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Abstract

Fiscal stimulus programs have contributed substantially to developing Asia's faster and stronger than expected recovery from the global financial crisis. This may lead to political pressures for greater use of countercyclical fiscal policy in the postcrisis period. However, the countercyclical effectiveness of fiscal policy depends critically on the extent to which it crowds out private investment and consumption. In the medium term, the use of fiscal policy to promote rebalancing toward domestic demand may require a moderate fiscal expansion. The extent of crowding out will impinge upon the effectiveness of such fiscal expansion in boosting domestic demand. Therefore, crowding out has implications for the effectiveness of fiscal policy as a tool for both short-run macroeconomic stabilization and medium- to long-term structural rebalancing. Overall, our evidence is decidedly mixed, with no clear evidence of either crowding out or crowding in. The evidence fails to provide compelling support for greater use of fiscal policy for countercyclical purposes. In the context of rebalancing, fiscal expansion will not, in and of itself, contribute to a more balanced demand and output structure. That would require using fiscal policy to help remove the structural impediments to private consumption and investment.

I. Introduction

Although developing Asia's growth performance was hit hard by the contraction of global trade during the peak of the crisis in the 4th quarter of 2008 and 1st quarter of 2009, it has staged a spectacular V-shaped recovery since then. Although the region's gross domestic product (GDP) growth rate slowed down to 6.6% in 2008 and 5.2% in 2009 from a 3-year average of 8.8% in 2005–2007, it is projected to rebound to 7.5% in 2010 and 7.3% in 2011. The region's unexpectedly speedy and robust turnaround is all the more remarkable in light of the fragile and uncertain recovery of the G3, a major export market for the region. There are a number of factors behind the turnaround. For one, throughout the crisis the region's banks and financial systems continued to function more or less normally and channel credit to the real economy throughout the crisis, in striking contrast to their badly damaged counterparts in the European Union and the United States. Another factor has been the relative absence of structural problems such as high levels of household debt that plagued some advanced economies. Perhaps the single most important driver of the region's recovery is the sizable fiscal stimulus packages quickly and decisively rolled out by governments across the region. Developing Asian governments aggressively boosted public spending and cut taxes to stimulate economic activity. The fiscal stimulus was made possible by healthy fiscal positions, most evident in generally low public debt–GDP ratios, and helped to prop up aggregate demand in the face of plunging exports and weak private consumption and investment.

The regionwide fiscal response was entirely appropriate given the likely prospect of a severe and protracted recession hanging over the region. Nevertheless, it was uncharacteristic and unusual in light of the region's long-held reluctance to use fiscal policy for countercyclical macroeconomic stabilization. The traditional role of fiscal policy in developing Asia has been to promote macroeconomic stability through fiscal discipline while providing growth-conducive public goods such as education and infrastructure. There have been episodes of countercyclical fiscal activism in the past, most notably in crisis-hit countries during the Asian crisis, but these have been few and far in between. Although developing Asia's overall fiscal conservatism has served the region well in the past, the widely perceived effectiveness of countercyclical fiscal policy in cushioning the adverse impact of the crisis may lead to political pressures for greater fiscal activism in the postcrisis period. That is, notwithstanding the fact that the region's fiscal stimulus was an exceptional policy response to an exceptional negative shock, it may trigger calls for using fiscal policy to stabilize output at a more general level. Whether fiscal policy is effective in smoothing short-run output fluctuations depends critically on the extent to which it crowds out private investment and consumption. If an additional dollar of public

spending displaces a dollar of private demand, the net effect on output would be zero. If, on the other hand, public spending does not displace private demand at all or crowds in additional private demand, then fiscal policy would be a highly effective countercyclical tool.

Beyond the crisis, in the medium and long term, one of the key structural challenges facing developing Asia is the need for rebalancing away from excessive dependence on external demand and toward a more balanced demand structure that accords a bigger role for domestic demand. However, it is difficult to ramp up private consumption and investment in the short run. Given that ramping up private domestic demand will inevitably take some time, the government may have to provide more demand during the transition period. That is, in the medium term, public demand can play a bridging role while the structure of the region's demand is shifting from its precrisis export-dependent structure to a more balanced postcrisis structure. The primary role of fiscal policy in the rebalancing process is to help remove the structural impediments and distortions constraining private consumption and investment. For example, higher public spending on education, health care, pensions, and social protection increases the incomes of households and mitigates the risk and uncertainty they face, thus encouraging them to consume more and save less. Given the relatively small size of governments in the region in general, securing fiscal resources for removing structural impediments is likely to require at least a modest expansion of the fiscal stance in the medium term. In addition, public demand can play a bridging role during the region's transition from a heavily export-based economic structure to a more balanced structure. However, if the crowding out effect is large, fiscal policy will have only a limited impact on output in the medium term.

The central objective of this paper is to empirically examine whether fiscal policy crowds out private consumption and investment in developing Asia. To do so, we look at evidence from both cross-country panel data and country-specific time-series data. The first type of analysis involves assessing the impact of fiscal variables on private consumption and investment for a panel of 24 countries, including 10 countries from developing Asia, using two empirical models: (i) simple panel regression and (ii) error correction model (ECM) involving cointegration. The second type of analysis applies Mountford and Uhlig's (2009) structural vector autoregression (SVAR) model based on sign restrictions to the time-series data of 10 developing Asian economies: the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. Overall, our empirical evidence from both cross-country panel data and country-specific time-series data indicate that fiscal expansion does not have a significant negative effect on private consumption and investment in the region. At the same time, fiscal expansion does not have a positive effect on private consumption and investment. The implication is that fiscal expansion is neutral with respect to private demand, neither crowding in nor crowding out private demand.

The rest of this paper is organized as follows. Section II provides a brief overview of the concepts of crowding out and crowding in. The next two sections report and discuss the results of our empirical analysis of crowding out and crowding in. Section III presents the evidence from cross-section panel data while Section IV presents the evidence from country-specific time-series data. Section V concludes the paper with some final observations.

II. Fiscal Policy and Crowding Out: A Brief Conceptual Overview

In the long term, if the rebalancing process is successful, private domestic demand and intraregional trade will become a more significant source of growth for developing Asia. However, in the medium term, while the economy is in the middle of a transition process toward a more balanced economy, the government can provide additional demand and thus bolster aggregate demand. More fundamentally, the removal of structural impediments that stand in the way of a vibrant domestic economy requires substantial fiscal resources, for example, more public expenditures on social protection. Given developing Asia's generally healthy state of public finances, in particular relatively low public debt–GDP ratios, many countries in the region can probably afford a moderate easing of fiscal stance in the medium term. The easing will primarily take the form of additional spending rather than tax cuts in light of the region's relatively low taxes, and represents a continuation of the fiscal stimulus packages into the medium term, even though the expansionary stance will be sharply scaled back.

Whether a moderate quantitative expansion of government spending can stimulate economic activity depends critically on the magnitude of the fiscal multiplier, or the increase in output due to higher public spending or tax cut. Hemming, Kell, and Mahfouz (2002) provide a good, concise review of the theoretical literature on the fiscal multiplier. In the simplest Keynesian model that assumes price rigidity and excess capacity, output is determined by aggregate demand. Some of the increase in aggregate demand due to fiscal expansion will be crowded out to the extent that government provision of goods and services substitutes for private provision. There will be additional crowding out if the higher demand is met through imports rather than domestic production. To the extent that the increase in government spending reduces private consumption and investment, some of the increase in aggregate demand will be nullified. For example, if the additional spending is financed by higher taxes, the consequent reduction in household disposable income will have an adverse effect on private consumption. Even if there are no new taxes in the current period, the anticipation of future tax increases may encourage higher household saving. Induced changes in the interest rate and exchange rate will further reduce the positive impact of fiscal expansion on aggregate demand. If the additional

public spending is financed not by higher taxes but by government borrowing, the resulting increase in interest rate will have an adverse effect on private investment and consumption. This effect will be bigger if private investment and consumption is highly sensitive to the interest rate. A further channel for crowding out is the exchange rate. Higher interest rates attract capital flows and an appreciation of the exchange rate. The resulting deterioration of the current account balance will offset some of the increase in aggregate demand due to the fiscal expansion.

Although the literature tends to highlight the crowding out of private investment and consumption due to fiscal expansion, fiscal expansion can also crowd in private demand. For example, government investment in physical infrastructure such as roads, railways, and ports raises the productivity of investments for all firms and industries, and thereby stimulates private investments. Likewise, government provision of stronger social safety nets such as unemployment benefits may reduce the risk and uncertainty facing households and thus encourage them to consume more and save less. Public spending can also have a positive impact on private consumption and investment by bolstering consumer and business confidence. This type of confidence-reviving effect is especially relevant for severe shocks such as the global financial crisis when the public desperately looks for signs that the government is doing something to revive the economy. The larger the crowding in effect, the larger the positive effect of fiscal expansion on aggregate demand and output. The net effect of moderate medium-term fiscal expansion on the region's economic activity thus depends on the extent to which the expansion crowds in or crowds out private domestic demand.

Fiscal policy can also have an indirect second-round impact on aggregate demand through its supply-side effects. Although supply-side effects of fiscal policy are generally more significant over a longer horizon, they can nevertheless have an impact on short-run demand. This is because expectations that long-run growth will be higher as a result of growth-friendly fiscal policy can stimulate private demand. Growth-friendly fiscal policy takes the form of tax cuts and public spending that expand the supply of labor and capital, and thus have a positive impact on long-run growth. For example, lower personal income taxes may encourage more workers to work, and lower payroll taxes may encourage firms to hire more workers. Likewise, some types of public spending, for example research and development expenditures, may create public goods that are beneficial for the supply side. To the extent that the feedback effect from the supply side to the demand side are significant, fiscal policy will have a bigger effect on output.

In the medium term, the greatest structural challenge for developing Asia is to rebalance growth away from excessive dependence on exports toward domestic demand. The primary contribution of fiscal policy to the rebalancing process is to help remove the wide range of structural impediments impeding a more dynamic domestic demand and economy. For example, higher public spending on health, education, pensions, and social protection would raise household disposable income and reduce household exposure

to risk and uncertainty, thereby stimulating consumption. In principle, a change in the composition of fiscal policy—e.g., away from physical infrastructure investments toward health, education, pensions, and social protection—can promote rebalancing without any loosening of the fiscal stance. In practice, in light of the fact that developing Asia is a low-tax, small-government region in the international context, the scope for shifting the composition of government spending remains limited. Many developing Asian countries face large infrastructure requirements in the medium term so it would be suboptimal to cut back spending on infrastructure to make more room for social protection outlays. Therefore, implementing pro-rebalancing fiscal measures, such as strengthening social protection, is likely to require an increase in the size of the government. This brings us back to the issue of crowding out. In the next two sections, we empirically examine whether fiscal policy has crowded in or crowded out private consumption and investment in the region.

III. Crowding Out: Empirical Evidence from Cross-Country Panel Data

In this section, we discuss our empirical analysis of the impact of fiscal policy on private consumption and investment using panel data. Our sample consists of 18 of the G20 economies (Argentina, Australia, Brazil, Canada, the People's Republic of China [PRC], France, Germany, India, Indonesia, Italy, Japan, the Republic of Korea, Mexico, the Russian Federation, South Africa, Turkey, the United Kingdom, and the United States). The sample also includes six developing Asian economies (Hong Kong, China; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand). Our total sample of 24 countries comprises 10 developing Asian economies, including four G20 members (the PRC, India, Indonesia, and the Republic of Korea). The data set is an unbalanced cross-country panel of quarterly data, and the length of each country's data depends on data availability (see Appendix 1). All the variables used in the empirical analysis—GDP, government expenditures, government revenues, and policy interest rate—and their data sources are listed in Appendix 2. All variables other than interest rates are seasonally adjusted.

For estimation, we use two empirical strategies. Before we do so, we perform the Im-Pesaran-Shin test to check for the stationarity of the key variables. The test results do not support the null hypothesis.¹ The first strategy is simple panel regression of consumption and investment growth on lagged growth of fiscal variables and deficit-to-GDP ratio. This strategy is based on the strategies used by Romer and Romer (2007) and Furceri and Karras (2009). The second strategy is ECM, which takes into account cointegration. Our simple panel regression measures the effect of fiscal expenditure on private consumption and investment whereas our ECM estimation looks at the effect of

¹ The Im-Pesaran-Shin test results are available from authors upon request.

both expenditure and revenues. The following are the basic specifications of our simple panel regressions.

$$\Delta \ln X_{i,t} = v_i + \sum_{j=1}^J \phi_j \Delta \ln X_{i,t-j} + \sum_{j=1}^J \alpha_j \Delta \ln Y_{i,t-j} + \sum_{j=1}^J \beta_j \Delta \ln G_{i,t-j} + \sum_{j=1}^J \gamma_j \left(\frac{B_{i,t-j}}{Y_{i,t-j}} \right) + \varepsilon_{i,t} \quad (1)$$

$$\Delta \ln X_{i,t} = v_i + \sum_{j=1}^J \beta_j^+ \Delta \ln G_{i,t-j} \times High_{i,t-j} + \sum_{j=1}^J \beta_j^- \Delta \ln G_{i,t-j} \times Low_{i,t-j} + \varepsilon_{i,t} \quad (2)$$

$$\Delta \ln X_{i,t} = v_i + \sum_{j=1}^J \beta_j \Delta \ln G_{i,t-j} \times AsiaDummy_i + \varepsilon_{i,t} \quad (3)$$

In the above estimation equations, the variable $X_{i,t}$ denotes either private consumption $C_{i,t}$ or investment $I_{i,t}$. $G_{i,t}$ and $R_{i,t}$ are government expenditures and revenues, respectively, and $Y_{i,t}$ is real GDP. Fiscal balance is defined as $B_{i,t} \equiv R_{i,t} - G_{i,t}$ while v_i refers to country-specific fixed effect. In addition, we also introduce three dummy variables. One is a dummy for developing Asian countries. The other two, “High” and “Low”, are defined as shown below to indicate the position of the business cycle in an economy.² These dummies are introduced in order to detect asymmetric responses of consumption and investment with respect to fiscal fluctuations.

“High” = 1 if $sign(\ln Y_{i,t-1} - \overline{\ln Y_{i,t-1}}) \geq 0$; = 0, otherwise.

“Low” = 1 if $sign(\ln Y_{i,t-1} - \overline{\ln Y_{i,t-1}}) \leq 0$; = 0, otherwise.

Table 1 reports the results of the simple panel regressions of consumption on fiscal and other explanatory variables. Column 1 (C1) to column 3 (C3) unanimously show that government expenditure crowds in consumption for the first three quarters. However, the positive effect does not persist for a whole year. Another limit to the crowding-in effect of government spending is the significant negative coefficient (also significant) of $\Delta \ln C_{i,t-1}$, which implies that the increase in consumption in the previous quarter due to fiscal shock cannot be sustained. (C4) confirms that expansionary fiscal policy tends to have a larger initial impact on consumption during downturns than upturns. However, the impact is more persistent during upturns. (C5) indicates that consumption in Asian economies responds more sensitively to fiscal stimuli at least for the first two quarters.

² Depending on whether the real GDP detrended by HP-filter is positive or not, the value of “high” and “low” are assigned.

Table 1: Regression Results of $\Delta \ln C_{i,t}$

| | (C-1) | (C-2) | (C-3) | | (C-4) | (C-5) |
|-----------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|----------------------------|----------------------------|
| $\Delta \ln G_t$ | 0.217*** (0.02) | 0.218*** (0.02) | 0.220*** (0.02) | $\Delta \ln G_t$ * HIGH | 0.161*** (0.02) | |
| $\Delta \ln G_{t-1}$ | 0.114*** (0.02) | 0.116*** (0.02) | 0.122*** (0.02) | $\Delta \ln G_{t-1}$ * HIGH | 0.154*** (0.02) | |
| $\Delta \ln G_{t-2}$ | 0.0516** (0.02) | 0.0517** (0.02) | 0.0523** (0.02) | $\Delta \ln G_{t-2}$ * HIGH | 0.0737*** (0.02) | |
| $\Delta \ln G_{t-3}$ | 0.0427** (0.02) | 0.0426** (0.02) | 0.0414* (0.02) | $\Delta \ln G_{t-3}$ * HIGH | 0.0290 (0.02) | |
| $\Delta \ln G_{t-4}$ | 0.0152 (0.02) | 0.0186 (0.02) | 0.0166 (0.02) | $\Delta \ln G_{t-4}$ * HIGH | -0.0188 (0.02) | |
| $\Delta \ln Y_{t-1}$ | 0.153*** (0.04) | 0.334*** (0.09) | 0.329*** (0.09) | $\Delta \ln G_t$ * LOW | 0.291*** (0.02) | |
| $\Delta \ln Y_{t-2}$ | -0.0800** (0.04) | -0.0492 (0.09) | -0.0492 (0.09) | $\Delta \ln G_{t-1}$ * LOW | 0.154*** (0.02) | |
| $\Delta \ln Y_{t-3}$ | 0.0232 (0.04) | -0.0742 (0.10) | -0.0727 (0.10) | $\Delta \ln G_{t-2}$ * LOW | 0.0346* (0.02) | |
| $\Delta \ln C_{t-4}$ | -0.121*** (0.04) | -0.0426 (0.09) | -0.0404 (0.09) | $\Delta \ln G_{t-3}$ * LOW | 0.0210 (0.02) | |
| $\Delta \ln C_{t-1}$ | | -0.197** (0.08) | -0.197** (0.08) | $\Delta \ln G_{t-4}$ * LOW | 0.0034 (0.02) | |
| $\Delta \ln C_{t-2}$ | | -0.0270 (0.09) | -0.0286 (0.09) | $\Delta \ln G_t$ * asia | | 0.0919*** (0.02) |
| $\Delta \ln C_{t-3}$ | | 0.1060 (0.09) | 0.1080 (0.09) | $\Delta \ln G_{t-1}$ * asia | | 0.0820*** (0.03) |
| $\Delta \ln C_{t-4}$ | | -0.0817 (0.09) | -0.0798 (0.09) | $\Delta \ln G_{t-2}$ * asia | | 0.0445 (0.03) |
| $\frac{B_{t-1}}{GDP_{t-1}}$ | | | -0.0171 (0.04) | $\Delta \ln G_{t-3}$ * asia | | 0.0230 (0.03) |
| $\frac{B_{t-2}}{GDP_{t-2}}$ | | | 0.0464 (0.06) | $\Delta \ln G_{t-4}$ * asia | | -0.0165 (0.02) |
| $\frac{B_{t-3}}{GDP_{t-3}}$ | | | 0.0101 (0.06) | | | |
| $\frac{B_{t-4}}{GDP_{t-4}}$ | | | 0.0192 (0.05) | | | |
| Constant | 0.0027 (0.00) | 0.0024 (0.00) | 0.0028 (0.00) | Constant | 0.0028 (0.00) | 0.00556*** (0.00) |
| Obs. | 895 | 895 | 895 | Obs. | 895 | 895 |
| #(cty) | 22 | 22 | 22 | #(cty) | 22 | 22 |

*** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors in parentheses.

Table 2 reports the results of the simple panel regressions of investment on fiscal and other variables on investment. Models (11)–(13) unanimously show that government expenditure crowds in investment for the first two quarters. The duration of the positive impact is, however, shorter than consumption. Another noticeable finding is that the negative and significant coefficient of $\Delta \ln I_{i,t-1}$ is smaller than the positive and significant coefficients of $\Delta \ln I_{i,t-2}$ and $\Delta \ln I_{i,t-2}$. This implies that fiscal shocks have a persistent positive effect on investment. (14) suggests that expansionary fiscal policy tends to have a bigger initial impact on investment during downturns than upturns. Furthermore, the impact of fiscal policy is more persistent during downturns. (15) indicates that investments in Asian economies respond more sensitively to fiscal stimuli than elsewhere, at least for the first two to three quarters.

We adopt the second empirical strategy, the ECM, to examine the short-run dynamics among the key variables. The long-run relations are estimated from running ordinary least squares (OLS) or panel regression with fixed effects. ECM consists of the following equations that represent the long-run and short-run dynamics, respectively.

(i) Long-run Relation

Long-run relations are estimated either by panel estimation with fixed effect or pooled OLS.

$$\ln X_{i,t} = v_i + k_1 r_{i,t} + k_2 \ln Y_{i,t} + k_3 \ln G_{i,t} + k_4 \ln R_{i,t} + \varepsilon_{i,t} \quad (\text{by fixed-effect panel})$$

$$\ln X_{i,t} = v + k_1 r_{i,t} + k_2 \ln Y_{i,t} + k_3 \ln G_{i,t} + k_4 \ln R_{i,t} + \varepsilon_{i,t} \quad (\text{by pooled OLS})$$

(ii) Short-run Dynamics

In estimating the short-run dynamics, we assign country-specific fixed effects to λ_i , which measures the country-specific speed of adjustment, and which differs across countries.

$$\begin{aligned} \Delta \ln X_{i,t} = & \xi + \sum_{j=0}^J \alpha_j \Delta \ln Y_{i,t-j} + \sum_{j=0}^J \beta_j \Delta \ln G_{i,t-j} + \sum_{j=0}^J \gamma_j \Delta \ln R_{i,t-j} \\ & + \sum_{j=1}^J \delta_j \Delta \ln C_{i,t-j} + \lambda_i EC_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where the error correction term is the residual from estimating the long-run equation ($EC_{i,t} \equiv \check{\varepsilon}_{i,t}$), and ξ_i is a parameter for fixed effect.

Table 2: Regression Results of $\Delta \ln I_{i,t}$

| | (I-1) | (I-2) | (I-3) | | (I-4) | (I-5) |
|-----------------------------|----------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|----------------------------|
| $\Delta \ln G_t$ | 0.218*** (0.02) | 0.216*** (0.02) | 0.218*** (0.02) | $\Delta \ln G_t$ * HIGH | 0.148*** (0.03) | |
| $\Delta \ln G_{t-1}$ | 0.111*** (0.03) | 0.111*** (0.03) | 0.119*** (0.03) | $\Delta \ln G_{t-1}$ * HIGH | 0.161*** (0.03) | |
| $\Delta \ln G_{t-2}$ | 0.0412 (0.03) | 0.0397 (0.03) | 0.0461 (0.03) | $\Delta \ln G_{t-2}$ * HIGH | 0.0824** (0.03) | |
| $\Delta \ln G_{t-3}$ | 0.0229 (0.03) | 0.0212 (0.03) | 0.0250 (0.03) | $\Delta \ln G_{t-3}$ * HIGH | 0.0483 (0.03) | |
| $\Delta \ln G_{t-4}$ | -0.0055 (0.02) | -0.0080 (0.02) | -0.0090 (0.02) | $\Delta \ln G_{t-4}$ * HIGH | -0.0274 (0.03) | |
| $\Delta \ln Y_{t-1}$ | 0.282*** (0.05) | 0.372*** (0.07) | 0.361*** (0.07) | $\Delta \ln G_t$ * LOW | 0.334*** (0.03) | |
| $\Delta \ln Y_{t-2}$ | -0.0176 (0.05) | -0.1100 (0.08) | -0.1220 (0.08) | $\Delta \ln G_{t-1}$ * LOW | 0.226*** (0.03) | |
| $\Delta \ln Y_{t-3}$ | 0.105* (0.06) | 0.0042 (0.08) | 0.0002 (0.08) | $\Delta \ln G_{t-2}$ * LOW | 0.101*** (0.03) | |
| $\Delta \ln Y_{t-4}$ | -0.171*** (0.05) | -0.191** (0.08) | -0.191** (0.08) | $\Delta \ln G_{t-3}$ * LOW | 0.0327 (0.03) | |
| $\Delta \ln I_{t-1}$ | | -0.0874* (0.05) | -0.0861* (0.05) | $\Delta \ln G_{t-4}$ * LOW | -0.0118 (0.03) | |
| $\Delta \ln I_{t-2}$ | | 0.0993* (0.05) | 0.101* (0.05) | $\Delta \ln G_t$ * asia | | 0.0988*** (0.03) |
| $\Delta \ln I_{t-3}$ | | 0.0920* (0.05) | 0.0938* (0.05) | $\Delta \ln G_{t-1}$ * asia | | 0.102*** (0.03) |
| $\Delta \ln I_{t-4}$ | | 0.0097 (0.05) | 0.0107 (0.05) | $\Delta \ln G_{t-2}$ * asia | | 0.0806** (0.04) |
| $\frac{B_{t-1}}{GDP_{t-1}}$ | | | -0.0366 (0.05) | $\Delta \ln G_{t-3}$ * asia | | 0.0431 (0.04) |
| $\frac{B_{t-2}}{GDP_{t-2}}$ | | | 0.0209 (0.07) | $\Delta \ln G_{t-4}$ * asia | | -0.0312 (0.03) |
| $\frac{B_{t-3}}{GDP_{t-3}}$ | | | 0.0081 (0.08) | | | |
| $\frac{B_{t-4}}{GDP_{t-4}}$ | | | 0.0461 (0.07) | | | |
| Constant | 0.0014 (0.00) | 0.0014 (0.00) | 0.0017 (0.00) | Constant | 0.0032 (0.00) | 0.00513** (0.00) |
| Obs. | 895 | 895 | 895 | Obs. | 895 | 895 |
| #(cty) | 22 | 22 | 22 | #(cty) | 22 | 22 |

*** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors in parentheses.

Table 3 reports the results of running pooled OLS or panel regression with fixed effects. The pooled OLS results indicate that government expenditures have a positive and significant effect on both consumption and investment whereas revenues have a negative and significant effect. The results are consistent with Keynesian theory. However, neither expenditures nor revenues are significant in the fixed-effects panel regressions.

Table 3: Estimation of Long-Run Relations

| | Ordinary Least Squares | | Panel (fixed effect) | |
|----------------------------|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|
| | $\ln C_{it}$ | $\ln I_{it}$ | $\ln C_{it}$ | $\ln I_{it}$ |
| <i>policy_{it}</i> | -0.1530 (0.14) | -0.861*** (0.16) | -0.0850*** (0.03) | -0.405*** (0.14) |
| $\ln GDP_{it}$ | 0.973*** (0.01) | 0.901*** (0.01) | 0.967*** (0.02) | 1.225*** (0.04) |
| $\ln EXP_{it}$ | 0.214*** (0.04) | 0.185*** (0.04) | 0.0127 (0.01) | -0.0323 (0.04) |
| $\ln REV_{it}$ | -0.167*** (0.04) | -0.143*** (0.04) | 0.0002 (0.01) | 0.0044 (0.03) |
| Constant | -0.694*** (0.05) | -0.782*** (0.06) | -0.231** (0.09) | -4.132*** (0.30) |
| Observations | 578 | 578 | 578 | 578 |
| R-squared | 0.992 | 0.987 | 0.976 | 0.903 |
| N. city | | | 21 | 21 |

*** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors in parentheses.

In Table 4, which reports the ECM regression of consumption on fiscal and other explanatory variables, the coefficient of current government expenditures is significant and positive. This implies that government spending crowds in private consumption. However, the effect is strictly contemporaneous and lagged government spending is insignificant. In addition, both current and lagged values of government revenues are insignificant. An additional finding is that Asian countries tend to have higher estimated speed of adjustment λ_t , which suggests that their consumption returns faster to long-run equilibrium. This, in turn, implies that either government expenditures or revenues crowd in private consumption. In Table 5, which reports the ECM regression of investment on fiscal and other explanatory variables, one lagged value of expenditures is negative and significant while three lagged values of revenues are positive and significant. This suggests that fiscal expansion crowds out private investment. For investment, all the estimated λ_t s are insignificant, which implies that investment is only loosely tied to long-run equilibrium and dominated by short-run dynamics. The results in Tables 4 and 5 are based on error correction terms from fixed-effect panel estimation but the results from error correction terms based on OLS are qualitatively similar.

Table 4: Error Correction Model of $\Delta \ln C_{i,t}$ with Different Speed of Adjustment λ_j

| Variable | Coefficient | Variable | Coefficient |
|-------------------------|---------------------------|-------------------------|---------------------|
| $\Delta \ln GDP_{it}$ | 0.913*** (0.02) | $\Delta \ln REV_{it}$ | 0.0041 (0.01) |
| $\Delta \ln GDP_{it-1}$ | 0.101** (0.05) | $\Delta \ln REV_{it-1}$ | 0.0077 (0.01) |
| $\Delta \ln GDP_{it-2}$ | 0.0702 (0.05) | $\Delta \ln REV_{it-2}$ | 0.0085 (0.01) |
| $\Delta \ln GDP_{it-3}$ | 0.277*** (0.05) | $\Delta \ln REV_{it-3}$ | 0.0102 (0.01) |
| $\Delta \ln GDP_{it-4}$ | 0.0984* (0.05) | $\Delta \ln REV_{it-4}$ | 0.0028 (0.01) |
| $\Delta \ln EXP_{it}$ | 0.0156** (0.01) | $\Delta \ln C_{it-1}$ | -0.0757* (0.05) |
| $\Delta \ln EXP_{it-1}$ | 0.0086 (0.01) | $\Delta \ln C_{it-2}$ | -0.0562 (0.05) |
| $\Delta \ln EXP_{it-2}$ | 0.0071 (0.01) | $\Delta \ln C_{it-3}$ | -0.262*** (0.05) |
| $\Delta \ln EXP_{it-3}$ | 0.0082 (0.01) | $\Delta \ln C_{it-4}$ | -0.136*** (0.05) |
| $\Delta \ln EXP_{it-4}$ | -0.0004 (0.01) | Constant | 0.0933* (0.05) |
| Observations | 530 | R-squared | 0.845 |

*** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors in parentheses.

Table 5: Error Correction Model of $\Delta \ln I_{i,t}$ with Different Speed of Adjustment λ_j

| Variable | Coefficient | Variable | Coefficient |
|-------------------------|--------------------|-------------------------|--------------------|
| $\Delta \ln GDP_{it}$ | 0.996*** (0.04) | $\Delta \ln REV_{it}$ | 0.0045 (0.01) |
| $\Delta \ln GDP_{it-1}$ | 0.0465 (0.06) | $\Delta \ln REV_{it-1}$ | 0.0135 (0.01) |
| $\Delta \ln GDP_{it-2}$ | -0.0512 (0.06) | $\Delta \ln REV_{it-2}$ | 0.0242* (0.01) |
| $\Delta \ln GDP_{it-3}$ | 0.0933 (0.07) | $\Delta \ln REV_{it-3}$ | 0.0326** (0.01) |
| $\Delta \ln GDP_{it-4}$ | 0.0612 (0.06) | $\Delta \ln REV_{it-4}$ | 0.0250** (0.01) |
| $\Delta \ln EXP_{it}$ | 0.0107 (0.01) | $\Delta \ln I_{it-1}$ | -0.0534 (0.04) |
| $\Delta \ln EXP_{it-1}$ | 0.0171 (0.02) | $\Delta \ln I_{it-2}$ | 0.0585 (0.04) |
| $\Delta \ln EXP_{it-2}$ | -0.0100 (0.02) | $\Delta \ln I_{it-3}$ | -0.0268 (0.04) |
| $\Delta \ln EXP_{it-3}$ | -0.0193 (0.02) | $\Delta \ln I_{it-4}$ | -0.0670 (0.04) |
| $\Delta \ln EXP_{it-4}$ | -0.0271* (0.01) | Constant | 0.0745 (0.09) |
| Observations | 530 | R-squared | 0.700 |

*** p<0.01, ** p<0.05, * p<0.1.

Note: Standard errors in parentheses.

IV. Crowding-Out: Evidence from Country-Specific Time-Series Data

In this subsection, we discuss our empirical analysis of the impact of fiscal policy on private consumption and investment using country-specific time-series data. Whether fiscal expansion crowds in or crowds out private demand will depend on country-specific circumstances. There is no good reason why the direction and magnitude of the impact of fiscal policy on private demand should be identical across different countries. In some countries, government spending largely consists of infrastructure investments that rein in private investment, whereas in other countries spending may raise debt sustainability concerns and thus impair consumer and business confidence. Our 10 sample economies are the PRC; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand. The data length for each economy is determined by data availability, as shown in Appendix 3. All the variables used in the empirical analysis and their data sources are listed in Appendix 4.

Our empirical strategy is to apply the SVAR model based on sign restrictions to the time-series data of the 10 sample economies. The basic intuition behind the model is that structural shocks can be identified by checking whether the signs of the corresponding impulse responses are consistent with theoretical priors. The model identifies both fiscal and nonfiscal shocks in the data by imposing sign restrictions for the identification of each shock. There are four shocks in the model: (i) business cycle shock; (ii) monetary shock; and (iii) two types of fiscal shocks, government revenue and spending shocks. The sign restrictions help us to identify the effects of unanticipated fiscal and nonfiscal shocks on eight variables, namely, GDP, government expenditures, government revenues, interest rate, GDP deflator, real exports, private consumption, and private investment. All variables are adjusted for inflation and take the form of logarithms except interest rate. All the eight variables in the model are endogenous since they depend on each other through their lagged values. The optimal lag length is determined endogenously. We impose sign restrictions on contemporaneous relations among variables, which makes the model a structural model, and check whether the restrictions are accepted.

A business cycle should be identified first since an economy is always subject to upswings and downswings emanating from a wide range of internal and external shocks. We then assume a negative external demand shock, such as the one the region suffered during the global financial crisis. As noted earlier, governments throughout the region have aggressively boosted spending, especially on infrastructure, and to a lesser extent cut taxes in order to support aggregate demand. Therefore, a negative external demand shock had a positive effect on government spending and a negative effect on government revenues. The set of sign restrictions imposed to identify the different shocks is consistent with such stylized facts and presented in Table 6. No restrictions are imposed on the signs of the responses of the key variables of interest (GDP, consumption, and investment) to the fiscal policy shocks.

Table 6: Identifying Sign Restrictions for the Vector Autoregression Model

| | Real GDP | Real Government Expenditure | Real Government Revenue | Policy Rate | GDP Deflator | Real Exports | Real Cons | Real Investment |
|----------------------------------|-------------|-----------------------------------|-------------------------------|----------------|-----------------|-----------------|--------------|--------------------|
| Business cycle shock (growth) | + | ? | + | ? | ? | ? | + | + |
| External demand shock | ? | ? | ? | ? | ? | – | ? | ? |
| Government revenue shock | ? | ? | – | ? | ? | ? | ? | ? |
| Government expenditure shock | ? | + | ? | ? | ? | ? | ? | ? |

GDP = gross domestic product, cons = consumption.

We now report the results of running the above sign restriction-based SVAR model for each country in Table 7. Given the generally low tax rates of the region and the need to improve revenue mobilization in some countries, medium-term fiscal easing in the region is much more likely to take the form of higher government spending rather than tax cuts. As such, we focus our discussion on the impact of expansionary expenditure shocks. Following Mountford and Uhlig (2009), we compute the 50th, 84th, and 16th percentile responses of GDP, private consumption, and private investment to fiscal and nonfiscal shocks (1) at impact and (2) in the long run, which refers to the sum of the coefficients of the lagged variables in the VAR. While we report both impact effect and long-run effect, the long-run effect matters more, since it captures the cumulative effect of fiscal policy after all the effects have worked their way through the economy. The 50th percentile or median response is the most representative response and reported in Table 7. The 84th percentile and 16th percentile responses are stronger and weaker than the median, respectively. The median response is significant if the 84th percentile and 16th percentile responses have the same sign but insignificant otherwise. The figures indicate the percent response to a 1% increase in government expenditure. For example, for the PRC, output increases by 0.0080% in the long run in response to a 1% increase in expenditure.

The long-run impulse responses in Table 7 indicate that government spending has a positive long-run impact on output in five economies—the PRC; Hong Kong, China; Indonesia; the Republic of Korea; and Singapore—but a negative long-run impact in the five other economies of India; Malaysia; the Philippines; Taipei, China; and Thailand. This suggests that fiscal stimulus can offset the negative impact of weaker external demand in some countries but not in other countries. Whether fiscal policy can promote rebalancing is ultimately a matter of whether fiscal policy crowds in or crowds out private consumption and investment. Government spending had a positive long-run impact on private consumption in the PRC, Indonesia, the Republic of Korea, and Singapore, but a negative impact in the six other countries. Government spending had a positive long-run impact on private investment in the PRC, Indonesia, and the Philippines; but a negative impact in the six other countries. Not surprisingly, the results are not consistent across

the 10 countries. Government spending stimulates consumption in some countries but dampens consumption in others. The impact of government spending on investment is similarly heterogeneous. The evidence on the effect of contractionary revenue shocks, which is reported in Table 8, is similarly mixed, with differing results across countries.

Table 7: Median Impact and Long-Run Responses of Output, Private Consumption, and Private Investment to Expansionary Government Expenditure Shocks

| | Output | | Private Consumption | | Private Investment | |
|-------------------------|---------------|---------------|---------------------|---------------|--------------------|----------------|
| | Impact | Long Run | Impact | Long Run | Impact | Long Run |
| China, People's Rep. of | 0.0043 | 0.0080 | 0.0036 | 0.0137 | 0.0018 | 0.0378 |
| Hong Kong, China | -0.031 | 0.0015 | -0.0028 | -0.0145 | -0.0945 | -0.2871 |
| India | -0.0014 | -0.0015 | -0.0014 | -0.0042 | -0.0664 | -0.1807 |
| Indonesia | -0.0021 | 0.2678 | -0.0101 | 0.0401 | -0.0937 | 1.8965 |
| Korea, Rep. of | 0.0118 | 0.0439 | 0.0001 | 0.0366 | -0.0116 | -0.2214 |
| Malaysia | -0.0031 | -0.0125 | 0.0034 | -0.0338 | 0.0224 | -0.0130 |
| Philippines | 0.0142 | -0.0043 | 0.0071 | -0.0074 | -0.0842 | 0.1326 |
| Singapore | 0.0028 | 0.1311 | -0.0059 | 0.0318 | -0.1517 | -0.0951 |
| Taipei,China | 0.0025 | -0.1825 | 0.0028 | -0.2582 | -0.2109 | -0.4485 |
| Thailand | 0.0020 | -0.0134 | 0.0037 | -0.0016 | -0.0762 | -0.2254 |

Note: The figures refer to 50th percentile or median responses. The 84th percentile (upper) and 16th percentile (lower) responses are available upon request. The figures indicate the percent response to a 1% increase in government expenditure. For example, for the PRC, output increases by 0.0080% in the long run in response to a 1% increase in government expenditure. The figures in bold are significant, i.e., the upper and lower responses have the same sign.

Table 8: Median Impact and Long-Run Responses of Output, Private Consumption, and Private Investment to Contractionary Government Revenue Shocks

| | Output | | Private Consumption | | Private Investment | |
|-------------------------|----------------|----------------|---------------------|----------|--------------------|----------|
| | Impact | Long Run | Impact | Long Run | Impact | Long Run |
| China, People's Rep. of | -0.0146 | -0.0036 | -0.0114 | -0.0077 | -0.0072 | 0.0589 |
| Hong Kong, China | 0.0014 | -0.0063 | 0.0044 | 0.0044 | 0.0266 | 0.1213 |
| India | -0.0049 | -0.0170 | 0.0072 | 0.0002 | -0.0641 | -0.1951 |
| Indonesia | 0.0066 | -0.2171 | 0.0146 | -0.0259 | 0.2101 | -1.3504 |
| Korea, Rep. of | 0.0033 | 0.0160 | 0.0015 | 0.0204 | 0.0183 | 0.0097 |
| Malaysia | 0.0057 | -0.0638 | 0.0025 | 0.0591 | 0.0157 | -0.0582 |
| Philippines | 0.0159 | 0.0454 | 0.0089 | 0.0152 | 0.0834 | -0.3832 |
| Singapore | 0.0002 | -0.1013 | 0.0123 | -0.0097 | -0.0232 | -0.0912 |
| Taipei,China | 0.0007 | -0.2582 | 0.0008 | -0.3780 | 0.1334 | -0.2818 |
| Thailand | -0.0023 | -0.0102 | 0.0011 | -0.0105 | -0.0050 | -0.0874 |

Note: The figures refer to 50th percentile or median responses. The 84th percentile (upper) and 16th percentile responses (lower) responses are available upon request. The figures indicate the percent response to a 1% increase in government expenditure. For example, for the PRC, output increases by 0.0080% in the long run in response to a 1% increase in government expenditure. The figures in bold are significant, i.e., the upper and lower responses have the same sign.

What is perhaps more important for our purposes than the signs of the responses is the significance, or the lack thereof, of the responses. For the most part, the long-run responses of output, consumption, and investment to expansionary expenditure shocks are not significant. The long-run response of output is positive and significant for Indonesia and Singapore but insignificant for all other countries. The long-run response of consumption is positive and significant in the PRC and Singapore but insignificant elsewhere. Finally, the long-run response of investment is positive and significant for Indonesia. It is negative and significant for Hong Kong, China; the Republic of Korea; Taipei, China; and Thailand, and insignificant for other countries. The responses of the three variables of interest to contractionary revenue shocks are also largely significant. Therefore, the overall evidence from country-specific time-series data does not strongly support either crowding in or crowding out. For most countries in the region, fiscal policy shocks do not seem to have either a positive or a negative effect on private consumption or investment. This is somewhat encouraging for rebalancing because it implies that a moderate medium-term quantitative expansion of the government in the region will not come at the expense of private demand.

V. Concluding Observations

The impact of fiscal policy on output depends to a large extent on whether or not fiscal expansion crowds out private consumption and investment. In the context of developing Asia in the postcrisis period, this matters for two reasons. First, in light of the apparent effectiveness of countercyclical fiscal policy in cushioning the impact of the global financial crisis on the region's economic activity, there may be political pressures for greater use of countercyclical fiscal policy in general. Second, addressing the key medium-term challenge of rebalancing is likely to require at least a moderate fiscal expansion in the medium term to provide the fiscal resources required for pro-rebalancing fiscal measures. The evidence from both cross-country panel data and country-specific time-series data indicate that the crowding out effect is at best limited in developing Asia. By and large, fiscal expansion does not seem to have a significant negative impact on private consumption and investment in the region. On the other hand, we also fail to find a significant crowding in effect. The main implication of the evidence seems to be that fiscal expansion is more or less neutral with respect to private demand. One possible interpretation of such result is that crowding out effects, e.g., negative impact on private investment due to higher interest rates, are more or less offset by crowding in effects, e.g., higher consumption due to reduction of household risk and uncertainty.

Our failure to find strong evidence of crowding out does not imply that developing Asia should use countercyclical fiscal policy more actively beyond the global crisis. Above all, there is very limited empirical evidence both across countries and over time that countercyclical fiscal policy works. Depending on the assumptions and models, the

empirical literature has produced a wide range of estimates for the magnitude of the impact of fiscal policy on output. Governments across developing Asia quickly and boldly unleashed sizable fiscal stimulus packages and those stimulus packages seem to have contributed substantially to the region's V-shaped recovery from the crisis. However, it would be far-fetched to make generalizations about the effectiveness of countercyclical fiscal policy from the region's exceptional fiscal response to the exceptional external shock it suffered. For one, the boost to household and business confidence is especially important during a severe crisis such as the global crisis, which means that countercyclical fiscal policy is likely to be more effective during such periods than during normal periods. Therefore, our findings do not support that the region should abandon its tradition of sound and responsible fiscal policy geared toward keeping fiscal deficits under control and public debt at manageable levels. In fact, it was precisely this tradition that gave the region the fiscal space that made possible its decisive fiscal response to the global crisis.

Our empirical evidence also has implications for the role of fiscal policy in developing Asia's medium- and long-term rebalancing toward a more balanced demand and output structure. As noted earlier, it is possible to interpret the lack of strong evidence of crowding out as favorable for using fiscal policy for rebalancing. In particular, it may be tempting to believe that a quantitative expansion of the government may help to prop up aggregate demand against the backdrop of uncertain external demand due to the uncertain recovery of the G3. However, rebalancing is a medium- and long-term structural process that strengthens domestic demand and domestic economy on a sustainable basis rather than a temporary short-term boost to domestic and hence aggregate demand. The key component of the structural process is the removal of structural impediments and distortions that constrain private domestic demand and production geared toward domestic demand. Securing fiscal resources for this purpose, such as more spending on social protection, is likely to require a modest expansion of the fiscal stance, although it will have to be sharply scaled back from the highly expansionary stance of the anticrisis fiscal stimulus programs. However, the modest fiscal expansion is incidental rather than central to the role of fiscal policy in the rebalancing process. As the example of Japan shows, fiscal expansion may lift aggregate demand and output in fits and spurts but cannot, on a sustained basis, pave the way for a more balanced economy. That requires using fiscal policy to strengthen private consumption and investment on a sustained basis.

Appendix 1: Availability of Quarterly Data for Cross-Country Panel Analysis

| Economy | Start | End |
|-------------------------|--------------|------------|
| Argentina | 2002Q2 | 2009Q2 |
| Australia | 2002Q3 | 2009Q2 |
| Brazil | 1999Q1 | 2009Q2 |
| Canada | 2002Q1 | 2009Q2 |
| China, People's Rep. of | – | – |
| France | 1999Q1 | 2008Q4 |
| Germany | 1999Q1 | 2008Q4 |
| Hong Kong, China | 1998Q3 | 2009Q2 |
| India | 2000Q3 | 2009Q1 |
| Indonesia | 2005Q3 | 2009Q2 |
| Italy | 1999Q1 | 2009Q2 |
| Japan | 1999Q2 | 2009Q2 |
| Korea, Rep. of | 2000Q1 | 2009Q2 |
| Malaysia | 2004Q2 | 2009Q2 |
| Mexico | 2005Q3 | 2009Q2 |
| Philippines | 2005Q2 | 2008Q4 |
| Russian Federation | 1995Q1 | 2009Q2 |
| Singapore | – | – |
| South Africa | 2004Q3 | 2009Q2 |
| Taipei, China | 2003Q3 | 2009Q2 |
| Thailand | 2004Q3 | 2009Q2 |
| Turkey | 2006Q1 | 2009Q2 |
| United Kingdom | 1999Q1 | 2009Q2 |
| United States | 1991Q1 | 2009Q2 |

Appendix 2: List of Variables and Their Data Sources for Cross-Country Panel Analysis

The data used in the empirical analysis are from the G-20 economies plus six developing Asian economies: Hong Kong, China; Malaysia; the Philippines; Singapore; Taipei,China; and Thailand. The quarterly values of the following variables are included in the data set.

- (i) GDP and GDP deflator: International Financial Statistics (IFS) (mostly in local currency unit)
- (ii) Interest rates: policy rate (central banks, Bloomberg)
- (iii) Government fiscal statistics (IFS, Bloomberg, and OECD STAT): Total government revenues and expenditures
- (iv) Consumption and investment (central banks, IFS, and Bloomberg): private consumption or household and nonprofit institutions serving households final consumption expenditure are used for consumption. On the other hand, gross fixed capital formation is used for investment.

Appendix 3: Availability of Quarterly Data for Time-Series Analysis

| Economy | Observations | Sample Period |
|-------------------------|--------------|---------------|
| China, People's Rep. of | 58 | 1995:1–2009:2 |
| Hong Kong, China | 68 | 1992:3–2009:2 |
| India | 53 | 1996:2–2009:2 |
| Indonesia | 66 | 1993:1–2009:2 |
| Korea, Rep. of | 74 | 1991:1–2009:2 |
| Malaysia | 74 | 1991:1–2009:2 |
| Philippines | 98 | 1985:1–2009:2 |
| Singapore | 86 | 1988:1–2009:2 |
| Taipei,China | 128 | 1977:3–2009:2 |
| Thailand | 66 | 1993:1–2009:2 |

Appendix 4: List of Variables and Their Data Sources for Time-Series Analysis

The data used in the empirical analysis are from 10 developing Asian economies—the People's Republic of China; Hong Kong, China; India; Indonesia; the Republic of Korea; the Philippines; Malaysia; Singapore; Taipei, China; and Thailand. The quarterly values of the following variables are included in the data set. All the following series have been compiled from CEIC, although another dataset (Datastream) has been used to check for the accuracy of some series.

- (i) Real GDP and Nominal GDP are obtained from CEIC Data Company Ltd. (in local currency unit) and GDP deflator has been derived as (nominal GDP/real GDP), which is used as price series for all countries.
- (ii) Short-term interest rate is obtained from CEIC: policy rate from each country is used as a proxy for short-term interest rate. The definition of policy rate, however, differs as follows: (the PRC: 1-year lending rate; Hong Kong, China: discount rate; India: repo rate; Indonesia: SBI rate; the Republic of Korea: overnight call rate; Malaysia: overnight policy rate; the Philippines: repurchase rate; Singapore: benchmark SIBOR 3-months rate; Taipei, China: rediscount rate; Thailand: Bank of Thailand policy rate).
- (iii) Real private consumption and total fixed investment were taken from CEIC. Wherever it is available in nominal terms, we have deflated the series, using GDP deflator as calculated above.
- (iv) Government total revenue and expenditure have been compiled from CEIC, and then these two series have been deflated by the GDP deflator in order to be expressed in real terms. We have converted annual fiscal data to quarterly series for Indonesia before 2000, by using the quarterly pattern in government consumption expenditure that is available on a quarterly basis from national accounts.
- (v) Broad money supply is M2 for all countries and they also come from CEIC. Nominal M2 values have been deflated by the GDP deflator to get real money balances.
- (vi) Exports of goods and services (from national accounts) for all countries except the PRC are compiled from Datastream. As the PRC does not release quarterly statistics for its GDP components, we have generated quarterly series from the annual data (particularly real exports of goods and services and government consumption expenditure in real terms from national accounts) using a technique that follows the pattern in the quarterly real GDP series.

Given that the data on private investment are not readily available for all Asian countries, we adopt the following approach to extract the private investment data.

We can derive private investment data by combining fiscal and national accounts data (all in nominal terms) as follows, and then, using an appropriate GDP deflator, the derived data is converted to real values for the empirical exercise.

From the fiscal account, total government expenditure (G) can be disaggregated into government consumption expenditure (GC) and government investment expenditure (IG) (all in nominal terms).

$$G \text{ (from fiscal account)} = CG \text{ (from national account)} + IG$$

Given government consumption (CG) data from national accounts, we can derive government investment (IG) data from the above relation. Then using total investment (I) data from national accounts, we derive private investment (IP) data as follows:

$$IP = I - IG.$$

To get a longer consistent time series for Indonesia, the Republic of Korea, and Malaysia, we have also rebased all the earlier GDP data and its components (2000 base year) to be comparable with the recent data (2005 base year).

References

- Asian Development Bank. 2009. *Asian Development Outlook 2009*. Manila.
- Furceri, D., and G. Karras. 2009. "Tax Changes and Economic Growth: Empirical Evidence for a Panel of OECD Countries. European Central Bank, Frankfurt.
- Hemming, R., M. Kell, and S. Mahfouz. 2002. The Effectiveness of Fiscal Policy in Stimulating Economic Activity—A Review of the Literature. IMF Working Paper WP/02/208, International Monetary Fund, Washington, DC.
- Mountford, A., and H. Uhlig. 2009. "What are the Effects of Fiscal Policy Shocks?" *Journal of Applied Econometrics* 24:960–92.
- Park, D., and K. Shin. 2009. Savings, Investment and Current Account Surplus in Developing Asia. ADB Economics Working Paper Series No.158, Economics and Research Department, Asian Development Bank, Manila.
- Romer, C., and D. H. Romer. 2007. The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. NBER Working Paper No. 13264, National Bureau of Economic Research, Cambridge.

About the Paper

Seok-Kyun Hur, Sushanta Mallick, and Donghyun Park examine the effect of expansionary fiscal policy on private investment and consumption in developing Asia. To do so, they analyze both cross-country panel data and country-specific time series data. Overall, they fail to find any clear evidence that fiscal policy crowds out private demand in the region.

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