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Characterizing Business Cycles in Small Economies

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Abstract

This paper aims to document a set of stylized facts characterizing business cycle dynamics in smaller economies. The paper uses a large sample of countries spanning 1960–2014 to show that country size is a significant factor affecting countries' volatility, comovement with gross domestic product and real interest rate, and persistence. Specifically, analysis finds that smaller countries (i) tend to have more volatile gross domestic product; (ii) have more volatile, less procyclical, and less persistent investment; (iii) exhibit more volatile trade balance and current account, have more procyclical exports, and thus less countercyclical trade balance; (iv) have more volatile government consumption and more procyclical public revenues and fiscal balance; and (v) possess more procyclical inflation. The effects of country size remain robust even after we control for the level of economic and institutional development, the presence of fiscal rule(s) and fixed exchange rates, and the commodity exporting status.

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Produced by the Research Support Team

Characterizing Business Cycles in Small Economies[*]

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1. Introduction

Economic volatility has become an undeniable reality for countries around the world. Developing countries have been particularly susceptible to large and frequent changes in the internal and external economic conditions. This is troubling since greater volatility is frequently associated with lower growth (Hnatkovska and Loayza, 2005) and higher inequality (Breen and Garcia-Penalosa, 2005). These effects are likely to be even more pronounced in smaller economies partially due to their less diversified production and trade structure coupled with greater trade openness. This combination makes it particularly difficult for these countries to absorb and smooth out the effects of terms of trade shocks, fluctuations in international interest rates, and environmental disturbances. As a result, these countries are more likely to exhibit higher vulnerability to external and internal shocks, and greater volatility of the key macroeconomic aggregates such as output, consumption, investment, current account, etc.

The relationship between country size and its economic performance has received renewed interest with the "new growth literature". With its focus on increasing returns to scale, this literature has emphasized the positive relationship between country size and economic growth. Empirical works, however, failed to find a significant association between the two variables.

A few empirical studies, such as Easterly and Kraay (2013) as well as Lederman and Lesniak (2016), however, do identify common features of smaller economies. In particular they find that small economies are more concentrated in terms of their value added, their export basket, their export destinations, that they are more open than larger economies, and that they have more volatile growth patterns. These features are highly relevant for the design of economic policies in those countries.

A topic that has been understudied in the literature so far is the relationship between economic size and the business cycle characteristics of small economies. This relationship is at least as important for policy design as the performance characteristics mentioned above and this paper intends to contribute to filling this gap.

The purpose of this study is to provide a comprehensive evaluation of the relationship between country size and its business cycles characteristics. Specifically, we aim to contrast the volatility, cyclicality and persistence of the key macroeconomic aggregates in small economies with those in larger economies. Our benchmark approach focuses on the properties of the cyclical component of various series obtained using Hodrick-Prescott decomposition. We explore several definitions of size -- based on population, labor force and geography.[1]

There are various reasons for why size may matter for business cycle fluctuations. First, smaller countries tend to have larger governments. Then, if government policy is a source of uncertainty and shocks, smaller countries will have more volatile economies. Second, smaller countries are less able to insure imperfectly correlated shocks across their different regions and jurisdictions, as well as sectors ad industries, and therefore may experience more pronounced business cycles.

[1] We also studied employment as a measure of size and found that results remain robust. Due to the scarcity of employment data for many countries, we focus on population, labor force and land area in the paper which allows for the broadest country coverage.

Third, smaller countries have lower capacity to build redistributive schemes across their regions and jurisdictions, reducing the ability of these countries to insure against regional shocks through fiscal transfers. Fourth, smaller countries have less diversified production and exports, which makes them more susceptible to domestic and external shocks. Fifth, smaller countries tend to rely more on fixed exchange rate policy. Sixth, smaller countries are more prone to weather shocks and natural disasters. All these channels indicate that business cycles are likely to be more pronounced in smaller economies.

We find strong empirical support for this intuition. Our analysis yields the following key results:

- Countries with smaller population have more volatile GDP and GNI. This is likely due to both larger and more volatile shocks facing small countries and their inability to insure them due to market imperfections and frictions.
- Smaller countries also have investment that is more volatile, less procyclical and less persistent. These properties of investment are likely the outcome of larger shocks to investment in small economies, as well as lack of scale economies in the private sector in small countries.
- We also find that trade balance and current account are more volatile in small economies.[2] Trade balance is also less countercyclical in these countries, primarily driven by more procyclical exports. Higher volatility likely reflects greater trade openness of small economies and their greater vulnerability to external conditions and natural disasters, while higher cyclicality is likely driven by a more concentrated production structure and exports.
- Small countries also feature higher fiscal volatility (government consumption volatility), and more procyclical fiscal balance, driven by more procyclical public revenues.[3] Higher fiscal volatility is likely a reflection of expenditure responses to domestic shocks in small countries, such as weather and natural disaster shocks. Higher revenue cyclicality is likely due to greater reliance of these economies on trade taxes, and further narrowing of the tax base through income tax holidays and "tax havens" for multinational activity.
- Inflation is more procyclical and less persistent in small economies, likely indicating the prevalence of demand-side shocks in these economies.
- Inspired by the literature emphasizing the importance of interest rate shocks in developing countries, we also explore the cyclicality of key macroeconomic aggregates with the real interest rate. We find that smaller countries tend to have more negative correlation between GDP and real interest rates, however, the difference is not statistically significant. The only significant effect of country size that we find is the stronger correlation between terms of trade and real interest rate in smaller countries, likely indicating the importance of endogenous risk premium in small countries.

[2] Or results also indicate that smaller countries feature less persistent current account, which together with higher volatility of current account in these countries suggest large and volatile shocks to current account (i.e. weather and natural disasters shocks, terms of trade shocks, investment shocks, etc.).

[3] We also find that government consumption is less procyclical with GDP while government investment is more procyclical with GDP in small economies. However, the differences are not statistically significant.

These results are broadly confirmed when country size is measured by labor force and land area.

Given the importance of the level of development for business cycles characteristics reported in the literature (for instance, Neumeyer and Perri, 2005; Aguiar and Gopinath, 2007; Calderón and Fuentes, 2007, and others) we investigate to what extent our results for country size are driven by differences in the level of development between small and large economies. We find that controlling for the level of development, country size remains a significant factor affecting business cycle volatilities. Interestingly, we also show that controlling for country size, developing countries have significantly higher macroeconomic volatilities compared to developed economies. These results are consistent with the existing studies that focus on the properties of business cycles in developing countries.

Turning to correlations with GDP, we show a similar result: controlling for the level of development, it is still the case that the cyclicality of a number of macro aggregates varies with country size. We also find that, conditional on country size, developing countries tend to have less procyclical aggregate investment, consumption, imports, and inflation; and less countercyclical trade balance.[4] Interestingly, we find that the cyclicality of real interest rate with GDP is not affected by the level of development when country size is controlled for. On the fiscal side, we show that controlling for country size, fiscal balance and public revenues are less procyclical, while public expenditures are more procyclical with GDP in developing countries.

Lastly, we look at the persistence of various macroeconomic aggregates and their correlations with the real interest rate. We find that practically all effects of country size on these business cycle moments survive even after controlling for the level of development.

Overall, these results suggest that country size exerts a significant effect on business cycles dynamics and that this effect exists above and beyond the level of development effect that it potentially confounds.

To ensure that our results are not driven by other country characteristics we introduce additional controls into our regressions of business cycle moments on size and level of development. Specifically, we add the level of institutional development which is proxied by the International Country Risk Guide (ICRG) index; a dummy variable for commodity exporting countries; a dummy variable for countries with fixed exchange rate regime; a dummy variable for the presence of fiscal rule(s); and a set of regional dummies.[5] We find that the effects of country size remain mostly unchanged even after controlling for these additional country characteristics. These results confirm the importance of country size for characterizing business cycle dynamics.

Finally, given our larger interest in the role of fiscal rules in the economic stabilization of small economies, we compare the business cycles characteristics of countries that have adopted various

[4] The lower countercyclicality of trade balance with GDP in developing countries may seem surprising in light of the results in Aguiar and Gopinath (2007). We confirm their finding of more countercyclical trade balance in the sample of 13 emerging market economies used in their analysis, and show that their findings do not extend to a larger sample of developing countries used in our study.

[5] These are relevant characteristics because smaller countries are more likely to adopt a fixed exchange rate regime, are slightly more likely to be commodity exporters, and are less likely to adopt fiscal rules.

types of fiscal rules and non-adopters. We find that volatilities of almost all variables are lower for countries with fiscal rules in place. However, after controlling for country size and other country characteristics, the difference remains highly statistically significant for inflation only. Interestingly, this result masks significant differences in business cycle characteristics of countries with different types of fiscal rules. For instance, we show that lower volatility result was driven by countries with revenue rules.

We then subject our findings to a series of robustness checks. First, we contrast the length and amplitude of business cycles in small and large countries. For this purpose, we apply the Harding and Pagan (2002) business cycles dating algorithm to quarterly GDP series in 39 developed and 30 developing countries.[6] We show that the amplitude of expansions is the same in small and large countries, while contractions are significantly more pronounced in small countries. This confirms our findings of greater GDP volatility in small countries. We also find that the duration of expansions is shorter in small countries, compared to large economies. At the same time, the duration of contractions is comparable in the two groups of countries. These findings indicate potential differences in the duration of business cycles between large and small countries. Therefore, we revisit our business cycles analysis by applying a lower smoothing parameter in the Hodrick-Prescott decomposition of the series in small countries. We find our results to be robust to this amended decomposition.

Second, we use Baxter and King (1995) band pass filter to decompose the series into trend and cyclical components. The results are robust to this alternative decomposition.

Third, we explore the sensitivity of our results with respect to alternative definitions of fixed exchange rate regime, and to the duration of fiscal rules used by different countries. Again, our results go through practically unchanged.

To sum up, we believe our results put forward a novel country characteristic – size (as measured by population or labor force or land area) – that exerts a significant influence on its business cycle properties.

The prevalence of larger and more volatile shocks, higher macroeconomic volatility, lower cyclicality of investment, and strong comovement of public revenues, fiscal balance and exports with GDP constitute important vulnerabilities faced by small economies. They motivate several recommendations for policy in these countries. First, we argue that countercyclical expenditure rule or fiscal rule that forces these economies to save for the "rainy day" during good times will help to alleviate the vulnerabilities faced by small economies by cushioning them in the face of weather, terms of trade, or world demand shocks, and by stabilizing tax base and investment. Second, we argue that balanced budget rule may not have the desired effects in small economies as it would require strongly procyclical public expenditures in order to match higher cyclicality of public revenues. Third, in order to stabilize the tax base, small economies may want to rethink tax breaks for multinationals; and instead subsidize domestic investment, especially for small

[6] These are all the countries for which we could find quarterly real GDP series with at least 30 quarters of non-missing observations.

firms who likely face lack of scale economies in investment (for instance, by subsidizing the fixed cost).

The rest of the paper is organized as follows. Section 2 provides a review of the relevant literature and discusses why country size may matter for business cycle dynamics. Section 3 describes the data and methodology used in the analysis. Section 4 contains a discussion of the results. Section 5 provides robustness evaluations. Section 6 summarizes the results and discusses their policy implications. Section 7 concludes. Additional results and robustness evaluations are presented in the Appendix.

2. Context and Literature Review

Our work is related to a large literature studying business cycle fluctuations in different countries. Most of this literature has primarily focused on contrasting the business cycle characteristics of industrial and emerging market economies. For developed countries, the set of stylized facts describing business cycles is found to be quite robust to country samples and time periods and is well-documented in the literature (see Kydland and Prescott, 1990; Backus and Kehoe, 1992; Backus, et al. 1995; and many others). These empirical regularities include: (i) Output and consumption have similar volatility, while investment is 2-3 times as volatile as output. Government expenditures are significantly less volatile than output; (ii) Consumption, investment and employment are procyclical with output; (iii) Government expenditures are generally acyclical or weakly countercyclical; (iv) Net exports to GDP are countercyclical; and (v) Output exhibits significant persistence.

Similar analysis for developing countries has been somewhat more limited and less conclusive. For instance, Agenor et al. (2000) document key features of macroeconomic fluctuations in 12 developing middle income countries. They show that output volatility, while varies significantly across countries, is much higher on average in these countries than in developed economies. They also find substantial persistence in output fluctuations in developing countries. In terms of fiscal policy, they show that government expenditures are countercyclical. Terms of trade appear to be strongly positively correlated with output fluctuations. The authors interpret their findings as suggesting that supply-side shocks are important drivers of business cycles in developing countries.

The works that followed revisited and challenged some of these findings. For instance, Rand and Tarp (2002) use a sample of 15 developing countries at a quarterly frequency to show that the duration of business cycles is shorter in developing countries than in developed economies. Then, using annual data for the same countries and a Hodrick-Prescott filter with smoothing parameter around 1 (indicating shorter cycles in developing countries) they show that GDP volatility is larger in developing countries than in the OECD economies, although the difference is small (around 15-20%). They also find that consumption is more volatile than output and that this result is true both for private and public consumption. At the same time, investment volatility in developing countries is in line with that for developed economies, in their study. For trade-related indicators such as imports, exports, terms of trade and the real effective exchange rate, they find no significant differences in volatility between developing and developed countries. When it comes to the

cyclical properties of macroeconomic aggregates, Rand and Tarp (2002) show that the correlation of consumption (private and public) and investment with GDP in their sample of developing countries is significant, positive, and in line with the same correlations in developed economies. Public expenditures and output are significantly positively correlated in six developing countries in their sample, and in general, the authors do not find clear evidence of a countercyclical role of fiscal policy in their data. Lastly, they show that imports are strongly procyclical, especially in Latin America, while exports do not exhibit a robust relationship with output.

Calderón and Fuentes (2007) and Male (2010) challenged the findings in Rand and Tarp (2002) of the shorter duration of business cycles in developing countries. While the previous studies have relied predominantly on Hodrick-Prescott filter or Band-Pass filter to remove the trend component of the macroeconomic aggregates, Calderón and Fuentes (2007) used a methodology in Harding and Pagan (2002) to identify the business cycle component of the variables. Then, using a sample of twelve Latin American, eight East Asian and Pacific and three other emerging economies, they show that the duration of contractions is similar in developed and developing countries, but the duration of expansions is shorter in developing countries, on average. They also show that the amplitude of contractions and expansions is larger in developing economies than in developed countries. Moreover, they find that the output losses associated with contraction are significantly larger in developing countries.

More recently, a few systematic regularities common to developing countries began to emerge. Neumeyer and Perri (2005), using a sample of 5 emerging market economies and 5 developed countries show that emerging economies business cycles are more volatile, their real interest rates are countercyclical and lead the cycle, their consumption is more volatile than output, and their net exports are strongly countercyclical, relative to developed economies. They propose a model of small open economy with interest rate shocks and financial frictions to rationalize the findings in the data. In their framework, shocks to the interest rate are driven by two components: the international interest rate and the country risk-premium. They show that changes in country spreads are important drivers of business cycles in developing countries. Uribe and Yue (2006) extend this work by empirically estimating and adding endogenous country risk-premium into the model, thus allowing for interactions between world interest rate, country spreads, and emerging-market fundamentals.

Aguiar and Gopinath (2007) revisit the evidence for 13 developed and 13 developing countries and document several striking differences between their business cycles: (i) the trade balance is strongly countercyclical for emerging markets as compared to developed economies; (ii) consumption is 40 percent more volatile than income for emerging markets, while the ratio is slightly below one for developed markets; and (iii) income growth and net exports are twice as volatile in emerging markets as in developed economies. They argue that a neoclassical growth model featuring shocks to trend growth can match these stylized facts.

Male (2010) using a larger sample of 32 developing countries documents that output, consumption and investment of developing countries are significantly more volatile than the corresponding variables in developed economies. For instance, output volatility in developing countries is double that in developed economies. She also finds that consumption is about 30% more volatile than

output, while investment is 3-4 times as volatile as output in developing countries. Both variables are highly procyclical, and of similar degree as observed in developed countries. These results line up well with Neumeyer and Perri (2005), Uribe and Yue (2006) and Aguiar and Gopinath (2007).

Unlike the previous studies, however, Male (2010) also finds that government revenues and expenditures exhibit significant volatility in developing countries: they are significantly more volatile than in developed countries and are 4 times more volatile than output. Moreover, she finds evidence of a countercyclical fiscal policy in developing countries. Male (2010) also documents that real interest rates in her sample of developing countries are less volatile than in developed economies and are weakly procyclical in Africa, Asia and Eastern Europe, but are countercyclical in Latin America. These results are in contrast the findings in Neumeyer and Perri (2005), Lubik and Teo (2005), Uribe and Yue (2006).

On the trade margin, Male (2010) shows that exports and imports are strongly procyclical in developing countries, although no systematic relationship emerges with trade balance. Moreover, terms of trade are strongly procyclical for the majority of developing countries in her sample. These results are generally in accord with Agenor et al. (2000). Lastly, she finds that output fluctuations in emerging markets are quite persistent, however, the magnitude of this persistence is found to be somewhat smaller than in developed economies.

Thus, while some common features in business cycle characteristics of developing countries emerge in the literature, a few important disagreements still remain. Namely, while the literature generally agrees than business cycles in developing countries are more volatile than in developed economies, the disagreements persist about some of the cyclical properties of the macroeconomic aggregates. This is especially the case for the cyclicality of trade balance and real interest rates.

The level of development is just one of the many country's characteristics that may affect its business cycle dynamics. In this study we are interested in learning whether country size may exert an independent influence on country's cyclical fluctuations. There are numerous reasons for why country size may matter:

- Smaller countries lack scale economies in the public sector. As a result, the cost of public goods in per capita terms is higher in smaller (less populous) countries, leading them to have larger governments (see, for instance, Alesina and Wacziarg (1998) who showed that the share of government spending over GDP is decreasing in population). If government is a source of macroeconomic uncertainty, then it is likely that smaller countries will have more volatile business cycles.[7] Furthermore, with government consumption expenditures (and public sector wage bill, in particular) taking up a larger share of GDP in small economies, the cyclicality of government consumption in small economies will likely be reduced. The cyclicality of public investment, on the other hand, is likely amplified to accommodate more rigid public consumption.

[7] In addition, smaller countries may experience higher volatility of government spending because they are less able to insure against idiosyncratic shocks, and because they have a smaller pool of taxpayers to spread the cost of financing government spending. Confirming this intuition, we find that smaller countries tend to have more volatile government spending. A similar result is documented in Furceri and Poplawski-Ribeiro (2008).

- Smaller countries lack scale economies in the private sector, leading to a more concentrated production structure and exports (see for example, Lederman and Maloney (2012), Lederman, Pienknagura and Rojas (2015), and Pinies, Wacker and Varma (2015)).[8] Indeed, in our data set, exports of small economies (based on 1.5 million population threshold) are concentrated in services, with the share of the latter in total exports equal to 46% as opposed to just 23% in large countries. Moreover, a substantial fraction of service exports in small economies is derived from tourism. This lowers risk-sharing opportunities across sectors and regions through factor reallocation, thus increasing the exposure of small economies to domestic and external shocks, and amplifying their business cycle fluctuations. Lack of scale economies in the private sector also likely affects private investment by making it lumpy and more volatile, as well as reducing its cyclicality with GDP.

- Smaller economies are more open to trade. This influences both volatility and cyclical dynamics of macro variables in these countries. For instance, Di Giovanni and Levchenko (2012) show how country size impacts on aggregate volatility through the trade channel in the data and in a model of heterogeneous firms. They argue that when the distribution of firm sizes is fat-tailed, idiosyncratic shocks to large firms can generate aggregate fluctuations (see also Delli Gatti et al. 2005; Gabaix 2011). Since smaller countries have fewer firms they will also experience higher aggregate volatility. Trade openness also affects the cyclical properties of macro aggregates. With exports being a larger component of GDP in small economies, its cyclicality with GDP is likely to be higher in these countries. In addition, small states tend to rely more on trade taxes, both due to greater trade openness, as well as prevalence of income tax holidays, "tax havens" for multinational activity, and other incentives in some regions. This narrows their tax base and leads to more procyclical tax base and public revenues in small economies.

- Larger countries are better able to hedge imperfectly correlated shocks across their different regions and jurisdictions. In the environment of imperfect international financial markets, where countries cannot fully self-insure, this implies that smaller countries will have more pronounced business cycles. Indeed, using intranational data for the US and Canada, Imbs (2004) show that bilateral risk sharing tends to be associated with low output correlations.

- Larger countries have greater capacity to build redistributive schemes across regions/jurisdictions, which allows them to better insure against shocks and thus reduce the impact of these shocks on the economies. Such transfers may take place through changes in regional tax payments or explicit transfers in response to temporary or permanent shocks to relative regional GDP. There is a large literature in public finance measuring the extent of fiscal transfers across regions/jurisdictions within countries in response to regional income differentials (see, for instance, Boadway and Shah (2009)). Hagen (2007) and Poghosyan, Senhadji, and Cottarelli

[8] The literature has discussed various channels through which country size may limit specialization and lead to a greater market size. For instance, Romer (1986), Lucas (1988), and others have argued that greater scale allows countries to benefit from positive externalities in the transmission of knowledge and human capital accumulation. Aghion and Howitt (1998) and Aghion et al. (2002) emphasized the idea that greater scale creates incentives for product competition and thus higher growth.

(2015) summarize the empirical literature on the size of interregional transfers across the OECD countries; Sachs and Sala-i-Martin (1992) provide estimates for the US; Bayoumi and Masson (1995) for Canada; and Obstfeld and Peri (1998) for Italy. They all find evidence of non-negligible within-country fiscal risk sharing.

- Small economies are more prone to weather shocks and natural disasters, which create potential disruptions in production and exports, and add to macro volatility in these economies.

- A number of small economies around the world have adopted fixed exchange rates regimes rendering their monetary policy subordinate to the goal of exchange rate stability.[9] As a result, the burden of macroeconomic stabilization falls entirely on the fiscal policy in these countries. With a limited number of stabilization instruments, smaller economies may experience more volatile business cycles.

- There are also benefits of being small. These include lower administrative and congestion costs (Alesina and Spolaore, 2003); and more importantly, lower heterogeneity of preferences of different individuals within a country (Olson, 1982). In the data, population heterogeneity has been documented to be inversely related to measures of economic performance, economic freedom, and quality of government (Easterly and Levine (1997), La Porta et al. (1999), Alesina et al. (2003)). This factor likely has a stabilizing effect on small economies.

The arguments laid out above suggest that, depending on which effects of size dominate, smaller countries may be faced with more or less pronounced business cycles relative to larger economies. Cyclicality of investment, trade and fiscal variables also likely differs in small economies. In this paper we provide a detailed characterization of the relationship between country size and its business cycles.

To isolate the effects of size it is important to control for other country characteristics that may affect the relationship between country size and its business cycle dynamics. First, in the data country size and country level of development are correlated. Indeed, we find that developing countries tend to be larger than developed economies in terms of their population, labor force, and land area. Given this empirical fact and based on the insights of the literature studying business cycle dynamics in developed and developing countries, it is important to control for the level of development when evaluating the effects of country size on business cycles dynamics. We consider controls for the level of economic development, as captured by the World Bank income classification variable; and the level of institutional development, as captured by the composite risk index from the International Country Risk Guide.

Second, as noted above, quite a few of the small economies have adopted currency pegs in an attempt to reach price stability or improve external competitiveness. So we also control for the presence of the fixed exchange rate regime in a country. Against the backdrop of minimal monetary policy, it became paramount for these countries to introduce sustainable fiscal policies. Working

[9] For instance, the Organization of Eastern Caribbean States (OECS) uses a common currency among its members and fixes the value of this currency to the US dollar.

towards the goal of more predictable and credible fiscal policy, a number of countries have adopted constraints on their fiscal policies in the form of one or several types of fiscal rules that impose numerical limits on budgetary aggregates (see, for example, Kopits and Symansky (1998) and (2001), IMF (2012), as well as Wyplosz (2005) and (2012)). The imposition of such rules may spill over onto the country's business cycles through several channels.

- Fiscal rules may limit the ability of the government to respond to business cycles shocks and smooth out their effects on the economy. This will tend to amplify macroeconomic volatility.
- By imposing limits on fiscal policy, fiscal rules lower the stock of debt that the government may accumulate, as well as make fiscal policy more predictable, thus reducing the incidence of fiscal policy shocks on the economy. This channel will tend to reduce macroeconomic volatility.

Therefore, the net effect of fiscal rules adoption depends on which of the two channels dominates. We investigate this question empirically, by comparing the business cycles dynamics of fiscal rule adopters and non-adopters; as well as by controlling for the potential effects of fiscal rules presence when evaluating the effects of country size on its business cycles characteristics.

Lastly, we also control for commodity exporting status since commodity exporting countries are more prone to external shocks such as weather and terms of trade.

3. Data Description and Methodology

Data

A common feature of the studies discussed above is that they rely on relatively small samples of developing countries in their analysis. To a large extent, this is due to limited availability of quarterly data. This produces a trade-off between the country coverage of the analysis and the usage of quarterly versus annual data. Annual data for the key macroeconomic aggregates is available for almost all countries and thus allows for the broadest possible sample coverage. In fact, for most very small countries, which are of particular interest to us, quarterly data are not available at all, leaving us no choice but to use annual data. Moreover, many macroeconomic variables now have long time-series coverage at annual frequency going back to the 1960s, which gives us sufficiently long time series for reliable statistical inference. On top of that, annual data are available for a large spectrum of macroeconomic variables, which allows us to examine various dimensions of business cycle fluctuations.

Our data come from several sources. Most of the macroeconomic variables and variables reflecting country size (population, labor force, employment, geographic area, etc.) are taken from the *World Development Indicators* (WDI) database of the World Bank. This data set covers the period of 1960-2014 at annual frequency. Most aggregate quantities that we use are measured in constant 2005 US dollars.[10]

The data on most fiscal variables, such as government revenues, expenditures, and net lending/borrowing are from the International Monetary Fund's *World Economic Outlook* (WEO)

[10] The business cycle moments remain unchanged when variables are measured in constant local currency units since the two denominations differ by a constant factor.

database and covers the period of 1980-2014 at annual frequency. This data are in national currency and we convert it into real terms using the GDP deflator.

Next, to control for the potential effects of governance, political, economic and financial risk, and political conditions on the business cycles characteristics, we also use the *International Country Risk Guide* (ICRG) database. This data covers the period going back to 1984.

Lastly, to assess the effects of fiscal rules on business cycles dynamics we rely on the International Monetary Fund's *Fiscal Rules database* which contains information on the type of fiscal rule in place, year of implementation, monitoring and enforcement procedures used. This data set is at annual frequency and covers 1985-2014 period.

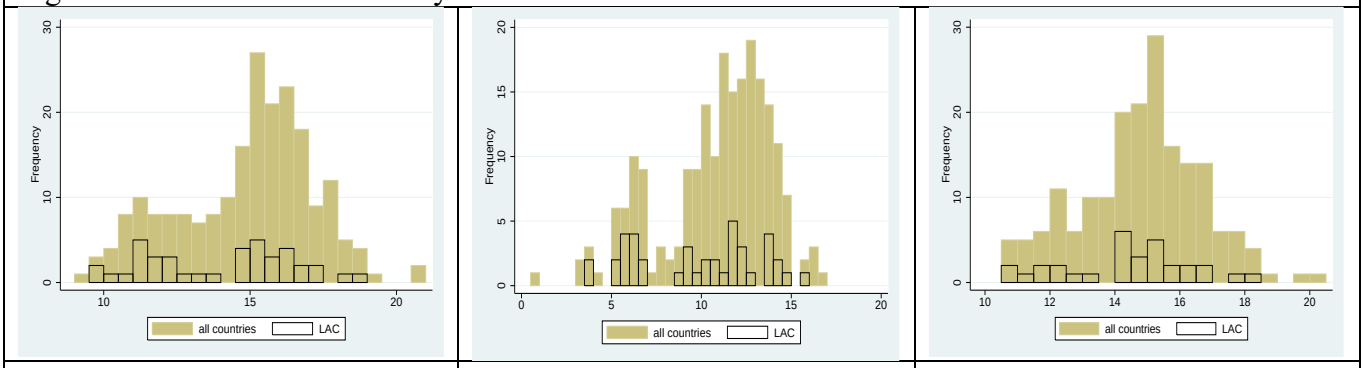
To have the broadest coverage possible, in our analysis we consider all countries and all variables for which we have at least 30 years of annual data. We also exclude countries that are non-sovereign states. This gives us a sample with a maximum of 138 countries (for GDP) and a minimum of 20 countries (for government investment).

Measures of size

We begin by characterizing measures of size we use in our analysis. We consider three key variables – population, labor force and geographic area.[11] For each variable we compute the average value over the sample period of 1960-2014 in each country. Using *average* values for population and labor force, rather than the *end of period* values, has the advantage of allowing to capture longer histories of size dynamics. This becomes especially relevant when using thresholds to separate countries into different size groups. For instance, several small countries in our data set have transitioned by 2014 out of the small group after being in it for most of the period. Using average size allows to account for such transitions and allocate these countries into the small size group.

The distributions of average values of size variables across countries are presented in Figure 1. Given our interest in the Latin America and Caribbean (LAC) region, we also show where LAC countries fit within those distributions.

Figure 1. Distributions of country size



(a) (log) average population (b) (log) average land area (c) (log) average labor force

[11] We also used total employment and found the results to be robust. The disadvantage of using employment as a measure of size is that employment data are available only for 30 countries in our sample.

Among all countries, the median country size in terms of land area is 100,00 sq. km; in terms of population – 4.151 million inhabitants; and in terms of labor force it is about 3 million. We use population as our benchmark variable for size, while land area and labor force are used in the robustness evaluations. Note that LAC countries are quite spread out along the size distributions, with a slight overrepresentation in the left tail of the distribution. This is driven by the small Caribbean economies.

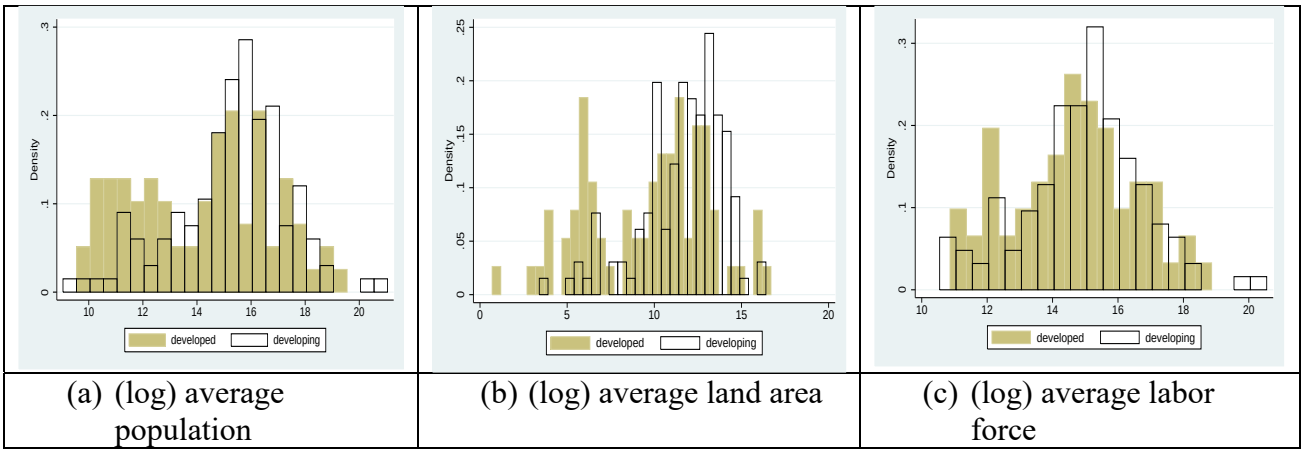
We consider two key thresholds to separate countries into small and not small. First, we define a country to be small if its population is below the threshold of 1.5 million people. This threshold is common in the literature and has been used by the IMF (Small States Report, 2000; Macroeconomic Issues in Small States, 2013, etc.) and the World Bank to define small states. We contrast the characteristics of these countries with those above the threshold of 1.5 million, to which we refer as "large" countries. With this threshold we have 51 countries in the small group and 141 countries in the large group.

In the robustness exercises we also define smallness based on labor force using a threshold of 1 million people; or on land area with a threshold of 20,000 sq. km. In both cases 41 countries fall into the small group. We also consider alternative population thresholds of 1 million and 2 million to define small countries since these have also been used in the existing literature. For instance, Easterly and Kraay (2000) adopt a threshold of 1 million population, while Favaro (2008) used a higher threshold of 2 million people. In these cases, the small group contains 44 countries with 1 million threshold, and 57 countries with 2 million threshold. These results are reported in Appendix B.

Second, we define a country to be small if its average size (measured by population, land area or labor force) is below the median. A large country is the one whose size (measured by population, land area or labor force) is above or equal to the median. This threshold gives us a more conservative measure of smallness.

To understand how country size varies between developed and developing countries, we re-plot the size distributions above, but now conditioning on the developmental status. Specifically, we combine countries classified by the World Bank as low income and middle income countries into a "developing" countries group, while high income OECD and non-OECD countries are combined into a "developed" countries group. Figure 2 plots these conditional distributions.

Figure 2. Distributions of country size by development level



(a) (log) average population | (b) (log) average land area | (c) (log) average labor force

It is easy to see that developed countries tend to be smaller in terms of land area that they occupy, as the land size distribution of these countries on panel (b) of Figure 2 is shifted to the left relative to the same distribution for developing countries. For instance, the smallest developed (high income) country by land area in our data is Monaco, while the largest is the Russian Federation. In the developing country group, the smallest country is Tuvalu, while the largest is China. In the same spirit, developing countries tend to be larger than developed countries in terms of their population (panel (a) of Figure 2) and labor force (panel (c) of Figure 2). Thus, while the association between the country developmental status and its size exists, the relationship between the two is far from perfect.

Business cycles decomposition methodologies

The key methodological aspect of the study is to perform the decomposition of the macroeconomic variables into their trend and cyclical components. We employ several approaches to accomplish this.

One is a non-parametric approach due to Bry and Boschan (1971) and Harding and Pagan (2002, 2006), the second is Hodrick and Prescott (1997) (HP) decomposition, and the third is Baxter and King (1995) band-pass (BP) filter decomposition.

The non-parametric procedure of Bry and Boschan (1971) and Harding and Pagan (2002, 2006) consists of a formal algorithm for dating business cycles by determining the turning points of the series, thus partitioning it into expansions and contractions. Bry and Boschan (1971) original algorithm applies to monthly data, while Harding and Pagan (2002, 2006) adapt it to quarterly data. The algorithm requires that each complete cycle has two phases (expansion and contraction) and they alternate; that the phases are at least 2 quarters long, and complete cycles are at least 5 quarters long. Following Harding and Pagan (2002) we also assume that the turning point is a local optimum relative to 2 quarters of data on either side. We apply this decomposition to quarterly (log) GDP series for 39 developed and 30 developing countries (see Hnatkovska and Koehler-Geib, 2016 for detailed data description).[12] We then characterize the

[12] These, essentially, are all the countries for which we could find quarterly real GDP series.

resulting business cycles by the duration of expansions and contractions and their amplitude. Amplitude measures the cumulative growth of GDP during an expansion and contraction. Duration of an expansion is defined as the length (in quarters) between a trough and a peak; while duration of a contraction is the length between a peak and a trough.

Next we compare the properties of expansions and contractions in small and large countries. As noted above, we define a country to be small if its population is less than 4.151 million people. Large countries have population greater or equal to 4.151 million people. Under this classification, our quarterly data set contains 22 small countries and 47 large countries.[13] Table **1** shows the mean and standard deviation for durations and amplitudes of expansions and contractions, separately for small and large countries in our data set.

Table 1. Characteristics of expansions and contractions, by country size

		Duration (in quarters)		**Amplitude**	
Small (pop<4.151mil)	Obs	Mean	Std. Dev.	Mean	Std. Dev.
expansion	22	17.62	10.00	0.29	0.21
contraction	22	4.30	2.26	-0.07	0.06
Large (pop>=4.151mil)					
expansion	47	23.87	11.63	0.29	0.16
contraction	46	4.38	2.71	-0.05	0.05

Two key features differentiate business cycles in small and large countries. First, the average duration of expansions is shorter in small countries (at 17.6 quarters) relative to large countries (at 23.9 quarters) and the difference is statistically significant at 5% significance level. The average duration of contractions is comparable in small and large countries, equal to about 4 quarters. Second, contractions are more pronounced in small countries, with the average cumulative drop in GDP equal to 7% in small countries, as opposed to 5% in large countries. In contrast, the amplitude of the expansions is the same in the two groups of countries, equal to 29%.

We interpret these results as providing mixed evidence on the differences in business cycles between small and large countries – by some measures, the business cycles are similar in the two groups, by others -- they are distinct. These results for small versus large countries echo the findings in the literature comparing developed and developing countries business cycles. For instance, using Bry and Boschan (1971) procedure to determine the turning points in GDP series for 15 developing countries, Rand and Tarp (2002) argued that the average length of the business cycle for these countries is only between 7 and 18 quarters, or 4.5 years. Other studies, using

[13] We do not use the 1.5 million population threshold to define small states as this gives a very small sub-sample of small countries in the quarterly data set.

different dating procedures show that there is no significant difference in the duration of business cycles between developed and developing countries (see Male, 2010 among others). Yet, others show more mixed evidence. For instance, Calderón and Fuentes (2007) find that on some dimensions, such as the duration of contractions, developed and developing countries are similar, while on others, such as duration of expansions, they differ, with developing countries experiencing shorter expansions, on average.

With these results in mind, we turn to the HP filter to decompose the series into a cyclical and trend components. To apply the HP filter, a choice of the smoothing parameter must be made. A default choice of the smoothing parameter for annual data used in the literature is 100. However, our findings from the Harding and Pagan procedure suggest that small countries business cycles may be somewhat shorter than the business cycles in large economies, which requires using a lower value for the smoothing parameter. We choose to start with the default value of the smoothing parameter equal to 100 for annual series, as our benchmark. This choice also facilitates the comparison of our results with the existing studies that rely on the HP filter to characterize business cycles in developed and developing countries. Then we consider a lower smoothing parameter for small economies in the robustness analysis, which is discussed in appendix D.

In the main text we focus on the results obtained with the HP filter, while the robustness evaluations using the BP filter are presented in appendix D.

After having obtained the cyclical components of the key macroeconomic variables such as gross domestic product (GDP), gross national income (GNI), private and government consumption and investment, employment, current account, trade balance, terms of trade, real interest rates, fiscal balance, public revenues and expenditures, etc., we characterize their volatility, persistence and the patterns of cyclicality with GDP and real interest rate.

This analysis provides us with a set of stylized facts about the business cycles of large versus small, developed versus developing countries, and those with and without fiscal rules in place.

4. Results

Next, we turn to the business cycle statistics for our sample of countries. We are interested in characterizing the volatility of key macroeconomic aggregates, such as output, income, and employment, components of aggregate demand, external variables, and variables capturing the stance of fiscal and monetary policy; the cyclicality of these variables with output and interest rate; as well as their persistence.

Trade balance, current account and fiscal balance are computed as a share of GDP. Interest rate is real lending rate computed as the difference between the lending rate and the consumer price index (CPI) inflation rate. All series (except trade balance, current account, fiscal balance, terms of trade and real interest rate) are log-transformed. To obtain the cyclical components of the variables, they are Hodrick-Prescott (HP) filtered with the smoothing parameter of 100. We also considered a lower smoothing parameter of 6.25 as advocated by Ravn and Uhlig (2002) and

found the results on the differences between large and small countries to remain robust. In fact, as long as the same smoothing parameter is applied to both groups of countries, the effects of size on business cycle statistics go through.

After having computed the cyclical components of our series, we calculate their standard deviation, autocorrelation coefficient, and comovement with the cyclical component of GDP, and real interest rate. We begin by presenting the results for volatilities.

Volatilities

Table **2** summarizes the average values of percentage standard deviation of various aggregates for the groups of small and large economies, as well as the difference between them, when population is used to define country size. Appendix A discusses volatility patterns when size is measured by labor force and land area. The standard deviation of investment, employment, consumption, exports, imports, public revenues and expenditures are all reported relative to the standard deviation of GDP.

As is commonly observed in the business cycles literature, aggregate investment is the most volatile variable among the expenditure components of GDP, with the relative volatility equal to around 4 on average. This number is comparable to that found in other studies. Private and government investment are more volatile than the aggregate, with the volatility of private investment equal to around 6 times that of GDP in small countries and 5 times that of GDP in large economies. The volatility of public investment is even higher at about 7 times that of GDP in both groups of economies.

Public expenditures and revenues are more volatile than GDP by about a factor of 2 in both groups of countries. Note that the data on these series is missing for a large set of countries in our sample, so much so that our subsample of small countries with population below 1.5 million only contains one country. Therefore, in our comparisons for these variables we focus on the definition of smallness based on the median.

Government consumption also exhibits higher volatility than GDP by a factor of about 1.9-2 in small economies; and 1.7-1.8 in large economies. Interestingly, private consumption is more volatile than GDP both in large and small economies. Both exports and imports also exhibit more volatility than GDP in both groups of countries.

Table 2. Volatilities of key macro aggregates, by population

% std dev	<1.5m	≥1.5m	diff	<median	≥median	diff
GDP	4.94	4.67	-0.27	5.51	4.16	-1.35***
	0.46	0.35	0.63	0.49	0.31	0.56
GNI	7.96	4.01	-3.95***	6.97	3.72	-3.25***
	1.96	0.26	1.00	0.96	0.27	0.71
Trade balance/GDP	7.62	3.49	-4.13***	6.56	3.17	-3.39***
	1.83	0.46	1.31	1.15	0.49	1.06
Current account/GDP	5.29	3.63	-1.66	6.16	2.70	-3.46***
	0.35	0.58	1.03	1.01	0.22	0.85

Real int rate	3.09	5.13	2.04	3.81	4.90	1.08
	0.23	1.50	2.01	0.58	1.73	1.95
Terms of trade	11.19	12.06	0.87	11.10	12.28	1.18
	2.12	0.93	2.34	1.33	1.07	1.85
Fiscal balance/GDP	2.28	2.00	-0.28	2.68	1.88	-0.80**
	.	0.12	.	0.40	0.12	0.32
Inflation	3.91	8.34	4.43*	4.24	8.98	4.75**
	0.68	1.42	2.44	0.53	1.68	2.19
% std dev						
% std dev of gdp						
Total investment	3.28	3.34	0.06	3.74	3.17	-0.58**
	0.30	0.13	0.34	0.31	0.11	0.27
Employment	0.47	1.15	0.68	0.75	1.16	0.40
	.	0.20	.	0.29	0.22	0.63
Government consumption	2.00	1.78	-0.22	2.09	1.70	-0.39
	0.42	0.11	0.31	0.27	0.11	0.25
Private consumption	1.78	1.25	-0.53***	1.70	1.19	-0.51***
	0.25	0.05	0.16	0.15	0.05	0.12
Exports	2.47	2.62	0.15	2.37	2.69	0.31
	0.32	0.13	0.32	0.21	0.14	0.26
Imports	2.68	3.22	0.55*	2.78	3.28	0.50**
	0.26	0.12	0.29	0.18	0.13	0.23
Private investment	6.08	5.23	-0.85	5.93	5.13	-0.80
	1.34	0.42	1.08	0.90	0.45	0.90
Public investment	7.29	6.58	-0.71	6.72	6.68	-0.04
	1.13	0.50	1.28	0.94	0.53	1.06
Public expenditures	1.05	2.18	1.13	2.62	2.07	-0.55
	.	0.17	.	0.61	0.17	0.47
Public revenues	1.44	2.29	0.85	2.26	2.27	0.02
	.	0.16	.	0.35	0.18	0.45

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01. Missing entries for standard errors occur because of limited data availability.

At the same time, several interesting disparities emerge between large and small economies. First, we find that GDP is more volatile in small economies, and this dichotomy holds for both measures of size. The differences are even more pronounced for GNI. Notice that volatility of GNI is comparable to volatility of GDP in larger countries, but significantly exceeds the volatility of GDP in smaller countries. This suggests that their net foreign income flows are more variable than in larger countries. Second, private consumption, total investment, trade balance, and current account, all are more volatile in small economies relative to large countries. In contrast, imports and inflation exhibit lower volatility in smaller countries. Lastly, on the fiscal side, fiscal balance is more volatile in small countries. We also find that government consumption and investment, as well as overall public expenditures are more volatile in smaller

economies, while public revenues exhibit similar volatility in small and large countries. The difference, however, is only significant for the fiscal balance.

Next, we assess the relationship between volatilities and size systematically, by estimating simple cross-country OLS regressions of volatilities on a continuous measure of country size. Specifically, we regress each (log) standard deviation or (log) relative standard deviation on (log) population. Appendix B presents the results with (log) labor force and (log) land area as alternative measures of country size. If smaller countries are characterized by higher volatilities, we expect the coefficient on the variable capturing size to be negative and significant. The results are presented in Table **3**.

Table 3. Regressions of volatilities on size: baseline and various controls

	Baseline **(i)**	**w/ developing=1 (ii)**	**w/ all controls (iii)**	**w/ types of FR (iv)**
GDP	-0.06***	-0.06***	-0.10***	-0.09**
GNI	-0.17***	-0.17***	-0.16***	-0.15***
Employment	-0.01	-0.00	0.11	0.22
Aggregate demand:				
Private cons	-0.08***	-0.09***	-0.06	-0.05
Gov cons	-0.01	-0.03	-0.07*	-0.07*
Aggregate inv	-0.06**	-0.06**	-0.08***	-0.09***
Priv investment	-0.06	-0.05	-0.09	-0.08
Gov investment	-0.04	-0.04	0.11	0.20
Exports	0.03	0.02	-0.00	-0.00
Imports	0.06***	0.06***	0.03	0.03
External sector:				
Trade balance/GDP	-0.21***	-0.24***	-0.22***	-0.21***
Current account/GDP	-0.18***	-0.18***	-0.20***	-0.19***
Terms of trade	-0.04	-0.05	-0.04	-0.03
Monetary/Fiscal policy:				
Inflation	0.09**	0.07**	-0.04	-0.02
Real int rate	-0.02	-0.01	-0.05	0.00
Fiscal balance/GDP	-0.12***	-0.12***	-0.06	-0.05
Public expenditures	-0.03	-0.08*	-0.06	-0.01
Public revenues	-0.00	-0.05	-0.04	-0.04
Source:	Table A1	Table A5	Table A9	Table A13

Note: * p<0.10, ** p<0.05, *** p<0.01

Column (i) in Table 3 reports the OLS coefficients from univariate cross-country regressions of (log) volatility of various macroeconomic variables on (log) population. The results confirm the findings from the group comparisons:

1. Volatilities of GDP, GNI, trade balance, current account, fiscal balance, aggregate investment and private consumption all significantly decrease with country size.
2. Only volatility of imports and inflation significantly rises with country size.

Cyclicality

Next, we look at the cyclical properties of macroeconomic aggregates by first considering their cyclicality with GDP, and second – with the real interest rate.

Table **4** summarizes the co-movements of the key macroeconomic aggregates with GDP, as measured by the correlation between the cyclical components of these variables and the cyclical component of GDP. We report this correlation separately for small and large countries, where country size is defined by population. Several results stand out from the table.

First, all key macroeconomic variables such as investment, consumption, government revenues and expenditures, employment, exports and imports comove positively with GDP, i.e. are procyclical with GDP. This result applies to both small and large countries, and holds for both measures of country size. Not surprisingly, GNI is strongly procyclical with GDP, and more so in larger economies.

Second, turning to investment, we find that aggregate investment exhibits lower procyclicality in smaller economies and this result is driven by the private investment. Public investment, instead, is more procyclical with GDP in smaller economies, although the difference is not statistically significant.

Third, private consumption is more procyclical with GDP in larger economies, while government consumption exhibits similar degree of comovement with GDP in both groups of countries.

Fourth, for external conditions, we find that exports are more procyclical in small economies, while imports exhibit similar correlation with GDP. Therefore, trade balance and current account are countercyclical with GDP, and more so in large economies. Terms of trade is weakly procyclical in both small and large economies, with the correlation being higher for small economies.

Fifth, on the fiscal side, both public revenues and expenditures comove more strongly with GDP in small economies, while fiscal balance is positively correlated with GDP in both small and large countries, and the difference between them is negligible.

Lastly, real interest rate is acyclical with GDP in large economies, but is negatively correlated with GDP in small economies. Inflation is procyclical in small economies and is acyclical in large economies. Employment is significantly more procyclical in large economies. These results apply to both thresholds of country size.

Table 4. Cyclicality of key macro aggregates with GDP, by population

	<1.5m	≥1.5m	diff	<median	≥median	diff
GNI	0.81	0.91	0.10**	0.84	0.92	0.08**
	0.06	0.01	0.04	0.03	0.01	0.03
Trade balance/GDP	-0.03	-0.23	-0.20**	-0.10	-0.23	-0.13*
	0.09	0.04	0.09	0.06	0.04	0.07
Current account/GDP	-0.19	-0.24	-0.05	-0.15	-0.27	-0.12*
	0.06	0.04	0.07	0.05	0.04	0.06

Real int rate	-0.15	0.00	0.15**	-0.15	0.02	0.16**
	0.06	0.04	0.07	0.05	0.05	0.07
Terms of trade	0.12	0.12	0.00	0.19	0.09	-0.10*
	0.06	0.03	0.08	0.05	0.03	0.06
Fiscal balance/GDP	0.40	0.26	-0.14	0.25	0.27	0.02
	.	0.05	.	0.08	0.06	0.14
Inflation	0.12	0.00	-0.13**	0.08	0.00	-0.09*
	0.05	0.03	0.05	0.04	0.03	0.05
Aggregate investment	0.52	0.69	0.17**	0.57	0.69	0.12**
	0.06	0.03	0.07	0.05	0.03	0.06
Employment	0.24	0.61	0.37	0.18	0.64	0.47**
	.	0.07	.	0.06	0.06	0.18
Government consumption	0.33	0.29	-0.04	0.29	0.30	0.01
	0.06	0.03	0.07	0.05	0.03	0.06
Private consumption	0.40	0.68	0.28***	0.47	0.70	0.23***
	0.10	0.02	0.07	0.06	0.02	0.06
Exports	0.53	0.43	-0.10*	0.50	0.43	-0.07
	0.06	0.03	0.06	0.04	0.03	0.05
Imports	0.50	0.57	0.07	0.50	0.58	0.08
	0.07	0.03	0.07	0.05	0.03	0.06
Private investment	0.29	0.39	0.10	0.28	0.42	0.14
	0.12	0.05	0.12	0.09	0.05	0.10
Public investment	0.38	0.30	-0.08	0.44	0.27	-0.17
	0.02	0.07	0.18	0.07	0.08	0.14
Public expenditures	0.51	0.00	-0.51	0.16	-0.02	-0.18
	.	0.05	.	0.13	0.06	0.15
Public revenues	0.80	0.47	-0.33	0.62	0.45	-0.17
	.	0.04	.	0.08	0.05	0.12

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Appendix B discusses the comovement patterns when size is measured by labor force and land area. We find them to be consistent across different measures of country size and across different thresholds used to define country size. Moreover, the unconditional cyclicality patterns reported in Tables 4 and in the appendix B generally confirm the results in the existing business cycles literature, and show how they extend to small and large economies.

To assess these results more systematically, we estimate simple cross-country OLS regressions with correlation of a variable of interest with GDP as a dependent variable, and country size (as measured by (log) population) as an explanatory variable. The results are presented in Table 5, column (i). Appendix B presents the results with (log) labor force and (log) land area as alternative measures of country size.

Table 5. Regressions of correlations with GDP on size: baseline and various controls				
	baseline	**w/**	**w/**	**w/**

	(i)	developing=1 (ii)	all controls (iii)	types of FR (iv)
GNI	0.01	0.01	0.03*	0.03**
Employment	0.06*	0.04	0.02	0.05
Aggregate demand:				
Private cons	0.04**	0.04**	0.04**	0.05**
Gov cons	-0.00	-0.00	0.01	0.01
Aggregate inv	0.03**	0.04***	0.03***	0.03***
Priv investment	0.05**	0.05***	0.06	0.07*
Gov investment	-0.03	-0.02	-0.03	-0.03
Exports	-0.03**	-0.03**	-0.05***	-0.04***
Imports	0.02	0.02	0.02	0.02*
External sector:				
Trade balance/GDP	-0.04**	-0.05***	-0.04*	-0.04*
Current account/GDP	-0.02*	-0.02*	-0.02	-0.02
Terms of trade	-0.00	0.00	0.00	0.01
Monetary/Fiscal policy:				
Inflation	-0.03***	-0.03**	-0.03**	-0.03**
Real int rate	0.03**	0.04**	0.03	0.03
Fiscal balance/GDP	-0.04	-0.01	-0.06*	-0.05*
Public expenditures	0.00	-0.02	-0.00	0.01
Public revenues	-0.03	-0.01	-0.07**	-0.07*
Source:	Table A2	Table A6	Table A10	Table A14

Note: * p<0.10, ** p<0.05, *** p<0.01

The main results are:

1. Smaller countries have significantly less procyclical aggregate and private investment, employment and private consumption.
2. Smaller countries are also characterized by a significantly less countercyclical trade balance and current account, with this correlation being largely driven by more procyclical exports.
3. Real interest rate is more countercyclical in small countries.
4. Lastly, in smaller countries' inflation tends to comove more strongly with output.

Next, we study the cyclicality patterns of macro aggregates with the real interest rate. Table 6 summarizes the results when size is measured by population. Again, the results based on labor force and land area are presented in appendix B.

Our results suggest that real interest rates are roughly acyclical with the key macro variables, with exception of inflation, in large economies. However, real interest rate tends to comove negatively with GDP and private investment; and positively with current account, on average, in small economies. Inflation comoves negatively with the real interest rate, and more so in small economies.

Table 6. Cyclicality of key macro aggregates with real interest rate, by population

	<1.5m	≥1.5m	diff	<median	≥median	diff
GDP	-0.15	0.00	0.15**	-0.15	0.02	0.16**
	0.06	0.04	0.07	0.05	0.05	0.07
GNI	-0.07	-0.01	0.07	-0.06	0.00	0.06
	0.04	0.05	0.19	0.09	0.06	0.13
Trade balance/GDP	-0.15	0.01	0.16	-0.11	0.02	0.12
	0.10	0.05	0.10	0.08	0.05	0.09
Current account/GDP	0.10	0.05	-0.05	0.14	0.00	-0.14*
	0.08	0.05	0.09	0.07	0.05	0.08
Terms of trade	0.05	-0.02	-0.07	0.08	-0.05	-0.13
	0.12	0.08	0.16	0.09	0.09	0.14
Fiscal balance/GDP	0.29	-0.02	-0.31	-0.05	0.00	0.05
	.	0.05	.	0.14	0.05	0.14
Inflation	-0.87	-0.68	0.19**	-0.82	-0.69	0.13*
	0.03	0.06	0.08	0.05	0.06	0.08
Total investment	0.00	0.01	0.02	0.01	0.01	0.00
	0.14	0.05	0.12	0.09	0.06	0.10
Employment	.	0.10	.	0.16	0.10	-0.06
	.	0.10	.	.	0.11	.
Government consumption	-0.01	0.05	0.06	0.02	0.05	0.03
	0.06	0.05	0.11	0.05	0.06	0.09
Private consumption	0.00	-0.03	-0.03	-0.05	-0.02	0.03
	0.13	0.06	0.14	0.11	0.06	0.11
Exports	-0.09	-0.07	0.03	-0.15	-0.04	0.11
	0.08	0.05	0.10	0.06	0.05	0.09
Imports	0.03	-0.05	-0.08	-0.02	-0.04	-0.02
	0.12	0.05	0.11	0.09	0.05	0.10
Private investment	-0.30	-0.04	0.27**	-0.28	-0.02	0.27**
	0.08	0.06	0.10	0.07	0.07	0.10
Public investment	0.17	0.02	-0.15	0.04	0.09	0.05
	0.05	0.14	0.24	0.14	0.16	0.23
Public expenditures	0.11	0.05	-0.05	0.16	0.04	-0.13
	.	0.05	.	0.15	0.05	0.12
Public revenues	0.42	0.02	-0.40	0.03	0.03	0.00
	.	0.06	.	0.18	0.06	0.16

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Turning to the regression analysis of these correlations, column (i) of Table **7** reports the results from the regressions of correlation coefficient of real interest rate with various variables on a constant and a variable reflecting country size ((log) population).

Table 7. Regressions of correlations with real interest rate on size: baseline and various controls			
	baseline	**w/ developing=1**	**w/ all controls**

	(i)	(ii)	(iii)
GDP	0.03**	0.04**	0.03
GNI	-0.02	-0.02	0.01
Employment	-0.01	-0.01	0.12
Aggregate demand:			
Private cons	-0.02	-0.02	-0.00
Gov cons	0.00	-0.00	-0.01
Aggregate inv	-0.02	-0.02	-0.01
Priv investment	0.06***	0.06***	-0.03
Gov investment	-0.06**	-0.09*	0.33
Exports	0.01	0.01	0.03
Imports	-0.03	-0.03	-0.03
External sector:			
Trade balance/GDP	0.05**	0.05**	0.05
Current account/GDP	-0.01	-0.01	0.00
Terms of trade	-0.04	-0.04	-0.07**
Monetary/Fiscal policy:			
Inflation	0.04**	0.03**	0.02
Fiscal balance/GDP	-0.01	0.01	0.02
Public expenditures	-0.01	-0.02	-0.05
Public revenues	-0.01	-0.01	-0.03
Source:	Table A3	Table A7	Table A11

Note: * p<0.10, ** p<0.05, *** p<0.01

Column (i) of Table **7** makes it clear that

1. Larger countries tend to have higher correlation between GDP and real interest rates. The same result applies to the correlation between real interest rate and private investment, trade balance, and inflation.
2. The correlation between government investment and the real interest rate, on the other hand, tends to decrease with size.
3. All other correlations seem to be unaffected by country size.

Persistence

Next, we turn to the persistence of the key macroeconomic aggregates. Table **8** summarizes the average first-order autoregressive coefficient for various variables, separately for large and small countries, where as before, country size is measured based on population. The results for labor force and land area are presented in appendix B.

We find that GDP exhibits the highest persistence, but the estimated coefficient does not differ much by country size. GNI, government consumption and private consumption are also quite persistent, but again, are also quite similar for small and large economies. The real interest rate, inflation and current account are the least persistent of all the variables considered, and more so in smaller economies.

Table 8. Persistence of key macro aggregates, by population						
	<1.5m	**≥1.5m**	**diff**	**<median**	**≥median**	**diff**
GDP	0.55	0.55	0.00	0.57	0.54	-0.03
	0.02	0.02	0.03	0.02	0.02	0.03
GNI	0.52	0.51	0.00	0.52	0.51	0.00
	0.05	0.02	0.07	0.03	0.02	0.05
Trade balance/GDP	0.46	0.42	-0.05	0.42	0.43	0.01
	0.03	0.02	0.05	0.03	0.02	0.04
Current account/GDP	0.25	0.28	0.03	0.22	0.31	0.08**
	0.04	0.02	0.05	0.03	0.03	0.04
Real interest rate	0.13	0.24	0.10*	0.16	0.23	0.07
	0.05	0.03	0.06	0.04	0.04	0.06
Terms of trade	0.28	0.31	0.03	0.31	0.30	0.00
	0.06	0.02	0.06	0.04	0.03	0.05
Fiscal balance/GDP	0.41	0.31	-0.10	0.20	0.33	0.13
	.	0.04	.	0.10	0.04	0.10
Inflation	0.18	0.26	0.09**	0.20	0.26	0.06*
	0.04	0.02	0.04	0.03	0.02	0.04
Total investment	0.45	0.55	0.10**	0.51	0.55	0.04
	0.05	0.02	0.05	0.04	0.02	0.04
Employment	0.42	0.63	0.22	0.42	0.64	0.23**
	.	0.03	.	.	0.03	0.09
Government consumption	0.53	0.52	-0.02	0.52	0.52	0.00
	0.03	0.02	0.05	0.03	0.02	0.04
Private consumption	0.50	0.52	0.01	0.47	0.53	0.06
	0.06	0.02	0.06	0.04	0.02	0.05
Exports	0.46	0.43	-0.03	0.46	0.43	-0.03
	0.04	0.02	0.04	0.03	0.02	0.04
Imports	0.53	0.46	-0.07*	0.50	0.45	-0.05
	0.04	0.02	0.04	0.03	0.02	0.04
Private investment	0.38	0.41	0.03	0.39	0.41	0.03
	0.11	0.03	0.08	0.07	0.04	0.07
Public investment	0.39	0.47	0.08	0.42	0.47	0.05
	0.21	0.04	0.12	0.12	0.04	0.10
Public expenditures	0.48	0.36	-0.12	0.23	0.38	0.15
	.	0.04	.	0.11	0.04	0.09
Public revenues	0.64	0.43	-0.21	0.52	0.41	-0.11
	.	0.03	.	0.07	0.03	0.07

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Table **9** investigates the significance of country size for the first-order autocorrelation coefficients of different variables. Column (i) presents the coefficient on size in univariate OLS regressions.

Table 9. Regressions of autoregressive coefficient on size: baseline and various controls				
	baseline	**w/ developing=1**	**w/ all controls**	**w/ types of FR**
GDP	-0.01	-0.00	-0.00	0.00
GNI	-0.00	-0.00	-0.01	-0.01
Employment	0.02	0.02	0.01	0.02
Aggregate demand:				
Private cons	0.01	0.01	-0.01	-0.01
Gov cons	0.00	0.00	-0.01	-0.01
Aggregate inv	0.02**	0.02***	0.01	0.01
Priv investment	0.02	0.02	0.05*	0.04
Gov investment	0.02	0.02	0.00	-0.03
Exports	-0.01	-0.01	-0.02	-0.02
Imports	-0.00	-0.00	-0.01	-0.01
External sector:				
Trade balance/GDP	0.01	0.01	0.00	0.00
Current account/GDP	0.02***	0.03***	0.03***	0.02**
Terms of trade	0.01	0.01	0.01	0.00
Monetary/Fiscal policy:				
Inflation	0.02**	0.02***	0.03***	0.03**
Real int rate	0.01	0.01	0.03**	0.03*
Fiscal balance/GDP	0.02	0.03	-0.01	-0.02
Public expenditures	0.03	0.04*	0.01	0.01
Public revenues	0.00	0.01	-0.02	-0.02
Source:	Table A4	Table A8	Table A12	Table A15

Note: * p<0.10, ** p<0.05, *** p<0.01

Several results are worth pointing out:

1. The coefficient on the measure of country size in the cross-country regressions of current account persistence on (log) population is positive and significant, indicating that current account dynamics are less persistent in smaller countries.
2. We also find that the persistence of aggregate investment and inflation is lower in smaller countries.
3. For all other variables, the persistence does not vary significantly with country size.

5. Robustness

Country Size and the Level of Development

The results above suggest that country size matters for macroeconomic volatility, persistence and cyclicality. We next ask to what extent the regressions above truly pick up the relationship between business cycle moments and size rather than reflect the association between country size and other factors, for instance, the level of development. We investigate this proposition in detail. Our hypothesis is that if size is just a stand-in for the developmental status of a country,

then including a variable capturing the level of country's development should render size variables insignificant in the volatilities, correlations and persistence regressions. To assess this hypothesis, we re-estimate the benchmark OLS regressions from Tables 3, 5, 7, and 9 by adding development level dummy as an explanatory variable. The dummy variable takes a value of 1 for developing countries (low and middle income economies in the World Bank income classification) and 0 for developed economies (high income OECD and non-OECD countries in the World Bank income classification).

Column (ii) of Table **3** reports the regression results for volatilities. It is easy to see that the sign and significance of the size variable survives even after a developing country dummy is included in the regression. Moreover, as can be seen from Table A5 that reports full regression results in the appendix, the developing country dummy is positive and highly significant in almost all regressions, suggesting that developing countries have significantly higher macroeconomic volatilities compared to developed economies. Overall, the results suggest that country size exerts an independent effect on macroeconomic volatilities, above and beyond the level of development effect that it potentially embodies.

Next, we repeat this exercise for the cyclical characteristic of our variables of interest. Specifically, we regress the correlation coefficient of the key macroeconomic aggregates with GDP on the country size variable and a developmental level dummy. The new coefficient on the size variable is presented in column (ii) of Table 5. Detailed regression results are summarized in Table A6 in the appendix.

As was the case with volatilities, we find that the sign and significance of the country size variables survive the inclusion of developmental status variable in the regressions. Controlling for the level of development, it is still the case that aggregate and private investment, private consumption and real interest rate are more procyclical with GDP in larger countries; while size has a negative effect on the comovement of inflation, trade balance, current account and exports with GDP.

The effects of development on cyclicality patterns are also non-negligible. Specifically, controlling for country size, developing countries tend to have less procyclical aggregate investment, consumption, imports and inflation. Development level also exhibits significant effect on the cyclicality patterns of fiscal variables: in accord with the findings in the existing literature (see, for instance, Gavin and Perotti (1997), Talvi and Végh (2005), Ilzetzki and Vegh (2008), etc.) fiscal policy tends to be procyclical in developing countries as both government consumption and public expenditure are procyclical with GDP, with the latter being significantly so. At the same time, we find that public revenues and fiscal balance in developing countries are less procyclical with GDP relative to developed countries.

Interestingly, we also find that developing countries have less countercyclical trade balance than developed countries. This result may seem surprising given the evidence on stronger countercyclicality of trade balance with GDP in emerging markets relative to developed economies in the existing literature. For instance, Aguiar and Gopinath (2007) report the correlation coefficient between trade balance and GDP in quarterly data to be -0.51 on average in

13 emerging market economies and -0.17 on average in 13 developed economies. Our analysis differs from that in Aguiar and Gopinath (2007) in two key respects. First, our data are at annual frequency, while the Aguiar and Gopinath (2007) analysis uses quarterly data. Second, our sample of countries has a much broader country coverage. Effectively, we included in our analysis all countries for which at least 30 years of data exists. Nevertheless, we can contrast our findings with the results in Aguiar and Gopinath (2007) by computing the degree of trade balance cyclicality based on only 26 countries used in their study (see Appendix of their paper for the list of countries). We find that in our data trade balance is indeed more countercyclical in the 13 emerging market economies analyzed in Aguiar and Gopinath (2007), with the average correlation coefficient equal to -0.52, in contrast to the 13 developed countries, where the average correlation coefficient is equal to -0.29. Thus, the finding of weaker average countercyclicality of trade balance in developing countries in our data set is driven by the inclusion of a larger set of countries into our developed and developing country groups.

Next, column (ii) of Table **7** re-evaluates the relationship of cyclical comovement of macro variables with real interest rate and country size by including a developmental status variable into the benchmark regression. We find that practically all effects of country size on this correlation survive when developing country dummy is included in the regressions. In addition we find a few interesting stylized facts for the relationship between the cyclicality with real interest rate and the level of development (these results are presented in Table A7 of the appendix). Specifically, we find that the negative comovement of private consumption with real interest rate is reduced in developing countries. The same result also applies to government consumption. At the same time, higher interest rates also have stronger negative effect on private investment in developing countries. In the same spirit, the correlation of fiscal balance and inflation with the real interest rate is lower in developing countries.

Lastly, we estimate the effect of country size and level of development on the persistence of macro variables. Column (ii) of Table **9** reports our results. Our earlier finding of lower persistence of current account, inflation and aggregate investment in smaller countries remains robust to the inclusion of income dummy into the regressions. In addition, the coefficient on the developing country dummy turns out to be negative and significant in many of the regressions (see Table A8 in the appendix). Specifically, we show that conditional on country size, the persistence of GDP, private and government consumption, trade balance and current account, fiscal balance, inflation, aggregate investment, and public revenues is smaller in developing countries as compared to developed (high income) economies. This result holds with all measures of country size.

To sum up, our results so far suggest that country size matters for a number of business cycle moments. Moreover, country size has an independent effect, above and beyond the effects of the country's level of development.

Country size and fiscal rules

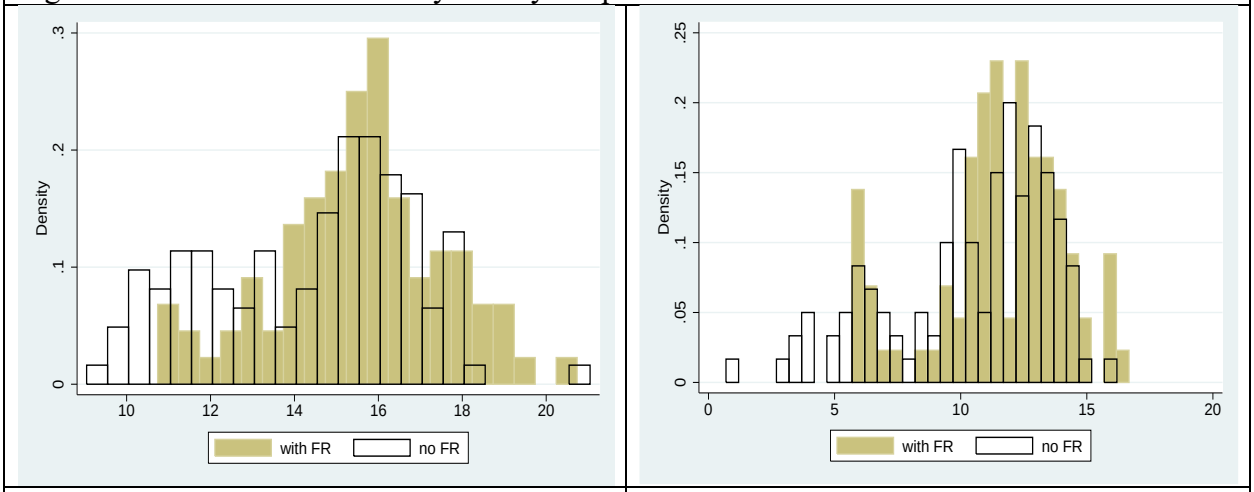
An important aspect of our analysis is to investigate if the adoption of fiscal rule(s) by a country has an effect on its business cycles dynamics. Specifically, we are interested in studying to what

extent macroeconomic volatilities, persistence and cyclicality patterns across countries are influenced by whether they chose to adopt fiscal rules. In our data set, a large fraction of countries -- 42% -- had adopted one or more fiscal rule since 1985. These rules can be of four types – expenditure rule, revenue rule, budget balance rule, and debt rule. It is very common for countries to have several of these rules in place simultaneously. We classify such countries as fiscal rule adopters in our analysis.

It is also interesting to note that among adopters about half are developing countries, and the other half are high income (or developed) countries. Among the non-adopters, the share of developing countries is much higher – at 72%.

The incidence of adopting fiscal rules also varies by country size. Specifically, it tends to be lower among smaller countries – only a third of all small (by population) economies in our sample have some form of fiscal rule in place since 1985. This can also be seen from Figure 3(a) which plots the distributions of country population for fiscal rules adopters and non-adopters; and from Figure 3(b) which shows the distributions of country land area for fiscal rules adopters and non-adopters.[14] The size distribution for fiscal rules non-adopters is shifted to the left on both plots, implying that non-adopters tend to be smaller relative to countries that have adopted fiscal rules.

Figure 3. Distributions of country size by the presence of fiscal rules

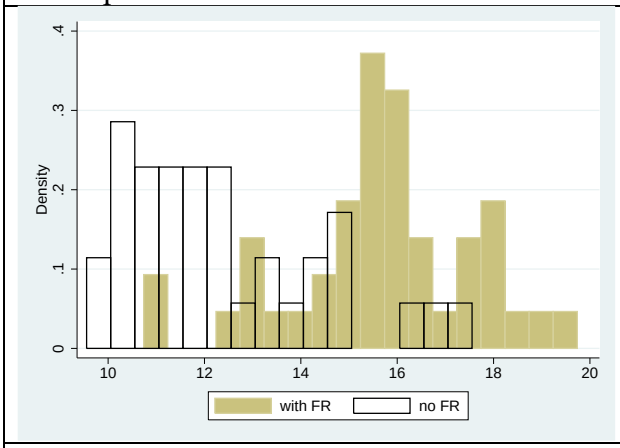


(a) (log) population (b) (log) area

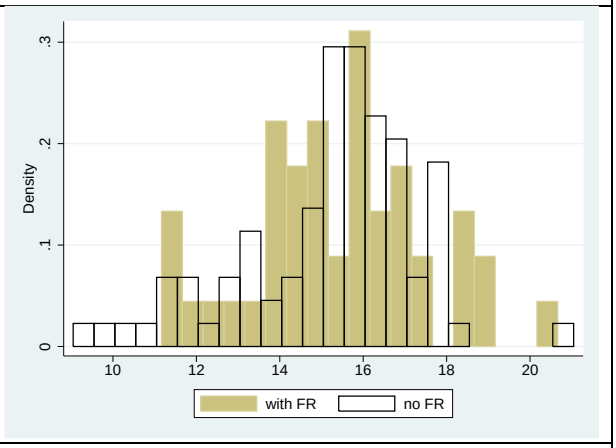
Figure 4 plots the country size distribution (based on population) conditional on both fiscal rules presence and the level of development. Figure 4(a) shows the size distributions for adopters and non-adopters within developed countries group, while Figure 4(b) does the same for the subsample of developing countries. It is easy to see that small countries are less likely to adopt fiscal rules within both developed and developing country groups, but more so for developed economies.

[14] We do not report the plots for labor force since the results are very similar to those for population.

Figure 4. Distributions of country size (population) by the presence of fiscal rules and level of development



(a) developed countries



(b) developing countries

Hence, larger and more developed countries have higher propensity of implementing some form of fiscal policy restraint.

There are various channels through which an adoption of a fiscal rule may spill into macroeconomic performance of a country. On the one hand, fiscal rules may inhibit the ability of the government to respond to business cycles shocks and smooth out their effects on the economy. This will tend to amplify macroeconomic volatility. On the other hand, by imposing limits on fiscal policy, fiscal rules will add credibility and predictability to the fiscal policy, lower the stock of debt that the government may accumulate, and therefore reduce the incidence of fiscal policy shocks on the economy. This channel will tend to reduce macroeconomic volatility. It is therefore an empirical question as to which channel may be more important.

To answer this question, we compute volatilities, co-movements, and persistence of the key macroeconomic aggregates separately for countries that have adopted fiscal rule(s) at some point since the 1985, and those that never had any fiscal rules in place.

Table **10** reports our findings for volatilities. We find that volatilities of almost all variables are lower for countries with fiscal rules in place. For instance, GDP is about 20% more volatile in countries without fiscal rules, compared to countries with fiscal rule. The differences are even more striking for the volatility of government consumption expenditures (which is 42% higher in non-adopters relative to adopters), trade balance (35% higher), current account (44% higher), and real interest rate (120% higher). The difference is strongly statistically significant for government expenditures. Interestingly, volatility of inflation is higher in countries with fiscal rules, which may reflect an endogenous nature of fiscal rule adoption in order to combat high and more volatile inflation.

Overall, these results suggest that the stabilization effect of fiscal rules on the economy tends to dominate their amplification effect on the business cycles.[15]

Table 10. Volatilities of key macro aggregates, by the presence of a fiscal rule			
	no fiscal rule	**with fiscal rule**	**diff**
% std dev			
GDP	5.19	4.30	-0.89
	0.36	0.43	0.56
GNI	5.15	3.92	-1.23*
	0.46	0.44	0.66
Trade balance/GDP	4.91	3.64	-1.27
	0.46	0.79	1.02
Current account/GDP	4.81	3.34	-1.47*
	0.88	0.30	0.89
Real int rate	6.55	2.97	-3.58*
	2.30	0.38	1.92
Terms of trade	12.37	11.39	-0.98
	1.33	0.97	1.70
Fiscal balance/GDP	2.19	1.92	-0.27
	0.29	0.12	0.26
Inflation	6.30	7.92	1.62
	1.16	1.73	2.18
% std dev			
% std dev of gdp			
Total investment	3.44	3.26	-0.17
	0.23	0.14	0.25
Employment	0.58	1.15	0.57
	.	0.20	.
Government consumption	2.23	1.54	-0.69***
	0.21	0.12	0.22
Private consumption	1.39	1.30	-0.09
	0.12	0.07	0.13
Exports	2.64	2.57	-0.07
	0.18	0.16	0.24
Imports	3.13	3.14	0.01
	0.17	0.14	0.22
Private investment	5.97	4.50	-1.47*
	0.62	0.39	0.83
Public investment	6.74	6.59	-0.15
	0.64	0.56	0.97
Public expenditures	2.47	2.01	-0.46

[15] Of course, this simple analysis ignores potential endogeneity in the adoption of fiscal rules, and thus our results should not be interpreted as causal effects of fiscal rules on business cycle moments.

	0.24	0.21	0.36
Public revenues	2.78	2.06	-0.72**
	0.33	0.17	0.34

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Next, we compare the cyclicality of the key macroeconomic variables for fiscal rule adopters and non-adopters. Table **11** reports the results for cyclicality with GDP, while Table **12** summarizes our findings for the cyclicality with the real interest rate. Table **11** shows that for most variables, the cyclicality with GDP does not differ much between fiscal rule adopters and non-adopters. The only exceptions are trade balance and current account which tend to be more countercyclical in countries that have fiscal rules in place; and imports which exhibit higher correlation with GDP in fiscal rules adopters. These differences are statistically significant. Interestingly, our results show that having a fiscal rule in place does not have a significant effect on the cyclicality of government consumption or investment. At the same time, total government expenditures are more procyclical with GDP in countries with no fiscal rules. We conjecture that this higher correlation is driven by the higher cyclicality of transfer payments in these countries. Public revenues are more procyclical in countries with fiscal rules, but the difference is not significant.

Table 11. Cyclicality of key macro aggregates with GDP, by the presence of a fiscal rule

	no fiscal rule	**with fiscal rule**	**diff**
GNI	0.89	0.91	0.01
	0.03	0.02	0.03
Trade balance/GDP	-0.09	-0.27	-0.18***
	0.05	0.04	0.07
Current account/GDP	-0.12	-0.32	-0.19***
	0.05	0.04	0.06
Real int rate	-0.08	-0.04	0.03
	0.05	0.05	0.07
Terms of trade	0.10	0.15	0.05
	0.04	0.04	0.06
Fiscal balance/GDP	0.17	0.30	0.13
	0.07	0.07	0.11
Inflation	-0.02	0.07	0.09*
	0.03	0.03	0.05
Total investment	0.59	0.70	0.11**
	0.04	0.03	0.05
Employment	0.57	0.59	0.03
	.	0.07	.
Government consumption	0.29	0.30	0.00
	0.04	0.04	0.05
Private consumption	0.63	0.64	0.01
	0.05	0.03	0.06
Exports	0.43	0.46	0.03
	0.03	0.03	0.05

Imports	0.46	0.63	0.17***
	0.04	0.03	0.05
Private investment	0.34	0.43	0.09
	0.06	0.07	0.10
Public investment	0.30	0.34	0.04
	0.08	0.11	0.13
Public expenditures	0.19	-0.06	-0.25**
	0.09	0.06	0.11
Public revenues	0.38	0.52	0.13
	0.09	0.05	0.09

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Table **12** reports the correlations of key macroeconomic variables with the real interest rate. The results reveal no systematic differences in the patterns of cyclicality between countries with and without fiscal rule.

Table 12. Cyclicality of key macro aggregates with real int rate, by the presence of a fiscal rule

	no fiscal rule	**with fiscal rule**	**diff**
GDP	-0.08	-0.04	0.03
	0.05	0.05	0.07
GNI	-0.01	-0.01	0.00
	0.09	0.06	0.11
Trade balance/GDP	0.00	-0.04	-0.03
	0.07	0.06	0.09
Current account/GDP	0.03	0.09	0.06
	0.07	0.05	0.09
Terms of trade	-0.10	0.09	0.18
	0.10	0.08	0.13
Fiscal balance/GDP	-0.11	0.04	0.15
	0.07	0.06	0.11
Inflation	-0.81	-0.70	0.11
	0.06	0.05	0.08
Total investment	0.01	0.01	0.00
	0.09	0.06	0.10
Employment	-0.53	0.17	0.70
	.	0.09	.
Government consumption	0.05	0.03	-0.02
	0.07	0.05	0.09
Private consumption	0.05	-0.06	-0.11
	0.09	0.06	0.11
Exports	-0.04	-0.09	-0.05
	0.08	0.05	0.09
Imports	-0.02	-0.04	-0.02

	0.08	0.06	0.10
Private investment	-0.11	-0.15	-0.05
	0.06	0.12	0.12
Public investment	0.13	-0.10	-0.23
	0.11	0.23	0.23
Public expenditures	0.05	0.06	0.01
	0.07	0.06	0.10
Public revenues	-0.07	0.08	0.15
	0.11	0.07	0.12

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Table **13** summarizes our results for persistence of the macro variables, separately for countries that have fiscal rules in place, and countries without fiscal rules. Several variables show significantly higher persistence coefficient in countries with fiscal rules. These are current account, fiscal balance, and inflation. For all other variables the differences in persistence are not statistically significant.

Table 13. Persistence of key macro aggregates, by the presence of a fiscal rule

	no fiscal rule	**with fiscal rule**	**diff**
GDP	0.54	0.57	0.03
	0.02	0.02	0.03
GNI	0.50	0.52	0.02
	0.04	0.02	0.04
Trade balance/GDP	0.40	0.45	0.05
	0.02	0.02	0.04
Current account/GDP	0.20	0.34	0.14***
	0.03	0.02	0.04
Real int rate	0.21	0.19	-0.01
	0.05	0.03	0.06
Terms of trade	0.28	0.34	0.06
	0.03	0.03	0.05
Fiscal balance/GDP	0.16	0.38	0.22***
	0.07	0.04	0.07
Inflation	0.20	0.28	0.08**
	0.03	0.02	0.04
Total investment	0.51	0.55	0.04
	0.03	0.02	0.04
Employment	0.54	0.62	0.09
	.	0.03	.
Government consumption	0.50	0.54	0.04
	0.03	0.02	0.03
Private consumption	0.50	0.52	0.03
	0.03	0.03	0.04
Exports	0.43	0.44	0.02

	0.02	0.02	0.03
Imports	0.46	0.48	0.02
	0.03	0.02	0.03
Private investment	0.41	0.40	-0.01
	0.04	0.05	0.07
Public investment	0.46	0.46	0.01
	0.05	0.08	0.09
Public expenditures	0.34	0.37	0.03
	0.05	0.04	0.08
Public revenues	0.41	0.44	0.03
	0.05	0.03	0.06

Note: Standard errors below statistics. * p<0.10, ** p<0.05, *** p<0.01

Other controls

In this section we extend our analysis to control for other possible factors affecting business cycles. Thus, one of the key characteristics distinguishing developed and developing countries is their level of institutional development. In this section we investigate whether the effects of size on countries' business cycles properties survives after we control for the level of institutional development. This analysis also allows us to see if the significant effect of development we uncovered in the previous section is driven by the differences in institutional quality across countries. We proxy the latter by a subjective index of investor perceptions, the Composite Risk Rating index from the International Country Risk Guide (ICRG). This index is a composite of political, financial, and economic risk ratings and can take values from 0 to 100, with a rating of 100 indicating the lowest risk, and a rating of 0 indicating the highest risk.

In the previous section we noted that the incidence of fiscal rule adoption varies across country size and level of development, with larger and more developed countries being more likely to adopt some form of fiscal restraint. Therefore, we investigate whether differences in volatility, cyclicality and persistence of various variables between small and large countries may be driven by their different propensity to adopt fiscal rules. For this purpose, we include into our regressions a dummy variable taking a value of 1 if a country has ever adopted fiscal rule(s) and 0 if not. We also check how robust our results are to the definition of a fiscal rule adopter. Specifically, we define a country to be a fiscal rule adopter if it has had fiscal rule(s) in place for at least 5 years. We find that the results remain robust to this alternative control for the fiscal rule(s) presence. This is not surprising given that the average duration of fiscal rule policies is more than 5 years in the majority of countries in our sample. For instance, expenditure rules are in place for just over 10 years, on average; while revenue rules, budget balance rules and debt rules have an average duration of 14 years across countries in our sample.

We also control for the regions in which countries in our sample are located using a set of regional dummies. Our seven regions include South Asia (1); Europe and Central Asia (2); Middle East and North Africa (3); East Asia and Pacific (4); Sub-Saharan Africa (5); Latin America and Caribbean (6); and North America (7).

Another important characteristic of smaller countries is that they have a more concentrated production structure and exports, often in basic commodities. We control for this possibility by including in our regression a dummy variable identifying commodity exporting countries. We define a country to be a commodity exporter if the average share of its exports of agricultural raw materials, food, fuel, ores and metals in total merchandise exports exceeds 61%, which is the cross-country average in our sample.

Lastly, a number of small economies around the world have opted for fixed exchange rate regimes. With a limited number of stabilization instruments, smaller economies may experience more volatile business cycles. Therefore, we control for the presence of a fixed exchange rate regime by including a dummy variable identifying those countries that fix or actively manage their exchange rates. The data on exchange rate regimes is from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREARE). Based on this classification, we assigned a country to have a fixed or managed exchange rate (fixed ER dummy=1) if it did not fall into freely floating or feely falling category. We find that in our sample of countries, the probability of falling into fixed exchange rate category is higher for smaller countries, equal to 92% (when smallness is based on 1.5 million population threshold), as opposed to 77% for large countries. We also consider a stricter definition of the fixed exchange rate regime, where a country is considered to have a fixed exchange rate regime only if it has had no separate legal tender; or has followed a pre-announced peg or currency board arrangement; or pre-announced horizontal band that is narrower than or equal to +/- 2%; or de facto peg. These practices too are more common in small countries, with the probability equal to 55%. The corresponding probability in large countries is 7%. These robustness results are presented in appendix E and are generally very similar to our benchmark findings.

Column (iii) of Table **3** reports the coefficient on the size variable in the regressions of macroeconomic volatilities on country size (measured by (log) population), development level dummy, time-average ICRG index, dummy for the presence of fiscal rule(s), as well as commodity exporter dummy, fixed exchange rate regime dummy, and a set of regional dummies. Detailed regression results are available in Table A9 in the appendix.

It is easy to see that the signs and significance of the estimated country size coefficient generally survive the inclusion of additional controls. It remains to be the case that smaller countries experience higher volatility of GDP, GNI, trade balance, current account, and aggregate investment. In addition, country size also has a significant negative effect on the volatility of government consumption, as smaller countries are characterized by higher volatility of this variable.

Country size only loses its significant positive effect on the volatility of inflation and imports. This effect, instead, is picked up by the other controls. For instance, countries with higher institutional quality and fixed exchange rates tend to have lower inflation volatility, on average. Countries with fiscal rule(s) in place, instead, exhibit higher inflation volatility. This result likely reflects the endogenous nature of fiscal rules adoption as countries with higher or more volatile inflation may opt for fiscal rules to anchor inflationary expectations.

Our results also indicate that the positive effect of country size on imports was driven primarily by the monetary regime, as the coefficient on the fixed exchange rate dummy is negative and significant. Country size also loses its significance for the volatility of private consumption and fiscal balance, although the coefficient on the size variables in these regressions remains unchanged.

Another interesting result that emerges from this regression, is the fact that development status dummy generally loses its significance once the ICRG index is included in the estimation. In turn, the ICRG index is negative and significant for many volatilities, indicating that countries with better institutions (lower risk) exhibit significantly less volatile business cycles. These results suggest that the level of development affects business cycle volatilities primarily through the level of institutional development.

The effect of commodity exporting on volatilities is significant for terms of trade and fiscal balance. Specifically, countries whose exports are concentrated in commodities tend to have more volatile terms of trade and fiscal balance.

We also find that volatilities of macro aggregates vary across regions, as reflected by the significance of regional dummies in our regressions. For instance, we find that countries in Latin America and Caribbean have significantly higher volatility of inflation. Inflation is also more volatile in East Asia and Pacific, and so are the current account and terms of trade.[16]

We repeat this exercise for the cyclical characteristics of the key variables. Column (iii) of Table 5 reports the results. Comparing them with column (i) of Table **5** reveals that the effects of size on the correlation of key macroeconomic variables with GDP remain practically unchanged when other controls are added to the regressions.[17] For instance, trade balance, inflation and exports, all exhibit higher correlation with GDP in small countries relative to larger economies. On the other hand, aggregate investment and consumption, tend to be less procyclical with GDP in smaller economies.

At the same time, adding controls renders size to become significant for the cyclicality of public revenues. Specifically, we find that smaller countries experience a stronger correlation of public revenues with GDP. At the same time, the cyclicality of public expenditures does not differ significantly between large and small countries. This leads to a more procyclical fiscal balance in smaller countries.

Turning to detailed regression results presented in Table A10 in the appendix, we also find that government investment is less procyclical in countries with fixed exchange rate regime. This may be driven by the need for reserve accumulation in good times in order to support the exchange rate.

Countries with fiscal rules tend to have more countercyclical current account and more procyclical imports. One possible explanation for this result is that government consumption is

[16] These results are not reported.
[17] We did not include average ICRG level into these regressions in order not to exclude countries with missing ICRG index and keep sample size as close as possible to that used in the univariate regressions.

more procyclical in these countries (which is indeed the case as the coefficient on the fiscal rule dummy in the cyclicality regression of government consumption is positive, although not significant). In this environment, an increase in government consumption will be accompanied by a greater deterioration of the current account, resulting in its more countercyclical dynamics with GDP. Another possibility is that these countries experience shocks that are more persistent which generally leads to a stronger countercyclicality of the current account and trade balance. Introduction of fiscal rules in these countries could have been an endogenous response to these shocks.

There are also significant differences in the cyclicality patterns across regions. For instance, controlling for various country characteristics, LAC countries have significantly more procyclical government consumption, while their fiscal balances tend to be less procyclical. In addition, the correlation of terms of trade with GDP tends to be higher in these countries.

We repeat this exercise for the cyclicality with the real interest rate. The results for country size remain unchanged when additional controls are added to the regressions (see column (iii) of Table 7). One interesting result that we should note is that after controlling for various country characteristics, LAC countries exhibit significantly more negative correlation between public revenues and real interest rate. This may reflect the countercyclical country risk-premium faced by these economies.

Lastly, we examine the robustness of the effects of country size on the persistence coefficient. The results are presented in column (iii) of Table 9. After controlling for additional country characteristics, it remains to be the case that current account and inflation are less persistent in smaller countries. However, country size loses its significant positive effect on the persistence of aggregate investment. Instead, the results imply that it is private investment that is less persistent in smaller countries.

The degree of persistence of various variables differs across regions. For instance, we find that LAC economies have less persistent public revenues, government investment, government consumption and fiscal balance. See Table A12 in the appendix.

Overall, our results in this section indicate that country size is a robust country characteristic affecting their business cycle dynamics. The effects of country size remain significant after controlling for the level of economic development and other country characteristics.

Types of fiscal rules

So far, we have treated all fiscal rules equally by combining them into one dummy variable. Next, we investigate whether the type of the fiscal rule implemented by a country matters for its business cycles. There are four possible types of fiscal rules in our data – expenditure rule, revenue rule, budget balance rule and debt rule. We create a dummy variable for each type and incorporate them into our extended regressions. Column (iv) of Tables 3, 5, and 9 report the resulting coefficients on the size variable.[18] Detailed regression results are reported in the

[18] We do not report the results for the correlation with real interest rate as these results are unchanged relative to the regression with all controls.

appendix in Table A13 for volatilities, Table A14 for correlations with GDP, and Table A15 for the autoregressive coefficient.

It is easy to see that controlling for different types of fiscal rules does not change our key insight that country size matters for business cycles volatility. Specifically, volatility of GDP, GNI, trade balance, current account, aggregate investment and government consumption are all significantly higher in smaller countries.

We also find that different types of fiscal rules have quite distinct effects on business cycle volatilities. In particular, our earlier finding of higher inflation volatility in countries with fiscal rules was driven entirely by countries with expenditure rules in place. This provides additional support to our conjecture that fiscal rule in these countries may have been implemented in response to volatile inflation, possibly driven by high levels of government spending. In contrast, countries with revenue rules tend to have lower volatility of inflation. In addition, volatilities of several other variables – GDP, GNI, trade balance and terms of trade -- are lower in countries that have adopted revenues fiscal rules. Using budget balance rules or debt rules does not seem to have significant effects on volatilities.

Next, we turn to the cyclicality of various variables with GDP. As can be seen from column (iv) of Table 5, our results on the effects of country size on cyclicality remain practically unchanged when types of fiscal rules are controlled for. In addition, we find that countries with expenditure rules tend to have less countercyclical real interest rate. This could be driven by less countercyclical country risk premium on international borrowing when expenditure rules are in place. We also show that countries with revenue rules experience lower correlation between terms of trade and GDP, which could potentially be a direct outcome of the design of the revenue fiscal rule. Furthermore, in these countries, government consumption is less procyclical with GDP, while fiscal balance is more procyclical with GDP. Budget balance rule and debt rule only affect cyclicality of private investment.

Lastly, in column (iv) of Table 9 we show that the effects of country size on persistence remain robust to the inclusion of types of fiscal rules.

6. Policy implications

Our analysis above has identified key vulnerabilities faced by small countries. In this section we discuss how fiscal policy rules can help address these vulnerabilities. Our findings boil down to the following several stylized facts. First, we found that GDP and GNI are significantly more volatile in small economies. Second, we showed that aggregate investment is significantly more volatile and less procyclical with GDP in small economies. The evidence suggests that these dynamics are likely driven by private investment, which we find to also be more volatile, less procyclical with GDP, and less persistent in small countries relative to larger economies. Third, we found trade balance and current account to be more volatile in small countries. Exports are also more procyclical with GDP in these economies, which leads to them having less countercyclical (in fact, close to acyclical) trade balance. Fourth, we found that small countries tend to have public revenues and fiscal balance that are more procyclical with GDP. Most fiscal

variables are also more volatile in small economies. Lastly, we showed that inflation is strongly procyclical with GDP in small economies.

Higher volatility of GDP and GNI in small economies suggests that these countries are either affected by larger shocks or are less able to insure them due to various market imperfections and frictions. To provide a proper attribution of GDP volatility to these factors, of course, one requires a structural model of small open economy with various shocks and frictions, which would allow for counterfactual experiments and policy evaluations. Such analysis, however, goes beyond the scope of this paper. Instead, here we attempt to provide an interpretation of our findings through the lens of fiscal policy's role and design.

Higher volatility of GDP in small countries arises against the backdrop of higher positive comovement between GDP and inflation in small countries relative to larger economies. This suggests an important role for demand-side shocks in smaller economies, since such shocks would drive up output and prices simultaneously. The prevalence of demand-side shocks opens a greater scope for fiscal policy in these economies. In this regard we find that fiscal policy is lacking in several respects in these countries.

First, we find that most fiscal variables are more volatile in small economies, with the difference being statistically significant for government consumption. Thus, such fluctuations may amplify GDP volatility in these counties.

Second, we show that fiscal balance is more procyclical with GDP in small economies. This effect is driven by higher procyclicality of public revenues in these economies. Of course, the procyclicality of public revenues by itself is not surprising since it is strongly influenced by the procyclical tax base. Then, assuming that tax rates do not vary much over the business cycle, it must be the case that the tax base is more procyclical in small economies relative to large countries.[19] To stabilize the tax base, small economies (which are typically tax havens), therefore, may consider re-evaluating the tax breaks and various tax incentives for foreign direct investment companies, especially since these multinationals likely generate a large share of potential tax revenues.

More generally, fiscal policy and fiscal rules must be designed while taking these features of small economies into account. For instance, a balanced budget rule implemented in these economies would exacerbate the volatility of GDP since it would require public expenditures that are more procyclical to match the higher procyclicality of public revenues. Additional concern with this type of fiscal rule is that reducing fiscal spending during economic downturns may be particularly difficult and costly due to lack of economies of scale and thus larger size of

[19] Vegh and Vuletin (2015) showed that tax policy is affected by the level of development, where it is mostly procyclical in developing countries, while it is acyclical in developed economies. The cyclicality of tax policy in small versus large countries is an open question. Even if we assumed that small countries were pursuing procyclical tax policy, the tax base would have to be even more procyclical to rationalize our results on the cyclicality of fiscal revenues.

the government in small economies. Instead, a revenue rule or expenditure rule that forces these economies to accumulate buffer savings would help smooth out the effects of shocks that they face. Indeed, our analysis shows that revenue rules are historically associated with lower volatility of GDP and several other macro aggregates.

Another striking finding from our analysis is the behavior of aggregate investment in small economies. In particular, we show that aggregate investment is significantly more volatile and less procyclical with GDP in small economies. These dynamics are most likely driven by private investment (subject to a caveat that public investment data are missing for a lot of countries in our sample), which we find to also be more volatile, less procyclical with GDP, and less persistent in small countries relative to larger economies. Lower persistence together with higher volatility of investment suggest that investment is likely subject to larger, more volatile shocks in small economies. These shocks could include shocks to total factor productivity, to real interest rate, to relative price of investment goods, to depreciation rate, to demand, etc. As we argued before, our evidence suggests that shocks to demand are likely important drivers of business cycles in small economies. Shocks to investment demand could be one component of these demand shocks.

Volatility of investment could further be amplified by the concentrated production structure of small economies. Since shocks cannot be smoothed by factor reallocation across sectors, the volatility of investment (and GDP) is greater in these economies.

The lower cyclicality of investment with GDP in small countries could be the outcome of fixed cost in investment. In the presence of financial constraints, such cost reduces the responsiveness of investment to shocks, making it less procyclical with GDP.[20] In addition, returns to investment may be more uncertain in smaller economies. This could be due to less diversified nature of these economies or their greater dependence on external demand conditions or greater policy uncertainty in these countries. With more uncertainty in expected returns, investment will be less responsive to productivity shocks in small countries. Both these channels would reduce the cyclicality of investment with GDP in small economies.

How can the fiscal authority incentivize and stabilize investment in small economies? One possibility is to use countercyclical expenditure rule. Under such a rule, greater government demand during downturns would create additional cash flow for firms, improving their net wealth and preventing them from inefficient downscaling or liquidation. This would be particularly relevant for firms facing financial constraints. Furthermore, adopting countercyclical fiscal rule would make fiscal policy more predictable as discretionary changes are reduced. This could help to lower the risk-premium faced by small economies in the international financial markets, thus making external financing more predictable and affordable for domestic firms. Such policy is expected to have a stabilizing effect on domestic investment. To counteract the lack of scale economies in the private sector of small countries, the government could subsidize the fixed cost of investment, especially for smaller firms.

[20] Such fixed cost of investment would also lower the volatility of investment, potentially offsetting some of the amplifications mechanisms discussed above. The data, however, suggest that this offsetting effect is not very strong.

We also find that trade balance and current account are more volatile in small countries. Exports are also more procyclical with GDP in these economies, which implies that their trade balance is less countercyclical than in larger economies. The higher comovement of exports with GDP could again be a reflection of highly specialized production structure and concentrated exports in small economies which, in combination with their greater trade openness, makes these economies particularly vulnerable to terms of trade, external demand shocks or natural disaster shocks. For instance, many small countries in our sample are service-based economies that export tourism services. Any weather-related disruption would lead to a significant exports drop in these economies. Adopting countercyclical expenditure rule or fiscal rule that forces these economies to save for the "rainy day" during good times will help to alleviate these vulnerabilities faced by small economies.

7. Conclusion

In this paper we set out to provide a set of stylized facts about the business cycle dynamics in small economies. We assembled an annual data set covering a large set of countries (138 countries with GDP data) over the period of 1960-2014 and use it to document the volatility, persistence and cyclicality with GDP and real interest rate for the key macroeconomic aggregates. Our findings are as follows:

- Volatilities of GDP, GNI, aggregate and private investment, government consumption, trade balance, and current account all significantly decrease with country size, as measured by the country population.
- Smaller countries have significantly less procyclical aggregate investment and private consumption; and significantly more countercyclical trade balance, with this correlation being largely driven by more procyclical exports. Public revenues are more procyclical in small economies, leading to a more procyclical fiscal balance. Inflation is also more procyclical in small countries.
- Correlations with real interest rate do not exhibit systematic patterns with country size. Only the correlation between terms of trade and real interest rate tends to decrease with country size.
- Current account, private investment, real interest rate and inflation exhibit a significantly lower persistence in smaller countries. The persistence of all other variables does not differ systematically across country sizes.
- These results are robust to controlling for various country characteristics, such as level of development, region of location, institutional quality, commodity exporting status, presence of fiscal rules and fixed exchange rate regime.

We also investigate whether the adoption of fiscal rules by various countries affects their business cycle moments. We find that different types of fiscal rules are associated with very different business cycle dynamics. For instance, in countries that have adopted expenditure rules, inflation volatility seems to be higher, while countries with revenue rules experience significantly lower volatility of GDP, GNI, trade balance, terms of trade and inflation. In the

same spirit, cyclicality and persistence patterns differ with the type of fiscal rule. Of course, these relationships do not imply causal effects of fiscal rules on business cycle moments, as different types of fiscal rules may be adopted by countries in response to their business cycle characteristics. Decoupling these feedback effects is left for future work.

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Appendix

This appendix contains detailed regression results, additional regressions and robustness evaluations.

A. Detailed regression results

Table A1. Regressions of volatilities on size				
	(log) population (i)	se	constant (ii)	se
GDP	-0.06***	(0.02)	2.24***	(0.30)
GNI	-0.17***	(0.04)	4.18***	(0.60)
Trade balance/GDP	-0.21***	(0.04)	4.50***	(0.71)
Current account/GDP	-0.18***	(0.02)	3.92***	(0.33)
Real int rate	-0.02	(0.03)	1.44***	(0.43)
Terms of trade	-0.04	(0.04)	2.95***	(0.64)
Fiscal balance/GDP	-0.12***	(0.03)	2.63***	(0.53)
Inflation	0.09**	(0.04)	0.05	(0.55)
Aggregate inv	-0.06**	(0.03)	2.14***	(0.41)
Employment	-0.01	(0.10)	0.04	(1.63)
Gov cons	-0.01	(0.04)	0.64	(0.62)
Private cons	-0.08***	(0.03)	1.57***	(0.48)
Exports	0.03	(0.02)	0.44	(0.40)
Imports	0.06***	(0.02)	0.07	(0.35)
Priv investment	-0.06	(0.04)	2.50***	(0.70)
Gov investment	-0.04	(0.03)	2.48***	(0.52)
Public expenditures	-0.03	(0.05)	1.16	(0.92)
Public revenues	-0.00	(0.04)	0.73	(0.75)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A2. Regressions of correlations with GDP on size				
	(log) population	se	constant	se
GNI	0.01	(0.01)	0.71***	(0.16)
Trade balance/GDP	-0.04**	(0.02)	0.49*	(0.29)
Current account/GDP	-0.02*	(0.01)	0.09	(0.19)
Real int rate	0.03**	(0.01)	-0.58**	(0.23)
Terms of trade	-0.00	(0.02)	0.13	(0.28)
Fiscal balance/GDP	-0.04	(0.03)	0.90*	(0.49)
Inflation	-0.03***	(0.01)	0.48***	(0.17)
Aggregate inv	0.03**	(0.01)	0.10	(0.23)
Employment	0.06*	(0.03)	-0.45	(0.54)
Gov cons	-0.00	(0.01)	0.31	(0.24)
Private cons	0.04**	(0.02)	-0.01	(0.30)
Exports	-0.03**	(0.01)	0.91***	(0.20)
Imports	0.02	(0.02)	0.31	(0.25)

Priv investment	0.05**	(0.02)	-0.38	(0.32)
Gov investment	-0.03	(0.02)	0.86**	(0.38)
Public expenditures	0.00	(0.03)	-0.02	(0.58)
Public revenues	-0.03	(0.02)	1.02**	(0.42)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A3. Regressions of correlations with real interest rate on size

	(log) population	se	constant	se
GDP	0.03**	(0.01)	-0.58**	(0.23)
GNI	-0.02	(0.02)	0.30	(0.37)
Trade balance/GDP	0.05**	(0.02)	-0.80***	(0.29)
Current account/GDP	-0.01	(0.02)	0.21	(0.26)
Terms of trade	-0.04	(0.02)	0.59	(0.40)
Fiscal balance/GDP	-0.01	(0.03)	0.13	(0.49)
Inflation	0.04**	(0.02)	-1.30***	(0.21)
Aggregate inv	-0.02	(0.02)	0.28	(0.37)
Employment	-0.01	(0.06)	0.36	(0.94)
Gov cons	0.00	(0.02)	-0.01	(0.30)
Private cons	-0.02	(0.02)	0.32	(0.40)
Exports	0.01	(0.02)	-0.19	(0.30)
Imports	-0.03	(0.02)	0.46	(0.39)
Priv investment	0.06***	(0.02)	-1.08***	(0.25)
Gov investment	-0.06**	(0.02)	1.06*	(0.42)
Public expenditures	-0.01	(0.03)	0.16	(0.45)
Public revenues	-0.01	(0.03)	0.25	(0.57)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A4. Regressions of autoregressive coefficient on size

	(log) population	se	constant	se
GDP	-0.01	(0.01)	0.63***	(0.09)
GNI	-0.00	(0.01)	0.59***	(0.18)
Trade balance/GDP	0.01	(0.01)	0.23	(0.14)
Current account/GDP	0.02***	(0.01)	-0.10	(0.13)
Real int rate	0.01	(0.01)	-0.01	(0.20)
Terms of trade	0.01	(0.01)	0.10	(0.19)
Fiscal balance/GDP	0.02	(0.02)	-0.05	(0.35)
Inflation	0.02**	(0.01)	-0.09	(0.13)
Aggregate inv	0.02**	(0.01)	0.19	(0.15)
Employment	0.02	(0.02)	0.21	(0.32)
Gov cons	0.00	(0.01)	0.50***	(0.13)
Private cons	0.01	(0.01)	0.41**	(0.20)

Exports	-0.01	(0.01)	0.56***	(0.15)
Imports	-0.00	(0.01)	0.48***	(0.12)
Priv investment	0.02	(0.02)	0.14	(0.30)
Gov investment	0.02	(0.03)	0.15	(0.47)
Public expenditures	0.03	(0.02)	-0.13	(0.37)
Public revenues	0.00	(0.02)	0.42	(0.32)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A5. Regressions of volatilities on size and development status

	(log) population	se	developing=1	se
GDP	-0.06***	(0.02)	0.33***	(0.09)
GNI	-0.17***	(0.04)	0.32***	(0.11)
Trade balance/GDP	-0.24***	(0.04)	0.97***	(0.13)
Current account/GDP	-0.18***	(0.02)	0.29**	(0.13)
Real int rate	-0.01	(0.03)	0.83***	(0.18)
Terms of trade	-0.05	(0.04)	0.45*	(0.25)
Fiscal balance/GDP	-0.12***	(0.03)	-0.04	(0.11)
Inflation	0.07**	(0.04)	0.77***	(0.15)
Aggregate inv	-0.06**	(0.02)	0.05	(0.07)
Employment	-0.00	(0.11)	0.09	(0.22)
Gov cons	-0.03	(0.03)	0.68***	(0.09)
Private cons	-0.09***	(0.03)	0.18**	(0.07)
Exports	0.02	(0.02)	0.23***	(0.07)
Imports	0.06***	(0.02)	0.13**	(0.06)
Priv investment	-0.05	(0.04)	-0.34	(0.21)
Gov investment	-0.04	(0.03)	0.12	(0.21)
Public expenditures	-0.08*	(0.05)	0.64***	(0.11)
Public revenues	-0.05	(0.04)	0.59***	(0.11)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A6. Regressions of correlation with GDP on size and development status

	(log) population	se	developing=1	se
GNI	0.01	(0.01)	-0.00	(0.03)
Trade balance/GDP	-0.05***	(0.02)	0.20***	(0.06)
Current account/GDP	-0.02*	(0.01)	0.10	(0.07)
Real int rate	0.04**	(0.01)	0.10	(0.07)
Terms of trade	0.00	(0.02)	-0.10	(0.08)
Fiscal balance/GDP	-0.01	(0.03)	-0.33***	(0.09)
Inflation	-0.03**	(0.01)	-0.20***	(0.04)
Aggregate inv	0.04***	(0.01)	-0.19***	(0.04)
Employment	0.04	(0.04)	-0.42***	(0.07)

Gov cons	-0.00	(0.02)	0.06	(0.06)
Private cons	0.04**	(0.02)	-0.14***	(0.05)
Exports	-0.03**	(0.01)	-0.01	(0.05)
Imports	0.02	(0.01)	-0.25***	(0.04)
Priv investment	0.05***	(0.02)	-0.16	(0.20)
Gov investment	-0.02	(0.02)	-0.24	(0.14)
Public expenditures	-0.02	(0.03)	0.23**	(0.10)
Public revenues	-0.01	(0.02)	-0.23**	(0.09)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A7. Regressions of correlation with real int rate on size and development status				
	(log) population	**se**	**developing =1**	**se**
GDP	0.04**	(0.01)	0.10	(0.07)
GNI	-0.02	(0.02)	0.24**	(0.09)
Trade balance/GDP	0.05**	(0.02)	-0.04	(0.09)
Current account/GDP	-0.01	(0.02)	-0.03	(0.09)
Terms of trade	-0.04	(0.03)	0.01	(0.14)
Fiscal balance/GDP	0.01	(0.03)	-0.19*	(0.10)
Inflation	0.03**	(0.01)	-0.19**	(0.08)
Aggregate inv	-0.02	(0.02)	0.06	(0.10)
Employment	-0.01	(0.07)	0.03	(0.14)
Gov cons	-0.00	(0.02)	0.19**	(0.08)
Private cons	-0.02	(0.02)	0.21**	(0.10)
Exports	0.01	(0.02)	-0.00	(0.08)
Imports	-0.03	(0.02)	0.10	(0.09)
Priv investment	0.06***	(0.01)	-0.14*	(0.07)
Gov investment	-0.09*	(0.04)	0.30	(0.24)
Public expenditures	-0.02	(0.03)	0.14	(0.11)
Public revenues	-0.01	(0.04)	0.02	(0.12)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A8. Regressions of autoregressive coefficient on size and development status				
	(log) population	**se**	**developing =1**	**se**
GDP	-0.00	(0.01)	-0.08***	(0.02)
GNI	-0.00	(0.01)	-0.04	(0.04)
Trade balance/GDP	0.01	(0.01)	-0.07*	(0.04)
Current account/GDP	0.03***	(0.01)	-0.09**	(0.04)
Real int rate	0.01	(0.01)	-0.05	(0.06)
Terms of trade	0.01	(0.01)	-0.03	(0.05)
Fiscal balance/GDP	0.03	(0.02)	-0.17**	(0.07)
Inflation	0.02***	(0.01)	-0.17***	(0.03)

Aggregate inv	0.02***	(0.01)	-0.10***	(0.03)
Employment	0.02	(0.02)	-0.18***	(0.05)
Gov cons	0.00	(0.01)	-0.06*	(0.03)
Private cons	0.01	(0.01)	-0.14***	(0.04)
Exports	-0.01	(0.01)	-0.00	(0.03)
Imports	-0.00	(0.01)	0.02	(0.03)
Priv investment	0.02	(0.02)	-0.11	(0.07)
Gov investment	0.02	(0.03)	-0.09	(0.11)
Public expenditures	0.04*	(0.02)	-0.10	(0.06)
Public revenues	0.01	(0.02)	-0.11*	(0.06)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A9. Regressions of volatilities on size and various controls

	population	se	developing =1	se	ICRG	se	Fiscal rule =1	se	com exporter=1	se	fixed ER =1	se	N
GDP	-0.10***	(0.04)	-0.13	(0.15)	-0.03***	(0.01)	-0.06	(0.10)	0.14	(0.11)	-0.05	(0.12)	107
GNI	-0.16***	(0.04)	-0.20	(0.17)	-0.03***	(0.01)	0.12	(0.14)	-0.01	(0.17)	-0.09	(0.11)	67
Trade balance/GDP	-0.22***	(0.04)	0.48*	(0.26)	-0.01	(0.01)	-0.21	(0.15)	0.13	(0.12)	0.19	(0.14)	82
Current account/GDP	-0.20***	(0.04)	-0.08	(0.22)	-0.01	(0.01)	0.03	(0.16)	0.18	(0.17)	0.15	(0.11)	73
Real int rate	-0.05	(0.06)	0.11	(0.46)	-0.05***	(0.02)	0.10	(0.24)	0.13	(0.17)	0.04	(0.27)	38
Terms of trade	-0.04	(0.05)	0.15	(0.21)	-0.02**	(0.01)	-0.04	(0.12)	0.45**	(0.19)	-0.06	(0.15)	63
Fiscal balance/GDP	-0.06	(0.04)	-0.17	(0.16)	-0.01	(0.01)	-0.17	(0.15)	0.34***	(0.12)	0.03	(0.13)	55
Inflation	-0.04	(0.06)	-0.09	(0.32)	-0.08***	(0.01)	0.43**	(0.20)	0.21	(0.20)	-0.73***	(0.19)	90
Aggregate inv	-0.08***	(0.03)	0.08	(0.12)	-0.01	(0.01)	-0.00	(0.12)	-0.05	(0.12)	-0.07	(0.10)	74
Employment	0.11	(0.14)	.	.	-0.02	(0.03)	0.30	(0.48)	0.79**	(0.34)	0.59	(0.39)	18
Gov cons	-0.07*	(0.04)	0.25	(0.15)	-0.03***	(0.01)	-0.01	(0.12)	0.00	(0.11)	-0.12	(0.14)	78
Private cons	-0.06	(0.04)	-0.04	(0.17)	-0.01	(0.01)	0.10	(0.15)	0.01	(0.12)	-0.02	(0.15)	74
Exports	-0.00	(0.04)	0.11	(0.14)	-0.01**	(0.01)	0.02	(0.12)	-0.09	(0.10)	-0.14	(0.12)	82
Imports	0.03	(0.03)	0.08	(0.14)	-0.00	(0.01)	-0.02	(0.09)	0.04	(0.09)	-0.19**	(0.09)	82
Priv investment	-0.09	(0.13)	-0.24	(0.61)	0.00	(0.03)	0.01	(0.23)	0.23	(0.33)	-0.03	(0.40)	32
Gov investment	0.11	(0.17)	-0.14	(0.70)	-0.01	(0.04)	-0.16	(0.23)	-0.17	(0.44)	-0.10	(0.33)	18
Public expenditures	-0.06	(0.07)	0.38**	(0.18)	-0.01	(0.01)	0.06	(0.18)	0.07	(0.21)	-0.03	(0.13)	46
Public revenues	-0.04	(0.05)	0.22	(0.17)	-0.01	(0.01)	0.10	(0.16)	0.14	(0.13)	0.04	(0.14)	47

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A10. Regressions of correlations with GDP on size and various controls

	population	se	developing=1	se	fiscalrule=1	se	com exporter=1	se	ER fixed=1	se	N
GNI	0.03*	(0.01)	-0.00	(0.04)	0.04	(0.04)	-0.01	(0.04)	0.04	(0.06)	71
Trade balance/GDP	-0.04*	(0.02)	0.03	(0.09)	-0.11	(0.07)	0.06	(0.07)	-0.04	(0.09)	92
Current account/GDP	-0.02	(0.02)	0.03	(0.08)	-0.13*	(0.07)	0.00	(0.07)	0.01	(0.08)	89
Real int rate	0.03	(0.02)	0.12	(0.10)	0.02	(0.07)	0.19**	(0.08)	-0.03	(0.11)	49
Terms of trade	0.00	(0.02)	-0.09	(0.09)	0.06	(0.06)	-0.07	(0.08)	-0.09	(0.07)	74

Fiscal balance/GDP	-0.06*	(0.03)	-0.12	(0.13)	-0.05	(0.12)	-0.06	(0.12)	0.01	(0.10)	50
Inflation	-0.03**	(0.01)	-0.15**	(0.06)	0.07	(0.05)	-0.05	(0.05)	-0.01	(0.07)	102
Aggregate inv	0.03***	(0.01)	0.02	(0.07)	0.03	(0.06)	-0.03	(0.05)	-0.04	(0.05)	82
Employment	0.02	(0.08)	.	.	-0.09	(0.24)	0.06	(0.16)	-0.20	(0.21)	18
Gov cons	0.01	(0.02)	-0.00	(0.09)	0.10	(0.06)	0.03	(0.06)	-0.01	(0.07)	86
Private cons	0.04**	(0.02)	-0.09	(0.07)	-0.06	(0.07)	-0.09	(0.08)	0.05	(0.06)	82
Exports	-0.05***	(0.02)	0.12	(0.07)	0.03	(0.05)	0.02	(0.05)	0.00	(0.06)	92
Imports	0.02	(0.01)	-0.05	(0.05)	0.10*	(0.05)	-0.05	(0.06)	0.03	(0.05)	92
Priv investment	0.06	(0.04)	-0.08	(0.33)	0.08	(0.11)	-0.17	(0.11)	0.10	(0.20)	38
Gov investment	-0.03	(0.02)	-0.05	(0.07)	0.08	(0.16)	0.07	(0.11)	-0.36**	(0.12)	20
Public expenditures	-0.00	(0.05)	-0.05	(0.13)	-0.21	(0.14)	0.07	(0.16)	0.04	(0.11)	46
Public revenues	-0.07**	(0.03)	-0.22**	(0.11)	-0.02	(0.11)	-0.09	(0.12)	-0.13	(0.09)	47

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A11. Regressions of correlations with real interest rate on size and various controls

	population	se	developing =1	se	fiscalrule =1	se	com exporter=1	se	ER fixed =1	se	N
GDP	0.03	(0.02)	0.12	(0.10)	0.02	(0.07)	0.19**	(0.08)	-0.03	(0.11)	49
GNI	0.01	(0.04)	0.26**	(0.10)	0.13	(0.09)	0.16	(0.11)	-0.06	(0.11)	26
Trade balance/GDP	0.05	(0.03)	-0.06	(0.16)	-0.08	(0.12)	-0.17	(0.11)	0.19*	(0.10)	36
Current account/GDP	0.00	(0.02)	-0.18	(0.17)	0.17	(0.12)	-0.11	(0.11)	0.17	(0.14)	42
Terms of trade	-0.07**	(0.03)	-0.05	(0.20)	0.22	(0.13)	0.43**	(0.15)	-0.06	(0.12)	22
Fiscal balance/GDP	0.02	(0.03)	-0.04	(0.08)	-0.15	(0.10)	0.28*	(0.16)	0.01	(0.06)	24
Inflation	0.02	(0.02)	-0.11	(0.13)	-0.03	(0.09)	0.09	(0.07)	-0.19	(0.15)	50
Aggregate inv	-0.01	(0.03)	0.15	(0.15)	-0.07	(0.17)	0.34**	(0.13)	-0.08	(0.20)	32
Employment	0.12	(0.15)	.	.	0.02	(0.49)	0.45	(0.31)	-0.17	(0.44)	11
Gov cons	-0.01	(0.04)	0.27*	(0.15)	0.15	(0.12)	0.11	(0.11)	-0.06	(0.12)	35
Private cons	-0.00	(0.04)	0.22	(0.17)	-0.07	(0.14)	0.29**	(0.11)	-0.03	(0.13)	33
Exports	0.03	(0.03)	0.02	(0.17)	-0.13	(0.12)	0.05	(0.09)	0.15	(0.13)	36
Imports	-0.03	(0.02)	0.08	(0.18)	-0.03	(0.10)	0.32***	(0.11)	-0.05	(0.12)	36
Priv investment	-0.03	(0.07)	0.23	(0.32)	-0.49*	(0.23)	-0.06	(0.15)	-0.21	(0.26)	15
Gov investment	0.33	(.)	-0.46	(.)	1.42	(.)	0.00	(.)	0.78	(.)	7
Public expenditures	-0.05	(0.05)	0.20	(0.17)	0.24	(0.20)	-0.14	(0.12)	0.15	(0.15)	24
Public revenues	-0.03	(0.04)	0.28	(0.17)	-0.02	(0.16)	0.33*	(0.16)	0.12	(0.14)	24

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A12. Regressions of persistence coefficient on size and various controls

	population	se	developing=1	se	fiscalrule=1	se	com exporter=1	se	ER fixed=1	se	N
GDP	-0.00	(0.01)	-0.04	(0.04)	0.01	(0.03)	0.02	(0.03)	-0.01	(0.03)	138
GNI	-0.01	(0.01)	0.07	(0.05)	-0.02	(0.05)	-0.03	(0.05)	-0.04	(0.05)	71
Trade balance/GDP	0.00	(0.01)	0.06	(0.06)	0.01	(0.04)	-0.09***	(0.03)	-0.06	(0.07)	92

Current account/GDP	0.03***	(0.01)	-0.05	(0.05)	0.13***	(0.04)	-0.04	(0.05)	0.06	(0.05)	92
Real int rate	0.03**	(0.01)	-0.09	(0.10)	-0.03	(0.06)	0.01	(0.07)	0.06	(0.08)	50
Terms of trade	0.01	(0.02)	-0.03	(0.05)	0.08	(0.05)	-0.03	(0.06)	-0.07	(0.05)	77
Fiscal balance/GDP	-0.01	(0.02)	-0.09	(0.09)	0.16	(0.09)	0.04	(0.09)	-0.10	(0.08)	55
Inflation	0.03***	(0.01)	-0.17***	(0.04)	0.03	(0.03)	0.01	(0.04)	-0.06	(0.05)	111
Aggregate inv	0.01	(0.01)	0.01	(0.04)	0.02	(0.05)	-0.04	(0.05)	-0.03	(0.04)	82
Employment	0.01	(0.05)	.	.	0.08	(0.12)	0.01	(0.10)	-0.07	(0.10)	18
Gov cons	-0.01	(0.01)	0.09	(0.06)	0.01	(0.04)	-0.06	(0.04)	-0.01	(0.05)	86
Private cons	-0.01	(0.01)	-0.00	(0.05)	-0.08	(0.05)	-0.08	(0.06)	-0.05	(0.05)	82
Exports	-0.02	(0.01)	0.06	(0.06)	0.01	(0.04)	-0.03	(0.04)	-0.08*	(0.04)	92
Imports	-0.01	(0.01)	0.08*	(0.05)	0.04	(0.04)	-0.08*	(0.05)	-0.11***	(0.03)	92
Priv investment	0.05*	(0.03)	-0.23	(0.16)	0.04	(0.09)	-0.14	(0.10)	0.20	(0.14)	38
Gov investment	0.00	(0.05)	0.05	(0.13)	0.11	(0.16)	0.13	(0.14)	-0.03	(0.12)	20
Public expenditures	0.01	(0.04)	-0.14	(0.10)	-0.07	(0.10)	-0.08	(0.11)	-0.04	(0.08)	46
Public revenues	-0.02	(0.03)	-0.11	(0.07)	-0.05	(0.07)	-0.00	(0.07)	-0.02	(0.06)	47

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A13. Regressions of volatilities on size, various controls, and types of fiscal rules

	Population	**se**	**Developing =1**	**se**	**ICRG**	**se**	**ER**	**se**	**RR**	**se**	**BBR**	**se**	**DR**	**se**	**com exporter =1**	**se**	**ER fixed=1**	**se**
GDP	-0.09**	(0.03)	-0.16	(0.15)	-0.03***	(0.01)	0.07	(0.10)	-0.43***	(0.13)	-0.15	(0.13)	0.00	(0.13)	0.16	(0.10)	-0.03	(0.13)
GNI	-0.15***	(0.04)	-0.16	(0.16)	-0.02***	(0.01)	0.11	(0.11)	-0.47***	(0.14)	-0.03	(0.14)	0.01	(0.12)	0.15	(0.16)	-0.05	(0.12)
Trade balance/GDP	-0.21***	(0.04)	0.43	(0.27)	-0.01	(0.01)	0.05	(0.11)	-0.42***	(0.13)	-0.14	(0.16)	-0.15	(0.13)	0.15	(0.12)	0.24*	(0.14)
Current account/GDP	-0.19***	(0.03)	-0.06	(0.23)	-0.01	(0.01)	0.01	(0.12)	-0.37	(0.26)	0.09	(0.18)	-0.17	(0.15)	0.17	(0.16)	0.23*	(0.12)
Real int rate	0.00	(0.07)	0.12	(0.49)	-0.04**	(0.02)	-0.01	(0.25)	-0.46	(0.32)	-0.10	(0.32)	0.16	(0.20)	0.25	(0.19)	0.06	(0.28)
Terms of trade	-0.03	(0.05)	0.17	(0.23)	-0.02*	(0.01)	-0.04	(0.19)	-0.57***	(0.20)	0.03	(0.16)	-0.08	(0.18)	0.46**	(0.21)	-0.04	(0.15)
Fiscal balance/GDP	-0.05	(0.04)	-0.17	(0.17)	-0.01	(0.01)	0.01	(0.16)	-0.20	(0.17)	-0.12	(0.17)	0.11	(0.14)	0.32**	(0.13)	0.04	(0.13)
Inflation	-0.02	(0.06)	-0.05	(0.33)	-0.07***	(0.02)	0.53**	(0.23)	-0.71**	(0.28)	-0.00	(0.30)	0.18	(0.28)	0.30	(0.22)	-0.63***	(0.19)
Aggregate inv	-0.09***	(0.03)	0.09	(0.12)	-0.01	(0.01)	-0.10	(0.08)	0.15	(0.11)	0.05	(0.11)	-0.03	(0.10)	-0.08	(0.12)	-0.08	(0.10)
Employment	0.22	(0.20)	.	.	0.01	(0.03)	-0.60	(0.62)	-0.57	(0.50)	1.18	(1.20)	1.03	(0.54)	0.99	(0.57)	1.33*	(0.62)
Gov cons	-0.07*	(0.04)	0.26	(0.17)	-0.03***	(0.01)	-0.10	(0.12)	0.07	(0.12)	0.07	(0.15)	0.00	(0.14)	-0.03	(0.11)	-0.13	(0.15)
Private cons	-0.05	(0.04)	-0.01	(0.17)	-0.00	(0.01)	-0.07	(0.10)	0.04	(0.11)	-0.05	(0.14)	0.15	(0.11)	0.02	(0.13)	-0.08	(0.15)
Exports	-0.00	(0.04)	0.09	(0.14)	-0.01**	(0.01)	0.11	(0.11)	-0.03	(0.12)	-0.02	(0.13)	0.11	(0.11)	-0.08	(0.10)	-0.15	(0.12)
Imports	0.03	(0.03)	0.07	(0.14)	-0.01	(0.01)	0.05	(0.09)	0.00	(0.09)	-0.04	(0.09)	-0.01	(0.08)	0.05	(0.08)	-0.18*	(0.09)
Priv investment	-0.08	(0.13)	0.10	(0.69)	0.03	(0.03)	-0.42	(0.31)	0.00	.	0.22	(0.20)	-0.06	(0.20)	0.32	(0.34)	-0.03	(0.43)
Gov investment	0.20	(0.20)	-0.55	(0.89)	-0.05	(0.06)	-1.00	(0.52)	0.00	.	0.39	(0.58)	-0.29	(0.55)	-0.57	(0.59)	-0.11	(0.27)
Public expenditures	-0.01	(0.06)	0.45**	(0.21)	0.00	(0.02)	0.03	(0.22)	-0.32	(0.28)	-0.10	(0.24)	0.37	(0.23)	0.13	(0.22)	-0.11	(0.14)
Public revenues	-0.04	(0.06)	0.24	(0.18)	-0.02	(0.02)	0.09	(0.19)	-0.12	(0.28)	0.19	(0.22)	-0.12	(0.19)	0.15	(0.13)	0.08	(0.15)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A14. Regressions of correlation with GDP on size, various controls, and types of fiscal rules

	Population	se	Developing =1	se	ER	se	RR	se	BBR	se	DR	se	com exporter =1	se	ER fixed=1	se
GNI	0.03**	(0.01)	-0.01	(0.04)	-0.03	(0.04)	0.01	(0.04)	0.05	(0.04)	0.07	(0.06)	-0.05	(0.04)	0.03	(0.05)
Trade balance/GDP	-0.04*	(0.02)	0.05	(0.10)	0.06	(0.10)	-0.02	(0.11)	-0.02	(0.08)	-0.06	(0.09)	0.06	(0.08)	-0.00	(0.09)
Current account/GDP	-0.02	(0.02)	0.03	(0.08)	0.04	(0.09)	-0.17	(0.14)	-0.08	(0.11)	-0.06	(0.09)	-0.01	(0.07)	0.05	(0.09)

Real int rate	0.03	(0.02)	0.19*	(0.10)	0.26**	(0.12)	0.08	(0.17)	-0.06	(0.08)	0.03	(0.10)	0.18**	(0.08)	-0.03	(0.08)
Terms of trade	0.01	(0.02)	-0.09	(0.09)	0.04	(0.11)	-0.16*	(0.10)	0.02	(0.09)	0.03	(0.10)	-0.07	(0.09)	-0.09	(0.08)
Fiscal balance/GDP	-0.05*	(0.03)	-0.06	(0.12)	-0.10	(0.12)	0.27*	(0.16)	0.13	(0.11)	-0.18*	(0.09)	-0.06	(0.11)	0.05	(0.10)
Inflation	-0.03**	(0.01)	-0.16**	(0.07)	-0.09	(0.07)	0.07	(0.11)	0.07	(0.08)	0.04	(0.07)	-0.06	(0.05)	-0.04	(0.07)
Aggregate inv	0.03***	(0.01)	0.01	(0.08)	-0.04	(0.04)	0.02	(0.05)	-0.03	(0.06)	0.05	(0.05)	-0.03	(0.04)	-0.07	(0.05)
Employment	0.05	(0.09)	.	.	0.32	(0.63)	-0.07	(0.18)	-0.72	(1.28)	0.09	(0.25)	0.30	(0.42)	-0.39	(0.63)
Gov cons	0.01	(0.02)	-0.02	(0.09)	0.01	(0.08)	-0.17**	(0.08)	0.05	(0.09)	0.08	(0.08)	0.04	(0.07)	-0.03	(0.08)
Private cons	0.05**	(0.02)	-0.07	(0.07)	-0.12*	(0.07)	0.03	(0.08)	0.04	(0.08)	-0.07	(0.08)	-0.12	(0.07)	0.05	(0.06)
Exports	-0.04***	(0.02)	0.12	(0.07)	-0.02	(0.05)	-0.04	(0.13)	0.05	(0.06)	0.02	(0.05)	0.01	(0.06)	0.00	(0.05)
Imports	0.02*	(0.01)	-0.07	(0.05)	-0.02	(0.06)	-0.08	(0.05)	0.03	(0.06)	0.08	(0.06)	-0.05	(0.06)	0.00	(0.05)
Priv investment	0.07*	(0.04)	-0.01	(0.31)	-0.14	(0.18)	0.00	.	-0.25**	(0.09)	0.36***	(0.11)	-0.22**	(0.10)	-0.01	(0.19)
Gov investment	-0.03	(0.03)	-0.05	(0.10)	0.10	(0.25)	0.00	.	-0.01	(0.25)	0.07	(0.15)	0.09	(0.11)	-0.39***	(0.09)
Public expenditures	0.01	(0.05)	-0.10	(0.14)	0.00	(0.17)	-0.17	(0.20)	-0.25	(0.17)	-0.02	(0.14)	0.06	(0.16)	0.04	(0.12)
Public revenues	-0.07*	(0.04)	-0.24*	(0.12)	-0.11	(0.12)	0.08	(0.19)	0.05	(0.12)	-0.08	(0.11)	-0.10	(0.12)	-0.11	(0.10)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table A15. Regressions of persistence coefficient on size, various controls, and types of fiscal rules

	population	se	Developing =1	se	ER	se	RR	se	BBR	se	DR	se	Com Exporter =1	se	ER fixed =1	se
GDP	0.00	(0.01)	-0.06	(0.03)	0.07**	(0.03)	-0.18***	(0.04)	-0.05	(0.04)	0.04	(0.03)	0.03	(0.03)	-0.01	(0.03)
GNI	-0.01	(0.01)	0.06	(0.05)	0.07	(0.04)	-0.12**	(0.05)	-0.05	(0.05)	0.04	(0.05)	0.00	(0.06)	-0.03	(0.04)
Trade balance/GDP	0.00	(0.01)	0.05	(0.06)	0.07	(0.05)	0.02	(0.05)	-0.07	(0.06)	0.05	(0.06)	-0.07**	(0.04)	-0.06	(0.06)
Current account/GDP	0.02**	(0.01)	-0.06	(0.05)	0.13**	(0.05)	-0.08	(0.07)	0.02	(0.05)	0.08	(0.06)	-0.03	(0.05)	0.05	(0.05)
Real int rate	0.03*	(0.02)	-0.08	(0.10)	-0.10	(0.09)	0.17	(0.14)	0.03	(0.08)	-0.04	(0.10)	-0.01	(0.08)	0.06	(0.09)
Terms of trade	0.00	(0.02)	-0.03	(0.06)	0.08	(0.06)	0.18***	(0.07)	-0.01	(0.06)	0.05	(0.05)	-0.03	(0.07)	-0.07	(0.05)
Fiscal balance/GDP	-0.02	(0.02)	-0.08	(0.09)	0.09	(0.08)	-0.01	(0.14)	0.16*	(0.08)	-0.11	(0.08)	0.06	(0.09)	-0.08	(0.09)
Inflation	0.03**	(0.01)	-0.16***	(0.04)	0.01	(0.05)	0.06	(0.07)	0.00	(0.05)	0.01	(0.05)	0.01	(0.04)	-0.06	(0.05)
Aggregate inv	0.01	(0.01)	0.01	(0.04)	0.00	(0.04)	0.02	(0.05)	-0.03	(0.04)	-0.01	(0.04)	-0.03	(0.05)	-0.04	(0.04)
Employment	0.02	(0.06)	.	.	0.21	(0.20)	-0.03	(0.14)	-0.29	(0.41)	-0.07	(0.15)	0.12	(0.21)	-0.22	(0.21)
Gov cons	-0.01	(0.01)	0.08	(0.06)	0.00	(0.04)	-0.04	(0.07)	-0.02	(0.05)	0.01	(0.05)	-0.05	(0.04)	-0.02	(0.05)
Private cons	-0.01	(0.01)	-0.01	(0.05)	0.03	(0.07)	-0.05	(0.07)	-0.12*	(0.06)	0.03	(0.06)	-0.05	(0.06)	-0.05	(0.05)
Exports	-0.02	(0.01)	0.06	(0.06)	0.04	(0.05)	-0.01	(0.07)	-0.00	(0.06)	0.05	(0.05)	-0.02	(0.04)	-0.08*	(0.04)
Imports	-0.01	(0.01)	0.06	(0.05)	0.04	(0.03)	-0.13*	(0.07)	-0.03	(0.04)	0.03	(0.04)	-0.07	(0.05)	-0.12***	(0.04)
Priv investment	0.04	(0.03)	-0.25	(0.16)	0.21	(0.13)	0.00	.	-0.15	(0.11)	0.13	(0.12)	-0.09	(0.11)	0.19	(0.15)
Gov investment	-0.03	(0.04)	-0.01	(0.14)	-0.12	(0.23)	0.00	.	0.41**	(0.18)	-0.23	(0.20)	0.04	(0.09)	0.09	(0.14)
Public expenditures	0.01	(0.04)	-0.14	(0.10)	0.04	(0.11)	-0.08	(0.16)	-0.02	(0.10)	-0.15	(0.09)	-0.08	(0.10)	0.01	(0.09)
Public revenues	-0.02	(0.03)	-0.11	(0.06)	-0.01	(0.07)	0.05	(0.11)	-0.02	(0.07)	-0.09	(0.08)	-0.01	(0.07)	0.01	(0.07)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

B. Using labor force and land area as measures of size

Table **B1** contrasts volatilities of key macro aggregates for small and large countries when country's labor force is used to define country size.

Table B1. Volatilities of key macro aggregates, by labor force				
% std dev	**<1m**	**≥1m**	**<median**	**≥median**
GDP	4.89	4.70	5.56	4.12

	0.51	0.33	0.52	0.28
Trade balance/GDP	7.83	3.39	5.82	3.24
	1.72	0.45	0.98	0.54
Current account/GDP	4.93	3.82	5.55	2.99
	0.37	0.55	0.98	0.27
Real int rate	3.18	4.97	3.84	4.91
	0.25	1.41	0.55	1.80
Terms of trade	11.39	12.03	11.12	12.31
	2.10	0.93	1.23	1.11
Fiscal balance/GDP	2.28	2.00	2.67	1.79
	0.00	0.12	0.24	0.12
Inflation	3.98	8.17	4.36	9.19
	0.75	1.38	0.57	1.77
% std dev				
% std dev of gdp				
Total investment	3.61	3.27	3.81	3.07
	0.43	0.12	0.26	0.11
Government consumption	2.11	1.75	1.99	1.71
	0.40	0.11	0.23	0.12
Private consumption	1.80	1.24	1.61	1.18
	0.23	0.05	0.13	0.05
Exports	2.55	2.60	2.45	2.67
	0.31	0.13	0.22	0.14
Imports	2.72	3.22	2.83	3.31
	0.25	0.12	0.16	0.14
Private investment	6.65	5.05	5.92	5.11
	1.29	0.39	0.83	0.47
Public investment	7.29	6.58	6.62	6.71
	1.13	0.50	0.77	0.57
Public expenditures	1.05	2.18	2.41	2.07
	0.00	0.17	0.45	0.17
Public revenues	1.44	2.29	2.25	2.28
	0.00	0.16	0.25	0.20

Note: Standard errors below statistics.

Both the magnitudes of the volatilities and their differences between small and large countries are comparable to those found with population as a measure of size. This is not surprising since population and labor force are highly correlated in our data.

Table B2 shows volatilities of key macro aggregates in large and small countries, where country size is defined based on land area. Again, the findings documented above generally stand under this alternative definition of size.

Table B2. Volatilities of key macro aggregates, by land area

% std dev	<20,000 sq km	≥20,000sq km	<median	≥median
GDP	4.48	4.81	4.98	4.59
	0.39	0.34	0.42	0.38
Trade balance/GDP	5.61	4.02	5.75	3.57
	1.25	0.54	1.28	0.49
Current account/GDP	6.60	3.24	5.38	3.15
	1.59	0.27	0.99	0.31
Real int rate	3.17	4.98	3.31	5.40
	0.41	1.40	0.37	1.82
Terms of trade	7.70	12.35	11.76	11.99
	1.97	0.90	1.51	1.02
Fiscal balance/GDP	.	2.00	2.01	2.00
	.	0.12	0.29	0.13
Inflation	3.34	8.25	3.92	9.42
	0.30	1.36	0.42	1.75
% std dev				
% std dev of gdp				
Total investment	3.38	3.32	3.38	3.31
	0.35	0.13	0.23	0.15
Government consumption	2.08	1.79	1.99	1.75
	0.48	0.12	0.25	0.13
Private consumption	1.85	1.29	1.54	1.25
	0.41	0.05	0.15	0.06
Exports	2.77	2.58	2.48	2.64
	0.52	0.12	0.20	0.14
Imports	3.04	3.14	2.73	3.29
	0.39	0.11	0.18	0.13
Private investment	7.21	5.17	6.75	4.96
	2.26	0.39	1.05	0.42
Public investment	6.91	6.66	6.45	6.75
	1.84	0.48	1.16	0.50
Public expenditures	.	2.15	2.16	2.15
	.	0.17	0.52	0.17
Public revenues	.	2.27	2.08	2.32
	.	0.16	0.32	0.19

Note: Standard errors below statistics.

Column (i) in Table B3 reports the OLS coefficients from univariate cross-country regressions of (log) volatility of various macroeconomic variables on (log) labor force, while column (ii) reports the constant term in those regressions. Symmetrically, columns (iii) and (iv) report the coefficients from the regressions of (log) volatilities on (log) land area.

Table B3. Regressions of volatilities on size

	Labor force (i)	se	Constant (ii)	se	Area (iii)	se	Constant (iv)	se
GDP	-0.08***	(0.02)	2.51***	(0.34)	-0.01	(0.01)	1.53***	(0.16)
Trade balance/GDP	-0.22***	(0.04)	4.39***	(0.68)	-0.09**	(0.04)	2.12***	(0.46)
Current account/GDP	-0.18***	(0.03)	3.87***	(0.40)	-0.10***	(0.02)	2.33***	(0.22)
Real int rate	-0.04	(0.03)	1.68***	(0.44)	0.01	(0.03)	1.00***	(0.32)
Terms of trade	-0.05	(0.04)	3.13***	(0.66)	0.03	(0.04)	1.99***	(0.51)
Fiscal balance/GDP	-0.12***	(0.03)	2.61***	(0.49)	-0.03	(0.04)	0.95**	(0.47)
Inflation	0.09**	(0.04)	0.05	(0.60)	0.09***	(0.03)	0.45	(0.34)
Aggregate inv	-0.06**	(0.03)	2.12***	(0.40)	-0.02	(0.02)	1.41***	(0.26)
Gov cons	-0.01	(0.04)	0.67	(0.59)	-0.01	(0.03)	0.61*	(0.34)
Private cons	-0.09***	(0.03)	1.53***	(0.46)	-0.03	(0.03)	0.63*	(0.34)
Exports	0.03	(0.03)	0.47	(0.39)	0.00	(0.02)	0.82***	(0.21)
Imports	0.06***	(0.02)	0.11	(0.34)	0.04**	(0.02)	0.55**	(0.22)
Priv investment	-0.06	(0.04)	2.44***	(0.67)	-0.04	(0.04)	2.09***	(0.54)
Gov investment	-0.04	(0.03)	2.45***	(0.52)	-0.02	(0.03)	2.07***	(0.38)
Public expenditures	-0.03	(0.05)	1.21	(0.89)	-0.00	(0.05)	0.71	(0.70)
Public revenues	0.00	(0.05)	0.71	(0.75)	0.03	(0.05)	0.30	(0.60)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Tables B4 and B5 report the cyclicality results for the two measures of country size – labor force and land area, respectively. We find that the results remain generally robust when these measures of size are used instead of population.

Table B4. Cyclicality of key macro aggregates with GDP, by labor force				
	<1m	**≥1m**	**<median**	**≥median**
Trade balance/GDP	-0.01	-0.23	-0.16	-0.22
	0.08	0.04	0.06	0.04
Current account/GDP	-0.17	-0.24	-0.14	-0.28
	0.07	0.03	0.05	0.04
Real int rate	-0.14	-0.02	-0.13	0.01
	0.07	0.04	0.05	0.05
Terms of trade	0.13	0.12	0.17	0.09
	0.06	0.03	0.05	0.03
Fiscal balance/GDP	0.40	0.26	0.40	0.22
	.	0.05	0.09	0.06
Inflation	0.11	0.01	0.06	0.01
	0.05	0.03	0.04	0.03
Total investment	0.50	0.69	0.60	0.69
	0.06	0.03	0.05	0.03
Government consumption	0.30	0.29	0.27	0.31
	0.06	0.03	0.04	0.03
Private consumption	0.39	0.68	0.53	0.69
	0.09	0.02	0.06	0.03

Exports	0.53	0.43	0.48	0.43
	0.05	0.03	0.04	0.03
Imports	0.47	0.58	0.54	0.57
	0.07	0.03	0.05	0.03
Private investment	0.24	0.41	0.31	0.41
	0.11	0.05	0.09	0.05
Public investment	0.38	0.30	0.39	0.28
	0.02	0.07	0.08	0.08
Public expenditures	0.51	0.00	-0.06	0.04
	.	0.05	0.13	0.06
Public revenues	0.80	0.47	0.62	0.43
	.	0.04	0.07	0.05

Note: Standard errors below statistics.

Table B5. Cyclicality of key macro aggregates with GDP, by land area				
	<20,000 sq km	**≥20,000 sq km**	**<median**	**≥median**
Trade balance/GDP	-0.08	-0.20	-0.10	-0.23
	0.12	0.03	0.07	0.04
Current account/GDP	-0.16	-0.24	-0.21	-0.24
	0.05	0.04	0.05	0.04
Real int rate	-0.18	0.01	-0.13	0.01
	0.06	0.04	0.05	0.04
Terms of trade	0.04	0.13	0.14	0.12
	0.04	0.03	0.05	0.03
Fiscal balance/GDP	.	0.26	0.34	0.24
	.	0.05	0.09	0.06
Inflation	0.13	0.00	0.08	0.00
	0.05	0.03	0.04	0.03
Total investment	0.51	0.67	0.67	0.65
	0.13	0.03	0.05	0.03
Government consumption	0.25	0.30	0.27	0.30
	0.13	0.03	0.04	0.03
Private consumption	0.48	0.65	0.60	0.65
	0.12	0.03	0.05	0.03
Exports	0.50	0.44	0.51	0.43
	0.08	0.02	0.04	0.03
Imports	0.52	0.57	0.54	0.57
	0.11	0.03	0.05	0.03
Private investment	0.29	0.39	0.30	0.40
	0.22	0.05	0.12	0.05
Public investment	0.37	0.31	0.37	0.30
	0.04	0.07	0.02	0.08

Public expenditures	.	0.01	0.03	0.01
	.	0.05	0.11	0.06
Public revenues	.	0.48	0.58	0.45
	.	0.04	0.05	0.05

Note: Standard errors below statistics.

Table B6. Regressions of correlations with GDP on size

	labor force	se	constant	se	area	se	constant	se
Trade balance/GDP	-0.04**	(0.02)	0.50*	(0.28)	-0.02	(0.02)	0.04	(0.21)
Current account/GDP	-0.03**	(0.01)	0.25	(0.23)	-0.01	(0.01)	-0.12	(0.11)
Real int rate	0.03*	(0.02)	-0.53**	(0.26)	0.04***	(0.01)	-0.51***	(0.09)
Terms of trade	-0.00	(0.02)	0.15	(0.30)	0.01	(0.01)	-0.01	(0.16)
Fiscal balance/GDP	-0.04	(0.03)	0.85*	(0.48)	-0.03	(0.03)	0.66	(0.44)
Inflation	-0.03**	(0.01)	0.40**	(0.18)	-0.02***	(0.01)	0.31***	(0.10)
Aggregate inv	0.04***	(0.01)	0.07	(0.22)	0.01	(0.01)	0.52***	(0.17)
Gov cons	-0.00	(0.02)	0.32	(0.23)	0.00	(0.02)	0.29	(0.23)
Private cons	0.04**	(0.02)	-0.00	(0.29)	-0.00	(0.01)	0.65***	(0.16)
Exports	-0.03**	(0.01)	0.89***	(0.19)	-0.03**	(0.01)	0.77***	(0.15)
Imports	0.02	(0.02)	0.29	(0.25)	-0.00	(0.01)	0.60***	(0.15)
Priv investment	0.05**	(0.02)	-0.36	(0.31)	0.02	(0.02)	0.13	(0.29)
Gov investment	-0.03	(0.03)	0.78*	(0.39)	0.00	(0.02)	0.28	(0.24)
Public expenditures	0.00	(0.03)	-0.03	(0.56)	-0.01	(0.03)	0.19	(0.41)
Public revenues	-0.03	(0.03)	0.97**	(0.42)	-0.03	(0.03)	0.87***	(0.32)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Table B7 and B8 report the results for the cyclicality of key macro aggregates with the real interest rate using labor force and land area as measures of size. These results are consistent with our findings that use population to measure country size.

Table B7. Cyclicality of key macro aggregates with real interest rate, by labor force

	<1m	≥1m	<median	≥median
GDP	-0.14	-0.02	-0.13	0.01
	0.07	0.04	0.05	0.05
Trade balance/GDP	-0.15	0.01	-0.09	0.02
	0.10	0.05	0.07	0.05
Current account/GDP	0.11	0.05	0.12	0.01
	0.09	0.05	0.06	0.06
Terms of trade	0.05	-0.02	0.12	-0.09
	0.12	0.08	0.09	0.09
Fiscal balance/GDP	0.29	-0.02	-0.04	0.01
	.	0.05	0.09	0.06
Inflation	-0.87	-0.69	-0.80	-0.70

	0.04	0.06	0.05	0.06
Total investment	0.00	0.01	0.01	0.01
	0.14	0.05	0.08	0.06
Government consumption	-0.01	0.05	0.03	0.05
	0.06	0.05	0.05	0.06
Private consumption	0.00	-0.03	-0.04	-0.02
	0.13	0.06	0.09	0.06
Exports	-0.09	-0.07	-0.13	-0.04
	0.08	0.05	0.06	0.06
Imports	0.03	-0.05	-0.02	-0.04
	0.12	0.05	0.08	0.06
Private investment	-0.30	-0.04	-0.26	-0.01
	0.08	0.06	0.07	0.07
Public investment	0.17	0.02	0.09	0.04
	0.05	0.14	0.11	0.22
Public expenditures	0.11	0.05	0.14	0.03
	.	0.05	0.10	0.05
Public revenues	0.42	0.02	0.09	0.01
	.	0.06	0.12	0.07

Note: Standard errors below statistics.

Table B8. Cyclicality of key macro aggregates with real interest rate, by land area

	<20,000 sq km	≥20,000 sq km	<median	≥median
GDP	-0.18	0.01	-0.13	0.01
	0.06	0.04	0.05	0.04
Trade balance/GDP	-0.14	0.00	-0.17	0.04
	0.11	0.05	0.07	0.05
Current account/GDP	0.14	0.03	0.10	0.03
	0.07	0.05	0.06	0.06
Terms of trade	0.19	-0.06	0.21	-0.11
	0.08	0.08	0.06	0.08
Fiscal balance/GDP	.	0.00	-0.04	0.00
	.	0.05	0.11	0.06
Inflation	-0.90	-0.68	-0.86	-0.65
	0.02	0.06	0.03	0.07
Total investment	0.06	0.00	0.06	-0.01
	0.11	0.05	0.10	0.05
Government consumption	0.06	0.04	0.00	0.06
	0.09	0.05	0.06	0.05
Private consumption	-0.03	-0.03	0.02	-0.05
	0.15	0.06	0.11	0.06
Exports	-0.18	-0.05	-0.14	-0.04
	0.08	0.05	0.07	0.05

Imports	-0.03	-0.03	0.02	-0.05
	0.12	0.05	0.09	0.06
Private investment	-0.28	-0.07	-0.20	-0.07
	0.10	0.06	0.08	0.08
Public investment	0.17	0.02	0.17	0.02
	0.05	0.14	0.05	0.14
Public expenditures	.	0.06	0.18	0.03
	.	0.05	0.14	0.05
Public revenues	.	0.03	0.07	0.03
	.	0.06	0.10	0.07

Note: Standard errors below statistics.

Table B9. Regressions of correlations with real interest rate on size

	labor force	se	constant	Se	area	se	constant	se
GDP	0.03*	(0.02)	-0.53**	(0.26)	0.04***	(0.01)	-0.51***	(0.09)
Trade balance/GDP	0.05**	(0.02)	-0.77***	(0.28)	0.02	(0.02)	-0.24	(0.21)
Current account/GDP	-0.01	(0.02)	0.25	(0.30)	-0.02	(0.01)	0.30*	(0.15)
Terms of trade	-0.04	(0.02)	0.57	(0.39)	-0.06***	(0.02)	0.70***	(0.18)
Fiscal balance/GDP	-0.01	(0.03)	0.14	(0.49)	0.04	(0.03)	-0.57	(0.40)
Inflation	0.04**	(0.02)	-1.28***	(0.23)	0.04***	(0.01)	-1.24***	(0.10)
Aggregate inv	-0.02	(0.02)	0.28	(0.35)	0.00	(0.02)	-0.04	(0.22)
Gov cons	0.00	(0.02)	-0.02	(0.29)	0.00	(0.02)	0.04	(0.19)
Private cons	-0.02	(0.02)	0.33	(0.38)	0.01	(0.02)	-0.17	(0.25)
Exports	0.01	(0.02)	-0.16	(0.30)	0.02	(0.02)	-0.30	(0.19)
Imports	-0.03	(0.02)	0.44	(0.38)	0.01	(0.02)	-0.16	(0.22)
Priv investment	0.06***	(0.02)	-1.01***	(0.24)	0.04**	(0.02)	-0.60***	(0.18)
Gov investment	-0.06*	(0.02)	1.00*	(0.42)	-0.06*	(0.03)	0.73*	(0.31)
Public expenditures	-0.01	(0.03)	0.17	(0.44)	-0.04	(0.03)	0.53	(0.40)
Public revenues	-0.01	(0.03)	0.23	(0.56)	0.04	(0.03)	-0.54	(0.43)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Tables B10 and B11 report the average persistence coefficient obtained for small and large countries when we use labor force and land area to measure country size, respectively.

Table B10. Persistence of key macro aggregates, by labor force

	<1m	≥1m	<median	≥median
GDP	0.54	0.56	0.59	0.53
	0.03	0.02	0.02	0.02
Trade balance/GDP	0.46	0.42	0.43	0.42
	0.03	0.02	0.02	0.02
Current account/GDP	0.24	0.28	0.22	0.31

	0.04	0.02	0.03	0.03
Real interest rate	0.12	0.24	0.16	0.24
	0.05	0.03	0.04	0.04
Terms of trade	0.27	0.31	0.30	0.31
	0.06	0.02	0.04	0.03
Fiscal balance/GDP	0.41	0.31	0.32	0.31
	.	0.04	0.08	0.04
Inflation	0.17	0.26	0.21	0.26
	0.04	0.02	0.03	0.03
Total investment	0.43	0.56	0.52	0.55
	0.06	0.02	0.04	0.02
Government consumption	0.55	0.52	0.52	0.52
	0.03	0.02	0.02	0.02
Private consumption	0.49	0.52	0.49	0.53
	0.06	0.02	0.04	0.02
Exports	0.47	0.43	0.46	0.42
	0.04	0.02	0.02	0.02
Imports	0.53	0.46	0.50	0.45
	0.03	0.02	0.02	0.02
Private investment	0.35	0.42	0.40	0.41
	0.10	0.03	0.06	0.04
Public investment	0.39	0.47	0.42	0.48
	0.21	0.04	0.10	0.05
Public expenditures	0.48	0.36	0.32	0.38
	.	0.04	0.08	0.04
Public revenues	0.64	0.43	0.52	0.40
	.	0.03	0.05	0.03

Note: Standard errors below statistics.

Table B11. Persistence of key macro aggregates, by land area				
	<20,000 sq km	**≥20,000 sq km**	**<median**	**≥median**
GDP	0.55	0.55	0.56	0.55
	0.03	0.02	0.02	0.02
Trade balance/GDP	0.49	0.42	0.41	0.43
	0.06	0.02	0.03	0.02
Current account/GDP	0.22	0.29	0.22	0.31
	0.04	0.02	0.03	0.03
Real interest rate	0.21	0.20	0.18	0.22
	0.04	0.04	0.04	0.04
Terms of trade	0.26	0.31	0.32	0.30
	0.10	0.02	0.04	0.03
Fiscal balance/GDP	.	0.31	0.22	0.34
	.	0.03	0.09	0.04

Inflation	0.20	0.25	0.22	0.25
	0.03	0.02	0.03	0.03
Total investment	0.48	0.54	0.53	0.54
	0.10	0.02	0.04	0.02
Government consumption	0.53	0.52	0.52	0.52
	0.04	0.02	0.02	0.02
Private consumption	0.57	0.51	0.51	0.51
	0.06	0.02	0.03	0.03
Exports	0.48	0.43	0.45	0.43
	0.07	0.02	0.03	0.02
Imports	0.53	0.46	0.47	0.47
	0.06	0.02	0.03	0.02
Private investment	0.46	0.40	0.48	0.38
	0.16	0.03	0.07	0.04
Public investment	0.24	0.48	0.40	0.47
	0.25	0.04	0.15	0.04
Public expenditures	.	0.36	0.27	0.39
	.	0.03	0.09	0.04
Public revenues	.	0.43	0.43	0.43
	.	0.03	0.05	0.03

Note: Standard errors below statistics.

Table B12. Regressions of autoregressive coefficient on size								
	labor force	se	constant	se	area	se	constant	se
GDP	-0.01	(0.01)	0.66***	(0.11)	-0.00	(0.00)	0.58***	(0.05)
Trade balance/GDP	0.01	(0.01)	0.25*	(0.13)	0.01	(0.01)	0.34***	(0.11)
Current account/GDP	0.03***	(0.01)	-0.19	(0.15)	0.02***	(0.01)	0.06	(0.07)
Real int rate	0.02	(0.01)	-0.05	(0.22)	0.00	(0.01)	0.16*	(0.09)
Terms of trade	0.02	(0.01)	0.06	(0.20)	0.01	(0.01)	0.23	(0.15)
Fiscal balance/GDP	0.02	(0.02)	-0.08	(0.34)	0.04**	(0.02)	-0.22	(0.28)
Inflation	0.03***	(0.01)	-0.14	(0.15)	0.01*	(0.01)	0.10	(0.08)
Aggregate inv	0.02**	(0.01)	0.19	(0.15)	0.00	(0.01)	0.50***	(0.12)
Gov cons	-0.00	(0.01)	0.53***	(0.13)	-0.00	(0.01)	0.55***	(0.07)
Private cons	0.01	(0.01)	0.39**	(0.18)	-0.01	(0.01)	0.68***	(0.11)
Exports	-0.01	(0.01)	0.55***	(0.14)	-0.01	(0.01)	0.52***	(0.11)
Imports	-0.00	(0.01)	0.47***	(0.12)	-0.01	(0.01)	0.53***	(0.11)
Priv investment	0.02	(0.02)	0.14	(0.28)	-0.01	(0.02)	0.47**	(0.22)
Gov investment	0.02	(0.03)	0.16	(0.45)	0.03	(0.03)	0.10	(0.37)
Public expenditures	0.03	(0.02)	-0.14	(0.37)	0.03	(0.02)	-0.01	(0.27)
Public revenues	0.00	(0.02)	0.40	(0.31)	-0.00	(0.02)	0.44**	(0.20)

Note: Standard errors in parentheses; * p<0.10, ** p<0.05, *** p<0.01

Country size and the level of development

Table B13. Regressions of volatilities on size and development status								
	labor force	**se**	**developing =1**	**se**	**area**	**se**	**developing =1**	**se**
GDP	-0.08***	(0.02)	0.30***	(0.10)	-0.02	(0.01)	0.30***	(0.10)
Trade balance/GDP	-0.24***	(0.04)	0.96***	(0.13)	-0.13***	(0.03)	0.98***	(0.16)
Current account/GDP	-0.18***	(0.02)	0.30**	(0.15)	-0.11***	(0.02)	0.30**	(0.15)
Real int rate	-0.02	(0.03)	0.85***	(0.19)	0.01	(0.03)	0.84***	(0.18)
Terms of trade	-0.05	(0.04)	0.43	(0.27)	0.02	(0.04)	0.42	(0.26)
Fiscal balance/GDP	-0.12***	(0.03)	-0.03	(0.11)	-0.02	(0.03)	-0.11	(0.12)
Inflation	0.09**	(0.04)	0.81***	(0.15)	0.06**	(0.03)	0.70***	(0.15)
Aggregate inv	-0.06**	(0.03)	0.05	(0.07)	-0.02	(0.02)	0.05	(0.07)
Gov cons	-0.03	(0.03)	0.68***	(0.09)	-0.04	(0.03)	0.68***	(0.09)
Private cons	-0.09***	(0.03)	0.18**	(0.07)	-0.04	(0.03)	0.17**	(0.08)
Exports	0.02	(0.03)	0.23***	(0.07)	-0.01	(0.02)	0.23***	(0.07)
Imports	0.06***	(0.02)	0.13**	(0.06)	0.04**	(0.02)	0.10	(0.06)
Priv investment	-0.05	(0.04)	-0.34	(0.21)	-0.03	(0.04)	-0.33	(0.22)
Gov investment	-0.04	(0.04)	0.12	(0.21)	-0.02	(0.03)	0.07	(0.23)
Public expenditures	-0.08*	(0.05)	0.64***	(0.11)	-0.04	(0.04)	0.60***	(0.12)
Public revenues	-0.05	(0.04)	0.59***	(0.10)	-0.00	(0.04)	0.53***	(0.11)

Table B14. Regressions of correlation with GDP on size and development status								
	labor force	**se**	**Developing =1**	**se**	**area**	**se**	**Developing =1**	**se**
Trade balance/GDP	-0.05***	(0.02)	0.20***	(0.06)	-0.03*	(0.02)	0.23***	(0.07)
Current account/GDP	-0.03**	(0.01)	0.10	(0.07)	-0.01	(0.01)	0.09	(0.07)
Real int rate	0.03**	(0.02)	0.10	(0.07)	0.04***	(0.01)	0.09	(0.07)
Terms of trade	-0.00	(0.02)	-0.12	(0.09)	0.01	(0.01)	-0.11	(0.08)
Fiscal balance/GDP	-0.01	(0.03)	-0.33***	(0.09)	-0.01	(0.03)	-0.33***	(0.09)
Inflation	-0.02**	(0.01)	-0.20***	(0.04)	-0.02**	(0.01)	-0.19***	(0.05)
Aggregate inv	0.04***	(0.01)	-0.19***	(0.04)	0.02	(0.01)	-0.19***	(0.04)
Gov cons	-0.00	(0.02)	0.06	(0.06)	-0.00	(0.02)	0.07	(0.06)
Private cons	0.04**	(0.02)	-0.14***	(0.05)	0.00	(0.01)	-0.15***	(0.05)
Exports	-0.03**	(0.01)	-0.02	(0.05)	-0.03**	(0.01)	0.02	(0.05)
Imports	0.02*	(0.01)	-0.25***	(0.04)	0.01	(0.01)	-0.25***	(0.04)
Priv investment	0.05***	(0.02)	-0.16	(0.20)	0.03	(0.02)	-0.15	(0.20)
Gov investment	-0.02	(0.03)	-0.25*	(0.14)	0.02	(0.03)	-0.33**	(0.13)
Public expenditures	-0.02	(0.03)	0.23**	(0.10)	-0.03	(0.03)	0.23**	(0.11)
Public revenues	-0.01	(0.02)	-0.23***	(0.09)	-0.01	(0.02)	-0.25***	(0.08)

Table B15. Regressions of correlation with real int rate on size and development status								
	labor force	**se**	**Developing =1**	**se**	**area**	**se**	**Developing =1**	**se**
GDP	0.03**	(0.02)	0.10	(0.07)	0.04***	(0.01)	0.09	(0.07)
Trade balance/GDP	0.05**	(0.02)	-0.04	(0.09)	0.02	(0.02)	-0.03	(0.09)
Current account/GDP	-0.01	(0.02)	-0.04	(0.09)	-0.02	(0.01)	-0.02	(0.09)
Terms of trade	-0.04	(0.03)	0.01	(0.14)	-0.06***	(0.02)	0.06	(0.09)
Fiscal balance/GDP	0.00	(0.03)	-0.19*	(0.10)	0.05**	(0.02)	-0.21**	(0.08)
Inflation	0.03**	(0.02)	-0.19**	(0.08)	0.04***	(0.01)	-0.19***	(0.07)
Aggregate inv	-0.02	(0.02)	0.06	(0.10)	0.00	(0.02)	0.05	(0.10)
Gov cons	-0.00	(0.02)	0.19**	(0.08)	-0.00	(0.02)	0.20**	(0.08)
Private cons	-0.02	(0.02)	0.21**	(0.10)	0.01	(0.02)	0.20*	(0.10)
Exports	0.01	(0.02)	-0.00	(0.08)	0.02	(0.02)	-0.02	(0.08)
Imports	-0.03	(0.02)	0.10	(0.09)	0.01	(0.02)	0.07	(0.10)
Priv investment	0.06***	(0.01)	-0.13*	(0.07)	0.04***	(0.01)	-0.13	(0.09)
Gov investment	-0.09*	(0.04)	0.31	(0.24)	-0.07	(0.05)	0.20	(0.19)
Public expenditures	-0.02	(0.03)	0.14	(0.11)	-0.04	(0.03)	0.15	(0.09)
Public revenues	-0.01	(0.04)	0.02	(0.12)	0.04	(0.03)	-0.02	(0.12)

Table B16. Regressions of autoregressive coefficient on size and development status								
	labor force	**se**	**Developing =1**	**se**	**area**	**se**	**Developing =1**	**se**
GDP	-0.01	(0.01)	-0.07***	(0.02)	0.00	(0.00)	-0.08***	(0.02)
Trade balance/GDP	0.01	(0.01)	-0.06*	(0.04)	0.01	(0.01)	-0.07*	(0.04)
Current account/GDP	0.03***	(0.01)	-0.08**	(0.04)	0.02***	(0.01)	-0.10**	(0.04)
Real int rate	0.02	(0.02)	-0.05	(0.06)	0.00	(0.01)	-0.05	(0.06)
Terms of trade	0.02	(0.01)	-0.02	(0.05)	0.01	(0.01)	-0.03	(0.05)
Fiscal balance/GDP	0.03*	(0.02)	-0.17**	(0.07)	0.05**	(0.02)	-0.18***	(0.07)
Inflation	0.03***	(0.01)	-0.17***	(0.03)	0.02***	(0.01)	-0.17***	(0.03)
Aggregate inv	0.02***	(0.01)	-0.10***	(0.03)	0.01	(0.01)	-0.10***	(0.03)
Gov cons	0.00	(0.01)	-0.06*	(0.03)	0.00	(0.01)	-0.07*	(0.03)
Private cons	0.01	(0.01)	-0.14***	(0.04)	-0.01	(0.01)	-0.14***	(0.04)
Exports	-0.01	(0.01)	-0.00	(0.03)	-0.01	(0.01)	-0.01	(0.03)
Imports	-0.00	(0.01)	0.02	(0.03)	-0.01	(0.01)	0.02	(0.03)
Priv investment	0.02	(0.02)	-0.11	(0.07)	-0.00	(0.02)	-0.09	(0.07)
Gov investment	0.02	(0.03)	-0.09	(0.11)	0.04	(0.03)	-0.12	(0.10)
Public expenditures	0.04*	(0.02)	-0.10	(0.06)	0.04*	(0.02)	-0.11*	(0.06)
Public revenues	0.01	(0.02)	-0.11*	(0.06)	0.01	(0.01)	-0.12**	(0.05)

C. Alternative thresholds for smallness

In this appendix we report average volatilities, correlation with GDP and real interest rate, as well as persistence for two alternative thresholds identifying small countries – 1 million

population and 2 million population. These thresholds have been used in several existing studies. For instance, Easterly and Kraay (2000) adopt a threshold of 1 million population, while Favaro (2008) used a higher threshold of 2 million people.

Table C1 shows results for volatilities, Table C2 and C3 for correlation with GDP and real interest rate, respectively, while Table C4 is for the autocorrelation coefficient.

Table C1. Volatilities of key macro aggregates, alternative thresholds for smallness

% std dev	<1m	<2m	≥10m
GDP	5.04	5.21	3.94
	0.54	0.51	0.35
Trade balance/GDP	7.89	7.62	2.66
	2.71	1.83	0.28
Current account/GDP	5.18	6.72	2.58
	0.36	1.39	0.28
Real int rate	3.18	3.09	3.18
	0.27	0.23	0.56
Terms of trade	12.42	11.19	11.67
	2.95	2.12	1.37
Fiscal balance/GDP	2.28	2.28	1.79
	.	.	0.13
Inflation	4.02	3.86	9.17
	0.75	0.66	2.24
% std dev			
% std dev of gdp			
Total investment	3.00	3.28	2.99
	0.37	0.30	0.14
Government consumption	1.75	2.00	1.67
	0.41	0.42	0.14
Private consumption	1.76	1.78	1.17
	0.38	0.25	0.05
Exports	2.36	2.47	2.50
	0.47	0.32	0.13
Imports	2.62	2.68	3.43
	0.35	0.26	0.16
Private investment	5.58	6.08	4.81
	1.57	1.34	0.58
Public investment	8.05	7.29	5.95
	.	1.13	0.38
Public expenditures	1.05	1.05	2.07
	.	.	0.19
Public revenues	1.44	1.44	2.26
	.	.	0.19

Table C2. Cyclicality of key macro aggregates with GDP, alternative thresholds for smallness			
	<1m	**<2m**	**≥10m**
Trade balance/GDP	-0.03	-0.23	-0.10
	0.09	0.04	0.06
Current account/GDP	-0.19	-0.24	-0.15
	0.06	0.04	0.05
Real int rate	-0.15	0.00	-0.15
	0.06	0.04	0.05
Terms of trade	0.12	0.12	0.19
	0.06	0.03	0.05
Fiscal balance/GDP	0.40	0.26	0.25
	.	0.05	0.08
Inflation	0.12	0.00	0.08
	0.05	0.03	0.04
Total investment	0.52	0.69	0.57
	0.06	0.03	0.05
Government consumption	0.33	0.29	0.29
	0.06	0.03	0.05
Private consumption	0.40	0.68	0.47
	0.10	0.02	0.06
Exports	0.53	0.43	0.50
	0.06	0.03	0.04
Imports	0.50	0.57	0.50
	0.07	0.03	0.05
Private investment	0.29	0.39	0.28
	0.12	0.05	0.09
Public investment	0.38	0.30	0.44
	0.02	0.07	0.07
Public expenditures	0.51	0.00	0.16
	.	0.05	0.13
Public revenues	0.80	0.47	0.62
	.	0.04	0.08

Table C3. Cyclicality of key macro aggregates with real interest rate, alternative thresholds for smallness			
	<1m	**<2m**	**≥10m**
GDP	-0.15	0.00	-0.15
	0.06	0.04	0.05
Trade balance/GDP	-0.15	0.01	-0.11

	0.10	0.05	0.08
Current account/GDP	0.10	0.05	0.14
	0.08	0.05	0.07
Terms of trade	0.05	-0.02	0.08
	0.12	0.08	0.09
Fiscal balance/GDP	0.29	-0.02	-0.05
	.	0.05	0.14
Inflation	-0.87	-0.68	-0.82
	0.03	0.06	0.05
Total investment	0.00	0.01	0.01
	0.14	0.05	0.09
Government consumption	-0.01	0.05	0.02
	0.06	0.05	0.05
Private consumption	0.00	-0.03	-0.05
	0.13	0.06	0.11
Exports	-0.09	-0.07	-0.15
	0.08	0.05	0.06
Imports	0.03	-0.05	-0.02
	0.12	0.05	0.09
Private investment	-0.30	-0.04	-0.28
	0.08	0.06	0.07
Public investment	0.17	0.02	0.04
	0.05	0.14	0.14
Public expenditures	0.11	0.05	0.16
	.	0.05	0.15
Public revenues	0.42	0.02	0.03
	.	0.06	0.18

Table C4. Persistence of key macro aggregates, alternative thresholds for smallness			
	<1m	**<2m**	**≥10m**
GDP	0.55	0.55	0.57
	0.02	0.02	0.02
Trade balance/GDP	0.46	0.42	0.42
	0.03	0.02	0.03
Current account/GDP	0.25	0.28	0.22
	0.04	0.02	0.03
Real interest rate	0.13	0.24	0.16
	0.05	0.03	0.04
Terms of trade	0.28	0.31	0.31
	0.06	0.02	0.04
Fiscal balance/GDP	0.41	0.31	0.20
	.	0.04	0.10

Inflation	0.18	0.26	0.20
	0.04	0.02	0.03
Total investment	0.45	0.55	0.51
	0.05	0.02	0.04
Government consumption	0.53	0.52	0.52
	0.03	0.02	0.03
Private consumption	0.50	0.52	0.47
	0.06	0.02	0.04
Exports	0.46	0.43	0.46
	0.04	0.02	0.03
Imports	0.53	0.46	0.50
	0.04	0.02	0.03
Private investment	0.38	0.41	0.39
	0.11	0.03	0.07
Public investment	0.39	0.47	0.42
	0.21	0.04	0.12
Public expenditures	0.48	0.36	0.23
	.	0.04	0.11
Public revenues	0.64	0.43	0.52
	.	0.03	0.07

These results are comparable to those obtained when the 1.5 million people threshold is used to identify small countries.

D. Detrending procedure

Next, we conduct the robustness analysis with respect to the de-trending procedure. As argued in the literature (see Canova, 1998), for the same series, the cyclical components obtained under different de-trending procedures can have quite different properties, in finite samples. Thus, it is important to check how sensitive our results are to an alternative trend-cycle decomposition.

We report two robustness exercises. The first is with respect to the smoothing parameter in the HP filter. The second exercise uses Baxter and King (1995) filter to decompose the series into trend and cyclical components.

D.1. Smoothing parameter in HP filter

In Section 3 we showed that the duration of expansions is slightly lower in small countries relative to larger economies. To account for this fact, we apply a lower smoothing parameter equal to 78 in small economies when performing the HP filter decompositions. In large countries we continue using the smoothing parameter equal to 100. We then re-estimate regressions of volatilities, correlations with GDP, and persistence on size and other country characteristics. Effectively, the results below are counterparts of those reported in Tables 18, 19, 20. Table D1 presents the results for volatilities, Table D2 – for cyclicality with GDP, while table D3 – for persistence. We find that all our results remain robust under this amended trend-cycle decomposition.

Table D1. Regressions of volatilities on size and various controls, robustness with respect to the smoothing parameter in HP filter

	population	se	Developing =1	se	ICRG_avg	se	Fiscalrule =1	se	com exporter =1	se	ER fixed =1	se
GDP	-0.09***	(0.04)	-0.13	(0.15)	-0.03***	(0.01)	-0.06	(0.10)	0.14	(0.10)	-0.05	(0.12)
Trade balance/GDP	-0.21***	(0.04)	0.48*	(0.26)	-0.01	(0.01)	-0.21	(0.15)	0.13	(0.12)	0.19	(0.14)
Current account/GDP	-0.20***	(0.04)	-0.08	(0.22)	-0.01	(0.01)	0.03	(0.16)	0.18	(0.17)	0.15	(0.11)
Real int rate	-0.04	(0.06)	0.11	(0.46)	-0.05***	(0.02)	0.09	(0.24)	0.13	(0.17)	0.04	(0.27)
Terms of trade	-0.03	(0.05)	0.15	(0.22)	-0.02**	(0.01)	-0.04	(0.12)	0.44**	(0.19)	-0.06	(0.15)
Fiscal balance/GDP	-0.05	(0.04)	-0.17	(0.16)	-0.01	(0.01)	-0.17	(0.15)	0.34***	(0.12)	0.03	(0.13)
Inflation	-0.03	(0.06)	-0.09	(0.33)	-0.08***	(0.01)	0.43**	(0.20)	0.21	(0.21)	-0.72***	(0.19)
Aggregate inv	-0.09***	(0.03)	0.07	(0.12)	-0.01	(0.01)	-0.00	(0.12)	-0.05	(0.12)	-0.07	(0.10)
Gov cons	-0.07*	(0.04)	0.24	(0.16)	-0.03***	(0.01)	-0.01	(0.12)	-0.01	(0.11)	-0.11	(0.14)
Private cons	-0.06	(0.04)	-0.04	(0.17)	-0.01	(0.01)	0.10	(0.15)	0.01	(0.12)	-0.02	(0.15)
Exports	-0.01	(0.03)	0.10	(0.14)	-0.01**	(0.01)	0.02	(0.12)	-0.09	(0.10)	-0.14	(0.12)
Imports	0.03	(0.03)	0.07	(0.14)	-0.00	(0.01)	-0.02	(0.09)	0.04	(0.09)	-0.18*	(0.09)
Priv investment	-0.09	(0.13)	-0.26	(0.62)	0.01	(0.03)	0.01	(0.23)	0.23	(0.33)	-0.02	(0.40)
Gov investment	0.11	(0.17)	-0.15	(0.68)	-0.00	(0.04)	-0.16	(0.23)	-0.17	(0.44)	-0.08	(0.31)
Public expenditures	-0.03	(0.07)	0.38**	(0.18)	-0.01	(0.01)	0.07	(0.18)	0.07	(0.21)	-0.03	(0.13)
Public revenues	-0.03	(0.05)	0.22	(0.17)	-0.01	(0.01)	0.10	(0.16)	0.13	(0.13)	0.03	(0.14)

Table D2. Regressions of correlations with GDP on size and various controls: robustness with respect to the smoothing parameter in HP filter

	populatio n	se	developing= 1	se	fiscalrule= 1	se	com exporter=1	se	ER fixed= 1	se
Trade balance/GDP	-0.04**	(0.02)	0.04	(0.09)	-0.11	(0.07)	0.05	(0.07)	-0.04	(0.09)
Current account/GDP	-0.02	(0.02)	0.03	(0.08)	-0.13*	(0.07)	0.01	(0.06)	0.01	(0.08)
Real int rate	0.03	(0.02)	0.13	(0.10)	0.03	(0.07)	0.19**	(0.08)	-0.03	(0.11)
Terms of trade	0.00	(0.02)	-0.08	(0.10)	0.06	(0.06)	-0.07	(0.08)	-0.09	(0.07)
Fiscal balance/GDP	-0.06*	(0.03)	-0.12	(0.13)	-0.05	(0.12)	-0.06	(0.12)	0.01	(0.10)
Inflation	-0.03**	(0.01)	-0.15**	(0.06)	0.07	(0.05)	-0.05	(0.05)	-0.01	(0.07)
Aggregate inv	0.03***	(0.01)	0.03	(0.07)	0.03	(0.06)	-0.02	(0.05)	-0.04	(0.05)
Gov cons	0.01	(0.02)	-0.01	(0.09)	0.10	(0.06)	0.04	(0.06)	-0.01	(0.07)
Private cons	0.05**	(0.02)	-0.08	(0.07)	-0.06	(0.07)	-0.09	(0.08)	0.05	(0.06)
Exports	-0.04***	(0.02)	0.12	(0.07)	0.03	(0.05)	0.02	(0.05)	0.00	(0.06)
Imports	0.02*	(0.01)	-0.05	(0.05)	0.10*	(0.05)	-0.05	(0.06)	0.03	(0.05)
Priv investment	0.06	(0.04)	-0.07	(0.33)	0.08	(0.11)	-0.17	(0.11)	0.10	(0.20)
Gov investment	-0.02	(0.02)	-0.05	(0.08)	0.08	(0.16)	0.08	(0.11)	-0.35**	(0.12)
Public expenditures	-0.00	(0.05)	-0.05	(0.13)	-0.20	(0.14)	0.07	(0.16)	0.04	(0.11)

Public revenues	-0.07**	(0.03)	-0.22**	(0.10)	-0.01	(0.11)	-0.09	(0.12)	-0.12	(0.09)

Table D3. Regressions of autoregressive coefficient on size and various controls: robustness with respect to the smoothing parameter in HP filter

	population	se	Developing =1	se	Fiscalrule =1	se	com exporter =1	se	ER fixed=1	se
GDP	0.00	(0.01)	-0.04	(0.03)	0.01	(0.03)	0.03	(0.03)	-0.01	(0.03)
Trade balance/GDP	0.01	(0.01)	0.06	(0.06)	0.01	(0.04)	-0.09***	(0.03)	-0.05	(0.07)
Current account/GDP	0.03***	(0.01)	-0.05	(0.05)	0.13***	(0.04)	-0.04	(0.05)	0.06	(0.05)
Real int rate	0.04***	(0.01)	-0.09	(0.10)	-0.04	(0.06)	0.01	(0.07)	0.06	(0.08)
Terms of trade	0.01	(0.02)	-0.02	(0.05)	0.08	(0.05)	-0.03	(0.06)	-0.06	(0.05)
Fiscal balance/GDP	-0.01	(0.02)	-0.10	(0.09)	0.16	(0.09)	0.04	(0.09)	-0.10	(0.08)
Inflation	0.03***	(0.01)	-0.17***	(0.04)	0.03	(0.03)	0.01	(0.04)	-0.05	(0.05)
Aggregate inv	0.02*	(0.01)	0.02	(0.04)	0.01	(0.05)	-0.04	(0.05)	-0.03	(0.04)
Gov cons	-0.01	(0.01)	0.10*	(0.06)	0.01	(0.04)	-0.05	(0.04)	-0.01	(0.05)
Private cons	-0.01	(0.01)	0.00	(0.05)	-0.08	(0.05)	-0.07	(0.06)	-0.05	(0.05)
Exports	-0.02	(0.01)	0.06	(0.06)	0.01	(0.04)	-0.02	(0.04)	-0.08*	(0.04)
Imports	-0.01	(0.01)	0.08*	(0.05)	0.04	(0.04)	-0.08	(0.05)	-0.11***	(0.03)
Priv investment	0.05*	(0.03)	-0.22	(0.15)	0.04	(0.08)	-0.14	(0.10)	0.20	(0.14)
Gov investment	0.00	(0.05)	0.07	(0.14)	0.11	(0.16)	0.13	(0.14)	-0.02	(0.12)
Public expenditures	0.02	(0.04)	-0.14	(0.11)	-0.07	(0.10)	-0.08	(0.12)	-0.04	(0.09)
Public revenues	-0.02	(0.03)	-0.12*	(0.07)	-0.06	(0.07)	-0.01	(0.07)	-0.02	(0.06)

D.2. Baxter and King filter

In this section we present the results on volatilities, correlations with GDP, and persistence obtained when the cyclical component of the macroeconomic variables is computed using Baxter and King (1995) filter. The minimum and maximum period of oscillation retained in the time series is assumed to be between 1.5 and 8.0 years, as is standard in the literature. We also set the lead-lag length of the filter to be 3 years.

The following tables replicate our extended regression results in the main text using the cyclical component computed with the Baxter-King filter. We find that all our results remain robust under this alternative trend-cycle decomposition.

Table D4. Regressions of volatilities on size and various controls, robustness with respect to BP filter

	population	se	Developing =1	se	ICRG_avg	se	Fiscalrule =1	se	com exporter =1	se	ER fixed=1	se
GDP	-0.09**	(0.03)	-0.10	(0.14)	-0.03***	(0.01)	-0.07	(0.10)	0.13	(0.10)	-0.10	-0.09**
Trade balance/GDP	-0.23***	(0.04)	0.51**	(0.24)	-0.01	(0.01)	-0.21	(0.13)	0.17	(0.12)	0.24*	-0.23***
Current account/GDP	-0.23***	(0.04)	-0.11	(0.23)	-0.02	(0.01)	-0.02	(0.16)	0.16	(0.17)	0.11	-0.23***
Real int rate	-0.08	(0.06)	-0.05	(0.43)	-0.08***	(0.02)	0.11	(0.25)	0.18	(0.19)	-0.21	-0.08

Terms of trade	-0.02	(0.06)	0.11	(0.24)	-0.03**	(0.01)	0.01	(0.13)	0.55***	(0.20)	0.11	-0.02
Fiscal balance/GDP	-0.03	(0.05)	-0.08	(0.20)	-0.01	(0.01)	-0.26	(0.17)	0.46***	(0.15)	0.08	-0.03
Inflation	-0.04	(0.06)	-0.03	(0.35)	-0.08***	(0.01)	0.42**	(0.20)	0.19	(0.21)	-0.67***	-0.04
Aggregate inv	-0.12***	(0.02)	0.07	(0.10)	-0.02**	(0.01)	-0.04	(0.12)	-0.02	(0.11)	-0.08	-0.12***
Gov cons	-0.09**	(0.04)	0.14	(0.18)	-0.03***	(0.01)	-0.01	(0.13)	0.02	(0.12)	-0.08	-0.09**
Private cons	-0.08*	(0.04)	-0.03	(0.18)	-0.01	(0.01)	0.14	(0.14)	0.07	(0.13)	0.02	-0.08*
Exports	-0.01	(0.03)	0.16	(0.14)	-0.02**	(0.01)	0.05	(0.11)	-0.12	(0.08)	-0.07	-0.01
Imports	0.01	(0.03)	0.02	(0.13)	-0.01	(0.01)	-0.00	(0.08)	0.03	(0.09)	-0.04	0.01
Priv investment	-0.08	(0.14)	-0.17	(0.76)	0.00	(0.03)	-0.07	(0.27)	0.22	(0.33)	0.01	-0.08
Gov investment	0.20	(0.15)	-0.49	(0.89)	-0.03	(0.05)	-0.15	(0.37)	-0.21	(0.44)	0.31	0.20
Public expenditures	-0.05	(0.09)	0.49*	(0.25)	-0.02	(0.02)	0.06	(0.22)	0.20	(0.26)	0.02	-0.05
Public revenues	-0.03	(0.07)	0.27	(0.19)	-0.02	(0.01)	0.13	(0.18)	0.14	(0.15)	0.11	-0.03

Table D5. Regressions of correlations with GDP on size and various controls: robustness with respect to BP filter

	population	se	Developing =1	se	Fiscalrule =1	se	com exporter=1	se	ER fixed=1	se
Trade balance/GDP	-0.04*	(0.02)	0.09	(0.09)	-0.12*	(0.07)	0.01	(0.08)	-0.02	(0.10)
Current account/GDP	-0.04**	(0.02)	0.07	(0.08)	-0.10	(0.07)	0.03	(0.07)	0.04	(0.08)
Real int rate	0.03**	(0.01)	0.18*	(0.10)	0.10	(0.06)	0.15**	(0.07)	0.06	(0.09)
Terms of trade	-0.00	(0.02)	0.06	(0.09)	0.07	(0.06)	0.05	(0.09)	0.02	(0.08)
Fiscal balance/GDP	-0.06*	(0.03)	-0.12	(0.11)	0.08	(0.11)	-0.11	(0.11)	0.01	(0.09)
Inflation	-0.02	(0.01)	-0.13*	(0.07)	0.02	(0.06)	-0.03	(0.06)	-0.05	(0.09)
Aggregate inv	0.06***	(0.02)	-0.05	(0.08)	0.05	(0.08)	0.01	(0.07)	-0.05	(0.05)
Gov cons	0.00	(0.02)	-0.05	(0.08)	0.09	(0.06)	0.01	(0.06)	-0.04	(0.07)
Private cons	0.06***	(0.02)	-0.15**	(0.07)	-0.03	(0.06)	-0.12*	(0.07)	0.06	(0.07)
Exports	-0.04*	(0.02)	0.03	(0.08)	-0.02	(0.05)	-0.01	(0.06)	0.01	(0.06)
Imports	0.02	(0.01)	-0.08	(0.06)	0.10*	(0.06)	-0.05	(0.06)	-0.02	(0.06)
Priv investment	0.06	(0.04)	0.02	(0.32)	0.15	(0.11)	-0.23**	(0.10)	0.02	(0.20)
Gov investment	0.03	(0.02)	-0.06	(0.10)	-0.15	(0.09)	0.08	(0.09)	-0.25*	(0.14)
Public expenditures	0.00	(0.05)	-0.07	(0.10)	-0.16	(0.10)	0.02	(0.17)	-0.13	(0.09)
Public revenues	-0.06*	(0.03)	-0.19*	(0.10)	-0.02	(0.10)	-0.10	(0.14)	-0.22***	(0.07)

Table D6. Regressions of autoregressive coefficient on size and various controls: robustness with respect to BP filter

	population	se	developing=1	se	fiscalrule=1	se	com exporter=1	se	ER fixed=1	se
GDP	0.00	(0.01)	-0.04	(0.04)	-0.01	(0.04)	0.01	(0.04)	-0.04	(0.04)

Trade balance/GDP	0.00	(0.01)	0.03	(0.05)	-0.02	(0.04)	-0.07**	(0.03)	-0.01	(0.06)
Current account/GDP	0.02***	(0.01)	-0.05	(0.04)	0.09***	(0.03)	-0.06	(0.04)	0.06	(0.04)
Real int rate	0.03***	(0.01)	-0.04	(0.09)	-0.07	(0.06)	0.01	(0.06)	0.04	(0.07)
Terms of trade	-0.02	(0.02)	-0.01	(0.06)	0.02	(0.05)	-0.05	(0.05)	-0.11	(0.06)
Fiscal balance/GDP	-0.01	(0.03)	-0.22**	(0.10)	0.13	(0.09)	-0.01	(0.07)	-0.09	(0.09)
Inflation	0.02**	(0.01)	-0.18***	(0.04)	-0.01	(0.03)	-0.00	(0.04)	-0.00	(0.05)
Aggregate inv	0.02	(0.01)	-0.01	(0.06)	-0.03	(0.05)	-0.02	(0.06)	-0.06	(0.06)
Gov cons	-0.01	(0.01)	0.07	(0.07)	0.00	(0.05)	-0.09*	(0.05)	-0.01	(0.07)
Private cons	-0.02	(0.01)	-0.03	(0.07)	-0.12**	(0.05)	-0.06	(0.07)	-0.05	(0.06)
Exports	-0.02	(0.01)	0.01	(0.06)	0.03	(0.04)	-0.03	(0.04)	-0.04	(0.04)
Imports	-0.01	(0.01)	0.06	(0.04)	0.04	(0.04)	-0.06	(0.04)	-0.06*	(0.03)
Priv investment	0.03	(0.03)	-0.20	(0.15)	0.03	(0.08)	-0.10	(0.10)	0.08	(0.13)
Gov investment	-0.04	(0.04)	0.18*	(0.09)	0.07	(0.14)	0.27*	(0.14)	-0.18	(0.13)
Public expenditures	-0.01	(0.04)	-0.07	(0.08)	-0.02	(0.09)	-0.05	(0.12)	-0.01	(0.08)
Public revenues	0.01	(0.03)	-0.27***	(0.07)	-0.05	(0.08)	0.01	(0.08)	-0.04	(0.08)

E. Exchange rate regime classification

In this section we explore the robustness of our results with respect to the fixed exchange rate regime classification. In the benchmark results reported in the main text we distinguished countries by whether or not they follow a flexible exchange rate regime. Here we instead split the countries by whether or not they follow a fixed exchange rate regime. Specifically, we define a dummy variable that takes a value of 1 if a country has had no separate legal tender; or has followed a pre-announced peg or currency board arrangement; or pre-announced horizontal band that is narrower than or equal to +/- 2%; or de facto peg. The regression results with this variable are presented in Tables F1 – F3. We should note that we face a data availability problem when this variable is used. In particular, we find that there are only 37 countries in our data set that fall into this "fixed exchange rate regime" classification. As a result, for several macro aggregates (especially on the fiscal side) for which data is scarce, the effect of the exchange rate regime cannot be estimated. Nevertheless, we report the results below.

We find that the results in these regressions remain practically unchanged relative to our benchmark results.

Table E1. Regressions of volatilities on size and various controls, robustness with respect to exchange rate regime classification

	population	se	Developing =1	se	ICRG_avg	se	Fiscalrule =1	se	com exporter =1	se	ER fixed=1	se
GDP	-0.09***	(0.03)	-0.13	(0.15)	-0.03***	(0.01)	-0.06	(0.10)	0.13	(0.11)	0.10	(0.18)
Trade balance/GDP	-0.24***	(0.04)	0.50*	(0.27)	-0.01	(0.01)	-0.18	(0.17)	0.12	(0.12)	-0.23	(0.22)
Current account/GDP	-0.23***	(0.04)	-0.10	(0.23)	-0.01	(0.01)	0.04	(0.14)	0.16	(0.15)	-0.38	(0.37)
Real int rate	-0.09	(0.06)	0.09	(0.46)	-0.05***	(0.01)	0.14	(0.24)	0.04	(0.17)	-0.61	(0.41)

Terms of trade	-0.02	(0.05)	0.13	(0.20)	-0.02**	(0.01)	-0.07	(0.12)	0.44**	(0.19)	0.18	(0.21)
Fiscal balance/GDP	-0.06	(0.04)	-0.17	(0.16)	-0.01	(0.01)	-0.18	(0.15)	0.34***	(0.12)		
Inflation	0.03	(0.07)	-0.20	(0.36)	-0.08***	(0.02)	0.44**	(0.21)	0.21	(0.21)	-0.09	(0.22)
Aggregate inv	-0.09***	(0.03)	0.06	(0.11)	-0.01	(0.01)	0.07	(0.12)	-0.06	(0.11)	-0.32**	(0.15)
Gov cons	-0.06*	(0.03)	0.23	(0.16)	-0.03***	(0.01)	0.03	(0.13)	-0.00	(0.11)	-0.12	(0.21)
Private cons	-0.07*	(0.04)	-0.04	(0.16)	-0.01	(0.01)	0.17	(0.13)	0.01	(0.11)	-0.32	(0.22)
Exports	0.00	(0.03)	0.10	(0.14)	-0.01*	(0.01)	0.07	(0.11)	-0.08	(0.10)	-0.17	(0.21)
Imports	0.03	(0.03)	0.07	(0.12)	-0.00	(0.01)	0.09	(0.09)	0.04	(0.08)	-0.41***	(0.14)
Priv investment	-0.15	(0.09)	0.13	(0.62)	0.03	(0.04)	0.13	(0.22)	0.51	(0.38)	-0.58*	(0.33)
Gov investment	0.14	(0.15)	-0.26	(0.70)	-0.01	(0.05)	-0.14	(0.32)	-0.22	(0.52)	0.03	(0.54)
Public expenditures	-0.02	(0.06)	0.38**	(0.17)	-0.01	(0.01)	0.07	(0.18)	0.08	(0.21)		
Public revenues	-0.03	(0.05)	0.22	(0.17)	-0.01	(0.01)	0.09	(0.17)	0.13	(0.13)		

Table E2. Regressions of correlations with GDP on size and various controls: robustness with respect to exchange rate regime classification

	population	se	Developing =1	se	Fiscalrule =1	se	com exporter=1	se	ER fixed=1	se
Trade balance/GDP	-0.04*	(0.02)	0.03	(0.09)	-0.11	(0.08)	0.05	(0.07)	0.00	(0.10)
Current account/GDP	-0.04**	(0.02)	0.04	(0.07)	-0.11*	(0.06)	0.00	(0.06)	-0.12*	(0.07)
Real int rate	0.00	(0.02)	0.13	(0.08)	0.06	(0.06)	0.16**	(0.07)	-0.28***	(0.10)
Terms of trade	0.01	(0.02)	-0.10	(0.09)	0.07	(0.07)	-0.07	(0.08)	-0.01	(0.10)
Fiscal balance/GDP	-0.06*	(0.03)	-0.12	(0.13)	-0.05	(0.12)	-0.06	(0.12)		
Inflation	-0.02	(0.01)	-0.16**	(0.06)	0.05	(0.05)	-0.06	(0.05)	0.10*	(0.06)
Aggregate inv	0.03**	(0.01)	0.01	(0.07)	0.06	(0.06)	-0.03	(0.04)	-0.10	(0.09)
Gov cons	0.01	(0.02)	-0.00	(0.08)	0.08	(0.06)	0.03	(0.06)	0.10	(0.09)
Private cons	0.05**	(0.02)	-0.08	(0.07)	-0.09	(0.07)	-0.09	(0.08)	0.08	(0.11)
Exports	-0.05***	(0.02)	0.12	(0.07)	0.03	(0.05)	0.02	(0.05)	-0.02	(0.07)
Imports	0.02	(0.01)	-0.04	(0.06)	0.09	(0.05)	-0.05	(0.06)	0.05	(0.08)
Priv investment	0.03	(0.03)	-0.06	(0.32)	0.10	(0.11)	-0.14	(0.10)	-0.09	(0.15)
Gov investment	0.01	(0.03)	-0.18	(0.22)	0.24*	(0.11)	0.06	(0.12)	-0.12	(0.22)
Public expenditures	-0.01	(0.05)	-0.06	(0.13)	-0.22	(0.13)	0.07	(0.16)		
Public revenues	-0.06*	(0.03)	-0.21*	(0.11)	0.02	(0.11)	-0.08	(0.12)		

Table E3. Regressions of autoregressive coefficient on size and various controls: robustness with respect to exchange rate regime classification

	population	se	developing=1	se	fiscalrule=1	se	com exporter=1	se	ER fixed=1	se
GDP	-0.00	(0.01)	-0.04	(0.03)	0.02	(0.03)	0.03	(0.03)	-0.05	(0.04)
Trade balance/GDP	0.00	(0.01)	0.05	(0.06)	0.03	(0.04)	-0.09***	(0.03)	-0.06	(0.06)
Current account/GDP	0.02*	(0.01)	-0.05	(0.05)	0.12***	(0.04)	-0.04	(0.04)	-0.04	(0.07)
Real int rate	0.03*	(0.02)	-0.07	(0.09)	-0.05	(0.06)	0.01	(0.07)	0.03	(0.09)

Terms of trade	0.00	(0.02)	-0.03	(0.06)	0.12**	(0.05)	-0.03	(0.06)	-0.11	(0.07)
Fiscal balance/GDP	0.00	(0.02)	-0.10	(0.09)	0.18*	(0.09)	0.06	(0.09)		
Inflation	0.02**	(0.01)	-0.18***	(0.04)	0.05	(0.03)	0.01	(0.04)	-0.09*	(0.05)
Aggregate inv	0.01	(0.01)	0.01	(0.04)	0.03	(0.04)	-0.04	(0.05)	-0.05	(0.08)
Gov cons	-0.01	(0.01)	0.09*	(0.05)	0.01	(0.04)	-0.06	(0.04)	-0.00	(0.06)
Private cons	-0.01	(0.01)	-0.01	(0.05)	-0.08	(0.06)	-0.08	(0.06)	0.02	(0.08)
Exports	-0.02	(0.01)	0.04	(0.06)	0.03	(0.04)	-0.03	(0.04)	-0.03	(0.05)
Imports	-0.01	(0.01)	0.06	(0.05)	0.07*	(0.04)	-0.08*	(0.05)	-0.08	(0.06)
Priv investment	-0.00	(0.03)	-0.19	(0.13)	0.08	(0.09)	-0.08	(0.08)	-0.16	(0.10)
Gov investment	0.07***	(0.02)	-0.10	(0.07)	-0.07	(0.10)	-0.08	(0.08)	0.43***	(0.10)
Public expenditures	0.02	(0.04)	-0.13	(0.10)	-0.06	(0.09)	-0.07	(0.11)		
Public revenues	-0.02	(0.02)	-0.11	(0.07)	-0.05	(0.08)	-0.00	(0.07)		