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Fiscal Policy Multipliers in Small States

by Ali Alichi, Ippei Shibata, and Kadir Tanyeri

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Abstract

Government debt in many small states has risen beyond sustainable levels and some governments are considering fiscal consolidation. This paper estimates fiscal policy multipliers for small states using two distinct models: an empirical forecast error model with data from 23 small states across the world; and a Dynamic Stochastic General Equilibrium (DSGE) model calibrated to a hypothetical small state's economy. The results suggest that fiscal policy using government current primary spending is ineffective, but using government investment is very potent in small states in affecting the level of their GDP over the medium term. These results are robust to different model specifications and characteristics of small states. Inability to affect GDP using current primary spending could be frustrating for policymakers when an expansionary policy is needed, but encouraging at the current juncture when many governments are considering fiscal consolidation. For the short term, however, multipliers for government current primary spending are larger and affected by imports as share of GDP, level of government debt, and position of the economy in the business cycle, among other factors.

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Contents

TABLES

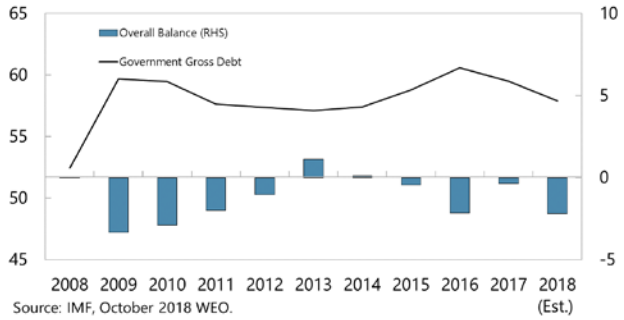
APPENDIX

APPENDIX TABLES

I. INTRODUCTION

Average government debt[2] of small states[3] rose from about 50 percent of GDP before the global financial crisis to about 60 percent of GDP in 2019 (Figure 1), partly due to expansionary fiscal policy responses, but also because of debt valuation and GDP changes. While debt dynamics differ across small states, many have seen an increase in government debt over the past decade (Figure 2).

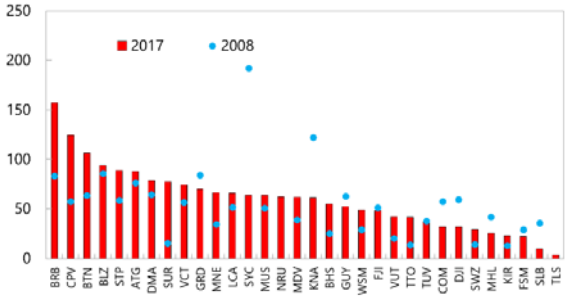
Figure 1. Small States*: Government Debt and Overall Fiscal Balance
(Percent of GDP, average)



Source: IMF, October 2018 WEO.
*All small states as per IMF definition. Due to lack of data, government debt series excludes Palau and Timor Leste and overall fiscal balance series excludes Bhutan and Micronesia.

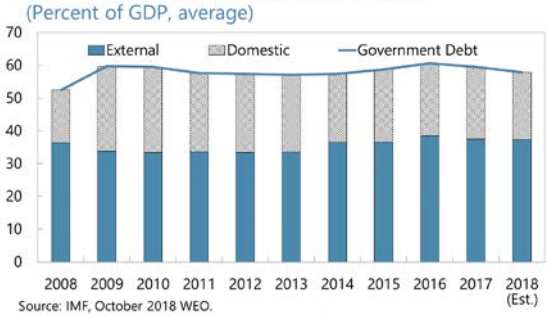
The composition of government debt in many small states shows that both domestic and external debt rose during this period, with the latter contributing more to the rise in the overall debt. (Figure 3).

Figure 2. Small States*: Government Debt
(Percent of GDP)



Source: IMF, 2018 October WEO.
*All small states as per IMF definition. Due to lack of data, government debt series excludes Palau and Timor Leste. See Table A1 for full names of countries.

Figure 3. Small States*: Composition of Government Debt: Domestic and External
(Percent of GDP, average)



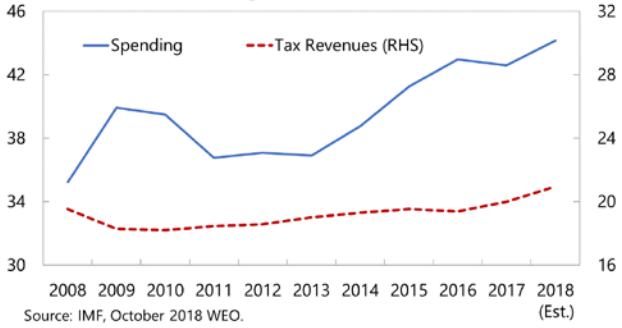
Source: IMF, October 2018 WEO.
*All small states as per IMF definition. Due to lack of data, government debt series excludes Palau and Timor Leste.

[2] Government debt throughout this paper refers to general government debt (World Economic Outlook code GGXWDG_GDP.A).

[3] The definition of small states in this paper follows IMF (2017). These include 34 developing countries with populations of fewer than 1.5 million. This definition is slightly different from the World Bank's definition of small states. The World Bank's definition includes 50 countries that have a population of 1.5 million or less, or are members of the Small States Forum—a high-level meeting of policymakers hosted by the World Bank during the IMF-WB Annual Meeting (WB, 2016).

Focusing on fiscal balances, one can see that higher deficits were the result of both higher government expenditures and a minor increase in tax revenues during this period (Figure 4). As a percent of GDP, average government expenditures sharply increased after the 2007-09 global financial crisis, mostly as a result of governments' efforts to boost their economies. Since then, government spending in small states has continued to rise in recent years in response to various exogenous shocks, including commodity prices, natural disasters, and exchange rate depreciations.

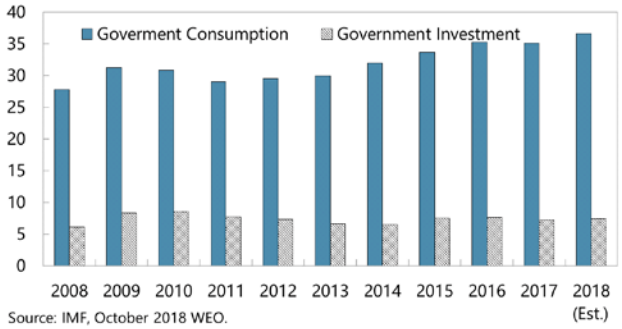
Figure 4. Small States*: Government Spendings and Tax Revenues
(Percent of GDP, average)



Source: IMF, October 2018 WEO.
*All small states as per IMF definition. Due to lack of data, tax revenues series excludes Fiji, Palau, Bhutan, and Samoa.

Figure 5 shows that the increase in government spending has been mostly in current spending, while capital spending has remained modest. In other words, government spending has led to an increase in government debt, but without much investment content, which could have had lasting positive effects on the economy.

Figure 5. Small States*: Government Spending: Consumption vs Investment
(Percent of GDP, average)



Source: IMF, October 2018 WEO.
*All small states as per IMF definition. Due to lack of data, government investment and consumption series exclude Fiji, Palau, Tuvalu, Bhutan, Kiribati, Samoa and Solomon Islands.

For small states with large debt levels, fiscal consolidation is necessary to put public finances on a sustainable path and open fiscal space to confront future adverse economic shocks. However, the first question that policymakers usually ask when considering fiscal consolidation is how it would affect GDP growth? This paper provides an answer to this question by estimating fiscal policy multipliers—the impact of fiscal policy on GDP—for small states.

Small states are characterized by small populations, narrow production bases, limited opportunities for diversification, and limited economic scales. Some struggle with geographic remoteness and are also prone to climate change and natural disasters. A small population base implies low demand for services and limited interest from international investors in the country. Fiscal policy in small states could have lower effectiveness in boosting GDP than other countries because small states have higher import shares of GDP. Higher levels of government debt as share of GDP in small states also results in higher risk premia. These

unique characteristics of small states point to possibly lower fiscal multipliers than those for advanced economies and larger developing economies. Empirical evidence on larger countries point to these conjectures. For instance, findings by Ilzetzki et al (2013) include (i) fiscal multipliers are larger in industrial than in developing countries, (ii) fiscal multipliers in open economies are smaller than in closed economies, and (iii) fiscal multipliers in high-debt countries are negative.

The contribution of this paper is to estimate fiscal policy multipliers in small states using two distinct models: an empirical model, which we argue is more reliable than prior ones, as well as a DSGE-type (GIMF) model, which to the best of our knowledge has not been applied to small states before. The empirical model uses the forecast error method and a local projection method, as in Jorda (2005) to estimate a causal impact of a change in government current primary spending[4] or government investment[5] on GDP—namely, fiscal multipliers. The DSGE model in this paper uses the IMF's Global Integrated Monetary and Fiscal (GIMF) model calibrated to a hypothetical small open economy.

Results from both the empirical and GIMF models suggest that medium-term multipliers of government current primary spending (on the level of GDP) are around zero, while those of government investment are closer to 1. Medium-term tax multipliers are estimated at a fraction of the medium-term government investment multipliers. As for the short term, however, government current primary spending multipliers are estimated to be larger. The impact government current primary spending multiplier is estimated at about 0.4 using our empirical model, and about 0.6 using our GIMF model. Sensitivity analysis shows that GIMF multipliers could be smaller or larger depending on many factors, including imports as share of GDP, level of government debt, and where the economy is in the business cycle.

Our findings that (i) current primary spending multipliers are small in small states and (ii) government investment multipliers are relatively large, are both in line with the existing literature. For example, Gonzalez-Garcia and others (2013), Guy and Belgrave (2012), and Narita (2014) found similar results for a group of Caribbean countries using a structural vector autoregression (SVAR) and a dynamic panel framework. There is also a vast literature

[4] Due to lack of data, we are not able to separate government consumption and transfers for most small states in our sample. Therefore, in our empirical work (only), we use the concept of government current primary spending, which is total government spending minus investment and interest expenses. This, in other words is government consumption plus transfers. In our GIMF simulations we separate government consumption and transfers.

[5] We do not estimate tax multipliers in our empirical model as tax revenues are known to be highly endogenous to the conditions of the economy and even our forecast error methods cannot account for the endogeneity issues in tax revenues (Furceri et al, 2018).

on estimating fiscal multipliers for larger countries. While there are lots of similarities in methodologies, the results of this strand of literature are of limited use for small states, given the aforementioned characteristics of small states.

Our empirical approach has several advantages over previous studies that estimated fiscal multipliers for small states. First, our sample is larger and covers 23 small states around the world (34 small states based on World Bank's definition for robustness). Second, we use a local projection method as in Jorda (2005) to allow for non-restrictive responses of output to fiscal policy in small states. Third, we use a novel forecast error approach to estimating fiscal multipliers from annual data and as a result avoid interpolating quarterly data from annual data. While this methodology relies on a similar timing assumption as in SVAR estimation on quarterly data (e.g. Blanchard and Perotti (2002)), the forecast error mitigates the foresight problem in which agents respond by changing their consumption and investment behavior before the actual realizations of changes in government spending. Previous studies that estimated fiscal multipliers for small states using a SVAR method did not account for foresight problem.[6] Moreover, we augment the simple local projection method to avoid bias by including future fiscal shocks as pointed out by Teulings and Zubanov (2014).

The rest of the paper is organized as follows. Section II reviews the empirical strategy employed in this study. Section III describes the data, and Section IV presents empirical results. Section V describes the GIMF model used in this study, and Section VI presents the results from the GIMF model. Section VII compares the results from this study with other studies. Section VIII concludes.

II. EMPIRICAL MODEL—THE FORECAST ERROR APPROACH

Our empirical model is what is generally referred to as the forecast error approach. The idea behind this approach is that the forecast captures anticipations of agents in the model regarding fiscal actions and the deviation of the reality from that forecast—the forecast error—plausibly captures an unanticipated increase/decrease in government spending. Our forecast error approach employs the local projection method following Jorda (2005) and in a similar spirit to Auerbach and Gorodnichenko (2013).

The growth impacts of fiscal shocks are estimated using the following baseline specification:

$$y_{j,t+h,t-1} = \alpha_j^h + \gamma_t^h + \beta_I^h \, FShock_{j,t}^I + \beta_C^h \, FShock_{j,t}^C + \delta^h \, X_{j,t} + \epsilon_{I,t}^h \qquad \text{--- (1)}$$

[6] Forni and Gambetti (2016) overcome such problem within a SVAR framework by including forecast variables for U.S. data. However, none of previous studies on small states have addressed such foresight problems.

where,

- $y_{j,t+h,t-1}$ is GDP growth rate between year *t-1* and $t+h$ for country *j*;
- α_j is a country fixed effect capturing factors that are time-invariant and country-specific;
- γ_t is the time fixed effect that captures a global factor (e.g. commodity price movement) that affects country's growth each year;
- $FShock_{j,t}^{k}$ is the unanticipated fiscal variable shock as a percent of GDP of type $k \in \{I, C\}$ where *I* stands for government investment and *C* stands for government current primary spending;
- $X_{i,t}$ is the set of control variables including two lags of GDP growth rate and the fiscal variable (in levels) as a percent of GDP, and the cumulative future fiscal variable shocks between year $t+1$ and $t+h$ ($\sum_{l=1}^{h} FShock_{j,t+l}^{k}$ for type $k \in \{I, C\}$) and a natural disaster variable that captures the damages due to natural disaster as a percent of GDP.[7]

We include the cumulative future fiscal variable shocks occurring within the forecast horizon between *t* and $t+h$, $\sum_{l=1}^{h} FShock_{j,t+l}^{k}$,to avoid biases in a baseline local projection estimation that ignores shocks between *t* and $t+h$ as pointed out by Teulings and Zubanov (2014).

We do not use logs of variables (e.g. log of real GDP and fiscal variables) but instead scale variables by previous year's GDP so that estimated coefficients are themselves fiscal multipliers. Previous literature also found that fiscal multipliers estimated from using logs of variables tend to be higher than using rescaled variables (Owyang et al, 2013).

Identification Using WEO Vintage Data

We use the IMF's October publication of the *World Economic Outlook* (WEO) vintage data following Furceri and Li (2017). Forecast errors are constructed from government investment and government current primary spending as a percent of GDP. We calculate the shock of the fiscal variable, $FShock_{j,t}^{k}$, as the difference between *actual* and *forecast*:

[7] In our baseline specification, the fiscal variable is divided by previous year's GDP. However, results are robust to a specification in which the fiscal variables are divided by trend GDP.

$$FShock_{j,t}^{k} = f_{j,t}^{k,Actual} - f_{j,t}^{k,Forecast} \quad \text{--- (2)}$$

where $f_{j,t}^{k} \equiv \frac{F_{j,t}^{k}}{Y_{j,t-1}}$ is a fiscal variable, $F_{j,t}^{k}$, of type $k \in \{I, C\}$ as percent of previous year's GDP, $Y_{j,t-1}$, $f_{j,t}^{k,Actual}$ is calculated based on the October WEO of the following year; forecast of fiscal variable as percent of GDP, $f_{j,t}^{k,Forecast}$ is calculated based on the October WEO of that year. For instance, a *forecast* of fiscal spending for year 2015 is taken from the fiscal variable from October WEO 2015 and the *actual* fiscal variable is taken from the fiscal variable from October WEO 2016, for year 2015.[8]

The unanticipated fiscal variable is the difference between the actual and the forecast fiscal variable based on the information set as of October of the year. This mitigates the anticipation effect in which agents in the economy change their consumption and investment behavior based on the news about future fiscal policies for the rest of the year. This is because whatever agents in the economy have anticipated given the information set as of October is already embedded in the forecast of fiscal variable.

By using the forecast of fiscal variable in October of the same year, we also minimize endogenous response of fiscal policy to the state of the economy in annual data. While government could still change government current primary spending or investment in response to the state of the economy, our framework imposes the same assumption as in Blanchard and Perotti (2012) in that fiscal variables do not correspond contemporaneously to the state of the economy within the final quarter of the year (i.e. between October and December). As policymakers in many small states generally have access to fewer timely indicators to learn the state of the economy than in advanced economies, this timing assumption can be more plausible in small states than in advanced countries.

There is also a remaining potential endogeneity in our framework. Government spending in many small states could respond to the state of the economy, for instance, by cutting spending in response to lower tax revenues arising from slow growth. As a robustness check, we control for tax revenues and our results are robust.

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[8] This formulation of fiscal shock, FShock, is the difference in the level of fiscal variable divided by the previous year's GDP and is analogous to the one in Furceri and Li (2017) because $FShock_{j,t}^{k} = \left(f_{j,t}^{k,Actual} - f_{j,t}^{k,Forecast}\right) = \frac{F_{j,t}^{k,Actual}}{Y_{j,t-1}} - \frac{F_{j,t}^{k,Forecast}}{Y_{j,t-1}} = \frac{F_{j,t}^{k,Actual} - F_{j,t-1}^{k}}{Y_{j,t-1}} - \frac{F_{j,t}^{k,Forecast} - F_{j,t-1}^{k}}{Y_{j,t-1}}$

$= \frac{\Delta F_{j,t}^{k,Actual}}{Y_{j,t-1}} - \frac{\Delta F_{j,t}^{k,Forecast}}{Y_{j,t-1}}$.

III. DATA

We use annual data for 1990-2017 from the IMF's *World Economic Outlook* (WEO) database. For our main empirical analysis, our small state sample is as per the IMF's definition of small states (34 countries). We further limit our sample by excluding some countries based on (i) insufficient data, (ii) unreliable data (e.g. negative government investment as percent of GDP),[9] or (iii) extremely large variance in government investment shocks, government current primary spending shocks, or GDP growth rates.[10] These restrictions bring down the number of small states for our empirical work to 23, consisting of 5 countries from Africa, 6 from Asia, 11 from the Caribbean, and 1 from Europe (Table A1).

For real GDP growth, we use the October 2018 WEO to calculate the real GDP growth rate based on real GDP series *ngdp_r*. This is to avoid any possible measurement errors that may arise from data revision and updates of compilation methodology. We use the *vintage* IMF WEO database to calculate relevant variables. Government investment uses series *gcek* prior to 2010 and *ggaan_t* after 2010. Government current primary spending uses current expenditure series *gcec* prior to 2000 and total general government expense *gge* after subtracting interest payment, *ggei*, thereafter.[11] Natural disaster damage data is obtained from EM-DAT.

IV. EMPIRICAL RESULTS

Baseline Results

The empirical results show that government current primary spending has a small but positive impact on growth only in the short term but almost no effect on growth over the medium term. Figure 6 plots the baseline impacts of government current primary spending on

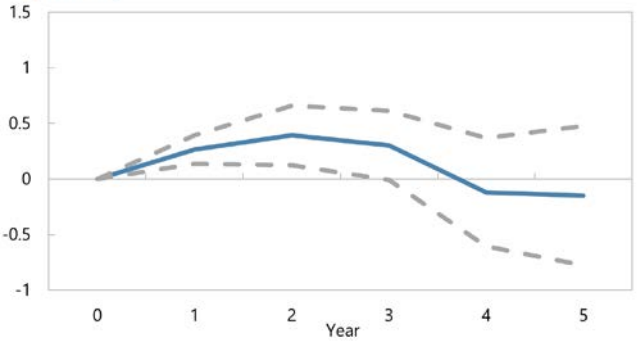
[9] Based on elimination criteria (i)-(ii), Maldives, Nauru, Palau, St Lucia, and Timor-Leste were excluded from the sample.

[10] For elimination criterion (iii), non-Caribbean countries were dropped from the sample if a) standard deviation of government investment is above 15 percent of GDP or b) standard deviation of government consumption is higher than 20 percent of GDP. For Caribbean countries, observations were eliminated from the regression sample by putting outlier dummies if government investment shock is outside (-10,10) percent of GDP or government consumption shock is outside (-15,20) percent of GDP. These thresholds are calculated to include 98th percentile of respective variables. These outliers could reflect measurement errors and possible data revisions of government statistics or of the WEOs. Based on elimination criterion (iii), Djibouti, Kiribati, Samoa, Sao Tome and Principe, Tuvalu, and Vanuatu were eliminated additionally. The paper's results are robust to large variations in these thresholds (not reported).

[11] As mentioned earlier, government current primary spending is equal to government consumption plus transfers.

GDP from our equation (1). An increase in government current primary spending by 1 percent of GDP would increase output by about 0.3 percent on impact (year 1), which peaks in the second year at around 0.4. Over time, the impact of an increase in government current primary spending on the level of GDP decreases to zero. In other words, a dollar spent on government current primary spending will increase GDP by around 30 cents on impact and 40 cents in the second year, but does not have a prolonged impact. Thus, government current primary spending has only a small and short-term impact on GDP.

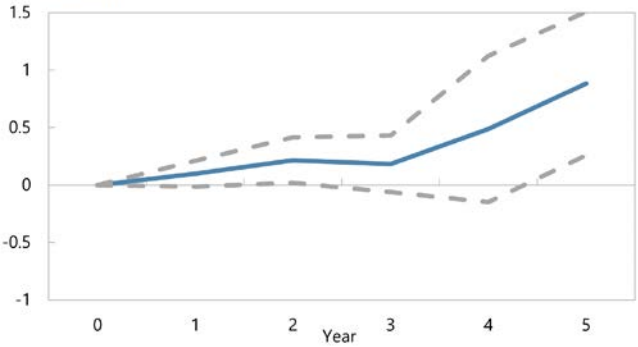
Figure 6. Response of GDP to +1 percent of GDP Shock in Government Consumption
(Percent)



Source: Authors' Estimations. -- 90% confidence interval

On the other hand, government investment has a small effect on GDP at impact but a relatively large and positive medium-term effect on GDP (Figure 7). In the first two years, government investment has a small impact on GDP but increases to around 0.2 percent of GDP in the second year and to around 0.9 percent in the fourth year. In other words, a dollar spent on investment increases GDP by 20 cents in the second year and by about 90 cents by the fourth year.[12]

Figure 7. Response of GDP to +1 percent of GDP Shock in Government Investment
(Percent)



Source: Authors' Estimations. -- 90% confidence interval

Expansion vs Consolidation

In this section, we investigate whether government spending has asymmetric effects on growth depending on episodes of fiscal consolidation or fiscal expansion. In the local projection framework, this can be easily done by separating fiscal shocks into positive

[12] Note that in our exercise, we do not calculate *cumulative multipliers* as in Ramey and Zubairy (2018) by dividing the total changes in output by the total change in the fiscal variable. We instead control future fiscal shocks in our regression and estimate the impact on GDP from the initial fiscal shock. Our fiscal multipliers are defined on the level of GDP in each period. We see this definition as a more straightforward one for cumulative effects. We follow this definition throughout the paper, both in our empirical and GIMF models.

(expansionary) and negative (consolidation) episodes. We extend the specification in equation (1) as follows:

$$y_{j,t+h,t-1} = \alpha_j^h + \gamma_t^h + \beta_I^{h,Exp} FShock_{j,t}^{I,Exp} + \beta_C^{h,Exp} FShock_{j,t}^{C,Exp} + \beta_I^{h,Cons} FShock_{j,t}^{I,Cons} + \beta_C^{h,Cons} FShock_{j,t}^{C,Cons} + \delta^h X_{j,t} + \epsilon_{I,t}^h \quad \text{--- (3)}$$

where, $FShock_{j,t}^{k,Exp}$ contains only positive (expansionary) fiscal shocks as in equation (2) and $FShock_{j,t}^{k,Cons}$ contains only negative (consolidation) fiscal shocks and set to be zero otherwise.[13]

We find that the government current primary spending multiplier for expansion episodes is smaller than that for consolidation episodes (Columns 2 and 3 in Table 1). This is consistent with the idea that when debt levels are high, increases in government current primary spending may signal that fiscal tightening will happen in the near future, thus constraining the impact for fiscal expansion (Ilzetzki et al, 2013). When government increases current primary spending, it does not boost GDP by much neither at impact nor in the medium term. On the other hand, when government reduces government current primary spending, it has a negative impact of around 0.4 percent on GDP at impact and 0.8 at the peak after one year.

Recession vs Boom Multipliers

Similarly, we can also investigate whether fiscal multipliers are larger in recessions than booms. We follow Auerbach and Gorodnichenko (2013) and modify equation (1) as follows:

$$y_{j,t+h,t-1} = \alpha_j^h + \gamma_t^h + \beta_I^{h,Recession}(G(z_{it}))FShock_{j,t}^{I} + \beta_C^{h,Recession}(G(z_{it}))FShock_{j,t}^{C} + \beta_I^{h,Boom}(1-(G(z_{it}))FShock_{j,t}^{I} + \beta_C^{h,Boom}(1-(G(z_{it}))FShock_{j,t}^{C} + \delta^h X_{j,t} + \epsilon_{I,t}^h \quad \text{--- (4)}$$

Where $G(z_{it}) = \frac{\exp(-\gamma z_{it})}{1+\exp(-\gamma z_{it})}$, $\gamma > 0$, is a smooth transition function to give weights of degree of recession for observations. z_{it} is an indicator for the business cycle (in this case GDP growth rate) normalized to have zero mean and unit variance.[14]

Similar to previous studies (e.g. Auerbach and Gorodnichenko ,2013), we find that both government current primary spending and investment could have a larger multiplier during

[13] As we divide the sample into two cases, the precision on the estimates becomes much weaker. To circumvent this problem, we also check the results for expansion vs recession and recession vs boom by increasing our sample size through extending our definition of small states to the ones based on WB's definition. This increases the sample from 23 to 34 countries. The results hold qualitatively true.

[14] As in Aurbach and Gorodnichenko (2013), we set $\gamma = 1.5$. The results are robust to alternative values of γ.

recessions than booms (Columns 4 and 5 in Table 1). For instance, while government current primary spending has a multiplier of 0.6 on impact during recessions, it does not have any notable effect on GDP during booms. On the other hand, while government investment has a large fiscal multiplier during recession at around 0.8 on impact during recessions, it has a negative fiscal multiplier during booms.

Table 1. Consolidation vs Expansion and Recession vs Boom

		(1) Baseline	(2) Consolidation	(3) Expansion	(4) Recession	(5) Boom
Gov. Cons.	On Impact	0.265***	0.392**	0.101	0.598***	0.0586
		(0.079)	(0.212)	(0.190)	(0.257)	(0.180)
	Peak	0.393***	0.842***	-0.139	0.793*	0.110
		(0.163)	(0.354)	(0.239)	(0.487)	(0.356)
Gov. Inv.	On Impact	0.0973	-0.0889	0.264***	0.814***	-0.414**
		(0.068)	(0.154)	(0.124)	(0.312)	(0.217)
	Peak	0.882***	0.541	1.064***	1.537***	1.201**
		(0.380)	(0.770)	(0.421)	(0.701)	(0.652)

Source: Authors' estimates.

Values in () are robust standard errors clustered by countries. *,**,*** are significance level at 0.125, 0.10, and 0.05, respectively.

Robustness Checks

We conduct a battery of robustness checks (Table A3). These include estimating equation (2) using just country fixed and time fixed effect (Column 4), adding lagged variables (Column 5), natural disasters (Column 6), future fiscal shocks (Column 7), controlling for terms of trade (Column 8), net exports (Column 9), government tax (Column 10), government revenue (Column 11), and also run separate regressions for government current primary spending (Column 12) and government investment (Column 13). We also test when changing the sample from IMF's definition of small states to WB's definition of small states (Table A4). The results are also robust to changes in control variables: such as a lag of difference in the fiscal variable, as in Auerbach and Gorodnichenko (2013), lags of fiscal shocks, or combinations of these lagged fiscal variables. We also find (but have not reported) that the results are robust to threshold values for classifying outliers, using trend GDP instead of actual GDP to divide variables, and to using previous year's WEO data, instead of current year's, to obtain fiscal variable forecast to construct fiscal variable shocks.

For robustness checks, we also conduct our analysis for small states based on the World Bank's (WB) definition. For this exercise, 34 out of 50 small states based on the WB's definition are included for the sample in our study after following the exclusion procedure described above. The sample includes 10 countries from Africa, 7 from Asia, 12 from the Caribbean and 5 from Europe (Table A2). For the sample definition as per World Bank's

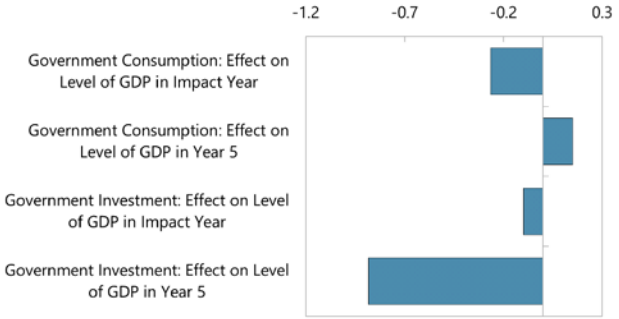
definition, we find that for this set of countries the impact multiplier was 0.2 and 0 for government current primary spending compared to the baseline multipliers of 0.3. For government investment, we find five-year multipliers of 0.6 for the larger sample compared to the baseline multipliers of 0.9. The five-year multipliers for government current primary spending and the impact multipliers for government investment are not statistically different from zero for both samples.

We have also estimate multipliers both for expansions and recessions for initially highly-indebted countries (defined as having a government debt of more than 70 percent of GDP), but the coefficients for initially highly-indebted countries are similar to the baseline specification. This is not a surprising result given than 14 out of 23 countries in our sample are highly-indebted. In the GIMF part we will show that the level of government debt affects fiscal multipliers.

Summary of Empirical Results

The main results of our empirical portion are summarized in Figure 8. Government current primary spending has a short-term impact multiplier of around 0.3, but negligible medium-term impact on growth. On the other hand, government investment has a small impact multiplier but a relatively large medium-term multiplier of around 0.9 on output.

Figure 8. GDP Cost of Fiscal Consolidation of 1 Percent of GDP
(Percent)



Source: Authors' estimation; Local Projection Method.

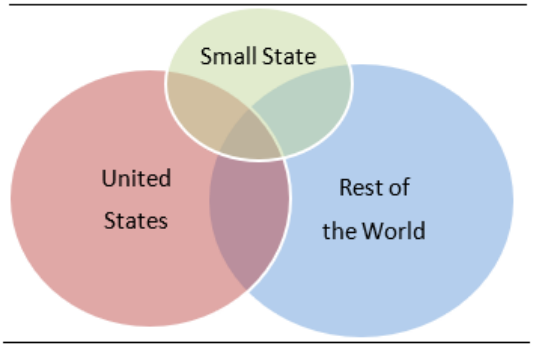
V. DSGE MODEL (GIMF)

Our DSGE model is based on the IMF's Global Integrated Monetary and Fiscal (GIMF) model. This model is an open-economy DSGE model, in which Ricardian equivalence does not hold for various reasons. These include, the model's feature of overlapping-generation agents with finite life times, some of whom are also liquidity constrained. GIMF also has multiple real and nominal rigidities, including consumer habits that induce consumption persistence, investment adjustment costs that induce investment persistence, and import adjustment costs that induce spillover persistence of policies of larger economies into the rest of the world.

GIMF relaxes the prevalent assumption in other DSGE models that all government spending is wasteful and does not contribute to aggregate supply. Instead, GIMF allows for productive public infrastructure spending that adds to the public capital stock and enhances the productivity of private factors of production.

The model's multiple non-Ricardian features, nominal and real rigidities, and fiscal and monetary policy reaction functions help produce plausible macroeconomic responses to changes in fiscal and monetary policy, as well as their spillover across economies, and is widely used to conduct policy analysis in IMF flagship publications.

Figure 9. GIMF Model Country Setup



Source: Authors.

Calibration

The 3-economy version of the GIMF used in the simulations has been calibrated to replicate key macroeconomic ratios such as the external openness, tax collection and composition, fiscal spending patterns, and trade relationships among a hypothetical small state, the United States, and an aggregate of the rest of the small state's trading partners (Figure 9 and Table 2).

The hypothetical small state is calibrated to broadly represent an average small state in terms of imports and government debt. Its initial level for both imports and government debt are set at 61 percent of GDP, which is the 2017 average for the small-states in the sample. Table 2 provides a summary of the calibration values for important parameters and rations used in the baseline of this paper, that is presented in Section VI.

Each period corresponds to one year. The hypothetical small state is assumed to comprise 0.001 percent of world GDP, and to have a steady state annual real GDP growth rate of 1.5 percent and inflation rate of 4 percent. The United States and the rest of the world are assumed to have a steady state annual growth rate of 1.5 and annual inflation rate of 2 percent. Population in all three regions is assumed to grow at 1 percent per year, and the real interest in the U.S. and rest of the world is assumed to be 4 percent per year in the steady state. The structural parameters regarding household preferences and firm technology are set following Kumhof and Laxton (2007). In particular, the parameters that govern the degree of household myopia, a key non-Ricardian feature of the model, are calibrated as follows. Households in all three countries are assumed to have a planning horizon of 15 years, i.e., a probability of death of 6.7 percent per year, and a decline in lifecycle worker productivity of

5 percent per year. Half of the small state's households are assumed to be liquidity-constrained. This proportion is larger than the 33 percent that was assumed for the United States by Kumhof and Laxton (2007). Given that financial development is lower in small states than in the United States or many other larger countries, a larger share of liquidity-constrained households in small states seems plausible.

Fiscal parameters, such as the ratios to GDP of government transfers, purchases of goods and services, and public investment are calibrated broadly based on averages of the small states.

Table 2. GIMF Baseline Steady State Calibration Values

Small State	
Real GDP Growth Rate (percent; annual)	1.5
Inflation Rate (percent; annual)	7.0
Real Gross Interest Rate (percent; annual)	4.0
Population Growth Rate (percent; annual)	1.0
Share of Liquidity-Constrained Agents (percent)	50.0
Fiscal Ratios (percent of GDP)	
Government Consumption to GDP	20.0
Public investment to GDP	4.7
Tax revenue to GDP	22.5
Of which	
Consumption taxes	7.5
Capital taxes	4.0
Labor taxes	8.0
Lump sum taxes	3.0
Government Debt	61.0
Imports (percent of GDP)	61.0
Labor Shares (percent)	55.0
Labor Share; nontradables (percent)	60.0
World and the U.S.	
Investment Share (percent)	17.2
Population Share in the World; small state (percent)*	0.0
Population Share in the World; U.S. (percent)	23.0
Population Share in the World; rest of the world (percent)	77.0

Source: Authors' assumptions and estimates.

*Population Shares reflect importance of trading partners from the perspective of small state and don't reflect the population shares of the region in the world per se.

VI. GIMF Model Results

A. Baseline Multipliers

Our baseline multipliers are for permanent public-debt-reducing shocks to fiscal policy variables that would reduce the overall fiscal deficit permanently by 1 percent of GDP. The baseline assumes no monetary policy reaction to the fiscal shock given that most small states either have pegged exchange rates or otherwise limited monetary policy (See Table A1 and A2 for exchange rate classifications of our sample countries).

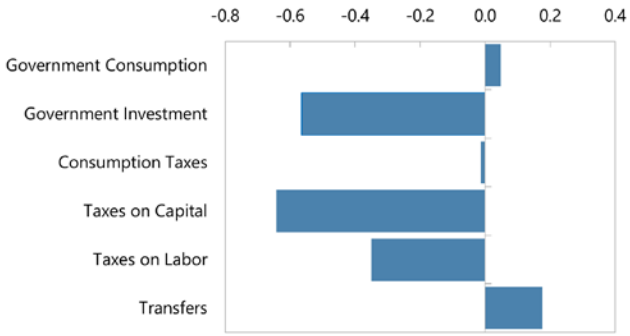
The five-year baseline fiscal multipliers are reported in Figure 10. These are the effects of each shock on the level of GDP after five years. The government current primary spending multiplier is estimated at almost zero, meaning that after five years, the cumulative GDP effect of a consolidation through reducing government current primary spending is almost zero. In other words, if the government of this small state cuts its consumption such that it permanently has a 1 percent of GDP lower deficit, the economy would not suffer any notable medium/long-term effect of such policy on its GDP level.

The five-year government investment multiplier, on the other hand, is estimated at around 0.6. In other words, if the government reduces its investment such that it has permanently 1 percent of GDP lower deficit, the economy would lose a cumulative of 0.6 percent off its GDP over five years.

Figure 10 also shows five-year multipliers of consolidation through increasing taxes, which range from about 0 on consumption taxes to 0.4 on labor taxes and 0.6 on capital taxes.

Figure 10. GDP Cost of Fiscal Consolidation of 1 Percent of GDP

(Percent; Effect on Level of GDP in Year 5)



Source: Authors' estimates.

Table 3 provides the path of multipliers from impact through 5 years. Multipliers are relatively larger at impact and decrease thereafter. In cases where consolidation is done through affecting the capital stock (government investment and taxes on capital) multipliers increase again over the medium term until they reach their steady state levels. In other cases, multipliers continue falling through the medium term and beyond until they reach zero.

Table 3. GDP Cost of Fiscal Consolidation of 1 Percent of GDP; Time Profile

(Percent; Effect on Level of GDP)

	1	2	3	4	5
Government Consumption	-0.6	-0.4	-0.2	0.0	0.0
Government Investment	-0.7	-0.6	-0.5	-0.5	-0.6
Consumption Taxes	-0.4	-0.3	-0.2	-0.1	0.0
Taxes on Capital	-0.5	-0.6	-0.5	-0.5	-0.6
Taxes on Labor	-0.3	-0.4	-0.4	-0.4	-0.4
Transfers	-0.3	-0.2	0.0	0.1	0.2

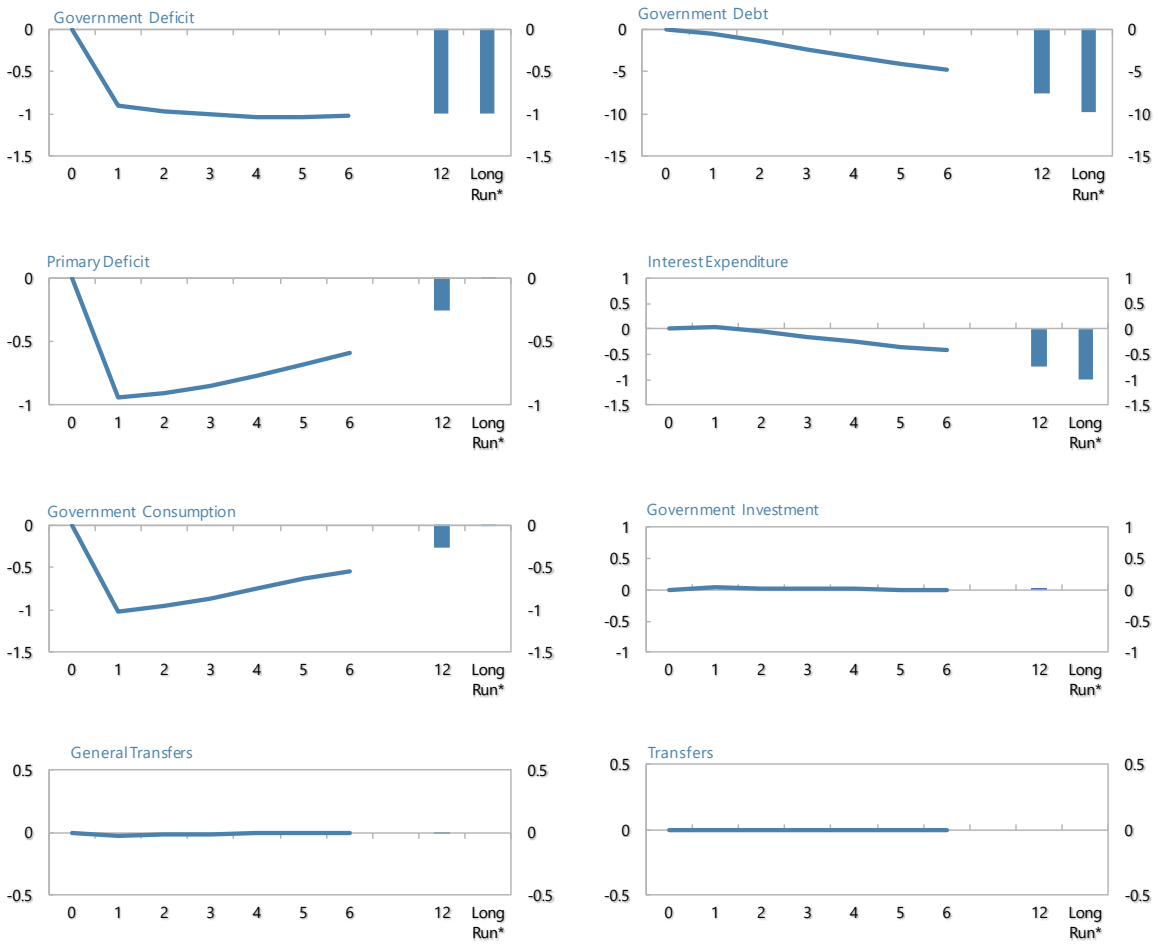
Source: Authors' estimates.

To gain more insight on the baseline multipliers, we plot the dynamics of a set of important underlying macroeconomic variables for a shock to government consumption (Figures 11a-b) and to government investment (Figures 12a-b).

Figure 11a shows the government consumption shock and the dynamics of fiscal ratios as a result of it. As mentioned before, the shock is calibrated to permanently lower the overall fiscal by 1 percent of GDP. This is shown in the top left panel of Figure 11a. The shock in this exercise is on government consumption, and as can be seen in Figure 11a government consumption is lowered, while government investment and transfers remain virtually

unchanged compared with the baseline. As the deficit is reduced permanently, the top right chart of Figure 11a shows that, as a result, government debt falls on a declining trend compared to the baseline. As government debt decreases over time, government interest expenditures also decrease as shown in Figure 11a. Since the overall fiscal deficit is kept constant over time, the declining interest expenditures imply an improving primary fiscal balance over time. This is a very important point for understanding the dynamics of some other macroeconomic variables presented in Figure 11b because the improving primary fiscal balance acts as an impulse to the economy.

Figure 11a: Permanent Consolidation of 1 Percent of GDP Using Lower Government Consumption: Fiscal Variables
(Percent deviation from steady state)

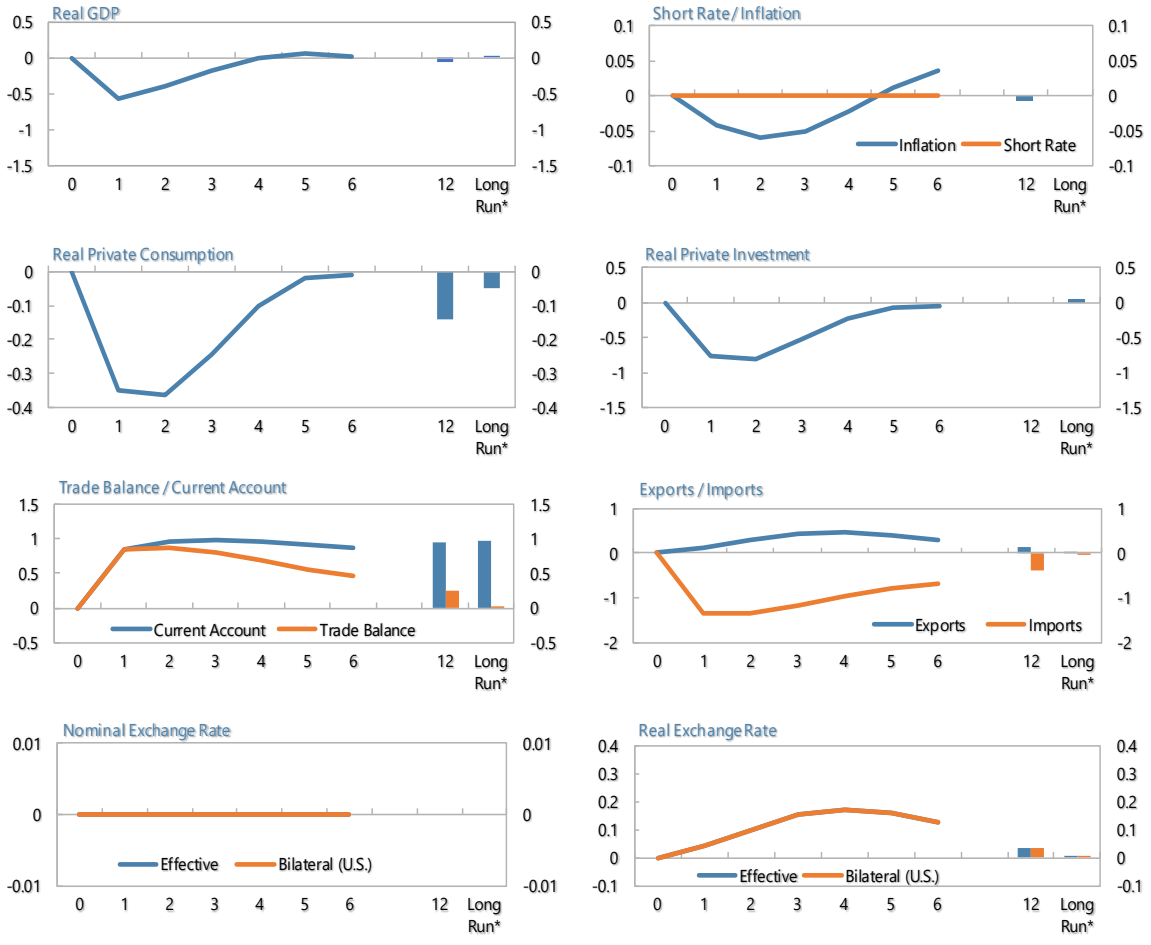


*Long Run refers to 20 years after the initial shock period.
Source: Authors' estimates.

The top left chart of Figure 11b shows the evolution of real GDP. Given that the shock was calibrated at a level to reduce the deficit permanently by 1 percent of GDP, the resulting GDP path (compared to the steady state as shown in Figure 11b) can be interpreted as the fiscal multiplier path. This figure shows that the impact multiplier of a government

consumption shock is about 0.6, but as time progresses the multiplier shrinks, reaching around 0 after about four years. In the rest of this subsection we describe the dynamics of various macroeconomic variables that lead to this result.

Figure 11b: Permanent Consolidation of 1 Percent of GDP Using Lower Government Consumption: Macro Variables
(Percent deviation from steady state)



*Long Run refers to 20 years after the initial shock period.
Source: Authors' estimates.

We showed in Figure 11a lower government consumption. Figure 11b shows that at impact private consumption and investment also take a hit at impact as many consumers lose their public jobs and many businesses lose their government contracts. However, as time goes by, private consumption and investment gradually return to their fundamental levels. This process is helped by the fact that the primary balance improves after the impact. The consolidation also leads to lower inflation and with the nominal exchange rate broadly unchanged, results in a real exchange rate depreciation. This boosts exports somewhat and lowers imports. A larger dampening effect on imports realizes at impact because both

government and private domestic demand shrink. Over time, however, as private demand improves, imports also partially recover.

Table 4 presents contributions of different variables to growth. The first row in Table 4 shows total impact on GDP or the fiscal multiplier over six years when the government cuts its overall fiscal deficit through government consumption by 1 percent of GDP. Private consumption and investment also decline as a response to a negative government consumption shock. If there were no trade leakage, GDP would decline by around -1.3 percent. However, imports would also decline as a result of lower government and private demand. This trade leakage dampens the original impact of a decline in government consumption and brings down overall GDP impact to around 0.6 percent. Over time, both consumption and investment pick up and the trade balance improves through an increase in exports and a decline in imports.

Table 4. Permanent Consolidation Using Lower Government Consumption

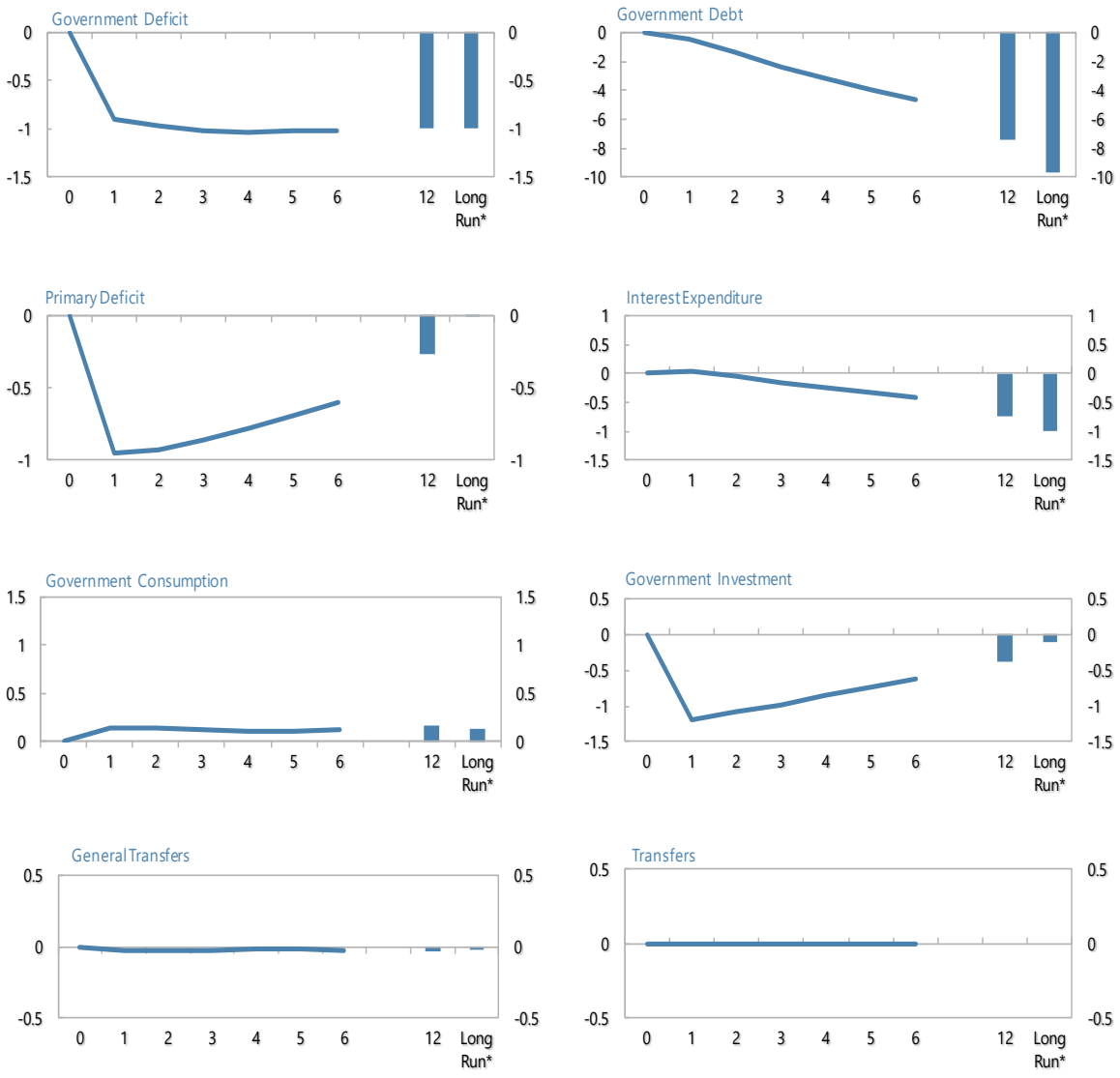
(Percent; Contribution to the Level of GDP)

	1	2	3	4	5	6
Total Impact on GDP	**-0.6**	**-0.4**	**-0.2**	**0.0**	**0.0**	**0.0**
Private Consumption	-0.2	-0.2	-0.1	-0.1	0.0	0.0
Private Investment	-0.1	-0.1	-0.1	0.0	0.0	0.0
Government Spending	-1.1	-1.0	-0.9	-0.8	-0.7	-0.6
Government Consumption	-1.2	-1.1	-0.9	-0.8	-0.7	-0.6
Government Investment	0.0	0.0	0.0	0.0	0.0	0.0
Net Exports	0.9	1.0	1.0	0.9	0.7	0.6
Exports	0.1	0.2	0.3	0.3	0.3	0.2
Imports	-0.8	-0.8	-0.7	-0.6	-0.5	-0.4

Source: Authors' estimates.

Figure 12a shows the government investment shock and the dynamics of different fiscal variables that follow it. The shock is calibrated to permanently lower the overall fiscal by 1 percent of GDP through government investment. Government investment is lowered, while government consumption and transfers remain virtually unchanged to the steady state. Similar to the previous case of a decline in the overall fiscal balance through government consumption, government debt declines over time due to a permanently lowered fiscal deficit as can be seen in the top right chart of Figure 12a. As overall fiscal deficit is kept constant, primary fiscal balance improves over time with a lower government debt.

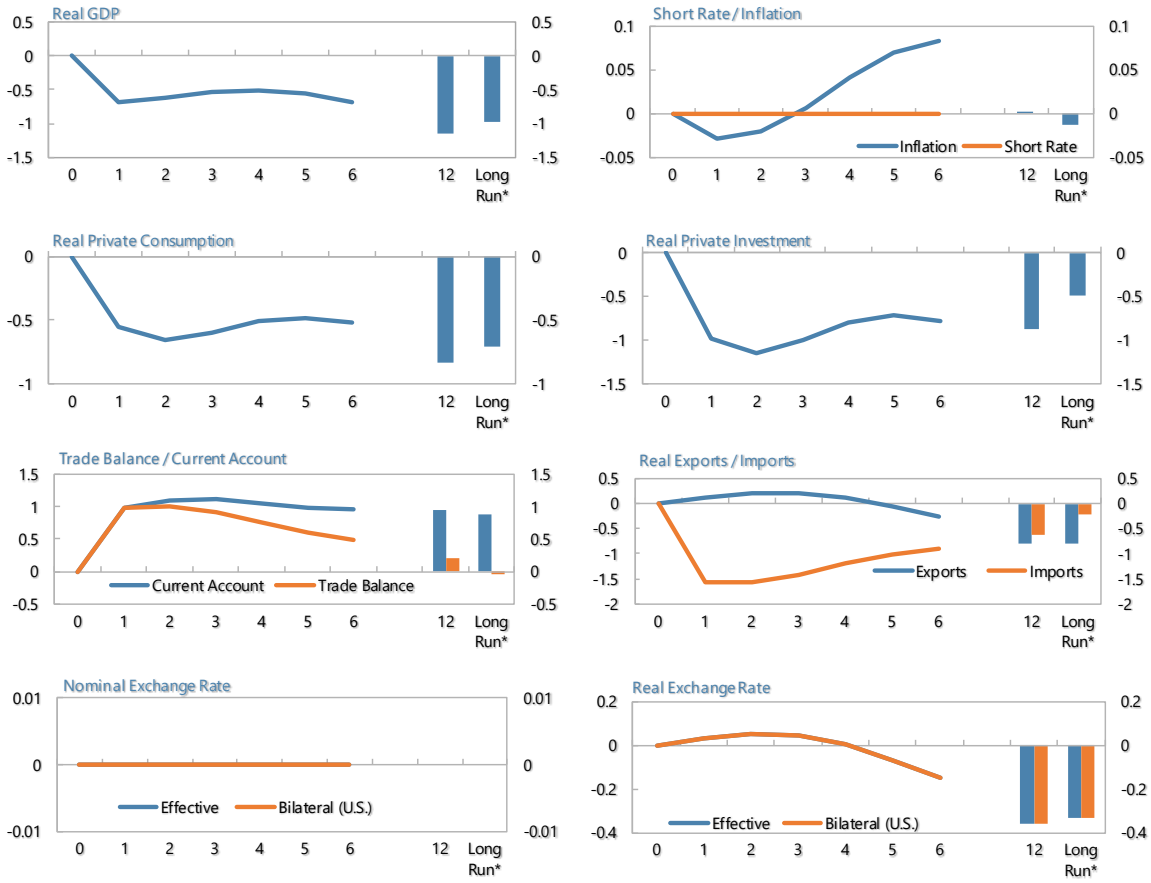
Figure 12a. Permanent Consolidation of 1 Percent of GDP Using Lower Government Investment: Fiscal Variables
(Percent deviation from steady state)



*Long Run refers to 20 years after the initial shock period.
Source: Authors' estimates.

Figure 12b plots the dynamics of macroeconomic variables in response to the permanent reduction in overall fiscal balance by 1 percent of GDP. The top left chart of Figure 12b shows the evolution of real GDP. Given that the shock was calibrated at a level to reduce the deficit permanently by 1 percent of GDP, the resulting GDP path (compared to the steady state as shown in Figure 12b) can be interpreted as the fiscal multiplier path.

Figure 12b. Permanent Consolidation of 1 Percent of GDP Using Lower Government Investment: Macro Variables
(Percent deviation from steady state)



*Long Run refers to 20 years after the initial shock period.
Source: Authors' estimates.

Similar to the case of government consumption, a 1 percent of GDP decline in overall fiscal balance negatively affects private consumption and investment at impact as many consumers lose their public jobs and many businesses lose their government contracts. Over time, both private consumption and investment recover, but end up at lower steady state levels because they get permanently negatively affected by lower government investment. The consolidation also lowers inflation and depreciates the real exchange rate. This improves the trade balance by boosting exports while dampening imports. Over time, as private demand recovers, imports also partly increase. Unlike the government consumption case, however, the decline in government investment also negatively affects the capital stock in the economy and leads to lower production. Thus, the decline in government investment has a more lasting impact on the output. In the very long term (well beyond our definition of 20 years for the long term and not shown) the output effect will go back to zero as private investment replaces the lost public investment due to the permanent consolidation.

B. Primary Multipliers

In the baseline, the size of policy shocks was always set such that they lower the overall deficit by 1 percent of GDP. In some cases, however, policymakers are interested in multipliers for a change in the primary (i.e. overall minus interest) balance by one percent of GDP. Figure 13 shows our models' results for these multipliers and compares them with the baseline multipliers.

One can readily see from Figure 13 that primary multipliers are larger than baseline multipliers. This is an intuitive result. With consolidation, government debt falls on a downward path. As a result, interest expenditures fall over time. Baseline multipliers assume lower overall balance. Therefore, in the baseline the primary balance improves over time whereas in the case of primary multipliers, the primary balance remains unchanged over time. As a result, baseline multipliers are smaller than primary multipliers.

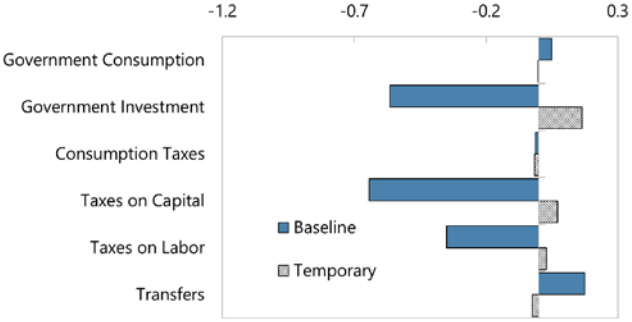
Figure 13. GDP Cost of Fiscal Consolidation of 1 Percent of GDP, Primary vs. Baseline
(Percent; Effect on Level of GDP in Year 5)

Source: Authors' estimates.

C. Temporary Multipliers

The baseline multipliers were estimated for a permanent consolidation shock. In this subsection, we present the multipliers for a temporary shock. In this exercise, fiscal policy variables are changed to reduce the overall deficit in the first year by 1 percent of GDP and return back to the steady state level in the following year. The overall deficit in all future years are kept unchanged compared to the steady state. Figure 14 shows the results and compares them with the baseline. Temporary multipliers are notably smaller than baseline multipliers. This is as expected because a temporary fiscal shock is much smaller than a permanent one with the same annual. Also, some temporary multipliers are estimated with "wrong" signs. This is because of various dynamics

Figure 14. GDP Cost of Fiscal Consolidation of 1 Percent of GDP, Temporary vs. Baseline
(Percent; Effect on Level of GDP in Year 5)



Source: Authors' estimates.

across variables in the model and, since multiplier sizes are very small, could easily be ignored.

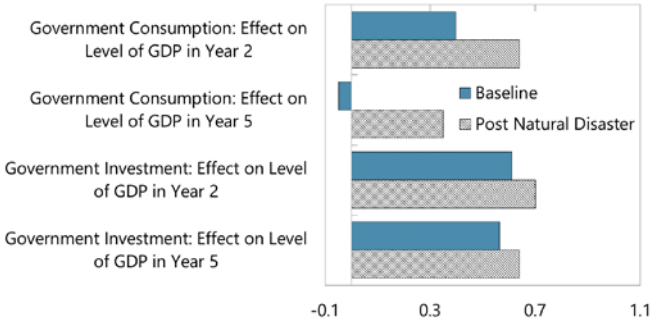
D. Multipliers following Natural Disasters

While our baseline DSGE estimation of fiscal multipliers in the previous sections has assumed that the model economy starts at the steady state, many small states in reality are often hit by natural disasters (e.g. hurricanes) that take them well out of their steady state. Following natural disaster, fiscal policy is usually considered as an important tool to bring the economy back towards its steady state. This section estimates fiscal multipliers after a natural disaster. We consider a natural disaster that destroys 10 percent of the country's GDP in the initial period, following which fiscal policy is implemented.

Figure 15 plots five-year cumulative GDP impacts of government consumption and investment in this post natural disaster economy. While government consumption in the baseline scenario had no medium-term impact on output, the fiscal stimulus from government consumption following a natural disaster has a medium-term multiplier of close to 0.4, notably larger than in the baseline. Similarly, the medium-term government investment multiplier after a natural disaster is estimated at 0.7, slightly larger than the baseline. These results are intuitive because one expects to have larger multipliers when there is slack in the economy. The results are also consistent with our empirical results (Section IV), which found larger multipliers in recessions compared to booms.

Figure 15. GDP Effect of Fiscal Stimulus of 1 Percent of GDP, Post Natural Disaster vs. Baseline

(Percent; Effect on Level of GDP in Year 5)



Source: Authors' estimates.

E. Sensitivity Analysis

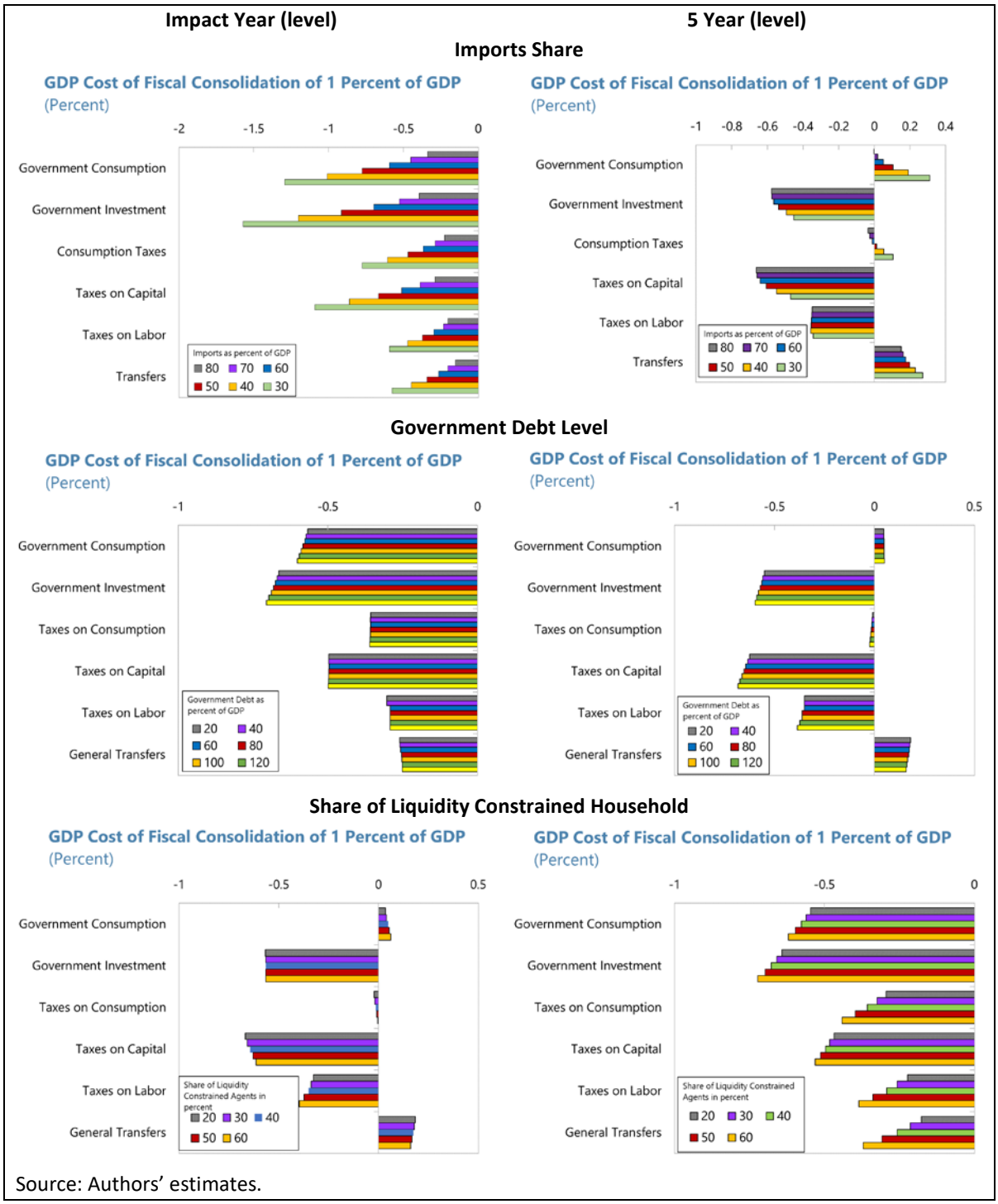
The baseline and other previous sections were calibrated for a hypothetical small state with specific characteristics (Table 2). Most notably, the imports and government debt level of the baseline's small state were set at the average levels of all small states. Given the diversity of small states, in this section we provide a sensitivity analysis of the results to three important country characteristics: (i) imports share, (ii) government debt level, (iii) share of liquidity-constrained households (Figure 15).

Figure 16 plots the GDP cost of fiscal consolidation in response to a 1 percent of GDP negative shock to fiscal shocks (i.e., government consumption, government investment, consumption tax, capital tax, labor tax, and transfers) on impact and over a 5-year horizon. Panel 1 shows the sensitivity analysis with respect to imports share from 30 to 80 percent of GDP. The higher the imports share, the lower the fiscal multipliers are because the trade leakage is greater when imports shares are higher. This holds true for both impact (one-year effect) and medium term (five-year effect).

Panel 2 of Figure 16 plots fiscal multipliers for different levels of government debt between 20 and 120 percent of GDP. The higher the government debt level, the higher the fiscal multipliers. This is because consolidation lowers the risk premium more for countries with higher debt levels and hence is more beneficial to those countries.

Lastly, Panel 3 of Figure 16 plots sensitivity analysis with respect to the share of liquidity-constrained households between 20 and 60 percent of population. The larger the share of liquidity-constrained households, the larger the fiscal multipliers. This is because liquidity-constrained household have a hand-to-mouth consumption behavior and thus have a higher marginal propensity to consume, resulting in a larger fiscal multiplier.

Figure 16. Sensitivity: GDP Cost of Fiscal Consolidation of 1 Percent of GDP



Source: Authors' estimates.

VII. COMPARISONS WITH PREVIOUS STUDIES

This section reviews the existing relevant studies and compares the results from our two models with the results of these studies.

There are only a few existing contributions in the literature to estimate fiscal multipliers for small states. We review the most relevant ones, separating them based on their methodologies, which are i) a SVAR and ii) a narrative approach. We also have seen one study using iii) a DSGE model. In the rest of this section we briefly explain these alternative empirical methodologies and provide reasons why our forecast error methodology is more plausible than these alternative methodologies for the purpose of estimating fiscal multipliers for small states.

i. Structural Vector Autoregression (SVAR) Methodology;

This methodology uses a Vector Autoregression, as in Blanchard and Perotti (2002), to identify government spending shocks. This approach assumes that the government does not change spending in response to a change in GDP within the contemporaneous period (e.g. quarter or year).

Gonzalez-Garcia, Lemus, and Mrkaic (2013) estimate SVAR with panel quarterly data interpolated from annual data for eastern Caribbean Currency Union (ECCU) countries and find that the fiscal multiplier for government consumption is not statistically significantly different from zero and that for government investment is slightly less than 0.4 after one year. Using interpolated quarterly data for 14 Caribbean countries between 1990 and 2011, Narita (2014) estimates SVAR and finds that impact multipliers for government consumption is 0.1-0.2 on impact and 0-0.3 on medium-term. Guy and Belgrave (2011) employ a SVAR approach to estimating fiscal multiplier for government expenditure for four Caribbean countries'[15] by interpolating annual data into quarterly data between 1980 and 2008. They find that the fiscal multipliers for government expenditure is very small ranging between 0.11 to 0.14 after one year and some small negative to 0.30 over a 6-year period. Both Guy and Palgrave (2011) and Narita (2014), however, do not distinguish government consumption from government investment.

ii. The Narrative Approach;

The second approach, known as a narrative approach, utilizes the news and budget documents to identify unexpected fiscal spending shocks by dropping the incidences of

[15] The four Caribbean countries in their study are Guyana, Trinidad and Tobago, Barbados, and Jamaica.

government spending increases in response to current or prospective economic conditions (e.g. Romer and Romer, 2010, David and Leigh, 2018). However, for this narrative approach, data is not available for most small states.

iii. DSGE Approach;

Dodzin and Bai (2016) calibrates a DSGE model for Palau and Kiribati and estimate an impact government consumption multiplier of around 0.5. To the best of our knowledge this is the only existing DSGE model that has studied multiplier for small states.

There are several reasons for employing a forecast error approach combined with a local projection method in our study rather than a SVAR or narrative approach.

First, the forecast error method can mitigate the anticipation effect of the fiscal variable as argued earlier. Moreover, forecast is available using the IMF WEO database for small states. While the forecast error method is good to the extent of how good the forecast is, the IMF October WEO for the year is one of the most comprehensive forecasts for small states.

Second, we use a forecast error approach because the timing assumption underlying the SVAR approach to identify shocks is less plausible for annual data, which is the only frequency available for many small states. By utilizing the forecast error method using October WEO of the same year, our identification assumption for estimating fiscal multiplier would be equivalent to the one used for SVAR run for quarterly data, in which fiscal variables do not respond to the state of the economy within a quarter (October-December). Other studies interpolate annual data to obtain quarterly data (e.g. Narita, 2014). However, such approach relies on how good the interpolation is. Given that many small states do not have official quarterly GDP statistics, measurement errors arising from such interpolation method could be severe.

Third, unlike a SVAR approach, a local projection method allows nonlinear responses of GDP to changes in government spending.

Fourth, a SVAR approach imposes a recursive structure on responses to shocks.

Notwithstanding different methodologies, our results are qualitatively consistent with them, even though they are quantitatively different (Table 5).[16] Our empirical results suggest that government consumption has an impact multiplier of around 0.3-0.4 and has a negligible medium-term impact on growth. Our GIMF model estimates a slightly larger impact

[16] Table A5 in Appendix provides more detailed information on the methodology and the sample for the existing studies that estimated fiscal multipliers for similar countries.

multiplier at around 0.6 but also has a negligible medium-term impact on growth. On the other hand, our empirical and GIMF results both suggest that government investment has a larger medium-term growth impact than government consumption, with fiscal multipliers at around 0.6-1.1. The fiscal multipliers are in line with results from the existing studies that have estimated fiscal multipliers for small states.

For broader categories of countries, including some small states, the IMF *Regional Economic Outlook* (REO) (2018), for instance, estimates fiscal multipliers for Latin America and the Caribbean (LAC) countries and showed that fiscal multipliers are between 0.5 and 1.1 using a narrative approach, SVAR, and forecasting error methods. Their narrative approach estimation uses annual data for the sample of 14 Latin American and Caribbean (LAC) countries between 1989 and 2016 and uses the fiscal consolidation episodes from David and Leigh (2018).[17] Their SVAR approach estimates fiscal multiplier country-by-country using quarterly data from eight LAC countries.[18] Their forecast error approach uses annual data since 1990 for the sample of 19 LAC countries.[19] They also separate government consumption and government investment and estimate that their respective fiscal multipliers are 0.2 and 0.6 on impact, and 0.5 and 1.1 after a year. However, the sample of countries in their study includes many countries in Latin America that are larger and have higher GDP per capital than most small states included in our results. But their results also suggest that fiscal multipliers for government investment is higher than that of government consumption.

Table 5. Fiscal Multipliers for Small States

	Government Consumption[ǂ]		Government Investment		Tax	
	On Impact	Medium Term	On Impact	Medium Term	On Impact	Medium Term
This Paper						
Empirical: LPM Forecast Errors	0.27-0.39*	-0.12	0.10-0.26*	0.88-1.06*	n.a	n.a.
DSGE: GIMF	0.58*	0.05*	0.68*	0.57*	-0.36*	-0.01*
Literature						
Gonzales-Garcia and others (2013)	0.20	0.00	0.12*	0.44*	-0.5*	0
Narita (2014)	0.13*				-0.51* wrong sign	
Guy and Belgrave (2012)**	0.11-0.18*					
Dodzin and Bai (2016)	0.16*, 0.47*					
WHD April 2018 REO	0.21*	n.a.	0.60*	n.a	-0.5*	n.a

Values with asterisk * are statistically different from zero, on impact multiplier is the impact in year of the shock, medium terms impact shows 4-5 year cumulative impact.
ǂ Government consumption in our empirical section refers to current primary spending, which is government expense minus interest payments and includes transfers.
For Guy and Belgrave (2012), impact multipliers imply multiplier after one year.

[17] Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay.

[18] Brazil, Chile, Colombia, Dominican Republic, Mexico, Paraguay, Peru, and Uruguay.

[19] Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

Batini, Eyraud, Forni, and Weber (2014) review fiscal multipliers from the exiting literature including for low-income and emerging economies from their study. They show that the fiscal multiplier is generally low for low income and emerging economies at around 0.2 to 1.3 with most panel studies finding at around 0.2-0.5 on impact. Therefore, our empirical results are generally in line with the previous literature that used different methodologies.

VIII. CONCLUDING REMARKS

As governments of small states with high debt are considering fiscal consolidation, this paper has a fresh look at the GDP costs of fiscal policy. Results from theoretical and empirical models suggest that government consumption (current primary spending in the empirical model) has a medium-term fiscal multiplier of about zero on the level of GDP (consistent with the literature) but government investment has a multiplier of around 0.6-1.1.

As for the short term, impact multipliers of government consumption (current primary spending in the empirical model) and investment are around ½. These results are consistent with the view that while in the short term, government consumption can affect GDP, it does not affect potential GDP in small states. On the other hand, government investment affects not only the short-term GDP, but more so potential GDP in small states. Tax multipliers are found to be larger than government consumption but smaller than government investment multipliers. These results were for consolidation. Expansionary policy multipliers are generally smaller than consolidation multipliers. This asymmetry occurs because expansions, especially for small states with high government debt, result in increased risk premia (e.g. on interest rates) which in turn dampen the multipliers.

This paper has several policy implications for small states: Small state governments that need to embark on a consolidation path are advised to design the composition in favor of cutting government consumption, and against cutting investment spending, as much as feasible. In fact, governments may find a consolidation plan growth friendly if, within the overall consolidation envelope, it included expansion of government investment.

There are several caveats to this study. First, the results may be affected by how government spending is financed. While the GIMF model assumes fiscal policy is financed by surplus/deficit, the empirical part does not consider financing sources for government spending. For instance, despite its strong growth implication of public investment spending, a higher public investment through debt financing may not be a desirable policy tool as the return on public investment may not be sufficiently high to offset the interest on both domestic and external loans. Moreover, this study does not take into account the political difficulty and possible distributional impact of cutting current expenditure. Future work could investigate the implications of revenue mobilization and different financing sources.

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APPENDIX: TABLES

Table A1. List of Small States and 2015 Exchange Rate Classifications (IMF definition)

	ISO Codes	Country Name	Region	Exchange Rate Classification
1	CPV	Cabo Verde	Africa	Conventional peg
2	COM	Comoros	Africa	Conventional peg
3	MUS	Mauritius	Africa	Floating
4	SYC	Seychelles	Africa	Floating
5	SWZ	Swaziland	Africa	Conventional peg
6	BTN	Bhutan	Asia	Conventional peg
7	SLB	Solomon Islands	Asia	Conventional peg
8	FJI	Fiji	Asia	Conventional peg
9	TON	Tonga	Asia	Pegged exchange rate within horizontal bands
10	MHL	Marshall Islands	Asia	Pegged exchange rate within horizontal bands
11	FSM	Micronesia	Asia	No separate legal tender
12	ATG	Antigua and Barbuda	Caribbean	Currency board
13	BHS	Bahamas	Caribbean	Conventional peg
14	BRB	Barbados	Caribbean	Conventional peg
15	DMA	Dominica	Caribbean	Currency board
16	GRD	Grenada	Caribbean	Currency board
17	GUY	Guyana	Caribbean	Stabilized arrangement
18	BLZ	Belize	Caribbean	Conventional peg
19	KNA	St. Kitts and Nevis	Caribbean	Currency board
20	VCT	St. Vincent and the Grenadines	Caribbean	Currency board
21	SUR	Suriname	Caribbean	Stabilized arrangement
22	TTO	Trinidad and Tobago	Caribbean	Stabilized arrangement
23	MNE	Montenegro	Europe	No separate legal tender

Sources: IMF (2017) and IMF (2015).
The list includes all small states based on the IMF definition from IMF (2017) except for those that meet the exclusion criteria as explained in the main text, which are Djibouti (DJI), Kiribati (KIR), Maldives (MDV), Nauru (NRU), Palau (PLW), St Lucia (LCA), Samoa (WSM), Sao Tome and Principe (STP), Timor-Leste (TLS), Tuvalu (TUV), and Vanuatu (VUT).

Table A2. List of Small States and 2015 Exchange Rate Classifications (WB definition)

	Country Name	Region	Exchange Rate Classification
1	Botswana*	Africa	Crawling peg
2	Cabo Verde	Africa	Conventional peg
3	Comoros	Africa	Conventional peg
4	Gabon*	Africa	Conventional peg
5	Gambia*	Africa	Other managed arrangement
6	Lesotho*	Africa	Conventional peg
7	Mauritius	Africa	Floating
8	Seychelles	Africa	Floating
9	Namibia*	Africa	Conventional peg
10	Swaziland	Africa	Conventional peg
11	Bhutan	Asia	Conventional peg
12	Brunei Darussalam*	Asia	Currency board
13	Solomon Islands	Asia	Conventional peg
14	Fiji	Asia	Conventional peg
15	Tonga	Asia	Pegged exchange rate within horizontal bands
16	Marshall Islands	Asia	Pegged exchange rate within horizontal bands
17	Micronesia	Asia	No separate legal tender
18	Antigua and Barbuda	Caribbean	Currency board
19	Bahamas, The	Caribbean	Conventional peg
20	Barbados	Caribbean	Conventional peg
21	Dominica	Caribbean	Currency board
22	Grenada	Caribbean	Currency board
23	Guyana	Caribbean	Stabilized arrangement
24	Belize	Caribbean	Conventional peg
25	Jamaica*	Caribbean	Crawl-like arrangement
26	St. Kitts and Nevis	Caribbean	Currency board
27	St. Vincent and the Grenadines	Caribbean	Currency board
28	Suriname	Caribbean	Stabilized arrangement
29	Trinidad and Tobago	Caribbean	Stabilized arrangement
30	Estonia*	Europe	Free floating
31	Montenegro	Europe	No separate legal tender
32	Iceland*	Europe	Floating
33	Malta*	Europe	Free floating
34	Cyprus*	Europe	Free floating

Sources: IMF (2017) and IMF (2015).
Countries with * are small states based on WB's definition in the sample that are not small states based on IMF's definition. The list includes all small states based on the WB definition from IMF (2017) except for those that meet the exclusion criterion, which are Bahrain, Djibouti, Guinea-Bissau, Equatorial Guinea, Kiribati, St. Lucia, Maldives, Nauru, Palau, Qatar, San Marino, Sao Tome and Principe, Timor-Leste, Tuvalu, and Vanuatu.

Table A3. Empirical Results (23 Small States, IMF definition) (Fiscal Multipliers)

Specification		(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Year	Baseline	Consolidation	Expansion	Recession	Boom	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Government Consumption Shock	1	0.265***	0.392**	0.101	0.598***	0.0586	0.0280	0.275***	0.265***	0.275***	0.271***	0.286***	0.253***	0.268***	0.230***	
		(0.079)	(0.212)	(0.190)	(0.257)	(0.180)	(0.180)	(0.082)	(0.079)	-0.082	(0.085)	(0.119)	(0.067)	(0.071)	(0.061)	
	2	0.393***	0.842***	-0.139	0.793*	0.110	0.145	0.466***	0.489***	0.343***	0.327**	0.340**	0.297***	0.385***	0.350***	
		(0.163)	(0.354)	(0.239)	(0.487)	(0.356)	(0.196)	(0.134)	(0.137)	-0.156	(0.170)	(0.197)	(0.118)	(0.149)	(0.108)	
	3	0.304*	0.591	-0.0388	-0.171	0.818	0.189	0.623***	0.654***	0.290	0.335**	0.247**	0.308*	0.407***	0.272	
		(0.189)	(0.420)	(0.333)	(0.725)	(0.589)	(0.232)	(0.177)	(0.180)	(0.187)	(0.189)	(0.140)	(0.187)	(0.189)	(0.189)	
	4	-0.119	0.163	-0.610	0.338	-0.461	0.162	0.718***	0.596***	-0.116	-0.232	-0.295	0.130	0.141	-0.182	
		(0.297)	(0.464)	(0.591)	(0.611)	(0.701)	(0.309)	(0.231)	(0.266)	(0.311)	(0.275)	(0.209)	(0.363)	(0.343)	(0.285)	
	5	-0.149	-0.167	-0.0848	-0.184	-0.139	0.273	0.807***	0.616**	-0.122	-0.208	-0.0590	-0.373	-0.423	-0.167	
		(0.380)	(0.400)	(0.672)	(0.566)	(0.582)	(0.324)	(0.299)	(0.317)	(0.399)	(0.358)	(0.376)	(0.386)	(0.384)	(0.351)	
Government Investment Shock	1	0.0973	-0.0889	0.264***	0.814***	-0.414**	0.226***	0.117*	0.0973	0.117*	0.144**	0.139	0.160**	0.120		0.119*
		(0.068)	(0.154)	(0.124)	(0.312)	(0.217)	(0.066)	(0.069)	(0.068)	(0.069)	(0.075)	(0.100)	(0.078)	(0.078)		(0.072)
	2	0.215**	-0.0528	0.478***	0.986***	-0.337	0.256***	0.0835	0.106	0.170	0.166	0.0535	0.275**	0.216		0.260***
		(0.120)	(0.250)	(0.195)	(0.394)	(0.296)	(0.107)	(0.158)	(0.160)	(0.121)	(0.127)	(0.151)	(0.140)	(0.151)		(0.119)
	3	0.184	0.340	0.0760	0.891	-0.484	0.245	-0.0265	0.00152	0.203	0.195	0.242	0.483***	0.398***		0.352***
		(0.150)	(0.313)	(0.302)	(0.606)	(0.416)	(0.171)	(0.224)	(0.231)	(0.162)	(0.136)	(0.218)	(0.149)	(0.134)		(0.164)
	4	0.486	0.779	0.257	1.537***	-0.505	0.453**	0.225	0.429	0.550	0.508	0.174	0.726**	0.698**		0.549
		(0.387)	(0.628)	(0.484)	(0.701)	(0.728)	(0.256)	(0.298)	(0.337)	(0.372)	(0.339)	(0.432)	(0.347)	(0.341)		(0.359)
	5	0.882***	0.541	1.064***	0.557	1.201**	0.490	0.337	0.664	0.966***	0.904***	0.697	0.745***	0.756***		0.865***
		(0.380)	(0.770)	(0.421)	(0.482)	(0.652)	(0.326)	(0.401)	(0.453)	(0.353)	(0.327)	(0.496)	(0.283)	(0.310)		(0.264)
Country &Time Fixed Effects		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged Variables		Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natural Disaster Damage		Yes	Yes		Yes				Yes		Yes	Yes	Yes	Yes	Yes	Yes
Future Fiscal Shocks		Yes	Yes		Yes					Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terms of Trade											Yes					
Net Exports												Yes				
Tax Revenue													Yes			
Government Revenue														Yes		
N		231	231		231		279	231	231	231	222	172	190	209	248	232
R-sq		0.289	0.296		0.326		0.151	0.245	0.289	0.245	0.253	0.324	0.300	0.262	0.269	0.230
adj. R-sq		0.214	0.215		0.248		0.092	0.169	0.214	0.169	0.171	0.225	0.208	0.174	0.208	0.161

Source: Authors' estimates.

* Number of Observations, R-squared and Adj R-squared are for the period from the impact regression

Standard errors are in parentheses and are clustered at country level, * 0.125, ** 0.1, *** 0.05 significance level

Natural Disaster, Net Exports, Tax, Government Revenue are all in % of GDP and those variables and Terms of Trade variable are all controlled contemparaneously at each horizon (in t+h).

Table A4. Empirical Results (34 Small States, WB Definition) (Fiscal Multipliers)

Specification		(1)	(2)		(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Year	Baseline	Consolidation	Expansion	Recession	Boom	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total
Government Consumption Shock	1	0.162***	0.209	0.119	0.427*	0.0114	0.0176	0.170***	0.162***	0.170***	0.150**	0.136	0.185***	0.184***	0.145***	
		(0.073)	(0.160)	(0.097)	(0.266)	(0.149)	(0.116)	(0.074)	(0.073)	(0.074)	(0.077)	(0.090)	(0.068)	(0.064)	(0.064)	
	2	0.193	0.497**	-0.0712	0.520	0.00179	0.0794	0.299***	0.312***	0.168	0.168	0.156	0.248**	0.281**	0.199**	
		(0.141)	(0.274)	(0.178)	(0.485)	(0.268)	(0.137)	(0.133)	(0.137)	(0.136)	0.169	(0.149)	(0.142)	(0.138)	(0.112)	
	3	-0.0464	-0.0638	-0.0182	0.203	-0.138	0.0772	0.373**	0.349*	-0.0491	0.170	-0.103	0.0349	0.0818	-0.00432	
		(0.204)	(0.363)	(0.350)	(0.508)	(0.485)	(0.195)	(0.210)	(0.212)	(0.200)	0.171	(0.193)	(0.239)	(0.218)	(0.189)	
	4	-0.160	-0.408	0.0858	0.779	-0.684	0.0568	0.420*	0.205	-0.164	0.172	-0.136	-0.194	-0.0794	-0.260	
		(0.187)	(0.468)	(0.334)	(0.565)	(0.524)	(0.241)	(0.251)	(0.239)	(0.189)	0.173	(0.168)	(0.310)	(0.270)	(0.190)	
	5	-0.112	-0.498	0.721	1.493	-1.401*	0.132	0.513**	0.226	-0.104	0.174	0.0629	-0.692***	-0.819***	-0.0333	
		(0.241)	(0.380)	(0.559)	(1.114)	(0.880)	(0.256)	(0.290)	(0.243)	(0.245)	0.175	(0.227)	(0.289)	(0.282)	(0.223)	
Government Investment Shock	1	0.107	-0.0188	0.205**	0.443	-0.147	0.132***	0.114*	0.107	0.114*	0.118*	0.103	0.111	0.0841		0.122**
		(0.069)	(0.115)	(0.113)	(0.303)	(0.175)	(0.057)	(0.070)	(0.069)	(0.070)	(0.074)	(0.085)	(0.087)	(0.084)		(0.068)
	2	0.165	-0.00779	0.353***	0.652	-0.174	0.128	0.0585	0.0722	0.136	0.174	0.0693	0.147	0.148		0.174
		(0.126)	(0.172)	(0.167)	(0.445)	(0.232)	(0.109)	(0.143)	(0.145)	(0.125)	(0.137)	(0.157)	(0.155)	(0.147)		(0.122)
	3	0.160	-0.0633	0.374	1.076***	-0.543	0.0841	-0.0443	-0.0756	0.178	0.169	0.128	0.302**	0.253*		0.318**
		(0.163)	(0.341)	(0.303)	(0.501)	(0.356)	(0.164)	(0.200)	(0.197)	(0.164)	(0.158)	(0.232)	(0.164)	(0.153)		(0.184)
	4	0.532**	0.283	0.724*	1.634***	-0.311	0.225	0.143	0.235	0.570**	0.502*	0.424	0.468	0.472		0.522**
		(0.309)	(0.476)	(0.448)	(0.598)	(0.451)	(0.226)	(0.270)	(0.299)	(0.304)	(0.310)	(0.368)	(0.300)	(0.301)		(0.302)
	5	0.614**	0.317	0.839***	0.904**	0.507	0.236	0.195	0.406	0.663***	0.628**	0.537	0.502*	0.478		0.640***
		(0.326)	(0.438)	(0.407)	(0.488)	(0.591)	(0.268)	(0.340)	(0.385)	(0.322)	(0.326)	(0.404)	(0.306)	(0.321)		(0.233)
Country &Time Fixed Effects		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged Variables		Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natural Disaster Damage		Yes	Yes		Yes				Yes		Yes	Yes	Yes	Yes	Yes	Yes
Future Fiscal Shocks		Yes	Yes		Yes					Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terms of Trade											Yes					
Net Exports												Yes				
Tax Revenue													Yes			
Government Revenue														Yes		
N		340	340		340		410	340	340	340	327	278	279	298	359	341
R-sq		0.209	0.212		0.225		0.100	0.173	0.209	0.173	0.215	0.223	0.249	0.251	0.192	0.174
adj. R-sq		0.155	0.152		0.166		0.059	0.119	0.155	0.119	0.155	0.152	0.181	0.188	0.146	0.125

Source: Authors' estimates.

* Number of Observations, R-squared and Adj R-squared are for the period from the impact regression

Standard errors are in parentheses and are clustered at country level, * 0.125, ** 0.1, *** 0.05 significance level

Natural Disaster, Net Exports, Tax, Government Revenue are all in % of GDP and those variables and Terms of Trade variable are all controlled contemparaneously at each horizon (in t+h).

Table A5. Comparisons of Fiscal Multipliers for Small States (Fiscal Multipliers)

	Government Consumption[ł]		Government Investment		Tax			
	On Impact	Medium Term	On Impact	Medium Term	On Impact	Medium Term	Sample Countries	Methodology
This Paper								
Empirical: LPM Forecast Errors	0.27-0.39*	-0.12	0.10-0.26*	0.88-1.06*	n.a	n.a.	23 Small States (IMF)	Local Projection Method with Forecast Errors, WEO 1990-2017 Annual data
	0.16*	-0.11	0.1-0.20*	0.61-0.84*	n.a	n.a.	34 Small States (World Bank)	
DSGE: GIMF	0.58*	0.05*	0.68*	0.57*	-0.36*	-0.01	A hypothetical small state	GIMF Model
Literature								
Gonzales-Garcia and others (2013)	0.20	0.00	0.12*	0.44*	-0.5*	0	8 ECCU countries	Panel SVAR, quarterly data interpolated from annual data for 1994Q1-2009Q4
Narita (2014)	0.13*				-0.51*		14 Caribbean countries	Panel SVAR, quarterly data interpolated from annual data
Guy and Belgrave (2012)**	0.11-0.18*				wrong sign		Barbados, Jamaica, TTO, Guyana	SVAR, 1980-2008, separately
Dodzin and Bai (2016)	0.16*, 0.47*						Palau and Kiribati	GIMF model
WHD 2018 April REO	0.21*	n.a.	0.60*	n.a	-0.5*	n.a	19 Latin American countries	Local Projection Method with Forecast Errors, WEO 1990-2018, Annual data

Values with asterisk * are statistically different from zero, on impact multiplier is the impact in year of the shock, medium terms impact shows 4-5-year cumulative impact.

For Guy and Belgrave (2012), impact multipliers imply multiplier after 4 quarters.

ł Government consumption in our empirical section refers to current primary spending, which is government expense minus interest payments and includes transfers.