) was the source of data. Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index was calculated by the authors as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. Data period covers 1984-2008.

Checks and balances

Beck, Clarke, Groff, Keefer, and Walsh (2001) was the source of data. An 18-category scale, from 1 to 18, with a higher score indicating more political checks and balances. Data period covers 1975-2009.

European settler mortality

Acemoglu, Johnson and Robinson (2001) was the source of data. Mortality rates of soldiers, bishops, and sailors stationed in the colonies between the seventeenth and nineteenth centuries.

Latitude

Acemoglu, Johnson and Robinson (2001) was the source of data. Absolute value of the latitude of the country (i.e., a measure of distance from the equator), scaled to take values between 0 and 1, where 0 is the equator.

Colonial dummies

Acemoglu, Johnson and Robinson (2001) was the source of data. Dummy indicating whether country was a British, French, German, Spanish, Italian, Belgian, Dutch, or Portuguese colony.

French legal origin dummy

Acemoglu, Johnson and Robinson (2001) was the source of data. Legal origin of the company law or commercial code of each country.

Constraint on executive in 1900

Acemoglu, Johnson and Robinson (2001) was the source of data. Seven-category scale, from 1 to 7, with a higher score indicating more constraints. Score of 1 indicates unlimited authority; score of 3 indicates slight to moderate limitations; score of 5 indicates substantial limitations; score of 7 indicates executive parity or subordination. Equal to 1 if country was not independent at that date.

Democracy in 1900

An 11-category scale, from 0 to 10, with a higher score indicating more democracy. Points from three dimensions: Competitiveness of Political Participation (from 1 to 3); Competitiveness of Executive Recruitment (from 1 to 2, with a bonus of 1 point if there is an election); and Constraints on Chief Executive (from 1 to 4). Equal to 1 if country not independent at that date.

Appendix 2. Data on cyclicality of fiscal policy and institutions

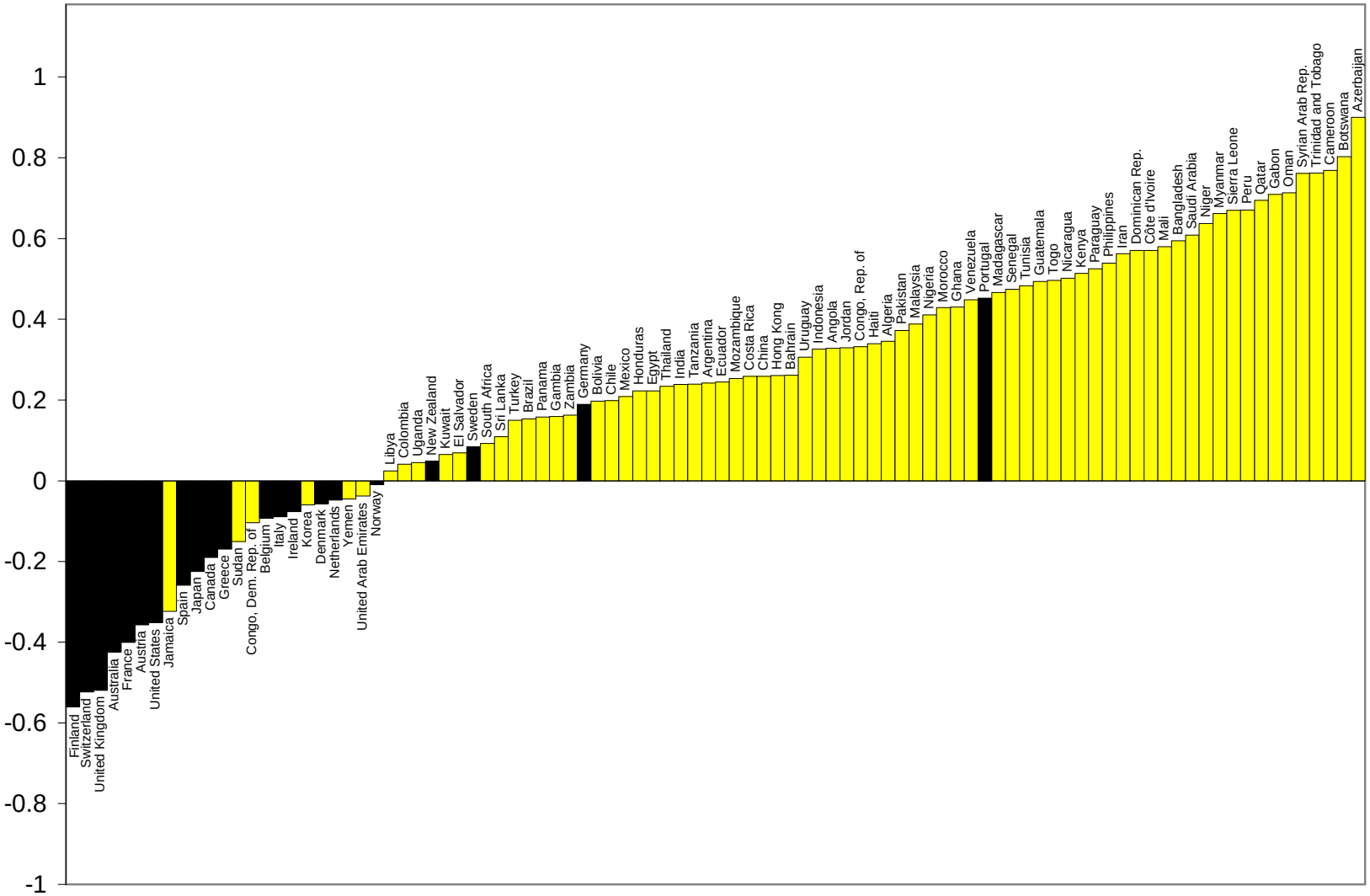
Country	Graduating class	Country correlations between the cyclical components of real government expenditure and real GDP: Average 1960-2009	Average 1960-1999	Average 2000-2009	Average institutional quality 1984-2008
Algeria	RG	0.35	0.48	-0.56	0.46
Angola	SS	0.33	0.16	0.67	0.41
Argentina	SS	0.24	0.31	0.01	0.54
Australia*	EG	-0.42	-0.41	-0.79	0.87
Austria*	EG	-0.36	-0.41	-0.21	0.89
Azerbaijan	SS	0.90	0.98	0.65	0.48
Bahrain	RG	0.26	0.63	-0.11	0.64
Bangladesh	SS	0.59	0.60	0.59	0.31
Belgium*	EG	-0.09	-0.09	-0.16	0.85
Bolivia	RG	0.20	0.24	-0.87	0.38
Botswana	RG	0.80	0.92	-0.32	0.66
Brazil	RG	0.15	0.16	-0.18	0.54
Cameroon	SS	0.77	0.80	0.02	0.47
Canada*	EG	-0.19	-0.09	-0.81	0.92
Chile	RG	0.20	0.27	-0.64	0.66
China	SS	0.26	0.18	0.73	0.56
Colombia	SS	0.04	0.00	0.17	0.46
Congo, Dem. Rep. of	BS	-0.10	-0.19	0.85	0.18
Congo, Rep. of	SS	0.33	0.34	0.31	0.39
Costa Rica	RG	0.26	0.35	-0.69	0.61
Côte d'Ivoire	RG	0.57	0.61	-0.16	0.48
Denmark*	EG	-0.06	-0.04	-0.31	0.92
Dominican Rep.	SS	0.57	0.57	0.63	0.49
Ecuador	SS	0.24	0.26	0.12	0.50
Egypt	SS	0.22	0.24	0.02	0.48
El Salvador	RG	0.07	0.04	-0.04	0.39
Finland*	EG	-0.56	-0.56	-0.52	0.93
France*	BS	-0.40	-0.49	0.02	0.81
Gabon	SS	0.71	0.72	0.34	0.45
Gambia	SS	0.16	0.16	0.19	0.54
Germany*	RG	0.19	0.33	-0.33	0.87
Ghana	SS	0.43	0.41	0.68	0.47
Greece*	BS	-0.17	-0.18	0.21	0.65
Guatemala	SS	0.49	0.51	0.29	0.38
Haiti	SS	0.34	0.34	0.47	0.19
Honduras	SS	0.22	0.24	0.19	0.38
Hong Kong	RG	0.26	0.41	-0.52	0.74
India	SS	0.24	0.15	0.51	0.57
Indonesia	RG	0.33	0.40	-0.24	0.40
Iran	SS	0.56	0.57	0.77	0.49
Ireland*	EG	-0.08	-0.01	-0.32	0.82
Italy*	EG	-0.09	-0.08	-0.14	0.70
Jamaica	BS	-0.32	-0.38	0.51	0.49
Japan*	EG	-0.22	-0.11	-0.56	0.82

Notes: The abbreviations EG, SS, RG, and BS stand for established graduate, still in school, recent graduate, and back to school graduating classes, respectively. * identifies industrial countries.

Country	Graduating class	Country correlations between the cyclical components of real government expenditure and real GDP			Average institutional quality
		Average 1960-2009	Average 1960-1999	Average 2000-2009	1984-2008
Jordan	SS	0.33	0.31	0.71	0.56
Kenya	SS	0.51	0.48	0.74	0.52
Korea	EG	-0.06	-0.01	-0.52	0.65
Kuwait	BS	0.07	-0.14	0.29	0.57
Libya	RG	0.02	0.45	-0.26	0.48
Madagascar	SS	0.47	0.53	0.29	0.50
Malaysia	RG	0.39	0.48	-0.74	0.63
Mali	SS	0.58	0.62	0.36	0.31
Mexico	SS	0.21	0.14	0.84	0.54
Morocco	RG	0.43	0.46	-0.10	0.58
Mozambique	SS	0.25	0.26	0.25	0.45
Myanmar	SS	0.66	0.65	0.73	0.29
Netherlands*	EG	-0.05	-0.03	-0.21	0.93
New Zealand*	SS	0.05	0.01	0.55	0.91
Nicaragua	SS	0.50	0.50	0.58	0.47
Niger	SS	0.64	0.65	0.36	0.41
Nigeria	RG	0.41	0.59	-0.75	0.34
Norway*	RG	-0.01	0.18	-0.88	0.89
Oman	RG	0.71	0.76	-0.06	0.61
Pakistan	SS	0.37	0.37	0.42	0.42
Panama	SS	0.16	0.10	0.85	0.41
Paraguay	RG	0.53	0.63	-0.14	0.38
Peru	SS	0.67	0.65	0.87	0.43
Philippines	RG	0.54	0.56	-0.19	0.44
Portugal*	SS	0.45	0.48	0.12	0.74
Qatar	SS	0.69	0.58	0.68	0.54
Saudi Arabia	RG	0.61	0.68	-0.62	0.60
Senegal	SS	0.47	0.46	0.75	0.46
Sierra Leone	SS	0.67	0.75	0.43	0.33
South Africa	SS	0.09	0.06	0.28	0.62
Spain*	EG	-0.26	-0.13	-0.62	0.76
Sri Lanka	SS	0.11	0.01	0.67	0.48
Sudan	BS	-0.15	-0.17	0.18	0.29
Sweden*	BS	0.08	-0.28	0.27	0.91
Switzerland*	BS	-0.52	-0.65	0.20	0.90
Syrian Arab Rep.	RG	0.76	0.79	-0.34	0.45
Tanzania	SS	0.24	0.14	0.87	0.47
Thailand	SS	0.23	0.22	0.35	0.58
Togo	SS	0.50	0.51	0.83	0.35
Trinidad and Tobago	SS	0.76	0.77	0.73	0.58
Tunisia	SS	0.48	0.48	0.73	0.55
Turkey	RG	0.15	0.47	-0.70	0.54
Uganda	RG	0.04	0.05	-0.02	0.42
United Arab Emirates	RG	-0.04	0.05	-0.12	0.57
United Kingdom*	EG	-0.52	-0.53	-0.43	0.87
United States*	EG	-0.35	-0.16	-0.94	0.87
Uruguay	SS	0.31	0.27	0.81	0.50
Venezuela	SS	0.45	0.40	0.68	0.44
Yemen	EG	-0.05	-0.04	-0.10	0.44
Zambia	RG	0.16	0.18	-0.37	0.43

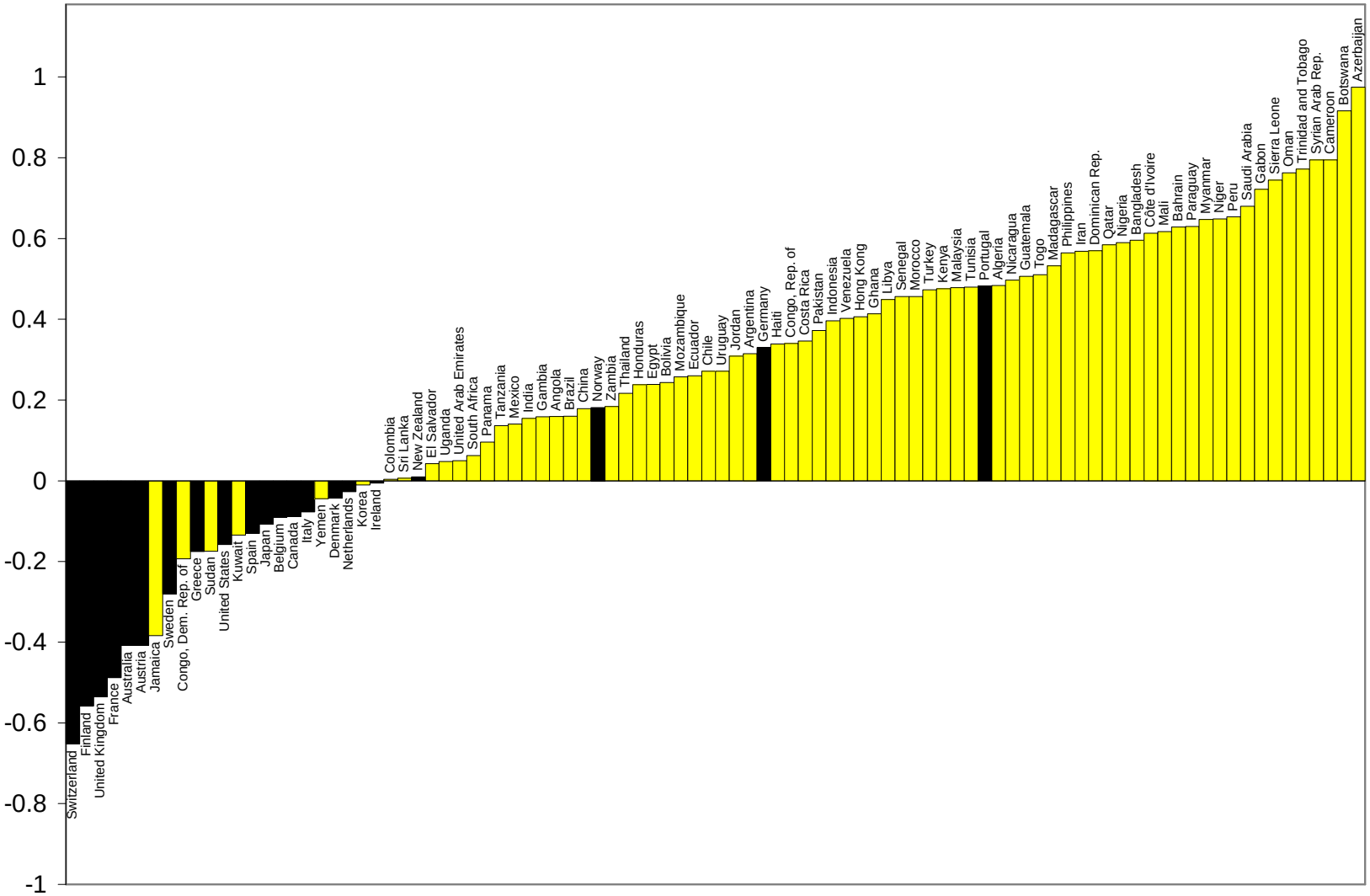
Notes: The abbreviations EG, SS, RG, and BS stand for established graduate, still in school, recent graduate, and back to school graduating classes, respectively. * identifies industrial countries.

Figure 1. Country correlations between the cyclical components of real government expenditure and real GDP. 1960-2009



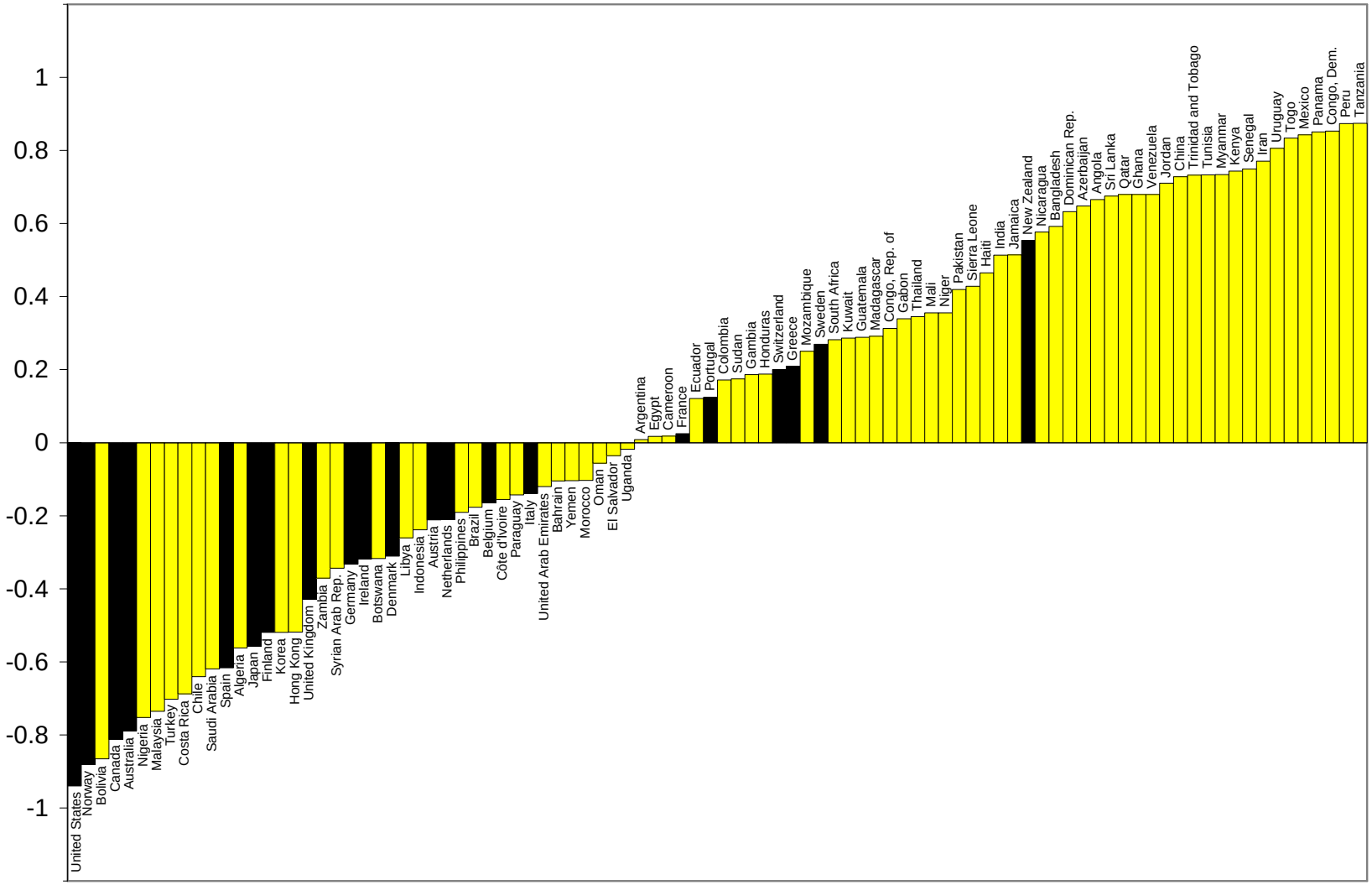
Notes: Dark bars are industrial countries and light ones are developing countries. The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. See Appendix 2 for correlation values for each country.
Source: World Economic Outlook and International Financial Statistics (IMF).

Figure 2. Country correlations between the cyclical components of real government expenditure and real GDP. 1960-1999



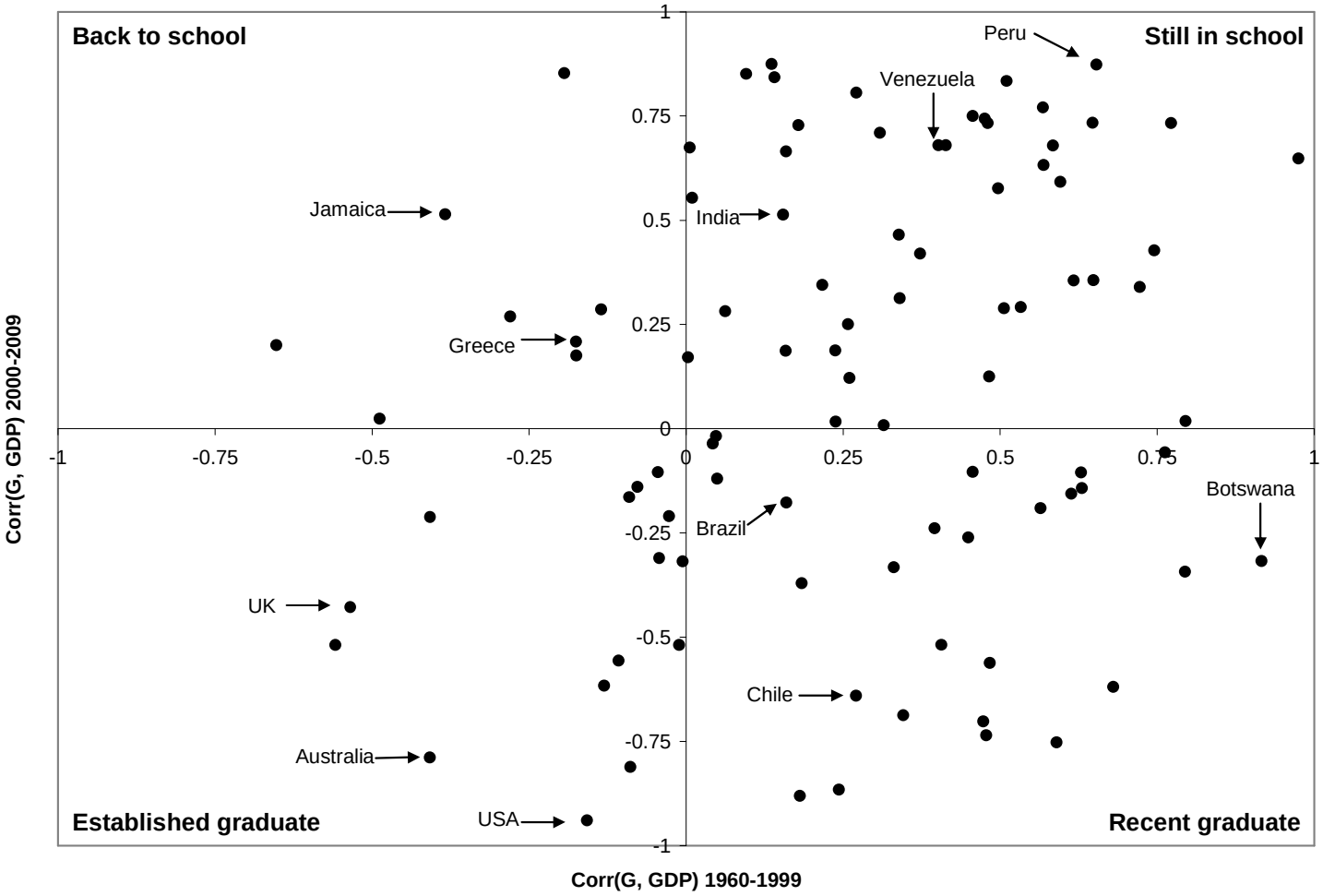
Notes: Dark bars are industrial countries and light ones are developing countries. The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. See Appendix 2 for correlation values for each country.
Source: World Economic Outlook and International Financial Statistics (IMF).

Figure 3. Country correlations between the cyclical components of real government expenditure and real GDP. 2000-2009



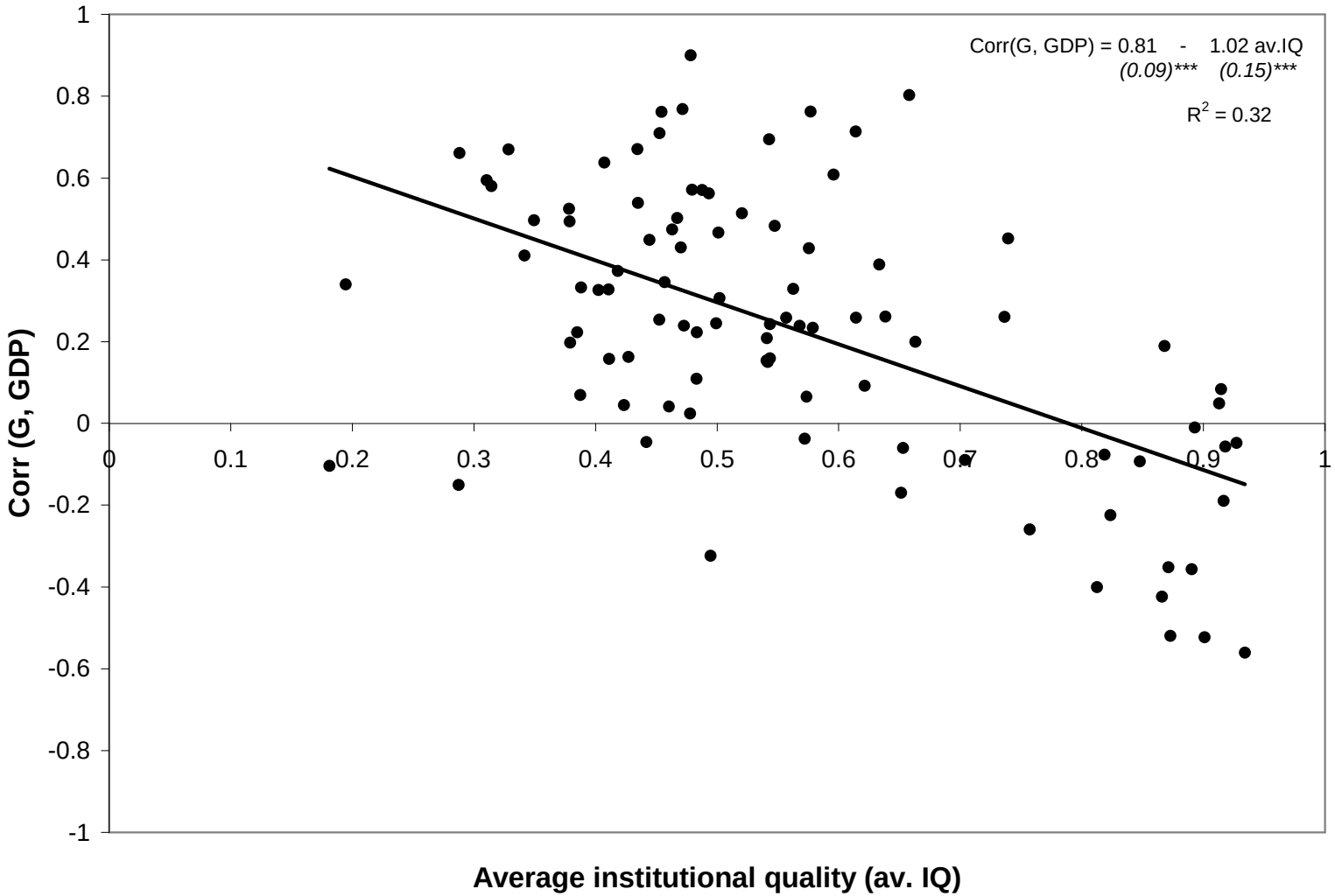
Notes: Dark bars are industrial countries and light ones are developing countries. The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. See Appendix 2 for correlation values for each country.
Source: World Economic Outlook and International Financial Statistics (IMF).

Figure 4. Country correlations between the cyclical components of real government expenditure and real GDP. 1960-1999 vs. 2000-2009



Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. See Appendix 2 for correlation values for each country.
Established graduates: Australia, Austria, Belgium, Canada, Denmark, Finland, Ireland, Italy, Japan, Korea, Netherlands, Spain, United Kingdom, United States, and Yemen.
Never graduated: Angola, Argentina, Azerbaijan, Bangladesh, Cameroon, China, Colombia, Rep. of Congo, Dominican Rep., Ecuador, Egypt, Gabon, Gambia, Ghana, Guatemala, Haiti, Honduras, India, Iran, Jordan, Kenya, Madagascar, Mali, Mexico, Mozambique, Myanmar, New Zealand, Nicaragua, Niger, Pakistan, Panama, Peru, Portugal, Qatar, Senegal, Sierra Leone, South Africa, Sri Lanka, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Uruguay, and Venezuela.
Back to school: Dem. Rep. of Congo, France, Greece, Jamaica, Kuwait, Sudan, Sweden, and Switzerland.
Recent graduates: Algeria, Bahrain, Bolivia, Botswana, Brazil, Chile, Costa Rica, Côte d'Ivoire, El Salvador, Germany, Hong Kong, Indonesia, Libya, Malaysia, Morocco, Nigeria, Norway, Oman, Paraguay, Philippines, Saudi Arabia, Syrian Arab Rep., Turkey, Uganda, United Arab Emirates, and Zambia.
Source: World Economic Outlook and International Financial Statistics (IMF).

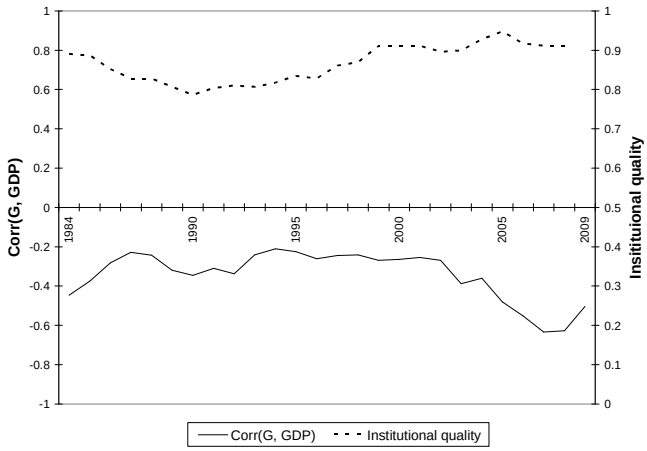
Figure 5. Country correlations between the cyclical components of real government expenditure and real GDP (1960-2009) vs. average institutional quality (1984-2008)



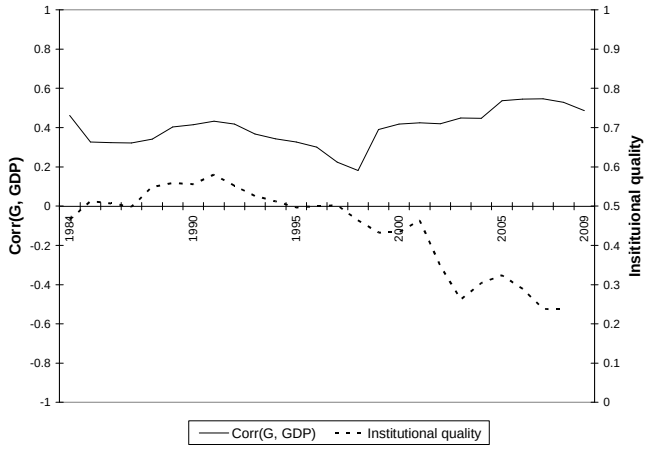
Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country correlations between the cyclical components of real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated for the period 1960-2009. Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, bureaucracy quality. Country average institutional quality (i.e., av. IQ) is calculated for each country for the period 1984-2008. See Appendix 2 for correlation values and average institutional quality for each country.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

Figure 6. Graduation examples. Country correlations between the cyclical components of real government expenditure and real GDP (20-year rolling windows) vs. institutional quality

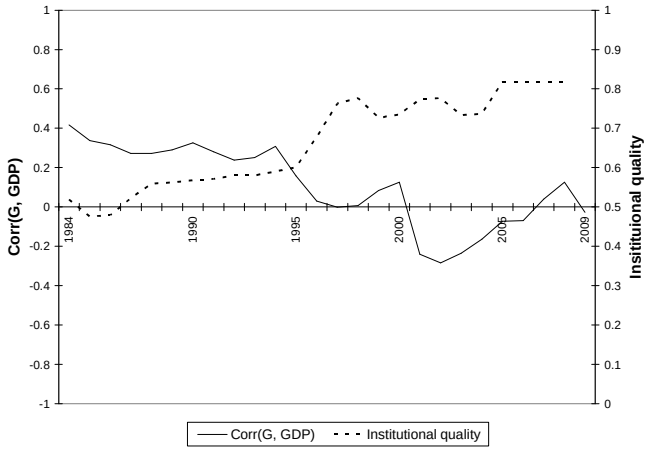
Panel A. Australia (established graduate)



Panel B. Venezuela (still in school)



Panel C. Chile (recent graduate)



Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country correlations between the cyclical components of real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated as 20-year rolling windows for the period 1960-2009.
Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. Actual institutional quality (i.e., for each year) is used.
Institutional quality is shown on the right axis and the correlation between the cyclical components of real government expenditure and real GDP is shown on the left.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

Table 1. Institutional quality statistics by graduating class

Dependent variable is:	IQ	$IQ^{initial}$	ΔIQ
	(1)	(2)	(3)
Group means			
Established graduate (EG)	0.82	0.84	-0.02
Still in school (SS)	0.48	0.43	0.05
Recent graduate (RG)	0.55	0.47	0.07
Back to School (BS)	0.60	0.56	0.04
Mean tests (p-value)			
EG vs. SS	1.9×10^{-251}	1.8×10^{-12}	2.3×10^{-25}
EG vs. RG	2.1×10^{-120}	1.5×10^{-6}	7.7×10^{-33}
EG vs. BS	1.6×10^{-35}	0.009	5.9×10^{-20}
SS vs. RG	3.1×10^{-19}	0.346	1×10^{-4}
SS vs. BS	5×10^{-22}	0.081	0.599
RG vs. BS	4.5×10^{-4}	0.399	0.006

Notes: Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. IQ refers to the current institutional quality value. $IQ^{initial}$ refers to earliest IQ value available for each country; in most cases it corresponds to the 1984 value. The only exceptions are Rep. of Congo (1985), Gambia (1985), Niger (1985), Sierra Leone (1985), Yemen (1990), and Azerbaijan (1998). $\Delta IQ \equiv IQ - IQ^{initial}$. The mean test is a t-test on the equality of means for two groups; the null hypothesis is that both groups have the same mean.
Source: International Country Risk Guide (ICRG).

Table 2. Panel regressions. Dependent variable is the cyclical component of real government expenditure.

	All	Established graduate (EG)	Still in school (SS)	Recent graduate (RG)	Back to school (BS)	All	Established graduate (EG)	Still in school (SS)	Recent graduate (RG)	Back to school (BS)
	(1)	(2a)	(2b)	(2c)	(2d)	(3)	(4a)	(4b)	(4c)	(4d)
RGDP cycle	1.99***	-1.84	1.55***	1.04**	2.95***	2.11***	-1.73	2.43***	1.27***	3.33***
	[11.9]	[-0.8]	[6.6]	[2.4]	[6.6]	[12.1]	[-0.8]	[7.7]	[2.8]	[6.8]
RGDP cycle × IQ	-2.51***	1.5	-1.19**	-1.34*	-4.35***					
	[-7.4]	[0.5]	[-2.3]	[-1.7]	[-4.6]					
RGDP cycle × $IQ^{initial}$						-2.81***	1.44	-3.25***	-1.41*	-4.43***
						[-7.7]	[0.5]	[-4.5]	[-1.8]	[-4.7]
RGDP cycle × ΔIQ						-1.70***	4.78	0.05	-3.67***	-10.91***
						[-3.4]	[1.0]	[0.1]	[-2.8]	[-3.1]
R^2	0.10		0.12			0.11		0.13		
Observations	2273		2273			2273		2273		
Countries	94		94			94		94		

Notes: Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). IQ refers to the current institutional quality value. $IQ^{initial}$ refers to earliest IQ value available for each country; in most cases it corresponds to the 1984 value. $\Delta IQ \equiv IQ - IQ^{initial}$. Estimations are performed using country fixed-effects. t-statistics are in square brackets. R^2 corresponds to within-R^2. Constant, IQ, $IQ^{initial}$, and ΔIQ terms are not reported.
×, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.

Table 3. Panel regressions. Dependent variable is the cyclical component of real government expenditure.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RGDP cycle	2.00***	0.86***	1.26***	0.79***	1.11***	0.49***	1.16***	1.65***
	[11.9]	[16.5]	[13.4]	[13.6]	[12.4]	[6.3]	[15.0]	[4.4]
RGDP cycle ˣ IQ	-2.52***							-1.54**
	[-7.4]							[-2.4]
RGDP cycle ˣ Financial integration		-0.13***						-0.07
		[-3.6]						[-1.2]
RGDP cycle ˣ Financial depth			-1.10***					-0.48
			[-4.7]					[-1.4]
RGDP cycle ˣ Output volatility				0.0004***				-0.0002
				[2.9]				[-0.4]
RGDP cycle ˣ Checks and balances					-0.12***			-0.03
					[-3.2]			[-0.5]
RGDP cycle ˣ Debt-GDP ratio						0.30***		0.23
						[3.0]		[1.3]
RGDP cycle ˣ Foreign reserves							-0.06***	-0.03
							[-4.3]	[-0.9]
R^2	0.10	0.08	0.09	0.07	0.09	0.07	0.10	0.12
Observations	2273	3412	2930	4089	3044	2701	2855	1278
Countries	94	94	94	94	93	93	91	85

Notes: Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). IQ refers to the current institutional quality value. Estimations are performed using country fixed-effects. t-statistics are in square brackets. R^2 corresponds to within-R^2. Constant, IQ, financial integration, financial depth, output volatility, checks and balances, debt-gdp ratio, and foreign reserves terms are not reported.
ˣ, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.

Table 4. Cross-country correlations between economic, institutional, demographic, and geographic variables.

	Corr(G, GDP)	Av. IQ	Financial integration	Financial depth	Output volatility	Checks and balances	Debt-GDP ratio	Foreign reserves	Log european settler mortality	Latitude	British colonial dummy	French colonial dummy	French legal origin dummy	Democracy in 1900	Constraint on executive in 1900	Terms of trade volatility	Debt-GDP ratio in 1900	Currency crashes in mid 20th century
Corr(G, GDP)	1																	
Av. IQ	-0.49	1																
Financial integration	-0.35	0.41	1															
Financial depth	-0.34	0.60	0.38	1														
Output volatility	0.49	-0.37	-0.22	-0.44	1													
Checks and balances	-0.35	0.49	0.36	0.33	-0.31	1												
Debt-GDP ratio	0.11	-0.15	-0.06	-0.14	0.24	-0.18	1											
Foreign reserves	0.07	0.02	-0.06	0.19	0.04	0.28	-0.29	1										
Log european settler mortality	0.47	-0.61	-0.36	-0.63	0.53	-0.46	0.37	-0.19	1									
Latitude	-0.36	0.54	0.24	0.50	-0.32	0.20	-0.21	0.11	-0.52	1								
British colonial dummy	-0.43	0.36	0.10	0.47	-0.33	0.34	-0.08	-0.07	-0.27	0.19	1							
French colonial dummy	0.41	-0.25	-0.33	-0.15	0.19	-0.41	0.23	-0.22	0.38	-0.02	-0.44	1						
French legal origin dummy	0.43	-0.36	-0.07	-0.36	0.34	-0.32	0.09	0.12	0.23	-0.13	-0.92	0.44	1					
Democracy in 1900	-0.53	0.70	0.43	0.42	-0.34	0.36	-0.18	0.04	-0.58	0.52	0.20	-0.30	-0.11	1				
Constraint on executive in 1900	-0.52	0.65	0.33	0.38	-0.31	0.36	-0.25	0.10	-0.56	0.46	0.14	-0.31	-0.03	0.95	1			
Terms of trade volatility	0.20	-0.40	-0.35	-0.47	0.37	-0.40	0.28	0.08	0.43	-0.42	0.00	0.03	-0.06	-0.34	-0.32	1		
Debt-GDP ratio in 1900	0.23	-0.09	-0.13	-0.12	0.16	-0.31	0.35	-0.13	0.16	-0.02	-0.39	0.38	0.39	-0.04	-0.07	0.02	1	
Currency crashes in mid 20th century	0.14	0.00	-0.19	-0.18	0.23	-0.22	-0.04	0.24	0.06	0.15	-0.43	0.20	0.43	-0.06	0.02	-0.09	0.15	1

Notes: See Appendix 1 for definition and source of variables.

Table 5. Cross-country regressions. Dependent variable is the correlation between the cyclical components of real government expenditure and GDP.

	Whole sample (1)	IV sample (2)	Whole sample (3)	IV sample (4)	Whole sample (5)	IV sample (6)	Whole sample (7)	IV sample (8)	Whole sample (9)	IV sample (10)	Whole sample (11)	IV sample (12)	Whole sample (13)	IV sample (14)	Whole sample (15)	IV sample (16)
Av. IQ	-1.02***	-0.90***													-0.49**	-0.57*
	[-6.6]	[-4.0]													[-2.1]	[-1.9]
Financial integration			-0.10***	-0.09**											-0.03	-0.03
			[-4.2]	[-2.7]											[-1.1]	[-1.0]
Financial depth					-0.43***	-0.59**									-0.16	0.11
					[-4.0]	[-2.6]									[-1.1]	[0.4]
Output volatility							0.08***	0.08***							0.05***	0.05**
							[6.9]	[3.9]							[3.7]	[2.4]
Checks and balances									-0.12***	-0.09**					-0.02	-0.02
									[-5.5]	[-2.7]					[-0.9]	[-0.6]
Debt-GDP ratio											0.08	0.06			0.01	-0.01
											[1.1]	[0.8]			[0.1]	[-0.1]
Foreign reserves													0.01	0.01	0.01	0.01
													[1.0]	[0.5]	[0.5]	[0.4]
R^2	0.32	0.24	0.16	0.12	0.15	0.12	0.34	0.24	0.25	0.12	0.01	0.01	0.01	0.01	0.53	0.38
Observations	94	52	94	52	94	52	94	52	93	52	94	52	91	52	90	52

Notes: See Appendix 1 for definition and source of variables. t-statistics are in square brackets. Constant term is not reported.
×, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.

Table 6. Cross-country regressions. Dependent variables are Av. IQ, Financial integration, Financial depth, Output volatility, Checks and balances, Debt-GDP ratio, and Foreign reserves.

	Panel A. Dependent variable is Av. IQ									Panel B. Dependent variable is Financial integration								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log european settler mortality	-0.07*** [-5.5]								-0.02ˣ [-1.6]	-0.31*** [-2.7]								-0.02 [-0.1]
Latitude		0.59*** [4.6]							0.07 [0.5]		1.89* [1.7]							0.20 [0.2]
British colonial dummy			0.06 [0.5]						-0.07 [-1.0]			0.25 [0.3]						-0.15 [-0.2]
French colonial dummy			-0.04 [-0.7]						0.04 [1.0]			-0.89** [-2.4]						-0.74* [-1.9]
French legal origin dummy			-0.04 [-0.4]						-0.19** [-2.7]			0.41 [0.5]						0.45 [0.6]
Democracy in 1900				0.03*** [6.9]					0.02 [1.0]				0.15*** [3.4]					0.40** [2.6]
Constraint on executive in 1900					0.05*** [6.1]				0.01 [0.7]					0.17** [2.5]				-0.48** [-2.2]
Terms of trade volatility						-0.01*** [-3.1]			-0.01 [-1.3]						-0.10** [-2.6]			-0.06ˣ [-1.6]
Debt-GDP ratio in 1900							-0.03 [-0.6]		0.02 [0.6]							-0.35 [-0.9]		-0.30 [-0.8]
Currency crashes in mid 20th century								0.002 [0.01]	0.16 [1.4]								-1.55 [-1.4]	-1.31 [-1.1]
R^2	0.38	0.30	0.15	0.49	0.43	0.16	0.01	0.01	0.69	0.13	0.06	0.12	0.19	0.11	0.12	0.02	0.04	0.40
Observations	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52

	Panel C. Dependent variable is Financial depth									Panel D. Dependent variable is Output volatility								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log european settler mortality	-0.08*** [-5.7]								-0.06*** [-3.2]	0.74*** [4.4]								0.54** [2.2]
Latitude		0.57*** [4.1]							0.12 [0.8]		-4.15** [-2.4]							-0.32 [-0.1]
British colonial dummy			0.29*** [2.9]						0.20** [2.4]			-0.43 [-0.3]						0.70 [0.6]
French colonial dummy			0.02 [0.4]						0.07ˣ [1.5]			0.17 [0.3]						-0.53 [-0.9]
French legal origin dummy			0.14 [1.4]						0.08 [0.9]			0.75 [0.6]						1.55 [1.3]
Democracy in 1900				0.02*** [3.3]					0.0001 [0.01]				-0.19** [-2.6]					0.10 [0.4]
Constraint on executive in 1900					0.03*** [2.9]				-0.001 [-0.04]					-0.26** [-2.3]				-0.20 [-0.6]
Terms of trade volatility						-0.02*** [-3.7]			-0.01** [-2.0]						0.17*** [2.8]			0.10ˣ [1.6]
Debt-GDP ratio in 1900							-0.05 [-0.9]		0.01 [0.4]							0.70 [1.2]		0.08 [0.1]
Currency crashes in mid 20th century								-0.22 [-1.3]	-0.09 [-0.6]								3.09* [1.7]	2.28 [1.2]
R^2	0.40	0.25	0.25	0.18	0.14	0.22	0.02	0.03	0.62	0.28	0.10	0.12	0.12	0.10	0.14	0.03	0.05	0.41
Observations	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52

Notes: See Appendix 1 for definition and source of variables. t-statistics are in square brackets. Constant term is not reported.
ˣ, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.

Table 6 cont. Cross-country regressions. Dependent variables are Av. IQ, Financial integration, Financial depth, Output volatility, Checks and balances, Debt-GDP ratio, and Foreign reserves.

	Panel E. Dependent variable is Checks and balances									Panel F. Dependent variable is Debt-GDP ratio								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log european settler mortality	-0.41*** [-3.7]								-0.15 [-1.0]	0.15*** [2.8]								0.10 [1.3]
Latitude		1.61 [1.4]							-0.77 [-0.6]		-0.77ˣ [-1.5]							-0.39 [-0.6]
British colonial dummy			0.40 [0.5]						-0.24 [-0.3]			0.09 [0.3]						0.39 [1.1]
French colonial dummy			-0.82** [-2.2]						-0.38 [-1.0]			0.28ˣ [1.6]						0.07 [0.4]
French legal origin dummy			-0.06 [-0.1]						-0.58 [-0.8]			0.07 [0.2]						0.30 [0.8]
Democracy in 1900				0.13*** [2.8]					-0.04 [-0.3]				-0.03 [-1.3]					0.12ˣ [1.6]
Constraint on executive in 1900					0.19*** [2.7]				0.14 [0.7]					-0.06* [-1.8]				-0.17ˣ [-1.6]
Terms of trade volatility						-0.12*** [-3.1]			-0.10** [-2.5]						0.03** [2.0]			0.02 [1.1]
Debt-GDP ratio in 1900							-0.86** [-2.3]		-0.37 [-1.0]							0.43** [2.7]		0.36* [2.0]
Currency crashes in mid 20th century								-1.87ˣ [-1.6]	-1.07 [-0.9]								-0.13 [-0.3]	0.09 [0.2]
R^2	0.21	0.04	0.20	0.13	0.13	0.16	0.10	0.05	0.43	0.14	0.05	0.06	0.03	0.06	0.08	0.13	0.01	0.32
Observations	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52

	Panel G. Dependent variable is Foreign reserves								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log european settler mortality	-0.34 [-1.4]								-0.45 [-1.3]
Latitude		1.79 [0.8]							2.53 [0.8]
British colonial dummy			0.87 [0.6]						1.01 [0.6]
French colonial dummy			-1.64** [-2.1]						-1.41ˣ [-1.6]
French legal origin dummy			1.99 [1.3]						2.09 [1.2]
Democracy in 1900				0.03 [0.3]					-0.22 [-0.6]
Constraint on executive in 1900					0.11 [0.7]				0.15 [0.3]
Terms of trade volatility						0.05 [0.6]			0.14ˣ [1.6]
Debt-GDP ratio in 1900							-0.68 [-0.9]		-0.57 [-0.7]
Currency crashes in mid 20th century								4.08* [1.8]	3.45 [1.3]
R^2	0.04	0.01	0.11	0.01	0.01	0.01	0.02	0.06	0.25
Observations	52	52	52	52	52	52	52	52	52

Notes: See Appendix 1 for definition and source of variables. t-statistics are in square brackets. Constant term is not reported.
ˣ, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.

Table 7. Instrumental variable cross-country regressions. Dependent variable is the correlation between the cyclical components of real government expenditure and GDP.

	Instrumenting only for Av. IQ							Instrumenting for all right-hand-side variables
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Av. IQ	-1.39***	-1.31***	-1.43***	-1.27***	-1.32***	-1.44***	-1.51***	-1.42***
	[-6.3]	[-5.4]	[-4.8]	[-5.0]	[-5.2]	[-5.5]	[-5.7]	[-2.6]
Financial integration		-0.02	-0.03	-0.03	-0.04ˣ	-0.03	-0.04ˣ	0.01
		[-0.7]	[-1.2]	[-1.3]	[-1.6]	[-1.4]	[-1.6]	[0.1]
Financial depth			0.31ˣ	0.48***	0.45**	0.49***	0.55***	0.39
			[1.5]	[2.6]	[2.6]	[2.8]	[3.1]	[0.6]
Output volatility				0.06***	0.06***	0.06***	0.07***	-0.02
				[3.9]	[3.9]	[3.9]	[4.1]	[-0.2]
Checks and balances					0.02	0.02	0.03ˣ	-0.16
					[0.9]	[1.2]	[1.6]	[-1.3]
Debt-GDP ratio						-0.04	-0.07	-0.17
						[-0.9]	[-1.3]	[-0.5]
Foreign reserves							-0.02	-0.03
							[-1.1]	[-0.5]
Overidentification test (p-value)	0.65	0.66	0.66	0.64	0.57	0.37	0.45	0.49
Weak identification tests (p-value):								
For Av. IQ	1.1×10^{-11}	7.6×10^{-11}	4.5×10^{-9}	4.2×10^{-9}	1.6×10^{-8}	7.2×10^{-8}	2×10^{-6}	1.1×10^{-11}
For Financial integration								1.4×10^{-3}
For Financial depth								1.6×10^{-9}
For Output volatility								6.9×10^{-5}
For Checks and balances								4.5×10^{-7}
For Debt-GDP ratio								2.4×10^{-2}
For Foreign reserves								1.3×10^{-3}
Observations	52	52	52	52	52	52	52	52

Notes: See Appendix 1 for definition and source of variables. t-statistics are in square brackets. The weak-identification test is the first-stage F test of excluded instruments; the null hypothesis is that the model is weakly identified (i.e., the excluded instruments have a nonzero correlation with the endogenous regressors but small). The over-identification test is the Hansen's J statistic; the null hypothesis is that the instruments are exogenous (i.e., uncorrelated with the error term). Constant term is not reported.

ˣ, *, ** and *** indicate statistically significant at the 15%, 10%, 5% and 1% levels, respectively.