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Fiscal Revenue, Fiscal Space and Expenditure Cyclicality Patterns: A Comparison of Asia, Latin America, and OECD Countries

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Abstract*

The unprecedented decline of policy interest rates and risk premia in the aftermath of the Global Financial Crisis markedly reduced the flow costs of serving the growing public and private debt, thus masking the growing fragility associated with rising aggregate leverage/GDP during the last 10 years. As such, the upward trajectory of OECD policy interest rates may impose growing fiscal challenges, thus testing the fiscal space of countries and their resilience. Against this background, we compare fiscal cyclicality across Asia, Latin America, and the OECD, and identify factors that explain countries' fiscal space and fiscal fragility. Our study reveals a mixed fiscal scenery, where more than half of the countries are characterized by limited fiscal space, and fiscal policy is either pro- or acyclical. More limited fiscal capacity, as measured by public debt/tax base and its volatility are positively associated with fiscal cyclicality, while public debt/GDP and its volatility are not statistically significant in our estimation, suggesting that public debt/tax base provides a more robust explanation than public debt/GDP for government spending cyclicality. We simulate the impact of an enduring interest-rate rise on fiscal space, rank countries and regions by the fragility/robustness of their fiscal space to such a shock, and discuss policies to increase fiscal resilience.

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1. Introduction

The Global Financial Crisis (GFC) focused attention on unsustainable leverage growth as a key contributing factor in growing financial fragility associated with "bubbly" dynamics. A prolonged appreciation of financial and real estate markets increases the vulnerability to sharp asset valuation corrections. A deep enough correction may trigger banking crises and fire sales dynamics, potentially pushing the economy into a prolonged depression and a growing exposure to social and political instability.[1] Concerns about reliving the 1930s Great Depression explain the complex set of policies implemented by the U.S. and other affected countries in the aftermath of the GFC: namely, a massive infusion of liquidity in support of financial and banking systems and bailing out systemic banks and prime creditors. The forced deleverage of private borrowers, and the growing fear of a prolonged recession, induced higher household savings and lower investment, further deepening recessionary forces.

Concerned countries experimented with fiscal stimuli aimed at mitigating the deepening recessions. Stabilizing the banking and financial systems, in addition to such stimuli, ended up sharply raising countries' public debt/GDP, pushing advanced developed countries towards a public debt/GDP of above 100% [see Fig. 1]. Similar trends applied to emerging market economies [EMEs], pushing their public debt/GDP upward, with some reaching well above 50%. Notwithstanding the fact that the average public EMEs' debt/GDP is below that of OECD countries, EMEs' lower tax base/GDP ratios, as well as the higher interest rates paid on their debt, implies such economies' growing fragility compared with OECD countries. While the public debt/GDP is used frequently in policy discussions, public debt/average tax base may provide a more informative measure of the burden associated with the stock of public debt [Aizenman and Jinjarak (2011)]. Henceforth, we referee to this measure as *de-facto fiscal space*.[2]

[1] See Minsky (1992) for the financial instability hypothesis, which analyzes financial market fragility over the life cycle of an economy with speculative investment bubbles endogenous to financial markets. Rajan (2005) pointed out that banking deregulation during the 1980s–2000s increased leverage and risk taking, contributing to a greater exposure to financial stability associated with tail risks. Schularick and Taylor (2012) and Jordà, Schularick, and Taylor (2013) provided empirical evidence linking leverage, business cycles, and crises.

[2] The euro crisis provided a vivid example of how focusing on public debt/GDP below a certain threshold caused a failure to recognize the large heterogeneity of the tax base/GDP in the eurozone [Aizenman,

Importantly, the post-GFC trajectory failed to deal with leverage concerns: "At $164 trillion—equivalent to 225% of global GDP—global debt continues to hit new record highs almost a decade after the collapse of Lehman Brothers. Compared with the previous peak in 2009, the world is now 12% of GDP deeper in debt, reflecting a pickup in both public and nonfinancial private sector debt after a short hiatus. All income groups have experienced increases in total debt, but, by far, emerging market economies are in the lead." [Fiscal Monitor (2018)]. In other words, stabilizing a crisis triggered by an unsustainable leverage growth in turn triggered a potentially untenable increase in leverage/GDP ratios.

The monetary easing associated with the U.S. FED and the European Central Bank (ECB) policies in the aftermath of the GFC led to an unprecedented decline of policy interest rates and risk premia. These developments markedly reduced the flow costs of serving the growing public and private debt, thereby masking the increasing fragility associated with the rising aggregate leverage/GDP over the last 10 years. This period has now passed: the (so far) robust recovery of the U.S., the gradual unwinding of the FED's balance sheet, the projected upward trajectory of the FED's funds rate, and the recovery of the eurozone will impose growing fiscal challenges that will test countries' fiscal space and their ability to cope with projected higher interest rates by raising their resilience.

A key resilience margin is securing fiscal space—i.e., the availability of a countercyclical fiscal policy aimed at mitigating business cycles and preventing a prolonged depression in the aftermath of financial crises [Ostry et. al (2010), Auerbach (2011)]. Gavin at al. (1996) identified the procyclicality of fiscal policy as a major amplifier of developing countries' vulnerability to shocks. Remarkably, over the last two decades the growing share of developing countries' fiscal policies and EMEs have become countercyclical [see Frankel (2011) and Frankel, Vegh, and Vuletin (2013)]. Woo (2009) presented evidence showing that social polarization, as measured by income and educational inequality, is consistently and positively associated with fiscal procyclicality, controlling for other determinants from existing theories. He also found a robust negative impact of fiscal procyclicality on economic growth. Aizenman and Jinjarak (2012) found that higher income inequality is strongly associated with a lower tax

Hutchison, and Jinjarak (2013)]. Similarly, the interest expense needed to serve the public debt as a share of tax revenue may provide a robust measure of the burden of serving the public debt and be more informative than the interest cost of the public debt/GDP ratio.

base, lower de-facto fiscal space, and higher sovereign spreads. [See Appendix Table A1 for a brief summary of the key related studies].

Against this background, we assess definitions and empirical measures of fiscal cyclicality, compare fiscal cyclicality across Asia, Latin America, and OECD, and identify factors accounting for cyclicality patterns. We link the capacity of countercyclical policy to the development of financial systems and fiscal space, as both impact the servicing capabilities of domestic and foreign debt. We study differences across the country groups and identify the role of economic structure (commodity versus manufacturing exporters and importers), financial depth, and credit history (defaults and inflation, sovereign spreads), as well as institutions and socio-economic factors (income distribution, polarization, ethnic polarization). We conclude with an analysis of suggested policies aiming at increasing the resilience of EMEs.

Our study reveals a mixed fiscal scenery, where more than half of the countries are characterized by limited fiscal space, and fiscal policy is either pro- or acyclical. More limited fiscal capacity, as measured by public debt/tax base and its volatility are positively associated with fiscal cyclicality, while public debt/GDP and its volatility are not statistically significant in our estimation, suggesting that public debt/tax base provides a more robust explanation than public debt/GDP for government spending cyclicality.[3] We simulate the impact of an enduring interest-rate rise on fiscal space, rank countries and regions by the fragility/robustness of their fiscal space to such a shock, and discuss policies to increase fiscal resilience.

2. Empirical Analysis

This section provides data and estimates fiscal cyclicality in Asia, Latin America, and OECD countries by examining contrasts between the 1990s and the 2000s and controlling for regional growth performance and global business cycles and shocks. We explore the determinants of countries' capacities in conducting countercyclical fiscal policy based on composition of

[3] Public debt/tax base in public finance is akin the net debt to earnings before interest depreciation and amortization ratio in the corporate sector (aka Debt / EBITDA). Net debt to earning ratio is a measurement of leverage, how many years it would take for a company to pay back its debt if net borrowing is zero, and EBITDA are held constant; used frequently by credit rating agencies. "Ratios higher than 4 or 5 typically set off alarm bells because this indicates that a company is less likely to be able to handle its debt burden, and thus is less likely to be able to take on the additional debt required to grow the business," see https://www.investopedia.com/terms/n/net-debt-to-ebitda-ratio.asp .

government revenue, public debt, and fiscal space, economic structure, asset-market volatility, ability to engage in domestic and international borrowing, as well as institutions and socio-economic factors. We control for the following factors:

Credit constraints. The shape of the supply of funds facing the public sector in recessions is a key determinant of fiscal space. A flatter supply of funds implies an easier countercyclical policy funded by borrowing, which in turn is impacted by the presence of buffers [international reserves, sovereign wealth funds] possibly managed by a fiscal rule that allows for more countercyclicality during recessions. Furthermore, lower external and internal private and public debt/GDP, as well as the ability to borrow in domestic currency, is associated with greater fiscal space thereby allowing for cheaper borrowing in bad times.

History, volatility, polarization and inequality. Factors affecting fiscal space include a history of default and inflation, the terms of trade volatility, the quality of institutions, and so forth. The tax revenue side is impacted by the maturity of institutions and the spectrum of taxes [e.g., value-added taxes (VAT) and income taxes that are properly enforced help]. Greater political and ethnic polarization, inequality, and corruption may reduce a population's cooperation to pay their "fair share", thereby making tax collection harder, increasing country's sovereign spreads, and leading to lower fiscal space.

Tax-base variability. The magnitude of revenue procyclicality depends on production structure. Higher commodity share in the GDP may be associated with higher exposure to procyclicality of state revenues. Higher urbanization and international trade is associated with easier collection of taxes, implying that tax compliance is higher and may result in tax revenue procyclicality.

Social polarization. Public procyclicality may be weaker in countries with more progressive taxes and transfers, as well as more countercyclical infrastructure expenditure [see the Chinese policy for using infrastructure and housing investment as a countercyclical policy].

Data and Empirical Specifications

To estimate the extent of fiscal policy cyclicality and its determinants, we follow Woo (2009) and proceed the analysis in two steps:

- **Step 1:** A regression by country using time series data to measure the cyclicality of fiscal policy for the 1960–2016 period. This is shown as

$$\Delta\, logRGS_{it} = \alpha_i + \beta_i * \Delta\, logRGDP_{it} + \varepsilon_{it}\,, \tag{1}$$

where i and t denote country and year, α_i is a constant term, ε_{it} is an error term, *RGS* is real general government final consumption, and *RGDP* is real gross domestic product. Instead of using OLS regression for (1), we use a standard two-step Prais-Winsten regression to correct for the first-order autocorrelation in the residuals. Estimated beta (namely $\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$) is our measure of fiscal policy cyclicality: a positive and statistically significant coefficient indicates fiscal procyclicality, a negative and statistically significant coefficient indicates fiscal countercyclicality, and a statistically insignificant coefficient indicates fiscal acyclicality.

In order to estimate fiscal policy cyclicality, each country must have at least 25 years of data. Real general government final consumption and real GDP are from the World Development Indicator (WDI) and cover the 1960–2016 perod. The nominal series were deflated using the GDP deflator, leaving us with 137 countries. For the 33 other countries lacking data from WDI, we used data series from the World Economic Outlook (WEO).

- **Step 2:** A cross-country regression explaining fiscal cyclicality.

We next investigate the association between limited fiscal capacity, macro determinants, and institutional variables. The baseline regression is

$$\hat{\beta}_i = \alpha_0 + \gamma_i CONTROL_i + \phi_i X_i + \varepsilon_i\,, \tag{2}$$

where i denotes country, $CONTROL_i$ includes macroeconomic controls (inflation, trade openness, financial openness, government GDP consumption share, and political constraints). X_i represents the determinants of interest, including limited fiscal capacity, export structure, and country risk, respectively. In order to mitigate the heteroskedascity problem, we report OLS regression results of equation (2) with the White robust standard error.

In the second step, the explanatory variables are annual data from 1960 to 2016, which were then averaged. Our variables of interest include:

- *Limited fiscal capacit*y, as measured by the ratio of public debt to tax revenue. We focus on general government tax including social contributions. We also calculate volatility of limited fiscal capacity, measured by standard deviation of limited fiscal capacity. Alternatively, we measure limited fiscal capacity by the ratio of public debt to the three-year moving average of tax revenue.
- *Public debt/GDP and its volatility*, as measured by standard deviation of public debt/GDP.
- *Export structures*, as measured by the export share of manufactured goods, and the export share of natural resources in the total exported goods, respectively.
- *Institutional quality*, as measured by composite risk index and component risk indicators including financial, economic, and political risk (and components of political risk index) from ICRG. We also control for political constraints - the extent to which the executives face political constraints in implementing their policy – which are from Henisz (2002).

Table 1 provides data sources and variable description. Table 2 reports the pairwise correlation matrix of the variables. Table 3 shows descriptive summary statistics of the variables in our sample.

Baseline Results using Government Spending

- The estimated coefficients of government spending cyclicality by country ($\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$) are reported in Appendix Table A2. Countries can be classified into countercyclicality (6 countries), procyclicality (92 countries), and acyclicality (72 countries). Appendix Table A6.1 and Table A6.2 show the key statistics of the most procyclical and the most countercyclical countries by region based on $\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$.
- Table 4 summarizes government spending cyclicality ($\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$) by region and income level. We find that Sub-Saharan Africa has the highest estimates of $\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$ (0.89; most procyclicality), followed by Latin American and the Caribbean (0.77), the Middle East and North Africa (0.69), East Asia and Pacific (0.46), Europe and Central Asia (0.41), South Asia (0.35), and North America with negative and the lowest estimates of $\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$ (-0.25; most countercyclicality). Across income levels, the degree of procyclicality is negatively associated with income level—i.e., non-OECD countries, on average, are more fiscally procyclical (0.74, higher $\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$) than OECD

countries (0.19). Low-income countries are most fiscally procyclical (0.93) followed by lower-middle income countries (0.78), upper-middle income countries (0.69), and the high-income group (0.32).

- Figure 2 shows the fiscal cyclicality of government spending for each country by geographic region and income level. Figure 3 provides a geographic map of estimated government spending procyclicality ($\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$) for all countries in the sample.

We next report the estimation from Step 2, explaining the determinants of fiscal policy cyclicality ($\widehat{\boldsymbol{\beta}}_{\boldsymbol{GS}}$). Table 5 provides the baseline results. We find that:

- *Political constraints* (*polcon*) are negatively associated with government spending cyclicality, implying a greater degree of constraints preventing policy discretions, which in turn limits fiscal procyclicality.
- *Inflation (inf)* is positively associated with fiscal cyclicality.
- *Trade openness (trade)* is negatively associated with fiscal cyclicality, suggesting that more open economies are less prone to procyclical fiscal policy.
- *Financial openness (TAL)* is negatively associated with fiscal cyclicality, implying that the countries are less likely to conduct procyclical fiscal policy if they are more financially open.
- *Government consumption share in GDP (gs)* is not statistically significant in explaining fiscal policy cyclicality.
- More *limited fiscal capacity,* as measured by *public debt/tax base (fiscal, lfiscap)* and its *volatility (fiscal_vol, lfiscap_vol)* are positively associated with fiscal cyclicality, while *public debt/GDP (debt)* and its *volatility (debt_vol)* are not statistically significant in our estimation, suggesting that *public debt/tax base* provides a more robust explanation than *public debt/GDP* for government spending cyclicality.
- *Manufacturing export share (manu)* is negatively associated with fiscal cyclicality, while *natural resource exporters (nare)* are characterized by fiscal procyclicality.
- The composite risk index and all three component risk indices (economic, financial, and political), as well as eight out of twelve political component risk indices (social economic, investment, internal conflict, corruption, military, ethnic, law, bureaucracy), are negatively associated with fiscal procyclicality, thus indicating that higher *institutional risks* are mostly associated with fiscal procyclicality.

Robustness Check using Tax Rates

To support our baseline estimation, we conduct a further analysis on the cyclical behavior of tax rates; the VAT, the personal income tax (PIT) and the corporate income tax (CIT).

- **Data and Empirical Specifications**

Step 1: Regression by country, using time series data to measure the cyclicality of three tax rates (VATs, PITs, and CITs, respectively) for the 1960–2016 period as shown:

$$taxrate_{it} = \alpha_i + \beta_i * \Delta\ logRGDP_{it} + \varepsilon_{it} \quad (3)$$

We use a standard two-step Prais-Winsten procedure to correct for first-order autocorrelation in the residuals. However, in the cases of the PIT and CIT, there are some countries in which the convergence of the AR(1) coefficient is not obtained, hence we use OLS instead (see the note at the end of Tables A4, A5 in the Appendix). The estimated beta ($\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}, \widehat{\boldsymbol{\beta}}\boldsymbol{PIT}, \widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$) is the measure of tax rate cyclicality: positive and significant coefficient indicates countercyclicality, negative and significant coefficient indicates procyclicality, and statistically insignificant coefficient indicates acyclicality.

The data set on the taxes are from Vegh and Vuletin (2015) and includes 76 countries from 1960 to 2016. For the estimation, each country must have at least 25 years of data; as such, we are left with 35 countries with a VAT, 62 countries with a PIT, and 62 countries with a CIT.

Step 2: Cross-country regression explaining tax rate cyclicality

Although the estimated equation is the same as equation (2), we use three different betas ($\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}, \widehat{\boldsymbol{\beta}}\boldsymbol{PIT}, \widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$) as dependent variables. For the control variables, we continue to use macro determinants and vary the specifications as in the baseline estimation. Our variables of

interests remain limited fiscal capacity, public debt, export structure, and institutional quality, among others.

Tables A3–A5 in the Appendix report the estimated coefficients of fiscal policy cyclicality using the VAT, PIT, and CIT, respectively. Table A3 for $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$ classifies the countries into countercyclicality (3 countries), procyclicality (5 countries), and acyclicality (27 countries). Table A4 for $\widehat{\boldsymbol{\beta}}\boldsymbol{PIT}$ categorizes the countries into countercyclicality (6 countries), procyclicality (8 countries), and acyclicality (48 countries). Table A5 for $\widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$ classifies the countries into countercyclicality (2 countries), procyclicality (6 countries), and acyclicality (54 countries). Hence, based on tax rates, most countries are acyclical. Appendix Tables A7.1-A9.2 show the key statistics of the most procyclical and the most countercyclical countries by region based on $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}, \widehat{\boldsymbol{\beta}}\boldsymbol{PIT}, \widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$ respectively.

- Note that the interpretation of $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$ is opposite that of $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$. Table 6 summarizes the estimation results for $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$. As shown, $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$ is not significantly associated with either limited fiscal capacity, public debt, export structure, or most of the country risk indices, except a negative association with economic risk index (ERI) and financial risk index (FRI). It implies that a VAT is more procyclical in the countries with lower economic and financial risk. We also find that VAT cyclicality is positively associated to the inflation rate, meaning that higher-inflation countries are characterized by a procyclical VAT.

In Table 7, which reports the estimation results for $\widehat{\boldsymbol{\beta}}\boldsymbol{PIT}$**,** we notably find

- *Government consumption share* is positively associated with PIT cyclicality in several countries. The findings suggest that countries with higher public spending as a percentage of GDP are less fiscally procyclical and increase the PIT rate in good times and vice versa.
- *GDP growth* is positively associated with PIT cyclicality, indicating that countries with a higher economic growth rate tend to run PIT policy more countercyclically.
- PIT cyclicality is negatively but weakly associated with *trade openness*, however, it is not significantly different from zero in most of the specifications.
- *Limited fiscal capacity volatility* is negatively associated with PIT cyclicality. Countries with greater volatility in limited fiscal capacity may find it harder to run PIT policy countercyclically. However, *limited fiscal capacity*—as well as public debt ratio and its volatility—are not significantly associated with PIT cyclicality.

- *Manufacturing export share* is positively associated with PIT cyclicality (hence, more countercyclical), which is consistent with government spending cyclicality. However, *natural resource share* is not significantly associated with PIT cyclicality.
- *Economic risk index*, and the two components of *political risk index* including *social economic risk* and *internal conflict risk* are positively associated with PIT cyclicality. This finding indicates that lower-risk countries are characterized by countercyclical PIT policy.

Table 8 summarizes estimation results for $\widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$.

- *Government share* is positively associated with CIT cyclicality in several countries as in the case if PIT cyclicality, indicating that countries with higher public spending share to GDP tend to have countercyclical CIT policy.
- *GDP growth* is also positively associated with CIT cyclicality in some countries. Similarly for PIT cyclicality, higher growth rate economies are characterized by countercyclical CIT.
- *Trade openness* is not significantly associated with CIT cyclicality.
- *Limited fiscal capacity* and its volatility, as well as public debt and its volatility, are not significantly associated with CIT cyclicality.
- We find that *manufacturing exporters* are more countercyclical in CIT, while *natural resource exporters* are more procyclical in CIT.
- None of the *country risk indices* are significantly associated with CIT cyclicality.

3. Policy Implications

To derive policy implications, we calculate the economic significance and rank across the explanatory variables. The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression, which allowed us to approximate the effects of one standard deviation change on economic and institutional determinants of the fiscal cyclicality. Figure 4 shows the economic significance of the variables to government spending cyclicality ($\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$) while Fig. 5 shows the economic significance of variables to VAT cyclicality ($\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$). The economic significance of variables to PIT cyclicality ($\widehat{\boldsymbol{\beta}}\boldsymbol{PIT}$) is shown in Fig. 6, and in Fig. 7, the economic significance of variables to CIT cyclicality ($\widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$) is demonstrated. Notably, we find a variation in the economic significance of each determinant on fiscal policy cyclicality

depending on the measure of fiscal policy (government spending, and VAT, PIT, and CIT tax rates).

- Figure 4 shows a one standard deviation change in *country risk indices* and *export structure*, except *natural resource export share*, to have large negative impact on government spending procyclicality (recall that a positive association implies more fiscal procyclicality), followed by a positive impact of *limited fiscal capacity*. Note that the economic significance of *manufacturing export share* is larger on government spending cyclicality than the significance of *natural resource export share*. Focusing on the measure of *limited fiscal capacity*, we also find that the positive economic significance of *public debt/tax base* and its volatility on fiscal procyclicality are larger on government spending cyclicality than *public debt/GDP* and its volatility.
- In addition, the positive economic significance of *limited fiscal capacity* and its volatility, as well as *public debt/GDP volatility*, are larger on VAT procyclicality (recall that positive association implies less fiscal procyclicality) than the economic significance of *country risk indices* and *export structure* (Fig. 5). Focusing on the measure of *limited fiscal capacity*, a one standard deviation change of *public debt/GDP* has a small association with VAT cyclicality compared to *public debt/tax base*.
- The positive economic significance of *limited fiscal capacity* and its volatility are larger on the PIT procyclicality (Fig. 6) and CIT procyclicality (Fig. 7) than any other determinants including *public debt/GDP* and its volatility, *country risk indices*, and *export structure*.

Government-spending cyclicality in OECD and non-OECD countries

We also study different cyclical patterns of government spending in OECD and non-OECD countries using panel regressions with pooled-OLS and fixed effects (controlling for country and year effects) specifications, as shown in Table 9. We find that although both OECD and non-OECD countries are characterized by procyclical fiscal policy, the non-OECD countries are characterized by more procyclical government spending patterns in the data.

Government-spending cyclicality by income level

We also use the fixed-effect estimation (controlling country and year effects) to study the cyclical patterns of government spending across income groups. As shown in Table 10, higher-

income countries are associated with smaller procyclical fiscal patterns, which is also consistent with our baseline results.

Government-spending cyclicality by sub-periods

As the government-spending cyclicality may be time varying, we divided the whole sample (1960–2016) into 6 sub-periods (1960–1971, 1972–1980, 1981–1989, 1990–1998, 1999–2007; and 2008–2016) with the first sub-period covering 12 years and the others covering 9 years of data [see Tables 11–12]. As shown in Table 11, the period of 1981–1989 is characterized by the largest procyclical government-spending patterns, followed by the next period (1990–1998), similar to the earlier period of 1960–1971, followed by the period 1999–2007 and the period 1972–1980. During the most recent period, 2008–2016, countries became less procyclical in their government spending. Using the fixed effects estimation with country and time controls [see Table 12], we also find that the highest procyclical period is from 1981 to 1989 and that countries have run less procyclical fiscally in recent years.

Tax rate cyclicality by country group

As shown in Tables 13 and 14 (using fixed and random effects, respectively), we find that OECD countries are fiscally procyclical in VATs, but countercyclical in CITs and PITs while non-OECD countries are associated with tax procyclicality in CITs and PITs.

Determinants of government-spending cyclicality across regions

In order to examine the economic significance of each variable on region-specific, government-spending cyclicality, we replicate the above mentioned analysis by region when North America and South Asia are dropped due to insufficient data. Therefore, we are left with five regions: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, and Sub-Saharan Africa.

Figures 8–12 show the economic significance by region, focusing on the associations of *public debt*, *export structure*, and *country risk indices* with government-spending cyclicality.

East Asia and Pacific countries: *Good governance and institutional quality*, as measured by most of the country risk indices, have large and negative effects on fiscal procyclicality

(except *external conflict index* which is not statistically significant). We find that *export structure* has a smaller association than *country risk indices* and that these findings for East Asia and the Pacific region are opposite from the baseline results and are not statistically significant. The economic significance of *limited fiscal capacity* is larger than *public debt/GDP*.

Europe and Central Asia countries: *Manufacturing export share* has a negative and large association with fiscal procyclicality. Most of the political risk indices have a negative and statistically significant association with fiscal procyclicality. *Natural resource share of exports* also has a large and positive but statistically insignificant association with fiscal cyclicality. In this region, all *limited fiscal capacity volatility* and *public debt/GDP volatility* have a positive effect on government-spending procyclicality, while *limited fiscal capacity* and *public debt/GDP* have a negative effect. Only *public debt/GDP* has a statistically significant association. Overall, *public debt/GDP* has a larger and negative association with fiscal cyclicality than that of *public debt/tax base*.

Latin America and Caribbean countries: Several *country risk variables* have large associations with fiscal cyclicality, followed by the economic significance of *public debt/GDP* and its volatility. The economic significance of *public debt/GDP* is larger than that of *limited fiscal capacity*. *Natural resource share of exports* has a large and positive association as expected, while the reverse is found for *manufacturing export share*, but it is statistically insignificant.

The Middle East and North Africa countries: *Ethnic index* has a large economic significance in this region on government-spending cyclicality, followed by economic significance of *government stability index* and *limited fiscal capacity* variables. However, the *limited fiscal capacity* is negative and statistically insignificant on the fiscal procyclicality. The economic significance of other risk indices is inconclusive, varying from negative to positive with some statistically significant and the others insignificant. The economic significance of *export structure* variables and *public debt/GDP* is rather small.

Sub-Saharan African countries: We find a large and positive economic significance of *limited fiscal capacity* variables, while *public debt/GDP* has a small and negative economic significance on government-spending cyclicality. Most of the *country risk indices* have a positive effect on fiscal procyclicality. *Manufacturing export share* has large and negative economic significance compared to the *natural resource export share*.

Simulation of an Increase in Public Debt/Tax Base: Government-spending cyclicality by region

To gain further insight, we looked closely at the economic significance of *limited fiscal capacity* on government-spending cyclicality, using both the *public debt/tax base* [see Fig. 13] and the *public debt/3-year average tax base* [see Fig. 14]. We performed this by simulating the economic significance of a 10% drop in fiscal capacity—specifically, 0.1*Regional-Specific estimated coefficient of public debt/tax base*Regional-Specific public debt/tax base average over the 1960-2016 period.

The upper panels in Figs. 13 and 14 show the limited de-facto fiscal capacity, as measured by *public debt/tax base*, during the recent years of 2010 to 2016. East Asia and the Pacific and the Middle East and North Africa have lower fiscal capacity compared with Latin America and Caribbean, Sub-Saharan Africa, and Europe and Central Asia. However, it can be seen from the lower panels in Figs. 13 and 14 that Sub-Saharan Africa is the most fiscally fragile and exposed to large government-spending procyclicality if its fiscal space deteriorates. Our simulation suggests a lesser degree of fiscal fragility in East Asia and the Pacific, but still more exposed than Latin America and the Caribbean, Europe and Central Asia, and the Middle East and North Africa.

Simulation of an Increase in Public Debt/Tax Base: Government spending cyclicality by country

We also conduct a simulation for each country, specifically: 0.1*Country-Specific public debt/tax base*Regional-Specific estimated coefficient of public debt/tax base to estimate the economic significance of a 10% drop in fiscal capacity on country-specific, government-spending cyclicality. We use regional-specific coefficient in place of country-specific coefficient as there is insufficient country-level data to estimate the 2nd-step regression (that is, equation (2); $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ = f[Public Debt/Tax Base, Control Variables]) on the country-by-country basis. As shown in the upper panels of Figs. 15 and 16, Iraq, Japan, Singapore, Egypt, Greece, Libya, Yemen, Jamaicaare notably characterized by limited fiscal capacity in the recent years (2010–2016), with levels of public debt approximately four to eight times higher than tax revenues, except Iraq with their public debt approximately forty time higher than tax revenue. According to the simulation,

fiscally fragile countries are in Sub-Saharan Africa (Republic of Congo, Nigeria, Rwanda Seychelles,) and East Asia and the Pacific (Singapore, Vietnam, Indonesia, Cambodia, Japan).

Robustness check

In order to test the role by tax revenue components, we simulate the regressions above using tax base without social security contributions, which contributes greatly to total tax revenue in some countries but not the others. Without social contributions, fiscal capacity is more constrained and government probably finds harder to run fiscal policy countercyclically as the economic significance of *limited fiscal capacity* to government spending cyclicality is slightly higher in this case. However, overall, there is not significant difference in regression results as well as economic significance of each variables to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}, \widehat{\boldsymbol{\beta}}\boldsymbol{VAT}, \widehat{\boldsymbol{\beta}}\boldsymbol{PIT}, \widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$ either in the whole sample or in sub-regions. However, to save space, these robustness check results are not presented in this paper, which will be provided as required.

4. Government Spending Simulation

To examine the sensitivity of our main variables of interest to spending category by general government, we replicate the above analysis covering the 1980-2016 period using another proxy of government spending taking into account capital investment. General government total expenditure in this case is defined as total expense plus the net acquisition of nonfinancial assets. The net acquisition of nonfinancial assets equals gross fixed capital formation less consumption of fixed capital plus changes in inventories and transactions in other nonfinancial assets.

- In terms of the ranking of government cyclicality across regions, Sub-Saharan Africa (0.94) and Latin America & Caribbean (0.8) are still at the top of the list as the most procyclical regions. Higher income level regions are still characterised by lower degree of procyclicality, and OECD group, on average, have run government spending policy more countercyclically than non-OECD countries [see Table 15]. It is also shown in Figure 17 that most of the Sub-Saharan African countries are procyclical, followed by Latin American & Caribbean countries although any implication should be taken cautiously because of data insufficiency in this case.

- Table 16 shows the determinants of fiscal cyclicality where *public debt* and *its volatility* are significantly and positively associated with $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ as expected but *limited fiscal capacity* is not. As capital investment is taken into consideration, *public debt* appears more sensitive than *limited fiscal capacity* in explaining government spending cyclicality. Regarding export structure, *manufacturing export share* is negatively associated with fiscal cyclicality while *natural resources export share* is not significant. The country risk indices including composite risk index, economic risk index, government stability, socioeconomic conditions, corruption, and law and order are negatively associated with fiscal cyclicality as in the baseline model.
- As using tax rate as a robustness check, it is shown that neither VAT nor CIT is explained by our main variables of interest. However, PIT seems to be very sensitive to risk indices including the composite and all three component risk indices as well as 5 political component risk proxies consisting of socioeconomic conditions, investment profile, internal conflict, military in politics, and law and order [see Tables 17-18].

Government-spending cyclicality in OECD and non-OECD countries

- As controlling capital formation as another spending category in panel regression using OLS and fixed effects estimations alternatively, it is still consistent that non-OECD countries are more fiscally procyclical than OECD counterparts although both groups are indicated to be procyclical [see Table 19].

Government-spending cyclicality by income level

- Again, it is supported by Table 20 using panel regression that lower income countries have highest level of government-spending procyclicality and vice versa for the higher income groups. The results are robust in fixed effects specification controlling both country and year effects.

Government-spending cyclicality by sub-period

- We divided the whole sample into 2 periods, pre-crisis (pre-2008) and post-crisis (from 2008 onwards) to consider the changes in government-spending cyclicality as the global

crisis aftermath. It is implied by Table 21 that the recent period (2008-2016) is depicted as a more fiscally procyclical epoch compared to the previous time. As breaking down the sample into 4 sub-periods, the 1980-1989 period is marked with the highest level of fiscal procyclicality, followed by the 1999-2007 period which is nearly the same procyclical as the post-crisis period while the 1990-1998 period, surprisingly, has lowest level of government-spending procyclicality [see Table 22].

Government-spending cyclicality by countries pre-crisis and post-crisis

To get further insight on how fiscal behaviour by country changes after the global financial crisis, we estimated the following equation for each country.

$$\Delta\, logRGS_{i,t} = \alpha_i + \beta_i * \Delta\, logRGDP_{it} * dpre + \lambda_i * \Delta\, logRGDP_{it} * dpost + \varepsilon_{i,t} \qquad (4)$$

Where *dpre* and *dpost* are dummies with *dpre=1* during the pre-crisis period and 0 otherwise, and *dpost=1* during the post-crisis period and 0 otherwise. Prais-Winsten estimation is also employed to correct for the first-order autocorrelation in the residuals. The difference in government-spending cyclicality in each country can be detected by comparing the two coefficients *(β, λ)* [see Appendix Table A12], then each country is treated as either *still in school* (both *β* and *λ* are positive), *back to school* (*β* is negative but *λ* is positive), *recent graduates* (*β* is positive but *λ* is negative), or *established graduates* (*β* and *λ* are both negative) [see Figure 18]. It is shown that most of the Sub-Saharan African, Latin American & Caribbean, and Middle East & North African countries belong to the top right quadrant while most of Europe & Central Asian countries gather in the bottom left quadrant.

Economic significance of the variables to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$

Figure 19 ranks the economic significance of the variables on government-spending cyclicality. Most of the country risk indices have negative and greater effect than other variables, followed by *public debt* and its volatility, and export structure. Meanwhile, *limited fiscal capacity* have positive but insignificant effect on $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$.

Economic significance of the variables to tax cyclicality

Figures 20-21 shows how $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$ and $\widehat{\boldsymbol{\beta}}\boldsymbol{PIT}$ are affected by the variables respectively. Although *limited fiscal capacity* and its volatility have a big economic significance on tax cyclicality but they are not statistically significant. Only *public debt volatility* and

bureaucracy quality have significant effect on $\widehat{\boldsymbol{\beta}}\boldsymbol{VAT}$ while all of the country risk indices have positive and significant impact on $\widehat{\boldsymbol{\beta}}\boldsymbol{PIT}$**.** Overall, VAT cyclicality appears not to be very sensitive to our variables while PIT cyclicality seems to be extremely sensitive to the country risk indices, which is consistent to the baseline results.

5. Developing Asia

In this section, we focus on the government spending behaviour in the developing Asian economies by regroup the countries based on Asian Development Bank (ADB) classification [see Appendix Table A13] employing general government final consumption expenditure as in the baseline model.

Government spending cyclicality by sub-region

Table 23 shows panel regression results of the percentage change of government spending on GDP growth rate on 5 sub-regions in developing Asian countries using Fixed Effects. Central Asia is characterized as the most procyclical area, followed by East Asia and Southeast Asia while South Asia and The Pacific are marked as acyclical regions. As controlling year fixed effects, however, Central Asia appears to be fiscally acyclical along with South Asia and The Pacific when East Asia and Southeast Asia are still ranked as the most procyclical areas. [See the note at the end of Table 23 for the list of 40 out of 45 countries in the panel regression].

Due to the data insufficiency, the ranking of cyclicality across sub-regions in developing Asia based on estimated $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ is different from that in panel regression [see Table 24]. Notice that we are able to control 32 countries in this case where Central Asia is consistently portrayed with greatest procyclical fiscal policy (0.92), which is surprisingly very close to The Pacific's grade (0.91). As grouping the countries by sub-developing Asian regions, these maximum points are notably higher than that of Sub-Saharan region (0.89) and Latin America & Caribbean (0.77), which are the maximum values in the whole sample. Meantime, East Asia (0.5), Southeast Asia (0.4), and South Asia (0.35) are described as the least procyclical regions. Overall, the average $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ of developing Asia (0.6) is still lower than that of the entire sample (0.64).

More clearly, Figures 22-23 sketch the estimated coefficient $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ by country whereby Bangladesh, Mongolia, Vanuatu, Indonesia, Kazakhstan, Georgia, Philippines, Kyrgyz Republic, Papua New Guinea, Pakistan, and Azerbaijan have the most procyclical government spending with $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ higher than 1, indicating that the government spending in these countries growths more

proportionately than GDP growth rate. On the contrary, Cambodia, Sri Lanka, Maldives, Bhutan, Republic of Korea, and Brunei Darussalam are the most countercyclical/acyclical countries with negative and statistically significant/insignificant $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$.

Determinants of government spending cyclicality

To examine how government spending behaviour of developing Asian countries is determined, we replicate cross sectional regression (equation (2)) for this region taking public debt, export structure, and country risk indices into account and calculate the economic significance of the variables to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$, likewise Figures 8-12. It can be seen from Figure 24 that *limited fiscal capacity* variables are positively associated to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$, which is similar to the baseline results for the whole sample although the volatility of limited fiscal capacity are more significant than itself. Their economic significance to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ is much higher than that of *public debt/GDP,* approximately the same as that of composite risk indices but much lower than that of several political component risk indices such as *corruption, investment,* and *bureaucracy*. *Public debt/GDP* and its volatility, however, are not significant to explain the government spending cyclicality and their economic significance is very modest. While all the *composite risk indices* are not significant in the regression, six out of twelve *political component risk indices* are statistically significant with mixed results. Only *external conflict* is positively associated with $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ when the other component indices are negatively associated with $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$. In terms of export structure, more procyclical government spending in this region could be explained by *manufacturing export share*, which has moderate economic significance to $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$, but not *natural resource share of exports* which shows slight economic significance. [See the note at the end of Figure 24 for the level of significance].

Simulation of an increase in Public Debt/Tax Base by sub-region

It can be shown that *limited fiscal capacity* is still a more robust explanation than *public debt/GDP* in developing Asia region. Figure 25 describes the fluctuations of fiscal capacity by sub-region during the past 17 years (2000-2016) making use of data availability. On average, South Asia is indicated as the most volatile area in terms of public debt/tax base over the 2000-2016 period with the most limited fiscal capacity. Southeast Asia, in spite of the rapid change of public debt/tax base, ends up the period with approximately double fiscal capacity compared to the year 2000. Meantime, the average public debt/tax base is far lower in other sub-regions, which is around 2-3, and decreases to about 1.5 at the end of the period. Nevertheless, any inference and/or

comparison for The Pacific region should be taken cautiously, which only includes data of Federated States of Micronesia on public debt/tax base in this case.

Taking into account that government spending behaviour of the 5 sub-regions in developing Asia is likely to be affected by the same condition while it is also determined by their specific fiscal capacity level, we approximate the change of government spending cyclicality in these sub-regions when their public debt/tax base increases by 10% by calculating 0.1*Estimated coefficient of Public Debt/Tax Base*Actual sub-region specific public debt/tax base average over 1960-2016. The predicted economic significance of public debt/3-year average tax base is also approximated using a different estimated coefficient. [See Figure 26]. It can be seen that the economic significance of public debt/tax base to government spending cyclicality is not much different in two cases of using two alternative proxies of limited fiscal capacity. If it is the case, Southeast Asia and South Asia are predicted as the two fragile regions across developing Asia when their fiscal capacity decreases, which is consistent to their highest level of public debt/tax based depicted in Figure 10. By contrast, Central Asia and East Asia are in a safer condition with higher fiscal capacity.

Simulation of an increase in Public Debt/Tax Base by country

The upper panel of Figures 27-28 illustrates the average public debt/tax base (public debt/3-year average tax base) over the recent years (2010-2016) by country, showing that Myanmar, Singapore, Bhutan, and Pakistan are at the top of the list regarding their limited fiscal capacity with public debt being sixth to eighth times higher than their tax revenue. We also conduct a simulation of a 10% decrease of fiscal capacity to government spending cyclicality for each country by calculating 0.1*Estimated coefficient of public debt/tax base*Actual country-specific public debt/tax base average over 1960-2016, and similarly for public debt/3-year average tax base indicator using a different estimated coefficient [see Figures 27-28]. However, as taking their limited capacity over the whole period (1960-2016) into consideration, it is anticipated that Myanmar and Lao People's Dem. Rep. are probably the most fiscally procyclical countries across developing Asia as facing higher public debt/tax base.

5. Concluding Remarks

Our study reveals a mixed fiscal environment in which more than half of the countries in the study are characterized by limited fiscal space and fiscal policy is either pro- or acyclical. We

also confirm that public debt/average tax base is a robust measure of limited fiscal space and more informative than public debt/GDP. We used the estimated regressions to simulate the impact of an enduring interest-rate rise on fiscal space and ranked countries by the fragility/robustness of their fiscal space to such a shock.

A limitation of our study is that, due to data constraints, we focus on the general government and thereby overlook the contribution of local and state government in a federal union system to cyclicality patterns. Chances are that controlling for these issues, we would find deeper pro- or acyclical patterns (e.g., in the U.S., state governments are frequently forced to apply procyclical expenditure patterns, which means cutting budgets at time of deep and prolonged recessions).

Considering the sizable increase in total leverage/GDP in the aftermath of the GFC, countries could use the global recovery as an opportune time to invest in greater fiscal space, which could be done by increasing the tax base. Countries could also benefit by investing in countercyclical fiscal buffers, including the accumulation of Sovereign Wealth Fund in good times to mitigate tax revenue shortfalls in bad times [e.g., Chile, Norway]. Likewise, a deeper safety net will add a countercyclical buffer that mitigates the adverse income effects of recessions, thus reducing income inequalities over time.

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Cross sectional regression

Table 1. Variable description

Variable	Description	Source
$\hat{\beta}GS$	The time series estimated coefficient from regression of percentage change of real government spending on percentage change of real GDP, 1960-2016	Prais-Winsten estimation
$\hat{\beta}VAT$	The time series estimated coefficient from regression of Value Added Tax rate on real GDP growth rate, 1960-2016	Prais-Winsten estimation
$\hat{\beta}PIT$	The time series estimated coefficient from regression of Personal Income Tax rate on real GDP growth rate, 1960-2016	Prais-Winsten estimation & OLS estimation
$\hat{\beta}CIT$	The time series estimated coefficient from regression of Corporate Income Tax on real GDP growth rate, 1960-2016	Prais-Winsten estimation & OLS estimation
debt	General Government Gross Debt-to-GDP Ratio, average 1960-2016. Gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future. This includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable.	IMF Historical Public Debt (1800-2016)
debt_vol	Standard deviation of General Government Gross Debt-to-GDP Ratio, 1960-2016	IMF Historical Public Debt (1800-2016)
fiscap	Limited fiscal capacity measured by public debt/ tax revenue, average 1980-2016, where tax revenue refers to General Government Total Tax Revenue-to-GDP Ratio, including social contributions	Tax ratio from ICTD/ UNU-WIDER Government Revenue Dataset 2017 (1980-2016) Public debt from Historical Public Debt (1800-2016)
fiscap_vol	Volatility of limited fiscal capacity measured by standard deviation of public debt/ tax revenue, 1980-2016	Tax ratio from ICTD/ UNU-WIDER Government Revenue Dataset 2017 (1980-2016) Public debt from Historical Public Debt (1800-2016)
lfiscap	Limited fiscal capacity measured by public debt/3-year moving average of tax revenue, average 1980-2016	Tax ratio from ICTD/ UNU-WIDER Government Revenue Dataset 2017 (1980-2016) Public debt from Historical Public Debt (1800-2016)
lfiscap_vol	Volatility of limited fiscal capacity measured by standard deviation of public debt/3-year moving average of tax revenue, 1980-2016	Tax ratio from ICTD/ UNU-WIDER Government Revenue Dataset 2017 (1980-2016) Public debt from Historical Public Debt (1800-2016)
polcon	Political constraints faced by executives in implementing policy, average 1960-2016	Henisz, W. J. (2002) Time coverage: 1800-2016
trade	Total exports and imports/GDP, average 1960-2016	WDI Time coverage: 1960-2016
inf	Inflation, average 1960-2016	WDI Time coverage: 1960-2016

Cross sectional regression

GDP	GDP growth rate, average 1960-2016	WDI Time coverage: 1960-2016
nare	The ratio of natural resources exports (including agricultural raw materials, ores and metals, fuel, and food) in total exports, average 1960-2016	WDI Time coverage: 1960-2016
manu	The ratio of manufactured exports (including chemicals, basic manufactures, machinery and transport equipment, and miscellaneous manufactured goods, excluding non-ferrous metals) in total exports, average 1960-2016	WDI Time coverage: 1960-2016
TAL	Total foreign assets and liabilities/GDP to measure de facto financial integration, average 1970-2011	Philip R Lane and Milesi-Ferretti (2007) Time coverage: 1970-2011
gs	Government consumption share of GDP, average 1960-2016 General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	WDI (1960-2016) WEO (1980-2016) for Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Maldives, Taiwan, St. Vincent and the Grenadines
CRI	Composite Risk Index, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
ERI	Economic Risk Index, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
FRI	Financial Risk Index, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
PRI	Political Risk Index, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
govstab	Government Stability, ranging 0-12 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
socecon	Socioeconomic onditions, ranging 0-12 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
invest	Investment Profile, ranging 0-12 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
inconflict	Internal Conflict, ranging 0-12 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
exconflict	External Conflict, ranging 0-12 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
corrupt	Corruption, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016

Cross sectional regression

military	Military in Politics, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
religious	Religious Tensions, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
law	Law and Order, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
ethnic	Ethnic Tensions, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
democracy	Democratic Accountability, ranging 0-6 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016
bureau	Bureaucracy Quality, ranging 0-4 point, higher point meaning lower risk	International Country Risk Guide Time coverage: 1984-2016

Cross sectional regression

Table 2. Pairwise correlation matrix

	$\hat{\beta}GS$	$\hat{\beta}VAT$	$\hat{\beta}PIT$	$\hat{\beta}CIT$	polcon	inf	trade	TAL	gs	GDP	debt	debt_vol	fiscap	fiscap_vol
$\hat{\beta}GS$	1													
$\hat{\beta}VAT$	-0.0259	1												
$\hat{\beta}PIT$	-0.1523*	-0.0223	1											
$\hat{\beta}CIT$	-0.1934*	-0.2601*	0.0867	1										
polcon	-0.2241*	-0.0835	-0.0048	0.1802*	1									
inf	0.1985*	-0.2915*	-0.1117*	-0.0104	0.0879*	1								
trade	-0.1652*	0.0809	0.0093	-0.0248	-0.1541*	-0.1115*	1							
TAL	-0.1319*	-0.0414	-0.0014	-0.0114	0.0913*	-0.0377	0.3254*	1						
gs	0.0886*	-0.0431	0.1640*	0.1103*	0.1863*	0.0078	0.0716*	0.0055	1					
GDP	-0.1219*	0.0322	0.3207*	0.1506*	-0.2349*	-0.1557*	0.2910*	-0.0009	-0.1315*	1				
debt	0.0558*	0.066	-0.1392*	0.1263*	-0.0529	0.1535*	0.0079	-0.0960*	0.0937*	-0.0177	1			
debt_vol	0.0965*	-0.1901*	-0.1862*	0.1294*	0.0068	0.3203*	0.0204	-0.0417	0.0654*	-0.0157	0.8178*	1		
fiscap	0.0362	0.1229*	-0.1406*	0.1600*	0.1318*	0.0230	-0.0200	-0.0195	0.0803*	0.1943*	0.1937*	0.2137*	1	
fiscap_vol	0.0350	0.0392	-0.2325*	-0.00660	0.1383*	0.0454	-0.0230	-0.0150	0.0810*	0.1839*	0.1889*	0.2213*	0.9988*	1
lfiscap	0.0381	0.115	-0.1519*	0.1545*	0.1291*	0.0255	-0.0211	-0.0209	0.0768*	0.1966*	0.1975*	0.2152*	0.9998*	0.9989*
lfiscap_vol	0.0371	0.0222	-0.2162*	-0.00350	0.1369*	0.0415	-0.0235	-0.0156	0.0788*	0.1844*	0.1850*	0.2130*	0.9982*	0.9997*
nare	0.2301*	-0.0466	-0.2299*	-0.2321*	-0.1129*	0.2142*	-0.1917*	-0.1284*	0.0014	-0.0176	0.1230*	0.2489*	0.1977*	0.1974*
manu	-0.3027*	-0.0481	0.3746*	0.3119*	0.2703*	-0.0823*	0.0358	-0.0107	0.0680*	-0.0538*	-0.2037*	-0.1953*	-0.1382*	-0.1380*
CRI	-0.3516*	-0.0986	0.1866*	0.1213*	0.1651*	-0.3214*	0.3090*	0.2214*	0.2421*	0	-0.4549*	-0.4087*	-0.3288*	-0.3254*
ERI	-0.3033*	-0.2327*	0.2805*	0.1460*	0.1637*	-0.3574*	0.3246*	0.1771*	0.1706*	0.1577*	-0.5123*	-0.4626*	-0.2509*	-0.2512*
FRI	-0.2849*	-0.2170*	0.1706*	0.1503*	0.1499*	-0.3105*	0.2660*	0.1885*	0.1467*	0.0670*	-0.5246*	-0.4599*	-0.3104*	-0.3100*
PRI	-0.3515*	-0.011	0.1336*	0.0865	0.1555*	-0.2739*	0.2845*	0.2263*	0.2738*	-0.0907*	-0.3464*	-0.3127*	-0.3270*	-0.3211*
govstab	-0.1351*	-0.1251*	0.1085*	0.0473	-0.1095*	-0.2031*	0.3479*	0.2690*	0.2117*	0.1835*	-0.3753*	-0.3088*	-0.1893*	-0.1925*
socecon	-0.3736*	-0.1680*	0.2288*	0.1736*	0.1641*	-0.2967*	0.2945*	0.2282*	0.1803*	0.0818*	-0.3898*	-0.3498*	-0.2830*	-0.2803*
invest	-0.3759*	-0.0274	0.1466*	0.0591	0.1816*	-0.3452*	0.3137*	0.2100*	0.1830*	0.0610*	-0.3702*	-0.3332*	-0.2058*	-0.2026*
inconflict	-0.2607*	-0.0076	0.2046*	0.1147*	0.05	-0.2384*	0.3465*	0.1898*	0.2461*	-0.1077*	-0.3111*	-0.2812*	-0.3531*	-0.3477*
exconflict	-0.1621*	0.1953*	-0.0372	-0.0631	0.0826*	-0.2068*	0.1873*	0.1333*	0.1401*	-0.2246*	-0.2839*	-0.3105*	-0.3994*	-0.3957*
corrupt	-0.4043*	0.0884	0.1322*	0.1152*	0.2311*	-0.2350*	0.1515*	0.2212*	0.2897*	-0.1015*	-0.1643*	-0.1622*	-0.1745*	-0.1695*
military	-0.3030*	0.0154	0.0207	0.0795	0.1342*	-0.2116*	0.2987*	0.1525*	0.3237*	-0.1596*	-0.2784*	-0.2477*	-0.3175*	-0.3121*
religious	-0.0947*	-0.0715	-0.0177	-0.2277*	0.0052	0.0658*	0.1278*	0.1137*	0.1003*	-0.2772*	-0.1336*	-0.0912*	-0.2087*	-0.1939*
law	-0.3228*	-0.1877*	0.1754*	0.1755*	0.1708*	-0.2549*	0.2600*	0.2036*	0.3718*	0.0026	-0.2913*	-0.2593*	-0.2284*	-0.2214*
ethnic	-0.2176*	0.0442	0.1912*	0.0082	-0.0295	-0.1382*	0.1680*	0.0963*	0.1432*	-0.0021	-0.2948*	-0.1960*	-0.2397*	-0.2369*
democracy	-0.2331*	0.1555*	-0.0211	0.073	0.3384*	-0.1766*	-0.0457	0.1319*	0.1623*	-0.2661*	-0.0709*	-0.0896*	-0.1726*	-0.1672*
bureau	-0.3605*	0.1329*	0.0733	0.1710*	0.2462*	-0.2529*	0.1794*	0.1837*	0.2801*	-0.0269	-0.2616*	-0.2870*	-0.2079*	-0.2085*

Cross sectional regression

Table 2: Pairwise correlation matrix *(continued)*

	lfiscap	lfiscap_vol	nare	manu	CRI	ERI	FRI	PRI	govstab	socecon	invest	inconflict	exconflict	corrupt
lfiscap	1													
lfiscap_vol	0.9987*	1												
nare	0.2009*	0.2005*	1											
manu	-0.1419*	-0.1409*	-0.5883*	1										
CRI	-0.3326*	-0.3260*	-0.4720*	0.4925*	1									
ERI	-0.2541*	-0.2500*	-0.3465*	0.3916*	0.9023*	1								
FRI	-0.3126*	-0.3084*	-0.3507*	0.4293*	0.9227*	0.9008*	1							
PRI	-0.3311*	-0.3231*	-0.5166*	0.5001*	0.9593*	0.7635*	0.7952*	1						
govstab	-0.1916*	-0.1926*	-0.1187*	0.0816*	0.6201*	0.5925*	0.6140*	0.5597*	1					
socecon	-0.2857*	-0.2808*	-0.4235*	0.4194*	0.9369*	0.8755*	0.8729*	0.8828*	0.5970*	1				
invest	-0.2101*	-0.2048*	-0.4495*	0.4187*	0.9118*	0.8461*	0.8293*	0.8704*	0.5761*	0.8592*	1			
inconflict	-0.3575*	-0.3498*	-0.4443*	0.4584*	0.8488*	0.6371*	0.6816*	0.9097*	0.5473*	0.7503*	0.7150*	1		
exconflict	-0.4006*	-0.3948*	-0.2926*	0.3551*	0.6754*	0.4942*	0.5297*	0.7362*	0.3365*	0.5347*	0.5896*	0.7066*	1	
corrupt	-0.1781*	-0.1727*	-0.4574*	0.4385*	0.7889*	0.6075*	0.6035*	0.8490*	0.3603*	0.7463*	0.7040*	0.6878*	0.5480*	1
military	-0.3221*	-0.3145*	-0.4634*	0.4697*	0.8286*	0.6141*	0.6776*	0.8859*	0.4130*	0.7248*	0.7523*	0.8090*	0.6466*	0.7021*
religious	-0.2097*	-0.1931*	-0.2550*	0.2456*	0.4586*	0.2031*	0.2931*	0.5840*	0.1619*	0.3262*	0.3742*	0.5917*	0.5073*	0.4378*
law	-0.2329*	-0.2239*	-0.4848*	0.4483*	0.8395*	0.6933*	0.6905*	0.8638*	0.5656*	0.8049*	0.7341*	0.7978*	0.4687*	0.8013*
ethnic	-0.2423*	-0.2397*	-0.3278*	0.2382*	0.5817*	0.4068*	0.4488*	0.6452*	0.4033*	0.5068*	0.4484*	0.6679*	0.4343*	0.4478*
democracy	-0.1756*	-0.1705*	-0.5496*	0.4930*	0.5828*	0.3686*	0.3980*	0.6835*	-0.0131	0.4872*	0.5335*	0.5163*	0.5465*	0.7096*
bureau	-0.2115*	-0.2105*	-0.4752*	0.4958*	0.8624*	0.7302*	0.7496*	0.8650*	0.4070*	0.8436*	0.7864*	0.6823*	0.5686*	0.8381*

Table 2: Pairwise correlation matrix *(continued)*

	military	religious	law	ethnic	democracy	bureau
military	1					
religious	0.4985*	1				
law	0.7505*	0.3584*	1			
ethnic	0.5218*	0.4636*	0.5240*	1		
democracy	0.6419*	0.4490*	0.5157*	0.2803*	1	
bureau	0.7556*	0.3528*	0.7681*	0.3950*	0.6859*	1

*Note: * denotes 5% level of significance*

Cross sectional regression

Table 3. Summary statistics of the variables

Variable	Observation	Mean	SD	Min	Max
$\hat{\beta}GS$	170	0.639	0.720	-2.898	3.440
$\hat{\beta}VAT$	35	-0.011	0.089	-0.202	0.219
$\hat{\beta}PIT$	62	0.037	0.813	-2.742	3.223
$\hat{\beta}CIT$	62	-0.001	0.144	-0.381	0.524
polcon	148	0.375	0.105	0.074	0.667
inf	164	0.364	1.008	0.016	7.163
trade	169	0.801	0.431	0.191	3.307
TAL	165	2.811	13.422	0.364	172.447
gs	170	0.154	0.061	0.001	0.358
GDP	169	0.040	0.022	-0.014	0.170
debt	167	0.568	0.362	0.016	2.601
debt_vol	167	0.305	0.354	0.009	3.175
fiscap	104	6.122	32.701	0.262	335.230
fiscap_vol	104	5.545	40.026	0.132	408.067
lfiscap	104	5.700	28.232	0.271	289.602
lfiscap_vol	104	5.234	36.670	0.157	373.884
nare	165	0.444	0.279	0.011	1.441
manu	165	0.259	0.229	0.000	0.844
CRI	132	66.557	11.166	34.360	90.053
ERI	132	33.846	5.284	19.078	44.803
FRI	132	34.984	5.505	18.561	47.359
PRI	132	64.160	12.944	27.703	91.894
govstab	132	7.619	0.910	4.543	10.653
socecon	132	5.702	1.925	1.259	10.187
invest	132	7.453	1.589	2.424	10.521
inconflict	132	8.850	1.776	3.520	11.999
exconflict	132	9.657	1.372	5.225	11.977
corrupt	132	2.956	1.118	0.741	5.929
military	132	3.796	1.599	0.341	6.000
religious	132	4.552	1.159	1.081	6.000
law	132	3.685	1.253	0.992	6.000
ethnic	132	3.980	1.179	0.857	6.000
democracy	132	3.794	1.394	0.885	6.000
bureau	132	2.167	1.056	0.000	4.000

Cross sectional regression

Table 4. Government spending cyclicality $\widehat{\beta}GS$ by region and income, 1960-2016

	Mean	SD	Minimum	Maximum
Region				
East Asia & Pacific	0.46	0.72	-0.98	1.84
Europe & Central Asia	0.41	0.55	-1.36	1.47
Latin America & Caribbean	0.77	0.54	-0.13	2.42
Middle East & North Africa	0.69	0.35	0.16	1.36
North America	-0.25	0.36	-0.50	0.01
South Asia	0.35	1.02	-0.67	2.08
Sub-Saharan Africa	0.89	0.93	-2.90	3.44
Level				
High income	0.32	0.53	-1.36	1.56
Low income	0.93	1.13	-2.90	3.44
Lower middle income	0.78	0.67	-0.98	2.08
Upper middle income	0.69	0.50	-0.54	2.42
OECD group				
OECD	0.19	0.55	-1.36	1.36
non-OECD	0.74	0.72	-2.90	3.44
Entire sample (170 countries)	**0.64**	**0.72**	**-2.90**	**3.44**

Cross sectional regression

Table 5. Determinants of fiscal behaviour

Dependent variable: Government spending cyclicality $\hat{\beta}GS$

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
polcon	-1.950***	-1.861***	-1.859***	-1.861***	-1.861***	-1.958***	-1.945***	-1.759***	-1.461***	-1.592***	-1.624***	-1.684***	-1.634***
	(0.553)	(0.557)	(0.558)	(0.557)	(0.558)	(0.548)	(0.555)	(0.559)	(0.516)	(0.594)	(0.593)	(0.595)	(0.604)
inf	0.134**	0.121	0.120	0.120	0.120	0.136**	0.126**	0.107*	0.113*	0.0853	0.0950	0.106	0.0911
	(0.0641)	(0.0812)	(0.0812)	(0.0812)	(0.0811)	(0.0621)	(0.0619)	(0.0643)	(0.0617)	(0.0647)	(0.0690)	(0.0666)	(0.0606)
trade	-0.317***	-0.228*	-0.227*	-0.228*	-0.227*	-0.312***	-0.321***	-0.253**	-0.292**	-0.116	-0.123	-0.144	-0.119
	(0.115)	(0.124)	(0.124)	(0.124)	(0.124)	(0.117)	(0.113)	(0.114)	(0.127)	(0.100)	(0.107)	(0.106)	(0.102)
TAL	-0.00239**	-0.00279**	-0.00281**	-0.00278**	-0.00281**	-0.00254*	-0.00231*	-0.00197*	-0.00331**	-0.00211**	-0.00311***	-0.00293**	-0.00185*
	(0.00120)	(0.00135)	(0.00135)	(0.00135)	(0.00135)	(0.00132)	(0.00123)	(0.00116)	(0.00133)	(0.00106)	(0.00108)	(0.00117)	(0.00109)
gs	1.077	0.680	0.680	0.683	0.681	1.088	1.065	1.048	1.411	0.537	-0.0665	-0.185	0.749
	(0.990)	(1.488)	(1.489)	(1.488)	(1.489)	(0.998)	(0.992)	(1.039)	(1.040)	(1.589)	(1.686)	(1.660)	(1.567)
fiscap		0.00127***											
		(0.000362)											
fiscap_vol			0.000956***										
			(0.000300)										
lfiscap				0.00148***									
				(0.000424)									
lfiscap_vol					0.00108***								
					(0.000318)								
debt						-0.0449							
						(0.191)							
debt_vol							0.0653						
							(0.218)						
nare								0.468**					
								(0.235)					
manu									-0.847***				
									(0.247)				
CRI										-0.0175***			
										(0.00555)			
ERI											-0.0278**		
											(0.0122)		
FRI												-0.0223*	
												(0.0119)	
PRI													-0.0155***
													(0.00466)
Constant	1.413***	1.302***	1.304***	1.301***	1.304***	1.436***	1.398***	1.102***	1.402***	2.392***	2.271***	2.165***	2.208***
	(0.305)	(0.319)	(0.320)	(0.319)	(0.320)	(0.302)	(0.309)	(0.316)	(0.303)	(0.525)	(0.550)	(0.591)	(0.464)
Number of countries	144	94	94	94	94	144	144	143	143	117	117	117	117
R-squared	0.134	0.180	0.179	0.180	0.179	0.134	0.135	0.160	0.197	0.186	0.165	0.160	0.192
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 5. Determinants of fiscal behaviour *(continued)*

Dependent variable: Government spending cyclicality $\hat{\beta}GS$

VARIABLES	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
polcon	-1.966***	-1.534**	-1.452**	-1.813***	-1.807***	-1.542**	-1.749***	-1.884***	-1.702***	-1.901***	-1.600**	-1.526**
	(0.636)	(0.586)	(0.599)	(0.630)	(0.629)	(0.610)	(0.605)	(0.623)	(0.640)	(0.614)	(0.627)	(0.597)
inf	0.124*	0.0833	0.0707	0.113*	0.127**	0.0869*	0.108*	0.140**	0.0981	0.122**	0.116*	0.0954
	(0.0644)	(0.0632)	(0.0642)	(0.0632)	(0.0636)	(0.0520)	(0.0637)	(0.0631)	(0.0603)	(0.0561)	(0.0625)	(0.0647)
trade	-0.139	-0.111	-0.0957	-0.109	-0.154	-0.195*	-0.118	-0.169	-0.153	-0.138	-0.198*	-0.168*
	(0.117)	(0.0981)	(0.0995)	(0.122)	(0.125)	(0.0986)	(0.114)	(0.121)	(0.104)	(0.113)	(0.117)	(0.0979)
TAL	-0.00257	-0.00172*	-0.00212**	-0.00309**	-0.00362***	-0.000671	-0.00297**	-0.00348**	-0.00201*	-0.00334***	-0.00283**	-0.00212**
	(0.00160)	(0.00102)	(0.00105)	(0.00123)	(0.00129)	(0.00116)	(0.00125)	(0.00137)	(0.00116)	(0.00121)	(0.00127)	(0.00104)
gs	-0.199	0.245	0.500	0.108	-0.487	1.228	0.781	-0.376	0.961	-0.312	0.0464	0.695
	(1.739)	(1.633)	(1.566)	(1.636)	(1.689)	(1.746)	(1.629)	(1.630)	(1.676)	(1.620)	(1.591)	(1.710)
govstab	-0.103											
	(0.0832)											
socecon		-0.114***										
		(0.0281)										
invest			-0.150***									
			(0.0454)									
inconflict				-0.0726*								
				(0.0383)								
exconflict					-0.0427							
					(0.0415)							
corrupt						-0.213***						
						(0.0445)						
military							-0.104**					
							(0.0439)					
religious								-0.0450				
								(0.0566)				
law									-0.145***			
									(0.0441)			
ethnic										-0.122**		
										(0.0605)		
democracy											-0.0806	
											(0.0587)	
bureau												-0.177***
												(0.0437)
Constant	2.260***	1.889***	2.282***	2.006***	1.898***	1.797***	1.642***	1.707***	1.757***	1.963***	1.680***	1.601***
	(0.708)	(0.385)	(0.495)	(0.459)	(0.535)	(0.343)	(0.380)	(0.475)	(0.362)	(0.470)	(0.418)	(0.352)
Number of countries	117	117	117	117	117	117	117	117	117	117	117	117
R-squared	0.150	0.201	0.202	0.163	0.147	0.218	0.178	0.146	0.183	0.177	0.155	0.187
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: OLS specification with robust standard error. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 6. Determinants of fiscal behaviour

Dependent variable: Value Added Tax cyclicality $\hat{\beta}$VAT

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
inf	-0.0500**	-0.0486**	-0.0522**	-0.0485**	-0.0523**	-0.0502**	-0.0543**	-0.0644**	-0.0738**	-0.0681**	-0.0739***	-0.0657***	-0.0607*
	(0.0207)	(0.0199)	(0.0195)	(0.0200)	(0.0200)	(0.0225)	(0.0244)	(0.0255)	(0.0281)	(0.0274)	(0.0225)	(0.0215)	(0.0300)
fiscap		0.0102											
		(0.0145)											
fiscap_vol			0.0134										
			(0.0167)										
lfiscap				0.00927									
				(0.0144)									
lfiscap_vol					0.0121								
					(0.0173)								
debt						-0.00226							
						(0.0728)							
debt_vol							-0.136						
							(0.0965)						
manu								-0.0805					
								(0.0556)					
nare									0.0895				
									(0.0720)				
CRI										-0.00267			
										(0.00172)			
ERI											-0.00946**		
											(0.00351)		
FRI												-0.00670**	
												(0.00310)	
PRI													-0.00137
													(0.00167)
Constant	0.00227	-0.0216	-0.00893	-0.0198	-0.00801	0.00341	0.0359	0.0358	-0.0232	0.199	0.349**	0.256*	0.101
	(0.0162)	(0.0355)	(0.0238)	(0.0356)	(0.0241)	(0.0429)	(0.0316)	(0.0327)	(0.0216)	(0.141)	(0.140)	(0.131)	(0.136)
Number of countries	35	33	33	33	33	35	35	35	35	33	33	33	33
p-value	0.0215	0.0602	0.0356	0.0641	0.0446	0.0742	0.0848	0.0538	0.0387	0.0601	0.00827	0.0170	0.116
R-squared	0.0850	0.0956	0.0907	0.0934	0.0889	0.0850	0.135	0.119	0.115	0.141	0.217	0.184	0.104

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 6. Determinants of fiscal behaviour *(continued)*

Dependent variable: Value Added Tax cyclicality $\hat{\beta}VAT$

VARIABLE	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
inf	-0.0550**	-0.0693***	-0.0614**	-0.0568*	-0.0413	-0.0504*	-0.0536*	-0.0477**	-0.0669**	-0.0478**	-0.0480	-0.0484*
	(0.0232)	(0.0249)	(0.0232)	(0.0316)	(0.0276)	(0.0253)	(0.0267)	(0.0216)	(0.0279)	(0.0219)	(0.0310)	(0.0272)
govstab	-0.0244											
	(0.0160)											
socecon		-0.0188										
		(0.0116)										
invest			-0.0130									
			(0.0122)									
inconflict				-0.00745								
				(0.0130)								
exconflict					0.00799							
					(0.0178)							
corrupt						-0.00264						
						(0.0134)						
military							-0.00639					
							(0.0130)					
religious								-0.00864				
								(0.0173)				
law									-0.0206			
									(0.0140)			
ethnic										0.000377		
										(0.0184)		
democracy											-0.000134	
											(0.0200)	
bureau												-0.000600
												(0.0176)
Constant	0.187	0.131	0.110	0.0711	-0.0869	0.00865	0.0294	0.0433	0.0897	-0.00358	-0.00119	-0.00000266
	(0.129)	(0.0925)	(0.115)	(0.137)	(0.199)	(0.0632)	(0.0721)	(0.0952)	(0.0729)	(0.0880)	(0.112)	(0.0640)
Number of countries	33	33	33	33	33	33	33	33	33	33	33	33
p-value	0.0645	0.0319	0.0387	0.142	0.0498	0.0979	0.105	0.102	0.0717	0.0918	0.0951	0.0968
R-squared	0.117	0.171	0.108	0.0964	0.0868	0.0814	0.0884	0.0847	0.173	0.0803	0.0803	0.0803

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 7. Determinants of fiscal behaviour

Dependent variable: Personal Income Tax cyclicality $\hat{\beta}PIT$

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
gs	5.579**	5.228**	5.258**	5.339**	5.508**	5.618**	5.316**	2.888	4.605*	3.551*	3.447*	4.678*	3.797*
	(2.377)	(2.181)	(2.353)	(2.145)	(2.352)	(2.410)	(2.453)	(2.605)	(2.411)	(2.079)	(2.003)	(2.346)	(2.193)
GDP	23.13**	21.94*	21.45*	21.91*	21.59*	22.23**	21.73**	21.36***	23.60***	25.05***	22.98**	23.34**	25.67***
	(9.003)	(11.31)	(11.10)	(11.40)	(11.19)	(9.385)	(8.561)	(7.515)	(8.662)	(8.994)	(8.817)	(9.476)	(8.946)
trade	-0.211	-0.273	-0.243	-0.265	-0.236	-0.230	-0.259	-0.106	-0.283	-0.275	-0.284	-0.244	-0.262
	(0.254)	(0.239)	(0.265)	(0.243)	(0.265)	(0.226)	(0.270)	(0.228)	(0.287)	(0.243)	(0.247)	(0.261)	(0.235)
inf	-0.0830	-0.0976	-0.0211	-0.0809	-0.0188	-0.0802	-0.0883	0.00268	-0.0181	-0.0324	-0.0138	-0.0519	-0.0484
	(0.113)	(0.112)	(0.107)	(0.130)	(0.111)	(0.115)	(0.112)	(0.0906)	(0.0936)	(0.129)	(0.121)	(0.119)	(0.131)
fiscap		-0.0435											
		(0.0700)											
fiscap_vol			-0.0523***										
			(0.0177)										
lfiscap				-0.0393									
				(0.0638)									
lfiscap_vol					-0.0390**								
					(0.0147)								
debt						-0.218							
						(0.480)							
debt_vol							-0.595						
							(0.465)						
manu								1.102**					
								(0.474)					
nare									-0.591				
									(0.361)				
CRI										0.0192			
										(0.0118)			
ERI											0.0535***		
											(0.0170)		
FRI												0.0273	
												(0.0210)	
PRI													0.0132
													(0.0115)
Constant	-1.476***	-1.194**	-1.266**	-1.227**	-1.327**	-1.336***	-1.215**	-1.467***	-1.068*	-2.574**	-3.012***	-2.344***	-2.191**
	(0.534)	(0.541)	(0.522)	(0.519)	(0.522)	(0.466)	(0.592)	(0.451)	(0.624)	(0.963)	(0.796)	(0.876)	(0.938)
Number of countries	62	52	52	52	52	62	62	62	62	58	58	58	58
p-value	0.0138	0.0127	0.00154	0.00804	0.00334	0.0200	0.0175	0.000672	0.00517	0.00675	0.00185	0.0208	0.00926
R-squared	0.179	0.131	0.150	0.130	0.145	0.182	0.190	0.262	0.218	0.194	0.215	0.180	0.185

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 7. Determinants of fiscal behaviour *(continued)*

Dependent variable: Personal Income Tax cyclicality $\hat{\beta}PIT$

VARIABLE	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
gs	5.091**	4.063*	4.583**	2.824	5.222**	4.004	6.121	5.075**	3.707	5.849**	5.716*	5.087
	(2.364)	(2.326)	(2.233)	(1.739)	(2.262)	(2.549)	(4.014)	(2.151)	(2.795)	(2.357)	(2.903)	(3.211)
GDP	23.18**	25.04**	23.52**	26.13***	24.67***	24.93**	22.20**	24.37***	23.93**	25.81***	22.33**	23.37**
	(9.697)	(9.623)	(9.492)	(8.216)	(8.427)	(9.842)	(10.10)	(8.607)	(9.934)	(7.996)	(10.36)	(10.51)
trade	-0.265	-0.288	-0.248	-0.367*	-0.250	-0.184	-0.191	-0.225	-0.211	-0.275	-0.205	-0.193
	(0.226)	(0.258)	(0.246)	(0.206)	(0.232)	(0.259)	(0.263)	(0.198)	(0.255)	(0.223)	(0.265)	(0.252)
inf	-0.0721	-0.0397	-0.0506	-0.0405	-0.0875	-0.0506	-0.0904	-0.107	-0.0429	-0.0376	-0.0945	-0.0710
	(0.121)	(0.113)	(0.131)	(0.130)	(0.112)	(0.124)	(0.120)	(0.0796)	(0.113)	(0.133)	(0.132)	(0.106)
govstab	0.0950											
	(0.101)											
socecon		0.123***										
		(0.0375)										
invest			0.0704									
			(0.0774)									
inconflict				0.155*								
				(0.0883)								
exconflict					0.0544							
					(0.110)							
corrupt						0.107						
						(0.0797)						
military							-0.0303					
							(0.155)					
religious								0.0591				
								(0.233)				
law									0.102			
									(0.0689)			
ethnic										0.194		
										(0.142)		
democracy											-0.0240	
											(0.143)	
bureau												0.0377
												(0.111)
Constant	-2.092**	-2.054***	-1.881**	-2.526***	-2.001	-1.686***	-1.400**	-1.721	-1.635***	-2.415**	-1.356	-1.521***
	(0.997)	(0.566)	(0.797)	(0.933)	(1.304)	(0.605)	(0.644)	(1.369)	(0.557)	(1.017)	(0.823)	(0.551)
Number of countries	58	58	58	58	58	58	58	58	58	58	58	58
p-value	0.0212	0.000976	0.0227	0.00175	0.0278	0.00678	0.0609	0.0285	0.0103	0.00132	0.0495	0.0321
R-squared	0.169	0.216	0.173	0.213	0.167	0.179	0.164	0.167	0.179	0.224	0.164	0.164

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 8. Determinants of fiscal behaviour

Dependent variable: Corporate Income Tax cyclicality $\hat{\beta}CIT$

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
gs	0.483	1.537***	1.131**	1.514***	1.124**	0.446	0.510	0.168	0.372	0.250	0.259	0.299	0.304
	(0.321)	(0.561)	(0.460)	(0.554)	(0.456)	(0.330)	(0.337)	(0.323)	(0.298)	(0.371)	(0.352)	(0.334)	(0.364)
GDP	1.558*	3.534**	3.356**	3.585**	3.355**	2.181**	1.905*	1.598*	2.001**	1.265	1.014	1.059	1.318
	(0.810)	(1.406)	(1.432)	(1.429)	(1.431)	(1.052)	(0.978)	(0.848)	(0.918)	(0.828)	(0.760)	(0.777)	(0.875)
trade	-0.0313	-0.0234	-0.0373	-0.0247	-0.0375	-0.0190	-0.0177	-0.0184	-0.0554	-0.0435	-0.0418	-0.0423	-0.0412
	(0.0502)	(0.0423)	(0.0474)	(0.0425)	(0.0475)	(0.0445)	(0.0430)	(0.0419)	(0.0520)	(0.0594)	(0.0569)	(0.0595)	(0.0582)
fiscap		0.0208											
		(0.0134)											
fiscap_vol			0.00245										
			(0.00248)										
lfiscap				0.0186									
				(0.0112)									
lfiscap_vol					0.00199								
					(0.00182)								
debt						0.138							
						(0.121)							
debt_vol							0.172						
							(0.224)						
manu								**0.189***					
								(0.0992)					
nare									**-0.131***				
									(0.0657)				
CRI										0.00207			
										(0.00291)			
ERI											0.00470		
											(0.00518)		
FRI												0.00474	
												(0.00624)	
PRI													0.00131
													(0.00237)
Constant	-0.113*	-0.384***	-0.260***	-0.378***	-0.258***	-0.202**	-0.179*	-0.135**	-0.0392	-0.204	-0.216	-0.233	-0.159
	(0.0575)	(0.129)	(0.0902)	(0.125)	(0.0893)	(0.0845)	(0.0909)	(0.0530)	(0.0716)	(0.160)	(0.136)	(0.190)	(0.130)
Number of countries	62	51	51	51	51	62	62	62	62	58	58	58	58
p-value	0.0325	0.0542	0.0692	0.0559	0.0691	0.0651	0.0761	0.0294	0.0252	0.0528	0.0436	0.0614	0.0605
R-squared	0.0428	0.131	0.0764	0.128	0.0764	0.0757	0.0714	0.127	0.112	0.0407	0.0417	0.0452	0.0353

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Cross sectional regression

Table 8. Determinants of fiscal behaviour *(continued)*

Dependent variable: Corporate Income Tax cyclicality $\hat{\beta}CIT$

VARIABLE	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
gs	0.440	0.261	0.418	0.234	0.498*	0.257	0.304	0.599*	0.0813	0.465	0.395	0.166
	(0.328)	(0.315)	(0.375)	(0.348)	(0.294)	(0.354)	(0.414)	(0.308)	(0.453)	(0.308)	(0.289)	(0.352)
GDP	1.007	1.221	1.036	1.361	0.795	1.436	1.229	0.0147	1.264	1.042	1.530*	1.505
	(0.747)	(0.830)	(0.743)	(0.833)	(0.759)	(0.873)	(0.779)	(0.775)	(0.810)	(0.732)	(0.863)	(0.923)
trade	-0.0360	-0.0469	-0.0358	-0.0502	-0.0267	-0.0349	-0.0369	-0.0219	-0.0391	-0.0344	-0.0345	-0.0319
	(0.0594)	(0.0554)	(0.0598)	(0.0631)	(0.0590)	(0.0513)	(0.0550)	(0.0509)	(0.0530)	(0.0546)	(0.0494)	(0.0488)
govstab	0.00415											
	(0.0177)											
socecon		0.0156										
		(0.0113)										
invest			0.00340									
			(0.0178)									
inconflict				0.0142								
				(0.0181)								
exconflict					-0.00679							
					(0.0191)							
corrupt						0.0164						
						(0.0162)						
military							0.00834					
							(0.0229)					
religious								-0.0330				
								(0.0202)				
law									0.0218			
									(0.0197)			
ethnic										0.00308		
										(0.0221)		
democracy											0.0143	
											(0.0155)	
bureau												0.0286
												(0.0216)
Constant	-0.112	-0.153**	-0.105	-0.186	-0.0187	-0.125**	-0.104	0.0861	-0.120**	-0.100	-0.158*	-0.134**
	(0.107)	(0.0603)	(0.0907)	(0.131)	(0.191)	(0.0544)	(0.0708)	(0.110)	(0.0502)	(0.105)	(0.0931)	(0.0547)
Number of countries	58	58	58	58	58	58	58	58	58	58	58	58
p-value	0.0856	0.0712	0.0713	0.0656	0.0827	0.0353	0.0691	0.0873	0.0369	0.0834	0.0505	0.0618
R-squared	0.0281	0.0568	0.0285	0.0426	0.0297	0.0412	0.0313	0.0815	0.0537	0.0283	0.0394	0.0567

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Panel regression

Table 9: Fiscal behaviour of government spending of OECD & non-OECD countries
Dependent variable: Percentage change of real government spending

	OECD			Non-OECD		
VARIABLE	**OLS**	**FE**	**FE**	**OLS**	**FE**	**FE**
Percentage change of real GDP	0.537***	0.486***	0.508***	0.715***	0.699***	0.706***
	(0.0572)	(0.0860)	(0.101)	(0.0553)	(0.0586)	(0.0599)
Constant	0.0218***	0.0235***	0.0458***	0.0144***	0.0150***	0.0407***
	(0.00220)	(0.00278)	(0.0108)	(0.00286)	(0.00217)	(0.0135)
Number of countries		35	35		160	160
Observations	1,692	1,692	1,692	6,332	6,332	6,332
R-squared	0.114	0.088	0.259	0.085	0.076	0.101
Country FE		YES	YES		YES	YES
Year FE			YES			YES

*Note: OLS/FE: Ordinary Least Squares/Fixed Effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 10: Fiscal behaviour of government spending by income level
Dependent variable: Percentage change of real government spending

	HIC		UMC		LMC		LIC	
Percentage change of real GDP	0.517***	0.586***	0.715***	0.725***	0.639***	0.632***	0.877***	0.866***
	(0.0789)	(0.0804)	(0.0552)	(0.0642)	(0.156)	(0.159)	(0.141)	(0.147)
Constant	0.0227***	0.0615***	0.0144***	0.0213	0.0157**	0.0424**	0.0110**	0.0359
	(0.00273)	(0.0139)	(0.00212)	(0.0223)	(0.00605)	(0.0183)	(0.00441)	(0.0262)
Number of countries	62	62	52	52	52	52	30	30
Observations	2576	2576	2133	2133	2063	2063	1288	1288
p-value	0.0000	0.0000	0.0000	.	0.0000	.	0.0000	.
R-squared	0.0782	0.163	0.112	0.164	0.0519	0.0905	0.0770	0.108
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

Note:
HIC: high income countries; UMC: upper middle income countries; LMC: lower middle income countries; LIC: lower income countries
*Fixed Effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Panel regression

Table 11: Fiscal behaviour of government spending by sub-periods
Dependent variable: Percentage change of real government spending

VARIABLES	1960-1971	1972-1980	1981-1989	1990-1998	1999-2007	2008-2016
Percentage change of real GDP	0.658***	0.361***	0.801***	0.734***	0.635**	0.325**
	(0.106)	(0.115)	(0.112)	(0.112)	(0.271)	(0.141)
Constant	0.658***	0.361***	0.801***	0.734***	0.635**	0.325**
	(0.106)	(0.115)	(0.112)	(0.112)	(0.271)	(0.141)
Number of countries	99	110	157	180	191	189
Observations	952	934	1319	1526	1671	1658
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.0974	0.0254	0.0696	0.0762	0.0405	0.0176
Country FE	YES	YES	YES	YES	YES	YES

*Note: Fixed Effects (country control). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 12: Fiscal behaviour of government spending by sub-periods
Dependent variable: Percentage change of real government spending

VARIABLES	1960-1971	1972-1980	1981-1989	1990-1998	1999-2007	2008-2016
Percentage change of real GDP	0.657***	0.367***	0.844***	0.718***	0.653**	0.516***
	(0.105)	(0.111)	(0.116)	(0.115)	(0.290)	(0.171)
Constant	0.0421***	0.0542***	0.0222	0.00789	0.00291	0.0198
	(0.0112)	(0.0127)	(0.0179)	(0.0186)	(0.0159)	(0.0125)
Number of countries	99	110	157	180	191	189
Observations	952	934	1319	1526	1671	1658
p-value	0.0000	0.0000	0.0000	0.0000	0.172	0.0000
R-squared	0.117	0.0575	0.0857	0.0873	0.0448	0.0919
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

*Note: Fixed Effects (country control, time control). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Panel regression

Table 13: Fiscal behaviour of tax rates of OECD and non-OECD countries
Dependent variable: Tax rate

Variables	VAT		PIT		CIT	
	OECD	Non-OECD	OECD	Non-OECD	OECD	Non-OECD
Real GDP growth rate	-0.149***	-0.00907	0.486**	-0.191**	0.315**	-0.148**
	(0.0446)	(0.0329)	(0.204)	(0.0874)	(0.121)	(0.0652)
Constant	17.29***	14.74***	48.06***	30.83***	33.22***	32.77***
	(0.114)	(0.116)	(0.538)	(0.309)	(0.341)	(0.238)
Number of countries	26	42	27	49	27	49
Observations	926	958	1097	1661	1200	1740
p-value	0.00267	0.784	0.0250	0.0333	0.0149	0.0283
R-squared	0.0311	0.000604	0.0117	0.00842	0.0139	0.00877

Note:
VAT: Value added tax rate; PIT: Personal income tax rate; CIT: Cooperate income tax rate
*Fixed Effects, country control. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 14: Fiscal behaviour of tax rates of OECD and non-OECD countries
Dependent variable: Tax rate

Variables	VAT		PIT		CIT	
	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD
Real GDP growth rate	-0.149***	-0.00892	0.484**	-0.191**	0.313***	-0.147**
	(0.0444)	(0.0328)	(0.202)	(0.0873)	(0.120)	(0.0646)
Constant	16.82***	14.27***	46.27***	30.97***	32.21***	32.21***
	(1.062)	(0.653)	(1.943)	(2.330)	(1.387)	(1.244)
Number of countries	26	42	27	49	27	49
Observations	926	958	1097	1661	1200	1740
p-value	0.000784	0.786	0.0164	0.0290	0.00910	0.0229
R-squared	0.0279	0.00202	0.0000832	0.00108	0.0112	0.0000435

Note:
VAT: Value added tax rate; PIT: Personal income tax rate; CIT: Cooperate income tax rate
*Random Effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 15. Government spending cyclicality $\widehat{\beta GS}$ by region and income, 1980-2016

Region	Mean	SD	Minimum	Maximum
East Asia & Pacific	0.18	0.83	-0.89	1.96
Europe & Central Asia	0.07	0.54	-0.57	1.32
Latin America & Caribbean	0.80	0.71	-0.40	2.75
Middle East & North Africa	0.27	1.01	-1.70	1.96
North America	-0.50	*NA*	-0.50	-0.50
South Asia	0.41	0.57	-0.17	1.08
Sub-Saharan Africa	0.94	1.55	-4.68	3.26
Level				
High income	0.01	0.76	-1.70	1.93
Low income	0.92	1.83	-4.68	2.89
Lower middle income	0.77	0.93	-1.03	2.75
Upper middle income	0.64	0.84	-0.89	3.26
OECD group				
Non-OECD	0.65	1.14	-4.68	3.26
OECD	-0.10	0.41	-0.57	0.97
ADB group				
Central Asia	0.09	*NA*	0.09	0.09
East Asia	0.46	1.33	-0.89	1.96
South Asia	0.41	0.57	-0.17	1.08
Southeast Asia	-0.23	0.68	-0.88	0.60
The Pacific	0.43	0.69	-0.68	1.33
Entire sample (104 countries)	0.49	1.07	-4.68	3.26

Table 16. Determinants of fiscal behaviour, 1980-2016

Dependent variable: Government spending cyclicality $\hat{\beta}GS$

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
polcon	**-2.291****	**-2.994****	**-3.184****	**-2.952****	**-3.182****	**-2.010***	**-2.305****	**-2.531****	**-2.186****	**-2.334****	**-2.109***	**-2.290****	**-2.358****
	(1.011)	(1.208)	(1.250)	(1.190)	(1.235)	(1.018)	(1.119)	(0.996)	(0.966)	(1.070)	(1.122)	(1.075)	(1.038)
inf	**0.700*****	**0.787*****	**0.771*****	**0.786*****	**0.767*****	**0.714*****	**0.692*****	**0.653*****	**0.636*****	**0.679*****	**0.658*****	**0.705*****	**0.719*****
	(0.0767)	(0.0741)	(0.0722)	(0.0745)	(0.0731)	(0.0787)	(0.0620)	(0.0808)	(0.0932)	(0.0873)	(0.0698)	(0.0790)	(0.0998)
trade	-0.286	-0.442*	-0.410*	-0.447*	-0.408*	-0.284	-0.217	-0.273	-0.346	-0.0758	0.00983	-0.0644	-0.146
	(0.233)	(0.225)	(0.217)	(0.224)	(0.216)	(0.225)	(0.253)	(0.231)	(0.211)	(0.253)	(0.241)	(0.245)	(0.269)
TAL	-0.0565	-0.0172	-0.0178	-0.0169	-0.0179	-0.0651*	-0.0616	-0.0394	-0.0206	-0.0477	-0.0563	-0.0641	-0.0568
	(0.0386)	(0.0340)	(0.0341)	(0.0340)	(0.0343)	(0.0372)	(0.0398)	(0.0385)	(0.0372)	(0.0627)	(0.0607)	(0.0584)	(0.0652)
gs	-0.813	1.096	1.112	1.112	1.134	-1.092	-0.788	-0.221	0.124	1.467	1.169	0.879	0.818
	(1.249)	(1.091)	(1.039)	(1.079)	(1.027)	(1.215)	(1.200)	(1.215)	(1.273)	(1.089)	(1.181)	(0.961)	(1.248)
fiscap		0.0680											
		(0.0705)											
fiscap_vol			0.110										
			(0.119)										
lfiscap				0.0792									
				(0.0737)									
lfiscap_vol					0.126								
					(0.125)								
debt						**0.707****							
						(0.288)							
debt_vol							**1.411****						
							(0.557)						
nare								0.649					
								(0.416)					
manu									**-1.342*****				
									(0.380)				
CRI										**-0.0300***			
										(0.0156)			
ERI											**-0.0712***		
											(0.0374)		
FRI												-0.0546	
												(0.0340)	
PRI													-0.0155
													(0.0115)
Constant	1.874***	1.137*	1.267**	1.091*	1.244**	1.424**	1.519**	1.489***	1.930***	2.959**	3.330***	3.045**	2.207**
	(0.596)	(0.573)	(0.552)	(0.580)	(0.553)	(0.578)	(0.644)	(0.553)	(0.581)	(1.115)	(1.165)	(1.349)	(0.928)
Number of countries	86	49	49	49	49	85	85	86	86	67	67	67	67
R-squared	0.192	0.498	0.503	0.501	0.508	0.227	0.240	0.216	0.272	0.259	0.275	0.262	0.237
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 16. Determinants of fiscal behaviour, 1980-2016 *(continued)*
Dependent variable: Government spending cyclicality $\hat{\beta}GS$

VARIABLES	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
polcon	-2.888***	-2.303**	-2.280**	-2.334**	-2.368**	-2.181**	-2.338**	-2.133**	-2.767**	-2.397**	-2.433**	-2.080*
	(0.873)	(1.107)	(1.024)	(0.996)	(1.074)	(0.993)	(1.037)	(0.991)	(1.081)	(1.021)	(1.105)	(1.160)
inf	0.677***	0.669***	0.687***	0.749***	0.765***	0.637***	0.752***	0.745***	0.652***	0.752***	0.773***	0.704***
	(0.0885)	(0.0685)	(0.113)	(0.103)	(0.104)	(0.0885)	(0.109)	(0.108)	(0.107)	(0.106)	(0.101)	(0.102)
trade	0.00130	-0.156	-0.124	-0.128	-0.239	-0.226	-0.165	-0.181	-0.276	-0.162	-0.119	-0.178
	(0.243)	(0.267)	(0.257)	(0.296)	(0.273)	(0.240)	(0.276)	(0.291)	(0.263)	(0.273)	(0.372)	(0.272)
TAL	-0.0483	-0.00782	-0.0537	-0.0790	-0.0774	-0.0249	-0.0765	-0.0819	-0.0118	-0.0783	-0.0962	-0.0495
	(0.0585)	(0.0591)	(0.0650)	(0.0616)	(0.0579)	(0.0489)	(0.0665)	(0.0638)	(0.0594)	(0.0638)	(0.0821)	(0.0644)
gs	0.645	1.498	0.734	0.131	-0.675	1.439	0.0199	-0.658	1.933	-0.0510	-0.863	0.488
	(1.379)	(1.381)	(1.037)	(1.508)	(1.265)	(2.015)	(0.927)	(1.256)	(1.717)	(1.107)	(0.948)	(1.484)
govstab	**-0.443****											
	(0.173)											
socecon		**-0.209*****										
		(0.0724)										
invest			-0.159									
			(0.114)									
inconflict				-0.0502								
				(0.0652)								
exconflict					0.0669							
					(0.104)							
corrupt						**-0.293****						
						(0.144)						
military							-0.0387					
							(0.0962)					
religious								0.0690				
								(0.113)				
law									**-0.285****			
									(0.114)			
ethnic										-0.0617		
										(0.102)		
democracy											0.0868	
											(0.187)	
bureau												-0.179
												(0.127)
Constant	4.685***	2.095***	2.371**	1.854***	1.072	1.876***	1.616**	1.291	2.104***	1.758*	1.409	1.610**
	(1.346)	(0.690)	(1.112)	(0.657)	(1.096)	(0.621)	(0.768)	(0.912)	(0.674)	(0.910)	(0.928)	(0.679)
Number of countries	67	67	67	67	67	67	67	67	67	67	67	67
R-squared	0.279	0.278	0.242	0.227	0.228	0.273	0.225	0.228	0.272	0.226	0.228	0.237
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: OLS specification with robust standard error. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table 17. Determinants of fiscal behaviour, 1980-2016

Dependent variable: Value Added Tax cyclicality $\hat{\beta}$VAT

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
polcon	-0.0690	0.0346	0.112	0.0404	0.117	-0.0363	0.0245	0.0704	-0.114	-0.00790	0.0362	-0.0698	-0.0216
	(0.300)	(0.386)	(0.430)	(0.389)	(0.429)	(0.342)	(0.328)	(0.366)	(0.246)	(0.382)	(0.384)	(0.398)	(0.316)
inf	-0.141	0.103	-0.0212	0.108	-0.0209	-0.125	-0.255	-0.102	-0.168	-0.0150	-0.0898	0.0394	-0.0336
	(0.437)	(0.691)	(0.675)	(0.690)	(0.674)	(0.471)	(0.445)	(0.386)	(0.398)	(0.579)	(0.599)	(0.631)	(0.533)
trade	-0.0250	-0.0844	-0.138	-0.0860	-0.143	-0.0241	-0.0824	-0.0597	-0.0357	-0.0817	-0.0844	-0.0655	-0.0823
	(0.0858)	(0.136)	(0.175)	(0.138)	(0.178)	(0.0853)	(0.117)	(0.102)	(0.0880)	(0.132)	(0.119)	(0.132)	(0.123)
TAL	**0.0307*****	**0.0364*****	**0.0383*****	**0.0363*****	**0.0387*****	**0.0301*****	**0.0308*****	**0.0348*****	**0.0328*****	**0.0373*****	**0.0361*****	**0.0362*****	**0.0380*****
	(0.00838)	(0.0101)	(0.0109)	(0.0101)	(0.0109)	(0.00862)	(0.00783)	(0.00827)	(0.00941)	(0.00820)	(0.00904)	(0.00724)	(0.00931)
gs	-0.238	-0.215	-0.262	-0.219	-0.259	-0.226	-0.266	-0.206	-0.144	-0.186	-0.183	-0.208	-0.146
	(0.241)	(0.297)	(0.344)	(0.297)	(0.338)	(0.230)	(0.244)	(0.229)	(0.202)	(0.208)	(0.234)	(0.227)	(0.231)
fiscap		-0.0116											
		(0.0185)											
fiscap_vol			-0.0508										
			(0.0541)										
lfiscap				-0.0123									
				(0.0183)									
lfiscap_vol					-0.0505								
					(0.0512)								
debt						-0.0292							
						(0.0543)							
debt_vol							-0.204						
							(0.143)						
manu								-0.115					
								(0.115)					
nare									0.127				
									(0.129)				
CRI										-0.000539			
										(0.00491)			
ERI											-0.00348		
											(0.00827)		
FRI												0.00210	
												(0.00708)	
PRI													-0.00112
													(0.00453)
Constant	0.0847	0.0611	0.0846	0.0630	0.0838	0.0842	0.135	0.0765	0.0375	0.0894	0.168	-0.00973	0.124
	(0.0863)	(0.144)	(0.166)	(0.144)	(0.165)	(0.0898)	(0.0993)	(0.0796)	(0.0975)	(0.344)	(0.320)	(0.290)	(0.299)
Number of countries	22	20	20	20	20	22	22	22	22	21	21	21	21
R-squared	0.195	0.250	0.281	0.254	0.285	0.207	0.287	0.264	0.260	0.226	0.232	0.230	0.232
p-value	0.0340	0.00110	0.0000527	0.00116	0.0000442	0.0643	0.00106	0.0168	0.0682	0.000471	0.000320	0.000198	0.000632

Table 17. Determinants of fiscal behaviour, 1980-2016 *(continued)*
Dependent variable: Value Added Tax cyclicality $\hat{\beta}VAT$

VARIABLES	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
polcon	-0.0386	-0.00505	-0.0172	-0.0362	-0.0193	-0.0116	-0.0206	-0.0320	-0.0253	-0.0202	-0.0214	-0.0786
	(0.328)	(0.350)	(0.349)	(0.269)	(0.308)	(0.337)	(0.299)	(0.311)	(0.296)	(0.338)	(0.319)	(0.353)
inf	0.00536	-0.0266	0.000766	-0.0789	0.00399	0.0953	0.00711	0.0283	-0.191	-0.00948	-0.0150	0.109
	(0.608)	(0.533)	(0.579)	(0.441)	(0.573)	(0.647)	(0.594)	(0.621)	(0.536)	(0.598)	(0.558)	(0.653)
trade	-0.0569	-0.0894	-0.0799	-0.0687	-0.0756	-0.0735	-0.0784	-0.0830	-0.0913	-0.0837	-0.0844	-0.0517
	(0.112)	(0.136)	(0.141)	(0.0931)	(0.134)	(0.120)	(0.117)	(0.129)	(0.118)	(0.118)	(0.133)	(0.120)
TAL	**0.0321*****	**0.0394*****	**0.0373*****	**0.0364*****	**0.0367***	**0.0360*****	**0.0373*****	**0.0380*****	**0.0393*****	**0.0353*****	**0.0382*****	**0.0301*****
	(0.00758)	(0.0117)	(0.00995)	(0.00817)	(0.0192)	(0.00765)	(0.0104)	(0.0101)	(0.00935)	(0.00745)	(0.0104)	(0.00724)
gs	-0.262	-0.157	-0.198	-0.0503	-0.198	-0.257	-0.191	-0.178	-0.0672	-0.201	-0.161	-0.320
	(0.254)	(0.206)	(0.198)	(0.244)	(0.198)	(0.240)	(0.248)	(0.251)	(0.221)	(0.236)	(0.201)	(0.217)
govstab	0.0431											
	(0.0463)											
socecon		-0.00863										
		(0.0307)										
invest			-0.00132									
			(0.0383)									
inconflict				-0.0172								
				(0.0266)								
exconflict					-0.00122							
					(0.0603)							
corrupt						0.0116						
						(0.0182)						
military							-0.00137					
							(0.0352)					
religious								-0.00787				
								(0.0273)				
law									-0.0205			
									(0.0366)			
ethnic										-0.00889		
										(0.0207)		
democracy											-0.0106	
											(0.0616)	
bureau												0.0417
												(0.0306)
Constant	-0.242	0.0994	0.0665	0.173	0.0674	0.0198	0.0593	0.0944	0.117	0.106	0.0995	-0.0162
	(0.371)	(0.201)	(0.339)	(0.197)	(0.583)	(0.131)	(0.133)	(0.125)	(0.158)	(0.118)	(0.291)	(0.127)
Number of countries	21	21	21	21	21	21	21	21	21	21	21	21
R-squared	0.247	0.234	0.225	0.280	0.225	0.236	0.225	0.228	0.261	0.231	0.228	0.288
p-value	0.000998	0.000973	0.000336	0.000553	0.000358	0.000392	0.000458	0.000659	0.000358	0.000699	0.000561	0.000179

*Note: OLS specification with robust standard error. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 18. Determinants of fiscal behaviour, 1980-2016

Dependent variable: Personal Income Tax cyclicality $\hat{\beta}PIT$

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
inf	**-0.426***** (0.0358)	**-0.408***** (0.0454)	**-0.402***** (0.0318)	**-0.407***** (0.0460)	**-0.401***** (0.0317)	**-0.424***** (0.0305)	**-0.426***** (0.0347)	**-0.366***** (0.0282)	**-0.411***** (0.0183)	**-0.334***** (0.0573)	**-0.342***** (0.0534)	**-0.363***** (0.0345)	**-0.344***** (0.0612)
fiscap		-0.135 (0.110)											
fiscap_vol			-0.0776 (0.0775)										
lfiscap				-0.140 (0.113)									
lfiscap_vol					-0.0788 (0.0794)								
debt						0.119 (0.491)							
debt_vol							-0.123 (0.556)						
manu								0.581 (0.396)					
nare									-0.134 (0.233)				
CRI										**0.0203**** (0.00856)			
ERI											**0.0462**** (0.0186)		
FRI												**0.0441***** (0.0157)	
PRI													**0.0148*** (0.00751)
Constant	0.0158 (0.103)	0.301 (0.203)	0.0377 (0.167)	0.315 (0.211)	0.0388 (0.168)	-0.0485 (0.223)	0.0348 (0.179)	-0.205* (0.107)	0.0682 (0.187)	-1.464** (0.651)	-1.652** (0.693)	-1.657*** (0.568)	-1.040* (0.579)
Number of countries	41	31	31	31	31	41	41	41	41	39	39	39	39
R-squared	0.142	0.215	0.157	0.217	0.157	0.145	0.142	0.187	0.146	0.229	0.226	0.214	0.215
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 18. Determinants of fiscal behaviour, 1980-2016 *(continued)*
Dependent variable: Personal Income Tax cyclicality $\hat{\beta}PIT$

VARIABLES	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
inf	-0.374***	-0.378***	-0.328***	-0.306***	-0.397***	-0.384***	-0.351***	-0.447***	-0.362***	-0.373***	-0.412***	-0.396***
	(0.0703)	(0.0445)	(0.0595)	(0.0748)	(0.0443)	(0.0568)	(0.0411)	(0.0327)	(0.0448)	(0.0786)	(0.0351)	(0.0393)
govstab	0.211											
	(0.167)											
socecon		**0.0838***										
		(0.0432)										
invest			**0.129***									
			(0.0649)									
inconflict				**0.159****								
				(0.0771)								
exconflict					0.192							
					(0.126)							
corrupt						0.0761						
						(0.0537)						
military							**0.109***					
							(0.0539)					
religious								0.173				
								(0.135)				
law									**0.0945****			
									(0.0426)			
ethnic										0.138		
										(0.145)		
democracy											0.0418	
											(0.0533)	
bureau												0.0605
												(0.0536)
Constant	-1.594	-0.523	-1.040*	-1.495*	-1.975	-0.255	-0.493*	-0.852	-0.378*	-0.589	-0.177	-0.150
	(1.339)	(0.314)	(0.555)	(0.768)	(1.341)	(0.268)	(0.250)	(0.741)	(0.213)	(0.690)	(0.250)	(0.173)
Number of countries	39	39	39	39	39	39	39	39	39	39	39	39
R-squared	0.185	0.191	0.211	0.284	0.236	0.167	0.199	0.223	0.184	0.189	0.148	0.152
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 19. Fiscal behaviour of government spending of OECD & non-OECD countries, 1980-2016
Dependent variable: Percentage change of real government spending

	OECD			Non-OECD		
VARIABLE	**OLS**	**FE**	**FE**	**OLS**	**FE**	**FE**
Percentage change of real GDP	0.152**	0.0718	0.227**	0.638***	0.634***	0.652***
	(0.0609)	(0.0869)	(0.0965)	(0.0991)	(0.117)	(0.126)
Constant	0.0217***	0.0238***	0.0596***	0.0187***	0.0188***	-0.00310
	(0.00220)	(0.00224)	(0.00864)	(0.00456)	(0.00498)	(0.0793)
Number of countries		35	35		157	157
Observations	991	991	991	3,657	3,657	3,657
R-squared	0.010	0.002	0.129	0.083	0.073	0.099
Country FE		YES	YES		YES	YES
Year FE			YES			YES

*Note: OLS/FE: Ordinary Least Squares/Fixed Effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 20. Fiscal behaviour of government spending by income level, 1980-2016
Dependent variable: Percentage change of real government spending

	HIC		UMC		LMC		LIC	
Percentage change of real GDP	0.0683	0.150	0.506***	0.512***	0.943***	0.947***	1.305***	1.351***
	(0.161)	(0.213)	(0.0926)	(0.100)	(0.152)	(0.150)	(0.242)	(0.263)
Constant	0.0272***	0.0391	0.0214***	0.0606	0.00706	-0.0781	0.000952	0.180
	(0.00497)	(0.0268)	(0.00400)	(0.0569)	(0.00666)	(0.152)	(0.00969)	(0.240)
Number of countries	57	57	54	54	52	52	29	29
Observations	1,523	1,523	1,231	1,231	1,246	1,246	648	648
R-squared	0.001	0.058	0.078	0.128	0.070	0.114	0.188	0.233
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

Note:
HIC: high income countries; UMC: upper middle income countries; LMC: lower middle income countries; LIC: lower income countries
*Fixed Effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 21. Fiscal behaviour of government spending pre-crisis and post-crisis
Dependent variable: Percentage change of real government spending

VARIABLES	1980-2007		2008-2016	
Percentage change of real GDP	0.557***	0.557***	0.650***	0.724***
	(0.155)	(0.161)	(0.0671)	(0.0907)
Constant	0.0168**	0.0297	0.0221***	0.0436***
	(0.00671)	(0.0381)	(0.00208)	(0.0105)
Observations	2,939	2,939	1,709	1,709
R-squared	0.048	0.061	0.100	0.161
Number of countries	189	189	192	192
Country FE	YES	YES	YES	YES
Year FE		YES		YES

*Note: Fixed Effects (country control, time control). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 22. Fiscal behaviour of government spending by sub-periods
Dependent variable: Percentage change of real government spending

VARIABLES	1980-1989		1990-1998		1999-2007		2008-2016	
Percentage change of real GDP	0.930***	0.915***	0.314	0.324	0.691***	0.690***	0.650***	0.724***
	(0.245)	(0.246)	(0.229)	(0.236)	(0.134)	(0.134)	(0.0671)	(0.0907)
Constant	0.00235	0.0169	0.0203**	0.0163	0.0141**	-0.00198	0.0221***	0.0436***
	(0.00934)	(0.0383)	(0.00882)	(0.0243)	(0.00638)	(0.0121)	(0.00208)	(0.0105)
Observations	352	352	991	991	1,596	1,596	1,709	1,709
R-squared	0.069	0.083	0.017	0.034	0.060	0.070	0.100	0.161
Number of countries	52	52	148	148	189	189	192	192
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES

*Note: Fixed Effects (country control, time control). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Table 23: Fiscal behaviour of government spending in developing Asian countries
Dependent variable: Percentage change of real government spending

VARIABLES	South Asia		Central Asia		Southeast Asia		East Asia		The Pacific	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Percentage change of real GDP	0.152	0.232	0.857***	0.780	0.498**	0.550**	0.742**	0.920**	-0.0260	-0.0417
	(0.318)	(0.361)	(0.212)	(0.533)	(0.180)	(0.214)	(0.242)	(0.249)	(0.280)	(0.303)
Constant	0.0505**	0.0435	0.0127**	-0.0598	0.0331***	0.0897**	0.0187	0.00810	0.0230**	0.122***
	(0.0166)	(0.0242)	(0.00518)	(0.0479)	(0.0101)	(0.0387)	(0.0153)	(0.0814)	(0.00786)	(0.0116)
Number of countries	8	8	8	8	10	10	5	5	9	9
Observations	337	337	223	223	410	410	239	239	260	260
p-value	0.646	.	0.00490	.	0.0222	.	0.0373	.	0.928	.
R-squared	0.002	0.201	0.132	0.288	0.017	0.178	0.051	0.245	0.000	0.205
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE		YES		YES		YES		YES		YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Fixed effects
South Asia: Afghanistan; Bangladesh; Bhutan; India; Maldives; Nepal; Pakistan; Sri Lanka
Central Asia: Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz Republic; Tajikistan; Turkmenistan; Uzbekistan
Southeast Asia: Brunei Darussalam; Cambodia; Indonesia; Lao People's Dem. Rep.; Malaysia; Myanmar; Philippines; Singapore; Thailand; Viet Nam
East Asia: People's Republic of China; Hong Kong, China; Republic of Korea; Mongolia; Taipei,China
The Pacific: Fiji; Kiribati; Marshall Islands; Palau; Papua New Guinea; Solomon Islands; Timor-Leste; Tonga; Vanuatu

Table 24: Government spending cyclicality $\widehat{\beta}GS$ in developing Asia, 1960-2016

Group	Mean	SD	Minimum	Maximum
Central Asia	0.92	0.45	0.18	1.47
East Asia	0.50	0.87	-0.35	1.84
South Asia	0.35	1.02	-0.67	2.08
Southeast Asia	0.40	0.78	-0.98	1.52
The Pacific	0.91	0.59	0.15	1.74
Entire developing Asia	**0.60**	**0.76**	**-0.98**	**2.08**

Note:
South Asia: Bangladesh; Bhutan; India; Maldives; Nepal; Pakistan; Sri Lanka
Central Asia: Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz Republic; Tajikistan; Uzbekistan
Southeast Asia: Brunei Darussalam; Cambodia; Indonesia; Malaysia; Philippines; Singapore; Thailand; Viet Nam
East Asia: People's Republic of China; Hong Kong, China; Republic of Korea; Mongolia; Taiwan
The Pacific: Fiji; Papua New Guinea; Solomon Islands; Tonga; Vanuatu

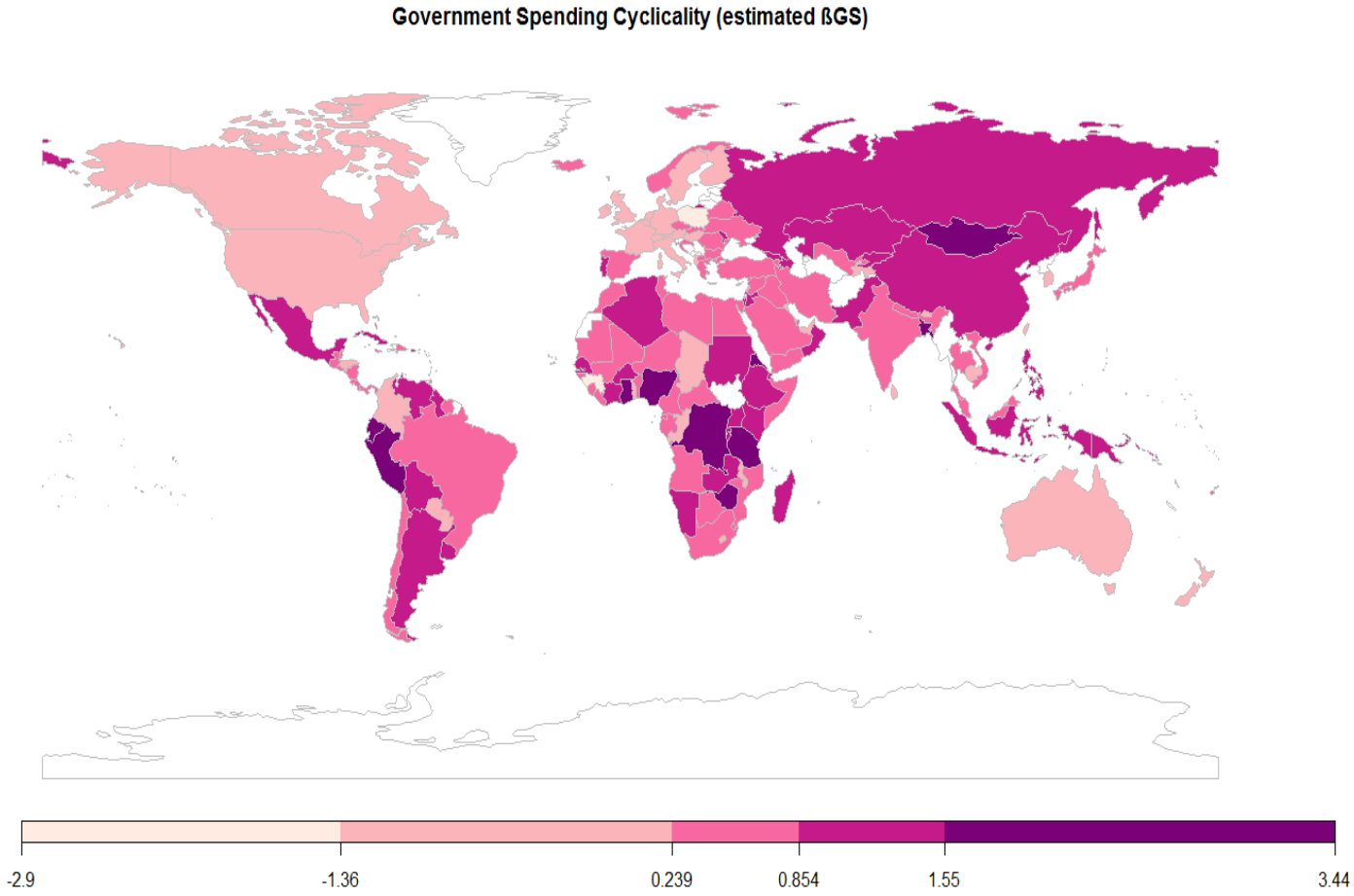
Figure 1: Public debt/GDP (%) in advanced economies, and emerging markets and developing economies.

Source: World Economic Outlook; authors' calculation.

Figure 2. Government spending cyclicality $\hat{\beta}GS$ by region and income, 1960-2016

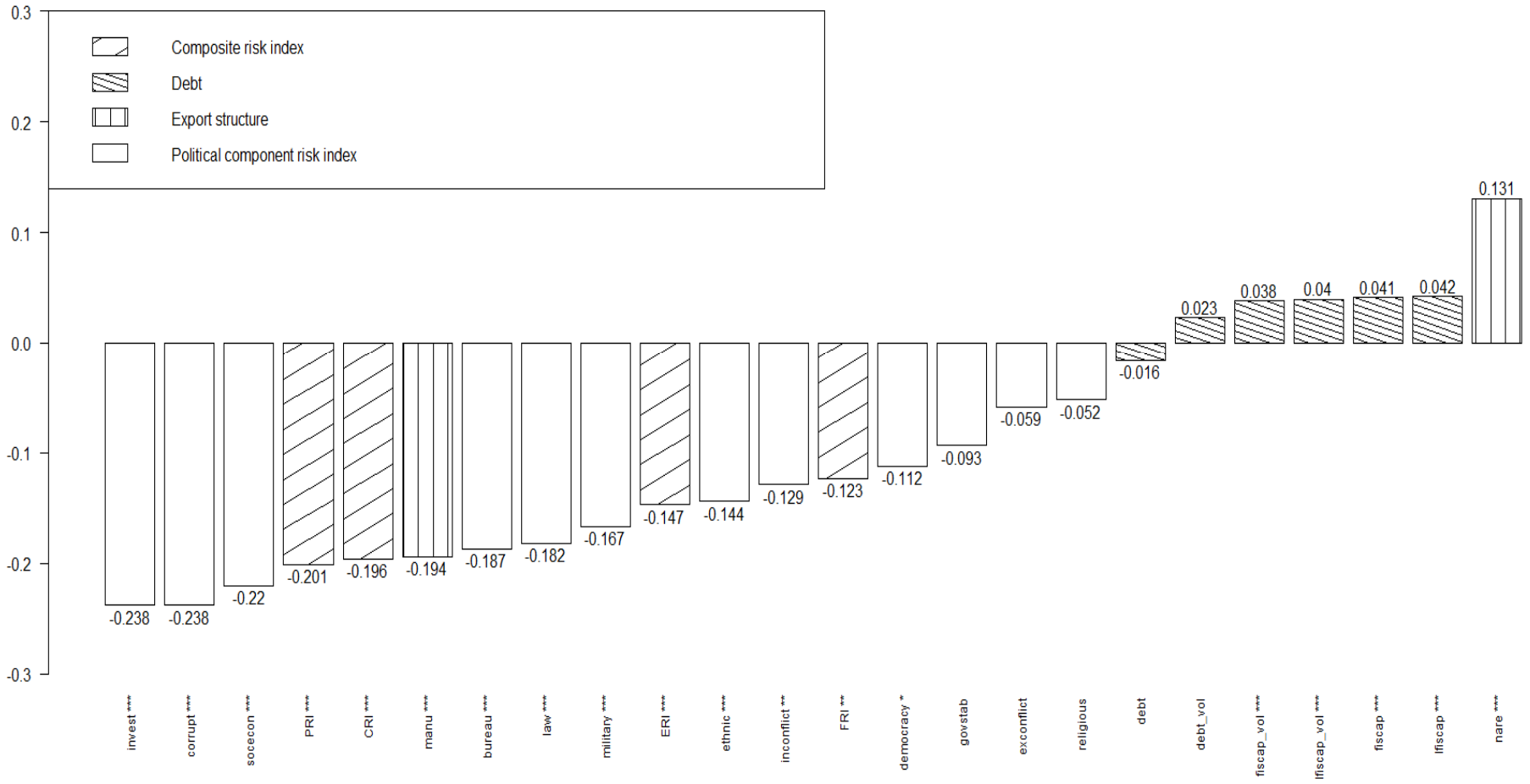
Note:
Specification: Two-step Prais-Winsten estimation to correct for the first order-autocorrelation in the residuals.

Figure 3. Magnitude of government spending cyclicality $\hat{\beta}GS$, 1960-2016



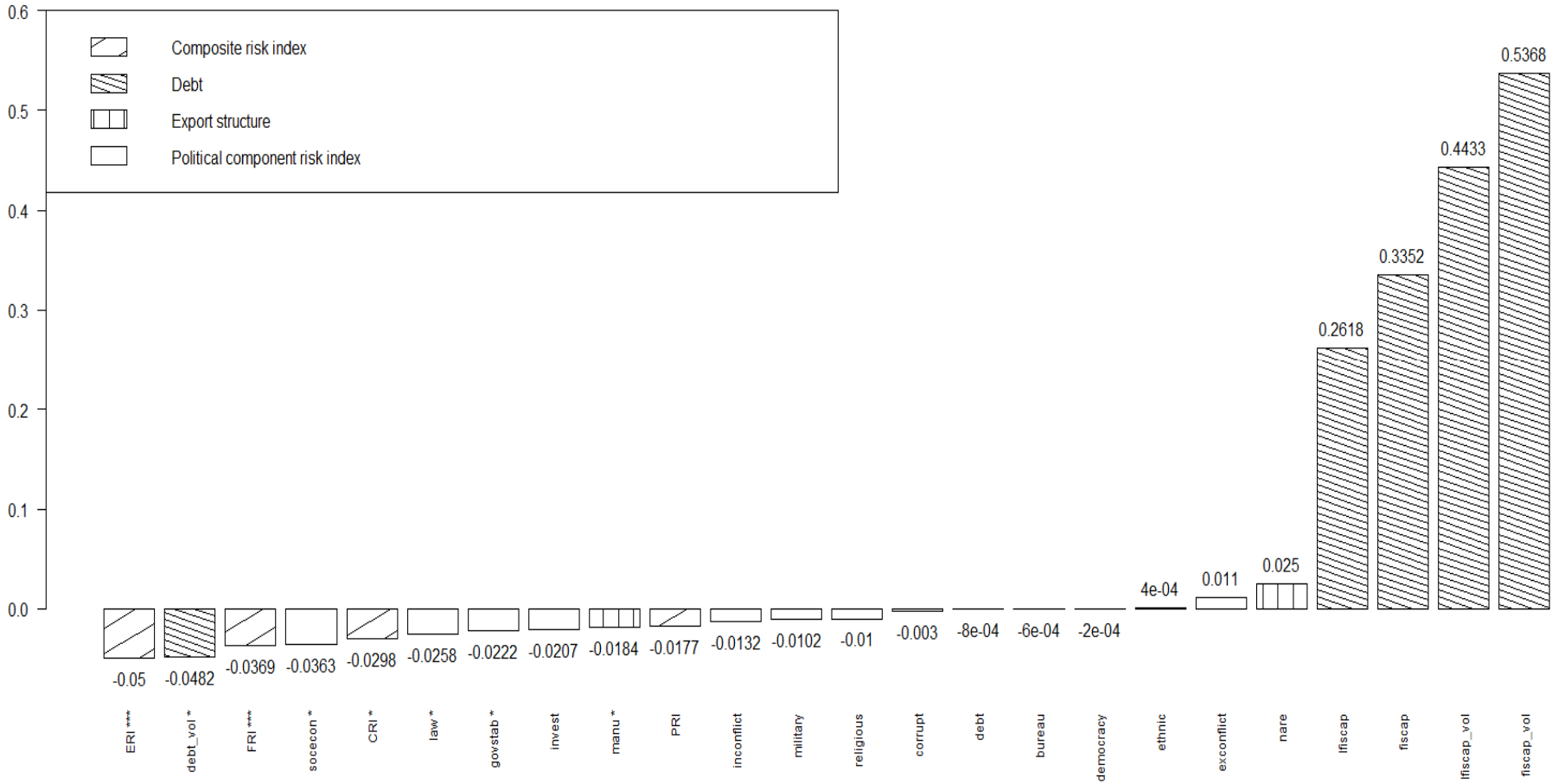
Note:
Specification: Two-step Prais-Winsten estimation to correct for the first order-autocorrelation in the residuals.

Figure 4. Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$



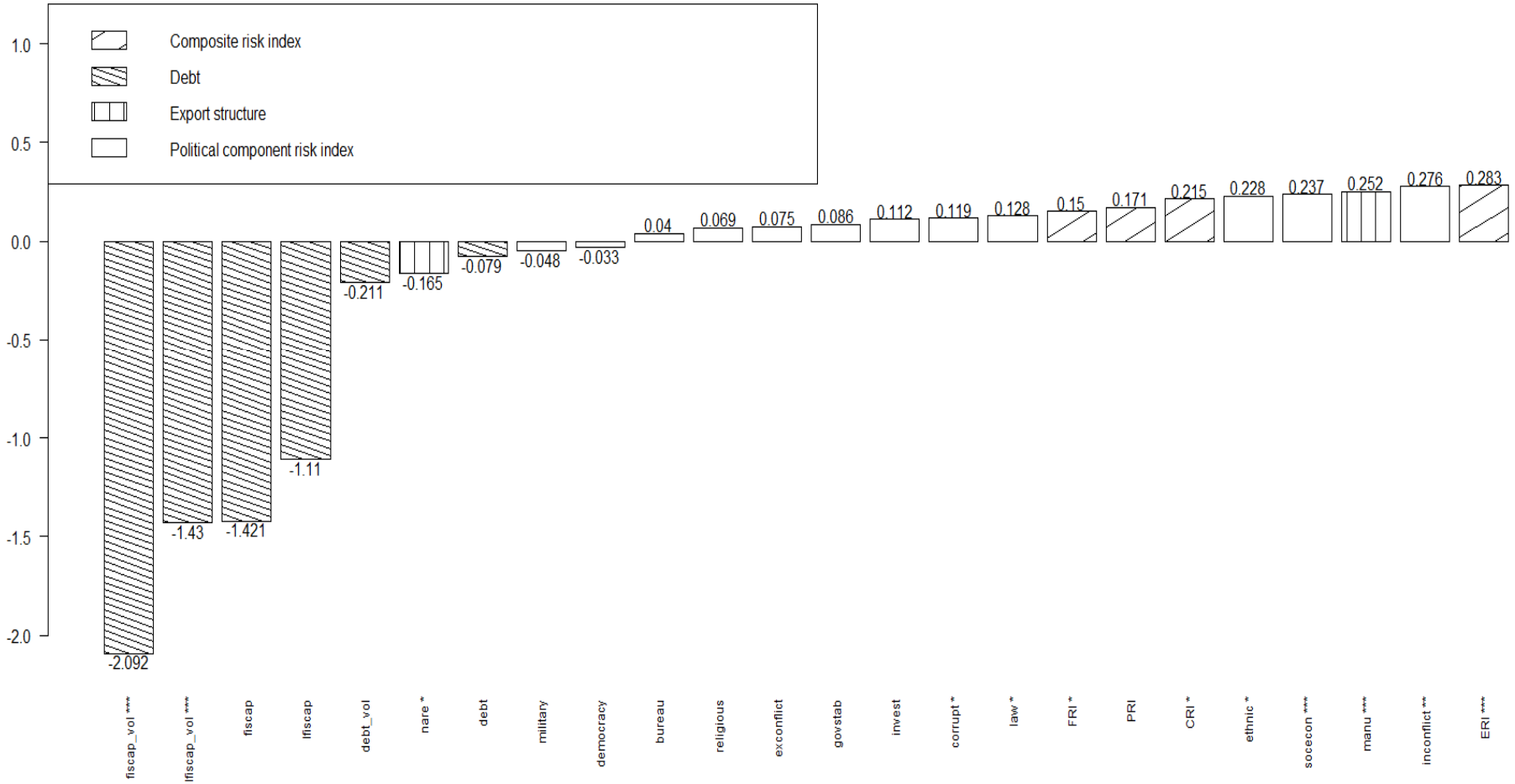
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (2) for 137 countries) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 5. Economic significance of variables to $\widehat{\beta}VAT$



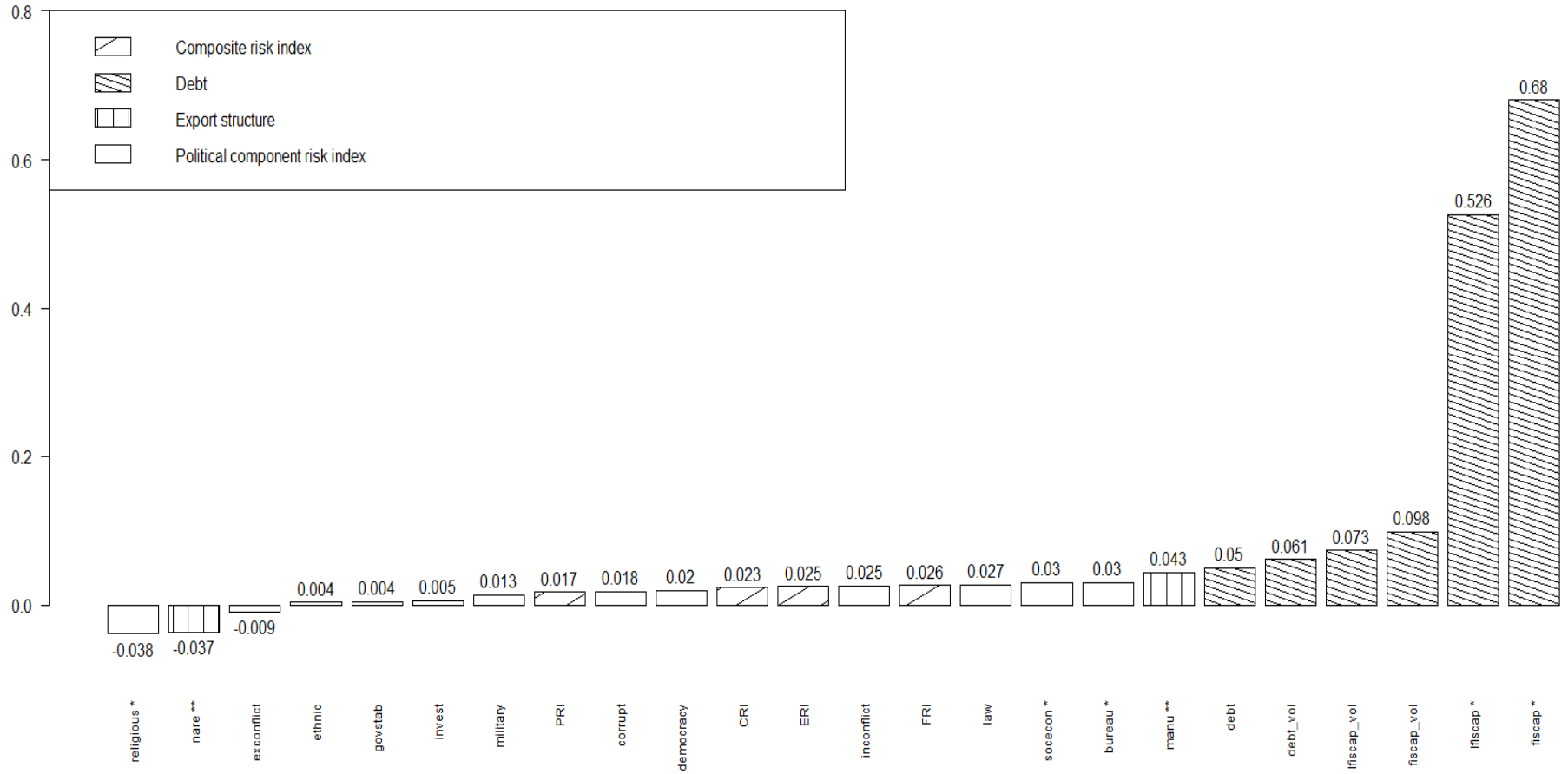
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (3)) to approximate the effect of its one standard deviation change on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 6. Economic significance of variables to $\widehat{\beta}PIT$



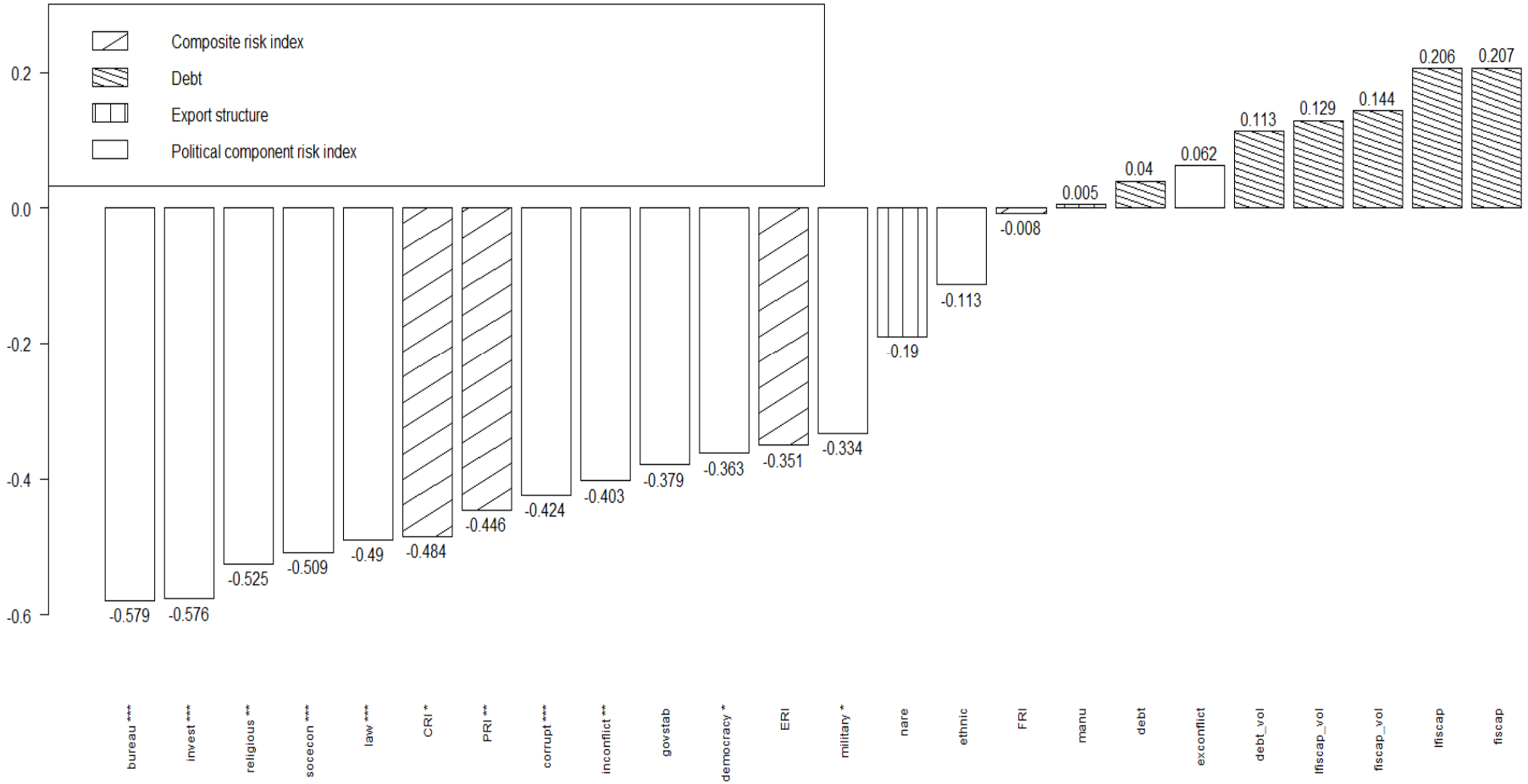
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (3)) to approximate the effect of its one standard deviation change on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 7. Economic significance of variables to $\widehat{\beta}CIT$



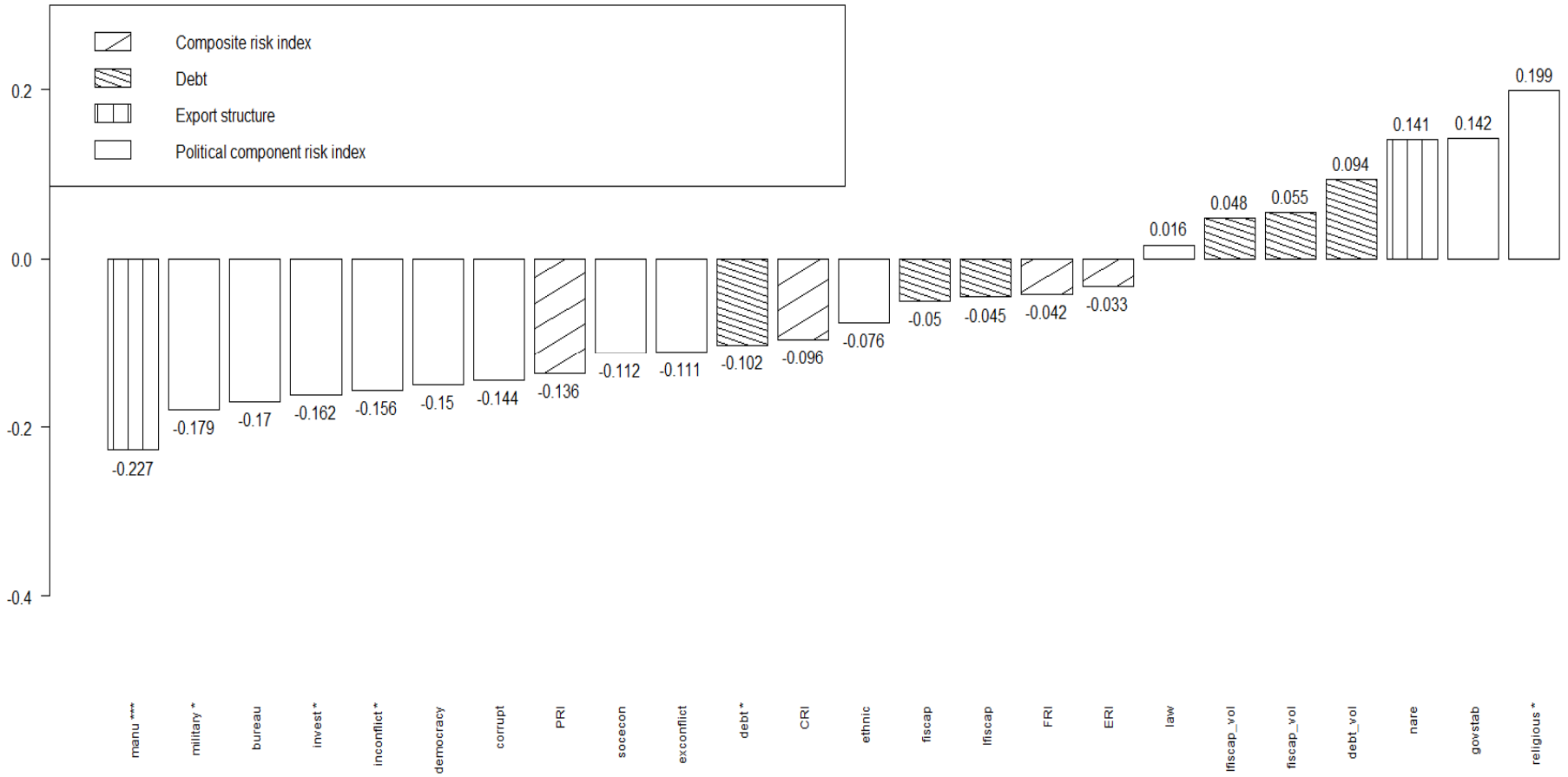
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (3)) to approximate the effect of its one standard deviation change on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 8: Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$ for East Asia & Pacific



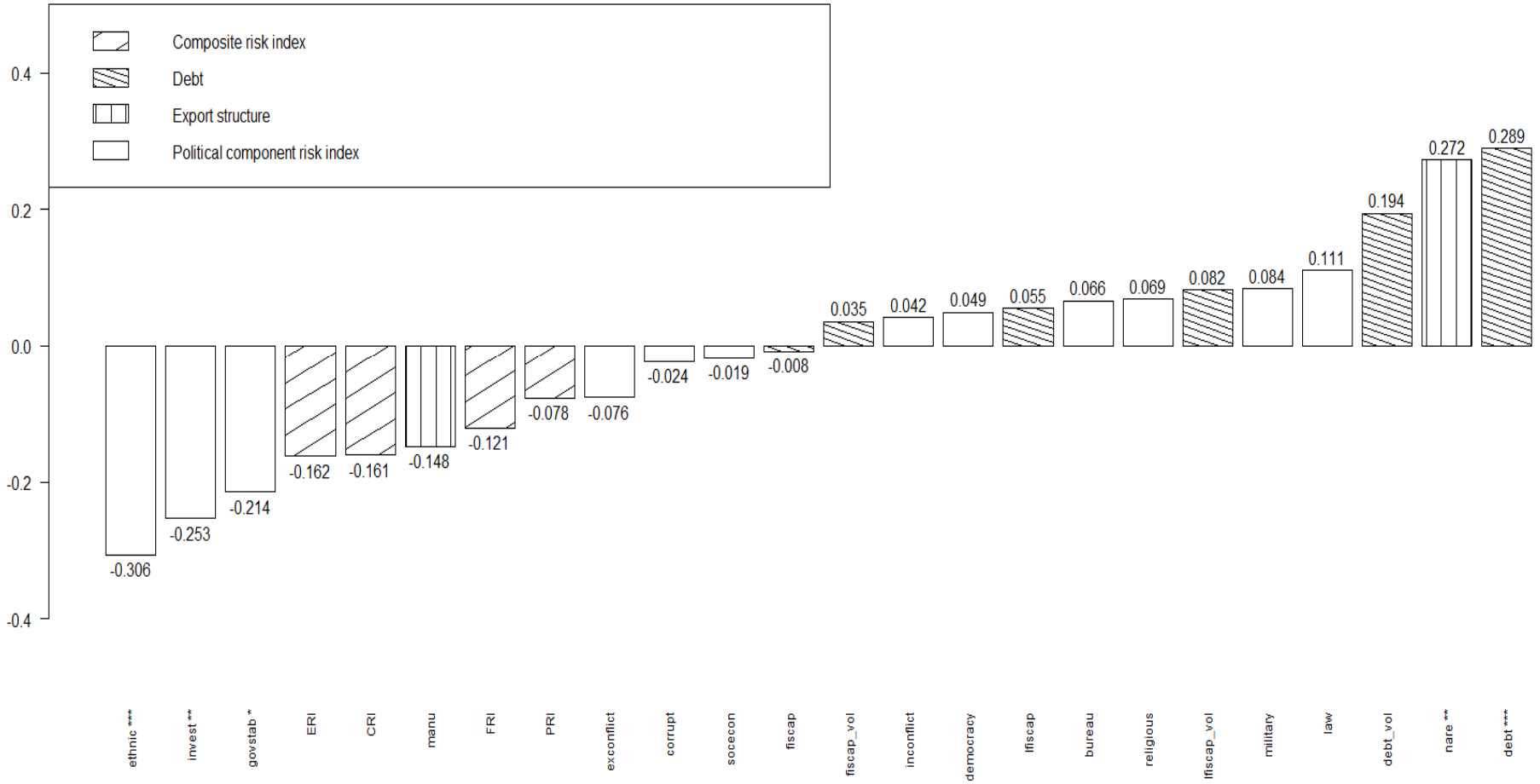
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for the countries in East Asia & Pacific (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 9: Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$ for Europe & Central Asia



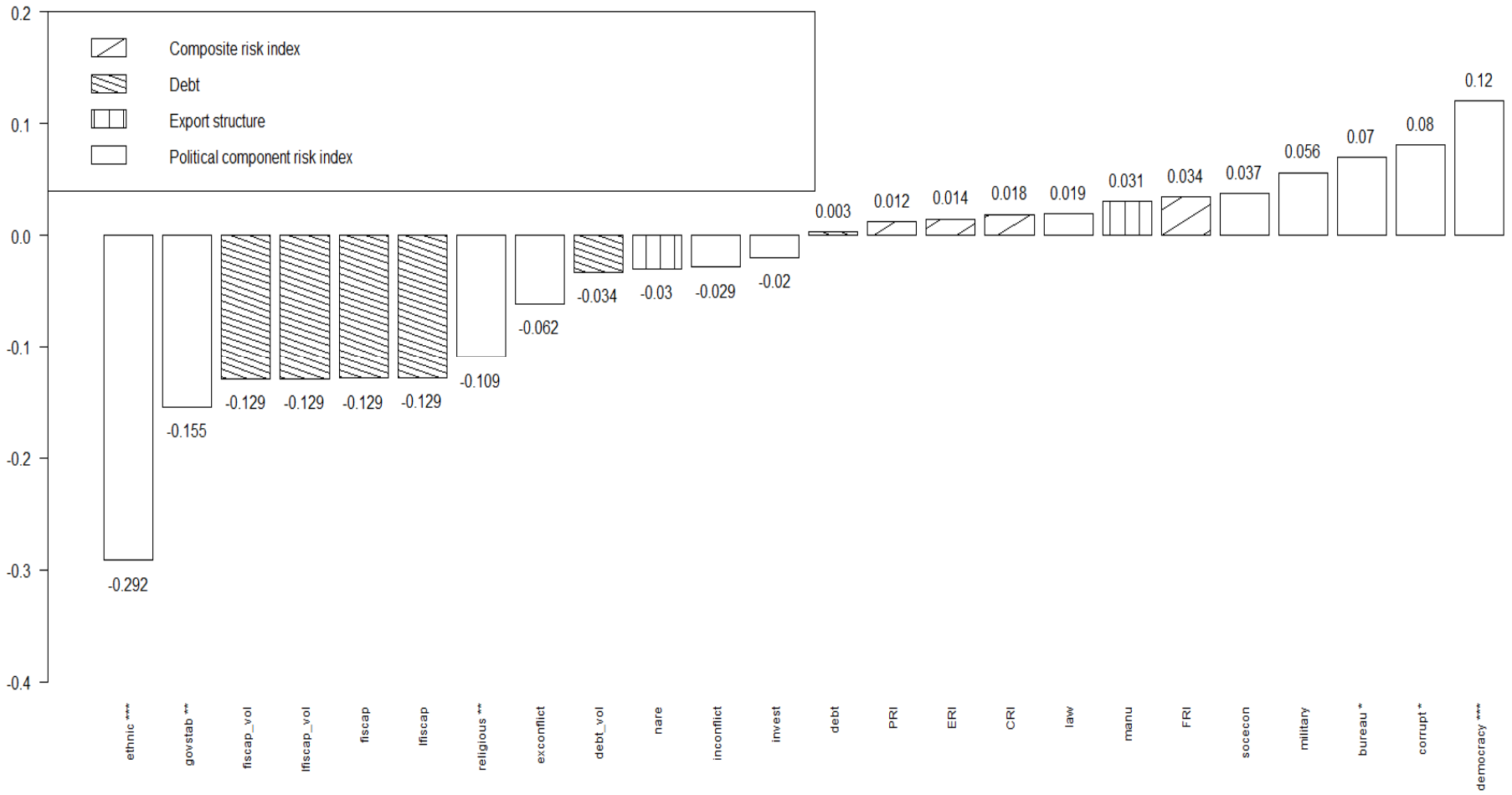
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for the countries in Europe & Central Asia (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 10: Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$ for Latin America & Caribbean



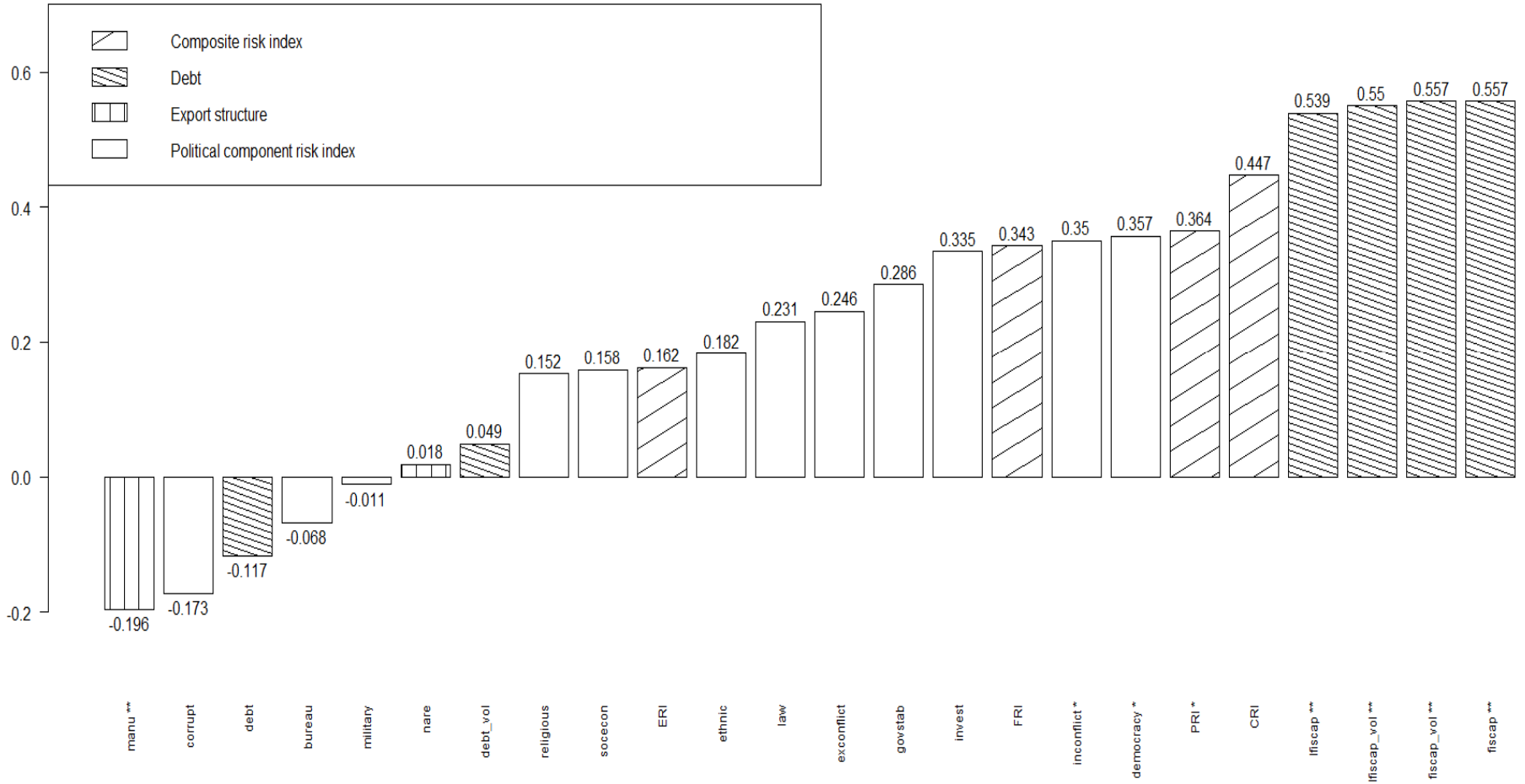
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for the countries in Latin America & Caribbean (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 11: Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$ for Middle East & North Africa



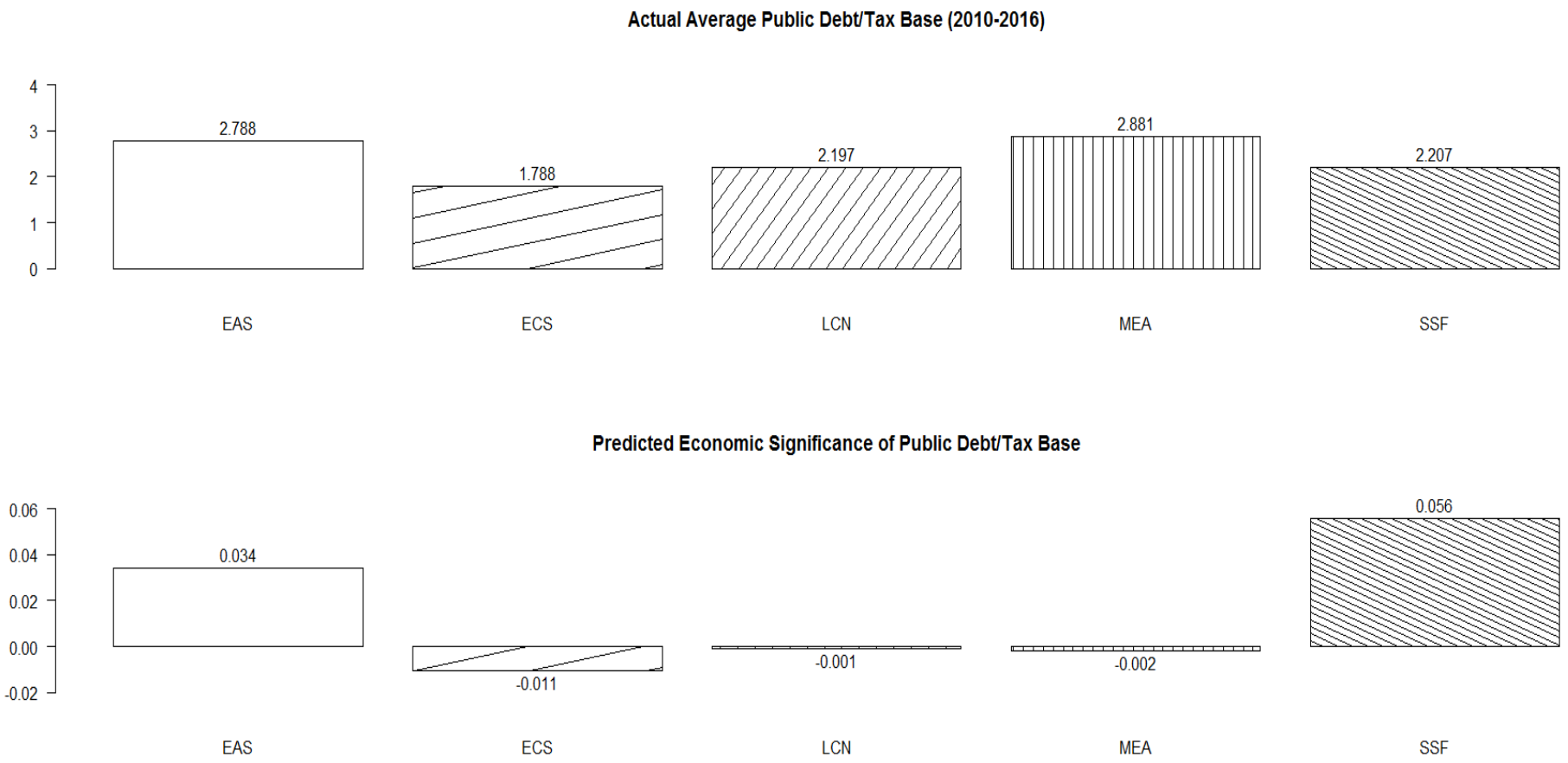
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for the countries in Middle East & North Africa (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 12: Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$ for Sub-Saharan Africa



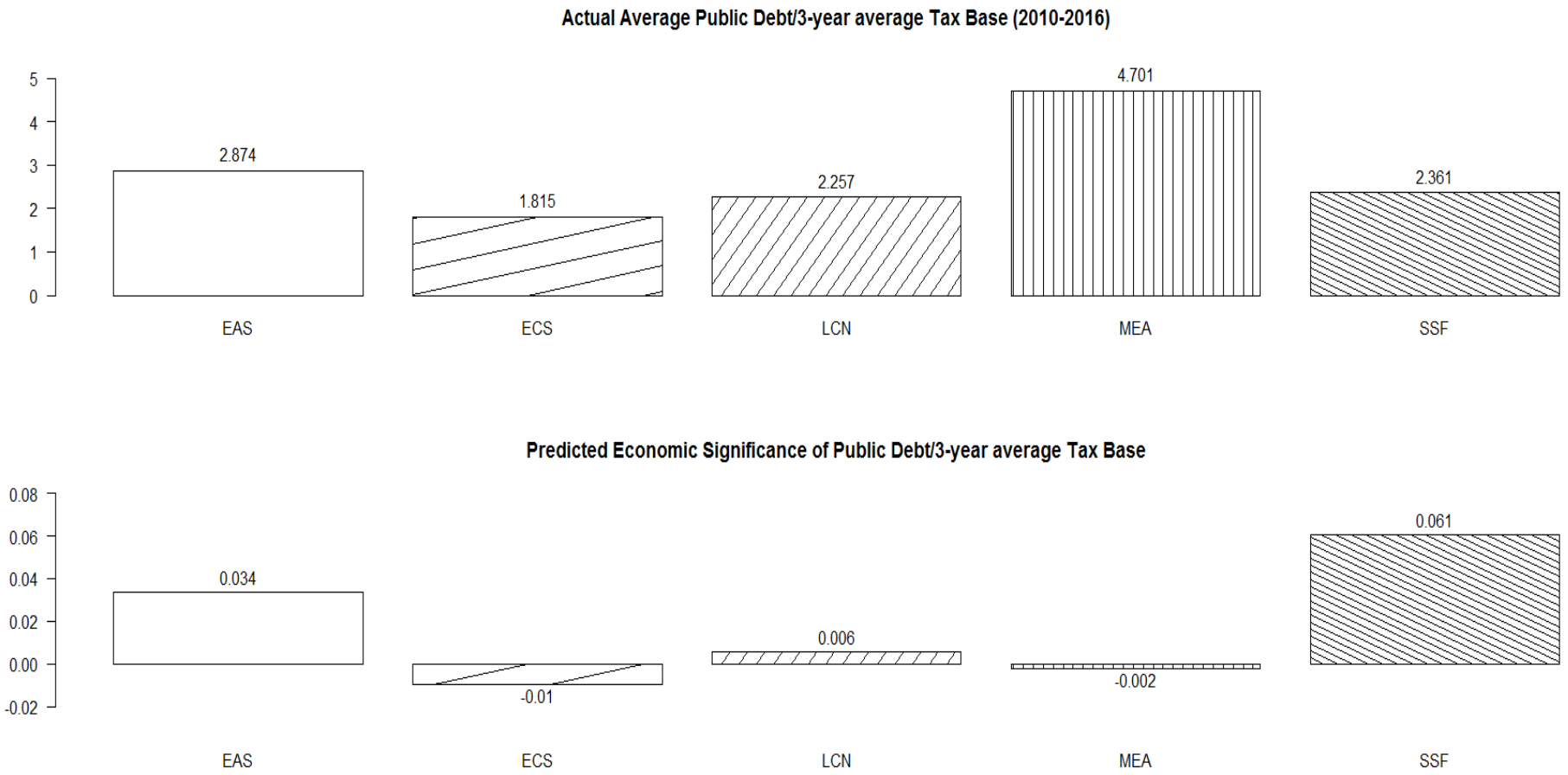
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for the countries in Sub-Saharan Africa (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 13: Economic significance of public debt/tax base to government spending cyclicality $\widehat{\beta}GS$ by region



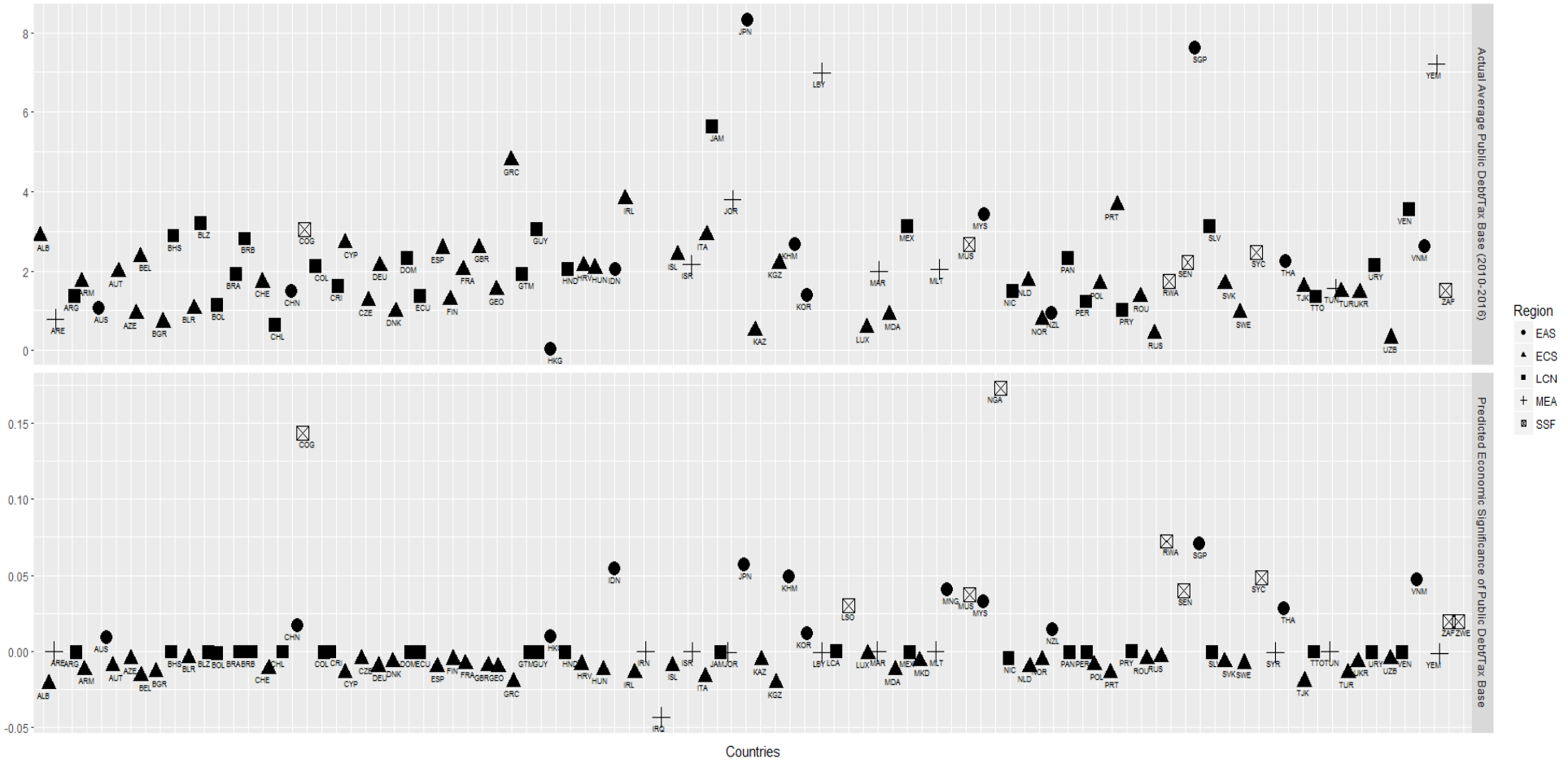
Note:
EAS: East Asia & Pacific; ECS: Europe & Central Asia; LCN: Latin America & Caribbean; MEA: Middle East & North Africa; SSF: Sub-Saharan Africa
The upper graph shows the actual public debt/tax base average over 2010-2016 by region. The lower graph approximates the change of government spending cyclicality by region if their public debt/tax base increases by 10%, which is calculated by 0.1(Regional-specific estimated coefficient of public debt/tax base)*(Actual regional-specific public debt/tax base average over 1960-2016). Regional-specific estimated coefficient of public debt/tax base is from the corresponding cross sectional regression for the region (similar to equation (2)) [See Appendix Table A11 for Regional-specific estimated coefficient of public debt/tax base].*

Figure 14: Economic significance of Public Debt/3-year average Tax Base to government spending cyclicality $\widehat{\beta}GS$ by region



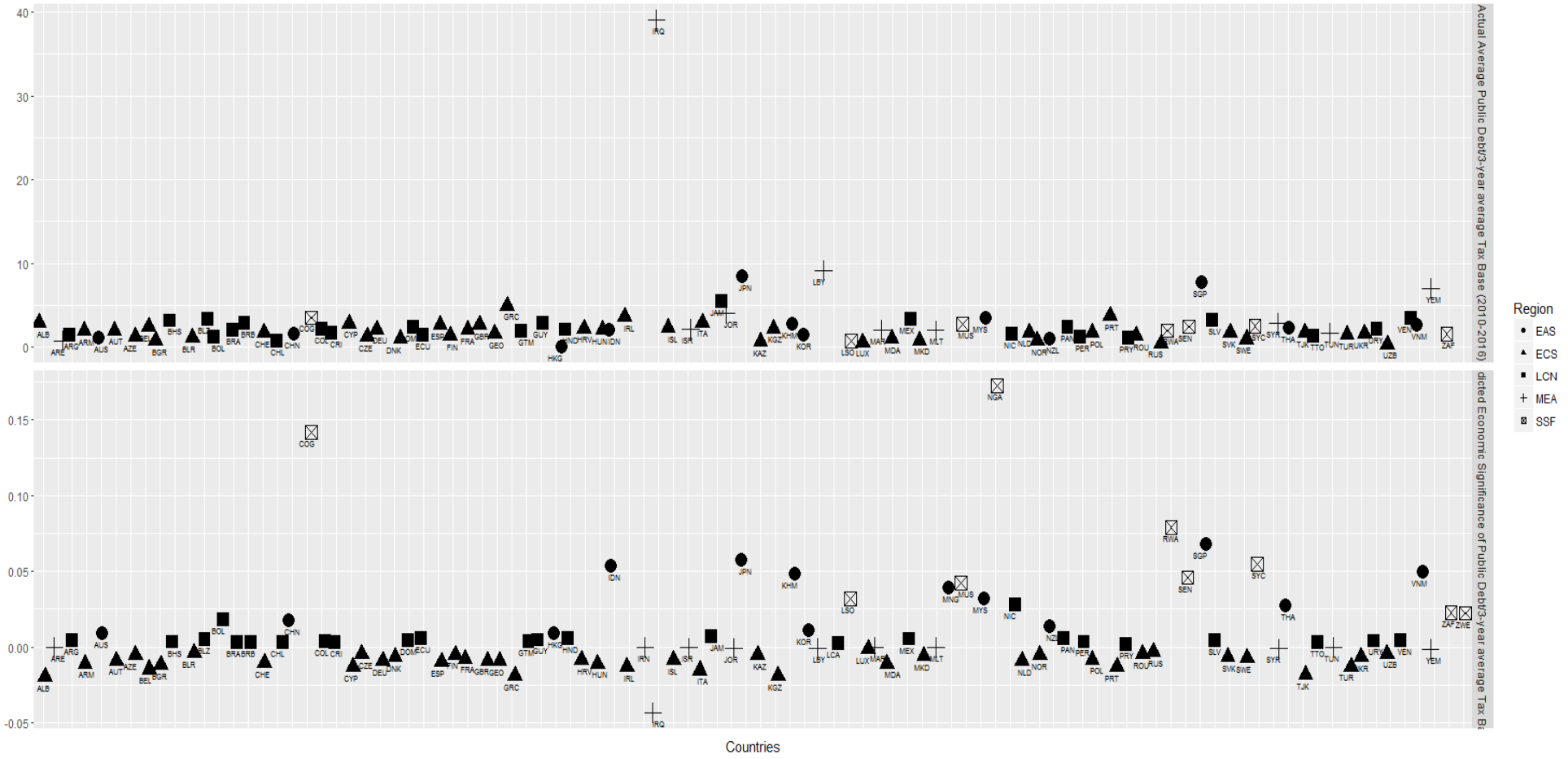
Note:
EAS: East Asia & Pacific; ECS: Europe & Central Asia; LCN: Latin America & Caribbean; MEA: Middle East & North Africa; SSF: Sub-Saharan Africa
The upper graph shows the actual public debt/3-year average tax base over 2010-2016 by region. The lower graph approximates the change of government spending cyclicality by region if their public debt/3-year average tax base increases by 10%, which is calculated by 0.1(Regional-specific estimated coefficient of public debt/3-year average tax Base)*(Actual regional-specific public debt/3-year average tax base over 1960-2016). Regional-specific estimated coefficient of public debt/3-year average tax base is from the corresponding cross sectional regression for the region (similar to equation (2)) [See Appendix Table A11 for Regional-specific estimated coefficient of Public Debt/Tax Base].*

Figure 15: Economic significance of Public Debt/Tax Base to government spending cyclicality $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ by country



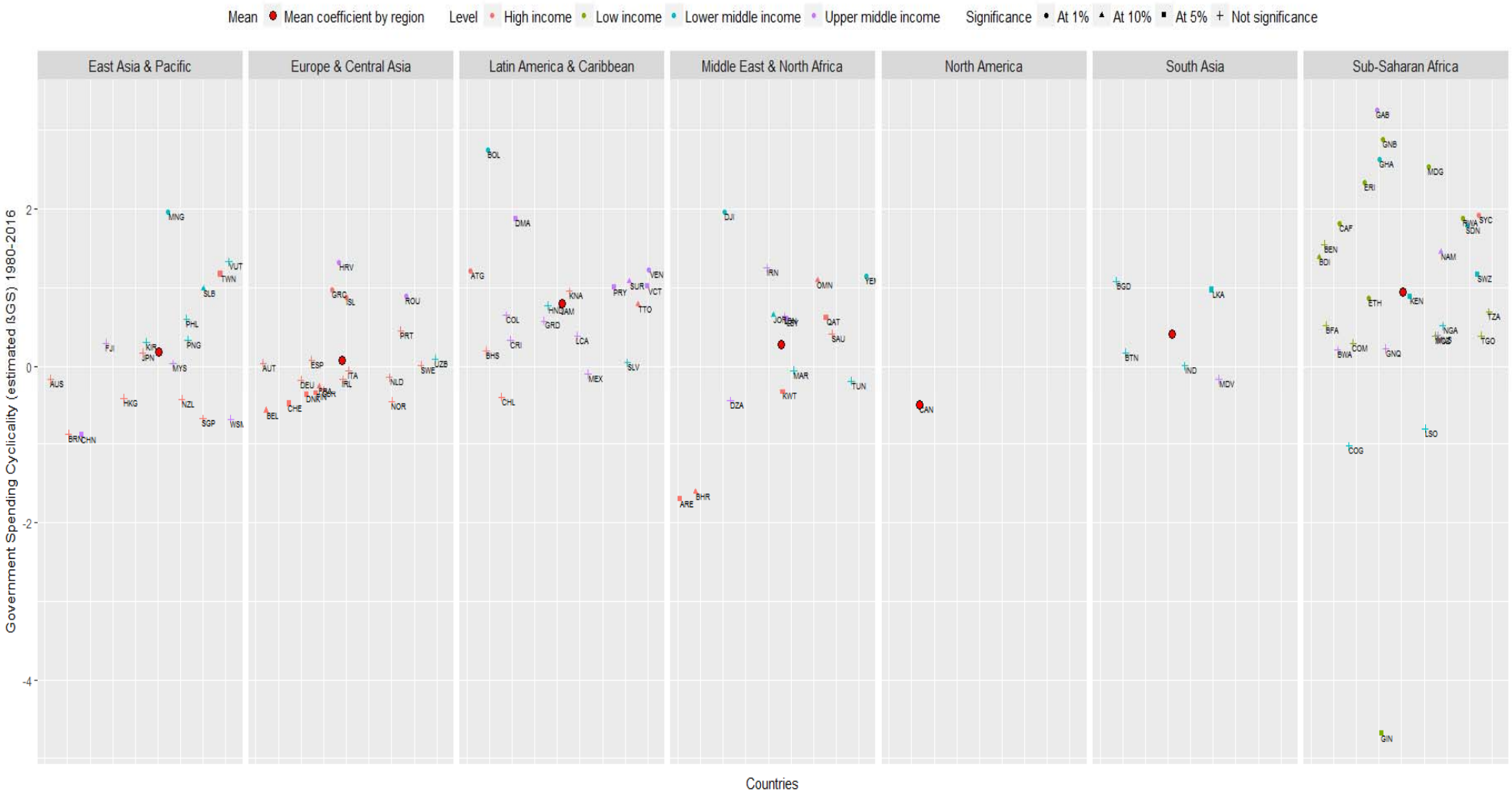
Note:
The upper graph shows the actual public debt/tax base average over 2010-2016 by country. The lower graph approximates the change of government spending cyclicality by country if their public debt/tax base increases by 10%, which is calculated by multiplying 0.1(Regional-specific estimated coefficient of public debt/tax base)*(Actual country-specific public debt/tax base average over 1960-2016). Regional-specific estimated coefficient of public debt/taxbase is from the corresponding cross sectional regression for the region (similar to equation (2)) [See Appendix Table A11 for Regional-specific estimated coefficient of public debt/tax base].*
We use regional-specific coefficient in place of country-specific coefficient as there is insufficient country-level data to estimate the 2nd-step regression (that is, equation (2); $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ = f[Public Debt/Tax Base, Control Variables]) on the country-by-country basis.

Figure 16: Economic significance of Public Debt/3-year average Tax Base to government spending cyclicality $\widehat{\beta GS}$ by country



Note:
The upper graph shows the actual public debt/3-year average tax base average over 2010-2016 by country. The lower graph approximates the change of government spending cyclicality by country if their public debt/3-year average tax base increases by 10%, which is calculated by multiplying 0.1(Regional-specific estimated coefficient of public debt/3-year average tax base)*(Actual country-specific public debt/3-year average tax base average over 1960-2016). Regional-specific estimated coefficient of public debt/3-year average tax base is from the corresponding cross sectional regression for the region (similar to equation (2)). [See Appendix Table A11 for Regional-specific estimated coefficient of public debt/3-year average tax base].*
We use regional-specific coefficient in place of country-specific coefficient as there is insufficient country-level data to estimate the 2nd-step regression (that is, equation (2); betaGS = f[Public Debt/Tax Base, Control Variables]) on the country-by-country basis.

Figure 17. Government spending cyclicality $\hat{\beta}GS$ by region and income, 1980-2016



Note:
Specification: Two-step Prais-Winsten estimation to correct for the first order-autocorrelation in the residuals.

Figure 18. Cyclicality of government spending $\widehat{\beta}GS$ pre-crisis and post-crisis

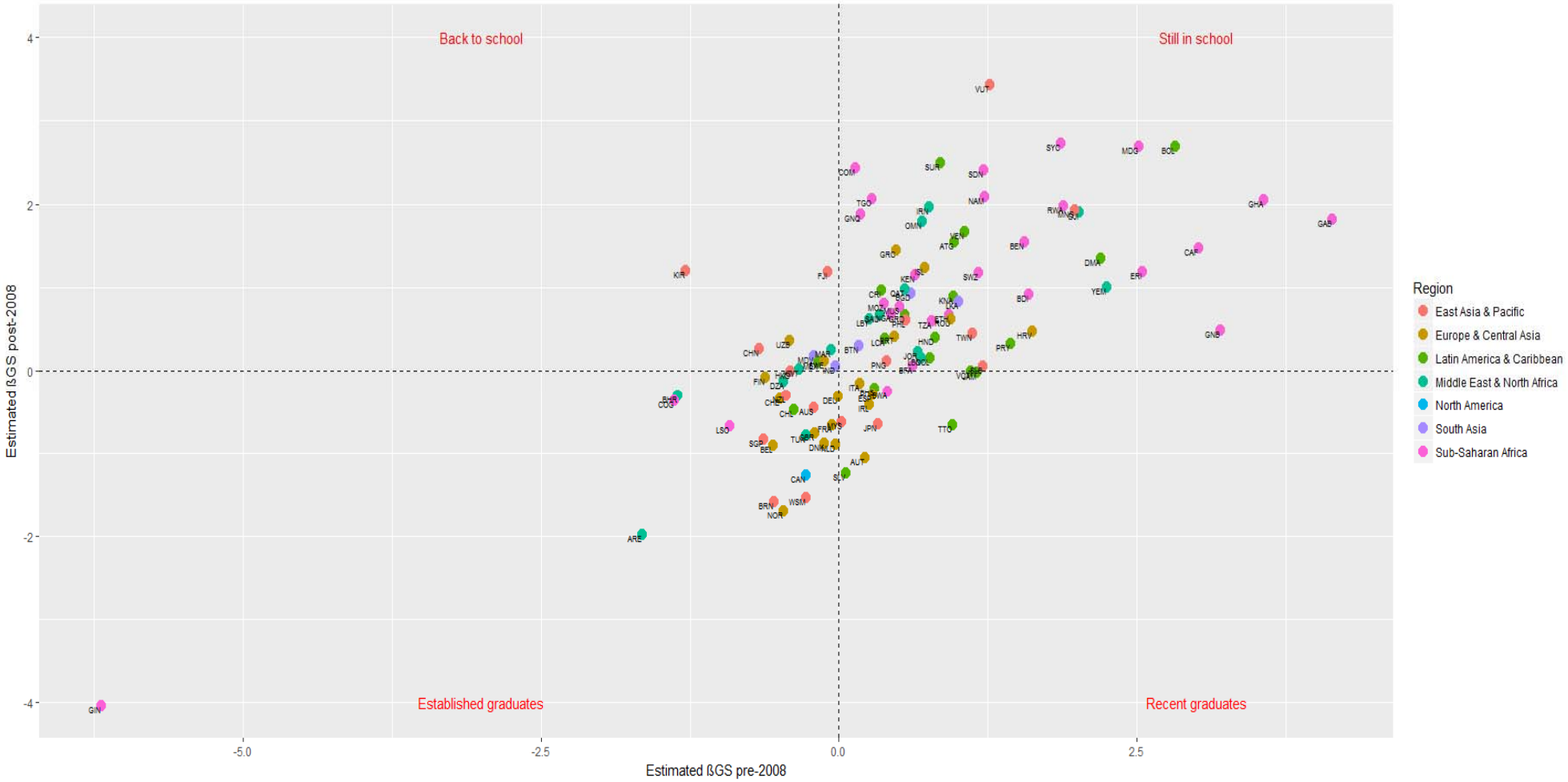
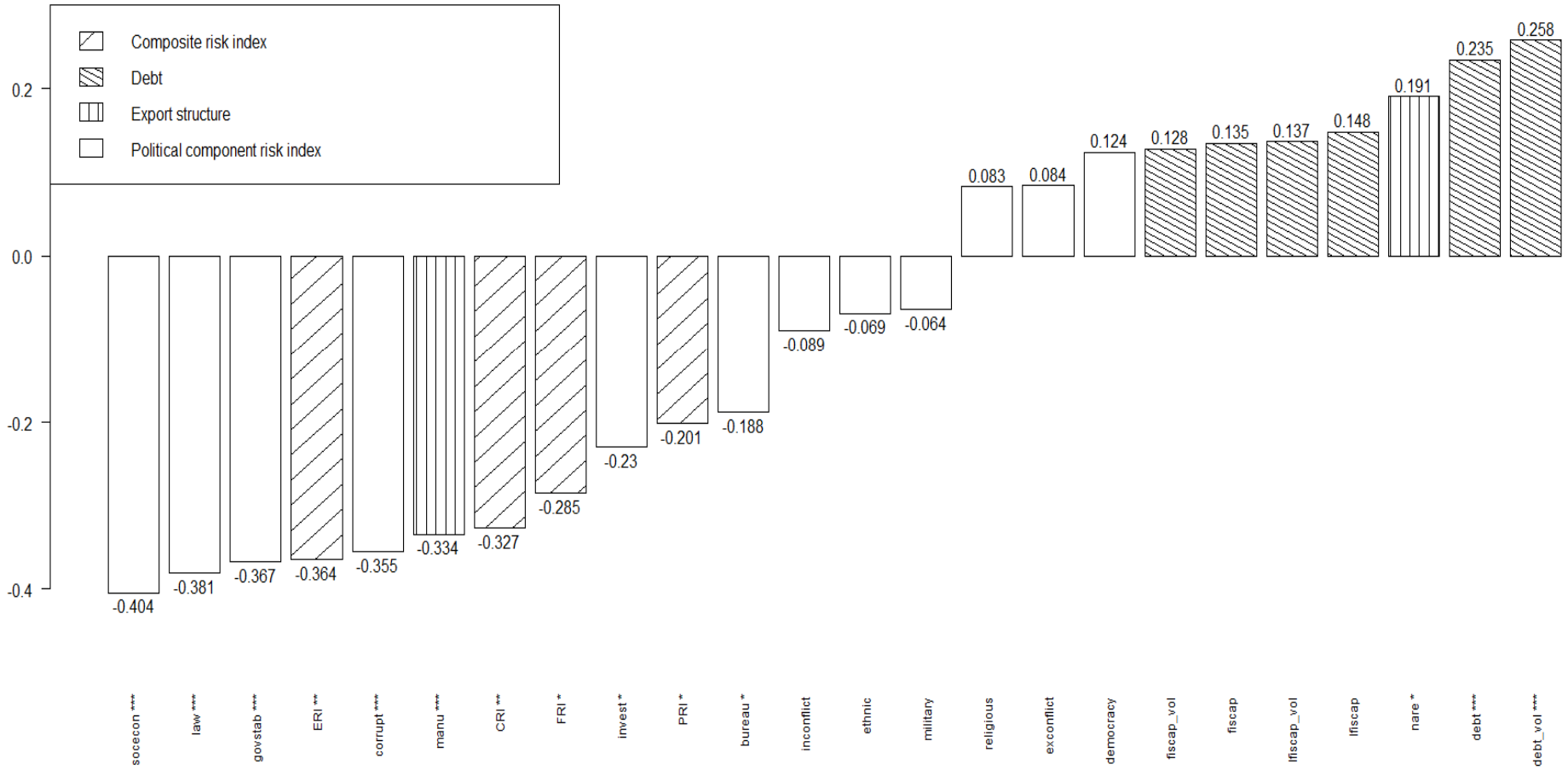
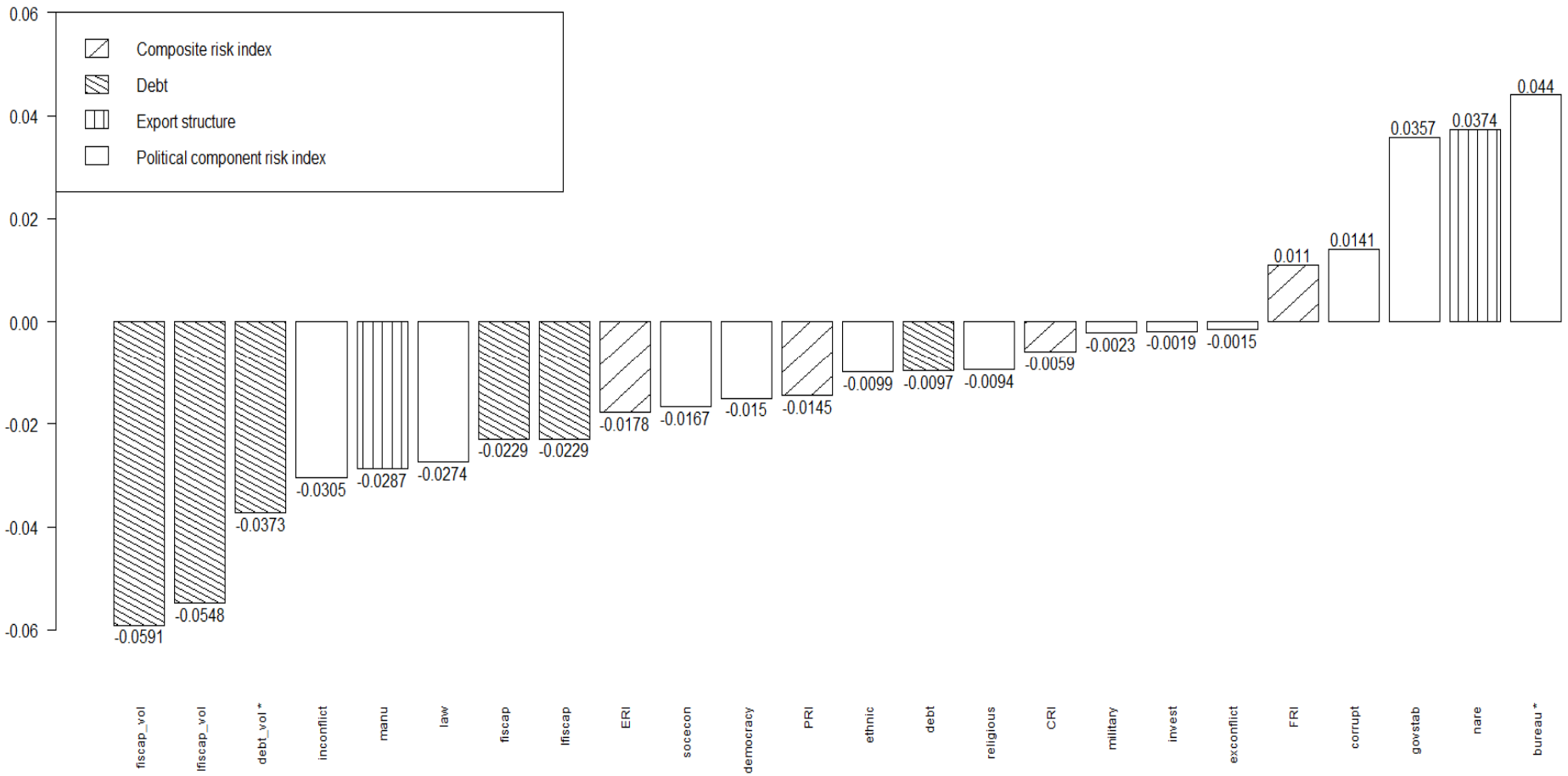


Figure 19. Economic significance of variables to government spending cyclicality $\widehat{\beta GS}$, 1980-2016



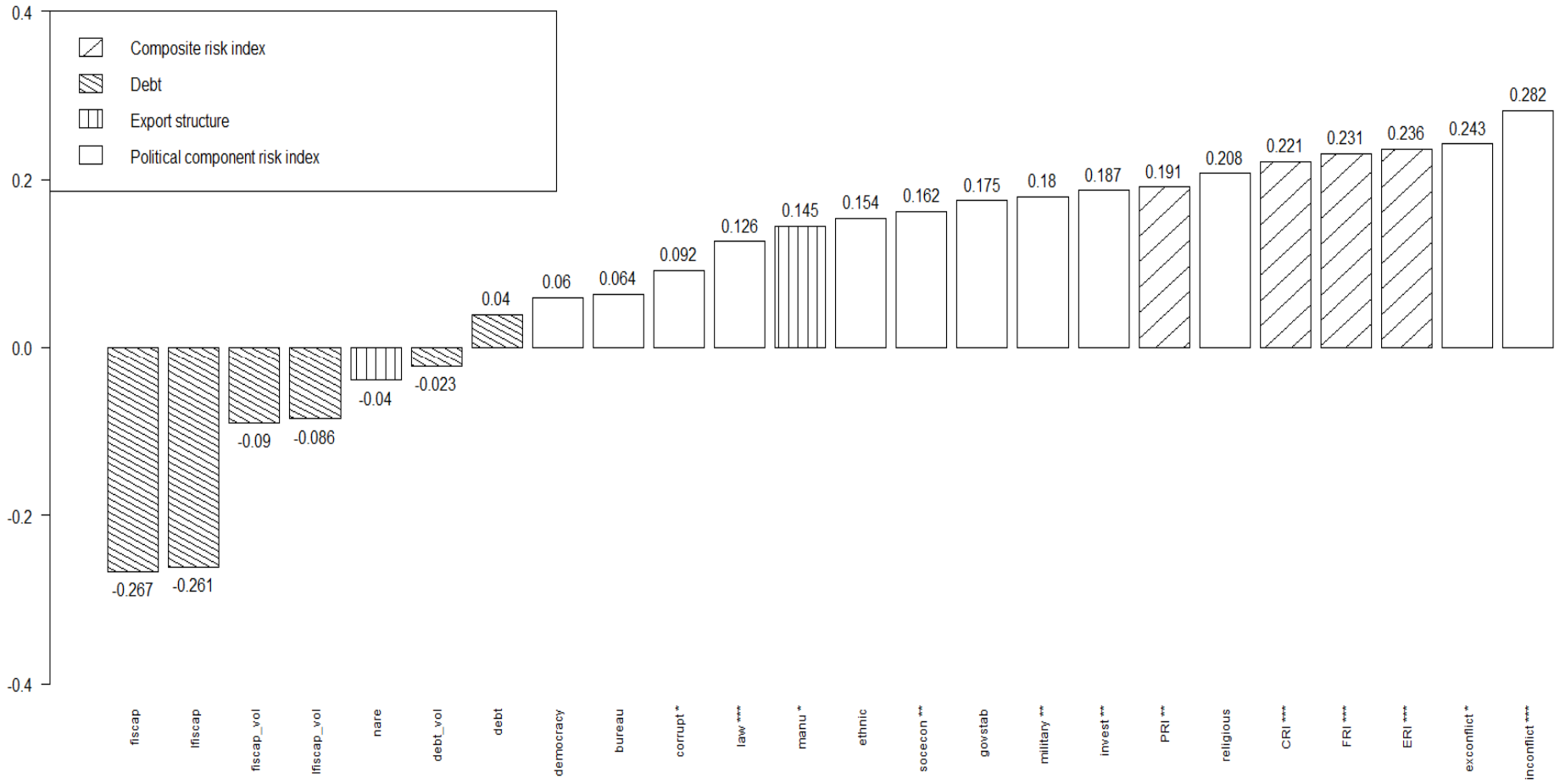
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 20. Economic significance of variables to $\widehat{\beta}VAT$, 1980-2016



Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (3)) to approximate the effect of its one standard deviation change on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 21. Economic significance of variables to $\widehat{\beta}PIT$

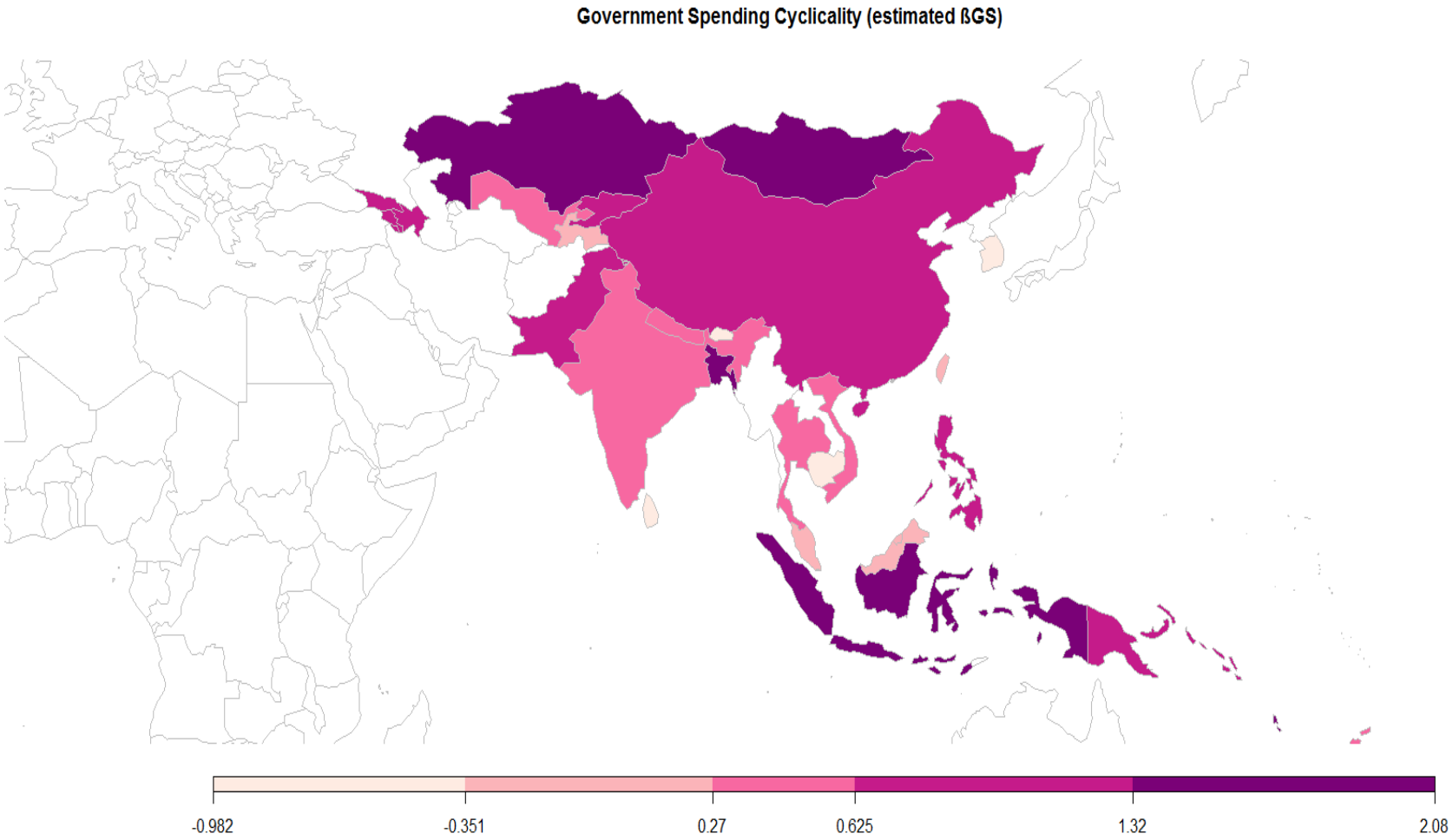


Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with the estimated coefficient in the corresponding regression (equation (3)) to approximate the effect of its one standard deviation change on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 22. Government spending cyclicality $\hat{\beta}GS$ by developing Asian region and income, 1960-2016

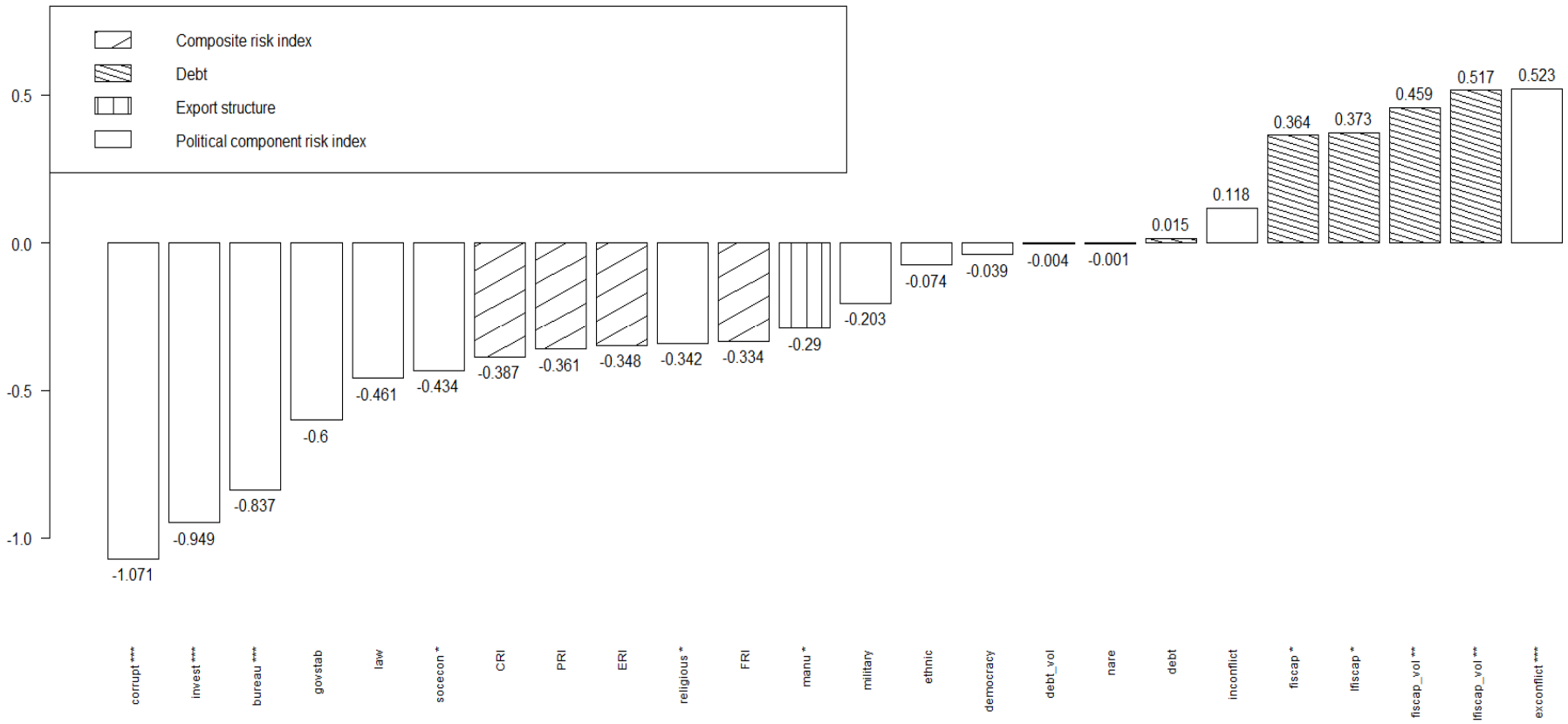
Note:
Specification: Two-step Prais-Winsten estimation to correct for the first order-autocorrelation in the residuals.

Figure 23. Magnitude of government spending cyclicality $\hat{\beta}GS$ in developing Asia, 1960-2016



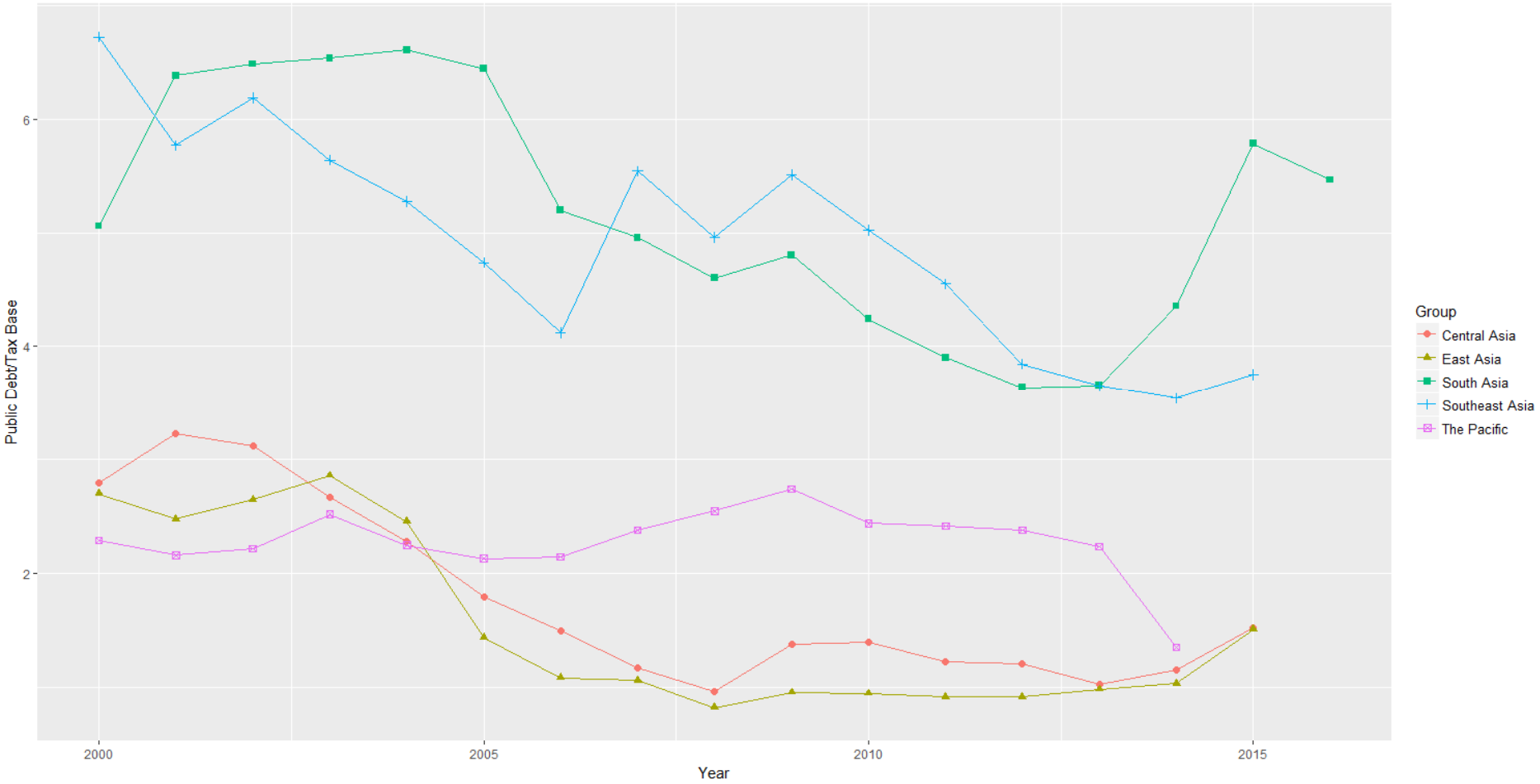
Note:
Specification: Two-step Prais-Winsten estimation to correct for the first order-autocorrelation in the residuals.

Figure 24. Economic significance of variables to government spending cyclicality $\widehat{\beta}GS$ for developing Asia



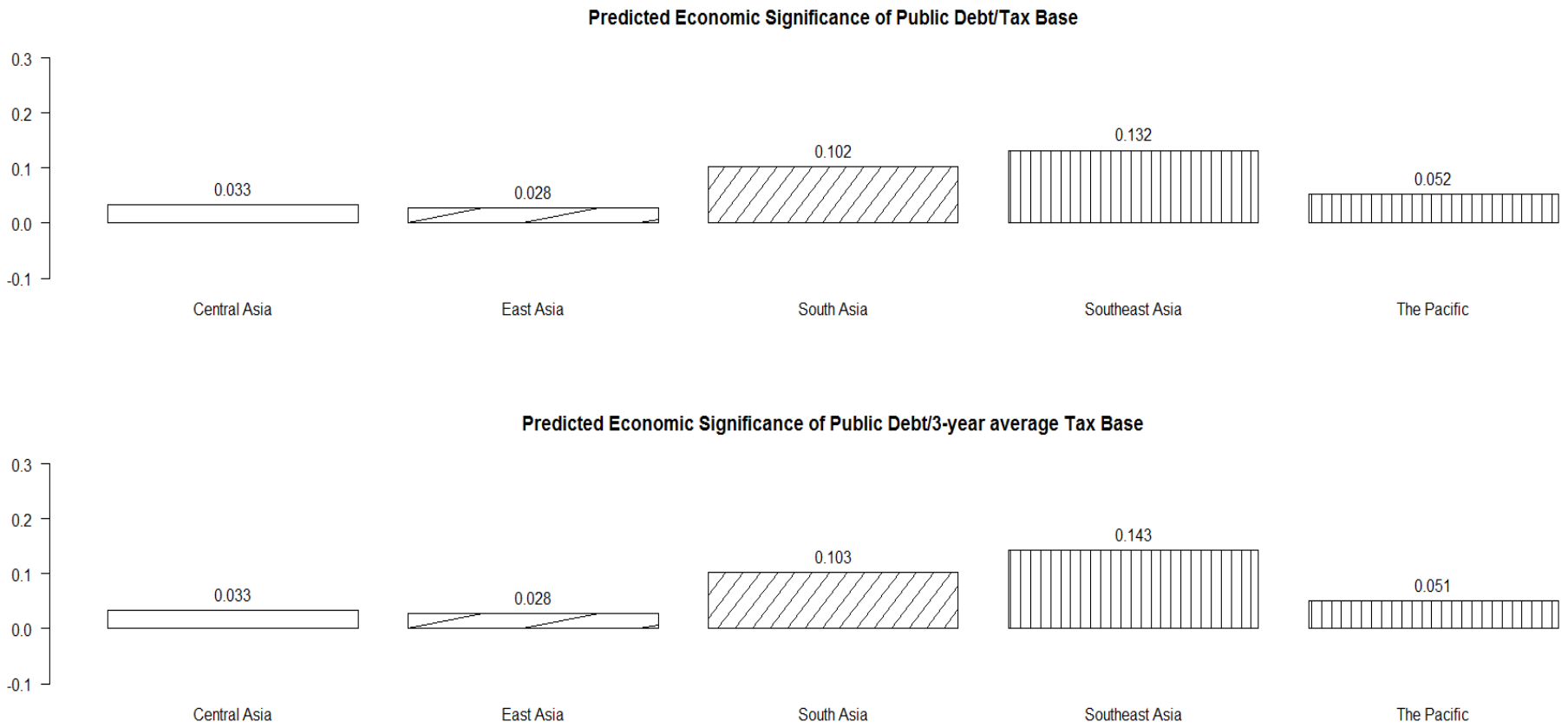
Note:
The economic significance of each explanatory variable is calculated by multiplying its standard deviation with its estimated coefficient from cross sectional regression for developing Asia countries (similar to equation (2)) to approximate the effect of its one standard deviation increase on the fiscal cyclicality.
****, **, * denotes that variable is statistically significant at 5%, 10%, 20% respectively.*

Figure 25. Public Debt/Tax Base in developing Asia, 2000-2016



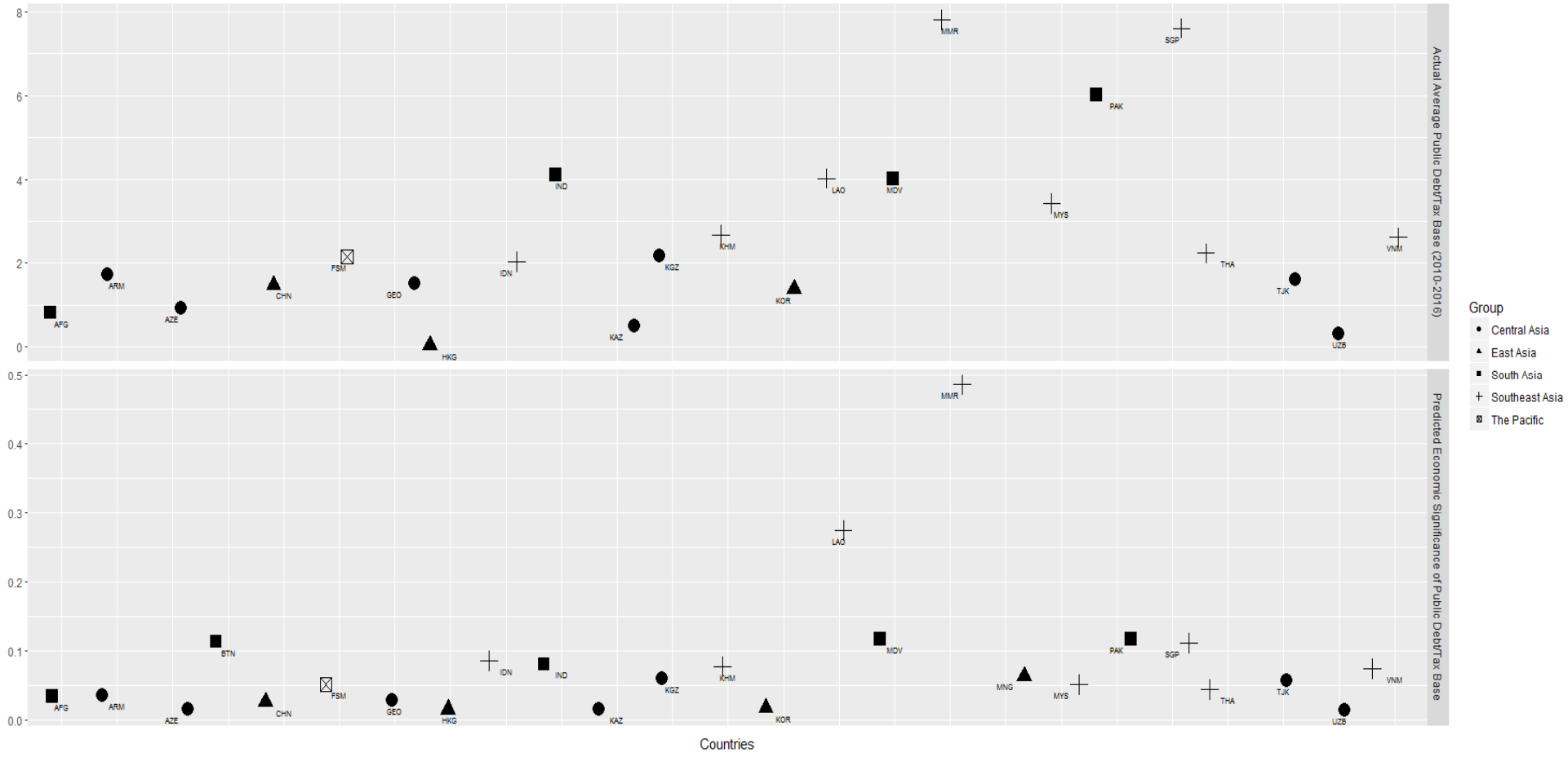
Note:
South Asia: Afghanistan; Bhutan; India; Maldives; Pakistan
Central Asia: Armenia; Azerbaijan; Georgia; Kazakhstan; Kyrgyz Republic; Tajikistan; Uzbekistan
Southeast Asia: Cambodia; Indonesia; Lao People's Dem. Rep.; Malaysia; Myanmar; Singapore; Thailand; Viet Nam
East Asia: People's Republic of China; Hong Kong, China; Republic of Korea; Mongolia
The Pacific: Federated States of Micronesia

Figure 26. Economic significance of public debt/tax base to government spending cyclicality $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ by sub-region in developing Asia



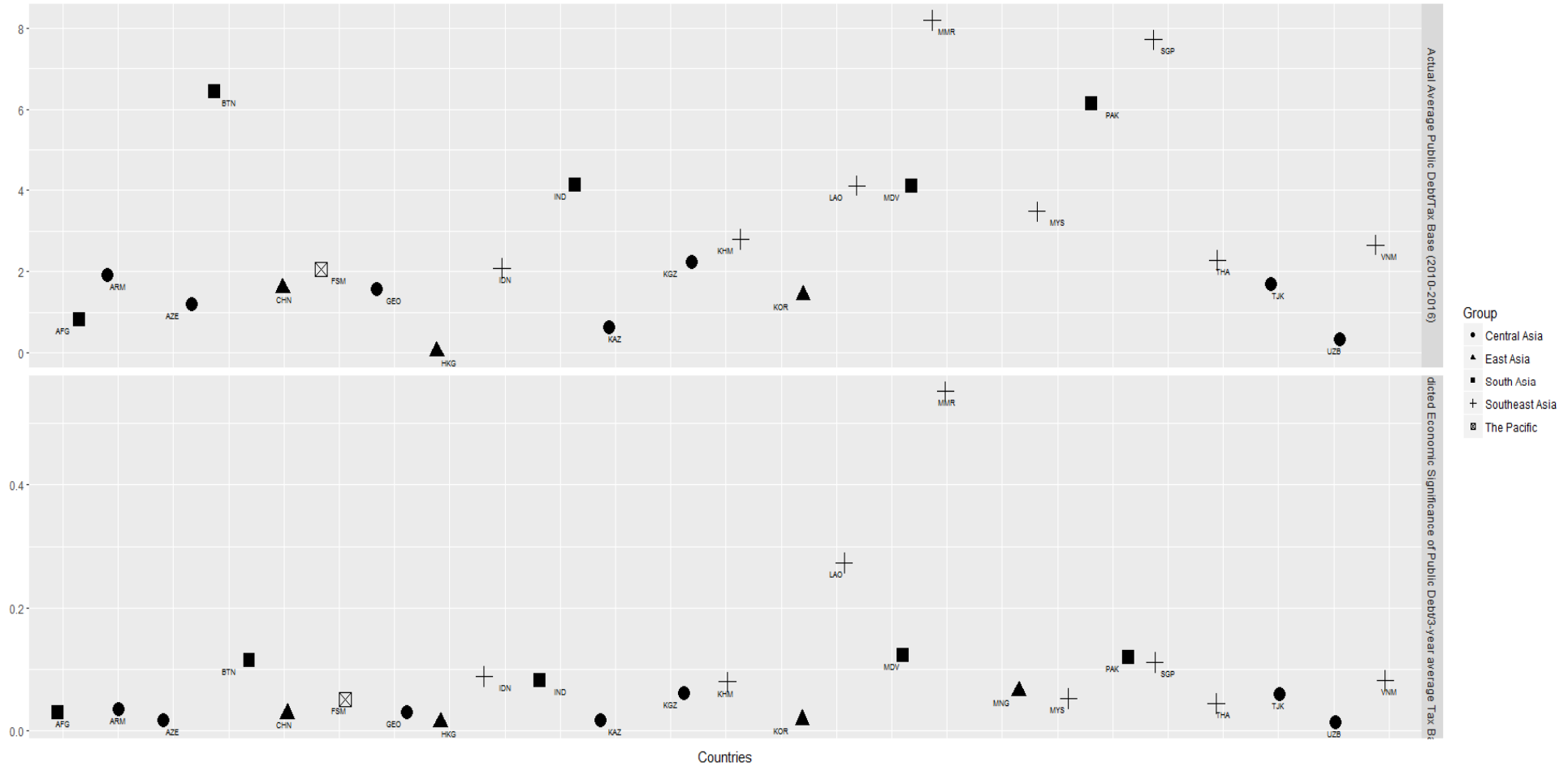
*Note: This graph approximates the change of government spending cyclicality by sub-region in developing Asia if their public debt/tax base increases by 10%. So, the predicted economic significance of Public Debt/Tax Base (similarly to Public Debt/3-year average Tax Base) are calculated by 0.1*Estimated coefficient of Public Debt/Tax Base*Actual sub-region specific public debt/tax base average over 1960-2016. Notice that the 'Estimated coefficient of Public Debt/Tax Base' is 0.187 and the 'Estimated coefficient of Public Debt/3-year average Tax Base' is 0.188, which are from the cross sectional regression for developing Asian countries (similar to equation (2)). We use the same estimated coefficient in place of sub-region specific coefficient as there is insufficient data to estimate the 2nd-step regression (that is, equation (2); $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ = f[Public Debt/Tax Base, Control Variables]) on the sub-region basis.*

Figure 27. Economic significance of public debt/tax base to government spending cyclicality $\widehat{\beta}GS$ by country in developing Asia



Note: The upper graph shows the actual public debt/tax base average over 2010-2016 by country. The lower graph approximates the change of government spending cyclicality by country if their public debt/tax base increases by 10%, which is calculated by multiplying 0.1(Estimated coefficient of public debt/tax base)*(Actual country-specific public debt/tax base average over 1960-2016). Notice that the 'Estimated coefficient of Public Debt/Tax Base' is 0.187, which is from the cross sectional regression for developing Asian countries (similar to equation (2)). We use regional coefficient in place of country-specific coefficient as there is insufficient country-level data to estimate the 2nd-step regression (that is, equation (2); $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ = f[Public Debt/Tax Base, Control Variables]) on the country-by-country basis.*

Figure 28. Economic significance of public debt/3-year average tax base to government spending cyclicality $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ by country in developing Asia



Note: The upper graph shows the actual public debt/3-year average tax base average over 2010-2016 by country. The lower graph approximates the change of government spending cyclicality by country if their public debt/tax base increases by 10%, which is calculated by multiplying 0.1(Estimated coefficient of public debt/tax base)*(Actual country-specific public debt/3-year tax base average over 1960-2016). Notice that the 'Estimated coefficient of Public Debt/3-year average Tax Base' is 0.188, which is from the cross sectional regression for developing Asian countries (similar to equation (2)). We use regional coefficient in place of country-specific coefficient as there is insufficient country-level data to estimate the 2nd-step regression (that is, equation (2); $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ = f[Public Debt/Tax Base, Control Variables]) on the country-by-country basis.*

Appendix

Table A1. Empirical literature on the cyclicality of fiscal policy

Studies	Methodology	Measurement of fiscal cyclicality	Sample	Key findings
Philip R. Lane (2003)	$\Delta\ log(G_{it}) = \alpha_i + \beta_i * \Delta\ log(Y_{it}) + \varepsilon_{it}$ (1) $\widehat{\beta_i} = \alpha_0 + \alpha_1 Z_i + \varepsilon_i$ (2) G_{it}: various components of government spending Y_{it}: real GDP Z_i: control variables (1): Country regression using OLS procedure with a correction for AR(1) in the residuals; (2): Weighted Least Squares.	$\beta_i > 0$: procyclicality $\beta_i < 0$: countercyclicality	22 OECD countries 1960-1998	The level of procyclicality varies across spending categories and countries. Volatile output and dispersed political power are associated with government spending procyclicality.
Kaminsky, Reinhart, and Végh (2004)	$\rho(GS,OG)$, $\varphi(inflationtax,OG)$ ρ, φ : country correlation coefficient *GS*: cyclical government spending; *OG*: output gap. The cyclical series are estimated by the Hodrick-Prescott filter method.	$\rho > 0$: procyclicality $\rho < 0$: countercyclicality $\varphi > 0$: countercyclicality $\varphi < 0$: procyclicality	104 countries 1960-2003	Most OECD countries have countercyclical fiscal policy while most of developing countries have procyclical fiscal policy.
Talvi and Végh (2005)	$\rho(FC,OG)$, $\varphi(inflationtax,OG)$ ρ, φ : country correlation coefficient *FC*: cyclical government consumption, cyclical revenue; *OG*: output gap. The cyclical series are estimated by the Hodrick-Prescott filter method.	$\rho>0$: procyclicality $\rho<0$: countercyclicality $\varphi>0$: countercyclicality $\varphi<0$: procyclicality	56 countries 1970-1994	Fiscal revenues are procyclical in both developing and industrial countries. Government consumption in the G7 countries is acyclical when that in non-G7 industrial countries and developing countries is procyclical. Inflation tax rate is countercyclical in industrial countries and procyclical in developing countries.
Alesina, Campante, and Tabellini (2008)	$\Delta\ F_{it} = \alpha_i + \beta_i * OG_{it} + \gamma X_{it} + \lambda F_{it-1} + \nu_t + \varepsilon_{it}$ (1) F_{it}: government surplus or public spending; OG_{it}: output gap, X_{it}: control variables. OG_{it} is estimated by the Hodrick-Prescott filter method. (1): Fixed effects where *OG* of country *i* is instrumented by *OG* of the region of country *i*. Alternatively, (1) is estimated by country to get $\widehat{\beta_i}$ and then run cross-country regression of $\widehat{\beta_i}$ on X_i.	β_i is interpreted depending on the fiscal policy variable	83 countries 1960-2003	Fiscal policy is procyclical in many developing countries. Political distortion (ie. corruption) is positively correlated with procyclicality of fiscal policy.
Ilzetzki and Vegh (2008)	$\Delta\ log(GS_{it}) = \alpha_i + \beta_i * \Delta\ log(Y_{it}) + \varepsilon_{it}$ (1) Y_{it}: output, GS_{it}: government spending, or its components (1) is regressed using alternative methods include 2SLS, GMM, OLS estimation of simultaneous equations, Granger causality tests, VAR.	$\beta_i > 0$: procyclicality $\beta_i < 0$: countercyclicality	49 countries 1960-2006	Fiscal policy is always procyclical in developing countries and acyclical/procyclical in high-income countries.
Woo (2009)	$\Delta\ log\ GS_{it} = \alpha_i + \beta_i * \Delta\ log\ Y_{it} + \varepsilon_{it}$ (1) $\widehat{\beta_i} = \alpha_0 + \alpha_1(\text{Social polarization})_i + \phi X_i + \varepsilon_i$ (2) GS_{it}: real general government spending Y_{it}: real GDP X_i: control variables	$\beta_i > 0$: procyclicality $\beta i < 0$: countercyclicality	96 countries 1960-2003	Developing countries are more procyclical than OECD countries. Latin America is the most fiscally procyclical region, followed by Sub-Saharan Africa and East Asian.

	(1): Country regression using Prais-Winsten procedure; (2): OLS.			Income inequality and educational inequality is positively associated with fiscal procyclicality.
Vegh and Vuletin (2015)	$Tax_{it} = \alpha_i + \beta_i * OG_{it} + \varepsilon_{it}$ *(1)* $\Delta Taxrate_{it} = \alpha_i + \beta_i * \Delta\ log(RGDP_{it}) + \varepsilon_{it}$ *(2)* Tax_{it}: Inflation tax, cyclical component of revenues, and Revenues/GDP OG_{it}: output gap $Taxrate_{it}$: VAT, PIT, CIT, Tax index The cyclical series are estimated by the Hodrick-Prescott filter method. (1): Fixed effects (2): Fixed effects, instrumental variables	β_i is interpreted depending on the fiscal policy variable	62 countries 1960-2013	Tax policy is acyclical in industrial countries but mostly procyclical in developing countries. Better institutional quality (less corruption and more bureaucratic quality) and more financially integration are associated with less procyclical/more countercyclical fiscal policy.

Table A2. Government spending cyclicality $\widehat{\beta}GS$ by country

iso	Country name	$\widehat{\beta}$	SE	p	constant	SE (constant)	p (constant)	Observations	R-squared	Significance	OECD group
AGO	Angola	0.854	0.416	0.049	-0.034	0.037	0.354	31	0.127	At 5%	non-OECD
ALB	Albania	0.082	0.290	0.779	0.028	0.024	0.252	36	0.002	Not significant	non-OECD
ARE	United Arab Emirates	0.166	0.303	0.586	0.0479*	0.024	0.057	36	0.015	Not significant	non-OECD
ARG	Argentina	1.352	0.655	0.045	0.022	0.037	0.555	48	0.087	At 5%	non-OECD
ARM	Armenia	0.801	0.176	0.000	-0.006	0.026	0.825	26	0.463	At 1%	non-OECD
ATG	Antigua and Barbuda	0.282	0.273	0.311	0.016	0.017	0.331	27	0.04	Not significant	non-OECD
AUS	Australia	-0.267	0.237	0.266	0.0529***	0.010	0.000	56	0.027	Not significant	OECD
AUT	Austria	0.153	0.155	0.329	0.0306***	0.007	0.000	56	0.023	Not significant	OECD
AZE	Azerbaijan	1.009	0.328	0.005	-0.012	0.045	0.796	26	0.283	At 1%	non-OECD
BDI	Burundi	1.156	0.392	0.005	0.033	0.025	0.192	56	0.138	At 1%	non-OECD
BEL	Belgium	-0.147	0.154	0.344	0.0355***	0.009	0.000	56	0.004	Not significant	OECD
BEN	Benin	0.703	0.494	0.161	0.014	0.022	0.509	56	0.036	Not significant	non-OECD
BFA	Burkina Faso	0.987	0.629	0.122	0.021	0.032	0.504	55	0.044	Not significant	non-OECD
BGD	Bangladesh	2.080	0.641	0.002	-0.027	0.032	0.404	53	0.168	At 1%	non-OECD
BGR	Bulgaria	0.335	0.369	0.371	0.017	0.023	0.447	36	0.028	Not significant	non-OECD
BHR	Bahrain	1.118	0.441	0.016	0.003	0.027	0.914	36	0.162	At 5%	non-OECD
BHS	Bahamas	0.366	0.180	0.050	0.007	0.010	0.483	37	0.104	At 10%	non-OECD
BLR	Belarus	0.782	0.276	0.009	-0.010	0.020	0.622	26	0.25	At 1%	non-OECD
BLZ	Belize	0.442	0.164	0.011	0.0283**	0.012	0.023	36	0.172	At 5%	non-OECD
BOL	Bolivia	1.022	0.369	0.008	0.023	0.016	0.147	56	0.117	At 1%	non-OECD
BRA	Brazil	0.611	0.258	0.022	0.022	0.014	0.135	56	0.093	At 5%	non-OECD
BRB	Barbados	1.555	0.711	0.036	0.009	0.021	0.661	36	0.123	At 5%	non-OECD
BRN	Brunei	-0.159	0.592	0.789	0.003	0.035	0.931	36	0.002	Not significant	non-OECD
BTN	Bhutan	-0.550	0.559	0.333	0.104**	0.045	0.027	36	0.033	Not significant	non-OECD
BWA	Botswana	0.430	0.236	0.074	0.0440*	0.025	0.085	56	0.065	At 10%	non-OECD
CAF	Central African Republic	0.396	0.210	0.065	-0.012	0.016	0.445	56	0.062	At 10%	non-OECD
CAN	Canada	-0.504	0.166	0.004	0.0571***	0.012	0.000	56	0.203	At 1%	OECD
CHE	Switzerland	0.115	0.195	0.558	0.0201***	0.006	0.001	36	0.025	Not significant	OECD
CHL	Chile	0.825	0.242	0.001	0.013	0.015	0.391	56	0.177	At 1%	OECD
CHN	China	0.874	0.095	0.000	0.012	0.010	0.246	56	0.614	At 1%	non-OECD

CIV	Ivory Coast	1.441	0.258	0.000	-0.010	0.017	0.536	56	0.367	At 1%	non-OECD
CMR	Cameroon	0.809	0.174	0.000	0.005	0.011	0.624	51	0.303	At 1%	non-OECD
COD	Congo, Dem. Rep.	1.901	0.658	0.006	-0.006	0.038	0.882	56	0.134	At 1%	non-OECD
COG	Congo	0.223	0.468	0.636	0.032	0.031	0.302	56	0.004	Not significant	non-OECD
COL	Colombia	0.222	0.643	0.731	0.051	0.031	0.105	56	0.005	Not significant	non-OECD
COM	Comoros	1.854	1.576	0.248	-0.005	0.041	0.894	36	0.041	Not significant	non-OECD
CPV	Cabo Verde	0.263	0.550	0.636	0.052	0.032	0.121	36	0.008	Not significant	non-OECD
CRI	Costa Rica	0.571	0.266	0.037	0.0293*	0.017	0.090	56	0.089	At 5%	non-OECD
CUB	Cuba	0.895	0.168	0.000	0.003	0.012	0.776	45	0.398	At 1%	non-OECD
CYP	Cyprus	0.501	0.318	0.124	0.019	0.021	0.373	41	0.063	Not significant	non-OECD
CZE	Czech Republic	0.739	0.180	0.000	-0.001	0.008	0.943	26	0.413	At 1%	OECD
DEU	Germany	0.048	0.135	0.725	0.0250***	0.007	0.000	46	0.077	Not significant	OECD
DJI	Djibouti	1.202	0.439	0.012	-0.016	0.018	0.388	25	0.242	At 5%	non-OECD
DMA	Dominica	-0.133	0.313	0.674	0.0308**	0.013	0.020	36	0.005	Not significant	non-OECD
DNK	Denmark	0.153	0.161	0.345	0.0324***	0.009	0.001	56	0.074	Not significant	OECD
DOM	Dominican Republic	0.789	0.420	0.066	0.007	0.037	0.841	56	0.06	At 10%	non-OECD
DZA	Algeria	0.963	0.181	0.000	-0.004	0.017	0.825	56	0.343	At 1%	non-OECD
ECU	Ecuador	2.424	0.455	0.000	-0.0495**	0.022	0.026	56	0.345	At 1%	non-OECD
EGY	Egypt	0.345	0.409	0.403	0.021	0.022	0.350	51	0.016	Not significant	non-OECD
ERI	Eritrea	2.209	0.530	0.000	-0.052	0.035	0.152	24	0.436	At 1%	non-OECD
ESP	Spain	0.701	0.161	0.000	0.0228***	0.008	0.005	56	0.276	At 1%	OECD
ETH	Ethiopia	1.419	0.374	0.001	-0.022	0.036	0.545	36	0.296	At 1%	non-OECD
FIN	Finland	-0.029	0.126	0.821	0.0400***	0.009	0.000	56	0.02	Not significant	OECD
FJI	Fiji	0.625	0.238	0.012	0.0216*	0.013	0.093	53	0.118	At 5%	non-OECD
FRA	France	-0.147	0.124	0.243	0.0379***	0.009	0.000	56	0.08	Not significant	OECD
GAB	Gabon	0.674	0.260	0.012	0.020	0.023	0.398	56	0.11	At 5%	non-OECD
GBR	UK	-0.184	0.176	0.302	0.0303***	0.008	0.000	56	0.03	Not significant	OECD
GEO	Georgia	1.322	0.186	0.000	0.011	0.025	0.663	36	0.599	At 1%	non-OECD
GHA	Ghana	2.060	0.438	0.000	-0.026	0.025	0.289	56	0.291	At 1%	non-OECD
GIN	Guinea	-2.898	1.364	0.041	0.154***	0.052	0.006	36	0.118	At 5%	non-OECD
GMB	Gambia, The	3.440	1.284	0.011	-0.105**	0.052	0.050	39	0.162	At 5%	non-OECD
GNB	Guinea-Bissau	0.489	0.370	0.193	0.004	0.026	0.876	46	0.038	Not significant	non-OECD
GNQ	Equatorial Guinea	0.550	0.287	0.064	0.025	0.064	0.697	36	0.098	At 10%	non-OECD

GRC	Greece	0.853	0.151	0.000	0.0163**	0.008	0.035	56	0.371	At 1%	OECD
GRD	Grenada	0.535	0.294	0.078	0.009	0.015	0.556	36	0.089	At 10%	non-OECD
GTM	Guatemala	0.794	0.562	0.164	0.012	0.025	0.633	56	0.036	Not significant	non-OECD
GUY	Guyana	1.461	0.468	0.003	-0.002	0.024	0.933	56	0.153	At 1%	non-OECD
HKG	Hong Kong	0.049	0.146	0.737	0.0637***	0.012	0.000	55		Not significant	non-OECD
HND	Honduras	-0.024	0.350	0.946	0.0444**	0.018	0.015	56	0.001	Not significant	non-OECD
HRV	Croatia	0.623	0.349	0.088	0.008	0.017	0.646	24	0.125	At 10%	non-OECD
HUN	Hungary	0.086	0.256	0.740	0.015	0.009	0.101	36	0.003	Not significant	OECD
IDN	Indonesia	1.524	0.455	0.002	-0.029	0.027	0.282	56	0.171	At 1%	non-OECD
IND	India	0.515	0.223	0.025	0.0355**	0.014	0.016	56	0.093	At 5%	non-OECD
IRL	Ireland	-0.018	0.160	0.909	0.0440***	0.014	0.003	46	0.017	Not significant	OECD
IRN	Iran	0.785	0.187	0.000	0.013	0.018	0.473	56	0.247	At 1%	non-OECD
IRQ	Iraq	0.734	0.264	0.008	0.015	0.063	0.812	46	0.149	At 1%	non-OECD
ISL	Iceland	0.714	0.129	0.000	0.0242***	0.007	0.001	56	0.363	At 1%	OECD
ISR	Israel	1.356	0.405	0.001	-0.006	0.023	0.788	56	0.171	At 1%	OECD
ITA	Italy	0.205	0.171	0.236	0.0242***	0.009	0.007	56	0.045	Not significant	OECD
JAM	Jamaica	0.782	0.277	0.007	0.012	0.019	0.522	48	0.146	At 1%	non-OECD
JOR	Jordan	1.046	0.224	0.000	-0.018	0.013	0.183	36	0.389	At 1%	non-OECD
JPN	Japan	0.381	0.097	0.000	0.0314***	0.007	0.000	56	0.246	At 1%	OECD
KAZ	Kazakhstan	1.469	0.304	0.000	-0.034	0.022	0.140	24	0.518	At 1%	non-OECD
KEN	Kenya	0.962	0.198	0.000	0.006	0.013	0.655	56	0.303	At 1%	non-OECD
KGZ	Kyrgyz Republic	1.133	0.120	0.000	-0.010	0.009	0.292	29	0.767	At 1%	non-OECD
KHM	Cambodia	-0.982	1.242	0.436	0.157*	0.090	0.091	29	0.062	Not significant	non-OECD
KNA	St. Kitts and Nevis	0.751	0.483	0.130	0.020	0.026	0.439	36	0.064	Not significant	non-OECD
KOR	South Korea	-0.351	0.230	0.132	0.0961***	0.022	0.000	56	0.029	Not significant	OECD
KWT	Kuwait	0.187	0.265	0.484	0.022	0.025	0.381	48	0.011	Not significant	non-OECD
LBN	Lebanon	0.163	0.273	0.556	0.025	0.026	0.343	28	0.01	Not significant	non-OECD
LBR	Liberia	0.835	0.501	0.103	0.044	0.038	0.255	42	0.065	Not significant	non-OECD
LBY	Libya	0.610	0.330	0.078	-0.024	0.026	0.358	24	0.137	At 10%	non-OECD
LCA	St. Lucia	0.141	0.263	0.594	0.0268*	0.013	0.053	39	0.008	Not significant	non-OECD
LKA	Sri Lanka	-0.669	0.844	0.431	0.071	0.042	0.100	55	0.011	Not significant	non-OECD
LSO	Lesotho	-0.200	0.745	0.790	0.051	0.031	0.114	36	0.016	Not significant	non-OECD
LUX	Luxembourg	-0.446	0.174	0.013	0.0606***	0.009	0.000	56	0.111	At 5%	OECD

MAC	Macau	-0.142	0.134	0.296	0.0842***	0.016	0.000	34	0.035	Not significant	non-OECD
MAR	Morocco	0.554	0.274	0.049	0.028	0.019	0.152	50	0.08	At 5%	non-OECD
MDA	Moldova	1.417	0.447	0.004	0.001	0.044	0.979	24	0.314	At 1%	non-OECD
MDG	Madagascar	1.477	0.341	0.000	-0.015	0.012	0.207	56	0.257	At 1%	non-OECD
MDV	Maldives	-0.540	0.191	0.009	0.103***	0.034	0.005	26	0.24	At 1%	non-OECD
MEX	Mexico	1.169	0.247	0.000	0.007	0.013	0.596	56	0.293	At 1%	OECD
MKD	Macedonia, FYR	0.659	0.389	0.103	-0.004	0.015	0.810	26	0.106	Not significant	non-OECD
MLI	Mali	0.742	0.546	0.182	0.007	0.028	0.794	43	0.045	Not significant	non-OECD
MLT	Malta	0.541	0.129	0.000	0.0222***	0.008	0.008	46	0.287	At 1%	non-OECD
MNG	Mongolia	1.842	1.098	0.103	-0.030	0.073	0.683	36	0.082	Not significant	non-OECD
MOZ	Mozambique	0.625	0.416	0.142	0.043	0.034	0.223	36	0.061	Not significant	non-OECD
MRT	Mauritania	0.388	0.359	0.284	0.006	0.030	0.842	56	0.021	Not significant	non-OECD
MUS	Mauritius	0.638	0.295	0.037	0.020	0.016	0.238	40	0.113	At 5%	non-OECD
MWI	Malawi	-0.796	0.466	0.093	0.0727**	0.030	0.019	56	0.051	At 10%	non-OECD
MYS	Malaysia	0.270	0.305	0.378	0.0429**	0.020	0.040	56	0.006	Not significant	non-OECD
NAM	Namibia	0.969	0.532	0.077	0.016	0.023	0.483	36	0.084	At 10%	non-OECD
NER	Niger	0.768	0.267	0.006	0.016	0.016	0.307	56	0.132	At 1%	non-OECD
NGA	Nigeria	1.775	0.739	0.022	-0.057	0.053	0.296	34	0.153	At 5%	non-OECD
NIC	Nicaragua	0.273	0.402	0.500	0.018	0.027	0.501	56	0.008	Not significant	non-OECD
NLD	Netherlands	0.153	0.184	0.409	0.0313***	0.008	0.000	56	0.02	Not significant	OECD
NOR	Norway	0.452	0.332	0.179	0.0291**	0.012	0.020	56	0.036	Not significant	OECD
NPL	Nepal	0.549	0.576	0.346	0.029	0.026	0.272	41	0.027	Not significant	non-OECD
NZL	New Zealand	-0.087	0.219	0.693	0.0281***	0.007	0.000	39	0.034	Not significant	OECD
OMN	Oman	0.955	0.270	0.001	0.043	0.045	0.338	48	0.229	At 1%	non-OECD
PAK	Pakistan	1.071	0.503	0.038	-0.002	0.028	0.931	56	0.078	At 5%	non-OECD
PAN	Panama	0.813	0.196	0.000	0.010	0.014	0.468	56	0.242	At 1%	non-OECD
PER	Peru	1.752	0.268	0.000	-0.017	0.015	0.265	56	0.441	At 1%	non-OECD
PHL	Philippines	1.228	0.275	0.000	-0.004	0.015	0.766	56	0.272	At 1%	non-OECD
PNG	Papua New Guinea	1.102	0.279	0.000	-0.018	0.016	0.291	43	0.275	At 1%	non-OECD
POL	Poland	-1.362	0.559	0.021	0.0930***	0.024	0.001	32	0.166	At 5%	OECD
PRI	Puerto Rico	1.013	0.172	0.000	-0.005	0.009	0.599	53	0.404	At 1%	non-OECD
PRT	Portugal	0.997	0.174	0.000	0.012	0.008	0.139	56	0.383	At 1%	OECD
PRY	Paraguay	0.183	0.403	0.652	0.0476**	0.022	0.033	36	0.011	Not significant	non-OECD

QAT	Qatar	0.845	0.239	0.001	0.013	0.031	0.666	36	0.27	At 1%	non-OECD
ROU	Romania	0.391	0.290	0.186	0.019	0.015	0.226	36	0.051	Not significant	non-OECD
RUS	Russia	0.948	0.330	0.008	-0.004	0.022	0.855	27	0.249	At 1%	non-OECD
RWA	Rwanda	1.148	0.188	0.000	0.001	0.023	0.950	56	0.41	At 1%	non-OECD
SAU	Saudi Arabia	0.443	0.187	0.022	0.0357*	0.020	0.079	48	0.108	At 5%	non-OECD
SDN	Sudan	0.944	0.464	0.047	-0.008	0.032	0.808	56	0.071	At 5%	non-OECD
SEN	Senegal	1.002	0.621	0.113	0.019	0.028	0.494	56	0.046	Not significant	non-OECD
SGP	Singapore	0.389	0.233	0.101	0.0508**	0.019	0.011	56	0.056	Not significant	non-OECD
SLB	Solomon Islands	0.935	0.427	0.035	0.009	0.029	0.770	36	0.123	At 5%	non-OECD
SLE	Sierra Leone	0.617	0.250	0.017	0.016	0.016	0.323	52	0.109	At 5%	non-OECD
SLV	El Salvador	0.482	0.231	0.042	0.0183*	0.011	0.092	51	0.084	At 5%	non-OECD
SOM	Somalia	0.598	0.707	0.407	0.041	0.045	0.375	24	0.033	Not significant	non-OECD
SUR	Suriname	0.520	0.543	0.344	-0.008	0.026	0.754	41	0.023	Not significant	non-OECD
SVK	Slovakia	0.346	0.403	0.400	0.014	0.020	0.494	24	0.035	Not significant	OECD
SWE	Sweden	-0.069	0.111	0.536	0.0370***	0.008	0.000	56	0.04	Not significant	OECD
SWZ	Swaziland	0.627	0.386	0.112	0.029	0.026	0.257	46	0.056	Not significant	non-OECD
SYC	Seychelles	0.974	0.306	0.003	0.005	0.020	0.806	39	0.216	At 1%	non-OECD
SYR	Syrian Arab Republic	0.561	0.202	0.008	0.019	0.018	0.302	47	0.146	At 1%	non-OECD
TCD	Chad	0.191	0.277	0.493	0.034	0.030	0.273	52	0.013	Not significant	non-OECD
TGO	Togo	0.239	0.414	0.565	0.029	0.027	0.279	54	0.008	Not significant	non-OECD
THA	Thailand	0.534	0.210	0.014	0.0375**	0.015	0.018	56	0.097	At 5%	non-OECD
TJK	Tajikistan	0.183	0.440	0.681	0.026	0.048	0.591	30	0.006	Not significant	non-OECD
TON	Tonga	0.146	0.596	0.809	0.024	0.016	0.148	31		Not significant	non-OECD
TTO	Trinidad and Tobago	0.755	0.325	0.024	0.017	0.018	0.352	55	0.09	At 5%	non-OECD
TUN	Tunisia	0.463	0.227	0.047	0.0293**	0.012	0.019	51	0.082	At 5%	non-OECD
TUR	Turkey	0.380	0.251	0.135	0.0389**	0.016	0.020	56	0.044	Not significant	OECD
TWN	Taiwan	0.088	0.211	0.680	0.0483***	0.016	0.005	36	0.042	Not significant	non-OECD
TZA	Tanzania	2.335	1.090	0.039	-0.081	0.057	0.164	36	0.112	At 5%	non-OECD
UGA	Uganda	1.150	0.924	0.222	-0.019	0.058	0.742	34	0.047	Not significant	non-OECD
UKR	Ukraine	0.598	0.156	0.001	-0.004	0.014	0.766	27	0.367	At 1%	non-OECD
URY	Uruguay	0.886	0.315	0.007	0.013	0.015	0.407	56	0.128	At 1%	non-OECD
USA	US	0.006	0.110	0.958	0.0282***	0.008	0.001	56	0.024	Not significant	OECD
UZB	Uzbekistan	0.517	1.682	0.761	0.106	0.110	0.342	29	0.006	Not significant	non-OECD

VCT	St. Vincent and the Grenadines	0.477	0.513	0.359	0.015	0.021	0.468	36	0.024	Not significant	non-OECD
VEN	Venezuela	1.349	0.396	0.001	-0.006	0.020	0.781	54	0.184	At 1%	non-OECD
VNM	Vietnam	0.358	2.269	0.876	0.033	0.151	0.830	27		Not significant	non-OECD
VUT	Vanuatu	1.740	0.415	0.000	-0.0417*	0.021	0.055	34	0.356	At 1%	non-OECD
YEM	Yemen, Rep.	0.732	0.215	0.002	-0.001	0.017	0.934	26	0.325	At 1%	non-OECD
ZAF	South Africa	0.842	0.251	0.001	0.0189*	0.009	0.050	56	0.171	At 1%	non-OECD
ZMB	Zambia	1.162	0.436	0.012	-0.002	0.024	0.942	36	0.173	At 5%	non-OECD
ZWE	Zimbabwe	2.049	0.597	0.001	-0.012	0.051	0.814	56	0.179	At 1%	non-OECD

Table A3. Value Added Tax (VAT) cyclicality $\widehat{\beta}VAT$ by country

iso	Country name	$\widehat{\beta}\,VAT$	SE	p	constant	SE (constant)	p (constant)	Observations	R-squared	Significance	OECD group
ARG	Argentina	-0.00488	0.031	0.876	18.29	1.052	0	43		Not significant	non-OECD
AUT	Austria	0.0111	0.0324	0.733	19.00	0.503	0	44	0.723	Not significant	OECD
AZE	Azerbaijan	-0.0985	0.025	0.000647	19.18	0.35	0	25	0.469	At 1%	non-OECD
BEL	Belgium	-0.00234	0.0302	0.938	19.53	1.169	0	46	0.635	Not significant	OECD
CAN	Canada	0.0146	0.0291	0.62	6.072	0.847	2.08E-07	26	0.589	Not significant	OECD
CHL	Chile	-0.0187	0.0223	0.406	18.97	0.389	0	42	0.795	Not significant	OECD
COL	Colombia	0.191	0.0599	0.00371	12.67	2.182	4.06E-06	28	0.335	At 1%	non-OECD
DEU	Germany	-0.0207	0.0342	0.548	15.03	2.225	2.61E-08	46	0.077	Not significant	OECD
DNK	Denmark	0.00832	0.0618	0.894	19.03	2.876	2.86E-08	50		Not significant	OECD
DOM	Dominican Republic	0.0629	0.0754	0.412	12.47	3.395	0.00126	25		Not significant	non-OECD
ECU	Ecuador	0.0489	0.0321	0.137	10.92	0.609	0	35	0.532	Not significant	non-OECD
ESP	Spain	-0.041	0.0871	0.641	16.44	2.526	4.00E-07	31	0.076	Not significant	OECD
FJI	Fiji	0.0393	0.08	0.628	11.18	1.093	5.01E-10	25	0.225	Not significant	non-OECD
FRA	France	-0.063	0.0724	0.389	19.63	0.516	0	49	0.665	Not significant	OECD
GBR	UK	-0.0969	0.0881	0.278	15.75	2.097	2.71E-09	44	0.011	Not significant	OECD
GEO	Georgia	0.0719	0.0199	0.00147	18.26	0.439	0	25	0.254	At 1%	non-OECD
GRC	Greece	-0.129	0.0603	0.0414	20.14	2.002	8.47E-11	30	0.512	At 5%	OECD
HUN	Hungary	0.086	0.0723	0.245	24.84	1.023	0	29	0.687	Not significant	OECD
ITA	Italy	-0.0343	0.0392	0.387	17.70	1.735	0	44	0.04	Not significant	OECD
JAM	Jamaica	0.105	0.0653	0.122	14.40	0.985	0	26	0.034	Not significant	non-OECD
JPN	Japan	-0.0519	0.0533	0.339	5.198	1.233	0.00027	28		Not significant	OECD
LUX	Luxembourg	-0.0301	0.026	0.253	12.91	1.533	8.54E-11	47		Not significant	OECD
MEX	Mexico	-0.0983	0.0595	0.107	14.52	0.707	0	37	0.016	Not significant	OECD
NOR	Norway	-0.042	0.0373	0.266	22.47	2.048	0	47	0.532	Not significant	OECD
NZL	New Zealand	0.0755	0.0769	0.334	12.64	0.682	0	30	0.351	Not significant	OECD
PER	Peru	-0.14	0.0414	0.00182	17.15	2.325	1.80E-08	35	0.413	At 1%	non-OECD
PHL	Philippines	0.00622	0.0306	0.84	10.84	0.773	0	29	0.652	Not significant	non-OECD
PRT	Portugal	0.0162	0.0657	0.807	19.24	2.374	6.16E-09	31	0.33	Not significant	OECD
RUS	Russia	-0.202	0.0562	0.00152	19.67	0.439	0	25	0.647	At 1%	non-OECD
SLV	El Salvador	-0.11	0.0779	0.171	12.86	0.39	0	25	0.261	Not significant	non-OECD
SWE	Sweden	-0.0975	0.0777	0.216	21.95	1.333	0	48		Not significant	OECD
THA	Thailand	-0.103	0.0224	0.000128	7.520	0.114	0	25	0.63	At 1%	non-OECD
TUR	Turkey	0.00515	0.0276	0.853	14.84	1.782	2.70E-09	32		Not significant	OECD

URY	Uruguay	0.0279	0.0305	0.366	19.53	1.392	0	48	0.156	Not significant	non-OECD
ZAF	South Africa	0.219	0.075	0.00783	13.28	0.238	0	25	0.284	At 1%	non-OECD

Specification: Standard two-step Prais-Winsten estimation of Value Added Tax rate on real GDP growth rate to correct for the first order autocorrelation in the residuals. Countries with at least 25 years of data are chosen. South Korea and Paraquay are dropped out of time-series regression because their VATs are constant.

Table A4. Personal Income Tax (PIT) cyclicality $\widehat{\beta}PIT$ by country

iso	Country name	$\widehat{\beta}$ *PIT*	SE	p	constant	SE (constant)	p (constant)	Observations	R-squared	Significance	OECD group
ARG	Argentina	0.0131	-0.0459	0.777	35.66	-2.338	0	39	0.676	Not significant	non-OECD
AUS*	Australia	-0.123	-0.77	0.874	50.96	-2.636	0	40	0.001	Not significant	OECD
AUT	Austria	-0.0234	-0.125	0.853	55.13	-3.726	0	44	0.675	Not significant	OECD
AZE	Azerbaijan	-0.106	-0.151	0.491	39.16	-8.283	9.18E-05	25	0.395	Not significant	non-OECD
BEL	Belgium	0.132	-0.23	0.571	65.43	-17.24	0.000544	38	0.29	Not significant	OECD
BOL	Bolivia	-0.835	-0.291	0.00699	34.32	-29.81	0.257	37	0.209	At 1%	non-OECD
BRA	Brazil	0.0242	-0.248	0.923	43.44	-9.061	2.98E-05	37	0.331	Not significant	non-OECD
BRB*	Barbados	-0.756	-0.589	0.208	44.23	-1.78	0	35	0.048	Not significant	non-OECD
BWA*	Botswana	2.419	-0.555	9.15E-05	25.83	-4.404	7.94E-07	41	0.328	At 1%	non-OECD
CAN	Canada	0.283	-0.166	0.0971	30.84	-0.924	0	36	0.737	At 10%	OECD
CHE	Switzerland	0.0795	-0.0701	0.266	30.85	-3.172	1.24E-10	31	0.729	Not significant	OECD
CHL*	Chile	-0.368	-0.404	0.369	49.73	-2.336	0	38	0.022	Not significant	OECD
COL	Colombia	-0.0285	-0.231	0.903	45.31	-7.587	7.57E-07	38	0.441	Not significant	non-OECD
CRI	Costa Rica	-0.0961	-0.218	0.662	13,626	-10,462	0.201	37	0.006	Not significant	non-OECD
CZE	Czech Republic	-0.0423	-0.255	0.87	34.40	-7.013	5.29E-05	26	0.386	Not significant	OECD
DEU	Germany	-0.0501	-0.0685	0.469	49.86	-4.625	0	46	0.623	Not significant	OECD
DNK	Denmark	0.62	-0.682	0.369	57.26	-2.913	0	38	0.262	Not significant	OECD
DOM	Dominican Republic	0.223	-0.283	0.437	57.01	-25.32	0.0307	37	0.143	Not significant	non-OECD
ECU	Ecuador	0.128	-0.156	0.416	37.19	-5.738	8.94E-08	43	0.348	Not significant	non-OECD
ESP	Spain	-0.197	-0.333	0.559	60.77	-9.054	7.87E-08	38	0.505	Not significant	OECD
FIN	Finland	0.0801	-0.215	0.711	54.03	-24.59	0.034	41	0.111	Not significant	OECD
FJI	Fiji	0.00969	-0.0669	0.886	35.73	-8.603	0.000192	38	0.293	Not significant	non-OECD
FRA	France	-0.156	-0.369	0.675	59.36	-7.818	4.49E-10	56	0.279	Not significant	OECD
GAB	Gabon	-0.286	-0.151	0.0717	49.88	-6.602	1.13E-07	25	0.651	At 10%	non-OECD
GBR	UK	0.0672	-0.294	0.82	64.75	-17.06	0.000374	56	0.177	Not significant	OECD
GEO	Georgia	-0.369	-0.0391	2.25E-09	21.04	-0.58	0	25	0.783	At 1%	non-OECD
GHA	Ghana	-0.0911	-0.536	0.866	31.59	-3.496	3.44E-09	26	0.498	Not significant	non-OECD
GRC	Greece	-0.308	-0.189	0.112	59.08	-11.46	9.39E-06	38	0.423	Not significant	OECD
HND	Honduras	-0.0431	-0.0949	0.652	32.76	-6.034	4.03E-06	38	0.374	Not significant	non-OECD
HUN	Hungary	-0.43	-0.213	0.054	33.58	-9.92	0.00235	27	0.356	At 10%	OECD
IND*	India	-2.742	-0.653	0.000166	57.64	-4.071	0	38	0.329	At 1%	non-OECD
IRN*	Iran	-0.117	-0.543	0.831	53.95	-4.021	0	37	0.001	Not significant	non-OECD
ITA*	Italy	2.339	-0.723	0.00248	49.83	-1.898	0	41	0.212	At 1%	OECD

JAM*	Jamaica	-1.54	-0.738	0.0438	35.93	-2.415	0	39	0.105	At 5%	non-OECD
JPN	Japan	0.0303	-0.21	0.886	61.07	-8.26	3.48E-09	45	0.398	Not significant	OECD
KEN*	Kenya	-0.553	-1.109	0.621	45.75	-4.828	0	41	0.006	Not significant	non-OECD
KOR*	South Korea	1.793	-0.57	0.00343	35.17	-4.056	3.94E-10	36	0.226	At 1%	OECD
LUX*	Luxembourg	0.0352	-0.363	0.923	48.12	-1.76	0	39	0	Not significant	OECD
MEX	Mexico	-0.0293	-0.0972	0.765	44.84	-5.938	4.45E-09	40	0.55	Not significant	OECD
MLT	Malta	0.235	-0.373	0.533	44.16	-7.497	1.19E-06	36	0.346	Not significant	non-OECD
MUS	Mauritius	-0.0293	-0.196	0.883	25.19	-5.659	0.000133	29	0.337	Not significant	non-OECD
NAM	Namibia	0.00888	-0.103	0.932	37.17	-0.832	0	26	0.844	Not significant	non-OECD
NGA*	Nigeria	-0.919	-0.428	0.0384	44.44	-3.324	0	40	0.108	At 5%	non-OECD
NOR*	Norway	0.642	-1.718	0.711	37.80	-5.273	1.97E-08	38	0.004	Not significant	OECD
NZL	New Zealand	-0.134	-0.272	0.625	44.77	-7.792	1.39E-06	39	0.379	Not significant	OECD
PAK*	Pakistan	3.223	-1.181	0.00975	22.31	-5.779	0.000452	38	0.171	At 1%	non-OECD
PER	Peru	-0.102	-0.107	0.35	44.25	-9.184	2.22E-05	41	0.318	Not significant	non-OECD
PHL	Philippines	0.0234	-0.354	0.948	37.94	-3.59	0	38	0.402	Not significant	non-OECD
PNG	Papua New Guinea	-0.109	-0.101	0.288	45.09	-2.325	0	41	0.501	Not significant	non-OECD
PRT*	Portugal	0.931	-0.817	0.262	46.57	-2.8	0	37	0.036	Not significant	OECD
PRY	Paraguay	0.00527	-0.0549	0.924	3.854	-3.794	0.317	36		Not significant	non-OECD
RUS	Russia	-0.475	-0.461	0.313	25.69	-4.924	2.13E-05	27	0.245	Not significant	non-OECD
SLV	El Salvador	-0.398	-0.204	0.058	50.09	-18.31	0.00931	41	0.221	At 10%	non-OECD
SWE	Sweden	0.0675	-0.139	0.629	64.95	-10.21	4.47E-08	56	0.317	Not significant	OECD
THA	Thailand	0.0163	-0.144	0.91	53.91	-14.22	0.000497	42	0.262	Not significant	non-OECD
TUR	Turkey	0.0449	-0.108	0.68	51.07	-11.66	5.48E-05	56	0.162	Not significant	OECD
TZA	Tanzania	-0.0925	-0.813	0.91	36.62	-5.159	1.24E-07	29	0.477	Not significant	non-OECD
URY	Uruguay	0.062	-0.147	0.675	11.34	-12.02	0.351	41		Not significant	non-OECD
USA	US	0.149	-0.264	0.574	56.98	-9.888	4.08E-07	56	0.31	Not significant	OECD
VEN	Venezuela	0.151	-0.0785	0.0629	37.75	-3.053	0	36	0.504	At 10%	non-OECD
ZAF*	South Africa	0.162	-0.534	0.764	44.98	-1.691	0	39	0.002	Not significant	non-OECD
ZMB	Zambia	-0.124	-0.262	0.64	47.58	-10.99	0.000198	28	0.301	Not significant	non-OECD

Specification: Standard two-step Prais-Winsten estimation of Personal Income Tax rate on real GDP growth rate to correct for the first order autocorrelation in the residuals. Countries with at least 25 years of data are chosen. Countries (*) are regressed using OLS because of non-convergence achieved in Prais-Winsten estimation. United Arab Emirates, Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia are dropped out of time-series regression because their PITs are constant.

Table A5. Corporate Income Tax (CIT) cyclicality $\widehat{\beta}CIT$ by country

iso	Country name	$\widehat{\beta}$ CIT	SE	p	constant	SE (constant)	p (constant)	Observations	R-squared	Significance	OECD group
ARG	Argentina	0.035	-0.0634	0.584	32.78	-1.76	0	38	0.418	Not significant	non-OECD
AUS	Australia	-0.172	-0.125	0.173	37.18	-5.93	6.27E-08	56	0.288	Not significant	OECD
AUT	Austria	0.00627	-0.281	0.982	39.27	-8.56	4.01E-05	44	0.232	Not significant	OECD
AZE	Azerbaijan	-0.0168	-0.0637	0.794	27.01	-4.87	1.22E-05	25	0.503	Not significant	non-OECD
BEL	Belgium	-0.0304	-0.147	0.837	37.63	-3.61	0	56	0.321	Not significant	OECD
BOL	Bolivia	-5.02E-11	-1.32E-06	1	27.50	-0.46	0	31	0.991	Not significant	non-OECD
BRA	Brazil	0.0243	-0.0446	0.59	33.83	-0.52	0	38	0.86	Not significant	non-OECD
BRB	Barbados	-0.176	-0.133	0.196	34.89	-5.25	1.28E-07	36	0.453	Not significant	non-OECD
BWA	Botswana	0.0731	-0.0755	0.337	27.50	-3.12	0	56	0.231	Not significant	non-OECD
CAN	Canada	-0.0259	-0.118	0.828	38.79	-6.71	1.68E-06	36	0.47	Not significant	OECD
CHE	Switzerland	-0.0064	-0.0201	0.752	9.141	-0.46	0	36	0.818	Not significant	OECD
CHL	Chile	-0.381	-0.193	0.0556	30.41	-5.45	2.51E-06	38	0.313	At 10%	OECD
COL	Colombia	-0.0223	-0.15	0.883	33.32	-2.76	0	38	0.544	Not significant	non-OECD
CRI	Costa Rica	0.0974	-0.175	0.58	35.10	-4.84	1.52E-08	38	0.36	Not significant	non-OECD
DEU	Germany	0.0195	-0.167	0.908	45.28	-12.4	0.00067	46	0.21	Not significant	OECD
DNK	Denmark	0.0177	-0.132	0.894	35.59	-4.94	2.58E-09	53	0.397	Not significant	OECD
DOM	Dominican Republic	-0.158	-0.126	0.219	32.74	-5.28	3.70E-07	38	0.301	Not significant	non-OECD
ECU	Ecuador	-0.0647	-0.0449	0.158	22.50	-1.5	0	38	0.55	Not significant	non-OECD
ESP	Spain	-0.11	-0.0871	0.211	30.36	-3.63	0	52	0.378	Not significant	OECD
FIN	Finland	0.073	-0.107	0.5	30.99	-8.08	0.00033	56	0.157	Not significant	OECD
FJI	Fiji	0.00401	-0.0336	0.905	27.95	-6.25	3.99E-05	56	0.193	Not significant	non-OECD
FRA	France	0.0237	-0.0805	0.769	41.58	-7.4	6.82E-07	56	0.363	Not significant	OECD
GBR	UK	-0.0216	-0.103	0.835	36.16	-9.83	0.00066	44	0.239	Not significant	OECD
GEO	Georgia	-0.207	-0.0482	0.00027	18.93	-1.15	0	25	0.705	At 1%	non-OECD
GHA	Ghana	-0.207	-0.0821	0.0156	50.48	-26.5	0.0636	45	0.128	At 5%	non-OECD
GRC	Greece	0.164	-0.115	0.161	35.45	-3.89	0	50	0.491	Not significant	OECD
HND	Honduras	-0.176	-0.231	0.452	33.01	-3.33	0	38	0.312	Not significant	non-OECD
HUN	Hungary	0.0928	-0.248	0.711	25.80	-4.54	5.61E-06	28	0.392	Not significant	OECD
IND	India	0.154	-0.0843	0.0737	44.43	-7.65	4.62E-07	51	0.357	At 10%	non-OECD
IRN	Iran	0.00395	-0.127	0.975	43.30	-11.3	0.00049	39	0.148	Not significant	non-OECD
ITA	Italy	-0.251	-0.112	0.0301	33.65	-2.07	0	43	0.549	At 5%	OECD
JAM	Jamaica	-0.0971	-0.0913	0.293	33.62	-2.42	0	50	0.341	Not significant	non-OECD
JPN*	Japan	0.524	-0.177	0.0045	33.62	-0.92	0	56	0.14	At 1%	OECD

KEN	Kenya	-0.0326	-0.102	0.75	32.50	-3.84	0	56		Not significant	non-OECD
KOR	South Korea	0.02	-0.0516	0.701	27.69	-1.97	0	37	0.618	Not significant	OECD
LUX	Luxembourg	-0.0163	-0.0647	0.803	34.63	-3.85	0	54	0.383	Not significant	OECD
MEX	Mexico	-0.0205	-0.0577	0.724	35.15	-2.74	0	37	0.672	Not significant	OECD
MLT	Malta	0.144	-0.0913	0.122	33.54	-0.61	0	46		Not significant	non-OECD
MUS	Mauritius	0.167	-0.111	0.144	56.20	-20.9	0.0119	31	0.072	Not significant	non-OECD
NAM	Namibia	-0.0131	-0.0514	0.802	35.58	-1.15	0	26	0.919	Not significant	non-OECD
NGA	Nigeria	0.000935	-0.0246	0.97	36.04	-5.29	8.39E-09	56	0.318	Not significant	non-OECD
NOR	Norway	0.0791	-0.0488	0.111	27.69	-0.52	0	56	0.877	Not significant	OECD
NZL	New Zealand	0.267	-0.306	0.39	34.81	-3.25	0	39	0.43	Not significant	OECD
OMN	Oman	0.036	-0.144	0.804	30.83	-15	0.0462	39	0.103	Not significant	non-OECD
PAK	Pakistan	0.359	-0.216	0.103	35.70	-5.5	2.77E-08	56	0.103	Not significant	non-OECD
PER	Peru	0.000208	-0.106	0.998	36.96	-4.82	4.39E-09	38	0.427	Not significant	non-OECD
PHL	Philippines	0.0386	-0.0534	0.474	32.89	-1.45	0	37	0.792	Not significant	non-OECD
PNG	Papua New Guinea	-0.0555	-0.0453	0.226	27.40	-2.64	0	56	0.117	Not significant	non-OECD
PRT	Portugal	-0.233	-0.128	0.0759	31.35	-7.1	9.71E-05	36	0.38	At 10%	OECD
PRY	Paraguay	-0.00623	-0.0771	0.936	21.17	-9.19	0.0275	36	0.129	Not significant	non-OECD
RUS	Russia	0.0319	-0.0927	0.734	27.40	-4.51	2.38E-06	27	0.424	Not significant	non-OECD
SAU	Saudi Arabia	0.0322	-0.0469	0.496	33.67	-10.6	0.00306	40	0.195	Not significant	non-OECD
SLV	El Salvador	0.00905	-0.102	0.93	28.27	-1.81	0	38	0.556	Not significant	non-OECD
SWE	Sweden	0.164	-0.147	0.269	32.68	-6.99	1.98E-05	56	0.197	Not significant	OECD
THA	Thailand	-0.0516	-0.0666	0.443	29.16	-2.86	0	41	0.629	Not significant	non-OECD
TUR	Turkey	0.199	-0.118	0.102	29.54	-6.99	0.00019	34	0.274	Not significant	OECD
TZA	Tanzania	-0.025	-0.224	0.912	39.04	-6.67	1.33E-06	36	0.439	Not significant	non-OECD
URY	Uruguay	0.0178	-0.0624	0.777	27.74	-1.26	0	38	0.462	Not significant	non-OECD
USA	US	0.0221	-0.0901	0.807	42.38	-4.64	0	56	0.495	Not significant	OECD
VEN	Venezuela	-0.0379	-0.0839	0.655	39.96	-4.4	1.26E-10	36	0.438	Not significant	non-OECD
ZAF	South Africa	-0.289	-0.114	0.0143	36.12	-4.23	0	54	0.449	At 5%	non-OECD
ZMB	Zambia	-0.0466	-0.0617	0.455	39.99	-3.16	0	36	0.646	Not significant	non-OECD

Specification: Standard two-step Prais-Winsten estimation of Corporate Income Tax rate on real GDP growth rate to correct for the first order autocorrelation in the residuals. Countries with at least 25 years of data are chosen. Countries (*) are regressed using OLS because of non-convergence achieved in Prais-Winsten estimation. Bahrain is dropped out of time-series regression because its CIT is constant.

Table A6.1. Key statistics of the most pro-/counter- cyclical countries by $\hat{\beta}GS$

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	POL	**ISR**	**GIN[(i)]**	**GMB[(i)]**	**KHM[(i)]**	**MNG**	**POL**	**KAZ[(i)]**	**DMA[(i)]**	**ECU**	**LBN[(i)]**	**ISR**	**CAN**	**USA**	**LKA[(i)]**	**BGD[(i)]**	**GIN[(i)]**	**GMB[(i)]**	**LUX**	**PRT**
$\hat{\beta}GS$	-1.36**	1.36***	-2.90**	3.44**	-0.98	1.84	-1.36**	1.47***	-0.13	2.42***	0.16	1.36***	-0.50***	0.01	-0.67	2.08***	-2.90**	3.44**	-0.45**	1.00***
debt	0.52	1.10	0.94	0.90	0.34	0.61	0.52	0.16	0.59	0.42	0.98	1.10	0.70	0.59	0.73	0.37	0.94	0.90	0.10	0.51
debt_vol	0.10	0.49	0.29	0.41	0.04	0.22	0.10	0.08	0.22	0.28	0.57	0.49	0.16	0.21	0.22	0.10	0.29	0.41	0.06	0.33
fiscap	1.42	3.15			4.15	3.42	1.42	0.89		3.81		3.15	2.31	2.64					0.26	2.22
fiscap_vol	0.24	1.08			1.41	1.29	0.24	0.61		2.83		1.08	0.39	0.76					0.15	0.71
lfiscap	1.43	3.10			4.24	3.44	1.43	0.90		3.87		3.10	2.33	2.68					0.27	2.29
lfiscap_vol	0.25	1.04			1.39	1.44	0.25	0.59		2.92		1.04	0.40	0.80					0.16	0.76
polcon	0.47	0.53	0.33	0.21	0.36	0.22	0.47			0.25	0.46	0.53	0.42	0.40	0.34	0.32	0.33	0.21	0.49	0.41
nare	0.18	0.09	0.69	0.32	0.35	0.68	0.18	0.71	0.29	0.79	0.11	0.09	0.38	0.18	0.47	0.15	0.69	0.32	0.04	0.16
manu	0.58	0.53	0.20	0.02	0.48	0.14	0.58	0.15	0.19	0.04	0.24	0.53	0.46	0.51	0.31	0.74	0.20	0.02	0.20	0.50
CRI	70.15	67.04	52.67	63.02		63.91	70.15	70.90		59.83	51.60	67.04	83.77	80.48	57.61	56.42	52.67	63.02	89.32	76.18
ERI	33.14	37.06	28.78	32.17		27.03	33.14	36.11		30.83	28.58	37.06	40.05	38.14	31.76	32.91	28.78	32.17	41.64	36.46
FRI	33.83	37.30	27.73	31.30		34.40	33.83	36.08		31.58	27.27	37.30	42.14	39.74	32.36	32.65	27.73	31.30	44.82	37.35
PRI	72.38	59.64	48.02	61.59		66.45	72.38	69.55		57.61	48.05	59.64	85.09	82.53	50.42	47.74	48.02	61.59	91.89	78.59
govstab	6.93	6.90	7.19	7.71		7.53	6.93	10.19		6.80	6.44	6.90	8.05	8.51	6.75	6.71	7.19	7.71	10.05	7.72
socecon	5.65	6.72	4.06	5.01		4.02	5.65	6.78		4.54	4.63	6.72	8.22	8.50	4.41	3.21	4.06	5.01	9.70	7.04
invest	8.42	8.01	5.41	7.27		6.43	8.42	8.02		5.16	6.19	8.01	9.71	10.02	6.96	5.73	5.41	7.27	10.39	8.42
inconflict	9.99	6.65	7.23	9.67		10.92	9.99	10.05		8.92	6.02	6.65	11.06	10.71	4.82	6.69	7.23	9.67	11.97	10.21
exconflict	10.63	6.94	8.33	9.49		11.28	10.63	11.00		9.19	5.35	6.94	11.36	9.21	9.36	9.14	8.33	9.49	11.53	11.05
corrupt	3.53	3.94	2.77	2.75		2.94	3.53	1.67		2.84	1.77	3.94	5.49	4.47	2.98	1.66	2.77	2.75	5.38	4.29
military	5.13	2.99	1.20	2.25		5.00	5.13	5.00		2.45	2.30	2.99	6.00	4.96	3.16	2.13	1.20	2.25	6.00	5.26
religious	4.25	2.29	3.01	4.39		4.76	4.25	4.61		4.73	2.29	2.29	5.77	5.44	3.16	3.02	3.01	4.39	6.00	5.85
law	4.51	4.31	2.77	3.96		3.48	4.51	3.85		3.26	3.22	4.31	5.88	5.55	2.36	1.93	2.77	3.96	6.00	5.07
ethnic	5.71	1.71	2.43	4.55		4.76	5.71	4.89		3.69	3.73	1.71	3.56	5.05	1.32	2.87	2.43	4.55	5.00	5.70
democracy	4.81	5.58	1.89	3.13		3.52	4.81	1.54		3.87	3.89	5.58	5.97	5.93	4.03	3.35	1.89	3.13	5.90	5.43
bureau	2.64	3.70	1.53	1.81		1.85	2.64	2.00		2.00	1.52	3.70	4.00	4.00	2.00	1.32	1.53	1.81	4.00	2.79

Note:

$\hat{\beta}GS$ is estimated using full sample and the other variables are calculated average using full sample

(1) The most countercyclical country; (2) The most procyclical country

[(i)] Country without observations for the corresponding variables

, **, *: $\hat{\beta}GS$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;
MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

BGD Bangladesh	*GMB Gambia*	*LKA Sri Lanka*	*USA America*
CAN Canada	*ISR Israel*	*LUX Luxembourg*	
DMA Dominica	*KAZ Kazakhstan*	*MNG Mongolia*	
ECU Ecuador	*KHM Cambodia*	*POL Poland*	
GIN Guinea	*LBN Lebanon*	*PRT Portugal*	

Table A6.2. Key statistics of the most pro-/counter- cyclical countries by $\widehat{\beta}GS$ (macro variables)

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	POL	**ISR**	**GIN[(i)]**	**GMB[(i)]**	**KHM[(i)]**	**MNG**	**POL**	**KAZ[(i)]**	**DMA[(i)]**	**ECU**	**LBN[(i)]**	**ISR**	**CAN**	**USA**	**LKA[(i)]**	**BGD[(i)]**	**GIN[(i)]**	**GMB[(i)]**	**LUX**	**PRT**
$\hat{\beta}GS$	-1.36**	1.36***	-2.90**	3.44**	-0.98	1.84	-1.36**	1.47***	-0.13	2.42***	0.16	1.36***	-0.50***	0.01	-0.67	2.08***	-2.90**	3.44**	-0.45**	1.00***
trade	79.09	70.43	56.50	69.30	124.75	113.27	79.09	82.15	91.18	55.53	82.70	70.43	67.47	26.85	63.48	37.90	56.50	69.30	321.09	69.67
inf	0.03	0.02	0.17	0.06	0.04	0.09	0.03	0.09	0.02	0.12	0.02	0.02	0.02	0.02	0.08	0.06	0.17	0.06	0.02	0.02
GDP	0.04	0.04	0.04	0.03	0.08	0.07	0.04	0.07	0.02	0.04	0.04	0.04	0.02	0.02	0.05	0.06	0.04	0.03	0.03	0.01
TAL	1.14	1.96	1.27	1.96	1.53	1.14	1.14	1.54	3.09	0.93	3.87	1.96	2.52	2.25	0.82	0.48	1.27	1.96	203.27	4.03
gs	18.35	23.67	7.46	9.49	5.33	13.87	18.35	11.25	0.18	12.02	14.21	23.67	20.28	15.30	11.42	5.20	7.46	9.49	16.50	19.67

Note:

$\hat{\beta}GS$ is estimated using full sample and the other control variables are calculated average over the most recent period (2000 to latest year available)

(1) The most countercyclical country; (2) The most procyclical country

[(i)] Country without observations for the corresponding variables

, **, *: $\hat{\beta}GS$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;

MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

BGD Bangladesh *GMB Gambia* *LKA Sri Lanka* *USA America*

CAN Canada *ISR Israel* *LUX Luxembourg*

DMA Dominica *KAZ Kazakhstan* *MNG Mongolia*

ECU Ecuador *KHM Cambodia* *POL Poland*

GIN Guinea *LBN Lebanon* *PRT Portugal*

Table A7.1. Key statistics of the most pro-/counter- cyclical countries by $\widehat{\beta VAT}$

Variable	OECD		Non-OECD		EAS		ECS		LCN		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	HUN	**GRC**	**ZAF**	**RUS**	**NZL**	**THA**	**HUN**	**RUS**	**COL**	**PER**	**PRT**	**GRC**
$\widehat{\beta VAT}$	0.09	-0.13**	0.22***	-0.20***	0.08	-0.10***	0.09	-0.20***	0.19***	-0.14***	0.02***	-0.13**
debt	0.80	0.73	0.39	0.37	0.46	0.31	0.80	0.37	0.27	0.36	0.51	0.73
debt_vol	0.20	0.52	0.08	0.31	0.17	0.14	0.20	0.31	0.13	0.12	0.33	0.52
fiscap	1.90	3.15	1.43	0.61	1.22	2.40	1.90	0.61	2.35	2.26	2.22	3.15
fiscap_vol	0.35	1.08	0.27	0.44	0.52	0.87	0.35	0.44	0.61	0.89	0.71	1.08
lfiscap	1.88	3.25	1.46	0.60	1.21	2.41	1.88	0.60	2.39	2.26	2.29	3.25
lfiscap_vol	0.32	1.14	0.27	0.42	0.52	0.83	0.32	0.42	0.61	0.92	0.76	1.14
polcon	0.42	0.37	0.33	0.28	0.37	0.47	0.42	0.28	0.39	0.40	0.41	0.37
nare	0.15	0.28	0.33	0.63	0.57	0.42	0.15	0.63	0.60	0.73	0.16	0.28
manu	0.71	0.20	0.35	0.18	0.16	0.37	0.71	0.18	0.18	0.10	0.50	0.20
CRI	71.77	68.28	67.70	67.14	81.17	69.64	71.77	67.14	63.33	60.59	76.18	68.28
ERI	32.74	33.41	34.29	36.60	37.67	37.85	32.74	36.60	33.33	32.74	36.45	33.41
FRI	34.05	32.20	35.24	38.66	37.71	39.50	34.05	38.66	36.17	33.53	37.35	32.20
PRI	76.53	70.82	64.91	59.74	86.55	61.97	76.53	59.74	56.62	55.97	78.59	70.82
govstab	7.49	7.21	7.66	8.78	7.79	7.49	7.49	8.78	7.41	6.09	7.72	7.21
socecon	6.34	6.03	5.22	4.85	8.29	7.16	6.34	4.85	4.67	4.98	7.04	6.03
invest	8.46	7.50	8.20	7.08	9.73	7.33	8.46	7.08	7.03	6.82	8.42	7.50
inconflict	11.36	9.13	8.00	8.25	11.74	8.38	11.36	8.25	5.62	6.24	10.21	9.13
exconflict	10.75	10.05	9.88	9.23	11.43	9.23	10.75	9.23	9.26	9.53	11.05	10.05
corrupt	3.84	3.55	3.74	1.95	5.61	2.33	3.84	1.95	2.69	2.71	4.29	3.55
military	5.71	4.54	4.54	4.16	6.00	2.61	5.71	4.16	2.49	3.12	5.26	4.54
religious	5.13	5.12	4.94	5.12	6.00	3.96	5.13	5.12	4.72	5.69	5.85	5.12
law	4.64	4.07	2.36	3.52	5.82	3.56	4.64	3.52	1.50	2.48	5.07	4.07
ethnic	4.46	5.53	2.95	2.70	4.31	3.92	4.46	2.70	5.28	2.69	5.70	5.53
democracy	5.33	5.15	4.68	2.88	5.94	3.65	5.33	2.88	3.95	3.68	5.43	5.15
bureau	3.24	2.79	2.78	1.22	4.00	2.53	3.24	1.22	2.39	1.59	2.79	2.79

Note:

$\widehat{\beta VAT}$ is estimated using full sample and the other variables are calculated average using full sample

(1) The most countercyclical country; (2) The most procyclical country

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean; Middle East & North Africa and South Asia have no observations for $\widehat{\beta VAT}$, North America only has observations for CAN but not USA; Sub-Saharan Africa only has observations for South Africa.

, **, *: $\widehat{\beta VAT}$ is significant at 10%, 5%, and 1% respectively*

COL Colombia *PRT Portugal* *PER Peru*

GRC Greece *RUS Russia*

HUN Hungary *THA Thailand*

NZL New Zealand *ZAF South Africa*

Table A7.2. Key statistics of the most pro-/counter- cyclical countries by $\widehat{\beta}VAT$ (macro variables)

Variable	OECD		Non-OECD		EAS		ECS		LCN		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	HUN	**GRC**	**ZAF**	**RUS**	**NZL**	**THA**	**HUN**	**RUS**	**COL**	**PER**	**PRT**	**GRC**
$\widehat{\beta}VAT$	0.09	-0.13**	0.22***	-0.20***	0.08	-0.10***	0.09	-0.20***	0.19***	-0.14***	0.02***	-0.13**
trade	148.55	56.44	58.90	53.20	59.04	128.39	148.55	53.20	36.10	46.67	69.67	56.44
inf	0.05	0.02	0.06	0.12	0.02	0.02	0.05	0.12	0.05	0.03	0.02	0.02
GDP	0.02	0.00	0.03	0.04	0.03	0.04	0.02	0.04	0.04	0.05	0.01	0.00
TAL	3.05	2.23	1.48	1.49	2.20	1.46	3.05	1.49	0.86	1.06	4.03	2.23
gs	21.10	20.36	19.45	17.68	18.26	14.93	21.10	17.68	16.70	11.42	19.67	20.36

Note:

$\widehat{\beta}VAT$ is estimated using full sample and the other control variables are calculated average over the most recent period (2000 to latest year available)

(1) The most countercyclical country; (2) The most procyclical country

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean; Middle East & North Africa and South Asia have no observations for $\widehat{\beta}VAT$, North America only has observations for CAN but not USA; Sub-Saharan Africa only has observations for South Africa.

, **, *: $\widehat{\beta}VAT$ is significant at 10%, 5%, and 1% respectively*

COL Colombia *PRT Portugal* *PER Peru*

GRC Greece *RUS Russia*

HUN Hungary *THA Thailand*

NZL New Zealand *ZAF South Africa*

Table A8.1. Key statistics of the most pro-/counter- cyclical countries by $\hat{\beta}PIT$

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	ITA	**HUN**	**PAK**	**IND**	**KOR**	**NZL**	**ITA**	**RUS**	**DOM**	**JAM**	**MLT**	**IRN**	**CAN**	**USA**	**PAK**	**IND**	**BWA[i]**	**NGA**	**ITA**	**GRC**
$\hat{\beta}PIT$	2.34***	-0.43*	3.22***	-2.74***	1.79***	-0.13	2.34***	-0.48	0.22	-1.54**	0.24	-0.12	0.28*	0.15	3.22***	-2.74***	2.42***	-0.92**	2.34***	-0.31
debt	0.81	0.80	0.57	0.55	0.17	0.46	0.81	0.37	0.31	0.89	0.41	0.23	0.70	0.59	0.57	0.55	0.22	0.53	0.81	0.73
debt_vol	0.34	0.20	0.17	0.18	0.09	0.17	0.34	0.31	0.12	0.49	0.22	0.14	0.16	0.21	0.17	0.18	0.11	0.52	0.34	0.52
fiscap	2.61	1.90	6.29	4.33	0.96	1.22	2.61	0.61	2.74	4.71	2.10	0.99	2.31	2.64	6.29	4.33		12.61	2.61	3.15
fiscap_vol	0.28	0.35	0.73	1.07	0.36	0.52	0.28	0.44	1.54	0.90	0.21	0.66	0.39	0.76	0.73	1.07		11.13	0.28	1.08
lfiscap	2.65	1.88	6.38	4.34	0.98	1.21	2.65	0.60	2.79	4.71	2.11	1.00	2.33	2.68	6.38	4.34		11.14	2.65	3.25
lfiscap_vol	0.27	0.32	0.70	1.04	0.36	0.52	0.27	0.42	1.52	0.85	0.24	0.69	0.40	0.80	0.70	1.04		10.01	0.27	1.14
polcon	0.48	0.42	0.41	0.48	0.39	0.37	0.48	0.28	0.34	0.34	0.34	0.26	0.42	0.40	0.41	0.48	0.22	0.44	0.48	0.37
nare	0.12	0.15	0.25	0.28	0.12	0.57	0.12	0.63	0.34	0.23	0.04	0.84	0.38	0.18	0.25	0.28	0.12	1.25	0.12	0.28
manu	0.68	0.71	0.60	0.46	0.75	0.16	0.68	0.18	0.33	0.28	0.39	0.06	0.46	0.51	0.60	0.46	0.73	0.02	0.68	0.20
CRI	77.04	71.77	55.03	63.33	77.89	81.17	77.04	67.14	63.94	66.08	76.95	60.30	83.77	80.48	55.03	63.33	77.19	55.85	77.04	68.28
ERI	37.55	32.74	32.11	32.82	40.28	37.67	37.55	36.60	34.02	29.50	38.58	31.64	40.05	38.14	32.11	32.82	40.59	31.82	37.55	33.41
FRI	39.86	34.05	32.11	37.30	42.00	37.71	39.86	38.66	32.00	33.73	37.11	35.56	42.14	39.74	32.11	37.30	40.71	34.83	39.86	32.20
PRI	76.23	76.53	45.77	56.50	73.83	86.55	76.23	59.74	62.45	69.21	78.42	54.05	85.09	82.53	45.77	56.50	72.53	45.98	76.23	70.82
govstab	7.09	7.49	7.00	6.87	7.46	7.79	7.09	8.78	7.46	7.35	8.17	7.10	8.05	8.51	7.00	6.87	8.61	6.89	7.09	7.21
socecon	7.46	6.34	5.53	5.21	8.58	8.29	7.46	4.85	4.60	5.65	8.30	5.30	8.22	8.50	5.53	5.21	5.63	3.23	7.46	6.03
invest	8.75	8.46	5.76	7.06	8.61	9.73	8.75	7.08	7.52	7.72	9.22	5.42	9.70	10.02	5.76	7.06	9.48	5.67	8.75	7.50
inconflict	10.21	11.36	6.54	6.56	9.83	11.74	10.21	8.25	9.24	9.12	10.56	7.74	11.06	10.71	6.54	6.56	10.79	6.96	10.21	9.13
exconflict	11.36	10.75	7.87	8.45	8.45	11.43	11.36	9.23	10.11	11.77	11.34	6.66	11.36	9.21	7.87	8.45	9.82	9.82	11.36	10.05
corrupt	3.11	3.84	1.96	2.56	3.08	5.61	3.11	1.95	2.66	2.14	3.53	2.65	5.49	4.47	1.96	2.56	3.51	1.61	3.11	3.55
military	6.00	5.71	0.82	4.08	4.08	6.00	6.00	4.16	2.71	6.00	5.35	4.65	6.00	4.96	0.82	4.08	5.64	1.39	6.00	4.54
religious	5.13	5.13	1.08	2.26	5.63	6.00	5.13	5.12	5.00	5.98	4.23	1.72	5.77	5.44	1.08	2.26	5.00	1.87	5.13	5.12
law	4.71	4.64	2.72	3.47	4.16	5.82	4.71	3.52	2.93	2.21	4.65	3.63	5.88	5.55	2.72	3.47	4.17	2.02	4.71	4.07
ethnic	5.02	4.46	2.32	1.97	5.74	4.31	5.02	2.70	4.34	4.76	4.99	3.73	3.56	5.05	2.32	1.97	4.28	2.35	5.02	5.53
democracy	4.99	5.33	2.30	5.03	4.72	5.94	4.99	2.88	4.43	4.17	5.33	3.20	5.97	5.93	2.30	5.03	3.68	2.89	4.99	5.15
bureau	2.86	3.24	1.98	2.98	3.09	4.00	2.86	1.22	1.41	2.68	2.71	1.85	4.00	4.00	1.98	2.98	2.23	1.18	2.86	2.79

Note:

$\hat{\beta}PIT$ is estimated using full sample and the other variables are calculated average using full sample

(1) The most countercyclical country; (2) The most procyclical country

[i] Country without observations for the corresponding variables

, **, *: $\hat{\beta}PIT$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;
MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

BWA Botswana	*IND India*	*MLT Malta*	*USA America*
CAN Canada	*IRN Iran*	*NGA Nigeria*	
DOM Dominican Republic	*ITA Italy*	*NZL New Zealand*	
GRC Greece	*JAM Jamaica*	*PAK Pakistan*	
HUN Hungary	*KOR South Korea*	*RUS Russia*	

Table A8.2. Key statistics of the most pro-/counter- cyclical countries by $\hat{\beta}PIT$ (macro variables)

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	ITA	**HUN**	**PAK**	**IND**	**KOR**	**NZL**	**ITA**	**RUS**	**DOM**	**JAM**	**MLT**	**IRN**	**CAN**	**USA**	**PAK**	**IND**	**BWA[i]**	**NGA**	**ITA**	**GRC**
$\hat{\beta}PIT$	2.34***	-0.43*	3.22***	-2.74***	1.79***	-0.13	2.34***	-0.48	0.22	-1.54**	0.24	-0.12	0.28*	0.15	3.22***	-2.74***	2.42***	-0.92**	2.34***	-0.31
trade	52.32	148.55	31.73	43.17	83.26	59.04	52.32	53.20	64.87	87.97	265.50	46.64	67.47	26.85	31.73	43.17	96.91	54.36	52.32	56.44
inf	0.02	0.05	0.08	0.07	0.03	0.02	0.02	0.12	0.09	0.10	0.02	0.17	0.02	0.02	0.08	0.07	0.07	0.12	0.02	0.02
GDP	0.00	0.02	0.04	0.07	0.04	0.03	0.00	0.04	0.05	0.01	0.03	0.04	0.02	0.02	0.04	0.07	0.04	0.07	0.00	0.00
TAL	2.35	3.05	0.64	0.62	1.14	2.20	2.35	1.49	0.80	1.75	9.31	0.50	2.52	2.25	0.64	0.62	1.46	1.17	2.35	2.23
gs	19.24	21.10	9.71	10.95	13.88	18.26	19.24	17.68	8.97	14.80	18.85	11.23	20.28	15.30	9.71	10.95	20.17	8.03	19.24	20.36

Note:

$\hat{\beta}PIT$ is estimated using full sample and the other control variables are calculated average over the most recent period (2000 to latest year available)

(1) The most countercyclical country; (2) The most procyclical country

[i] Country without observations for the corresponding variables

, **, *: $\hat{\beta}PIT$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;
MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

BWA Botswana *IND India* *MLT Malta* *USA America*
CAN Canada *IRN Iran* *NGA Nigeria*
DOM Dominican Republic *ITA Italy* *NZL New Zealand*
GRC Greece *JAM Jamaica* *PAK Pakistan*
HUN Hungary *KOR South Korea* *RUS Russia*

Table A9.1. Key statistics of the most pro-/counter- cyclical countries by $\widehat{\beta}CIT$

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	JPN	**CHL**	**PAK**	**ZAF**	**JPN**	**AUS**	**TUR**	**ITA**	**CRI**	**CHL**	**MLT**	**IRN**	**USA**	**CAN**	**PAK**	**IND**	**MUS[(i)]**	**ZAF**	**GRC**	**ITA**
$\hat{\beta}CIT$	0.52***	-0.38*	0.36	-0.29**	0.52***	-0.17	0.20	-0.25**	0.10	-0.38*	0.14	0.00	0.02	-0.03	0.36	0.15*	0.17	-0.29**	0.16	-0.25**
debt	0.94	0.47	0.57	0.39	0.94	0.25	0.36	0.81	0.43	0.47	0.41	0.23	0.59	0.70	0.57	0.55	0.47	0.39	0.73	0.81
debt_vol	0.80	0.43	0.17	0.08	0.80	0.08	0.12	0.34	0.25	0.43	0.22	0.14	0.21	0.16	0.17	0.18	0.13	0.08	0.52	0.34
fiscap	4.82	2.14	6.29	1.43	4.82	0.76	2.21	2.61	1.86	2.14	2.10	0.99	2.64	2.31	6.29	4.33	2.72	1.43	3.15	2.61
fiscap_vol	2.36	2.30	0.73	0.27	2.36	0.26	0.67	0.28	0.47	2.30	0.21	0.66	0.76	0.39	0.73	1.07	0.31	0.27	1.08	0.28
lfiscap	5.03	2.06	6.38	1.46	5.03	0.79	2.21	2.65	1.86	2.06	2.11	1.00	2.68	2.33	6.38	4.34	2.73	1.46	3.25	2.65
lfiscap_vol	2.46	2.18	0.70	0.27	2.46	0.29	0.66	0.27	0.43	2.18	0.24	0.69	0.80	0.40	0.70	1.04	0.32	0.27	1.14	0.27
polcon	0.51	0.35	0.41	0.33	0.51	0.49	0.41	0.48	0.39	0.35	0.34	0.26	0.40	0.42	0.41	0.48	0.35	0.33	0.37	0.48
nare	0.04	0.72	0.25	0.33	0.04	0.65	0.36	0.12	0.47	0.72	0.04	0.84	0.18	0.38	0.25	0.28	0.21	0.33	0.28	0.12
manu	0.82	0.09	0.60	0.35	0.82	0.18	0.35	0.68	0.29	0.09	0.39	0.06	0.51	0.46	0.60	0.46	0.36	0.35	0.20	0.68
CRI	84.92	72.38	55.03	67.70	84.92	80.35	58.73	77.04	70.19	72.38	76.95	60.30	80.48	83.77	55.03	63.33		67.70	68.28	77.04
ERI	40.29	36.50	32.11	34.29	40.29	38.92	29.64	37.55	33.17	36.50	38.58	31.64	38.14	40.05	32.11	32.82		34.29	33.41	37.55
FRI	46.42	37.89	32.11	35.24	46.42	37.30	30.26	39.86	35.41	37.89	37.11	35.56	39.74	42.14	32.11	37.30		35.24	32.20	39.86
PRI	83.05	70.77	45.77	64.91	83.05	84.17	56.74	76.23	71.71	70.77	78.42	54.05	82.53	85.09	45.77	56.50		64.91	70.82	76.23
govstab	7.78	7.29	7.00	7.66	7.78	8.17	7.58	7.09	6.96	7.29	8.17	7.10	8.51	8.05	7.00	6.87		7.66	7.21	7.09
sococon	8.28	6.84	5.53	5.22	8.28	8.18	5.15	7.46	6.30	6.84	8.30	5.30	8.50	8.22	5.53	5.21		5.22	6.03	7.46
invest	9.54	8.97	5.76	8.20	9.54	8.94	6.73	8.75	7.50	8.97	9.22	5.42	10.02	9.70	5.76	7.06		8.20	7.50	8.75
inconflict	11.03	8.54	6.54	8.00	11.03	10.91	7.30	10.21	9.97	8.54	10.56	7.74	10.71	11.06	6.54	6.56		8.00	9.13	10.21
exconflict	10.65	10.16	7.87	9.88	10.65	10.61	8.47	11.36	9.35	10.16	11.34	6.66	9.21	11.36	7.87	8.45		9.88	10.05	11.36
corrupt	4.17	3.74	1.96	3.74	4.17	4.82	2.64	3.11	3.77	3.74	3.53	2.65	4.47	5.49	1.96	2.56		3.74	3.55	3.11
military	5.61	3.31	0.82	4.54	5.61	6.00	2.88	6.00	6.00	3.31	5.35	4.65	4.96	6.00	0.82	4.08		4.54	4.54	6.00
religious	5.59	5.40	1.08	4.94	5.59	6.00	3.78	5.13	5.00	5.40	4.23	1.72	5.44	5.77	1.08	2.26		4.94	5.12	5.13
law	5.23	4.59	2.72	2.36	5.23	5.83	3.67	4.71	3.78	4.59	4.65	3.63	5.55	5.88	2.72	3.47		2.36	4.07	4.71
ethnic	5.78	5.17	2.32	2.95	5.78	4.41	2.20	5.02	6.00	5.17	4.99	3.73	5.05	3.56	2.32	1.97		2.95	5.53	5.02
democracy	5.40	4.13	2.30	4.68	5.40	6.00	4.37	4.99	5.23	4.13	5.33	3.20	5.93	5.97	2.30	5.03		4.68	5.15	4.99
bureau	3.99	2.64	1.98	2.78	3.99	4.00	2.17	2.86	2.01	2.64	2.71	1.85	4.00	4.00	1.98	2.98		2.78	2.79	2.86

Note:

$\hat{\beta}CIT$ is estimated using full sample and the other variables are calculated average using full sample

(1): The most countercyclical country; (2): The most procyclical country

[(i)] Country without observations for the corresponding variables

, **, *: $\hat{\beta}CIT$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;

MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

AUS Australia	*IND India*	*MUS Mauritius*
CAN Canada	*IRN Iran*	*PAK Pakistan*
CHL Chile	*ITA Italy*	*TUR Turkey*
CRI Costa Rica	*JPN Japan*	*USA America*
GRC Greece	*MLT Malta*	*ZAF South Africa*

Table A9.2. Key statistics of the most pro-/counter- cyclical countries by $\widehat{\beta}CIT$ (macro variables)

Variable	OECD		Non-OECD		EAS		ECS		LCN		MEA		NAC		SAS		SSF		Eurozone	
	(1)	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*	*(1)*	*(2)*
	JPN	**CHL**	**PAK**	**ZAF**	**JPN**	**AUS**	**TUR**	**ITA**	**CRI**	**CHL**	**MLT**	**IRN**	**USA**	**CAN**	**PAK**	**IND**	**MUS[(i)]**	**ZAF**	**GRC**	**ITA**
$\hat{\beta}CIT$	0.52***	-0.38*	0.36	-0.29**	0.52***	-0.17	0.20	-0.25**	0.10	-0.38*	0.14	0.00	0.02	-0.03	0.36	0.15*	0.17	-0.29**	0.16	-0.25**
trade	28.40	67.37	31.73	58.90	28.40	41.06	48.12	52.32	76.82	67.37	265.50	46.64	26.85	67.47	31.73	43.17	115.93	58.90	56.44	52.32
inf	0.00	0.03	0.08	0.06	0.00	0.03	0.17	0.02	0.08	0.03	0.02	0.17	0.02	0.02	0.08	0.07	0.05	0.06	0.02	0.02
GDP	0.01	0.04	0.04	0.03	0.01	0.03	0.05	0.00	0.04	0.04	0.03	0.04	0.02	0.02	0.04	0.07	0.04	0.03	0.00	0.00
TAL	1.56	1.93	0.64	1.48	1.56	2.23	0.89	2.35	0.94	1.93	9.31	0.50	2.25	2.52	0.64	0.62	24.40	1.48	2.23	2.35
gs	18.86	11.83	9.71	19.45	18.86	17.74	13.58	19.24	15.38	11.83	18.85	11.23	15.30	20.28	9.71	10.95	14.02	19.45	20.36	19.24

Note:

$\hat{\beta}CIT$ is estimated using full sample and the other control variables are calculated average over the most recent period (2000 to latest year available)

(1): The most countercyclical country; (2): The most procyclical country

[(i)] Country without observations for the corresponding variables

, **, *: $\hat{\beta}CIT$ is significant at 10%, 5%, and 1% respectively*

EAS: East Asia & Pacific; ECS: Europe and Central Asia; LCN: Latin America & Caribbean;

MEA: Middle East & North Africa; NAC: North America; SAS: South Asia; SSF: Sub-Saharan Africa

AUS Australia	*IND India*	*MUS Mauritius*
CAN Canada	*IRN Iran*	*PAK Pakistan*
CHL Chile	*ITA Italy*	*TUR Turkey*
CRI Costa Rica	*JPN Japan*	*USA America*
GRC Greece	*MLT Malta*	*ZAF South Africa*

Table A10. Country data coverage of the key variables

Country	$\widehat{\beta}GS$ (1)	$\widehat{\beta}VAT$ (2)	$\widehat{\beta}PIT$ (3)	$\widehat{\beta}CIT$ (4)	*fiscap* (5)
Albania	1980-2016				1994-2015
Algeria	1960-2016				
Angola	1985-2016				
Antigua and Barbuda	1989-2016				
Argentina	1960-2016	1974-2016	1976-2016	1979-2016	1985-2014
Armenia	1990-2016				1993-2014
Australia	1960-2016		1974-2016	1960-2016	1980-2015
Austria	1960-2016	1973-2016	1973-2016	1973-2016	1980-2015
Azerbaijan	1990-2016	1992-2016	1992-2016	1992-2016	1993-2015
Bahamas	1977-2016				1991-2014
Bahrain	1980-2016		1980-2016	1980-2016	
Bangladesh	1960-2016				
Barbados	1980-2016		1980-2016	1980-2016	1990-2015
Belarus	1990-2016				2003-2015
Belgium	1960-2016	1971-2016	1975-2016	1960-2016	1980-2015
Belize	1980-2016				1990-2015
Benin	1960-2016				
Bhutan	1980-2016				1983-2009
Bolivia	1960-2016		1976-2016	1979-2016	1985-2015
Botswana	1960-2016		1974-2016	1960-2016	
Brazil	1960-2016		1979-2016	1979-2016	1990-2015
Brunei	1974-2016				
Bulgaria	1980-2016				1992-2015
Burkina Faso	1960-2015				
Burundi	1960-2016				
Cabo Verde	1980-2016				
Cambodia	1987-2016				1996-2015
Cameroon	1965-2016				
Canada	1960-2016	1991-2016	1981-2016	1981-2016	1980-2015
Central African Republic	1960-2016				
Chad	1960-2016				
Chile	1960-2016	1975-2016	1974-2016	1979-2016	1980-2015
China	1960-2016				2005-2014
Colombia	1960-2016	1989-2016	1976-2016	1979-2016	1980-2016
Comoros	1980-2016				
Congo	1960-2016				2003-2012
Congo, Dem. Rep.	1960-2016				

Costa Rica	1960-2016		1974-2016	1979-2016	1990-2015
Croatia	1992-2016				1994-2014
Cuba	1970-2015				
Cyprus	1975-2016				1995-2015
Czech Republic	1990-2016		1991-2016		1993-2015
Denmark	1960-2016	1967-2016	1975-2016	1962-2016	1980-2015
Djibouti	1991-2016				
Dominica	1980-2016				
Dominican Republic	1960-2016	1992-2016	1979-2016	1979-2016	1990-2015
Ecuador	1960-2016	1982-2016	1974-2016	1979-2016	1995-2015
Egypt	1965-2016				
El Salvador	1965-2016	1992-2016	1974-2016	1979-2016	2002-2015
Equatorial Guinea	1980-2016				
Eritrea	1992-2016				
Ethiopia	1980-2016				
Fiji	1960-2016	1992-2016	1979-2016	1960-2016	
Finland	1960-2016		1974-2016	1960-2016	1980-2015
France	1960-2016	1968-2016	1960-2016	1960-2016	1980-2015
Gabon	1960-2016		1988-2016		
Gambia, The	1977-2016				
Georgia	1980-2016	1992-2016	1992-2016	1992-2016	2004-2015
Germany	1970-2016	1970-2016	1970-2016	1970-2016	1980-2015
Ghana	1960-2016		1991-2016	1960-2016	
Greece	1960-2016	1987-2016	1975-2016	1961-2016	1980-2015
Grenada	1980-2016				
Guatemala	1960-2016				1990-2014
Guinea	1980-2016				
Guinea-Bissau	1970-2016				
Guyana	1960-2016				2006-2012
Honduras	1960-2016		1979-2016	1979-2016	1991-2015
Hong Kong	1961-2016				2001-2014
Hungary	1980-2016	1988-2016	1990-2016	1989-2016	1982-2015
Iceland	1960-2016				1981-2015
India	1960-2016		1974-2016	1966-2016	1980-2014
Indonesia	1960-2016				1998-2015
Iran	1960-2016		1974-2016	1978-2016	1980-1989
Iraq	1970-2016				2004-2009
Ireland	1970-2016				1980-2015
Israel	1960-2016				1980-2015
Italy	1960-2016	1973-2016	1975-2016	1974-2016	1980-2015
Ivory Coast	1960-2016				

Jamaica	1966-2016	1991-2016	1974-2016	1966-2016	1990-2015
Japan	1960-2016	1989-2016	1972-2016	1960-2016	1980-2014
Jordan	1980-2016				2008-2013
Kazakhstan	1992-2016				1993-2014
Kenya	1960-2016		1974-2016	1960-2016	
Kuwait	1965-2016		1965-2016		
Kyrgyz Republic	1987-2016				2001-2015
Lebanon	1980-2016				
Lesotho	1980-2016				1990-2008
Liberia	1960-2016				
Libya	1980-2006				1991-2012
Luxembourg	1960-2016	1970-2016	1974-2016	1963-2016	1980-2015
Macau	1982-2016				
Macedonia, FYR	1990-2016				1995-2008
Madagascar	1960-2016				
Malawi	1960-2016				
Malaysia	1960-2016				1990-2014
Maldives	1990-2016				1980-2014
Mali	1967-2016				
Malta	1970-2016		1981-2016	1970-2016	1995-2015
Mauritania	1960-2016				
Mauritius	1976-2016		1988-2016	1976-2016	1990-2014
Mexico	1960-2016	1980-2016	1974-2016	1980-2016	1980-2014
Moldova	1992-2016				1995-2015
Mongolia	1980-2016				1992-2007
Morocco	1966-2016				2000-2014
Mozambique	1980-2016				
Namibia	1980-2016		1991-2016	1991-2016	
Nepal	1975-2016				
Netherlands	1960-2016				1980-2015
New Zealand	1977-2016	1987-2016	1977-2016	1977-2016	1980-2015
Nicaragua	1960-2016				1987-2015
Niger	1960-2016				
Nigeria	1981-2015		1974-2016	1960-2016	1992-2007
Norway	1960-2016	1970-2016	1974-2016	1960-2016	1980-2015
Oman	1967-2015		1977-2015	1977-2015	
Pakistan	1960-2016		1974-2016	1960-2016	1994-2016
Panama	1960-2016				1989-2015
Papua New Guinea	1961-2004		1976-2016	1960-2016	
Paraguay	1980-2016	1991-2016	1980-2016	1980-2016	2005-2015
Peru	1960-2016	1982-2016	1976-2016	1979-2016	1990-2015

Philippines	1960-2016	1988-2016	1979-2016	1980-2016	
Poland	1984-2016				1986-2015
Portugal	1960-2016	1986-2016	1976-2016	1981-2016	1980-2015
Puerto Rico	1960-2013				
Qatar	1980-2016		1980-2016		
Romania	1980-2016				1990-2015
Russia	1989-2016	1992-2016	1990-2016	1990-2016	2000-2015
Rwanda	1960-2016				1996-2014
Saudi Arabia	1968-2016		1968-2016	1977-2016	
Senegal	1960-2016				1997-2014
Seychelles	1976-2015				1993-2015
Sierra Leone	1964-2016				
Singapore	1960-2016				1980-2015
Slovakia	1992-2016				1994-2015
Solomon Islands	1980-2016				
Somalia	1960-1984				
South Africa	1960-2016	1992-2016	1974-2016	1960-2016	1980-2015
South Korea	1960-2016	1978-2016	1974-2016	1980-2016	1980-2015
Spain	1960-2016	1986-2016	1975-2016	1965-2016	1980-2015
Sri Lanka	1961-2016				
St. Kitts and Nevis	1980-2016				
St. Lucia	1977-2016				1989-1999
St. Vincent and the Grenadines	1980-2016				
Sudan	1960-2016				
Suriname	1975-2016				
Swaziland	1970-2016				
Sweden	1960-2016	1969-2016	1960-2016	1960-2016	1980-2015
Switzerland	1980-2016		1981-2016	1981-2016	1980-2015
Syrian Arab Republic	1960-2007				1981-2008
Taiwan	1980-2016				
Tajikistan	1985-2015				1998-2015
Tanzania	1980-2016		1988-2016	1980-2016	
Thailand	1960-2016	1992-2016	1974-2016	1975-2016	1980-2015
Togo	1960-2016				
Tonga	1981-2012				
Trinidad and Tobago	1960-2015				1990-2015
Tunisia	1965-2016				1983-2014
Turkey	1960-2016	1985-2016	1960-2016	1983-2016	1980-2015
UK	1960-2016	1973-2016	1960-2016	1973-2016	1980-2015
US	1960-2016		1960-2016	1960-2016	1980-2015
Uganda	1982-2016				

Ukraine	1989-2016				1992-2015
United Arab Emirates	1980-2016		1980-2016		2012-2015
Uruguay	1960-2016	1969-2016	1976-2016	1979-2016	1980-2015
Uzbekistan	1987-2016				1999-2015
Vanuatu	1980-2014				
Venezuela	1960-2014		1979-2014	1979-2014	1990-2015
Vietnam	1989-2016				1992-2015
Yemen, Rep.	1990-2016				1992-2012
Zambia	1980-2016		1981-2016	1980-2016	
Zimbabwe	1960-2016				1980-1989

Note:
Data coverage in the columns (1)-(4) for each country are used for estimating $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}, \widehat{\boldsymbol{\beta}}\boldsymbol{VAT}, \widehat{\boldsymbol{\beta}}\boldsymbol{PIT}, \widehat{\boldsymbol{\beta}}\boldsymbol{CIT}$ *respectively in the corresponding time-series regression. The variable "fiscap" by country which is used in cross-sectional regressions is average over the corresponding period in column (5).*

Table A11. Regional-specific estimated coefficient of Public Debt/Tax Base

Variable	Public Debt/Tax Base	Public Debt/3-year average Tax Base
East Asia & Pacific	0.1182	0.1139
Europe & Central Asia	-0.0643	-0.0581
Latin America & Caribbean	-0.0022	0.0153
Middle East & North Africa	-0.0013	-0.0015
Sub-Saharan Africa	0.1371*	0.1547*

Note:

The regional-specific estimated coefficient of Public Debt/Tax Base by region is from the corresponding cross-sectional regression for the region (similar to equation (2), that is $\widehat{\boldsymbol{\beta}}\boldsymbol{GS}$ *= f[Public Debt/Tax Base, Control Variables]). We also run similar regression by region using public debt/3-year average tax base alternatively.*

** denotes the coefficient is significant at 10%*

Table A12. $\widehat{\beta GS}$ pre-crisis and post-crisis by country, 1980-2016

iso	Country name	$\widehat{\beta GS}$ pre-crisis	$\widehat{\beta GS}$ post-crisis	Observations	R-squared
ARE	United Arab Emirates	-1.657**	-1.978*	25	0.246
ATG	Antigua and Barbuda	0.966*	1.554**	26	0.287
AUS	Australia	-0.213	-0.446	28	0.016
AUT	Austria	0.218	-1.052	28	0.15
BDI	Burundi	1.589*	0.927	26	0.128
BEL	Belgium	-0.555*	-0.902	36	0.087
BEN	Benin	1.554	1.55	27	0.044
BFA	Burkina Faso	0.618	0.0622	31	0.02
BGD	Bangladesh	0.604	0.931	36	0.077
BHR	Bahrain	-1.356	-0.295	26	0.239
BHS	The Bahamas	0.295	-0.21	26	0.019
BOL	Bolivia	2.821***	2.693***	32	0.368
BRN	Brunei Darussalam	-0.545	-1.582	31	0.03
BTN	Bhutan	0.168	0.304	35	0.016
BWA	Botswana	0.406	-0.246	36	0.063
CAF	Central African Republic	3.021***	1.482***	28	0.523
CAN	Canada	-0.278	-1.261***	36	0.401
CHE	Switzerland	-0.499**	-0.33	33	0.166
CHL	Chile	-0.379	-0.475	26	0.087
CHN	China	-0.672	0.268	34	0.245
COG	Republic of Congo	-1.383	-0.357	27	0.044
COL	Colombia	0.762	0.152	34	0.11
COM	Comoros	0.138	2.434	32	0.045
CRI	Costa Rica	0.357	0.969	26	0.037
DEU	Germany	-0.00678	-0.309	25	0.014
DJI	Djibouti	2.015**	1.908**	25	0.279
DMA	Dominica	2.196**	1.351	26	0.223
DNK	Denmark	-0.124	-0.875***	36	0.271
DZA	Algeria	-0.464	-0.124	26	0.014
ERI	Eritrea	2.543***	1.194	24	0.562
ESP	Spain	0.278	-0.29	36	0.032
ETH	Ethiopia	0.920**	0.67	35	0.194
FIN	Finland	-0.620***	-0.0783	36	0.258
FJI	Fiji	-0.0985	1.193	24	0.091
FRA	France	-0.0618	-0.652**	36	0.258
GAB	Gabon	4.139***	1.824	26	0.351
GBR	UK	-0.209	-0.755**	36	0.141
GHA	Ghana	3.565***	2.052***	36	0.423

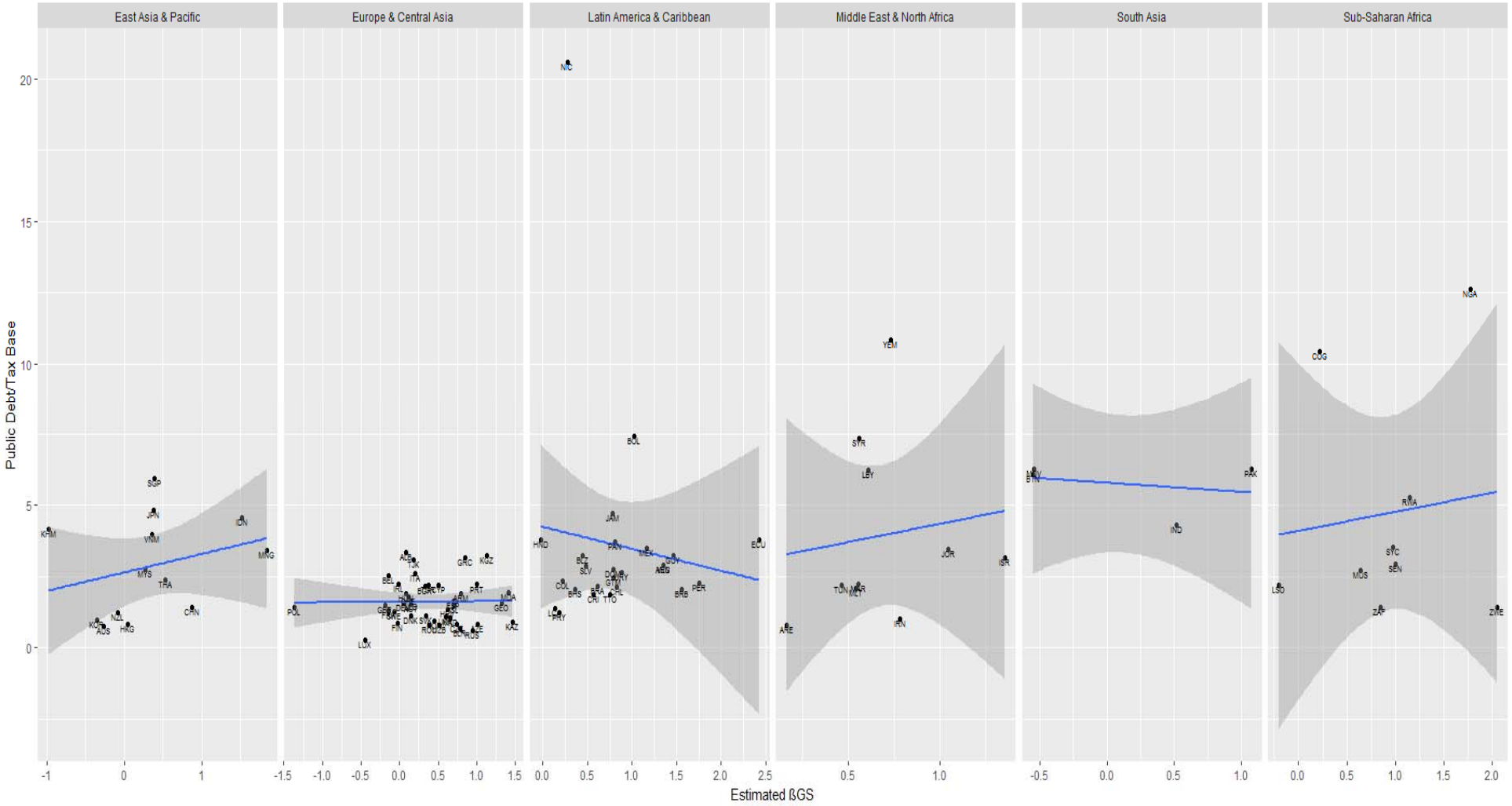
GIN	Guinea	-6.197***	-4.032**	26	0.277
GNB	Guinea-Bissau	3.197***	0.485	25	0.341
GNQ	Equatorial Guinea	0.183	1.884	36	0.042
GRC	Greece	0.477	1.454***	35	0.384
GRD	Grenada	0.548	0.67	26	0.059
HKG	Hong Kong	-0.413	-0.00158	35	0.064
HND	Honduras	0.802	0.399	26	0.047
HRV	Croatia	1.621***	0.479	24	0.451
IND	India	-0.0334	0.0552	28	0.021
IRL	Ireland	0.255	-0.407	36	0.068
IRN	Iran	0.758	1.975*	26	0.136
ISL	Iceland	0.721**	1.246**	36	0.244
ITA	Italy	0.17	-0.149	28	0.022
JAM	Jamaica	1.157	-0.0122	26	0.023
JOR	Jordan	0.662*	0.236	31	0.122
JPN	Japan	0.322	-0.649	36	0.124
KEN	Kenya	0.641	1.154**	34	0.155
KIR	Kiribati	-1.287	1.211	26	0.148
KNA	St. Kitts and Nevis	0.962	0.898	36	0.072
KWT	Kuwait	-0.335**	0.0193	26	0.22
LBN	Lebanon	0.691*	0.163	26	0.114
LBY	Libya	0.255	0.620***	26	0.454
LCA	St. Lucia	0.387	0.389	31	0.043
LKA	Sri Lanka	1.001**	0.842	26	0.248
LSO	Lesotho	-0.922	-0.672	34	0.02
MAR	Morocco	-0.0676	0.255	26	0.003
MDG	Madagascar	2.519***	2.696**	36	0.485
MDV	Maldives	-0.213	0.184	26	0.057
MEX	Mexico	-0.175	0.104	26	
MNG	Mongolia	1.974***	1.937***	35	0.512
MOZ	Mozambique	0.374	0.811	36	0.029
MUS	Mauritius	0.507	0.779	26	0.053
MYS	Malaysia	0.0238	-0.625	26	0.089
NAM	Namibia	1.22	2.099**	26	0.193
NGA	Nigeria	0.434	0.687	26	0.011
NLD	Netherlands	-0.0317	-0.892*	36	0.083
NOR	Norway	-0.468	-1.688	36	0.067
NZL	New Zealand	-0.444	-0.304	31	0.075
OMN	Oman	0.699	1.803***	26	0.299
PHL	Philippines	0.559	0.61	27	0.021
PNG	Papua New Guinea	0.397	0.123	33	0.026

PRT	Portugal	0.465	0.416	30	0.041
PRY	Paraguay	1.438**	0.33	36	0.142
QAT	Qatar	0.552*	0.982**	26	0.23
ROU	Romania	0.939***	0.624	26	0.496
RWA	Rwanda	1.880***	1.978***	24	0.848
SAU	Saudi Arabia	0.343	0.678	26	0.047
SDN	Sudan	1.21	2.411	26	0.121
SGP	Singapore	-0.638	-0.824	26	0.061
SLB	Solomon Islands	1.206**	0.0552	36	0.114
SLV	El Salvador	0.0554	-1.239	26	0.032
SUR	Suriname	0.853	2.500**	26	0.199
SWE	Sweden	-0.123	0.122	36	0.057
SWZ	Swaziland	1.171**	1.183	36	0.144
SYC	Seychelles	1.861***	2.738***	33	0.43
TGO	Togo	0.273	2.064**	27	0.187
TTO	Trinidad and Tobago	0.953**	-0.651	28	0.178
TUN	Tunisia	-0.276	-0.779	25	0.046
TWN	Taiwan	1.121**	0.458	36	0.165
TZA	Tanzania	0.778	0.603	25	0.035
UZB	Uzbekistan	-0.413	0.371	24	
VCT	St. Vincent and the Grenadines	1.106**	-0.00517	36	0.161
VEN	Venezuela	1.054***	1.672***	28	0.415
VUT	Vanuatu	1.264	3.434*	25	0.145
WSM	Samoa	-0.281	-1.529	24	0.106
YEM	Yemen	2.248**	1.007***	26	0.629

Table A13. ADB Developing Member Economies

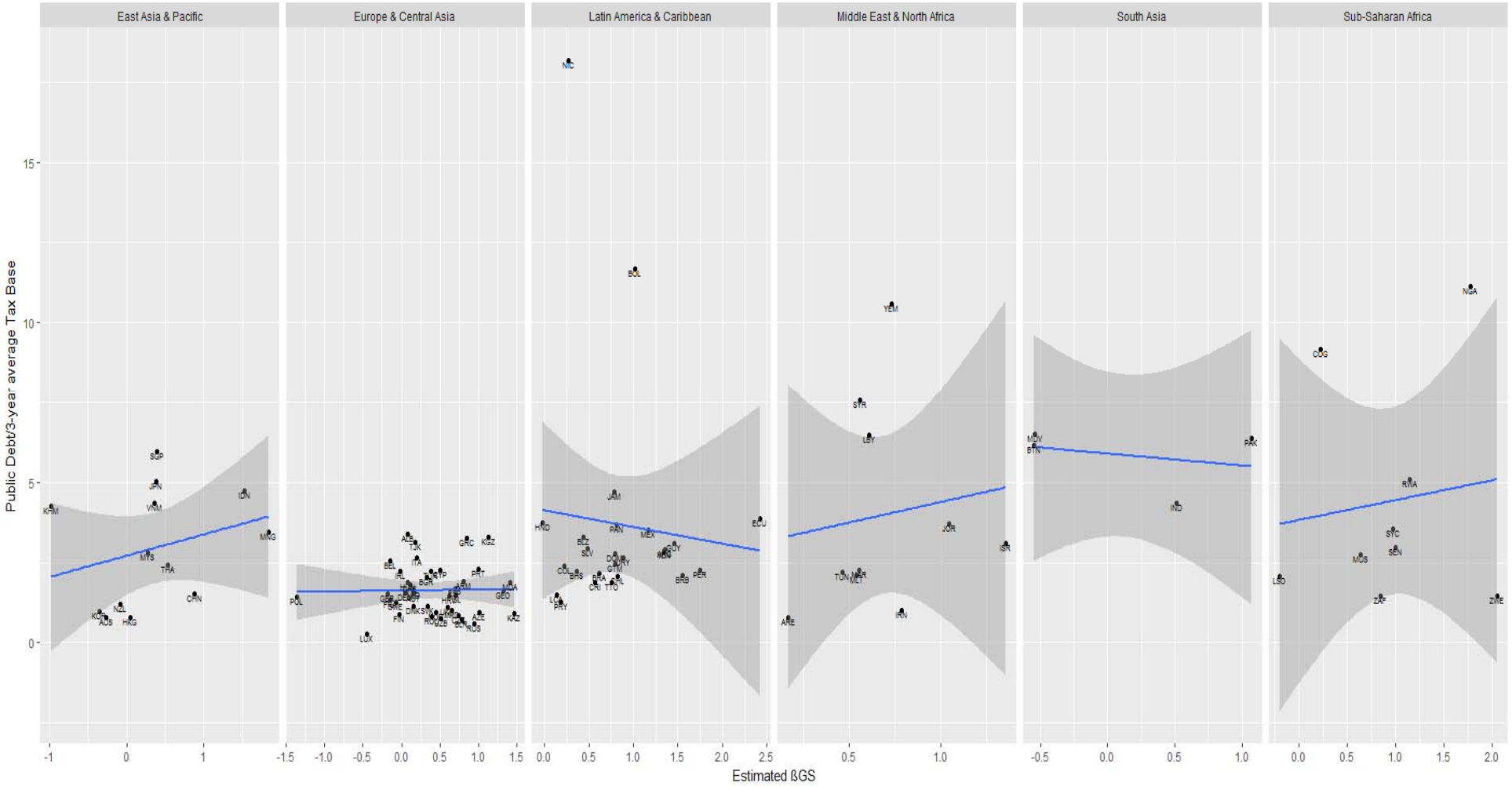
Central Asia	East Asia	South Asia	Southeast Asia	The Pacific
Armenia	Hong Kong, China	Afghanistan	Brunei Darussalam	Cook Islands
Azerbaijan	Mongolia	Bangladesh	Cambodia	Federated States of Micronesia
Georgia	People's Republic of China	Bhutan	Indonesia	Fiji
Kazakhstan	Republic of Korea	India	Lao People's Dem. Rep.	Kiribati
Kyrgyz Republic	Taipei,China	Maldives	Malaysia	Marshall Islands
Tajikistan		Nepal	Myanmar	Nauru
Turkmenistan		Pakistan	Philippines	Palau
Uzbekistan		Sri Lanka	Singapore	Papua New Guinea
			Thailand	Samoa
			Viet Nam	Solomon Islands
				Timor-Leste
				Tonga
				Tuvalu
				Vanuatu

Figure A1. Correlation of $\widehat{\boldsymbol{\beta GS}}$ and Public Debt/Tax Base across countries by region, 1960-2016



Note:
The blue lines are the linear regression lines of public debt/tax base on $\widehat{\boldsymbol{\beta GS}}$ by region. The graphs shows the clusters of the countries by region, as most of the countries by region either gather as a group or lie in the 95% confidence interval, which is the shaded area. For Middle East & North Africa, we dropped Iraq out of the graph as it is an extreme case with its average public debt/tax base over the 1960-2016 period being approximately 335.23. This helps get clearer cluster trend in the region and still does not change the trend otherwise. North America is not included because of the data insufficiency.

Figure A2. Correlation of $\widehat{\beta GS}$ and Public Debt/3-year Average Tax Base across countries by region, 1960-2016



Note:
The blue lines are the linear regression lines of public debt/3-year average tax base on $\widehat{\beta GS}$ by region. The graphs shows the clusters of the countries by region, as most of the countries by region either gather as a group or lie in the 95% confidence interval, which is the shaded area. For Middle East & North Africa, we dropped Iraq out of the graph as it is an extreme case with average public debt/3-year average tax base over the 1960-2016 period being approximately 289.6. This helps get clearer cluster trend in the region and still does not change the trend otherwise. North America is not included because of the data insufficiency.