WPS7507

Policy Research Working Paper 7507

The Effects of Volatility, Fiscal Policy Cyclicality and Financial Development on Growth

Evidence for the Eastern Caribbean

Markus Brüeckner
Francisco Carneiro

WORLD BANK GROUP
Caribbean Country Management Unit
&
Macroeconomics and Fiscal Management Global Practice Group
December 2015

Policy Research Working Paper 7507

Abstract

This paper presents estimates of the effects that terms of trade volatility has on growth of real gross domestic product per capita. Based on five-year non-overlapping panel data comprising 175 countries during 1980–2010, the paper finds that: (i) in model specifications that do not include country fixed effects, terms of trade volatility has a significant negative average effect on economic growth; (ii) once country fixed effects are included in the model, the average effect of terms of trade volatility on economic growth is not significantly different from zero; (iii) robust to the inclusion of country fixed effects, terms of trade volatility has significantly adverse effects on economic growth in countries with pro-cyclical fiscal policy; and (iv) in model specifications that do not include country fixed effects, financial development is a significant mediating factor with regard to the effect that terms of trade volatility has on economic growth, however, the significance of this effect vanishes once country fixed effects are included in the model. The paper also explores these relationships for the Organization of Eastern Caribbean States region. A key conclusion from the research is that countercyclical fiscal policy and deeper financial markets will have particularly high payoffs in reducing the adverse growth effects of terms of trade volatility in the Organization of Eastern Caribbean States region.

This paper is a product of the Caribbean Country Management Unit and the Macroeconomics and Fiscal Management Global Practice Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at fcarneiro@worldbank.org.

The Effects of Volatility, Fiscal Policy Cyclicality, and Financial Development on Growth: Evidence for the Eastern Caribbean*

Markus Brüeckner
University of Queensland

and

Francisco Carneiro
The World Bank

Keywords: Volatility; fiscal policy; procyclicality; financial development; terms of trade; growth

JEL Classification: E62, F1; G2; G28; O1; O11

* The authors are grateful for comments and suggestions received from Alfonso Garcia Mora, David Rosenblatt, and Daniel Lederman. The usual disclaimers apply.

1. Introduction

The Caribbean region is quite unique in the sense that it concentrates some of the smaller countries in the world which despite sharing many similarities also present marked heterogeneity. Population size and per capita income levels, for example, differ quite widely within the region.[1] Some are commodity-exporters (such as Trinidad and Tobago, the Dominican Republic, Guyana and Suriname) while most are service-oriented economies. Similarities include proximity to major markets in North and South America, and for most countries, a transition from agriculture or mining to a service-driven economy, anchored in particular on tourism and financial services. Growth has also been uneven in the region, with commodity-exporters experiencing the highest growth rates over the last few years in comparison with the service-oriented economies which have suffered the most with the effects of the global financial crisis (see IMF, 2015).

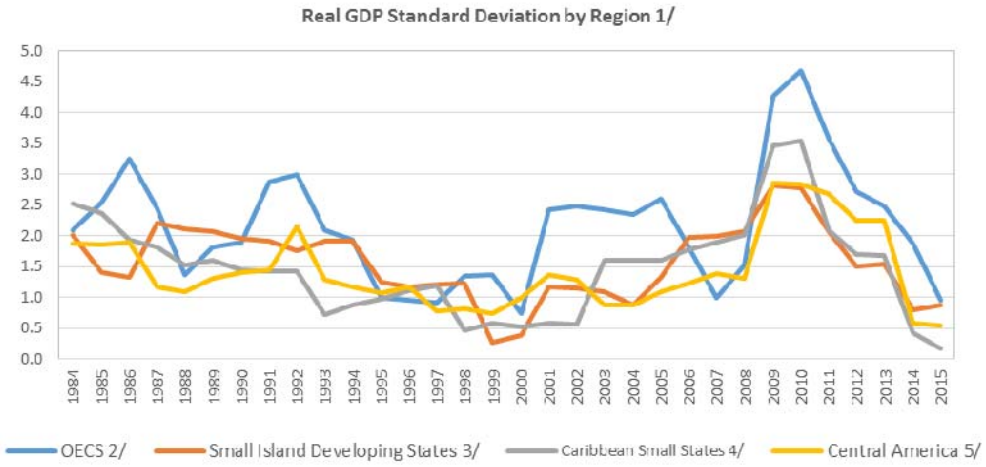
The economic performance of the members of the Organization of Eastern Caribbean States (OECS - consisting of Antigua and Barbuda, Dominica, Grenada, St Kitts and Nevis, St. Lucia, and St Vincent and the Grenadines) has been particularly uneven due to reasons that range from the need to reinvent themselves after the end of preferential trade agreements with Europe in the 1980s to the frequency of natural hazards. After growing faster than the rest of the world in the 1980s at an annual average of 6 percent, the OECS countries have experienced a significant growth slowdown since the 1990s with annual growth rates of 2 percent or less on average. More recently, the region was severely hit by the effects of the global financial crisis of 2008-09 because of their close ties with the economies of the U.S., Canada, and Europe which are their main source of tourist arrivals.[2] Some common challenges faced by the small economies of the OECS include exposure to frequent natural disasters; vulnerability to external shocks; high debt; and lack of economies of scale.

The OECS countries have also suffered historically with volatility of economic growth. Economic growth volatility in the OECS has been higher than that observed in other groups of countries with similar characteristics such as other small states of the Caribbean, the broader group of small-island development states (SIDS), and Central American countries (Figure 1). Output volatility in the region was particularly pronounced in the early half of the 1990s and 2000s and then more recently during 2008-2010 as a result of the global financial crisis. This is not surprising given these countries' small size, high degree of openness, dependence on tourism from a not so diversified range of countries, and proneness to natural hazards which make them highly exposed to external shocks.

[1] From the small island states of the Organization of the Eastern Caribbean States (OECS, with some 600,000 inhabitants in total) to Jamaica (2.7 million people). Guyana has one of the lowest GDPs per capita in the world (USD4,170 in 2014), while Barbados, on the other hand, is an upper middle income country (with GDP per capita of USD16,300 in 2014).

[2] See Kouame and Reyes (2015) for evidence of how the Caribbean's economic growth rates relate to those of key drivers of the global economy.

Figure 1: Economic Growth Volatility in the OECS and Comparators, 1984-2015



Source: IMF; WEO and World Bank staff calculation.
1/ 5 year moving standard deviation
2/ Antigua and Barbuda, Dominica, Grenada, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines.
3/ Comoros, Djibouti, Fiji, Guinea-Bissau, Kiribati, Maldives, Marshall Islands, Mauritius, Micronesia, Fed. Sts, Palau, Papua New Guinea, Samoa, Sao Tome and Principe, Seychelles, Singapore, Solomon Islands, Timor-Leste, Tonga, and Vanuatu.
4/ The Bahamas, Barbados, Belize, Guyana, Suriname, Jamaica, and Trinidad and Tobago.
5/ Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

Amid this mixed and volatile growth performance, the OECS countries have also followed a rather pro-cyclical fiscal policy stance in line with what has been the norm for most of the developing economies. Talvi and Végh (2005) and Ilzetzki and Vegh (2008) have shown that pro-cyclical fiscal policy is a common characteristic of the entire developing world. More recent research has identified signs of improvement in the fiscal policy stance of developing countries. For instance, Frankel, Vegh, and Vuletin (2013) have found evidence of a steady move by developing countries away from fiscal policy pro-cyclicality. Carneiro and Garrido (2015) extend this analysis to a larger sample of countries, consider various sub-periods and stages of the business cycle, as well as employ a variety of de-trending methods to generally confirm the results in Frankel, Vegh, and Vuletin (2013). They show that among 104 developing countries in their sample, about 40 to 50% (depending on the de-trending method) followed or switched to counter-cyclical fiscal policies during the 1990-2010 period. In comparison, among the 14 Caribbean countries, only 2 to 5 of them followed the same course during the 1990-2010 period.

Understanding the sources and consequences of macroeconomic volatility represents one of the key challenges facing policy makers in developing countries, and especially so in small island states. Volatility is often associated with lower economic growth, especially in less developed economies (Hnatkovska and Loayza, 2005). Macroeconomic volatility in these countries leads to much more unstable consumption paths than in developed economies. Moreover, by reducing economic growth in these countries, volatility can also affect future consumption. It is therefore not surprising that the welfare gains from reducing volatility in developing countries can be substantial (see, for instance, Athanasoulis and van Wincoop, 2000).

The main objective of this paper is to study the main sources of macroeconomic volatility in

the Eastern Caribbean economies and other parts of the world. In doing so, we explore the impact of terms of trade volatility, fiscal policy (pro) cyclicality, and financial development for a sample of 175 countries over the period 1980-2010. By considering the effects of the interaction between terms of trade volatility and fiscal pro-cyclicality we are able to gauge (i) whether fiscal pro-cyclicality exacerbates the negative growth effect of terms of trade volatility; and (ii) whether the mediating role of fiscal policy cyclicality is particularly pronounced in the OECS as compared to other countries. This is an important policy discussion for a region that adopts a strong peg against the US dollar since this arrangement limits considerably their ability to respond to shocks. In addition, the interaction between terms of trade volatility, pro-cyclicality and financial development will generate evidence as to whether a counter-cyclical fiscal policy stance and further financial development can mitigate the adverse growth effects of terms of trade volatility in the OECS region.

The paper is organized as follows. After this Introduction, section 2 discusses the econometric approach, the methodology, and the data used in the analysis. Section 3 presents a brief review of the literature on terms of trade volatility, government spending cyclicality, and financial development can affect economic growth. Section 4 describes the empirical findings while section 5 discusses what should be the direction of policy for a stronger financial sector; what the options are for a more counter-cyclical fiscal policy in the presence of a pegged exchange rate regime; and how policy makers in the region can be better equipped to deal with the effects of terms of trade volatility and mitigate its impacts on growth.

2. Econometric Model, Methodology, and Data

The main objective of this paper is to test the hypotheses that: (i) an increase in volatility results in lower GDP growth; (ii) the negative impact of volatility on growth is more pronounced in less financially developed countries; and (iii) in countries where fiscal policy is more pro-cyclical.

Testing the above hypotheses requires cross-country time-series (panel) data on GDP per capita, financial development, and government spending. These data are available from the Penn World Tables and the World Development Indicators.

The econometric model for testing hypotheses (i)-(iii) is:

$$(1)\quad Growth_{it} = a_i + b_t + \alpha Volatility_{it} + \beta(Volatility_{it}*FD_i) + \gamma(Volatility_{it}*Procyclicality_i) + \varphi lnGDP_{it-1} + e_{it}$$

where *Growth* is the change in the natural logarithm of real GDP per capita in country i between period t and t-1. *Volatility* is the country-specific standard deviation of external economic shocks. Following Rodrik (1998), we will use the standard deviation of countries' terms of trade as the measure of externally induced economic volatility. *FD* is a measure of financial development. Following the finance literature, our main measure of financial development is the GDP share of domestic credit to the private sector. In order to avoid reverse causality bias (i.e. growth affects financial development), the *FD* measure will be used in the econometric model at the beginning of the sample period. Further, the paper will present estimates where *FD* is instrumented with legal origin.[3]

[3] The law and finance literature, see, for example, La Porta et al. (1998), has documented that countries' legal origin is an important determinant of cross-country differences in financial development. La Porta et al. argued that common law ensures a greater protection of private property (relative to civil law). Protection of private property is paramount for investment and the development

Procyclicality is a measure of the extent to which government spending responds to business-cycle variation in GDP. Formally $G_{it}=\theta_i GDP^{cycl}_{it}$. The parameter θ captures the pro-cyclicality of government spending. I.e. if θ is positive, then government spending increases when the cyclical component of GDP is positive (meaning, when GDP is above trend). We obtain data on θ from Frankel et al. (2013). Frankel et al. (2013) provide values of θ for a sample of 93 countries; we will use this data in the estimation of equation (1). In order to maximize coverage of countries when estimating equation (1), we will apply the methodology of Frankel et al. to generate values of θ for countries not covered by Frankel et al. (2013).

The econometric model includes country fixed effects, a_i. These fixed effects capture time-invariant country characteristics that affect economic growth, i.e. variables related to history and geography. Note that the country fixed effects account for the linear effect that FD_i and $Procyclicality_i$ have on economic growth. The time fixed effects, b_t, capture common shocks that affect countries' GDP per capita growth in a given time period.

Differentiating equation (1) with respect to volatility yields:

(2) $$d(Growth)/d(Volatility) = \alpha + \beta*FD_i + \gamma*Procyclicality_i$$

Hypotheses (i)-(iii) imply that $\alpha<0$, $\beta<0$, $\gamma<0$.

In order to examine whether the coefficients α, β, and γ differ for the Eastern Caribbean, we augment the econometric model:

(3) $$Growth_{it} = a_i + b_t + \alpha_1 Volatility_{it} + \beta_1(Volatility_{it}*FD_i) + \gamma_1(Volatility_{it}*Procyclicality_i) + (\alpha_2 Volatility_{it} + \beta_2(Volatility_{it}*FD_i) + \gamma_2(Volatility_{it}*Procyclicality_i))*OECS_i + \varphi_1 lnGDP_{it-1} + e_{1it}$$

where *OECS* is an indicator variable that is unity if countries are part of the Organization of Eastern Caribbean States. Note that α_2, β_2, and γ_2 capture the differences in effects that the variables of interest have on economic growth in OECS countries. This can be seen from differentiating equation (3) with respect to volatility:

(4) $$d(Growth)/d(Volatility) = \alpha_1 + \beta_1*FD_i + \gamma_1*Procyclicality_i + (\alpha_2 + \beta_2*FD_i + \gamma_2*Procyclicality_i)*OECS_i$$

(5) $$d(d(Growth)/d(Volatility))/dOECS_i = \alpha_2 + \beta_2*FD_i + \gamma_2*Procyclicality_i$$

Although small-island countries have greater terms of trade and output volatility (see Easterly and Kraay, 2000; Tumbarello, 2013), it is unclear whether this implies heterogeneity in the coefficients specified in equation (1). In fact, Easterly and Kraay (2000) conclude that small states are no different from large states, and so should receive the same policy advice that large states do.

We note that standard errors are Huber robust and clustered at the country level. Clustering standard errors at the country level ensures that residuals are appropriately adjusted for arbitrary within-country serial correlation (Wooldridge, 2002).

Table 1 provides a list of the variables used in the econometric analysis and their data sources. Table 2 shows bi-variate correlations. Summary statistics of the variables' first and second

---

of the financial sector. La Porta et al. document for a cross-section of countries that financial development is significantly higher in countries with common law.

moments can be found in Table 3.

3. Related Literature

Volatility

The effect of volatility on output in the long-run depends on the presence of frictions in the economy. Lucas (1987) showed that, in the absence of frictions, the effect of business cycle fluctuations on output and welfare are trivial. One type of friction that can induce a negative effect of volatility on output are irreversibilities in investment. In the presence of irreversibilities of investment volatility induced by a greater variance of technology shocks will lead to lower investment and hence output (e.g., Bernanke, 1983; Pindyck, 1991). Policy volatility, too, can have a negative effect on investment and output growth as shown by Aizenman and Marion (1993) in a two-period general equilibrium model with investment irreversibilities. In a multi-sector model, volatility has a negative effect on output in the long-run if there are costs associated with moving factors across sectors, see, for example, Bertola (1994) and Dixit and Rob (1994).

Ramey and Ramey (1995) estimate the effect of volatility in a sample of 92 countries during 1960-1985. They find that volatility, measured as the standard deviation of GDP growth, has a significant negative effect on transitional growth and the long-run level of GDP per capita. The authors document that the effect of volatility on GDP per capita continues to be negative and significant when controlling for the investment share of GDP. Further, they show that volatility has no significant effect on the investment share of GDP.

Fatas and Mihov (2003) estimate the effect of government spending volatility and output volatility on economic growth. Based on a sample of 91 countries, they find that government spending volatility significantly increases output volatility and reduces growth. The authors document that political constraints significantly reduce government spending volatility. This finding they interpret as supporting the argument that political constraints are growth enhancing because they restrict discretionary fiscal policy. In a follow up paper, Fatas and Mihov (2013), expand the sample to 93 countries and confirm their original result that policy volatility reduces growth. In particular, the find that a one-standard-deviation increase in policy volatility reduces long-term economic growth by about 0.7% in the panel regressions, and by more than one percentage point in the cross-section.

Woo (2011) traces policy volatility to inequality and shows that inequality-induced policy volatility has a negative effect on economic growth. Woo's argument is that, in unequal societies, redistributive struggles emerge and these struggles lead to disagreement over what is the optimal fiscal policy. For a sample of more than 60 countries during 1960-2000, Woo documents that inequality is associated with a higher standard deviation of government spending growth; and that the latter variable is significantly negatively associated with (transitional) GDP per capita growth.

An issue with studying the effect of output volatility and fiscal policy volatility on output growth is that the former variables are endogenous. Hence, interpreting the above findings as providing evidence of a causal effect of volatility on growth is problematic. A step forward is to examine the impacts in volatility of exogenous economic shocks, such as the fluctuations in the terms of trade and weather (rainfall).

Rodrick (1998) estimates the impact that terms of trade volatility has on government size. He finds that, in countries more open to international trade terms of trade volatility leads to larger government size. Rodrick argues that larger government size provides a buffer against terms of

trade shocks.

Brueckner and Gradstein (2013) examine the impact that rainfall volatility has on GDP volatility and government size. They find that rainfall volatility has a significant effect on GDP volatility in developing countries. Using rainfall volatility as an instrument for GDP volatility they find that the latter variable has a significant positive effect on government size.

Government Spending Cyclicality

Government spending can mitigate the negative effect that volatility has on growth if: (i) government spending is counter-cyclical; and (ii) its impact on output is positive. For conceptual clarity it is useful to note that: (i) refers to the behavior of government spending, i.e. the response of government spending to the business-cycle; (ii) refers to the government spending multiplier, i.e. the effectiveness of government spending with regard to changing output in the short-run (and possibly the long-run). If government spending is pro-cyclical and the government spending multiplier is positive, then increases in the variance of exogenous shocks will have a more negative effect on growth.

The mainstream result in the empirical literature on government spending cyclicality is that government spending tends to pro-cyclical in (the majority of) developing countries. Telvi and Vegh (2002) find that fiscal policy is acylical in G7 countries while it is procyclical in developing countries. Their findings are based on a sample of 56 countries during the period 1970-1994. Based on a sample of 104 countries for the period 1960-2003, Kaminsky et al. (2005) find that in OECD countries government spending is counter-cyclical while it is procyclical in developing countries. Using instrumental variables estimation, Brueckner and Gradstein (2014) show that in developing countries government spending responds strongly to persistent variation in GDP; the response of government spending to transitory variation in GDP is positive but not significantly different from zero. These authors show that transitory output shocks have a smaller effect on government spending than persistent shocks.

A strand of the literature has argued that the cyclicality of government spending depends on financial market imperfections. In particular, financing constraints prevent governments from borrowing during recessions; see Gavin and Perotti (1997). The presence of financing constraints suggests asymmetry in the response of government spending to the business cycle. Hercowitz and Strawczynski (2004) provide empirical evidence for a ratcheting effect. These authors document that in OECD countries the ratio of government spending over GDP rises during recessions and is only partially reduced during booms.

A more recent strand of the literature has argued that the cyclicality of government spending depends on institutions. Alesina et al. (2008) argue that the pro-cyclicality of government spending is related to corruption. Based on a sample of 83 countries during 1960-2003, they find that in democracies with higher levels of corruption government spending is more procyclical. The authors explain their finding through the lens of a political economy model where voters "starve the Leviathan" in order to reduce political rents. During a boom, voters demand more public goods and lower taxes in order to prevent corrupt politicians from appropriating tax revenues.

The results in Alesina et al. (2008) are related to Lane (2003) who estimates the response of government spending to the output gap in OECD countries. Lane finds that government spending is procyclical in OECD countries with dispersed political power.

Frankel et al. (2013) examine the response of government spending to the output gap for a

set of 93 countries during 1960-2009. These authors find that country-specific coefficients characterizing the response of government spending to the output gap are negative for industrialized countries while in emerging market and developing countries these coefficients are positive, thus indicating procyclicality. Frankel et al. show that the country-specific government spending cyclicality coefficients are negatively correlated with measures of institutional quality.[4] Carneiro and Garrido (2015) document that the findings in Frankel et al. are robust to expanding the sample to 180 countries during 1980–2012. Further, Carneiro and Garrido document that the findings in Frankel et al. are robust to using different filtering methods and allowing for structural breaks.

There is no consensus in the literature regarding the size of the government spending multiplier in developed countries. Keynesians argue for government spending multipliers that exceed unity while neoclassical economists argue that government spending multipliers are small, i.e. below unity and possibly negative. See Ramey for a review (2011). Ramey and Zubairy (2014) find that there is no evidence that the government spending multiplier is state-dependent, i.e. they find no evidence that the government spending multiplier is larger during recessions or when monetary policy is at the zero lower bound.

The literature on the government spending multiplier in developing countries is not as developed as the literature for industrialized countries. Evidence based on instrumental variables regressions suggests that the government spending multiplier in developing countries is positive but below unity, see Kraay (2012, 2014). Kraay (2012) instruments government spending in developing countries with World Bank project-level disbursements. These disbursements, Kraay argues, are exogenous because they isolate the component of World Bank-financed government spending in a given year that is associated with past project approval decisions. For a sample of 29 primarily low-income countries where variation in government spending from this source is large relative to the size of the economy, Kraay finds that the government spending multiplier is around 0.5, thus positive but below zero. Extending the sample to 102 developing countries over the period 1970-2010, Kraay (2014) finds that the one-year spending multiplier is around 0.4

Financial Development

Aghion et al. (2010) study how credit constraints affect the impact that volatility has on economic growth. They develop a model where firms have the option to engage in short-term investment projects and long-term investment projects. Long-term investment projects differ from short-term investment projects in two important aspects: (i) long-term investment projects are characterized by a relatively less volatile long-term return; (ii) long-term investment projects have a high liquidity risk. In the absence of financial frictions, i.e. when markets are perfect, long-term investment is counter-cyclical (the cost of long-term investment is lower in recessions). When firms are faced with financing frictions, the higher liquidity risk associated with long-term investment implies that firms may only be able to start long-term investment projects during booms; i.e. financing frictions imply that long-term investment may be counter-cyclical.

A testable prediction of the Aghion et al. (2010) model is that in countries with underdeveloped financial markets, volatility has a more negative effect on growth. The mechanism in the Aghion et al. (2010) model is through a lower share of long-term investment projects (that have a more positive effect on productivity). For a panel of 21 OECD countries during 1960-2000, the authors examine the effect of commodity price volatility on economic growth. Long-term investment projects are measured by the ratio of structural investment to total private investment.

4 The index of institutional quality that is used in Frankel et al. is based on data provided by International Country Risk Guide on the investment profile, corruption, the rule of law, and bureaucratic quality.

Their measure of credit constraints is the ratio of private credit to GDP. Consistent with their model's predictions, the authors find that financial development mitigates the effect that volatility has on output growth.

Aghion et al. (2009) show that real exchange rate volatility has a more negative effect on economic growth in less financially developed countries. Based on a panel of 83 countries during 1960-2000, the authors find quantitatively large negative effects of exchange rate volatility on growth in countries with thin financial markets. To explain the empirical results, Aghion et al. build an open economy general equilibrium model with sticky wages and where firms face credit constraints. An exchange rate appreciation reduces firms' earnings and hence makes the credit constraint more likely to be binding. Exchange rate depreciation has the opposite effect; however, the presence of the credit constraint implies that the negative effects on output outweigh the positive effects. Consequently, the more severe credit constraints, the more negative is the effect of exchange rate volatility on growth.

Rodriguez (2014) examines how the impact of volatility on economic growth depends on financial development and fiscal policy cyclicality. Rodriguez finds that: (i) the negative impact of volatility on economic growth is exacerbated by financial underdevelopment; (ii) in financially underdeveloped economies countercyclical fiscal policy reduces the negative impact that volatility has on economic growth.

4. Empirical Results

4.1 Graphical Analysis

Before we discuss the results from the econometric analysis, it is useful to first illustrate graphically the relationship between volatility and economic growth. Figure 2 plots on the y-axis countries' average GDP per capita growth (over five years); on the x-axis is the standard deviation of the terms of trade growth rate (also computed over a five year period). We see from Panel A in Figure 2 that for a sample of 175 countries terms of trade volatility has a negative average effect on economic growth. The coefficient from a bivariate regression that corresponds to the plot in Panel A of Figure 2 is -0.31; this coefficient is significant at the 1 percent level (p-value 0.007). Panel B shows that a negative relationship between terms of trade volatility and economic growth is visible also within the sub-sample of OECS countries. The coefficient from a bivariate regression that corresponds to the plot in Panel B of Figure 2 is -0.36; thus it is quantitatively very close to the slope coefficient that emerges in Panel A. Statistically, we cannot reject the hypothesis that the slope coefficient in Panel A is equal to the slope coefficient in Panel B (t-value 0.91).

Figure 3 plots the unconditional relationship between economic growth and terms of trade volatility based on cross-country time-series variation in these variables. Panel A plots this relationship using all observations; Panel B excludes outliers. Both panels show that the cross-country time-series relationship between economic growth and terms of terms volatility is negative. The slope coefficient in Panel A is -0.24 and in Panel B it is -0.44. In Panel A the slope coefficient is significantly different from zero at the 5 percent level; in Panel B it is significantly different from zero at the 1 percent level.

In Figure 4 we plot the relationship between economic growth and terms of trade volatility based on cross-country time-series variation in these variables, conditional on country and time fixed effects. Panel A shows this relationship for all observations; Panel B restricts the observations to OECS countries. The scatter plots in Panels A and B of Figure 4 do not point to a systematic conditional relationship between economic growth and terms of trade volatility. Indeed, neither the

slope coefficient in Panel A nor the slope coefficient in Panel B is significantly different from zero at the conventional significance levels.

4.2 Regression Results

Table 4 reports estimates of the average effect that terms of trade volatility has on economic growth, based on a static panel data model. Column (1) reports unconditional estimates; column (2) adds to the regression time fixed effects; column (3) includes in the econometric model country fixed effects; and column (4) shows estimates based on an econometric model that includes both time and country fixed effects.

Model specifications that do not include country fixed effects, i.e. columns (1) and (2), show a significant negative average relationship between terms of trade volatility and economic growth. The estimated relationship should be interpreted as countries with lower terms of trade volatility having systematically higher GDP per capita growth. The coefficient of -0.34 suggests that the cross-country relationship between terms of trade volatility and economic growth is sizable. For example, the model predicts that economic growth is lower by around 0.6 percentage points per annum when taking a country from the 25th percentile (0.034) of terms of trade volatility to the 75th percentile (0.125).

Model specifications that include country fixed effects, i.e. columns (3) and (4), show that the relationship between terms of trade volatility and economic growth is quantitatively small and statistically insignificant. This suggests that a significant average effect of terms of trade volatility on economic growth is present in the cross-section of countries but not at the within-country level. Column (5) shows that the growth rate of the terms of trade has a significant positive within-country effect on economic growth. Hence, the first moment of terms of trade growth has a significant positive within-country effect on GDP per capita growth, on average; the effect of the second moment of terms of trade growth on GDP per capita growth is, on average, insignificant when focus is on within-country variation.

Table 5 shows that with regard to the average relationship between economic growth and terms of trade volatility, a dynamic model yields similar results to the static model that was estimated in Table 4. The dynamic panel model includes the lag of GDP per capita on the right-hand side of the estimating equation; a negative coefficient on lagged GDP per capita means that there is a convergence. In columns (1) and (2) we see that the coefficient on lagged GDP per capita is not significant. Hence, there is no cross-country convergence in GDP per capita; this is a well-known result (see, for example, Mankiw et al., 1992). Columns (3) and (4) show that there is significant convergence of GDP per capita to country-specific steady states. This can be seen from the negative coefficient on GDP per capita in the model specifications that include country fixed effects. The estimated coefficient on lagged GDP per capita in model specifications with country fixed effects suggests that the per annum convergence rate to country-specific steady state is around 3 percent.

In order to explore whether the average relationship between terms of trade volatility and economic growth is different for the OECS region the econometric model is augmented to include an interaction term between terms of trade volatility and a dummy that is unity for countries that belong to the OECS. Table 6 reports the estimation results from this augmented econometric model. The main finding is that there is no evidence that the average relationship between terms of trade volatility and economic growth is significantly different for the OECS region. This is true regardless of whether or not country fixed effects are included in the econometric model.[5]

5 Note that in columns (3)-(5) the model does not explicitly include the OECS dummy; this is because the country fixed effects

Table 7 reports estimates from an econometric model that includes an interaction term between terms of trade volatility and the GDP share of domestic credit to the private sector. Following the finance literature (La Porta et al., 1998), we use variation in the GDP share of domestic credit to the private sector that is predicted by British legal origin. As an additional variable we use distance to the equator in order to generate variation in the GDP share of domestic credit that is exogenous to economic growth.[6]

From columns (1) and (2) of Table 7 we see that the negative effect of terms of trade volatility is mediated by cross-country differences in financial development. The coefficient on terms trade volatility is around -0.7 and significant at the 1 percent level; the interaction term between terms of trade volatility and the GDP share of domestic credit to the private sector is around 1.6 and significant at the 5 percent level. These values imply that at median levels of financial development (GDP share of domestic credit to the private sector equal to 35 percent), terms of trade volatility has a significant negative effect on economic growth; however at higher values of financial development the effect is insignificant.[7]

Financial development has a positive effect on economic growth on average. This can be seen from the coefficient on the GDP share of domestic credit to the private sector. The relevant coefficient is around 0.2 and is significantly different from zero at the 1 percent level, see columns (1) and (2). This is in accordance with the finance literature where it is found that a greater GDP share of domestic credit to the private sector is on average growth enhancing. Sahay et al. (2015) present evidence that the growth effect of financial development may be non-linear. Indeed, we see from columns (1) and (2) of Appendix Table 1 that the relationship between GDP p.c. growth and the GDP share of domestic credit to the private sector is an inverted U-shaped. The average marginal effect of financial development on economic growth remains, however, positive and significant. Further, we have explored using the index of financial development developed in Sahay et al. (2015); this yields results similar to those presented in Table 7, see Appendix Table 2.[8]

The statistical significance of the mediating role of financial development with regard to the effect of terms of trade volatility on economic growth vanishes once country fixed effects are included in the econometric model. This is shown in columns (3)-(5) of Table 7. Although the coefficient on the interaction term remains positive, it is quantitatively smaller than in columns (1) and (2). The interaction term is, in columns (3)-(5), not significantly different from zero at the conventional significance levels. An F-test shows that the coefficients on the interaction term and on terms of trade volatility are jointly not significantly different from zero (p-value above 0.1). Hence, the role of financial development as a mediating factor vanishes when focus is on the within-country relationship between terms of trade volatility and economic growth.

Terms of trade volatility has a particularly large negative effect on economic growth in countries where fiscal policy is procyclical. This is shown in Tables 8 and 9. Table 8 reports estimates from an econometric model that includes an interaction term between the standard deviation of the terms of trade growth rate and the country-specific coefficients that measure the

---

fully take into account the average growth of OECS countries.

6 Both British legal origin and distance to the equator have a highly significant positive effect on the GDP share of domestic credit to the private sector. The F-statistic on the joint test that British legal origin and distance to the equator have no significant effect on the GDP share of domestic credit to the private sector is 34.77; British legal origin and distance to the equator explain about one-quarter of the variation in the sample of countries' average GDP shares of domestic credit to the private sector.

7 The interquartile range of the GDP share of domestic credit to the private sector predicted by British legal origin and distance to the equator is [0.25, 0.46]

8 The index of financial development developed in Sahay et al. (2015) measures depth (size and liquidity of markets), access (ability of individuals to access financial services), and efficiency of financial markets and institutions (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets).

response of government spending to the business cycle. Table 9 reports estimates from an econometric model that includes in addition to the interaction between terms of trade volatility and fiscal procyclicality an interaction term between terms of trade volatility and financial development. The coefficient on the interaction between terms of trade volatility is negative in all specifications. In Table 8, it is significantly different from zero in specifications that include country fixed effects (columns (3)-(5)). If country fixed effects are excluded, see columns (1) and (2), the interaction between terms of trade volatility and fiscal procyclicality is individually not significantly different from zero; however, the F-test rejects the null hypothesis that the interaction term is jointly equal to zero with the linear effect that terms of trade volatility has on economic growth. In Table 9, we see that the interaction between terms of trade volatility and fiscal procyclicality is significantly different from zero in all specifications.

The difference in effect of terms of trade volatility on economic growth across differences in countries' fiscal procylicality is sizable. For example, according to the estimates in column (5) of Table 9, for a country at the 25th percentile of fiscal procyclicality the implied marginal effect (standard error) of terms of trade volatility on economic growth is 0.04 (0.20); for a country at the 75th percentile the corresponding marginal effect (standard error) is -0.36 (0.21).

The estimates reported in Table 10 speak to the question of whether the mediating role that fiscal (counter-)cyclicality and financial development have with regard to the effect of terms of trade volatility on economic growth differ for the OECS region. Specifically, Table 10 reports estimates from an econometric model that includes, in addition to the variables in Table 9, two further interaction terms: one interaction term is constructed as the interaction between terms of trade volatility, fiscal procyclicality, and the OECS indicator; and another interaction term that is constructed as the interaction between terms of trade volatility, financial development, and the OECS indicator. The coefficient on the first (second) interaction term gives the difference in the mediating role of fiscal procyclicality (financial development) for the OECS region.

Table 10 shows that the coefficient on the interaction between terms of trade volatility, fiscal procyclicality, and the OECS indicator is significantly negative. Further, the interaction between terms of trade volatility and fiscal procyclicality is also negative and significantly different from zero. These results suggest that: (i) fiscal procyclicality exacerbates the negative growth effect of terms of trade volatility – for the OECS region and for other regions; and (ii) the mediating role of fiscal cyclicality is particularly pronounced in the OECS region. It is also noteworthy that the coefficient on the interaction between terms of trade volatility, financial development, and the OECS indicator is significantly positive. The interaction between terms of trade volatility and fiscal procyclicality is not significantly different from zero. The results in Table 10 thus suggest that counter-cyclical fiscal policy and financial development can mitigate the adverse growth effects of terms of trade volatility in the OECS region.

5. Conclusions and Directions for Policy

This paper has assessed the effects of terms of trade volatility on real GDP per capita growth in the OECS and other regions of the world. The average effect of terms of trade volatility on economic growth is sensitive to the inclusion of country fixed effects in the estimations. In model specifications that do not include country fixed effects, terms of trade volatility has a significant negative average effect on economic growth, but once country fixed effects are included in the model, the average effect of terms of trade volatility on economic growth is not significantly different from zero. When we introduced fiscal policy cyclicality in the model, the estimates showed that terms of trade volatility has significant adverse effects on economic growth in countries with a procyclical fiscal policy. This finding is robust to the inclusion of country fixed effects.

Financial development is a significant mediating factor with regard to the effect that terms of trade volatility has on economic growth in model specifications that do not include country fixed effects; the significance of this effect vanishes once country fixed effects are included in the model.

The paper also explored these relationships for the OECS region. A key conclusion from the research is that counter-cyclical fiscal policy and stable and well developed financial markets and institutions will have particularly high payoffs in terms of reducing the adverse growth effects of terms of trade volatility in the OECS region. One way of strengthening the region's ability to shift toward a more counter-cyclical fiscal policy stance would be through the adoption of fiscal rules. These are widely recognized as effective mechanisms that can increase the discipline and credibility of the fiscal authorities. Not only would fiscal rules help in making fiscal policy less pro-cyclical in the OECS, but they would also help the countries in the region to make significant progress in reigning in fiscal expenditures and implementing effective fiscal consolidation programs. The introduction of fiscal rules would need to be supported by expenditure reforms in the context of a medium term fiscal framework to signal the authorities' commitment to fiscal sustainability. Many countries in similar situations have benefitted from the parallel creation of an independent fiscal council that monitors macroeconomic projections underlying the budgeting process and the compliance with the fiscal rule (see Amo-Yartey et al., 2012).

One of the marked features of the Caribbean is the provision of financial services. Many of the countries of the region have experienced a rapid increase in financial sector linkages over the last three decades and the resulting greater financial integration has facilitated the flow of funds and financial intermediation, allowing the Caribbean countries to overcome scale constraints. As a consequence, the banking system in the region expanded rapidly in the 2000s with some countries experiencing a significant increase in their offshore banking sector. The rapid expansion of the sector coincided with the acceleration of credit right before the global financial crisis when economic growth rates in the region reached their highest levels of the decade in 2007. Following a significant credit expansion to the private sector for 2000-07, a sharp contraction in regional economic activity after the global financial crisis has put significant stress on banks' balance sheets and exposed vulnerabilities in the banking system. Our results suggest that measures aimed at increasing the depth, access, and efficiency of financial markets and institutions would have a beneficial effect on growth in the OECS. Earlier research suggests that such measures could take the form of financial sector reforms that could bolster and harmonize prudential regulations in the region in line with international best practices, the enhancement of financial sector supervision, and the establishment of deposit insurance and crisis resolution frameworks to strengthen financial sector stability and minimize the effects of any negative shocks (see Ogawa et al., 2013).

References

Aghion, P., G.M Angeletos, A. Banerjee, and K. Manova (2010). "Volatility and Growth: Credit Constraints and Productivity Enhancing Investment." *Journal of Monetary Economics* 57: 246-265.

Aghion, P., P. Bacchetta, R. Ranciere, and K. Rogoff (2009). "Exchange Rate Volatility and Productivity Growth: The Role of Financial Development." *Journal of Monetary Economics* 56: 494-513.

Aizenman, J. and N. Marion (1993). "Policy Uncertainty, Persistence and Growth." *Review of International Economics* 1: 145-163.

Alesina, A., F. Campante, and G. Tabellini (2008). "Why Is Fiscal Policy Often Procyclical?" *Journal of the European Economic Association* 5: 1006–1036

Amo-Yartey, C., M Narita, G.P. Nicholls, J.C. Okwuokei, A. Peter, and T. Turner-Jones (2012). "The Challenges of Fiscal Consolidation", *IMF Working Paper WP/12/276*, International Monetary Fund, Washington, D.C.

Athanasoulis, S. G., van Wincoop, E. (2000). "Growth uncertainty and risksharing", *Journal of Monetary Economics* 45:3, 477-505.

Bernanke, B. (1983). "Irreversibility, Uncertainty, and Cyclical Investment." *Quarterly Journal of Economics* 98: 85-106.

Bertola, G. (1994). "Flexibility, Investment, and Growth." *Journal of Monetary Economics* 34: 215-238.

Brueckner, M. and M. Gradstein (2013). "Exogenous Volatility and the Size of Government in Developing Countries." *Journal of Development Economics* 105: 254-266.

Brueckner, M. and M. Gradstein (2014). "Government Spending Cyclicality: Evidence from Transitory and Persistent Shocks in Developing Countries." *Journal of Development Economics* 111: 107-116.

Carneiro, F. and L. Garrido (2015). "New Evidence on the Cyclicality of Fiscal Policy." World Bank Policy Research Paper 7293.

Dixit, A. and R. Rafael (1994). "Switching Costs and Sectoral Adjustments in General Equilibrium with Uninsured Risk." *Journal of Economic Theory* 62: 48-69.

Easterly, W. and A. Kraay (2000). "Small States, Small Problems? Income, Growth, and Volatility in Small States." *World Development* 28: 2013-2027.

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

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

Frankel, J., C. Vegh, and G. Vuletin (2013). "On Graduation from Fiscal Procyclicality." *Journal of*

Development Economics 100: 32-47.

Gavin, M. and R. Perotti (1997) "Fiscal Policy in Latin America," NBER Macroeconomics Annual (Cambridge, Mass.: MIT Press, 1997), pp. 11-61.

Hnatkovska, V. and N. Loayza (2004). "Volatility and Growth". *World Bank Policy Research Working Paper No. 3184*.

Hercowitz, Z. and M. Strawczynski (2004). "Cyclical Ratcheting in Government Spending: Evidence from the OECD." *Review of Economics and Statistics* 86: 353-361.

IMF (2015). "Macroeconomic Developments and Selected Issues in Small Developing States", International Monetary Fund, Washington, D.C.

Kaminski, G., C. Reinhart, and C. Vegh (2004). "When It Rains It Pours: Procyclical Capital Flows and Macroeconomic Policies." NBER Macroeconomic Annual 2004, edited by Mark Gertler and Kenneth Rogoff. MIT Press.

Kouame, A.T and M.I. Reyes (2015). "Before and After the Global Financial Crisis: Evaluating the Caribbean's Synchronization with Global Engines of Growth". World Bank, mimeo.

Kraay, A. (2012). "How large is the Government Spending Multiplier? Evidence from World Bank Lending." *Quarterly Journal of Economic*s 127: 829-887.

Kraay, A. (2014). "Government Spending Multipliers in Developing Countries: Evidence from Lending by Official Creditors." *American Economic Journal: Macroeconomics* 6: 170-208.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny (1998). "Law and Finance." J*ournal of Political Economy* 106: 1113–1155.

Lane, P. (2003). "The Cyclical Behavior of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87: 1661–1675.

Lucas, R. (1987). Models of business cycles. Oxford: Blackwell.

Mankiw, G., D. Romer, and D. Weil (1992). "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107: 407-437.

Ogawa, S., J. Park, D. Singh, and N. Thacker (2013). "Financial Interconnectedness and Financial Sector Reforms in the Caribbean". *IMF Working Paper WP/13/175*, International Monetary Fund, Washington, D.C.

Pindyck, R. (1991). "Irreversibility, Uncertainty, and Investment." *Journal of Economic Literature* 29: 1110-48.

Ramey, G. and V. Ramey (1995). "Cross-Country Evidence on the Link Between Volatility and Growth." *American Economic Review* 85 1138-1151.

Ramey, V. (2011). "Can Government Purchases Stimulate the Economy? *Journal of Economic Literature* 49: 673-685.

Ramey, V. and S. Zubairy (2014). "Government Spending Multipliers During Good and Bad

Times." mimeo.

Rodrik, D. (1998). "Why Do More Open Economies Have Bigger Governments." *Journal of Political Economy* 106: 997-1032.

Rodriguez, A. (2014). "Financial development, fiscal policy and volatility: Their effects on growth." *Journal of International Trade and Economic Development* 23: 223-266.

Sahay, R., M. Čihák, P. N'Diaye, A. Barajas, R. Bi, D. Ayala, Y. Gao, A. Kyobe, L. Nguyen, C. Saborowski, K. Svirydzenka, and Seyed Reza Yousefi (2015). "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." IMF Discussion Note SD 15/08.

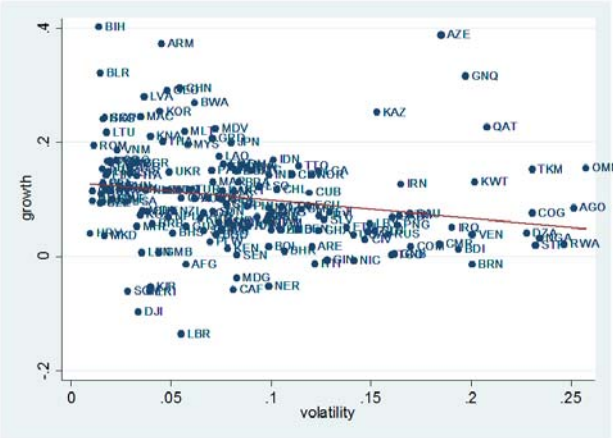
Tumbarello, P., E. Cabezon, and Y. Wu (2014). "Are the Asia and Pacific Small States Different from Other Small States?" IMF Working Paper 13/123.

Vegh, C. And E. Talvi (2002). "Tax base variability and procyclical fiscal policy in developing countries. *Journal of Development Economics* 78: 156-190.

Woo, J. (2011). "Growth, income distribution, and fiscal policy volatility. *Journal of Development Economics* 96: 289-313.

Figure 2. Economic Growth and Volatility
(Cross-Country Relationship)

Panel A: All Countries



Panel B: OECS Only

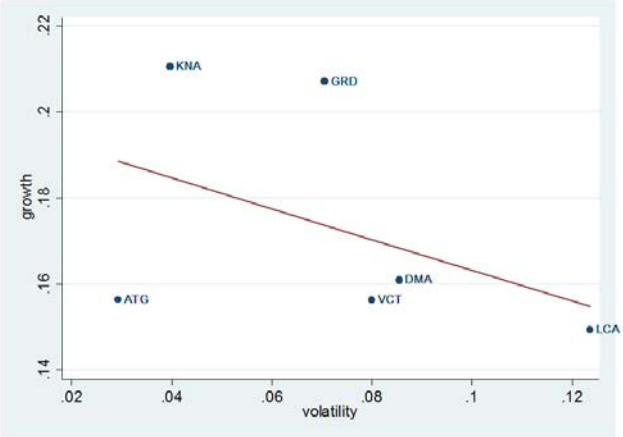
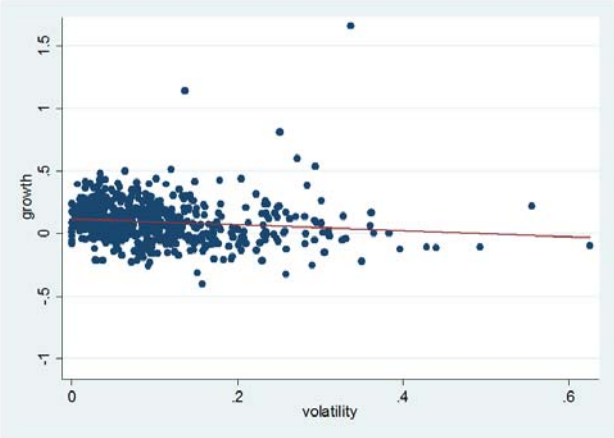


Figure 3. Economic Growth and Volatility
(Unconditional Cross-Country Time-Series Relationship)

Panel A: All Observations



Panel B: Excluding Outliers

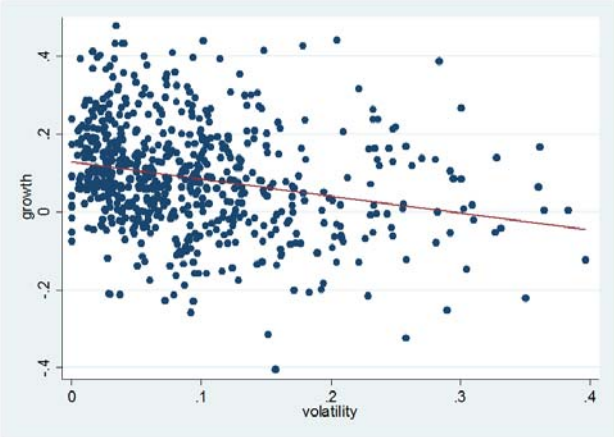
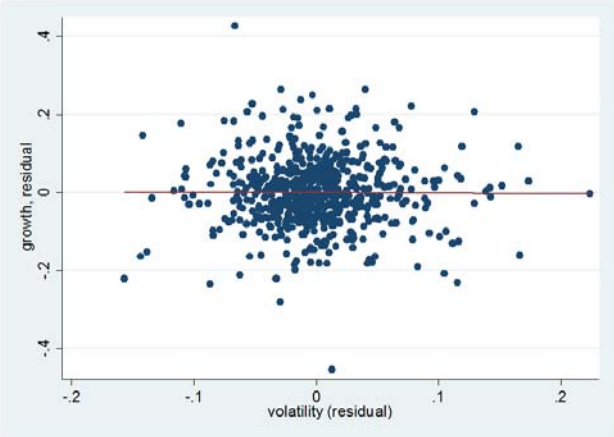


Figure 4. Economic Growth and Volatility
(Cross-Country Time-Series Relationship, Conditional on Country and Time Fixed Effects)

Panel A. All Observations



Panel B. OECS Only

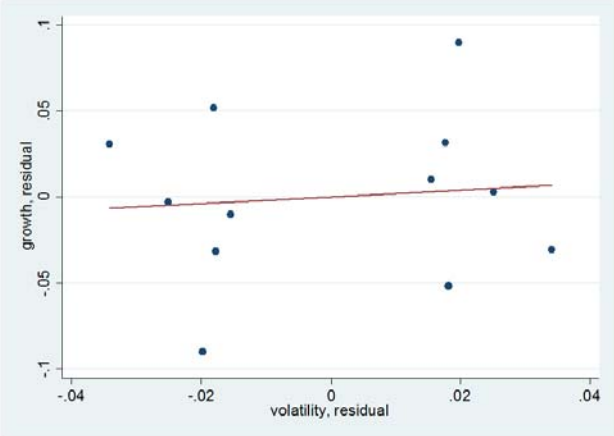


Table 1. Description of Variables

Variable	Description	Source
$Growth_{it}$	The change in the natural logarithm of real PPP GDP per capita between period t and t-1.	PWT 7.1
$ln(GDP)_{t-1}$	The natural logarithm of real PPP GDP per capita in period t-1.	PWT 7.1
FD	The ratio of domestic credit to the private sector divided by GDP. Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	WDI (2013)
ProCyclicality	The response of government spending to cylical variation in GDP.	Frankel et al. (2013); PWT 7.1
Volatility	The standard deviation of the change in the natural logarithm of the net barter terms of trade index. The net barter terms of trade index is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000.	WDI (2013)

Table 2. Bi-variate Correlations

	$Growth_{it}$	$ln(GDP)_{t-1}$	*FD*	*ProCyclicality*	*Volatility*
$Growth_{it}$	1				
$ln(GDP)_{t-1}$	0.12	1			
FD	0.11	0.65	1		
ProCyclicality	-0.09	-0.35	-0.39	1	
Volatility	-0.13	-0.11	-0.33	0.13	1

Table 3. Summary Statistics

	Mean	Sdv	Observations
$Growth_{it}$	0.10	0.16	632
$ln(GDP)_{t-1}$	8.18	1.25	632
FD	0.41	0.41	632
ProCyclicality	0.34	0.33	632
Volatility	0.09	0.08	632

Table 4. Economic Growth and Volatility
(Average Effect, Static Model)

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.44***	-0.34***	-0.10	-0.01	-0.05
	(0.08)	(0.08)	(0.10)	(0.09)	(0.09)
Terms of Trade Growth					0.11***
					(0.03)
R-Squared	0.06	0.15	0.06	0.12	0.15
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 5. Economic Growth and Volatility
(Average Effect, Dynamic Model)

Dependent Variable is:	GDP per capita Growth					
	(1)	(2)	(3)	(4)	(5)	(6)
	LS	LS	LS	LS	LS	SYS-GMM
Terms of Trade Volatility	-0.39***	-0.33***	-0.10	0.04	0.00	-0.02
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.07)
Terms of Trade Growth					0.10***	0.08***
					(0.03)	(0.02)
Lagged GDP per capita	0.01**	0.00	-0.05	-0.15***	-0.15***	-0.17
	(0.01)	(0.01)	(0.04)	(0.05)	(0.05)	(0.11)
Country Fixed Effects	No	No	Yes	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 6. Economic Growth and Volatility
(Is the Effect Different in the OECS?)

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.44***	-0.34***	-0.10	-0.01	-0.05
	(0.08)	(0.08)	(0.10)	(0.09)	(0.09)
Terms of Trade Volatility*OECS	0.48	0.34	0.19	-0.05	-0.16
	(0.39)	(0.32)	(0.73)	(0.37)	(0.42)
OECS	-0.02	-0.04*			
	(0.03)	(0.02)			
Terms of Trade Growth					0.11***
					(0.03)
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 7. Economic Growth, Financial Development, and Volatility

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility [A]	-0.68***	-0.71***	-0.33	-0.30	-0.38*
	(0.17)	(0.16)	(0.25)	(0.20)	(0.19)
Terms of Trade Volatility*Credit-to-GDP ratio [B]	1.60**	2.17***	0.69	1.28	0.89
	(0.63)	(0.58)	(0.96)	(0.89)	(0.66)
Credit-to-GDP ratio	0.26***	0.23***			
	(0.06)	(0.06)			
Terms of Trade Growth					0.08***
					(0.02)
Test [A]=[B]=0, p-value	0.00	0.00	0.16	0.33	0.12
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 8. Economic Growth, Fiscal Procyclicality, and Volatility

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility [A]	-0.46***	-0.38***	-0.12	-0.02	-0.03
	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)
Terms of Trade Volatility*Fiscal Procyclicality [B]	-0.31	-0.32	-0.75**	-0.68**	-0.66**
	(0.28)	(0.23)	(0.30)	(0.27)	(0.28)
Fiscal Procyclicality	-0.00	0.01			
	(0.03)	(0.03)			
Terms of Trade Growth					0.10***
					(0.03)
Test [A]=[B]=0, p-value	0.00	0.00	0.04	0.04	0.06
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 9. Economic Growth, Financial Development, Fiscal Procyclicality, and Volatility

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.46**	-0.37**	-0.38*	-0.06	0.05
	(0.18)	(0.18)	(0.21)	(0.21)	(0.22)
Terms of Trade Volatility*Fiscal Procyclicality	-0.52*	-0.41*	-0.70**	-0.67**	-0.67**
	(0.24)	(0.21)	(0.29)	(0.27)	(0.27)
Terms of Trade Volatility*Credit-to-GDP ratio	0.55	0.37	0.98	0.16	-0.30
	(0.56)	(0.51)	(0.65)	(0.61)	(0.66)
Fiscal Procyclicality	0.04	0.01			
	(0.04)	(0.01)			
Credit-to-GDP ratio	0.27***	0.20***			
	(0.05)	(0.05)			
Terms of Trade Growth					0.10***
					(0.03)
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Table 10. Economic Growth, Financial Development, Fiscal Procyclicality, and Volatility: Heterogeneity OECS

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.46**	-0.37**	-0.38*	-0.07	-0.03
	(0.19)	(0.18)	(0.21)	(0.20)	(0.22)
Terms of Trade Volatility*Fiscal Procyclicality	-0.43*	-0.42**	-0.70**	-0.67**	-0.60**
	(0.25)	(0.21)	(0.29)	(0.27)	(0.27)
Terms of Trade Volatility*Fiscal Procyclicality*OECS	-1.95**	-2.22***	-72.01*	-78.00***	-73.01***
	(0.77)	(0.64)	(42.04)	(15.37)	(26.31)
Terms of Trade Volatility*Credit-to-GDP ratio	0.55	0.36	0.99	0.17	-0.08
	(0.56)	(0.51)	(0.65)	(0.61)	(0.64)
Terms of Trade Volatility*Credit-to-GDP ratio *OECS	1.76**	2.07***	9.07	15.08***	12.66*
	(0.86)	(0.62)	(10.56)	(4.05)	(6.73)
Fiscal Procyclicality	0.04	0.04			
	(0.04)	(0.03)			
Credit-to-GDP ratio	0.27***	0.20***			
	(0.06)	(0.06)			
OECS	0.03*	0.01			
	(0.01)	(0.01)			
Terms of Trade Growth					0.12***
					(0.03)
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Appendix Table 1. Non-Linear Effects of GDP Share of Domestic Credit to Private Sector

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.20	-0.19	-0.88	-0.96**	-1.05**
	(0.17)	(0.35)	(0.60)	(0.45)	(0.46)
Terms of Trade Volatility*Credit-to-GDP ratio	-1.29	-0.82	5.05	6.51**	6.52*
	(2.74)	(2.62)	(4.05)	(3.22)	(3.56)
Terms of Trade Volatility*Credit-to-GDP ratio squared	3.63	3.43	-7.61	-9.15*	-9.17*
	(4.45)	(4.45)	(5.97)	(4.77)	(5.59)
Credit-to-GDP ratio	0.69**	0.79***			
	(0.28)	(0.26)			
Credit-to-GDP ratio squared	-0.59	-0.82**			
	(0.40)	(0.40)			
	(0.06)	(0.36)			
Terms of Trade Growth					0.08***
					(0.02)
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.

Appendix Table 2. Financial Development Index from Sahay et al. (2015)

Dependent Variable is:	GDP per capita Growth				
	(1)	(2)	(3)	(4)	(5)
	LS	LS	LS	LS	LS
Terms of Trade Volatility	-0.70***	-0.74***	-0.32	-0.30	-0.21
	(0.19)	(0.17)	(0.27)	(0.22)	(0.23)
Terms of Trade Volatility*FD Index	2.42**	3.29***	0.93	1.81	1.07
	(0.98)	(0.93)	(1.44)	(1.34)	(1.31)
FD Index	0.42***	0.36***			
	(0.09)	(0.26)			
Terms of Trade Growth					0.10***
					(0.03)
Country Fixed Effects	No	No	Yes	Yes	Yes
Time Fixed Effects	No	Yes	No	Yes	Yes

Note: The method of estimation is least squares. Huber robust standard errors (shown in parentheses) are clustered at the country level. *Significantly different from zero at the 10 percent significance level, ** 5 percent significance level, *** 1 percent significance level.