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Fiscal Policy Volatility and Growth in Emerging Markets and Developing Economies

Francisco Arroyo Marioli
Antonio Fatás
Garima Vasishtha

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Abstract

This paper studies the volatility of fiscal policy in a large sample of countries with a focus on emerging markets and developing economies and commodity exporters over 1990–2021. The findings show that fiscal policy has been more volatile in emerging markets and developing economies than in advanced economies, and in commodity exporters relative to non-commodity exporters over this period. The degree of commodity dependence, and institutional and policy variables can explain a large percentage of the cross-country variation in volatility. The existence of fiscal rules, a more liberalized capital account, and more flexible exchange rates are all associated with lower fiscal policy volatility. The paper also shows the negative macroeconomic consequences of this additional volatility on economic growth, finding that, over a 30-year period, it can explain 8 percent of the income gap between the emerging markets and developing economies and advanced economies in the sample.

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Francisco Arroyo Marioli, Antonio Fatás, and Garima Vasishtha*

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* Arroyo Marioli: World Bank, Prospects Group; farroyomarioli@worldbank.org. Fatás: INSEAD; CEPR; antonio.Fatas@insead.edu. Vasishtha: World Bank, Prospects Group; gvasishtha@worldbank.org. The authors thank Amat Adarov, Ayhan Kose, Carlos Arteta, Francesco Zanetti, Franz Ulrich Ruch, Franziska Ohnsorge, Jeffrey Frankel, Joseph Mawejje, Philip Kenworthy, Samuel Hill, Sinem Kilic Celik and seminar participants at the World Bank for insightful comments and suggestions on earlier versions of this paper. Lule Bahtiri provided excellent research assistance. We gratefully acknowledge support from the World Bank PHRD Fund. The views expressed in this paper are entirely those of the authors and should not be attributed to the World Bank, its Executive Directors, or the countries they represent.

1. Introduction

The global economy has witnessed two large recessions in the past 15 years, requiring monetary and fiscal policy makers to make use of all available tools to minimize the impact of these crises. It is fair to say that fiscal policy has been asked to do more than in previous crises due to a combination of some countries being close to or at the zero lower bound and the unique nature of the pandemic-induced crisis which required support that monetary policy could not provide. As a result, global debt levels and deficits have surged (Figure 1). The rise in government debt and the narrowing of fiscal space in emerging markets and developing economies (EMDEs) since the pandemic is of particular concern. Together with the wide swings in commodity prices seen in recent years, these developments have reignited interest in the complex link between commodity prices and fiscal policy (Figure 2).

In this context, designing optimal fiscal policies that support macroeconomic performance becomes critical. The issue of optimal fiscal policy is obviously a complex one and there are several aspects of fiscal policy that can be discussed in this context. First, fiscal policy needs to be countercyclical to stabilize growth during downturns. Second, fiscal policy needs to be sustainable through a stable and transparent long-term framework. And third, fiscal policy should not be an additional source of volatility through changes in spending or taxes that are not an optimal response to economic conditions. This paper focuses on the last of these dimensions of fiscal policy, investigating the key drivers of fiscal volatility in EMDEs and understanding how a volatile fiscal policy can worsen macroeconomic performance.

The importance of fiscal policy volatility for macroeconomic volatility and growth prospects has been well documented (for example, Afonso and Furceri 2008; Fatás and Mihov 2003, 2007, 2013; Fernandez-Villaverde et al. 2015).[1] Institutional frameworks and political processes have been found to be important determinants of fiscal policy volatility (for example, Fatás and Mihov 2003, 2013). Our paper makes a novel contribution to this literature by focusing on the determinants of fiscal policy volatility for a large sample of EMDEs, particularly commodity exporters, and examining how this volatility affects growth. This is important for the following reasons. First, commodities are significant sources of export and fiscal revenues for nearly two-thirds of EMDEs and three-quarters of low-income countries (LICs), and more than half of the world's poor reside in commodity-exporting EMDEs (World Bank 2018, 2022). Second, declines in commodity prices can trigger procyclical cuts in public expenditures because of reduced revenues from commodity production and exports. Conversely, rising commodity prices can lead to procyclical increases in public spending. Fiscal policy, therefore, often amplifies the impact of commodity price cycles on economic growth and reinforces the business cycle (Céspedes and Velasco 2014; Talvi and Végh 2005). Third, revenues derived from the resource sector are likely not only volatile but their size is

[1] A closely related strand of literature finds that fiscal policy variability depresses growth mainly through its impact on uncertainty (Aizenman and Marion 1999; Lensink, Bo and Sterken 1999). More generally, there are of course many other dimensions of macroeconomic policy volatility that have been investigated in the literature. For instance, monetary policy volatility can also have a contractionary effect on output, as demonstrated by Mumtaz and Zanetti (2013).

also disproportionately large.[2] Fourth, these revenues are prone to rent-seeking behavior and suboptimal policies. Therefore, a persistent challenge for commodity-exporting EMDEs is how to manage the impact of volatile resource revenues on macroeconomic and financial stability.[3]

Against this backdrop, this paper addresses the following questions. Is fiscal policy more volatile in commodity exporters than in non-commodity exporters? What are the main drivers of fiscal policy volatility in EMDEs? What is the relationship between fiscal policy volatility and economic growth in EMDEs? To answer these questions, we also provide an update to the academic literature on fiscal policy volatility and growth.

Our approach proceeds as follows. First, we construct country-specific measures of fiscal policy volatility based on the variance of exogenous changes in fiscal policy stance using fiscal policy reaction functions for every country in our sample. We then establish some stylized facts on fiscal cyclicality and volatility for different country groups: advanced economies, EMDEs, commodity exporters, and non-commodity exporters. Next, using cross-sectional regressions, we examine the role of institutions, policy variables as well as other country-specific factors in driving fiscal volatility. We then test the impact that fiscal volatility has on GDP volatility and per capita GDP growth to draw some implications for the macroeconomic consequences of such volatility.

The paper presents the following main findings. First, fiscal policy tends to be more volatile in EMDEs than in advanced economies, and in commodity exporters relative to non-commodity exporters. These results hold for all four fiscal policy indicators used to capture fiscal volatility – primary expenditure, revenue, government consumption, and primary balance-to-GDP. Moreover, fiscal policy tends to be more volatile the larger the commodity sector, even when controlling for income levels. Second, fiscal volatility has generally trended downwards in EMDEs and commodity exporters over the last three decades, although the trend is less clear for some of the fiscal indicators used. In particular, the period following the 2008-09 global financial crisis (GFC) and before the COVID-19 pandemic witnessed a notable decline in fiscal volatility in these countries.

Third, institutional and policy variables account for more than half of the cross-country variation in fiscal policy volatility, with more political constraints and better institutions being associated with less volatile fiscal policy. Specifically, the existence of fiscal rules, a more liberalized capital account, and more flexible exchange rates are all associated with lower fiscal policy volatility. Fourth, we find that fiscal policy volatility amplifies business cycle fluctuations and is detrimental to economic growth. Moreover, a significant fraction of the difference in GDP volatility between advanced economies and EMDEs can be explained by differences in their fiscal volatility. Taken together, our findings underscore the macroeconomic challenges faced by commodity-exporting

[2] Oil exporters are generally more dependent on resource revenues than metal exporters are. On average, resource revenues account for about 28 percent of total fiscal revenues in oil exporters, compared to just over 10 percent in aluminum and copper exporters, and less than 4 percent in zinc and nickel exporters.

[3] Terms-of-trade shocks arising from commodity price movements can account for as much as half of the variation in economic activity in EMDEs (Di Pace, Juvenal, and Petrella 2020; Kose 2002).

EMDEs in the face of commodity price fluctuations and offer insights for policy makers on the appropriate design of policies, institutional frameworks, and the impact of fiscal policy decisions.

The structure of the paper is as follows. Section 2 provides a review of the related literature. Section 3 presents our empirical methodology and the data set and describes the construction of our measure of fiscal policy volatility. Section 4 summarizes key stylized facts about fiscal policy volatility for our sample of countries and analyzes the determinants of this volatility, including for commodity exporters. Section 5 focuses on the macroeconomic effects of fiscal policy volatility. Section 6 concludes by summarizing the main findings and the associated policy implications.

2. Literature review

Our paper is related to several strands of the literature. There is extensive literature on the importance of volatility for economic growth (for example, Blatmann, Hwang, and Williamson 2007; Ramey and Ramey 1995; van der Ploeg and Poelhekke 2009, 2010).[4] Most of this literature shows that volatility can be harmful for economic growth, although the empirical estimates vary substantially across countries. Volatility can have multiple sources and there is a strand of the academic literature that has focused on the role of volatility of economic policy. Here, some studies have examined the economic effects of exogenous changes in fiscal policy, showing that changes in fiscal policy that are not related to the economic cycle can have significant effects on economic activity (see, for example, Blanchard and Perotti 2002; Fatás and Mihov 2001). This means that fiscal policy itself can be a source of economic volatility and be detrimental to economic growth.

This is the starting point of a third strand of the literature that looks at the potential growth effects of fiscal policy volatility (Fatás and Mihov 2013). This literature not only documents the negative relationship between fiscal policy volatility and economic growth but also explores the determinants of fiscal policy volatility, particularly the role of institutional and political variables. The fact that institutional and political variables can explain the behavior of fiscal policy connects these papers to an older literature on the political business cycle (Persson 2001; Shi and Svensson 2006) and to the literature on the benefits of good budgetary processes and fiscal rules.[5]

We build on several of these strands of the literature while pushing it forward by focusing on a large sample of EMDEs and commodity exporters, in particular. Several papers have documented that EMDEs are different when it comes to fiscal policy. EMDEs are characterized by more procyclical fiscal policies compared to advanced economies.[6] This procyclicality of fiscal (and monetary) policies in emerging market economies exacerbates the business cycle volatility in these countries (Lane 2003a).

[4] See Bakas, Chortareas, and Magkonis (2019) for a review of the literature.

[5] On the merits of good budgetary processes and fiscal rules, see, for example, Eichengreen, Hausman, and von Hagen (1999); Fatás et. al (2003); Frankel (2011); Lane (2003a); von Hagen and Harden (1995); and Wyplosz (2002).

[6] This procyclicality is well documented. See, for example, Bergman and Hutchison (2018); Frankel, Végh, and Vuletin (2013); Gavin and Perotti (1997); Ilzetzki and Végh (2008); Kaminsky, Reinhart, and Végh (2004); and Talvi and Végh (2005).

For commodity exporters, there is also evidence that the inherent volatility of commodity prices affects macroeconomic outcomes as well as the conduct of fiscal policy. Madrid-Aris and Villena (2005) show that in the case of Chile, the price of copper has become the main driver of economic performance as "the Chilean economy has become commoditized." When it comes to fiscal policy outcomes, Kaminsky (2010) finds that terms-of-trade booms do not necessarily lead to larger government surpluses in developing countries, reflecting the procyclical nature of government spending. Similarly, Medina (2010) and Villafuerte, Lopez-Murphy, and Ossowski (2010) document that fiscal revenue and expenditure respond strongly to commodity prices in Latin America and the Caribbean. Spatafora and Samake (2012) also show that commodity prices have a significant impact on fiscal outcomes in developing countries. A related strand of the literature looks at the effects of oil revenue volatility on economic growth in oil exporters (El-Anshasy, Mohaddes, and Nugent 2015; Jarrett, Mohaddes, and Mohtadi 2019) as well as the impact of oil price shocks on the non-oil sector's growth in oil exporters (Wilson, Newiak, and Mati 2021). However, these studies only cover either a limited set of countries or mainly oil exporters. In contrast, we take a more comprehensive approach by looking at all types of commodity exporters—energy, metals, and agriculture.

3. Methodology and data

We proceed by first isolating fiscal behavior from the economic cycle by estimating a GDP-dependent fiscal policy reaction function for each country. We then construct our measure of policy volatility using the country-specific residuals from this equation. The goal here is to study the role of fiscal behavior beyond the typical economically-induced behavior.

3.1 Fiscal policy reaction function

We think of governments designing fiscal policy based on a fiscal policy reaction function summarized by the following relationship:

$$Fiscal\ Policy_t = \alpha + \beta\ Economic\ Activity_t + \gamma\ Controls_t + \epsilon_t \quad (1)$$

Where "*Fiscal Policy*" is a variable that captures the stance of fiscal policy. We use four alternative measures of fiscal policy. Three of these correspond to different measures of the budgetary stance: primary expenditures, revenues, and the primary budget balance. The fourth one is government consumption (from the national accounts). By looking at government consumption separately we seek to understand whether a particular component of expenditures matters more for our analysis. Primary expenditures, revenues, and government consumption are all expressed in real terms and measured as log differences. The primary budget balance is expressed as the annual change of its ratio to GDP.

"*Economic Activity*" denotes the cyclical stance of the economy – typically represented in the literature by the output gap, unemployment rate, or output growth. We use annual GDP growth as the measure of the cycle. The alternatives – the output gap and the unemployment rate – are

more difficult to construct or measure accurately for diverse economies.[7]

β summarizes the cyclical behavior of fiscal policy and indicates whether fiscal policy is countercyclical or procyclical. It is composed of both automatic stabilizers and the discretionary response of governments to economic fluctuations.[8] Fiscal policy can also depend on other variables ("*Controls*"). For example, the level of indebtedness (a proxy for available fiscal space) or external shocks might affect fiscal policy regardless of the state of the business cycle.

The residual, ϵ, captures changes in fiscal policy that are unrelated to the business cycle or any of the control variables. We can think of these decisions as being the result of political decisions (such as changes in tax rates or spending associated with the political cycle) or errors in policy (such as mismeasurement of the output gap).

Using the logic of equation (1), how do we think about optimal fiscal policy? There are two criteria that can be included in this discussion. First, we expect fiscal policy to be countercyclical. This means, for example, that the coefficient β is negative when fiscal policy is measured by expenditures, positive when measured by the budget balance, and positive and higher than one when measured by revenues. Second, the uncertainty associated with the residual can be seen as generating excessive volatility in GDP and, possibly, reduced long-term growth. This second aspect will be the focus of our analysis, building on what the academic literature has already shown. Following Fatás and Mihov (2013), we measure the standard deviation of the residual in the fiscal policy reaction function (σ_i^{ε}) and interpret it as the volatility of fiscal policy.

What about the introduction of controls in the regression? If our objective was to fully explain the behavior of fiscal policy, we would introduce as many variables as possible. But our objective is to understand changes in fiscal policy that are orthogonal to the countercyclical policies captured by β. Therefore, in our analysis we start with a baseline regression where no controls are introduced. The logic is the following: imagine there is an external event that causes a certain change in fiscal policy. Any change that is purely driven by the effects that this external event has on GDP will already be captured by the first term ("*Economic Activity*"). Anything else will be additional fiscal policy volatility that we do not want to remove from our analysis. We want that volatility to be captured in the residual and, therefore, the right econometric specification is one without additional controls.

We will, however, make one exception. Because of our focus on the conduct of fiscal policy in commodity exporters, we will introduce a variation in equation (1) that includes controls that are

[7] We do, however, also use the HP-filtered GDP levels as a measure of economic activity to check the robustness of our results. The results using this alternative measure are highly consistent with those reported in Table 1.

[8] In our specification, there are potential problems of endogeneity as fiscal policy could potentially affect economic activity contemporaneously. The academic literature has acknowledged these issues but, because of the lack of an obvious instrument, has made use of OLS in many instances (for example, Aghion, Hemous and Kharroubi 2014; Alesina, Campante and Tabellini 2008; and Lane 2003b). Fatás and Mihov (2013) explored a set of instruments to test the robustness of the results presented in those earlier papers. Given that in those tests the results produced using different methods were similar, and for the sake of simplicity, we only make use of OLS in our paper.

specific to these countries. Specifically, we will include commodity prices as a control to understand whether the inclusion of these prices explains some of the volatility of fiscal policy. The idea is to test whether the fiscal volatility in commodity-exporting countries comes solely from commodity price volatility or not.

3.2 Data

We make use of annual data over the 1990-2021 period. The choice of our sample period is dictated by data availability. The data comprises 184 countries, with 148 EMDEs and 36 advanced economies. We classify countries into 'commodity exporters' and 'non-commodity exporters' by applying the classification criteria used in World Bank (2022).[9] Based on this classification, our sample comprises a diverse set of 90 commodity-exporting EMDEs. 'Non-commodity exporting' EMDEs are simply the ones not classified as commodity exporters.

We analyze three fiscal policy variables from the government budget: primary expenditure, government revenue, and primary balance (Source: IMF World Economic Outlook). In addition, to understand whether different components of expenditures matter more than others, we also analyze government consumption as a measure of fiscal policy (Source: World Bank World Development Indicators).

Our data comes from multiple sources. For commodity exporters, we obtain data on natural resource rents (as percent of GDP) from the World Bank's World Development Indicators. Fiscal rules are based on the IMF's Fiscal Rules Dataset (Davoodi et al. 2022). Country-specific commodity terms of trade indices are obtained from the IMF. We use institutional and political variables from the International Country Risk Group (ICRG) and the Polity IV Database. We use the Chinn-Ito index as our measure of capital account openness. We provide details of the country coverage, variables included in the analysis, and data sources in Appendix 1.

4. Measuring fiscal policy volatility

4.1 Characterizing fiscal policy volatility

We start by checking the cyclicality of each of the four measures of fiscal policy, although this is not the focus of our analysis. As described above, we measure cyclicality by the estimate of the parameter β in equation (1). This parameter includes both the working of automatic stabilizers as well as any discretionary changes in fiscal policy implemented in response to fluctuations in GDP. Figure 3 summarizes our results for two groups of countries: advanced economies versus EMDEs;

[9] An economy is defined as a commodity exporter when, on average in 2017-19, either (1) total commodity exports accounted for 30 percent or more of total exports or (2) exports of any single commodity accounted for 20 percent or more of total exports. Economies for which these thresholds were met as a result of re-exports were excluded. When data were not available, judgment was used.

commodity exporters versus the rest.[10]

Figure 3A shows that, on average, primary expenditure plays a strong countercyclical role in advanced economies while it remains acyclical for EMDEs. The government consumption element of the budget shows a pattern of mild procyclicality for advanced economies and moderate procyclicality for EMDEs. This is consistent with the fact that the most countercyclical element of the budget is likely to be transfers and not consumption.[11] For both groups revenues are almost proportional to GDP with an elasticity which is not too far from one, but slightly above, as expected. The budget balance elasticity is significantly different across the two groups reflecting the countercyclical nature of expenditures in advanced economies. These results are consistent with the academic literature that has shown that fiscal policy tends to be procyclical in EMDEs and acyclical/countercyclical in advanced economies, although the procyclicality in EMDEs has declined somewhat over time (Arroyo Marioli and Vegh *forthcoming*; Carneiro and Garrido 2016; Frankel et al. 2013; Kaminsky et al. 2004; and Richaud et al. 2019).[12]

Figure 3B compares the cyclicality of fiscal policy for commodity exporters versus non-commodity exporters. We find that non-commodity exporters display countercyclical expenditures on average, although the size of the β coefficient is smaller than that for the group of advanced economies. On the other hand, commodity exporters are characterized by acyclical spending (same as the group of EMDEs). Government consumption is once again more procyclical than expenditures, on average.

The coefficient on revenues is higher for commodity exporters probably because government revenues are influenced by commodity prices that are likely to be procyclical (Villafuerte and Lopez-Murphy 2010). As a result, the coefficient for the budget is quite similar for the two groups. For commodity exporters, the countercyclicality of taxes partially compensates for the acyclicality of spending (Kaminsky, Reinhart, and Vegh 2004). Our results on cyclicality, by being consistent with previous literature, provide reassurance that the fiscal policy reaction function we are estimating is capturing the right information on the behavior of fiscal policy.

Next, we turn to the focus of our analysis which is the volatility (σ_i^{ε}) of the residual in equation (1),computed for each country in our sample. It is first interesting to ask whether our four different measures of fiscal policy volatility provide similar perspectives on fiscal policy. Table 1 presents a simple cross-country correlation between the four indicators. As expected, these indicators are highly correlated, with the lowest correlation being between revenues and the primary balance.

[10] Country averages are calculated using weights based on the size of each economy measured by total GDP using PPP. We also calculated simple averages for all the fiscal policy variables and the results were similar, indicating that our results are not being driven by outliers.

[11] There is also the possibility that changes in investment explain some of this difference, but investment is a much smaller share of expenditures (particularly in advanced economies) and it is unlikely that investment can react contemporaneously to changes in GDP.

[12] The difference between the means of the fiscal cyclicality parameters for the two country groups shown in Figure 3 is statistically significant at the 1 percent level.

As done in Figure 3 for the cyclicality parameter, we first establish some stylized facts for our measures of volatility by comparing them across the two country groups (Figure 4). A few stylized facts emerge. *First*, as shown in Figure 4A, the volatility of primary expenditures, government consumption, and revenues is much higher for EMDEs than for advanced economies. The difference between the means of the two groups of countries is statistically significant at the 1 percent level. It is interesting that the gap in the volatility of government consumption is larger than that for primary expenditures, highlighting the role of government consumption in the volatility of fiscal policy.

Second, the primary balance volatility is smaller and closer between the two groups compared with the other fiscal policy indicators, but one must be careful in doing a direct comparison to the other two variables. A 1 percent exogenous change in government expenditures for an average EMDE only leads to a change in the primary balance (as a percent of GDP) of about 0.3 percent because government size is about 30 percent on average.[13] If we adjust for this factor the differences between the two indicators (expenditures and the primary balance) are not that large.

Third, as shown in Figure 4B, the group of commodity exporters displays a much larger volatility of fiscal policy compared to non-commodity exporters or to either of the other two groups in Figure 4A. The difference between the means for commodity exporters and non-commodity exporters is significant at the 1 percent level. As in the case of EMDEs, government consumption is more volatile than the other indicators, although by a small margin.

Now we look at how this volatility has changed over the years. We make use of the results from equation (1) and calculate averages of the standard deviation of the residuals over five-year rolling windows. Figure 5 displays the results for the four fiscal policy indicators for the group of EMDEs. While the patterns across the four charts are not identical, there is an overall downward trend in at least three of the indicators: primary expenditures, government consumption, and revenues. The trend for the primary balance indicator is less obvious although there is a clear decline in volatility in the years that followed the GFC which was only interrupted by the volatility associated with the COVID crisis.[14]

We reproduce the same analysis now for the group of commodity exporters and also explore the correlation between fiscal volatility and energy prices (Figure 6). The patterns for fiscal volatility indicators are similar, with a clear downward trend in the volatility of government consumption and revenues. The trend is less obvious in the case of primary expenditures or the primary balance although, as in the case of EMDEs, there was a period of low volatility following the GFC and before the pandemic-induced crisis. Further, there does not appear to be any clear relationship between fiscal volatility and energy prices over the sample period although the volatility in primary

[13] 'Government size' is measured as the share of general government total expenditure in GDP (from the IMF WEO database).

[14] We have reproduced these results for the group of advanced economies, although not shown here for brevity. The pattern is weaker. While there is some decline in the volatility of primary expenditures following the sharp spike in the pre-2000 period, there is almost no decline in volatility for the other three indicators.

expenditure, revenues, and primary balance moves somewhat in line with the energy price index in the post-GFC period.[15]

4.2 Determinants of fiscal policy volatility

In the previous section, we established that EMDEs and commodity exporters display higher fiscal policy volatility than other countries. But what are the factors that make fiscal policy in these countries more volatile? Are there specific economic characteristics, such as GDP per capita, that can explain this? Advanced economies tend to have a significant presence of services and manufacturing sectors that dwarf their commodity sectors. As a result, being an EMDE and a commodity exporter is highly correlated. At the same time, the group of EMDEs masks substantial heterogeneity in income levels across countries. Likewise, commodity exporters are also characterized by important differences in the type of commodity exported and their degree of commodity dependence. In the empirical exercises that follow, we examine the role of these heterogeneities across countries in driving fiscal policy volatility.

We focus on indicators of fiscal policy that are related to the spending side of the budget. While each of the four fiscal policy indicators contains important information about fiscal policy, primary expenditures, and government consumption are likely to provide a more accurate perspective on the volatility of fiscal policy decisions. The reason is that capturing exogenous changes in fiscal policy using a specification like the one in equation (1) is more straightforward when using expenditures than when using revenues (or the primary balance). The automatic stabilizer component of expenditures tends to be small, so changes in expenditures tend to be driven by discretionary stimulus packages or by changes that are unrelated to the business cycle, and these latter ones are the changes we capture in our measure of volatility. On the other hand, when it comes to revenues, our linear specification might not appropriately capture the potential non-linear nature of tax elasticities. Given that we are dealing with a large sample of diverse countries, it would be impossible to incorporate more precise specifications of tax elasticities for each country. Our approach mimics that of the academic literature that typically uses government expenditures or government consumption to measure volatility in fiscal policy (see, for example, Fatás and Mihov 2013).

We start by examining the determinants of fiscal policy volatility. Table 2 displays a first set of exploratory results. We present three specifications each for primary expenditures (columns (1) to (3)) and government consumption (columns (4) to (6)) as our indicators of fiscal policy volatility. We start with the simplest possible specification in columns (1) and (4). Results show that the dummy variables for EMDEs and commodity exporters are significant and explain as much as 30 percent of the cross-country volatility in fiscal policy. That is, even after controlling for EMDEs, commodity exporters by themselves display more volatility. This suggests that commodity dependence is a source of volatility by itself. Of course, these dummy variables represent a diverse

[15] The energy index is taken from the World Bank Commodities Prices Data. We also examined the extent to which fiscal policy volatility comoves with non-energy prices. Since the energy and non-energy indexes are highly correlated over the sample period, we chose to include only the energy index in Figure 6 for simplicity.

group of countries. EMDEs are defined by the level of development while commodity exporters by the export share of commodities, but there is heterogeneity across countries within each of the groups. Not all commodity exporters export the same commodities, and the nature of different commodities makes their production structures very different. We, therefore, introduce two variables to account for the heterogeneity across countries. First, we introduce (the log of) GDP per capita to better capture the level of development for individual countries. The addition of GDP per capita does not change the magnitude or the significance of the coefficient of either of the two dummy variables. In fact, GDP per capita is not significant in column (2) although it is significant in column (5). This suggests that EMDEs are not different simply because their GDP per capita is lower than that of advanced economies, and that there are other features of fiscal policy that differ across EMDEs.

Second, we add a variable ("resource rents") that measures the rents coming from natural resources as a share of GDP. Higher rents coming from natural resources are likely correlated with the percentage of government revenues that come from the commodities sector.[16] The objective here is to allow our explanatory variable to have a much finer distinction depending on the actual revenues coming from natural resources rather than relying on a dummy variable that treats all countries with significant income coming from natural resources as equal. The introduction of this variable (Columns (3) and (6)) makes the dummy for commodity exporters become insignificant and even negative. This should not be a surprise as it reinforces the idea that economies with large commodities sectors display more volatility in fiscal policy. In other words, it is not just the presence of an important commodity sector, but the size of the sector also matters.

The introduction of this new variable also reduces the size of the EMDE dummy as some of these countries have substantial rents coming from natural resources and it, therefore, absorbs some of the variation in fiscal policy volatility. Note that GDP per capita becomes significant once this variable is introduced, suggesting that higher levels of GDP per capita are associated with lower fiscal policy volatility. Therefore, taken together these results suggest that both the level of development and the degree of commodity dependence help explain fiscal volatility. Finally, the fact that a limited set of variables explains about 45-50 percent of the cross-country variation in fiscal policy suggests that our measure of volatility is not simply capturing noise from the initial regression in equation (1).

Next, we exploit the richness of our diverse sample of commodity exporters by separating them into three groups—agriculture, metals, and energy exporters—depending on the main type of commodity exported to examine whether there are differences in fiscal behavior across different types of commodity exporters. Table 3 presents the results. We find evidence of additional volatility for all three groups, but it is for the energy exporters where the coefficient is always

[16] We chose to use 'resource rents' instead of resource revenues due to data availability issues. The 'Natural Resource Governance Institute' provides data on resource revenues (as percent of GDP) complied from the Extractive Industries Transparency Initiative's (EITI), IMF, and the International Centre for Tax and Development (ICTD). The database provides data for about 90 countries from the 1980s onwards although data availability varies across countries. The correlation between our measure of total resource rents and the resource revenues from this dataset is about 69 percent.

highly significant (see columns (1) and (3)). When using government consumption as our fiscal policy variable, all three dummies are significant although the significance is always stronger for energy exporters. Interestingly, once we control for resource rents, the significance of the three dummies drops except in one specification. This suggests that part of the difference among types of commodity exporters is due to the difference in their degree of commodity dependence. That is, energy exporters depend more on their energy exports than agricultural exporters depend on their agriculture exports. Also, this should not be a surprise given the strong multicollinearity between these variables and the fact that, as we have argued above, resource rents is a more precise measure of the influence of commodity exports.

So far, we have explored the degree and the type of commodity dependence, and degree of development as factors driving fiscal policy volatility. Next, we go beyond economic explanations of fiscal policy volatility and explore political economy and institutional variables. The list of potential variables here is large and the academic literature has used many of them. Our goal here is not to do a horse race between all the potential explanatory variables but to understand whether some key variables can account for the higher volatility in EMDEs and commodity exporters.

Table 4 presents the results. As in the above exercise, we present results for the two variables that capture the spending side of the budget—primary expenditures and government consumption. Columns (1) and (4) present a simple specification that includes two institutional variables often used in the literature: political constraints and control of corruption. Both variables are significant, have the right sign and, just by themselves, explain close to 40 percent of the cross-country variation of our fiscal policy volatility measure.[17]

We then add the economic determinants of Table 2 in columns (2) and (5) and now we can explain close to 60 percent of the cross-country variation in fiscal policy volatility, roughly 20 percent more than in columns (1) and (4). There are several other interesting results to notice. The EMDE dummy variable changes sign and is not significant. This suggests that the additional volatility that characterizes EMDEs is coming from political economy and institutional variables, such as the two we have chosen.

In Table 2, once we controlled for resource rents the dummy variable for commodity exporters turned non-significant. That is not the case anymore. For example, in column (5) of Table 4 the dummy variable is again significant and positive. This means that even after controlling for political constraints and corruption, there is something special about these economies that cannot be fully captured by the natural resources rents variable. Notice, however, that the size of the coefficient is much smaller than when the dummy variables were included without controls in column (1) of Table 2. Also, GDP per capita becomes insignificant, compared to (3) and (6) in Table 2 where political constraints and corruption control are not present. The EMDE dummy also remains

[17] Institutional variables have limited time-series variation and have often been used in the literature as causal explanations of different macroeconomic phenomena. However, one cannot rule out that the causality might run in the other direction as well. This might be particularly relevant for countries with natural resources since their existence could be the source of corruption (see De Rosa and Iootty 2012; Vicente 2010).

insignificant. This indicates that institutional factors may be the underlying explanation for the observed role that development plays in fiscal volatility.

Finally, in columns (3) and (6) of Table 4 we include one additional variable that might be relevant for commodity exporters— a dummy variable representing whether a country has a sovereign wealth fund (SWF) or not. Many commodity-exporting countries have established SWFs to achieve multiple objectives, including reducing budget volatility and smoothing intergenerational government consumption. The variable appears consistently with a negative sign, validating recent studies which find that the existence of SWFs can reduce the procyclicality of fiscal policy in commodity-dependent developing countries (for example, Kassouri and Altıntaş 2021; Ouedraogo, and Sourouema 2018). However, the coefficient is not significant which could be the outcome of collinearity between the existence of a SWF and the other institutional variables included in the regressions.

The results presented in Table 4 show that the institutional features of the countries in our sample can explain a significant amount of fiscal policy volatility. Some of these features are quite broad and not easily relatable to a particular reform agenda (for example, political constraints). We now explore a set of other variables that are more easily influenced by policy changes. Results are presented in Table 5 where we only focus on primary expenditures for brevity, given the similarity in results so far from the two spending variables.

We start by including the following three variables: an index of the number of fiscal policy rules in place; the Chinn-Ito indicator of openness of the capital account, and a dummy variable for the exchange rate regime which takes the value "0" for fixed rate regimes and "1" for floating exchange rate regimes (Column (1)).[18] The three variables are significant and their coefficients of the expected sign. The existence of fiscal rules, a liberalized capital account, and more flexible exchange rates all reduce fiscal policy volatility. It is important to note that these three variables also explain a large share of the volatility of fiscal policy, around 32 percent.

We then introduce our two dummies for country groups (Column (2)), and the significance of the three variables remains. This indicates that these policy tools can reduce volatility regardless of the level of development or commodity dependence. Also, as we have seen before, the EMDE dummy is not significant while commodity exporters still stand out as having more volatility. Adding a set of other controls (Column (3)) confirms some of our previous results. Specifically, introducing rents from natural resources weakens the explanatory power of the commodity exporters dummy. However, we can explain a much larger share of volatility, almost 64 percent. The coefficient for the existence of a SWF remains negative, although non-significant, possibly because one of the new policy variables has already captured the relevant effect.[19]

[18] See Appendix 1 for a detailed description of these variables.

[19] There is also a difference in sample size relative to Table 4 since not all variables are available for all countries. We have checked whether the difference in sample size is responsible for some of the variation in results and this is generally not the case. For example, the results of Table 5 still hold when the regressions are estimated for the subsample of EMDEs or the subsample of commodity exporters.

Finally, in the last column, we include the two institutional variables. 'Control of corruption' remains significant and of the right sign while 'political constraints' is not significant anymore.[20] The total fraction of explained volatility increases meaningfully: overall, policy variables, commodity dependence, and institutional variables can explain up to 72 percent of fiscal volatility.

The results of Table 5 offer a policy view on how certain frameworks, such as fiscal rules, can help reduce the volatility of fiscal policy. Such frameworks have been shown to be effective in delivering better outcomes in fiscal policy. Debrun and Kumar (2008) find evidence that fiscal rules are a strong signal of the unobservable preferences of governments for sensible fiscal policy. Other papers have focused on the importance of well-designed fiscal rules to deliver lower fiscal deficits (Caselli and Reynaud 2020; Dahan and Strawczynski 2013; Debrun et al. 2008; Fabrizio and Mody 2006), reduce fiscal procyclicality (Céspedes and Velasco 2014), and reduce fiscal policy volatility (Badinger and Reuter 2017). Among the design of the fiscal policy rules that have proven to be relevant, some papers emphasize the positive effect of "second-generation rules"(for example, Eyraud et al. 2018). Some have focused on the role of expenditure limits, mostly in the context of advanced economies. For EMDEs and commodity exporters, the role of well-established rules to decide on spending, in particular when rising commodity prices boost government revenues, is highlighted in several papers (Bova et al. 2014; Frankel 2011).

Our analysis is performed only with the cross-section of countries. Most of the institutional variables that we have considered as determinants have limited time-series variation, which makes it difficult to study the impact of reforms. However, anecdotal evidence suggests that this effect is consistent with our main results. For example, we can connect the results of Table 5 to the downward trend in fiscal policy volatility among both EMDEs and commodity exporters shown in Figure 5 and Figure 6.

Specifically, we examine how a key policy variable in Table 5, the number of fiscal rules, has changed over time. Figure 7 is based on the weighted average of this variable for the two groups and shows a clear upward trend of increasing use of fiscal rules, as also documented in Bova et al. (2014). This, combined with the results of Table 5, can be seen as an explanation of the improved fiscal policy performance of these countries. This is consistent with the evidence presented in Céspedes and Velasco (2014) on how the increasing use of fiscal rules has reduced the procyclicality of fiscal policy in commodity exporters.

4.3 Fiscal policy volatility and commodity prices

Our results thus far have shown that commodity exporters are characterized by higher fiscal policy volatility than non-commodity exporters. The fact that including natural resources rents as a percentage of GDP explains this pattern has confirmed that the relevant channel is the revenues coming from commodities. But is the volatility in fiscal policy just a reflection of volatility in

[20] We also checked the sensitivity of the results in Table 5 to the inclusion of a measure of fiscal space, such as debt-to-GDP. The results, although not reported here for brevity, remain robust and the coefficient of the debt-to-GDP variable is not significant.

commodity prices? Could it be capturing a commodity price cycle which is not perfectly correlated with the cycle in economic activity that is already captured by GDP growth?

To analyze these issues, we follow the methodology of Céspedes and Velasco (2014) in separating GDP growth from the commodity price cycle by estimating a policy reaction function (i.e., equation (1)) that includes the price of commodities. By removing the potential comovements between fiscal policy and the price of commodities from the residual, it is possible that the volatility of commodity exporters gets closer to that of the other countries in the sample.

We run two variations of this exercise: first, we include the country-specific commodity export price index (from the IMF's Commodity Terms of Trade database)—a weighted average of the export price of commodities, where the weight is the share of exports of a particular commodity. The second specification makes use of the price of oil.[21] Figure 8 shows the results for our four measures of fiscal policy volatility. As is clear from the four panels, the inclusion of the variation in commodity prices does not change the fact that commodity exporters have a much more volatile fiscal policy than other countries. In fact, there is almost no difference between the three specifications regardless of the fiscal policy variable being used. One potential explanation of our result is that the direct effect of commodity prices cannot be separated from the indirect effect that they have through economic activity. This is consistent with the evidence presented in Husain, Tazhibayeva, Ter-Martirosyan (2008). An alternative explanation is that the relationship between commodity prices and fiscal policy is much more complex than our simple fiscal policy rule.

5. Macroeconomic effects of fiscal policy volatility

So far, we have documented the pattern of fiscal policy volatility with a focus on EMDEs and commodity exporters. We have shown that countries with certain institutional characteristics and policies have a more volatile fiscal policy. But what are the macroeconomic consequences of this additional volatility?

We measure these macroeconomic effects on both the volatility of GDP growth and the growth of GDP per capita by using the methodology of Fatás and Mihov (2013). We start with a regression of the type

$$\sigma_i^{\Delta y} = \alpha + \rho\sigma_i^{\varepsilon} + \gamma X_i + u_i \qquad (2)$$

Where $\sigma_i^{\Delta y}$ is the volatility of GDP growth and σ_i^{ε} is the measure of fiscal policy volatility. X_i represents a set of controls.

Table 6 presents the results, with fiscal policy volatility measured using primary expenditures. Whether by itself or when including some of our standard controls, fiscal policy volatility is related to higher output volatility. Interestingly, neither EMDEs nor commodity exporters as a group

[21] We use the average of Brent, Dubai and WTI oil prices (in nominal US dollars) from the World Bank's Commodities Price Data (the "*Pink Sheet*").

display higher output volatility except for what is already mediated through their higher fiscal policy volatility.

Columns (3) to (5) make use of instrumental variables in an attempt to capture the causal effect of fiscal policy volatility. Instrumental variables are taken from our specification of Table 4. Political constraints and control of corruption are variables that are often used in the literature as instruments for government policies since they are seen as exogenous to economic conditions and mostly affect the economy through their effects on the state and government behavior (Fatás and Mihov 2013). The results using instrumental variables are similar to the OLS results. Only in column (5) we see a smaller coefficient for fiscal policy volatility, but it is important to note that this specification includes a larger set of instruments and the sample size is almost 50 percent of our baseline specification because of the lack of data. The dummy for EMDEs is only significant at the 10 percent level, confirming that the additional volatility in economic activity in these countries is absorbed by our measure of fiscal policy volatility. That is, the main channel through which we see excess output volatility in EMDEs is via the government spending behavior. In the case of commodity exporters, the dummy is negative although non-significant.

Finally, we look at the implications for growth by estimating variants of a standard growth regression (Barro 1991). The benchmark specification is given by

$$\overline{\Delta y_i} = \alpha' + \rho' \log(\sigma_i^{\varepsilon}) + \gamma' Z_i + u_i \qquad (3)$$

Where, $\overline{\Delta y_i}$ is the average per capita GDP growth for country i; σ_i^{ε} is the measure of fiscal policy volatility–our key regressor; Z_i is a vector of variables that have been found to have significant explanatory power for the cross-country variation in growth. We estimate equation (3) using both OLS as well as instrumental variables to address endogeneity concerns.

Table 7 presents the results of these growth regressions. Here we follow the specification of Fatás and Mihov (2013) who include controls based on the growth regressions of Sala-i-Martin, Doppelhofer and Miller (2004).[22] These controls are shown to be the most robust variables in a standard growth regression. Fiscal policy volatility is not significant when included by itself, but it becomes significant when controls are introduced. The coefficient for fiscal policy volatility in the instrumental variables specification (column (3)) is significant and of magnitude comparable to that in the OLS regression. The size of the coefficient is also broadly in line with recent estimates in the literature.[23] One way to think about its economic significance is that a one standard deviation decrease in fiscal policy volatility (i.e., in the order of 6.38 percentage points) will increase growth in GDP per capita by 0.7 percentage points. This is a large number given that

[22] We have estimated different specifications including a variety of controls. For example, we have included in these regressions controls such as the existence of a sovereign wealth fund. The results are not significant. Note that this variable is already included as an instrument for fiscal policy volatility.

[23] Our specification differs from that of Fatás and Mihov (2013) in that we do not transform the policy volatility variable by using logs. If we were to do that transformation, the coefficient would be around 1, which is consistent with the results presented in Fatás and Mihov (2013).

average growth of GDP per capita in our sample is around 1.8 percent. Also, based on the results in Table 2 fiscal policy volatility for commodity exporters was about 3.3 points higher than that for other countries. This translates into a reduction of growth in GDP per capita of about 0.35 percentage points.

These results have relevant policy implications. An additional 0.7 annual growth rate implies 23 percent growth over our sample period. This explains more than 8 percent of the income gap between advanced economies and EMDE in our sample. Anecdotal evidence supports these results. For example, Frankel (2011) documents how Chile, a commodity-exporting emerging market, introduced a series of fiscal rules and policies in the post-1990s period with the aim of reducing its discretionary expenditure. These included rules on spending, deficit, and the establishment of a sovereign wealth fund. External experts were also given a role in making projections, limiting the role of government executives even further. As a result, Chile's expenditure volatility has fallen in the last 20 years. The Chilean income gap versus advanced economies fell from 60 percent in 2000 to 54 in 2019.

6. Conclusions and policy implications

We examine the behavior of fiscal policy over the 1990-2021 period for a larger sample of countries than that used in previous studies, with a focus on EMDEs and commodity-exporting countries. We find that fiscal policy tends to be more volatile in EMDEs than in advanced economies as well as in commodity exporters relative to non-commodity exporters. We also find that this volatility increases with the degree of commodity dependence. This pattern holds for all four fiscal policy indicators used – primary expenditure, revenue, government consumption, and primary balance-to-GDP.

Institutional and policy variables account for a large fraction of the cross-country variation in fiscal policy volatility. The existence of fiscal rules, a more liberalized capital account, and more flexible exchange rates are all associated with lower fiscal policy volatility. Further, we find that fiscal policy volatility is associated with higher output volatility and is detrimental to economic growth. Our results suggest that a one standard deviation reduction in fiscal volatility in EMDEs over the last 30 years could have reduced the income gap relative to advanced economies by as much as 8 percent.

Our results offer insights for policy makers in commodity-exporting EMDEs on the appropriate design of fiscal policies, institutional frameworks, and the impact of fiscal policy decisions. A sustainable, properly designed, and stability-oriented fiscal framework would help build buffers during commodity price booms to prepare for a subsequent slump in prices. Fiscal rules can help in this regard by dampening the procyclicality and volatility of government spending and improving macroeconomic performance. Stabilization funds can be used to invest windfalls in commodity revenues, thereby saving resource revenues for future generations. Our results suggest that changes in policy, even if they are motivated by relevant economic or political arguments, should be implemented carefully, and should consider their effects on policy volatility and ultimately on economic growth.

Finally, our findings highlight the complex challenges faced by commodity-exporting EMDEs in maintaining macroeconomic resilience in the face of commodity price fluctuations. In low-income countries, these challenges are further compounded by lack of fiscal space and weak institutions. The wide swings in commodity prices since the onset of the pandemic have further underscored the vulnerabilities of the many EMDEs highly dependent on commodity exports. The role that revenues from commodities play in the budgets of these economies and their impact on fiscal policy volatility suggests potential benefits from diversification of their economies, away from commodities. Policies to encourage export diversification can help reduce reliance on commodity exports, stabilize export earnings, and promote long-run growth (Bleaney and Greenaway 2001; Ghosh and Ostry 1994; Hesse 2008; Joya 2015).

7. References

Aghion, P., D. Hemous, and E. Kharroubi. 2014. “Cyclical Fiscal Policy, Credit Constraints, and Industry Growth.” *Journal of Monetary Economics 62*: 41-58.

Afonso, A., and D. Furceri. 2008. “Government Size, Composition, Volatility and Economic Growth.” Working Paper Series 849, European Central Bank.

Aizenman, J., and N. Marion. 1999. “Volatility and Investment: Interpreting Evidence from Developing Countries.” *Economica* 66 (262): 157–79.

Alesina, A., F. Campante, and G. Tabellini. 2008. ”Why is Fiscal Policy Often Procyclical?” *Journal of the European Economic Association* 5:1006-1036.

Arroyo Marioli, F., and C. A. Vegh. [Forthcoming]. “Fiscal Procyclicality in Commodity Exporting Countries: How Much Does it Pour and Why?” Mimeo.

Badinger, H., and W. H. Reuter. 2017. "The Case for Fiscal Rules." *Economic Modelling* 60: 334-343.

Bakas, D., G. Chortareas, and G. Magkonis. 2019. “Volatility and Growth: A Not So Straightforward Relationship.” *Oxford Economic Papers* 71(4): 874-907.

Barro, R. 1991. “Economic Growth in a Cross Section of Countries.” *Quarterly Journal of Economics* 106: 407–433.

Bleaney, M., and D. Greenaway. 2001. “The Impact of Terms of Trade and Real Exchange Volatility on Investment and Growth in Sub-Saharan Africa.” *Journal of Development Economics* 65 (2): 491-500.

Bova, E., N. Carcenac, and M. Guerguil. 2014. “Fiscal Rules and the Procyclicality of Fiscal Policy in the Developing World.” IMF Working Paper 14/122, International Monetary Fund, Washington, DC.

Bergman, U. M., and M. Hutchison. 2018. "Fiscal Procyclicality in Developing Economies: The Role of Fiscal Rules, Institutions and Economic Conditions." *Unpublished paper, University of Copenhagen, Copenhagen*.

Blanchard, O. and R. Perotti. 2002. “An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output.” *Quarterly Journal of Economics* 117: 1329-1368.

Blattman, C., J. Hwang, and J. G. Williamson. 2007. “Winners and Losers in the Commodity Lottery: the Impact of Terms of Trade Growth and Volatility in the Periphery 1870–1939.” *Journal of Development Economics* 82(1): 156–179.

Carneiro, F., and L. Garrido. 2016. “Revisiting the Evidence on the Cyclicality of Fiscal Policy Across the World.” MFM Global Practice Discussion Paper No. 16, World Bank.

Caselli, F., and J. Reynaud. 2020. "Do Fiscal Rules Cause Better Fiscal Balances? A New Instrumental Variable Strategy." *European Journal of Political Economy* 63: 101873.

Céspedes, L. F., and A. Velasco. 2014. “Was this Time Different? Fiscal Policy in Commodity Republics.” *Journal of Development Economics* 106: 92–106.

Chinn, M. D., and H. Ito. 2006. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics* 81 (1): 163-192.

Dahan, M., and M. Strawczynski. 2013. “Fiscal Rules and the Composition of Government Expenditures in OECD Countries.” *Journal of Policy Analysis and Management* 32 (3): 484-504.

Davoodi, H., P. Elger, A. Fotiou, D.M. Garcia, A. Lagerborg, R. Lam, and S. Pillai. 2022. "Fiscal Rules Dataset: 1985-2021." International Monetary Fund, Washington, D.C.

Debrun, X., L. Moulin, A. Turrini, J. Ayuso-i-Casals, and M. S. Kumar. 2008. “Tied to the Mast? National Fiscal Rules in the European Union.” *Economic Policy* 23 (54): 298–362.

Debrun, X., and M. Kumar. 2008. "Fiscal Rules, Fiscal Councils and All That: Commitment Devices, Signaling Tools or Smokescreens?" *Proceedings of the 9th Banca d’Italia Workshop on Public Finance*. Rome: Banca d’Italia.

De Rosa, D., and M. Iootty. 2012. “Are Natural Resources Cursed? An Investigation of the Dynamic Effects of Resource Dependence on Institutional Quality.” *World Bank Policy Research Working Paper* 6151. World Bank Washington, DC.

Di Pace, F., L. Juvenal, and I. Petrella. 2020. “Terms-of-Trade Shocks are Not All Alike.” IMF Working Paper 2020/280, International Monetary Fund, Washington, DC.

Eichengreen, B., R. Hausman, and J. von Hagen. 1999. “Reforming Budgetary Institutions in Latin America: The Case for a National Fiscal Council." *Open Economies Review* 10(4): 415-442.

El-Anshasy, A., Mohaddes, K., J.B. Nugent. 2015. “Oil, Volatility and Institutions: Cross-Country Evidence from Major Oil Producers.” Cambridge Working Papers in Economics 1523.

Eyraud, L., X. Debrun, A. Hodge, V. Duarte Lledo, and C. A. Pattillo. 2018. “Second-Generation Fiscal Rules: Balancing Simplicity, Flexibility, and Enforceability.” IMF Staff Discussion Note 18/04, International Monetary Fund, Washington DC.

Fabrizio, S. and A. Mody. 2006. "Can Budget Institutions Counteract Political Indiscipline?" *Economic Policy* 21(48): 689-739

Fatás, A. and I. Mihov. 2001. "The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence.'' INSEAD Working Paper.

Fatás, A., J. Von Hagen, A. H. Hallett, A. Sibert, and R. Strauch. 2003. *Stability and Growth in Europe: Towards a Better Pact*. Vol. 13. Centre for Economic Policy Research.

Fatás, A., and I. Mihov. 2003. "The Case for Restricting Fiscal Policy Discretion." *The Quarterly Journal of Economics* 118(4): 1419-1447.

Fatás, A., and I. Mihov. 2007. "Fiscal Discipline, Volatility and Growth," in *Fiscal policy, stabilization, and growth: Prudence or abstinence*? Edited by L. Serven, G. Perry and R. Suescun. World Bank, Washington, DC, USA

Fatás, A., and I. Mihov. 2013. "Policy Volatility, Institutions, and Economic Growth." *The Review of Economics and Statistics* 95(2): 362-376.

Jesús Fernández-Villaverde, J., P. Guerrón-Quintana, K. Kuester, and J. Rubio-Ramírez. "Fiscal Volatility Shocks and Economic Activity." American Economic Review 105(11): 3352-84.

Frankel, J. A. 2011. "A Solution to Fiscal Procyclicality: The Structural Budget Institutions Pioneered by Chile." NBER Working Paper 16945, National Bureau of Economic Research, Cambridge, MA.

Frankel, J., C. A. Vegh, and G. Vuletin. 2013. "On Graduation from Fiscal Procyclicality." *Journal of Development Economics* 100(1): 32-47.

Gavin, M., and R. Perotti. 1997. "Fiscal Policy in Latin America." In *NBER Macroeconomics Annual 1997, Vol. 12*, edited by B. Bernanke and J. Rotemberg, 11-72.
Cambridge, MA: MIT Press.

Ghosh, A. R., and J. D. Ostry. 1994. "Export Instability and the External Balance in Developing Countries." *IMF Staff Papers* 41 (2): 214-235.

Henisz, W. 2000. "The Institutional Environment for Economic Growth." *Economics and Politics* 12 (1): 1-31.

Hesse. H. 2008. "Export Diversification and Economic Growth." Commission on Growth and Development Working Paper 21, World Bank, Washington, DC.

Husain, A., K. Tazhibayeva, and A. Ter-Martirosyan. 2008. "Fiscal Policy and Economic Cycles in Oil-Exporting Countries." IMF Working Paper 08/253, International Monetary Fund, Washington, DC.

Ilzetzki, E., and C. Vegh. 2008. “Procyclical Fiscal Policies in Developing Countries: Truth or Fiction.” NBER Working Paper 14191, National Bureau of Economic Research, Cambridge, MA.

Jarrett, U., K. Mohaddes, and H. Mohtadi. 2019. "Oil Price Volatility, Financial Institutions and Economic Growth." *Energy Policy* 126: 131-144.

Joya, O. 2015. “Growth and Volatility in Resource-Rich Countries: Does Diversification Help?” *Structural Change and Economic Dynamics* 35: 38-55.

Kaminsky, G. L. 2010. "Terms of Trade Shocks and Fiscal Cycles.” NBER Working Paper 15780, National Bureau of Economic Research, Cambridge, MA.

Kaminsky, G. L., C. M. Reinhart, and C. A. Vegh. 2004. “When it Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies.” *NBER Macroeconomics Annual* 19: 11-53.

Kassouri, Y., and H. Altıntaş. 2021. “Cyclical Drivers of Fiscal Policy in Sub-Saharan Africa: New Insights from the Time-Varying Heterogeneity Approach.” *Economic Analysis and Policy* 70: 51-67.

Kose, M. A. 2002. “Explaining Business Cycles in Small Open Economies: ‘How Much Do World Prices Matter?’” *Journal of International Economics* 56 (2): 299-327.

Ilzetzki, E., C. M. Reinhart and K. Rogoff. 2022. “Rethinking Exchange Rate Regimes.” In *Handbook of International Economics*, edited by G. Gopinath, E. Helpman, and K. Rogoff, Vol. 6, 91-145.

Lane, P. R. 2003a. “Business Cycles and Macroeconomic Policies in Emerging Markets Economies.” *International Finance* 6(1): 89–108.

Lane, Philip. 2003b. “The Cyclicality of Fiscal Policy: Evidence from the OECD.” *Journal of Public Economics* 87: 2661-2675.

Lensink, R., H. Bo, and E. Sterken. 1999. “Does Uncertainty Affect Economic Growth? An Empirical Analysis.” *Review of World Economics* 135(3): 379-396.

Madrid-Aris, M., and M. Villena. 2005. “The Commoditization of the Chilean Economy: Some Stylized Facts About its Economy.” Working Paper, Universidad Santa Maria, Santiago, Chile.

Medina, L., 2010. “The Dynamic Effects of Commodity Prices on Fiscal Performance in Latin America.” IMF Working Paper 10/192, International Monetary Fund, Washington, DC.

Mumtaz, H., and F. Zanetti. 2013. “The Impact of the Volatility of Monetary Policy Shocks.” *Journal of Money, Credit and Banking* 45(4): 535-558.

Ouedraogo, R., and W. S. Sourouema. 2018. "Fiscal Policy Pro-cyclicality in Sub-Saharan African Countries: The Role of Export Concentration." *Economic Modelling* 74: 219-229.

Persson, T. 2001. “Do Political Institutions Shape Economic Policy," NBER Working Paper 8214, National Bureau of Economic Research, Cambridge, MA.

Ramey, G., and V. A. Ramey. 1995. “Cross-country Evidence on the Link Between Volatility and Growth.” *American Economic Review* 85(5): 1138–1151.

Richaud, C., A. G. M. Galego, F. Ayivodji, S. Matta, and S. Essl. 2019. “Fiscal Vulnerabilities in Commodity Exporting Countries and the Role of Fiscal Policy.” MTI Discussion Paper 15, World Bank, Washington DC.

Sala-i-Martin, X., G. Doppelhofer, and R. Miller. 2004. “Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach.” *American Economic Review* 94(4): 813–835.

Shi, M. and J. Svensson. 2006. “Political Budget Cycles: Do they Differ Across Countries and Why?” *Journal of Public Economics* 90(8): 1367-1389.

Spatafora, N. and I. Samake. 2012. “Commodity Price Shocks and Fiscal Outcomes.” IMF Working Paper 12/112, International Monetary Fund, Washington, DC.

Talvi, E., and C. A. Végh. 2005. “Tax Base Variability and Procyclical Fiscal Policy in Developing Countries.” *Journal of Development Economics* 78 (1): 156-190.

van der Ploeg, F., and S. Poelhekke. 2009. “Volatility and the natural resource curse.” *Oxford Economic Papers* 61(4): 727–760.

van der Ploeg, F. and S. Poelhekke S. 2010. “The Pungent Smell of ‘Red Herrings’: Subsoil Assets, Rents, Volatility and the Resource Curse.” *Journal of Environmental Economics and Management* 60(1): 44–55.

Vicente, P. C. 2010. “Does Oil Corrupt? Evidence from a Natural Experiment in West Africa.” *Journal of development Economics* 92(1): 28-38.

Villafuerte, M. and Lopez-Murphy, P. 2010. "Fiscal Policy in Oil Producing Countries During the Recent Oil Price Cycle." IMF Working Paper 10/28, International Monetary Fund, Washington, DC.

Villafuerte, M., P. Lopez-Murphy, and R. Ossowski, 2010, “Riding the Roller Coaster: Fiscal Policies of Nonrenewable Resource Exporters in Latin America and the Caribbean.” IMF Working Paper 10/251, International Monetary Fund, Washington, DC.

von Hagen, J. and I. Harden. 1995. “Budget Processes and Commitment to Fiscal Discipline." *European Economic Review* 39: 771-79.

Wilson, J., M. Newiak, and A. Mati. 2021 “Asymmetric Non-Commodity Output Responses to Commodity Price Shocks.” IMF Working Paper 2021/163, International Monetary Fund, Washington, DC.

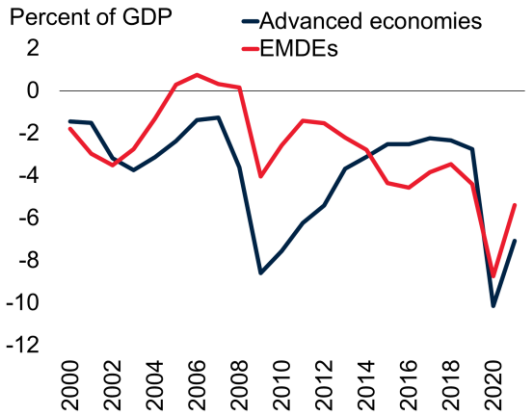
World Bank. 2018. “The Role of Major Emerging Markets in Global Commodity Demand.” *Global Economic Prospects: The Turning of the Tide*? June. Washington, DC: World Bank.

World Bank. 2022. *Global Economic Prospects*. January. Washington, DC: World Bank.

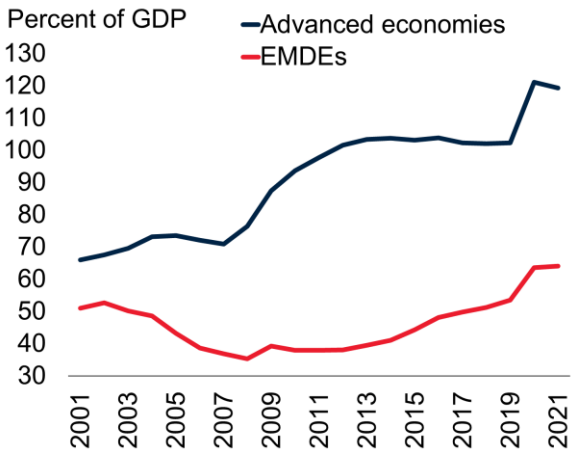
Wyplosz, Charles (2002) “Fiscal Policy: Institutions vs. Rules," manuscript.

Figure 1. Budget balance and gross government debt over the last two global crises

A. Budget balance

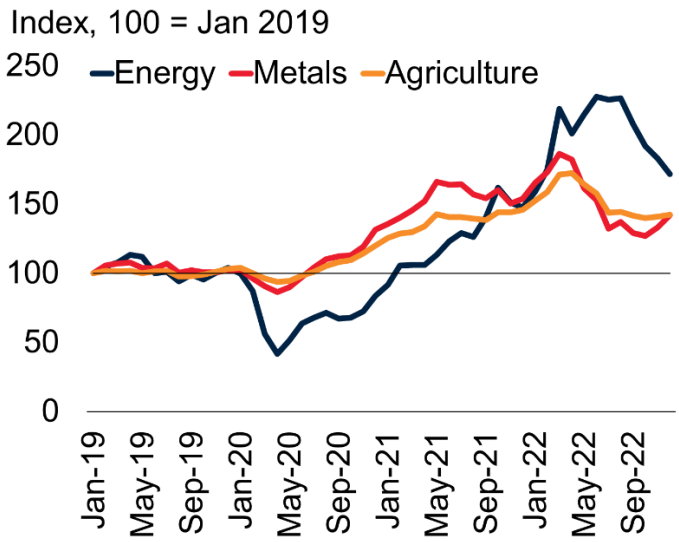


B. Gross government debt



Sources: IMF World Economic Outlook; World Bank.
Notes: EMDEs = emerging market and developing economies. Country weights based on PPP GDP.
A. Weighted averages of budget balance (as percent of GDP) for 35 advanced economies and 148 EMDEs. Data from 2000 to 2021.
B. Weighted averages of gross government debt (as percent of GDP) for 30 advanced economies and 144 EMDEs. Data from 2000 to 2021.

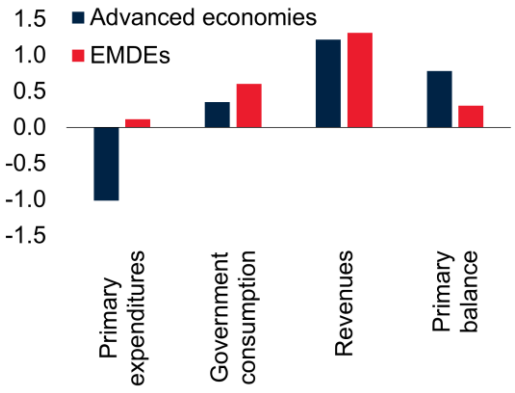
Figure 2. Commodity prices



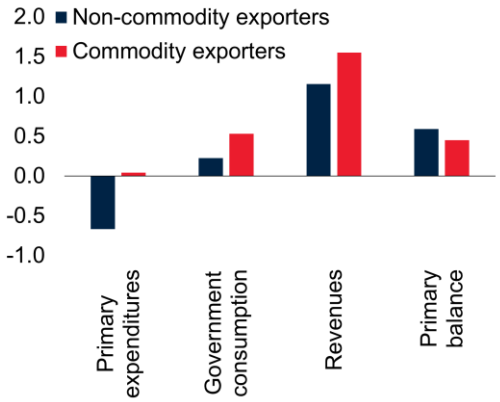
Source: World Bank.
Note: Last observation is December 2022.

Figure 3. Cyclicality of fiscal policy: By country groups

A. EMDEs vs. advanced economies



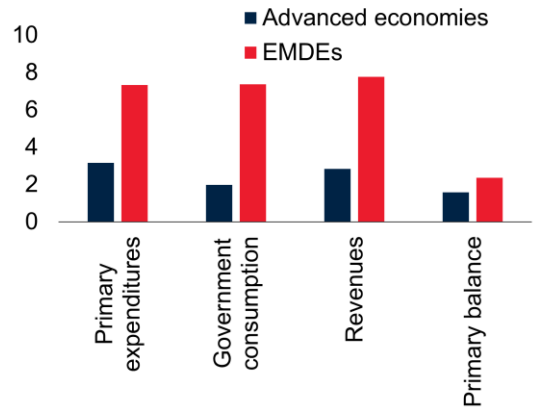
B. Commodity exporters vs. non-commodity exporters



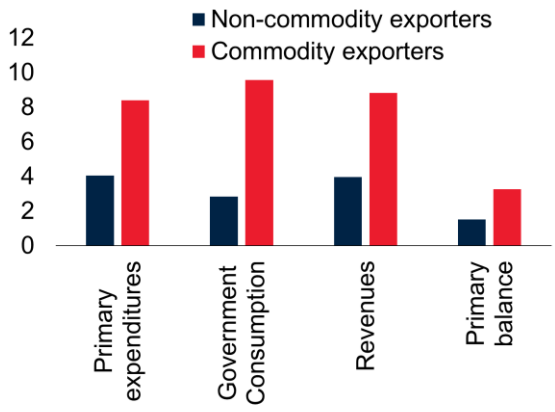
Sources: Authors' calculations; IMF WEO Database; World Bank.
Note: Figures show the weighted averages, by country group, of the β coefficient in equation (1) with the dependent variables being real primary expenditure growth, real government consumption growth, real revenue growth, and change in primary balances (as percent of GDP). Weights are based on the size of each economy measured by total GDP using PPP.

Figure 4. Fiscal policy volatility: By country groups

A. EMDEs vs advanced economies



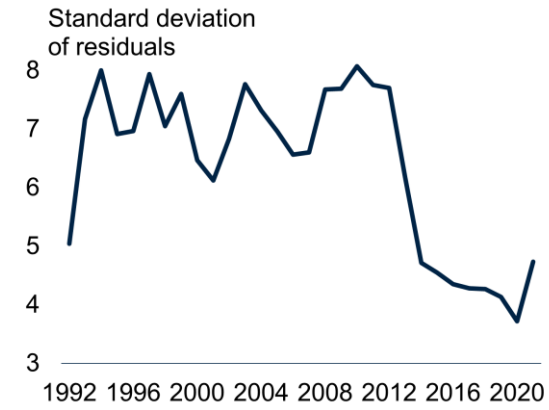
B. Commodity exporters vs. non-commodity exporters



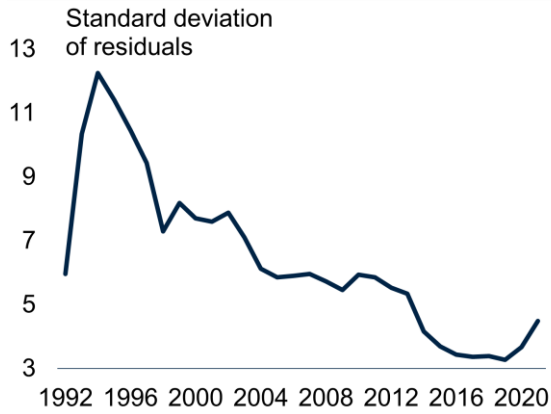
Sources: Authors' calculations; IMF WEO Database; World Bank.
Note: Figures show the weighted averages, by country group, of the standard deviations of the residuals obtained from estimating equation (1) for four different dependent variables: log difference of real primary expenditures, log difference of real government consumption, log difference of real revenues, and the change in primary balance (% of GDP). Weights used are the PPP GDP shares in the respective group's total GDP.

Figure 5. Fiscal policy volatility in EMDEs — Five-year rolling windows

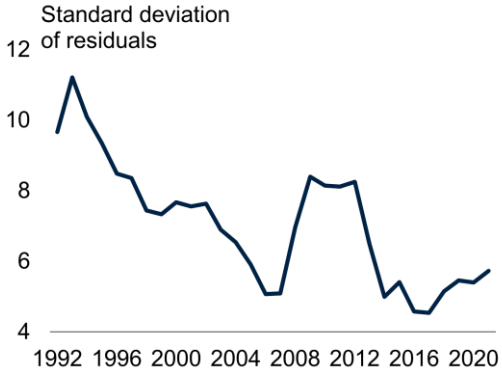
A. Primary expenditure



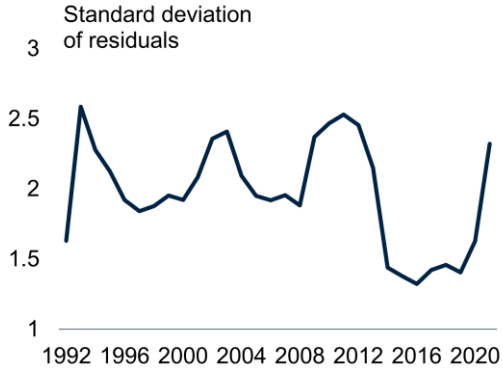
B. Government consumption



C. Revenues



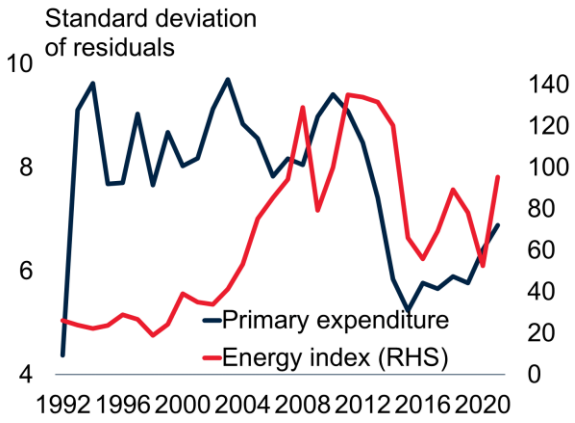
D. Primary balance



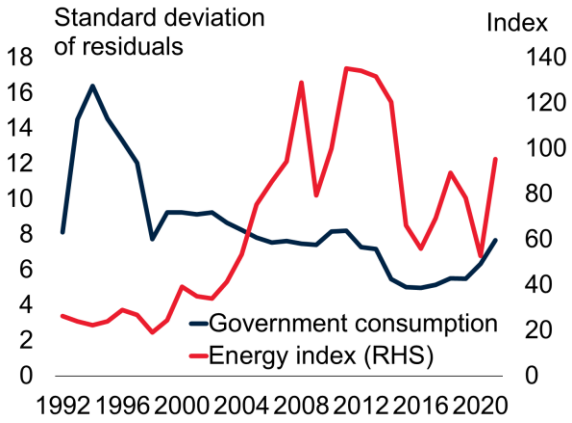
Note: Figures show the average standard deviation of residuals from equation (1) for EMDEs. The standard deviation is calculated using a five-year rolling window.

Figure 6: Fiscal policy volatility in commodity exporters – Five-year rolling windows

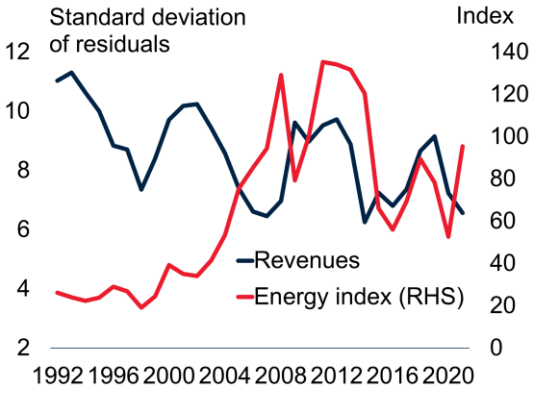
A. Primary expenditure



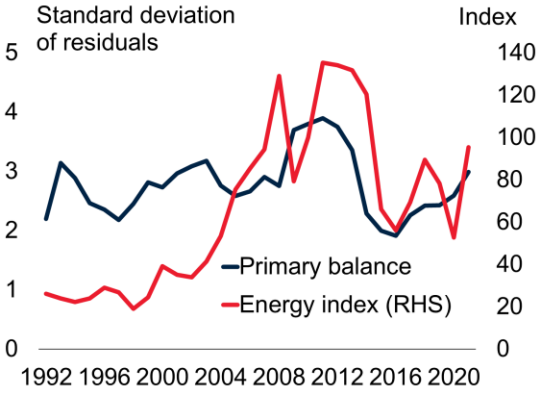
B. Government consumption



C. Revenues



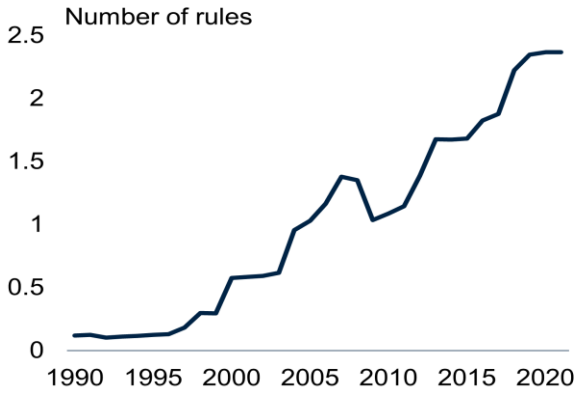
D. Primary balance



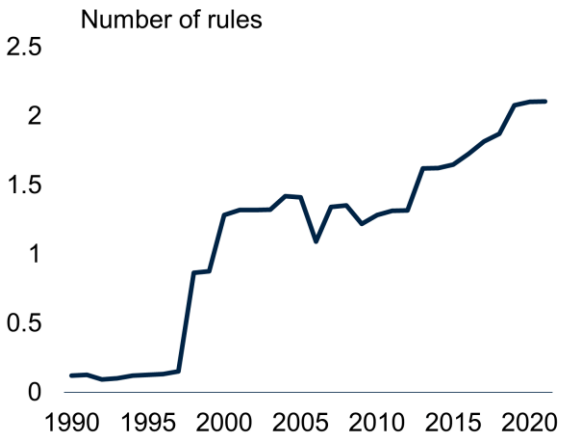
Note: Figures show the average standard deviation of residuals from equation (1) for commodity-exporting countries. The standard deviation is calculated using a five-year rolling window.

Figure 7. Fiscal rules in place

A. EMDEs



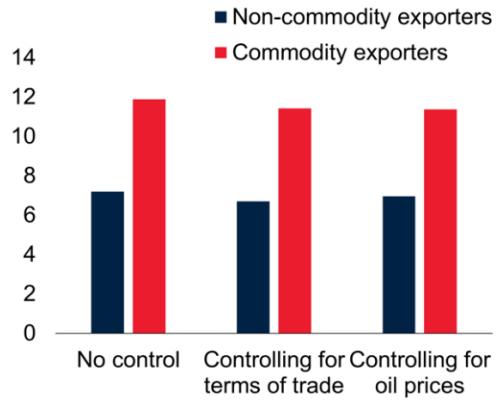
B. Commodity exporters



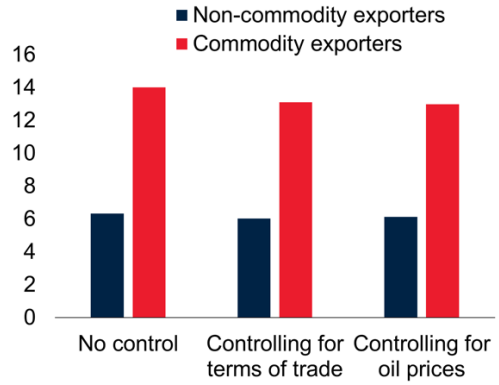
Sources: Davoodi et al. (2022); World Bank.
Note: EMDEs = emerging market and developing economies. Figures show the weighted averages of the number of fiscal rules in place.
A. Weights used are each country's GDP as a share of total EMDEs GDP, on a PPP basis.
B. Weights used are each commodity-exporting country's GDP as a share of the group's GDP, on a PPP basis.

Figure 8. Alternative measures of fiscal policy volatility

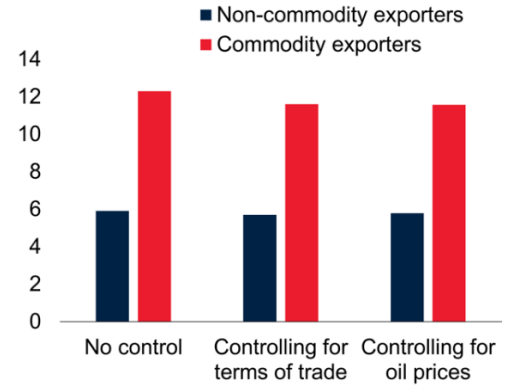
A. Primary expenditures



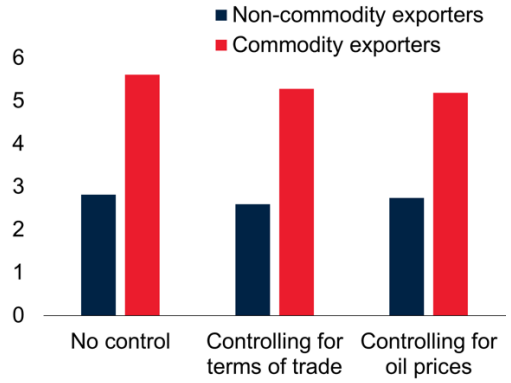
B. Revenues



C. Government consumption



D. Primary balance



Sources: IMF WEO Database; World Bank.

Note: Figures show the average standard deviations of the residuals obtained from equation (1) with the dependent variables being the log difference of real primary expenditures (Figure 8.A), log difference of real revenues (Figure 8.B), the log difference of real consumption (Figure 8.C), and the change in primary balance as percent of GDP (Figure 8.D). 'No control' refers to the baseline specification with real GDP growth as the only regressor.

Table 1. Correlation between measures of volatility

	Primary Expenditures	Revenues	Primary Balance	Government Consumption
Primary Expenditures	1.00			
Revenues	0.68	1.00		
Primary Balance	0.66	0.30	1.00	
Government Consumption	0.70	0.62	0.32	1.00

Note: Correlations between the standard deviations of the residuals obtained from regressing the log difference of real primary expenditures, log difference of real revenues, the change in primary balance (percent of GDP), and the log difference of real consumption on real GDP growth, as specified in equation (1).

Table 2. Determinants of fiscal policy volatility

	Primary Expenditures			Government Consumption		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
EMDE	4.930***	4.123***	1.756**	5.749***	3.769***	1.547
	(0.657)	(1.177)	(0.870)	(0.714)	(0.958)	(0.980)
Commodity exporters	3.295***	3.143***	-1.053	4.601***	4.323***	0.771
	(0.852)	(0.935)	(0.845)	(0.918)	(0.927)	(1.051)
GDP per capita		-0.498	-1.240***		-1.201**	-1.933***
		(0.603)	(0.423)		(0.509)	(0.500)
Resource rents			0.376***			0.316***
			(0.0814)			(0.052)
Constant	3.930***	9.217	17.390***	2.324***	15.08***	23.102***
	(0.460)	(6.456)	(4.495)	(0.402)	(5.427)	(5.355)
Observations	178	177	177	167	166	166
R-squared	0.219	0.224	0.451	0.324	0.349	0.500

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
'EMDE' is a dummy variable that takes the value "1" if a country is classified as an EMDE, and "0" otherwise.
'Commodity exporters' is a dummy variable representing whether a country is a commodity exporter or not.

Table 3. Determinants of fiscal policy volatility, by type of commodity

	Primary Expenditures		Government Consumption	
VARIABLES	(1)	(2)	(3)	(4)
EMDE	2.900***	1.794**	2.613**	1.539
	(1.047)	(0.867)	(1.121)	(1.045)
Agriculture exporters	0.712	-0.592	2.197*	1.178
	(0.983)	(1.036)	(1.294)	(1.350)
Metal exporters	2.236*	-0.136	2.984**	1.224
	(1.337)	(1.353)	(1.395)	(1.328)
Energy exporters	6.185***	-1.125	7.250***	1.139
	(1.625)	(1.252)	(1.561)	(2.004)
GDP per capita	-1.243**	-1.114**	-1.885***	-1.855***
	(0.523)	(0.453)	(0.644)	(0.608)
Resources rents		0.377***		0.307***
		(0.089)		(0.0657)
Constant	17.081***	16.017***	22.318***	22.23***
	(5.593)	(4.818)	(6.855)	(6.466)
Observations	177	177	166	166
R-squared	0.292	0.450	0.407	0.503

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. 'EMDE' is a dummy variable that takes the value "1" if a country is classified as an EMDE, and "0" otherwise. 'Agriculture', 'Metal', and 'Energy' exporters are dummy variables that take the value "1" if a country is a net exporter of the respective commodity group and "0" otherwise.

Table 4. Institutional determinants of fiscal policy volatility

	Primary Expenditures			Government Consumption		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Political constraints	-11.27***	-3.596	-4.095	-8.497***	-0.714	-1.037
	(2.502)	(3.224)	(3.298)	(2.834)	(3.220)	(3.284)
Control of corruption	-1.997***	-1.836***	-1.821***	-2.908***	-1.674**	-1.668**
	(0.421)	(0.570)	(0.570)	(0.530)	(0.653)	(0.661)
EMDE		-2.381*	-2.418*		-1.397	-1.441
		(1.266)	(1.272)		(1.487)	(1.456)
Commodity exporters		0.661	0.843		2.062	2.199*
		(0.747)	(0.716)		(1.273)	(1.300)
Resource rents		0.281***	0.284***		0.253***	0.256***
		(0.0688)	(0.0699)		(0.0567)	(0.0551)
GDP per capita		-0.548	-0.349		-1.479**	-1.347*
		(0.464)	(0.496)		(0.617)	(0.739)
SWF			-0.945			-0.627
			(0.773)			(1.198)
Constant	17.92***	19.44***	17.96***	19.73***	25.67***	24.69***
	(1.305)	(5.025)	(5.114)	(1.615)	(6.616)	(7.544)
Observations	133	132	132	130	129	129
R-squared	0.394	0.595	0.599	0.363	0.543	0.544

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. 'EMDE' is a dummy variable that takes the value "1" if a country is classified as an EMDE, and "0" otherwise. 'Commodity exporters' is a dummy variable representing whether a country is a commodity exporter or not. 'SWF' is a dummy equal to "1" if a country has a sovereign wealth fund and "0" otherwise.

Table 5. Policy determinants of fiscal policy volatility

	Primary Expenditures			
VARIABLES	(1)	(2)	(3)	(4)
Fiscal policy rules	-1.171***	-0.947***	-1.040**	-0.694**
	(0.336)	(0.348)	(0.411)	(0.308)
Capital account openness	-8.908***	-7.312***	-4.256**	-4.202**
	(2.192)	(2.574)	(1.729)	(1.666)
Exchange rate regime	-4.245***	-4.722***	-4.541***	-3.206***
	(0.899)	(1.093)	(1.294)	(0.857)
EMDE		-0.398	0.536	-1.255
		(1.276)	(1.151)	(0.970)
Commodity exporters		3.356***	0.0398	1.082
		(1.134)	(0.849)	(0.753)
Resource rents			0.543***	0.402***
			(0.180)	(0.0678)
GDP per capita			1.023	0.282
			(1.091)	(0.651)
SWF			-0.324	-0.349
			(0.832)	(0.703)
Political constraints				3.963
				(4.676)
Control of corruption				-0.761*
				(0.388)
Constant	16.48***	14.04***	0.928	8.710
	(2.113)	(2.836)	(10.191)	(5.579)
Observations	93	93	93	77
R-squared	0.324	0.371	0.636	0.713

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. 'EMDE' is a dummy variable that takes the value "1" if a country is classified as an EMDE, and "0" otherwise. 'Commodity exporters' is a dummy variable representing whether a country is a commodity exporter or not. 'SWF' is a dummy equal to "1" if a country has a sovereign wealth fund and "0" otherwise.

Table 6. Effects of fiscal policy volatility on GDP growth volatility

	GDP growth volatility				
	OLS		IV		
VARIABLES	(1)	(2)	(3)	(4)	(5)
Fiscal policy volatility	0.341***	0.359***	0.363***	0.499***	0.141***
	(0.072)	(0.0734)	(0.104)	(0.175)	(0.0523)
GDP per capita		0.837*		0.886	0.318
		(0.454)		(0.564)	(0.281)
EMDE		1.073*		0.886	0.950*
		(0.624)		(0.679)	(0.489)
Commodity exporters		0.156		-0.715	-0.339
		(0.412)		(0.446)	(0.388)
Constant	1.358**	-7.421	1.309**	-8.426	-0.762
	(0.527)	(5.097)	(0.649)	(6.548)	(3.037)
Observations	178	177	133	132	77
R-squared	0.300	0.338	0.23	0.254	0.238

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0. Fiscal policy volatility in all specifications is measured using primary expenditures. Instruments for (3) and (4): Political constraints; control of corruption. Instruments for (5): Political constraints; control of corruption; resource rents; fiscal rules dummy; capital account openness; and exchange rate regime.

Table 7. Effects of fiscal policy volatility on GDP per capita growth

	GDP per capita growth		
		OLS	IV
VARIABLES	(1)	(2)	(3)
Fiscal policy volatility	-0.022	-0.116***	-0.110***
	(0.060)	(0.022)	(0.036)
Government size		0.013	0.020
		(0.012)	(0.013)
Initial GDP per capita		-0.659***	-0.767***
		(0.138)	(0.147)
Capital account openness		1.210***	1.230***
		(0.302)	(0.314)
Investment price		-1.481***	-1.548***
		(0.392)	(0.432)
Constant	1.986***	8.416***	9.202***
	(0.533)	(1.157)	(1.332)
Observations	177	161	128
R-squared	0.006	0.356	0.403

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Fiscal policy volatility in all specifications is measured using primary expenditures.
Instruments for (3): Political constraints; control of corruption.

Appendix 1

Table A1: Country coverage and groups

Advanced economies (36)	
	Australia;* Austria; Belgium; Canada*; Cyprus; Czechia; Denmark; Estonia; Finland; France; Germany; Greece; Hong Kong SAR, China; Iceland*; Ireland; Israel; Italy; Japan; Korea, Rep.; Latvia; Lithuania; Luxembourg; Malta; Netherlands; New Zealand; Norway*; Portugal; Singapore; Slovak Republic; Slovenia; Spain; Sweden; Switzerland; Taiwan, China; United Kingdom; United States
Emerging Market and Developing Economies (EMDEs) (148)	
Commodity Exporters (89)	
Energy exporters (32)	Algeria; Angola; Azerbaijan; Bahrain; Bolivia; Brunei Darussalam; Cameroon; Chad; Colombia; Congo, Rep.; Ecuador; Equatoria Guinea; Gabon; Ghana; Indonesia; Islamic Republic of Iran; Iraq; Kazakhstan; Kuwait; Libya; Myanmar; Nigeria; Oman; Qatar; Russian Federation; Saudi Arabia; Timor-Leste; Trinidad and Tobago; Turkmenistan; United Arab Emirates; Venezuela, RB; Yemen, Rep
Other commodity exporters (58)	Argentina; Armenia; Belize; Benin; Botswana; Brazil; Burkina Faso; Burundi; Cabo Verde; Central African Republic; Chad; Chile; Comoros; Congo, Dem. Rep.; Costa Rica; Côte d'Ivoire; Ethiopia; Fiji; Gambia, The; Guatemala; Guinea; Guinea-Bissau; Guyana; Honduras; Kenya; Kosovo; Kyrgyz Republic; Lao PDR; Liberia; Madagascar; Malawi; Mali; Mauritania; Mongolia; Mozambique; Namibia; Nicaragua; Niger; Papua New Guinea; Paraguay; Peru; Rwanda; Senegal; Seychelles; Sierra Leone; Solomon Islands; South Africa; Sudan; Suriname; São Tomé and Príncipe; Tajikistan; Tanzania; Togo; Uganda; Ukraine; Uruguay; Uzbekistan; Zambia
Non-commodity exporters (59)	Albania; Antigua and Barbuda; Bangladesh; Barbados; Belarus; Bhutan; Bosnia and Herzegovina; Bulgaria; Cambodia; China; Croatia; Djibouti; Dominica; Dominican Republic; Egypt, Arab Rep; El Salvador; Eritrea; Eswatini; Georgia; Grenada; Haiti; Hungary; India; Jamaica; Jordan; Kiribati; Lebanon; Lesotho; Malaysia; Maldives; Marshall Islands; Mauritius; Mexico; Micronesia; Moldova; Morocco; Nepal; North Macedonia; Pakistan; Palau; Panama; Philippines; Poland; Romania; Samoa; Serbia; Sri Lanka; St. Kitts and Nevis; St. Lucia; St. Vincent and the Grenadines; Syrian Arab Republic; Thailand; Bahamas, The; Tonga; Tunisia; Türkiye; Tuvalu; Vanuatu; Vietnam

Note: The number of countries in each country group is in parenthesis. * denotes advanced economy commodity exporters.

Table A2: Variable list and sources

Variable	Description	Source
Fiscal policy variables		
General government revenue	Revenue consists of taxes, social contributions, grants receivable, and other revenue.	IMF World Economic Outlook (WEO)
Primary balance	Primary net lending/borrowing is net lending (+)/borrowing (-) plus net interest payable/paid (interest expense minus interest revenue); percent of GDP	IMF WEO
Primary expenditure	Primary expenditures are obtained by subtracting interest payments from general government total expenditures. Interest payments are calculated as the difference between overall fiscal balance and the primary balance (all in percent of GDP).	IMF WEO and authors' calculations
Government consumption	General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees) and most expenditures on national defense and security; excludes government military expenditures that are part of government capital formation.	World Development Indicators (World Bank)
Other country-specific variables		
Real GDP; Real GDP per capita		IMF WEO
Political constraints	The Political Constraints Index (POLCON) measures the extent to which policy changes are constrained by institutional and political factors.	POLCON dataset (Henisz 2000)
Control of corruption	An index measuring of corruption within the political system; ranges from 0 to 6.	International Country Risk Guide
Government size	General government total expenditure (percent of GDP)	IMF WEO
Investment price	Price level of investment	Penn World Tables
Capital account openness	The Chinn-Ito index (KAOPEN) measuring a country's degree of capital account openness; available from 1970-2019 for 182 countries.	Chinn and Ito (2006)
Openness	Sum of exports and imports (percent of GDP	
Inflation	Consumer price inflation	IMF WEO

Variable	Description	Source
Resources rents	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	World Development Indicators (World Bank)
Fiscal rules	The dataset covers four types of rules: budget balance rules, debt rules, expenditure rules, and revenue rules, applying to the central or general government or the public sector.	Davoodi et al. (2022)
SWF (Sovereign wealth fund)	Dummy variable; "0" if a country does not have a SWF and "1" if it has a SWF.	Based on information in https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund
Commodity variables		
Commodity terms of trade of exports	Country-specific commodity export price indices; Individual commodities are weighted by the ratio of exports to total commodity exports; rolling weights index; reference period 2012=100; based on 40 commodities.	IMF Commodities Terms of Trade
Oil prices	Average of Brent, Dubai and WTI oil prices in nominal US dollars	World Bank Commodities Prices Data (the "Pink Sheet" Data)