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[+]Kiseok Hong is Professor of the Department of Economics, Ewha Womans University, Seoul, Korea. Tel +82 2 3277 3909, khong@ewha.ac.kr

[++]Hsiao Chink Tang is Economist, Office of Regional Economic Integration, ADB, 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines. Tel +63 2 632 5637, hctang@adb.org

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Abstract

The goal of this paper is to provide stylized facts on recovery from economic downturns and to evaluate the role of macroeconomic policies in promoting recovery. In particular, we examine gross domestic product (GDP) recessions and financial downturns (credit contractions and stock price declines) using data from 21 Organisation for Economic Co-operation and Development (OECD) economies and 21 developing Asian economies. We find, in general, recovery from a GDP recession in Asian economies is somewhat slower than in OECD economies. However, recovery from a financial downturn is not much different between Asian and OECD economies. We also find OECD economies have been more active and effective in using counter-cyclical policies than Asian economies in the face of GDP recessions and financial downturns. Recent evidence, however, suggests Asian economies may have better success in the current global crisis.

Keywords: Recession, Financial Crisis, Recovery, Policy Response, Asia

JEL Classification: E20, E30, E32

1. Introduction

The goal of this paper is to provide stylized facts on the process of recovery from economic downturns and to evaluate the role of counter-cyclical macroeconomic policies in promoting recovery. In our previous research (Hong et al., 2009), we examined historical crisis episodes in Asia and found that economic downturns are more frequent, longer-lasting, and more severe in developing Asian economies than in advanced economies. This project extends our previous research and provides analysis on recoveries from a downturn in Asia. This project is also related to the International Monetary Fund's (IMF) *World Economic Outlook* April 2009 (WEO 2009), which addresses the issue of crisis and recovery, and provides empirical analysis using data from Organisation for Economic Co-operation and Development (OECD) economies. This project follows the methodology of WEO 2009 and examines gross domestic product (GDP) recessions, credit contractions, and stock price declines using data from the 21 developing Asian economies that were examined in Hong et al. (2009). Through this research, we hope to provide a more complete picture of economic downturns and recoveries in Asia.

We carry out various statistical analyses—including linear regression, survival analysis, and probit estimation—for both GDP recessions and financial downturns. First, the estimation results show that, in general, recovery from a GDP recession in Asian economies is somewhat slower than in OECD economies. However, when outliers are excluded, the difference is not statistically significant. Similarly, recovery from a financial downturn is not particularly slower in Asia than in the OECD. Second, Asia exhibits greater volatility over the course of a downturn and recovery. Third, fiscal policy has been strongly counter-cyclical for GDP recessions in both the OECD and developing Asia. Monetary policy, on the other hand, has been counter-cyclical only in OECD recessions. During credit contractions, monetary policy becomes expansionary in the OECD and developing Asia alike. Fourth, while details differ depending on the variable and estimation method used, expansionary macroeconomic policies tend to promote recovery. The effect of counter-cyclical policies is more evident in the OECD than in Asia. For Asian economies, policy changes in foreign countries, particularly Japan, also seem to be important for recovery.

The paper proceeds as follows. Section II describes data sets and variables we use in the paper, including definitions of economic downturns and recovery. Section III provides results from our empirical analysis. In section IV, we provide a summary of policy responses and the recovery process during the recent global crisis. Section V concludes the paper.

2. Data and Variables

2.1 Data

Our sample consists of 21 developing Asian economies and 21 industrialized economies. The developing Asian economies include the 10 members of the Association of

Southeast Asian Nations (ASEAN);[1] Bangladesh; People's Republic of China (PRC); Hong Kong, China; India; Kazakhstan; Republic of Korea (Korea); Kyrgyz Republic; Pakistan; Papua New Guinea; Sri Lanka; and Uzbekistan. We exclude the Middle East and countries with low data availability. The industrialized economies refer to 21 members of the OECD, including Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (UK), and United States (US). The sample period is from 1961 to 2009. We use unbalanced panel data to utilize as many observations as possible.

Following Claessens et al. (2008) and Hong et al. (2009), we consider both GDP recessions and financial downturns. In severe economic crises, including the most recent one in the US, contractions in GDP are often accompanied by contractions in financial activities. For a full analysis of recovery from a severe crisis, one would need to examine both the real sector and the financial sector. We use real GDP to represent the real sector, while using domestic credit and stock prices for the financial sector. Domestic credit and stock prices are deflated using the consumer price index (CPI).

Our GDP variable is annual real GDP from International Financial Statistics (IFS), World Development Indicators (WDI), and the OECD. While most previous studies on crisis and recovery focus on developed economies where quarterly data are available (Claessens et al., 2008; WEO, 2009), this paper examines developing Asian economies and developed economies at the same time. The quarterly GDP series for developing economies provided in IFS are very limited and not seasonally adjusted, which necessitates the use of annual data for these economies. We maintain data consistency by using annual GDP for both developing and developed economies. In contrast to GDP, domestic credit and stock prices are widely available quarterly. Also, financial downturns often involve sharp changes in bank credit and stock prices, which may not be effectively captured in the annual data. For these reasons, we follow previous studies and use a quarterly series of domestic credit and stock prices. When we need to aggregate data with different frequencies, we expand annual data such that four quarters in a year have the same value. For those variables that are available both quarterly and annually, we simply choose the appropriate frequency. For example, CPI is used at the annual frequency when combined with GDP data and at the quarterly frequency when combined with domestic credit and stock price data.

For measures of policy responses, we consider changes in the call interest rate and changes in government consumption expenditure. WEO 2009 uses primary balance in addition to these variables as an alternative measure of fiscal policy. We do not follow this approach because fiscal variables other than government consumption have very low data availability, especially among developing Asian economies.[2] Both the call rate

[1] ASEAN includes Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam.

[2] Also, in international government finance data, the accounting framework recently has changed from cash basis to accrual basis, as recommended by the IMF's Government Finance Manual 2001. The newly constructed government finance data are available only from 1990 onward, while the old series are available only up to 2001. The two series are not consistent with each other and thus cannot be combined.

and government consumption were obtained from IFS and the OECD. The call rate is adjusted for inflation, where inflation is defined as year-on-year growth in the CPI, available both quarterly and annually. On the other hand, real government consumption expenditure, being a part of GDP accounts, is available only annually for most developing economies. In order to maintain consistency across countries, we use an annual series of government consumption for all countries in our sample. More specific definitions of monetary and fiscal policy will be provided below.

2.2 Definitions of Recession (Downturn) and Recovery

For GDP, domestic credit, and stock prices, we first date peaks and troughs in each series based on the concept of classical business cycles, which was formalized by Burns and Mitchell (1946) and later implemented in an algorithm by Bry and Boschan (1971), and Harding and Pagan (2002). According to Harding and Pagan's rule, period t in a quarterly series x is defined as a trough if $x_t < x_{t+k}$, for $k = -1, -2, 1, 2$; and a peak if $x_t > x_{t+k}$, for $k = -1, -2, 1, 2$. Given peaks and troughs, a recession or a downturn is naturally defined as the period immediately after a peak to the following trough. A censoring rule is additionally applied to ensure that each cycle and each of its phases has a minimum duration. Harding and Pagan recommend setting the minimum duration for a single phase at 2 quarters and the minimum duration for a complete cycle at 5 quarters. When applied to an annual series, Harding and Pagan's rule will imply that period t should be defined as a trough if $x_t < x_{t+k}$, for $k = -1$ and 1, and a peak if $x_t > x_{t+k}$, for $k = -1$ and 1. In other words, any period (year) of negative growth can be regarded as a recession (or downturn). Watson (1994) uses the same reasoning in his analysis of annual data. We apply this rule to our annual real GDP series.[3] The duration is simply given by the length (number of years) of a recession, while the amplitude measures the peak-to-trough fall in the logarithmic value of the series.

Recovery is defined in this article by two measures: (i) the length of time until recovery to previous peak and (ii) the growth rate during the first year of recovery. The first one measures how long a series, after hitting a trough, remains below the previous peak. The second one measures the growth rate of a series during the 1-year period following a trough. Once again, this is the same definition used by WEO 2009. Figure 1 illustrates an example where the series reaches a peak in period t and a trough in period $t+2$. The duration of the downturn is thus 2 and the amplitude given by ab. The time until recovery to previous peak is 1 (or $t+3$ minus $t+2$) and the growth in the first year after the trough is ab.

2.3 Definitions of Policy Responses

One difficulty in measuring policy responses is distinguishing between discretionary changes in policies and the components of policies that automatically respond to economic fluctuations. Government spending, for example, is largely restricted by government revenue, which in turn is determined by economic activity. Consequently, government spending tends to decrease during recessions even when the government

[3] It is clear that we do not need a separate censoring rule for annual series, because a complete cycle (from peak to peak) will always take at least 2 years, which is greater than 5 quarters.

takes on an expansionary stance by running deficits. In order to properly evaluate discretionary policy responses by the government, one needs to control for the automatic positive correlation between government consumption and GDP that may originate from the income elasticity of tax revenue. In this paper, we address this problem by making cyclical adjustments for policy variables using a simple regression framework. More specifically, to cyclically adjust government consumption, we estimate the following equation separately for both the developed economy group and the developing economy group, using a panel estimation technique:

$$government\ consumption\ gap_{i,t} = \beta_0 + \beta_1 * GDP\ gap_{i,t} + e_{i,t}, \quad (1)$$

where *government consumption gap* and *GDP gap* are residuals from Hodrick–Prescott filtering of log(government consumption expenditure) and log(GDP), respectively.[4] This is slightly different from the specification used in WEO 2009. In WEO 2009, the dependent variable is given by log(government consumption expenditure) and a time trend is included as an additional explanatory variable for de-trending purposes. We apply the Hodrick–Prescott filter to government consumption since in many countries the series exhibits a strongly nonlinear trend. Cyclically-adjusted government consumption is given by the residual in equation (1). It can be regarded as a measure or proxy of discretionary fiscal policy, with a positive value indicating an expansionary stance.

For the call interest rate, the following equation is estimated for both the developed economy group and the developing economy group, using a panel estimation technique:

$$real\ interest\ rate_{i,t} = \gamma_0 + \gamma_1 * GDP\ gap_{i,t} + \gamma_2 * inflation_{i,t} + \gamma_3 * dummy\_85_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where *dummy_85* is a dummy variable that takes the value of 1 for periods after 1985. As in WEO 2009, it is included to allow for a possible structural shift in the equilibrium interest rate. Results do not change substantially when *dummy_85* is excluded. The cyclically-adjusted interest rate is given by the residual in equation (2). Since equation (2) corresponds to the Taylor rule for monetary policy, a positive deviation from the rule can be regarded as a discretionary tightening of monetary policy. One may argue that a positive coefficient of *GDP gap* in equation (2) is already evidence of discretionary counter-cyclical changes in monetary policy. Since central banks do not officially adopt the Taylor rule in their conduct of monetary policy, a systematic relationship between the interest rate and GDP gap itself may be an outcome of discretionary monetary policy. Also, even when central banks actually follow a rule similar to the Taylor rule, they are taking an active role in trying to stabilize the economy since the Taylor rule is considered an active, not passive, rule. These arguments suggest that equation (2) may provide too much filtration. Fortunately, the exact method of cyclical adjustment turns out not to be critically important for our analysis. Upon estimating an equation with no *GDP gap* on the right-hand side, we find that our main results do not change substantially.[5]

[4] A smoothing parameter of 6.25 is used for an annual series and a parameter of 1600 is used for a quarterly series.

[5] Our main results are robust to some other variations in the cyclical adjustment process. For example, we estimated equations (1) and (2) for each country separately and obtained similar results.

Another concern may be that our GDP data are annual, while the interest rate and inflation rate are both available quarterly. To check on the appropriateness of using GDP gap measures obtained from annual GDP series in combination with quarterly series of the other variables, we examine OECD countries in which both annual and seasonally-adjusted quarterly series are available for GDP. Figure 2 shows that the two series produce similar output gap measures. On this basis, we proceed to use annual GDP gap series in combination with quarterly interest rate and inflation series in our analysis of financial downturns.

Now, using cyclically-adjusted policy variables obtained from equations (1) and (2), we can measure the policy response over the course of a recession or downturn. Specifically, we define the policy response as the cumulative sum of changes in the cyclically-adjusted policy variable during a recession or downturn from peak to trough.

3. Empirical Analysis

3.1 Stylized Facts about Recovery

We first provide some summary statistics about recovery in Table 1. The two measures of recovery mentioned above are computed separately for OECD economies and developing Asian economies. As the table shows, among OECD economies, it takes 1.44 years on average for GDP to recover its previous peak after hitting a trough. Since our data are annual, any recovery period shorter than 1 year will be counted as 1 year, causing an upward bias in our estimate of time until recovery. WEO 2009, which uses quarterly data, reports that the average duration of recovery is 3.22 quarters for the same OECD economies.

For developing Asia, the average duration of recovery is 2.3 years, which is substantially longer than the OECD average. However, a closer look at the data shows that the average value for Asia is being influenced by a few outlier observations, including the severe recessions of 1979–1981 in Brunei Darussalam and 1997–1998 in Papua New Guinea. The recovery to previous peaks took 21 and 8 years, respectively, in these two cases. With these two outliers excluded, the average duration is reduced to 1.76 years with a standard deviation of 1.48. Although both figures are still higher than their OECD counterparts, the difference is not statistically significant.

Another way of looking at the pace of recovery is to estimate the probability that an economy will remain below the previous peak beyond a certain number of years. The survival function—the probability to remain below the previous peak beyond a specified time—is estimated using a Weibull distribution. We exclude the aforementioned outliers in the estimation in order to provide a more representative and robust result. When they are included, the difference between OECD and developing Asian economies is magnified. Figure 3 plots the survival function for OECD and developing Asian economies separately to show that for OECD economies the probability to “survive” (or remain below the previous peak) is slightly higher than 60% 1 year after the trough and decreases gradually as time passes. The survival function takes somewhat higher values for developing Asia, indicating that it takes longer for an Asian economy to

recover from a recession. The growth rate during the first year of recovery is 2.92% on average for the OECD and 5.25% for developing Asia. The difference largely reflects differences in the potential growth rate between the two regions. The all-time average of GDP growth is 3.33% for the OECD and 5.49% for developing Asia. Table 1 shows that an economy does not fully recover its potential growth rate in the first year after hitting a trough.[6]

Table 1 provides similar statistics for financial downturns as well. One difference is that since we use quarterly series for domestic credit and stock prices, the time until recovery now refers to the number of quarters. For both the OECD and developing Asia, downturns in stock prices appear to be more persistent than downturns in domestic credit: the average time until recovery is 5–6 quarters for domestic credit and 15–20 quarters for stock prices.[7] At the same time, the growth rate during the first year of recovery is substantially higher for stock prices than for domestic credit. This suggests that stock prices exhibit much greater volatility as the peak to trough in stock prices is so sharp that even with the high post-trough growth rate a recovery to previous peak is not achieved until 4–5 years later. Another interesting and related pattern is that growth in the financial variables during the post-trough year is much higher than growth in ordinary years. In other words, the financial variables exhibit mean reverting behavior. These patterns, while being observed in both regions, are particularly strong in developing Asia.

To summarize, recovery from financial downturns is not particularly slower in Asia compared to the OECD. Time until recovery is similar between the two regions. Also, growth in financial variables is higher in Asia, largely reflecting differences in the long-term growth trend between the two regions. What is more important is the great volatility that Asia exhibits over the course of a financial downturn and recovery. Hong et al. (2009) report that the peak-to-trough drop is sharper in Asia not only for GDP recessions, but also for financial downturns. Table 1.2 shows that the growth rate during the recovery year is also greater in Asia. Together these results imply that Asian economies fall hard and recover fast.

3.2 Policy Responses

This section provides some stylized facts about policy responses. As explained above, we first need to make cyclical adjustment to our policy variables by estimating equations (1) and (2). The estimation results of equations (1) and (2) from using annual data are reported below. We identify outliers in each variable using the method developed by Hadi (1994) and exclude them before running regressions.[8] The regressions are estimated using a fixed-effects panel procedure. In order to reduce endogeneity bias, we use instrumental variables estimation for the government consumption equation, with the 1-year lagged value of *GDP gap* as the instrument.

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[6] The average growth rate during the first year of recovery is not much influenced by the 1979–1981 recession of Brunei Darussalam.

[7] The time until recovery may be underestimated because some credit contractions and stock price declines were so persistent that the economy did not recover previous peak values during the sample period. For these extremely persistent episodes, time until recovery cannot be computed.

[8] Stata provides the routine for this procedure.

OECD:

$$\textit{government consumption gap}_{i,t} = \text{constant} + \underset{(5.57)}{0.72}*\textit{GDP gap}_{i,t}$$

Asia:

$$\textit{government consumption gap}_{i,t} = \text{constant} + \underset{(3.84)}{1.14}*\textit{GDP gap}_{i,t}$$

OECD:

$$\textit{real interest rate}_{i,t} = \text{constant} + \underset{(1.42)}{0.12}*\textit{GDP gap}_{i,t} - \underset{(-10.40)}{0.31}*\textit{inflation}_{i,t} + \underset{(4.68)}{0.01}*\textit{dummy\_85}_{i,t}$$

Asia:

$$\textit{real interest rate}_{i,t} = \text{constant} + \underset{(1.19)}{0.11}*\textit{GDP gap}_{i,t} - \underset{(-11.84)}{0.47}*\textit{inflation}_{i,t} + \underset{(1.00)}{0.004}*\textit{dummy\_85}_{i,t}$$

Numbers in parentheses denote *t*-ratios. The coefficient for GDP *gap* is significant and positive for government consumption in both the OECD and developing Asia, confirming that government consumption is automatically interrelated with GDP. For the *real interest rate*, GDP *gap* is not significant even though it is positive, while *inflation* has a significant and negative effect. In order to check the robustness of these results, we consider an alternative cyclical adjustment for the interest rate using only *inflation* and *dummy_85* as control variables. As will be shown below, the main results do not change substantially when using the cyclical-adjustment method. Although not reported here, we obtain similar results from using quarterly data in the estimation of equation (2): coefficients on the explanatory variables are of the same sign and have roughly the same magnitude. As explained before, to maintain data consistency, we use the (cyclically-adjusted) annual real interest rate series when analyzing GDP recessions and the quarterly series when analyzing financial downturns.

3.2.1 GDP Recessions

Policy responses are defined as the cumulative sum of changes in cyclically-adjusted government consumption or cyclically-adjusted call rates. A positive value of fiscal policy would mean an increase in government consumption, which is expansionary. On the other hand, a positive value of monetary policy would mean an increase in the call rate, which is contractionary. Table 2 shows how fiscal and monetary policies have responded to recessions and financial downturns in the OECD and developing Asia. All data are annual. We exclude outlier observations in cyclically-adjusted government consumption and call rates before computing the policy measures. Table 2 shows that for GDP recessions fiscal policy has been strongly counter-cyclical in both the OECD and developing Asia, reaching about 2.2% and 3.9%, respectively. However, this does not necessarily mean that actual government consumption increases during a recession. In

fact, with no cyclical adjustment, cumulative government consumption growth during a recession turns out to be –0.5% in Asia compared to 2.7% in the OECD.

Monetary policy has also been counter-cyclical in the OECD economies. We report two measures of monetary policy in Table 2 that correspond to the two different methods of cyclical adjustment mentioned above. Monetary policy 1 is the benchmark measure that is based on equation (2). According to this measure, the cumulative decrease in the call rate during a GDP recession period is about 0.58 percentage points and significant at the 10% level. In developing Asian economies, however, the cumulative change in the interest rate is not significant, suggesting that Asian monetary authorities may not have been as active in changing the interest rate to moderate the effects of a recession. When we estimate equation (2) without GDP gap on the right-hand side, the resulting monetary policy measure turns out to be more strongly counter-cyclical for the OECD (–0.89 percentage points), but still insignificant for developing Asia. Also, although not reported in the table, we have used quarterly data for OECD countries and obtained similar patterns. Both fiscal and monetary policies turn expansionary during a recession among the OECD.

The lack of significant counter-cyclicality in the monetary policies of developing Asian economies may be partly due to its small number of observations. Since the unit of observation in Table 2 is each recession episode, the number of observations is only 23 for Asia and 55 for the OECD.[9] In order to avoid this problem, we consider an alternative approach by changing the unit of observation to each country-year and examining how changes in (cyclically-adjusted) government consumption and/or the interest rate differ between recession years and ordinary years. Specifically, we estimate the following equation for the OECD and Asia separately, using ordinary least squares:

$$\Delta cyclically\ adjusted\ real\ interest\ rate_{i,t} = \delta_0 + \delta_1 * dummy\_recession_{i,t} + \delta_2 * dummy\_85_{i,t} + \eta_{i,t} \quad (3)$$

where $dummy\_recession_{i,t}$ is a dummy variable that takes the value of 1 if country i is in recession in year t and 0 otherwise. A significantly negative value of δ_1 can be interpreted as an evidence of counter-cyclical monetary policy. The estimation result, however, is not substantially different from Table 2. We find that the coefficient for the recession dummy is negative but still insignificant at the 5% level for Asia (with a t-ratio of –0.32) and significantly negative for the OECD (with a t-ratio of –2.08).[10] We repeat the same procedure with government consumption and obtain a significantly positive coefficient on the recession dummy for both the OECD and Asia.

[9] Also, the call interest rate may simply be a poor indicator of monetary policy action. Financial markets in many of these countries for most years were still relatively undeveloped and, hence, interest rates may not have been a key monetary policy indicator.

[10] As expected, when we cyclically adjust the call rate only with respect to the inflation rate, the coefficient of the recession dummy becomes more significant for OECD economies (t-ratio of –3.16). The coefficient remains insignificant for Asian economies (t-ratio of 0.88).

3.2.2 Financial Downturns

Policy responses during financial downturns are also provided in Table 2. As mentioned above, we use quarterly data both to identify financial downturns and to measure fiscal and monetary policy changes during the downturn periods. The most notable pattern in Table 2 regarding financial downturns is that monetary policy becomes expansionary during credit contractions in the OECD and developing Asia alike. The cumulative decrease in the call rate is about 0.8% for the OECD and about 4.6% in Asia. Monetary policy response is much greater in developing Asia perhaps because credit contractions in the region are more severe than those in the OECD. Hong et al. (2009) report that the amplitude of credit contractions is 18.47% in Asian economies and 7.3% in OECD economies. The severity of credit contractions in Asia can also be inferred from Table 1, which shows that while credit growth during the first year of recovery is much higher in Asia, the time until recovery is similar between the two regions. This is possible only if the initial peak-to-trough drop is similarly large for Asia.

Unlike monetary policy, fiscal policy does not exhibit a systematic pattern during credit contractions. In OECD economies, the fiscal policy measure is close to zero, indicating that government consumption remains largely neutral during credit contractions. In Asian economies, on the other hand, the mean of the fiscal policy measure is significantly negative. It is not obvious why the government would adopt a contractionary policy during times of financial downturns. One possibility is that the government may be forced to tighten its budget under a crisis situation. For example, the IMF initially recommended tight fiscal policies for Korea in response to the 1997/98 Asian financial crisis. However, the initial prescription was abandoned in 1998 as the economic downturn turned out to be much worse than expected. In addition, there are quasi-fiscal activities of public enterprises, public funds, and contingent liabilities from government guarantee programs that are not included in the official budget balance figures. When these items are taken into account, the true fiscal position of Korea may well have been more expansionary than official figures suggest. Our data also show that Korea and other Asian economies in 1998 recorded an increase in cyclically-adjusted government consumption.

A closer look at the data suggests that the significantly negative value of fiscal policy during credit contractions may be an artifact driven by a few exceptional cases. We find that Indonesia in 1974, Pakistan in 1974, and Sri Lanka in 1994 (where the years indicate troughs) experienced unusually large drop in government consumption, with the cumulative fiscal policy measure reaching below –60% in all cases. When these three observations (out of 78) are excluded, the mean is no longer significant. Indeed, the median is also insignificant, supporting the argument that the mean is influenced by a few extreme cases.

For stock price declines, we do not find any systematic policy responses in either of the two regions. The only significant figure is the median of fiscal policy for OECD economies. We believe this is consistent with common expectations: the government or monetary authorities do not set their policies based on particular asset prices.

Clearly, GDP recessions and financial downturns sometimes overlap and they both affect policy decisions. Therefore, the univariate statistics in Table 2 may not accurately

represent independent effects of GDP recessions and financial downturns on policy variables. In order to separate policy responses to GDP recessions from those associated with financial downturns, we estimate the following equation:

$$\Delta cyclically\ adjusted\ real\ interest\ rate_{i,t} = \delta_0 + \delta_1 * dummy\_recession_{i,t} + \delta_2 * dummy\_85_{i,t} + \delta_3 * dummy\_credit\ contraction_{i,t} + \eta_{i,t} \quad (4)$$

where *dummy_credit contraction* is a dummy variable that takes the value of 1 for credit contraction periods. Coefficients δ_1 and δ_3 can be interpreted as representing the response of monetary policy to GDP recessions and credit contractions, respectively. We do not include a dummy variable for stock price declines based on the result in Table 2. Also, we do not estimate a similar equation for government consumption because, as Table 2 shows, fiscal policy responds only to GDP recessions.[11] Estimation results are provided in Table 3. Interest rate series are cyclically adjusted using both inflation and GDP gap for columns (1) and (3), and only inflation for columns (2) and (4). The most evident pattern in Table 3 is that the interest rate tends to decrease during credit contractions. Once the effect of credit contractions is controlled, the interest rate does not exhibit a significant decrease in recession years, even in OECD economies (column [1]). Only when the effect of GDP gap is not controlled in advance is the interest rate shown to decrease significantly during recessions in the same economies (column [2]). This suggests that the interest rate does not decrease during recessions more than implied by the Taylor rule. In developing Asia, the interest rate does not decrease in response to GDP recessions regardless of the cyclical adjustment method, confirming the result in Table 2.

Overall, Table 2 suggests that OECD economies have been more actively using counter-cyclical policies than Asian economies in the face of GDP recessions. During credit contractions, countries in both groupings have pursued interest rate cuts.

3.3 Policy Responses and Recovery

In this section, we examine whether counter-cyclical policies promote recovery. In particular, we estimate the following two equations that correspond to our two recovery measures:

$$growth\ during\ the\ first\ year\ of\ recovery_{i,t} = \delta_0 + \delta_1 * fiscal\ policy_{i,t} + \delta_2 * monetary\ policy_{i,t} + \delta' X_{i,t} + \eta_{i,t} \quad (5)$$

$$probability\ density\ of\ recovery_i = f(t_i, z_i) = \gamma e^{\beta' Z i} t_i^{\gamma-1} \exp(-e^{\beta' Z i} t_i^{\gamma}) \quad (6)$$

Equation (5) specifies growth in GDP or financial variables during the first year of recovery as a linear function of policy and control variables. The subscript *i*,*t* denotes downturn *t* in country *i*. The monetary policy measure used here is the same as monetary policy 1 in Table 2. The main results do not change when monetary policy 2 is used. The control variable vector *X* includes the peak-to-trough amplitude of a downturn

[11] We have considered these variations and found that none of them changes the main patterns.

and some foreign policy variables.[12] The peak-to-trough amplitude is included to capture possible interrelation between the severity of a downturn and the pace of subsequent recovery. To the extent that there is overshooting in the initial drop, a greater absolute value of the amplitude will imply higher growth in the following periods. Also, the macroeconomic policy stance of big countries like US, Japan, and Germany may have important implications for other countries' recovery. In order to examine the international spillover effects, we consider changes in the cyclically-adjusted interest rate and changes in cyclically-adjusted government consumption in the year immediately preceding a trough. Equation (5) is estimated using a panel model with fixed effects.

Equation (6) specifies the probability density of recovery as a Weibull function. The variable t_i in equation (6) denotes the event time (the time of recovery) of an individual i (economic downturn i); z_i and β the covariate vector of individual i and the corresponding coefficient vector, respectively; and γ the shape parameter of the distribution. The covariate vector z includes the same explanatory variables as in equation (5). For both equations, the unit of observation is each downturn episode rather than a country-year.

3.3.1 GDP Recessions

We first estimate equation (5) using GDP recessions from the OECD and developing Asia collectively and provide the results in Table 4. When each region is used separately, the number of observations is too small—only 19 for Asia and 54 for the OECD—and the results are less significant in most cases. Estimation results from using only the Asian country sample will be further discussed in Table 7. One of the most robust findings in Table 4 is the significantly positive effect of fiscal policy on the post-trough growth rate. The estimated coefficient implies that a 1 percentage point increase in the fiscal policy measure will lead to a 0.3 percentage point increase in the GDP growth rate.[13] Previous studies on fiscal policy have typically found that the fiscal multiplier effect is quite small. One exception has been WEO 2009 where the fiscal policy response was shown to be important for the strength of recovery in OECD economies. Applying the same approach to annual data from OECD and developing Asian economies, we confirm the finding of WEO 2009. However, probably due to the small number of observations, we do not obtain any significant result when equation (5) is estimated for the OECD and developing Asia separately.[14] Another robust finding in Table 4 is the insignificance of monetary policy. The coefficient of the monetary policy measure is close to zero in all specifications. This result is also broadly consistent with WEO 2009 where the coefficient of monetary policy is estimated to be insignificant in most specifications. The coefficient of the absolute value of amplitude is always positive and occasionally

[12] The duration of a downturn is found to always be insignificant and thus has been dropped.

[13] Since government consumption amounts to about 15% of GDP in our sample, a 1 percentage point increase in government consumption growth corresponds to about 0.15% growth in GDP. The coefficient of 0.3 in Table 4 thus implies that the short-term multiplier may be as high as 2 (i.e., 2 = 0.3/0.15).

[14] WEO 2009, which uses quarterly data for OECD economies, has more than 100 observations (recession episodes) for the OECD alone.

significant, indicating that the greater the initial fall the more rapidly the economy recovers.[15]

Among the foreign policy variables that we consider, the monetary policy of Japan seems to have the most significant and robust effect on other countries' recovery. As columns (3) and (4) show, an increase in the cyclically-adjusted interest rate in Japan is significantly and negatively associated with GDP growth in other countries. The monetary policy of the US is not as significant as that of Japan, probably because our sample is heavily representative of Asian economies with strong financial ties with Japan. Although not reported in this paper, we have examined the monetary policy of Germany as well and found that it is insignificant in most cases. Foreign fiscal policy variables are also mostly insignificant. However, US fiscal policy has a significantly positive coefficient in column (4) where the fiscal and monetary policy variables of Japan and the US are included at the same time. While not as robust as the effect of Japan's monetary policy, the result in column (4) is at least not inconsistent with common expectations. Overall, these results support the view that international policy coordination can be critical for recovery from a crisis.

Estimation results of equation (6) are provided in Table 5. As before, GDP recessions from the OECD and developing Asia are considered together. Since equation (6) specifies the probability of recovery (or the hazard of exiting a recessionary state during which GDP remains below the previous peak), a variable with a positive coefficient should be interpreted as promoting recovery. Estimates reported in Table 5 denote coefficients rather than exponentiated coefficients, i.e., coefficients rather than hazard ratios. Results in Table 5 are broadly consistent with results in Table 4. First, among domestic policy responses, fiscal policy appears to be more important than monetary policy: the coefficient on fiscal policy is always significantly positive, while the coefficient on monetary policy is always insignificant. Second, among foreign policy variables, Japan's monetary policy is most important. An increase in Japan's interest rate tends to deter recovery. All other policy variables are insignificant in all specifications. Third, the coefficient of the absolute value of amplitude is always significant and negative, indicating that the larger the drop the longer it takes to recover. This is not necessarily inconsistent with the positive coefficient of the same variable reported in Table 4. For a recession with a large peak-to-trough drop, it is entirely possible to have high post-trough growth and yet not recover to the previous peak quickly.

Results in Tables 4 and 5 suggest that expansionary macroeconomic policies, in particular expansionary fiscal policies, can bring about a quick recovery. However, as some people argue, expansionary policies may also entail possible negative impacts in the medium-term such as an increased fiscal burden, asset price bubble, and incomplete structural adjustment. These negative outcomes may in turn increase the possibility of a recurring recession. In order to examine medium-term implications of expansionary macroeconomic policies, we estimate the following probit equation that relates the recurrence probability of a recession with short-term policy responses:

[15] WEO 2009 reports the opposite in using the peak-to-trough amplitude without any transformation to still obtain a positive coefficient. It is not clear where the discrepancy between WEO 2009 and our result stems from. We have examined quarterly data for OECD countries following WEO 2009 and still found that a greater downturn is associated with a faster recovery.

$$probability\ of\ recurrence_i = \Phi(\alpha_0 + \alpha_1 * fiscal\ policy_i + \alpha_2 * monetary\ policy_i + \alpha' X_i + \eta_i), \quad (7)$$

where Φ is the cumulative normal distribution function and the subscript i denotes recession i. The vector of controlling variables, X, is the same as before. The recurrence of a recession is defined by an indicator variable that takes the value of 1 if another recession occurs during the 5 years subsequent to the trough year of recession i and takes the value of 0 otherwise. The sample probability of recurrence is 0.28. The estimation results of equation (7) are provided in Table 6. As the table shows, the recurrence probability is positively associated with monetary policy or an increase in the interest rate. In Tables 4 and 5, recovery from a recession was shown to be systematically correlated with fiscal policy but not with monetary policy. Table 6 shows that monetary policy may be important for medium-term performance of the economy. It also suggests that in contrast to the concerns about possible side effects, the positive effects of an expansionary policy may outweigh negative ones in the medium-term.

Another clear pattern in Table 6 is the significant and negative correlation between the recurrence probability and the absolute value of amplitude. As shown in Table 4, the absolute magnitude of amplitude is positively associated with the post-trough GDP growth rate, suggesting that the economy may be overreacting to negative shocks during a recession period and thus the trough may be unnecessarily deep. The negative correlation between the recurrence probability and the absolute value of amplitude, on the other hand, suggests that the economy may become more robust after a severe recession. While a deep recession might be painful in the short-run, in the long-run it might force policymakers to undertake necessary reforms that would make the economy more immune to another recession. Among foreign policy variables, fiscal stimulus in Germany is shown to significantly lower the recurrence probability in other countries. While the coefficient of US fiscal policy has the wrong sign, it is significant only at the 10% level.

In Table 7, we briefly examine how the estimation results change when only Asian recessions are used in the sample. US and German policy variables are excluded from explanatory variables because Japan's policy stance seems to be most important for Asian economies and also because the sample size is only 19. Column (1) estimates equation (5), while columns (2) and (3) estimate equations (6) and (7), respectively. Table 7 shows that despite the small number of observations, coefficients of macroeconomic policy variables are still significant and have the right sign in most cases. For example, the GDP growth rate during the first year of recovery is positively correlated with fiscal stimulus and negatively correlated with a higher interest rate (column [1]). Overall, Table 7 supports the view that counter-cyclical policies have been largely successful in promoting recovery from GDP recessions in Asia.

3.3.2 Financial Downturns

We have examined how macroeconomic policy responses during a recession can affect the pace of recovery, using various estimation methods. Now we repeat the same analyses for financial downturns. The unit of observation is each episode of credit contraction and/or stock price decline. The number of financial downturns is greater than the number of GDP recessions, partly because we use quarterly data for financial

downturns and partly because financial variables are inherently more volatile than GDP. The large number of observations enables us to estimate equations (5), (6), and (7) separately for OECD and developing Asian economies, and make comparison between the two groupings.[16]

We first estimate equations (5), (6), and (7) for credit contractions, and report the results in Tables 8, 9, and 10, respectively. Column (1) of Table 8 shows that, among OECD economies, the growth rate of domestic credit during the first year of recovery is positively associated with increases in government consumption (our measure of fiscal policy) and negatively associated with increases in the call rate (our measure of monetary policy). This result is consistent with common views on the role of expansionary macroeconomic policies. Columns (2) through (4) add foreign policy variables. All foreign policy variables are defined as the sum of changes in government consumption or the call rate over the 1-year period (four quarters) immediately preceding a trough. According to columns (2) through (4), none of the foreign policy variables considered is significant. We estimate the same equations for Asian economies in columns (5) through (8) and find that in contrast to the case of the OECD, domestic fiscal and monetary policies do not have significant effects on the strength of recovery. As before, foreign policy variables are all insignificant. However, one can formally show that the coefficients of domestic policy variables are significantly different between the OECD and Asia. This difference suggests that the OECD has been more successful with its policy responses to a credit contraction.

Table 9 shows how the probability of exiting a credit contraction episode is determined. The most evident result in the table is the significantly negative effect of the absolute value of amplitude on the hazard rate. This simply indicates that the greater the peak-to-trough drop is, the longer it takes to return to the previous peak level. The next strongest pattern is that the coefficient of Japan's monetary policy is significantly negative for Asian economies. This result is also consistent with common expectations since a contractionary monetary policy in a leading country will likely deter recovery in other countries. Lastly, the fiscal policy of the US has a positive effect on the recovery of OECD economies, but the effect is only marginally significant at the 10% level.

The recurrence probability of a credit contraction is not well explained by our explanatory variables. As before, recurrence is defined as another depressive episode that occurs within 5 years.[17] As Table 10 shows, the only significant result at the 5% level is the negative correlation between US monetary policy and the recurrence in the OECD sample. This result implies that credit contractions that coincide with an interest rate cut in the US are more likely to be followed by another credit contraction in the medium-term. It is not immediately clear, however, why such a pattern should be observed.[18] While it is often argued that expansionary policies can entail negative impacts in the medium-term

[16] Although not reported in the table, when we merge OECD and Asian economies in one sample and impose equality restrictions on the coefficients across the two regions, the estimation results lose much of their significance.

[17] The sample recurrence probability is 0.67 for the OECD and 0.68 for Asia.

[18] A possible explanation can be gleaned from one of the oft-cited cause of the current global crisis: the long-period of low interest rates pursued by the US Federal Reserve after the 2001 recession.

by causing a delay in necessary reforms and adjustments, Table 10 shows no significantly negative impacts from domestic monetary policies. In fact, according to columns (3) and (4) of Table 10, a more expansionary monetary policy (a decrease in the interest rate) implies a lower probability of a recurring credit contraction. It is hard to explain why a US interest rate cut should have negative medium-term implications for OECD economies when a domestic one does not. We suspect that our foreign policy variables have an endogeneity problem when used for the OECD sample because the three countries—Germany, Japan, and the US—are all members of the OECD and have mutual influence with other OECD member countries. The estimated effects of foreign policy variables for the OECD sample thus need to be taken with caution. We believe that the exogeneity assumption of the foreign policy variables is better met for Asian economies. In addition to domestic monetary policies, domestic fiscal policies also have a marginally significant effect on the recurrence probability. Columns (1) through (4) show that for OECD economies an expansionary fiscal policy lowers the recurrence probability.

Next, we estimate equations (5), (6), and (7) for stock price declines and report the results in Tables 11, 12, and 13, respectively. Table 11 shows that the growth rate of stock prices 1 year into the recovery phase is not systematically correlated with anything in either the OECD or Asia. The only exception is the monetary policy of Japan, which is shown to have significantly negative effects on the stock returns of OECD economies. The overall lack of significant patterns in Table 11 is consistent with the proposition that stock returns follow a random process that is not easily predicted.

The probability of recovering the previous peak level in stock prices is systematically correlated with the amplitude and some foreign policy variables. As Table 12 shows, the coefficient of the absolute value of the amplitude is significantly negative for both the OECD and developing Asia, indicating that a greater initial drop delays the time to recovery. Among other variables, the fiscal policy of Japan and monetary policy of Germany both have a marginally significant and negative impact for the OECD sample. Again, the mixture of correct and wrong signs may be a consequence of the endogeneity bias mentioned above. For the developing-Asia sample, both the monetary policy of Japan and fiscal policy of the US have significant impacts with correct signs: an increase in Japan's interest rate deters recovery, while an increase in US government consumption promotes recovery.

The probability of a recurring stock price decline is similar to the probability of a recurring credit contraction in that it is not well explained by our specifications. Since a stock price decline episode is almost surely followed by another within 5 years, we redefine recurrence here as another depressive episode that occurs within 3 years.[19] The main results do not change when we vary the window size. Table 13 shows that in the OECD sample the coefficient of US monetary policy is significantly negative. This result is reminiscent of the negative correlation between US monetary policy and the recurrence of credit contraction. Another significant result in Table 13 is that the absolute value of the amplitude has a positive impact on the recurrence probability. In other words, a large

[19] With this new definition, the sample recurrence probability is 0.75 for the OECD and 0.82 for developing Asia.

drop in stock prices is more likely to be followed by another stock price decline within the next 3 years than a small drop would be.

4. Counter-Cyclical Policies in the Current Global Recession

In this section, we provide anecdotal evidence of fiscal and monetary policies used in Asia to combat the global recession. By and large, we find that stimulative policies have supported economic activity. In our previous paper (Hong et al. 2009), we cautioned that Asia would experience a severe recession in 2009 in view of the global recession and financial downturns that were underway. Yet, we recognized that much of the actual outcome would depend on the counter-cyclical measures implemented. Encouragingly, the evidence seems to point to a positive outcome as emerging Asia only registered 2 quarters of negative growth on the back of aggressive policy easing (Figure 4). Public consumption was essentially the key driver of growth when the region went into recession in the fourth quarter of 2008. Since then, its contribution has remained sizeable with specific fiscal measures that support private consumption also making stronger contributions. Similarly, there has been a gradual recovery in investments, which obviously takes longer to come to fruition. Figure 5 breaks down the growth drivers into smaller sub-regions and individual countries for the first 3 quarters of 2009. As evidence of the oft-mentioned fiscal muscle of the PRC, all growth during the first 3 quarters of 2009 was due to higher investment and consumption.[20] Public consumption was central in all economies, especially when considering that net export growth was mainly due to the larger fall in imports than exports. Besides the PRC, India and Indonesia are the only countries that did not enter into recession and experience a sharp pullback in investment.[21] They also happen to be the most populated countries and relatively-less-open economies in the region.

The discretionary fiscal stimulus packages implemented in the wake of the global financial crisis have been sizeable, expenditure driven, and quickly delivered. A quick glance at the fiscal balance of the central government underlines the massive scale of expansion undertaken, which swings from a mere average deficit of 0.6% of GDP from 2000 to 2008 to –4.2% of GDP in 2009 (Table 14). No country shows an improvement in its fiscal position in 2009, which of course is also partly due to lower tax revenue collected given depressed economic activity. In terms of the size of discretionary stimulus, IMF (2009b) estimates that Asia's discretionary fiscal stimulus amounted to 2.7% of GDP in 2009, higher than the 2.0% among the G20. In smaller sub-groups, the newly industrialized economies' (NIEs) level of discretionary fiscal stimulus in 2009 was 2.6%, the PRC's and India's was 2.7%, and ASEAN-5's was 1.8%.[22] Also significant is

[20] The PRC does not breakdown investment and consumption into the public and private components in its quarterly series.

[21] Technically, the Philippines also did not enter into recession. Still, its growth was only marginally positive and the economy saw a sharp slowdown in investments and exports. The continued strong inflows of remittances from its large population of overseas workers were most helpful in keeping private consumption vibrant. Despite the global economic turbulence, USD12.8 billion was remitted back to the country over the 9 months to September 2009, which was 4.2% higher than the same period in 2008 (*Bangko Sentral ng Pilipinas*, 2009).

[22] ASEAN-5 refers to Indonesia, Malaysia, Philippines, Thailand, and Viet Nam.

the fact that in Asia, 82% of the stimulus represents increased government spending (rather than tax measures) compared to 74% in G20. Government spending has a higher likelihood and more direct way of stimulating growth as opposed to tax cuts, where income saved may or may not induce individuals and corporations to consume or invest. Cambodia, the Lao People's Democratic Republic (Lao PDR), Malaysia, PRC, Thailand, and Viet Nam all have fiscal stimulus packages with more than 80% based on expenditure spending (World Bank 2009). Only India, Indonesia, and Korea included notable tax cuts on labor, consumption, or capital in their respective fiscal packages.[23] In addition, what has been encouraging is the quick disbursement of much of the stimulus funds. The World Bank report also shows that many countries have delivered more fiscal stimulus than what they officially announced (Figure 6). Even low-income countries, such as Cambodia and Lao PDR, which were thought to be unable to afford fiscal stimulus measures, have implemented such programs through domestic sources of funding from the government's own deposits and borrowing from banks.

Fiscal stimulus appears to have had a positive impact on growth. While most of the fiscal stimulus measures exhibit the qualities of an effective counter-cyclical policy, the exact impact on growth of the stimulus is not easily estimated and remains subject to great debate.[24] That said, the IMF (2009a) in its report to the G20 Ministers and Central Bank Governors Meeting in March 2010 suggests a low–high multiplier range for different fiscal measures: 0.3–0.6 for revenue, 0.5–1.8 for capital spending, and 0.3–1.0 for other spending. Based on these ranges, IMF (2009b) estimates that Korea's fiscal stimulus added as much as 0.9–2.8 percentage points over baseline growth in the first half of 2009, while the PRC's measures added 0.7–2.3 percentage points over the same period (Figure 7). Even the much smaller and more open economies of Hong Kong, China; Indonesia; Malaysia; Philippines; Singapore; and Thailand saw an improvement of 0.5–1.5 percentage points. While not being able to reverse the contracting forces in an economy, the fiscal stimulus can nonetheless cushion an otherwise much harder landing.

Aggressive monetary policy strategies through reductions in the policy rate and statutory reserve requirement ratio, and moral suasion for greater lending can provide a conducive environment that supports growth. Table 15 compares the policy and lending rate reductions in selected Asian countries during the 1997/98 Asian financial crisis and the 2008/09 global crisis. Several stylized facts can be observed. First, current monetary policies have been more aggressive in terms of duration as it took only 6 months on average to bring interest rates to their trough during the 2008/09 global crisis compared to 11 months in the 1997/98 episode. Second, outside of the most severely hit countries by the Asian financial crisis, this current episode of monetary policy easing has been most widespread and aggressive when both the amplitude and duration are accounted for. This is most notable in Hong Kong, China; India; and Taipei,China where their slopes (ratio of amplitude to duration) are much steeper than during the 1997/98 Asian financial crisis. Third, the above-mentioned observations also apply to instances when

[23] For details of the fiscal stimulus packages announced and their composition in selected Asian countries, see Table 2.3 in ADB (2009) and Annex 1 in UNESCAP (2009).

[24] See Barro (2009), Barro and Redlick (2009), Cogan et al. (2009), Feldstein (2009), and Romer and Bernstein (2009) for the debate on the efficacy of fiscal stimulus in the US. Also the debate on Keynesian principles at *The Economist*: http://www.economist.com/debate/days/view/276/print/all

lending rates have fallen much faster than during the earlier crisis and countries outside those most severely hit by the 1997/98 Asian financial crisis have been the most aggressive. Fourth, it appears that the pass-through of policy rates to lending rates has improved in the current crisis as lending rates have fallen by as much as policy rates, which is reflected much earlier in the lending rates. This reinforces the empirical finding of IMF (2009b) that rejects the claim that the transmission of policy rates to lending rates has weakened during the current crisis. It is positive that lower interest rates are passed to borrowers, but this does not necessarily translate into higher levels of bank lending. Despite the very uncertain and weak business and employment prospects faced by borrowers, it is encouraging to note that there has not been a widespread collapse of bank lending. Bank loan growth has softened from its previous peak, which is to be expected in such difficult times, yet it remains in positive territory and is holding up well when examined in a longer-term perspective (Figures 8 and 9). This bears little resemblance to the credit crunch of the 1997/98 Asian financial crisis. Instead, in the PRC and Viet Nam, the surge in bank lending has been so marked that there have been renewed fears of misdirected lending propping up asset bubbles. Only in Taipei,China and Hong Kong, China has bank loan growth slid into negative territory, although both are now showing signs of a lending recovery.

Monetary conditions have generally remained loose, but would have been more expansionary if not for falling prices. Except for Korea, the real policy rate remains slightly positive in emerging East Asia, averaging about 2.8% (Figure 10) compared to around 0.5% in the US. Viet Nam has reduced its policy rate the most as indicated by the size of its bubble in the chart, although the reductions occurred from a high base. In the PRC; Malaysia; Taipei,China; and Thailand; real policy rates would have been even lower if not for deflation. The loose monetary conditions have also been aided by the depreciation of most currencies against the US dollar. Now that the recovery is underway, further policy rate reductions seem unlikely. Still, Asian central banks have not been as aggressive as their Western counterparts. The most probable cause is that the heart of the crisis lies in the West and was exacerbated by the overleveraged positions of financial institutions and consumers.

In the West, lower interest rates are most useful in lowering the cost of borrowing, improving debt serviceability, and alleviating the balance sheet deterioration of borrowers and, in turn, lenders. In contrast, there is no such over-borrowing problem among most Asian financial institutions, corporations, and consumers, especially after the 1997/98 Asian financial crisis. Perhaps more importantly, an interest rate that is too low reduces the return on individual savings, which in Asia applies to most consumers and, as a result, jeopardizes the very driver of growth that policymakers are trying to promote. Moreover, a very low interest rate may not necessarily entice increased borrowing when business prospects remain uncertain. Coupled with the ample liquidity released into the financial system, this could incentivize funds to move into unproductive areas. Besides, prices are unlikely to fall any further as the underlying structural causes pushing up commodity prices in 2007 and early 2008 have not disappeared. A key takeaway point that emerged from the recently concluded United Nations (UN) World Summit on Food Security in November 2009 was that the current global downturn only temporarily masked upward price pressures and as soon as the global recovery gains traction rapidly rising prices will return (Diouf 2009). Even without the global economy

regaining its full vigor, we are already witnessing strong price increases in many classes of commodities amid very low global interest rates.

5. Conclusion

In this paper, we have examined the role of macroeconomic policies in recovery from GDP recessions and financial downturns among Asian economies. Our analysis shows that Asian economies have been more dependent on fiscal policies than monetary policies as a means to counter GDP recessions. Government spending in Asian economies increases significantly during a recession, while the interest rate does not exhibit a systematic pattern. In contrast, OECD economies have used fiscal and monetary policies effectively to counter GDP recessions. During credit contractions, monetary policies appear to have been more important than fiscal policies in both Asia and the OECD. Overall, we find that macroeconomic policies change counter-cyclically during economic downturns in both regions.

We also find that counter-cyclical policies promote recovery. In Asian economies in particular, discretionary increases in government spending and discretionary reductions in the interest rate during a recession period are positively associated with GDP growth in the post-trough year. Monetary policies seem to matter in the medium-term as well: an interest rate cut during a recession lowers the probability of another recession in the next 5 years. For recovery from a credit contraction, only monetary policies in OECD economies are shown to have a significant effect. Among Asian economies, the monetary policy stance of Japan seems to be more important than the domestic stance. While neither fiscal nor monetary policies have a significant effect on recovery from a stock price decline, this is consistent with the proposition that stock returns are not easily predictable.

Our estimate of the effect of fiscal policy is substantially greater than most previous ones. According to Table 4, a 1 percentage point increase in government consumption growth during the recession period leads to a roughly 0.3 percentage point increase in GDP growth during the first year of the recovery phase. Since government consumption is about 15% of GDP among our sample, a 1 percentage point increase in government consumption growth corresponds to additional government consumption of about 0.15% of GDP. The coefficient of 0.3 in Table 4 thus implies that the short-term multiplier may be as high as 2 (i.e., 2 = 0.3/0.15). Most previous studies, on the other hand, argue that the expansionary effect of fiscal policies (or the fiscal multiplier) is only moderate. While there is a wide range of estimates, previous studies typically find that the short-term fiscal multiplier is less than 1 (Barro and Redlick, 2009 and *OECD Economic Outlook*, 2009). It is not clear why our estimate of the fiscal policy effect is so large. One possible explanation is that in contrast to previous studies that examine all sample years we only use recession periods in our estimation. Since a demand stimulus can be effective only when there is slack in the economy, the fiscal multiplier may become greater during a recession. Anecdotal evidence from the current global crisis and recession supports this explanation. Coupled with aggressive fiscal and monetary policy moves, Asian economies have experienced a strong rebound. Another possibility is that government consumption expenditure during a recession may proxy overall fiscal outlay that includes

non-standard items such as capital injection. Capital injection into troubled financial institutions can stimulate the economy through money and credit creation rather than through the traditional Keynesian channel. The asymmetric effect of fiscal policy over a business cycle will be an important topic for future research.

Another issue left for future research involves the long-term implications of an expansionary fiscal policy. Although fiscal responsibility is a more serious issue for OECD economies, there are growing concerns about government debt in some developing Asian economies as well. A simple regression analysis of OECD data indicates that a 1 percentage point increase in the deficit-to-GDP ratio eventually leads to about a 5 percentage point increase in the fiscal debt-to-GDP ratio. The highly persistent nature of fiscal deficits and/or fiscal debt point to the importance of controlling deficits and debt early on. For Asian economies, the implementation of fiscal rules, such as automatic stabilizers, may be desirable in order to both curb discretionary increases in government spending and expand social safety nets.

Table 1-1: Recovery from Economic Downturns, Organisation for Economic Co-operation and Development (OECD)

	Mean	Median	Standard Deviation
GDP recession			
Time until recovery to previous peak[1]	1.44	1.00	1.00
Growth during the first year of recovery[2]	2.92	2.51	1.99
All-time average growth	3.33	3.24	2.53
Credit contraction			
Time until recovery to previous peak[3]	5.17	3.00	5.86
Growth during the first year of recovery[2]	9.20	6.01	13.28
All-time average growth	1.64	1.30	11.50
Stock price decline			
Time until recovery to previous peak[3]	19.83	6.00	30.30
Growth during the first year of recovery[2]	20.01	18.44	16.21
All-time average growth	0.68	0.87	8.92

Table 1-2: Recovery from Economic Downturns, Asia

	Mean	Median	Standard Deviation
GDP recession			
Time until recovery to previous peak[1]	2.30	1.00	3.27
Growth during the first year of recovery[2]	5.25	4.00	3.64
All-time average growth	5.49	5.80	4.87
Credit contraction			
Time until recovery to previous peak[3]	5.69	3.00	8.45
Growth during the first year of recovery[2]	17.91	11.93	32.08
All-time average growth	8.48	8.69	17.89
Stock price decline			
Time until recovery to previous peak[3]	14.52	6.00	22.11
Growth during the first year of recovery[2]	31.60	26.41	28.47
All-time average growth	2.72	0.68	33.58

Note:

All-time average growth refers to the average growth rate over the entire sample period. [1]Number of years. [2]Percent increase. [3]Number of quarters.

Table 2-1: Policy Responses, OECD

	Mean	Median	Standard Deviation
GDP recession			
Fiscal policy[1]	2.18**	2.29**	2.31
Monetary policy1[2]	-0.58*	-0.73**	2.48
Monetary policy2[2]	-0.89**	-1.05**	2.52
Credit contraction			
Fiscal policy[1]	-0.11	-0.26	2.11
Monetary policy1[2]	-0.78**	-0.47**	3.01
Monetary policy2[2]	-0.86**	-0.65**	3.02
Stock price decline			
Fiscal policy[1]	0.16	0.26**	1.70
Monetary policy1[2]	0.08	-0.07	2.38
Monetary policy2[2]	0.04	-0.08	2.38

Table 2-2: Policy Responses, Asia

	Mean	Median	Standard Deviation
GDP recession			
Fiscal policy[1]	3.85**	3.41**	4.84
Monetary policy1[2]	-0.65	-0.79	3.56
Monetary policy2[2]	-1.04	-1.21	3.49
Credit contraction			
Fiscal policy[1]	-4.46**	-2.39	18.93
Monetary policy1[2]	-4.64**	-3.90**	12.50
Monetary policy2[2]	-4.98**	-3.99**	12.42
Stock price decline			
Fiscal policy[1]	-0.13	-0.28	16.18
Monetary policy[2]	-1.96	-1.07	13.27
Monetary policy[2]	-2.42	-0.80	12.67

Note:
* and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses GDP gap, inflation, and dummy_85 as controlling variables. Monetary policy 2 is based on the cyclical adjustment of the interest rate that uses only inflation and dummy_85 as controlling variables.
[1]Percent changes from peak to trough.
[2] Percentage point changes from peak to trough.

Table 3: Interest Rate Changes During GDP Recessions and Credit Contractions

	OECD		Asia	
	Cyclical adjustment 1 (1)	**Cyclical adjustment 2 (2)**	**Cyclical adjustment 1 (3)**	**Cyclical adjustment 2 (4)**
GDP recession	-0.08 (-1.18)	-0.19** (-2.71)	0.76** (2.27)	0.28 (0.83)
Credit contraction	-0.19** (-3.12)	-0.19** (-3.19)	-0.89** (-3.94)	-0.91** (-4.02)
# of obs.	2843	2843	1501	1497

Note:
The dependent variable is the change in the cyclically-adjusted call interest rate. Estimation is by ordinary least squares (OLS).
t-ratios are in parentheses.
* and ** denote significance at the 10% level and the 5% level, respectively.

Table 4: GDP Growth During the First Year of Recovery

	(1)	**(2)**	**(3)**	**(4)**
Fiscal policy	0.32** (2.80)	0.28** (2.36)	0.38** (3.49)	0.33** (3.13)
Monetary policy1	-0.09 (-0.73)	-0.12 (-0.86)	0.02 (0.18)	-0.06 (-0.50)
Log(-amplitude)	0.47** (2.01)	0.47* (1.87)	0.32 (1.31)	0.34 (1.50)
Fiscal policy of Japan		0.001 (0.00)		0.26 (1.02)
Fiscal policy of Germany		-0.14 (-0.71)		-0.31* (-1.70)
Fiscal policy of US		0.15 (1.03)		0.30* (1.93)
Monetary policy1 of Japan			-0.36** (-2.16)	-0.53** (-3.14)
Monetary policy1 of Germany			-0.29 (-1.24)	-0.07 (-0.27)
Monetary policy1 of US			0.04 (0.26)	0.11 (0.64)
# of obs.	73	73	73	73

Note:
The dependent variable is the GDP growth rate during the first year after a trough. Panel estimation with fixed effects. *t*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 5: Probability of Exiting a Recession

	(1)	(2)	(3)	(4)
Fiscal policy	0.19**	0.23**	0.24**	0.24**
	(4.18)	(4.73)	(5.07)	(4.76)
Monetary policy1	-0.07	-0.05	-0.05	-0.04
	(-1.47)	(-0.96)	(-0.98)	(-0.77)
Log(-amplitude)	-0.62**	-0.70**	-0.70**	-0.68**
	(-7.55)	(-7.81)	(-7.95)	(-7.37)
Fiscal policy of Japan		-0.10		0.16
		(-1.29)		(1.30)
Fiscal policy of Germany		0.17**		0.01
		(2.06)		(0.08)
Fiscal policy of US		-0.11		0.04
		(-1.47)		(0.45)
Monetary policy1 of Japan			-0.20**	-0.28**
			(-2.50)	(-2.68)
Monetary policy1 of Germany			0.08	0.19
			(0.63)	(1.35)
Monetary policy1 of US			0.05	0.01
			(0.67)	(0.14)
# of obs.	73	73	73	73

Note:
The probability density of recovery is assumed to follow a Weibull distributioin. *z*-ratios are in parentheses. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap*, *inflation*, and *dummy_85* as controlling variables. * and ** denote significance at the 10% level and the 5% level, respectively.

Table 6: Probability of a Recurring Recession

	(1)	(2)	(3)	(4)
Fiscal policy	0.02	-0.02	0.02	-0.02
	(0.33)	(-0.28)	(0.37)	(-0.29)
Monetary policy1	0.16**	0.15*	0.19**	0.16**
	(2.24)	(1.83)	(2.26)	(1.97)
Log(-amplitude)	-0.27**	-0.28**	-0.28**	-0.37**
	(-2.21)	(-2.10)	(-2.20)	(-2.39)
Fiscal policy of Japan		-0.08		-0.11
		(-0.53)		(-0.62)
Fiscal policy of Germany		-0.34**		-0.38**
		(-2.37)		(-2.21)
Fiscal policy of US		0.21*		0.26*
		(1.90)		(1.91)
Monetary policy1 of Japan			0.001	-0.09
			(0.02)	(-0.53)
Monetary policy1 of Germany			-0.16	-0.20
			(-1.07)	(-0.92)
Monetary policy1 of US			0.04	0.20
			(0.30)	(1.08)
# of obs.	73	73	73	73

Note:
Probit estimation of the probability of a recurring recession. The recurrence is defined as another recession that occurs within 5 years. *z*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 7: Recovery from GDP Recessions, Asia

	(1) GDP Growth During the First Year of Recovery	(2) Probability of Exiting a Recession	(3) Probability of a Recurring Recession
Fiscal policy	0.38**	0.33**	-0.03
	(2.03)	(3.59)	(-0.35)
Monetary policy1	0.73**	-0.06	0.66**
	(-2.17)	(-0.86)	(1.97)
Log(-amplitude)	0.45	-0.49**	-0.24
	(0.36)	(-2.84)	(-0.86)
Fiscal policy of Japan	-0.43	0.48**	0.61
	(-0.42)	(2.44)	(1.44)
Monetary policy1 of Japan	-1.10**	0.01	0.91
	(-2.58)	(0.06)	(1.45)
# of obs.	19	19	19

Note:
Numbers within parentheses are *t*-ratios for column (1) and *z*-ratios for columns (2) and (3). * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 8-1: Credit Growth During the First Year of Recovery, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	0.78**	0.66*	0.74**	0.63*
	(2.34)	(1.88)	(2.21)	(1.84)
Monetary policy1	-0.69**	-0.60**	-0.56**	-0.44
	(-2.70)	(-2.18)	(-2.08)	(-1.48)
Log(-amplitude)	-0.003	-0.003	-0.005	-0.004
	(-0.42)	(-0.48)	(-0.78)	(-0.66)
Fiscal policy of Japan		-0.07		-0.18
		(-0.41)		(-1.04)
Fiscal policy of Germany		-0.22		-0.32
		(-0.66)		(-0.97)
Fiscal policy of US		0.65		0.53
		(1.25)		(0.99)
Monetary policy1 of Japan			0.18	-0.04
			(0.38)	(-0.07)
Monetary policy1 of Germany			-0.46	-0.59
			(-1.00)	(-1.22)
Monetary policy1 of US			-0.51	-0.41
			(-1.21)	(-0.96)
# of obs.	69	69	68	68

Table 8-2: Credit Growth During the First Year of Recovery, Asia

	(5)	(6)	(7)	(8)
Fiscal policy	-0.09	-0.09	-0.08	-0.04
	(-0.88)	(-0.76)	(-0.81)	(-0.34)
Monetary policy1	0.09	0.12	0.10	0.04
	(0.54)	(0.67)	(0.62)	(0.23)
Log(-amplitude)	0.03*	0.03	0.03*	0.03
	(1.69)	(1.65)	(1.74)	(1.44)
Fiscal policy of Japan		-0.34		-0.10
		(-0.11)		(-0.20)
Fiscal policy of Germany		-0.24		-1.31
		(-0.18)		(-0.92)
Fiscal policy of US		-1.22		2.47
		(-0.55)		(1.43)
Monetary policy1 of Japan			-1.45	-2.10
			(-1.11)	(-1.28)
Monetary policy1 of Germany			0.69	0.69
			(0.40)	(0.33)
Monetary policy1 of US			-0.05	0.82
			(-0.05)	(0.64)
# of obs.	47	47	47	47

Note:
The dependent variable is the credit growth rate during the first year after a trough. Panel estimation with fixed effects. *t*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 9-1: Probability of Exiting a Credit Contraction, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	-0.06 (-0.97)	-0.06 (-0.85)	-0.05 (-0.80)	-0.04 (-0.52)
Monetary policy1	0.04 (0.77)	0.05 (0.91)	0.05 (0.87)	0.04 (0.71)
Log(-amplitude)	-1.09** (-6.65)	-1.17** (-6.88)	-1.10** (-6.63)	-1.16** (-6.75)
Fiscal policy of Japan		0.03 (0.88)		0.02 (0.56)
Fiscal policy of Germany		0.03 (0.39)		-0.02 (-0.22)
Fiscal policy of US		0.22* (1.77)		0.24* (1.82)
Monetary policy1 of Japan			-0.11 (-0.99)	-0.17 (-1.46)
Monetary policy1 of Germany			0.02 (0.14)	0.04 (0.39)
Monetary policy1 of US			-0.09 (-0.87)	-0.03 (-0.31)
# of obs.	66	66	65	65

Table 9-2: Probability of Exiting a Credit Contraction, Asia

	(1)	(2)	(3)	(4)
Fiscal policy	-0.007 (-0.71)	-0.01 (-1.05)	-0.01 (-0.82)	-0.01 (-0.97)
Monetary policy1	-0.04** (-2.00)	-0.02 (-0.99)	-0.02 (-0.92)	-0.01 (-0.52)
Log(-amplitude)	-1.19** (-5.06)	-1.03** (-4.64)	-1.24** (-4.91)	-1.24** (-4.85)
Fiscal policy of Japan		-0.03 (-0.74)		-0.04 (-0.99)
Fiscal policy of Germany		0.04 (0.31)		-0.03 (-0.17)
Fiscal policy of US		-0.26* (-1.65)		-0.09 (-0.44)
Monetary policy1 of Japan			-0.45** (-1.97)	-0.47** (-2.03)
Monetary policy1 of Germany			0.33 (1.28)	0.31 (1.19)
Monetary policy1of US			0.09 (0.68)	0.08 (0.54)
# of obs.	41	41	41	41

Note:
The probability density of recovery is assumed to follow a Weibull distributioin. *z*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 10-1: Probability of a Recurring Credit Contraction, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	-0.14*	-0.13	-0.16*	-0.16*
	(-1.72)	(-1.58)	(-1.92)	(-1.78)
Monetary policy1	0.08	0.07	0.15**	0.14*
	(1.30)	(1.03)	(1.96)	(1.66)
Log(-amplitude)	0.13	0.13	0.05	0.05
	(0.85)	(0.84)	(0.31)	(0.31)
Fiscal policy of Japan		0.03		0.03
		(0.82)		(0.73)
Fiscal policy of Germany		0.03		0.07
		(0.41)		(0.80)
Fiscal policy of US		0.04		-0.11
		(0.34)		(-0.75)
Monetary policy1 of Japan			0.12	0.17
			(0.88)	(1.15)
Monetary policy1 of Germany			0.22	0.24
			(1.54)	(1.59)
Monetary policy1 of US			-0.38**	-0.41**
			(-2.98)	(-3.04)
# of obs.	70	70	69	69

Table 10-2: Probability of a Recurring Credit Contraction, Asia

	(1)	(2)	(3)	(4)
Fiscal policy	-0.0001	0.006	0.0007	0.27
	(-0.01)	(0.40)	(0.05)	(0.18)
Monetary policy1	0.01	0.01	0.02	0.01
	(0.60)	(0.37)	(0.80)	(0.51)
Log(-amplitude)	0.13	0.18	0.08	0.10
	(0.68)	(0.87)	(0.38)	(0.42)
Fiscal policy of Japan		0.04		0.05
		(0.82)		(0.82)
Fiscal policy of Germany		-0.14		-0.07
		(-0.90)		(-0.39)
Fiscal policy of US		0.16		0.01
		(1.01)		(0.04)
Monetary policy1 of Japan			0.19	0.17
			(1.00)	(0.82)
Monetary policy1 of Germany			-0.21	-0.12
			(-0.96)	(-0.50)
Monetary policy1 of US			-0.10	-0.10
			(-0.70)	(-0.63)
# of obs.	48	48	48	48

Note:
Probit estimation of the probability of a recurring credit contraction. The recurrence is defined as another contraction that occurs within 5 years. *z*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 11-1: Stock Price Growth During the First Year of Recovery, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	0.17 (0.17)	0.25 (0.25)	0.24 (0.26)	0.21 (0.22)
Monetary policy1	0.42 (0.60)	0.37 (0.49)	0.78 (1.11)	0.73 (0.99)
Log(-amplitude)	-0.002 (-0.09)	-0.0001 (-0.01)	0.002 (0.10)	0.003 (0.16)
Fiscal policy of Japan		0.29 (0.47)		-0.13 (-0.21)
Fiscal policy of Germany		0.41 (0.42)		-0.85 (-0.83)
Fiscal policy of US		-0.29 (-0.33)		-0.24 (-0.21)
Monetary policy1 of Japan			-3.04** (-2.45)	-3.34** (-2.54)
Monetary policy1 of Germany			-0.37 (-0.32)	-0.49 (-0.42)
Monetary policy1 of US			-0.14 (-0.15)	-0.03 (-0.03)
# of obs.	122	122	122	122

Table 11-2: Stock Price Growth During the First Year of Recovery, Asia

	(1)	(2)	(3)	(4)
Fiscal policy	-0.07 (-0.24)	-0.20 (-0.59)	-0.09 (-0.32)	-0.21 (-0.59)
Monetary policy1	0.42 (1.54)	0.56* (1.96)	0.41 (1.46)	0.54* (1.81)
Log(-amplitude)	0.02 (0.64)	0.003 (0.09)	0.02 (0.72)	0.005 (0.14)
Fiscal policy of Japan		-2.42 (-1.44)		-0.02 (-1.19)
Fiscal policy of Germany		0.06 (0.02)		0.004 (0.11)
Fiscal policy of US		3.60 (1.15)		0.03 (0.88)
Monetary policy1 of Japan			-0.007 (-0.35)	-0.001 (-0.06)
Monetary policy1 of Germany			0.02 (0.80)	0.009 (0.33)
Monetary policy1 of US			-0.02 (-1.15)	-0.01 (-0.55)
# of obs.	56	56	56	56

Note:
The dependent variable is the growth rate of stock prices during the first year after a trough. Panel estimation with fixed effects. *t*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 12-1: Probability of Exiting a Stock Price Decline, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	0.007 (0.15)	-0.003 (-0.06)	0.02 (0.37)	0.004 (0.08)
Monetary policy1	-0.007 (-0.18)	0.02 (0.50)	-0.006 (-0.13)	0.02 (0.36)
Log(-amplitude)	-1.20** (-9.36)	-1.23** (-9.35)	-1.20** (-9.19)	-1.22 (-9.28)
Fiscal policy of Japan		-0.06* (-1.84)		-0.07 (-1.98)**
Fiscal policy of Germany		0.003 (0.06)		-0.04 (-0.71)
Fiscal policy of US		-0.07 (-1.17)		-0.07 (-1.09)
Monetary policy1 of Japan			0.07 (1.02)	0.05 (0.72)
Monetary policy1 of Germany			-0.11* (-1.70)	-0.13** (-1.96)
Monetary policy1 of US			0.04 (0.53)	0.07 (1.07)
# of obs.	119	119	119	119

Table 12-2: Probability of Exiting a Stock Price Decline, Asia

	(1)	(2)	(3)	(4)
Fiscal policy	0.01 (1.27)	0.02 (1.31)	0.02 (1.23)	0.02 (1.61)
Monetary policy1	0.003 (0.26)	0.008 (0.65)	0.007 (0.53)	0.01 (0.85)
Log(-amplitude)	-1.19** (-6.54)	-1.34** (-6.58)	-1.27** (-6.68)	-1.43** (-6.72)
Fiscal policy of Japan		-0.006 (-0.10)		0.08 (0.95)
Fiscal policy of Germany		0.04 (0.27)		-0.67 (-0.04)
Fiscal policy of US		0.30* (1.92)		0.38** (2.15)
Monetary policy1 of Japan			-0.29** (-2.03)	-0.38** (-2.47)
Monetary policy1 of Germany			0.12 (0.97)	0.07 (0.54)
Monetary policy1 of US			-0.09 (-0.85)	-0.01 (-0.06)
# of obs.	49	49	49	49

Note:
The probability density of recovery is assumed to follow a Weibull distributioin. *z*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 13-1: Probability of a Recurring Stock Price Decline, OECD

	(1)	(2)	(3)	(4)
Fiscal policy	0.01 (0.19)	0.007 (0.09)	-0.01 (-0.12)	-0.01 (-0.18)
Monetary policy1	-0.03 (-0.62)	-0.04 (-0.82)	0.002 (0.05)	-0.02 (-0.28)
Log(-amplitude)	0.22* (1.68)	0.23* (1.68)	0.18 (1.30)	0.20 (1.42)
Fiscal policy of Japan		-0.0004 (-0.01)		0.02 (0.39)
Fiscal policy of Germany		-0.11 (-1.51)		-0.14 (-1.59)
Fiscal policy of US		-0.005 (-0.05)		-0.02 (-0.17)
Monetary policy1 of Japan			-0.13 (-1.28)	-0.18 (-1.59)
Monetary policy1 of Germany			0.08 (0.75)	0.08 (0.74)
Monetary policy1 of US			-0.22** (-2.56)	-0.21** (-2.40)
# of obs.	122	122	122	122

Table 13-2: Probability of a Recurring Stock Price Decline, Asia

	(1)	(2)	(3)	(4)
Fiscal policy	0.006 (0.33)	0.008 (0.41)	0.009 (0.45)	0.01 (0.51)
Monetary policy1	-0.01 (-0.57)	-0.01 (-0.58)	-0.01 (-0.68)	-0.01 (-0.67)
Log(-amplitude)	0.44** (2.38)	0.43** (2.16)	0.49** (2.38)	0.47** (2.14)
Fiscal policy of Japan		0.04 (0.37)		0.002 (0.01)
Fiscal policy of Germany		0.05 (0.29)		0.02 (0.10)
Fiscal policy of US		0.007 (0.03)		0.07 (0.31)
Monetary policy1 of Japan			0.05 (0.33)	0.05 (0.27)
Monetary policy1 of Germany			-0.07 (-0.41)	-0.07 (-0.40)
Monetary policy1 of US			0.15 (0.88)	0.16 (0.81)
# of obs.	57	57	57	57

Note:
Probit estimation of the probability of a recurring stock price decline. The recurrence is defined as another stock price decline that occurs within 5 years. *z*-ratios are in parentheses. * and ** denote significance at the 10% level and the 5% level, respectively. Monetary policy 1 is based on the cyclical adjustment of the interest rate that uses *GDP gap, inflation*, and *dummy_85* as controlling variables.

Table 14: Fiscal Balance of Central Government

	2000–2008 Average	2009[6]	2010[7]
		(% of GDP)	
Cambodia[1]	-3.0	-3.2	—
China, People's Rep. of[1]	-0.8	-3.1	—
Hong Kong, China[4]	2.0	-3.9	—
India[4]	-3.6	-6.0	-6.8
Indonesia	-0.7	-2.6	-1.6
Korea, Rep. of[5]	1.4	-2.1	-0.4
Malaysia[2]	-4.0	-7.4	-5.6
Philippines	-1.8	-3.2	-2.8
Singapore[1,4]	9.3	-3.5	—
Taipei,China[1]	-1.1	-4.0	-4.2
Thailand[4]	-0.3	-4.0	-3.5
Viet Nam[3]	-4.7	-7.0	-6.2
Average	-0.6	-4.2	-3.9

Notes:
— = not available.
[1] Refers to general government balance.
[2] Refers to federal government balance.
[3] Refers to state budget balance.
[4] Fiscal year.
[5] Consolidated budget balance.
[6] 2009 estimates except for Cambodia (International Monetary Fund projection); People's Republic of China, Indonesia, and Thailand (*Asian Development Outlook Update 2009*); and Hong Kong, China (June 2009 projection).
[7] Estimates and government targets.

Source: National sources, *Asian Development Outlook* (various issues), *IMF Article IV* reports, and CEIC.

Table 15: Policy Rate and Lending Rate Reductions During Crises

	1997/98 Crisis						2008/09 Global Crisis					
	Policy Rate			Lending Rate			Policy Rate			Lending Rate		
	Amp	Dur	Sl	Amp	Dur	Sl	Amp	Dur	Sl	Amp	Dur	Sl
China, P.R. of*	-	-	-	-	-	-	189	3	63	216	4	54
Hong Kong, China	75	3	25	175	8	22	325	9	36	250	7	36
India	400	26	15	250	12	21	425	7	61	238	9	26
Indonesia	5779	14	413	1807	27	67	300	9	33	93	7	13
Korea, Rep. of	2085	16	130	895	22	41	325	5	65	239	6	40
Malaysia	807	14	58	579	19	30	150	4	38	99	10	10
Philippines	2087	3	696	752	10	75	200	8	25	318	7	45
Taipei,China	75	6	13	54	6	9	238	6	40	183	9	20
Thailand	1794	9	199	700	15	47	250	5	50	140	6	23
Viet Nam*	-	-	-	-	-	-	700	5	140	1110	8	139
Average	1638	11	194	652	15	39	310	6	55	289	7	41

Notes:
"Amp" refers to amplitude is in basis points. "Dur" refers to duration in months. "Sl" refers to slope, that is, amplitude divided by duration. Amplitude is calculated based on the Harding and Pagan methodology whereby the peak interest rate level refers to the highest level of interest rate or the last peak during the crisis periods and the trough is the first trough as interest rates are eased.
* Interest rate cycles of PRC and Viet Nam during the 1997/98 crisis exhibited no discernible peak and trough.

Source: Authors' calculations based on data from Bloomberg, CEIC, Datastream, IMF *International Financial Statistics,* and national sources.

Figure 1: Definition of Recession/Downturn and Recovery

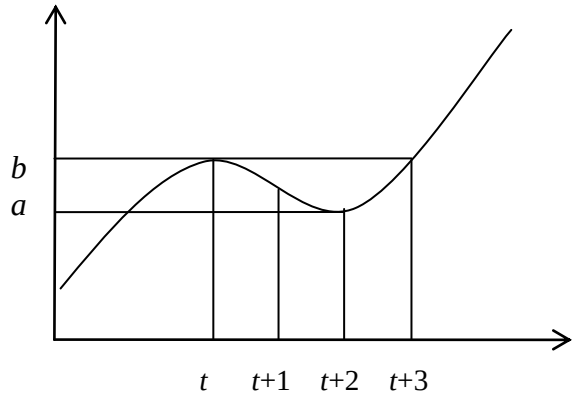


Figure 2: Output Gap from Annual GDP Series vs. Quarterly GDP Series

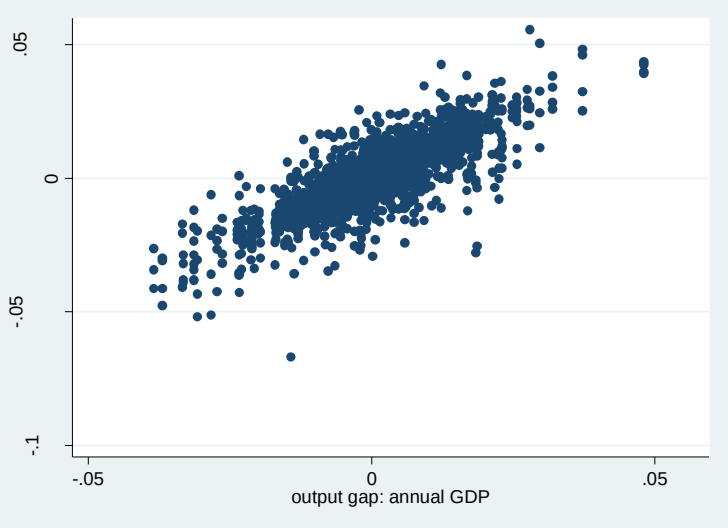
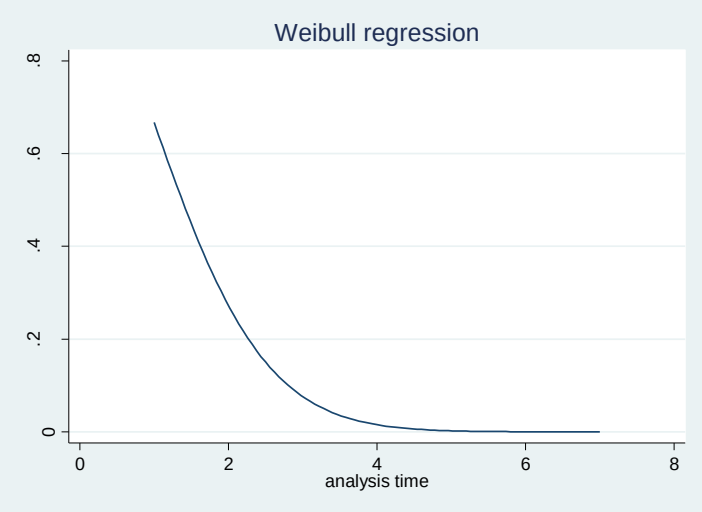


Figure 3: Probability to Remain in a Recession

OECD



Asia

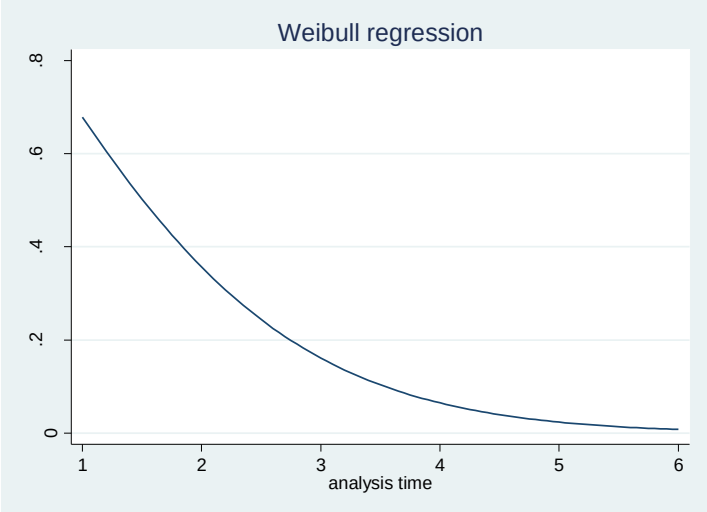
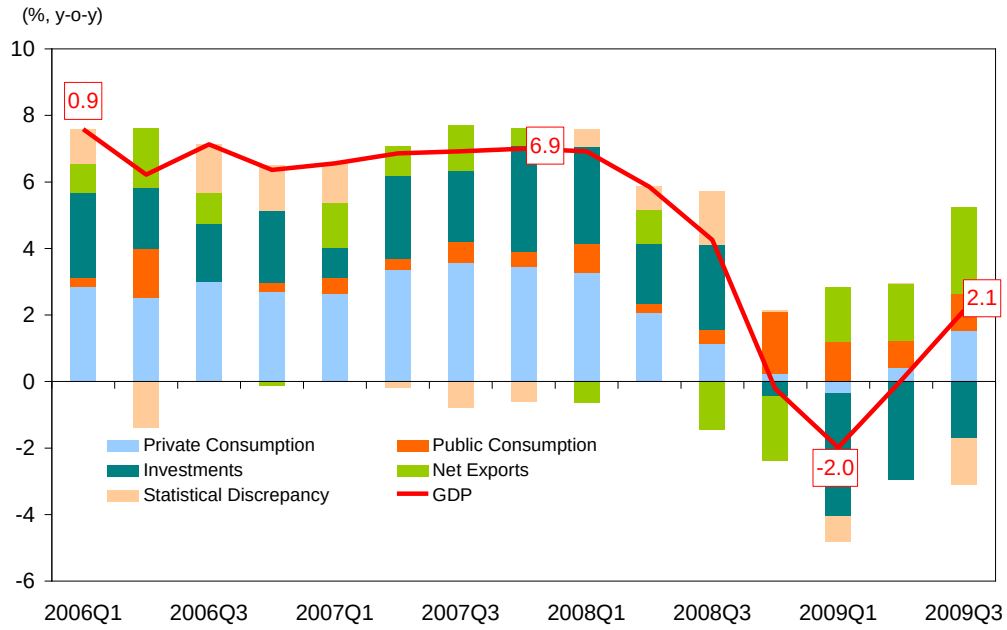


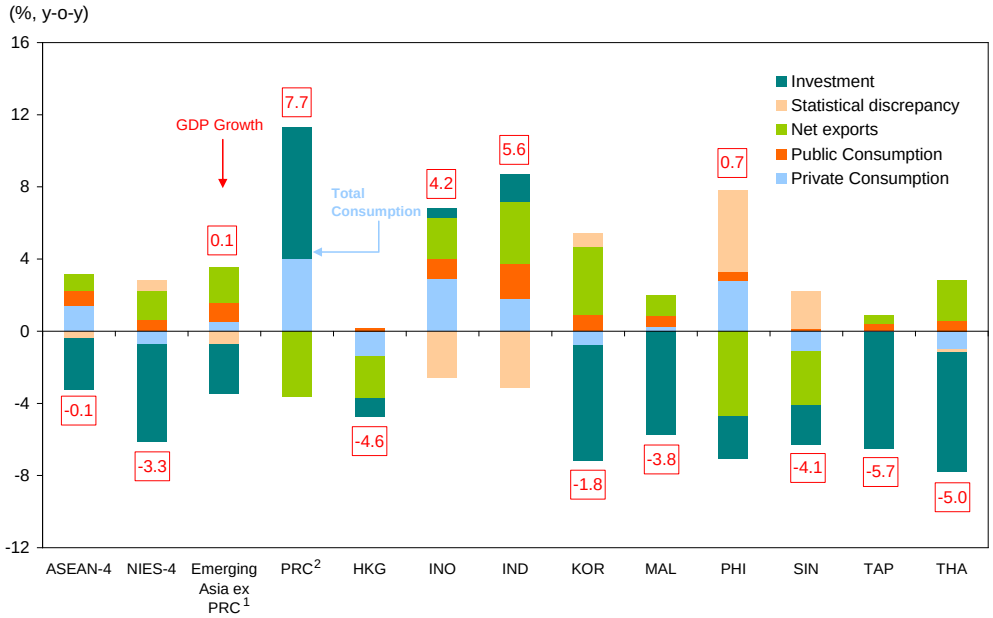
Figure 4: Contributions to GDP Growth: Emerging Asia excl. PRC[1]



Notes: Emerging Asia refers to ASEAN-4 (Indonesia, Malaysia, Philippines, and Thailand), NIEs-4 (Hong Kong, China; Republic of Korea; Singapore; and Taipei,China) plus India. People's Republic of China (PRC) is not included because it does not have the same quarterly component breakdowns.

Source: Authors' calculations based on CEIC data.

Figure 5: Contributions to GDP Growth by Region and Country (first three quarters of 2009)

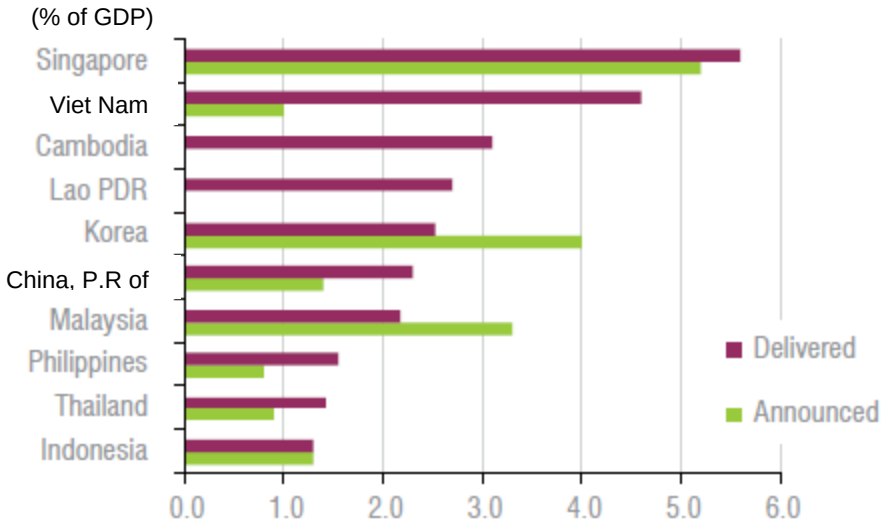


Notes: PRC=People's Rep of China; HKG=Hong Kong, China; INO=Indonesia; IND=India; KOR=Republic of Korea; MAL=Malaysia; PHI=Philippines; SIN=Singapore; TAP=Taipei,China; and THA=Thailand.

[1] Refers to ASEAN-4 (Indonesia, Malaysia, Philippines, and Thailand) plus NIEs-4 (Hong Kong, China; Republic of Korea; Singapore; and Taipei,China) plus India.
[2] For PRC, Total Consumption (Public plus Private Consumption) is used as no breakdown is available.

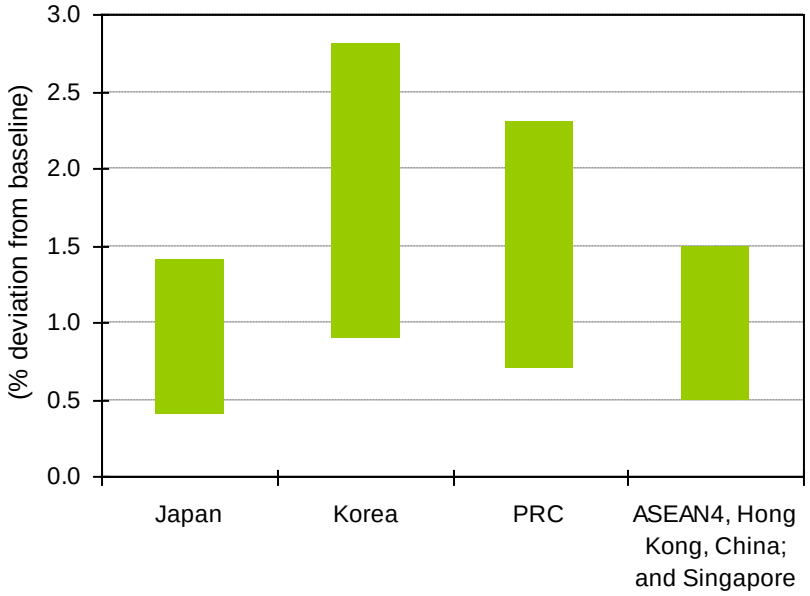
Source: Authors' calculations based on CEIC data.

Figure 6: Fiscal Measures Announced and Delivered in 2009



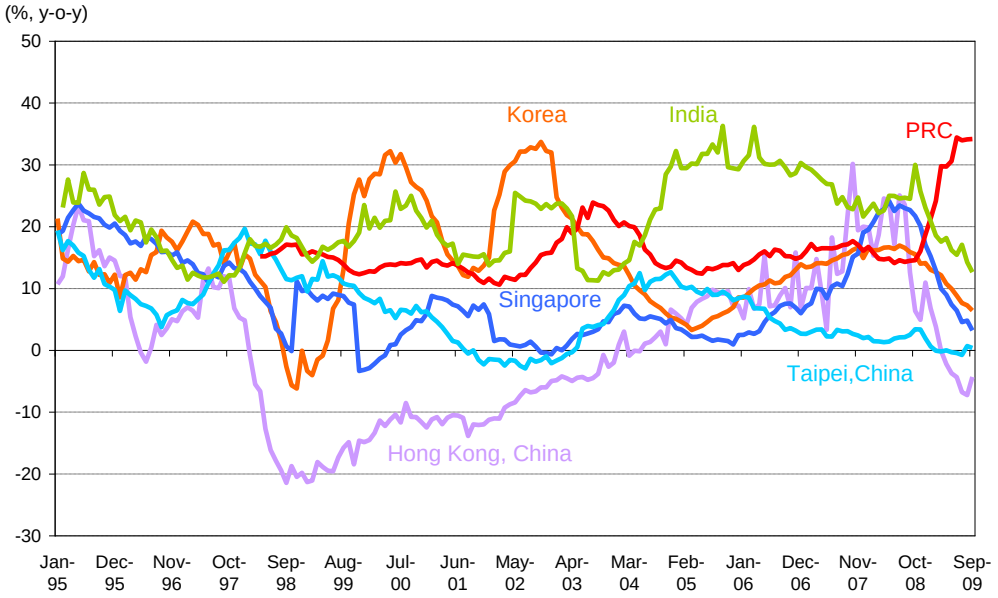
Source: Figure 37, World Bank (2009)

Figure 7: Impact of Fiscal Stimulus on 1H2009 Growth



Source: Box 1.2, IMF (2009b).

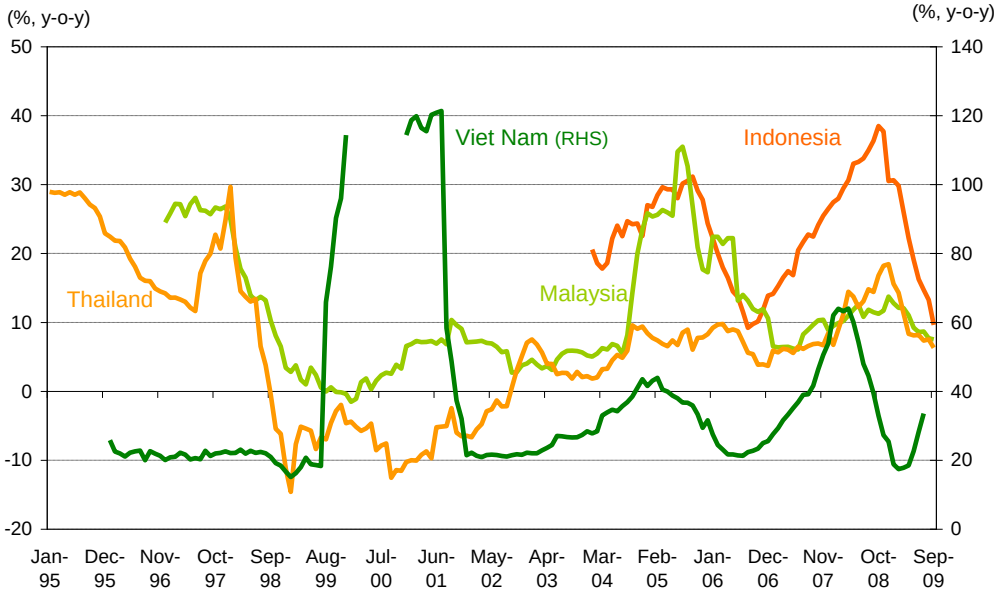
Figure 8: Bank Lending Growth NIEs-4, PRC, and India



Notes: NIEs-4 comprises Hong Kong, China; Republic of Korea; Singapore; and Taipei,China. Data for Hong Kong, China refer to authorized institutions' loans and advances; Republic of Korea, commercial and specialized bank loans; Singapore, domestic banking institutions' loans and advances; and Taipei,China, domestic bank loans and advances.

Source: Authors' calculations based on data from CEIC and central bank websites.

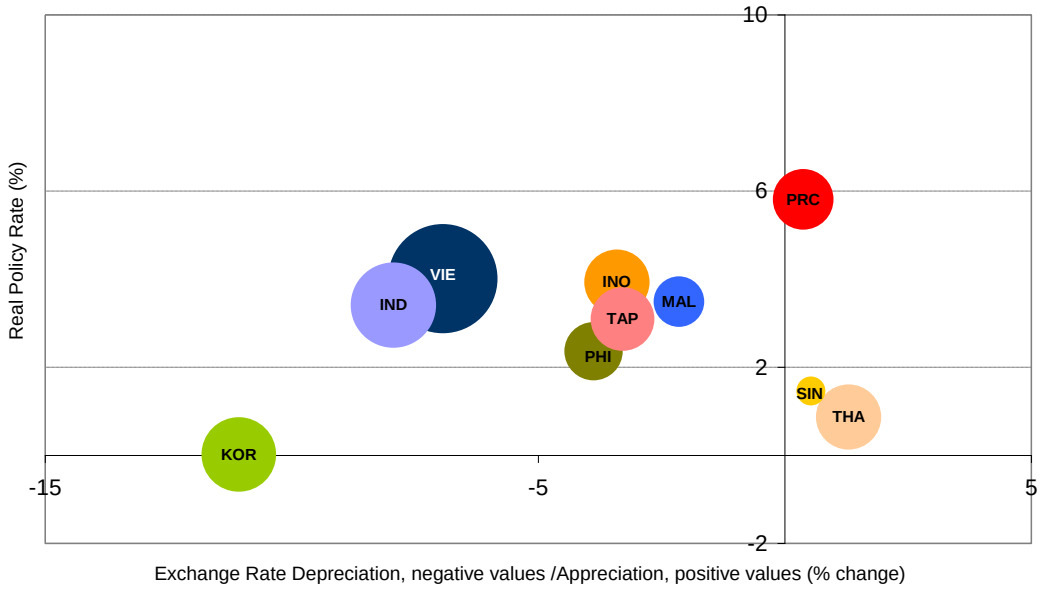
Figure 9: Bank Loan Growth Selected ASEAN Economies



Notes: Data for Indonesia refer to commercial bank loans; Malaysia, commercial bank loans and advances; Philippines, commercial and universal bank loan portfolio; and Thailand, commercial bank loans.

Source: Authors' calculations based on data from CEIC and central bank websites.

Figure 10: Monetary Conditions (end-August 2008 to end-October 2009)



Notes: PRC=People's Rep of China; HKG=Hong Kong, China; INO=Indonesia; IND=India; KOR=Republic of Korea; MAL=Malaysia; PHI=Philippines; SIN=Singapore; TAP=Taipei,China; and THA=Thailand. Real policy rate is calculated as end-October nominal policy rate minus the latest available consumer price inflation rate. Exchange rate changes are percentage changes vis-à-vis the US dollar between the two periods.

Source: Authors' calculations based on Bloomberg data and national sources.

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