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Dynamics Between Stock Market Movements And Fiscal Policy: Empirical Evidence From Emerging Asian Economies

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Abstract

Pro-cyclical fiscal policy has raised concern in many emerging economies due to its adverse consequences to the economic activities. This paper takes a different approach to the issue, which aims to examine the bidirectional relationships between fiscal policy and stock market activities, using a panel of 12 emerging Asia-Pacific economies from 1990 to 2015. We estimate a variety of Panel Vector Autoregressive models to test for the consistence of the results. The empirical results show that fiscal policies in these countries tend to a pro-cyclical path in responding to stock market movements. The pro-cyclical behavior is found with both government expenditure and government revenue. On the other hand, a fiscal consolidation attempt has a rewarding effect on stock prices.

Keyword Financial market, stock market, fiscal policy, PVAR, emerging markets.

1 Introduction

The aftermath of the recent global financial crisis has characterized most financial markets around the world with sharp collapse of asset prices, in particular equity prices, and obliteration in wealth. Although these markets have been gradually recovered since the financial crisis outbreak, both policymakers and the academic world would have been interested in investigating the stabilizing role of macroeconomic policies on the financial market. The role of the financial market is not limited to the allocation and supply of financial resources, but may extend to the synchronization of macroeconomic policies. Answering this question helps to avoid the recurrence of such unfavorable incident and effectively counter it using proper fiscal or monetary policy.

Moreover, in the middle of the recent financial distress, policymakers have called on the stabilizing role of fiscal policy to mitigate the adverse consequences and foster economic growth. Ever since, financial market's development has played a crucial role in the conduct of macroeconomic policy. For instance, governments worldwide have been injected large fiscal stimulus packages to restore financial stability in the banking sector, provided loan guarantees and obtained positive results. Asset prices have gradually picked up and improved public finance situation by means of the revenue channel (Tagkalakis, 2011).

Regarding the emerging markets, the conduct of fiscal policy in these economies has caused major concern. Numerous countries are characterized with unsustainable fiscal deficits, inflation, high level of public debt and high risk premium on debt. This fiscal context is related to low degree of financial development, as well as high degree of dollarization and exchange rate pass-through. This situation precipitates the predominance of pro-cyclical policy in the developing world (Mohanty, 2012). Such policy can be dangerous as it would prolong the current business cycle, worsening booms and intensifying busts. If this is the case, then fiscal policy in emerging markets will not have the deserving stabilization effects on either the economy or the financial market.

For developed countries, there are many studies investigating the impacts of macroeconomic policy on stock market movements. Recent research has been dedicated to understand the transmission mechanism of fiscal policy shocks to financial market and vice versa (Akitoby and Stratmann, 2008; Ardagna, 2009; Arin et al., 2009; Castro, 2010; Agnello and Schuknecht, 2011; Agnello and Sousa, 2013; Agnello et al., 2012; Agnello and Nerlich, 2012; Agnello and Sousa, 2011; Agnello et al., 2015; Da et al., 2018; El Montasser et al., 2015; Heim, 2011). Most of these studies focus on developed economies. As for developing economies, there is not much attention being paid, we can quote the empirical work of Aye et al. (2014); Gupta et al. (2014) on South Africa. This relationship in developing and emerging markets is not guaranteed because stock markets in developing world have smaller size and more illiquid in comparison with their counterparts in developed world. To our knowledge, the literature covering this issue in emerging economies is still limited. We would like to contribute to the literature by investigating these relationships using an update emerging Asia-Pacific economies database.

The motivation of this research is many fold. The understanding of the transmission channel of fiscal policy to financial market is not yet complete. On both theoretical and empirical aspects, many authors disagree on the impacts of tax policy on asset prices. For instance, Afonso and Sousa (2011, 2012) praise the positive effect of taxes on asset prices, while Tavares and Valkanov (2001) condemn the negative effect of taxes on asset prices through both direct and indirect channels. Ardagna (2009) shows that a fiscal consolidation accompanying a reduction in public debt would lead to an increase in stock prices. On the other hand, the effects of expenditure are ambiguous, which can change sign between long – run and short – run (Tavares and Valkanov, 2001). The puzzling empirical results between the two variables deserve another research. Secondly, we want to further investigate the underlying dynamics between government budget balance and stock market return. Agnello and Sousa (2013) examine these relationships and find a fiscal tightening situation to a shock in stock prices. However, Agnello and Sousa (2013) did not explain the origin of this fiscal tightening. In another case, Thorbecke (2002) also did not explain how budget deficits would negatively affect stock prices. In this study, we approach the problem through the traditional budget balance, but we will shed the light on these intertwined relationships and explain how budget balance reacts and responds to stock prices. Thirdly, by using discretionary expansionary fiscal policy and appropriate automatic stabilizers, the magnitude and duration of a financial crisis in developed countries are reduced (Clements et al., 2010). However, these positive impacts of countercyclical fiscal policies are less pronounced in emerging markets. Indeed, the financial markets in these countries can barely absorb the government stimulus packages because of pro-cyclical spending bias, narrow automatic stabilizers, limited access to credit and inadequate fiscal space before the crisis (Hartnett et al., 2002; Kaminsky et al., 2004). In fact, there is evidence that fiscal policies in emerging Asian economies tend to be procyclical to the economic cycle. Procyclicality is prevalent in these countries since poor macroeconomic conditions prevent governments from effectively conducting countercyclical policies. Duval and Singh (2013) report that several Asian economies are still struggling to escape the procyclical trap, such as India, Vietnam, Malaysia and Indonesia. Furthermore, fiscal policies in nine over 12 countries of the sample are found procyclical (Bangladesh, China, India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, and Thailand) (Frankel et al., 2013). Procyclical policies can be detrimental to the economy since they tend to exacerbate boom/bust cycle. In the case of financial markets, procyclicality can hamper the stabilizing effects of fiscal policy on asset prices.

The paper is planned as follows. First, we identify the transmission channels of the impact of fiscal policy on financial markets and vice versa in the review literature section 2. Section 3 provides our empirical model, methodology and a data description of our sample. In section 4, we study the fiscal policy reactions (and notably the primary balances) to financial market movements and vice versa using the results of the impulse-response functions for a variety of systems. Section 5 concludes the study.

2 Literature review

The literature can be divided into two main streams: the first one investigates the impact of fiscal policy on asset markets, including stock market, and the other one examines the response of policy maker to fluctuations in asset prices.

First, fiscal policy can affect financial markets through certain mechanisms (Darrat, 1988; Tavares and Valkanov, 2001; Eschenbach and Schuknecht, 2002; Jaeger and Schuknecht, 2007; Akitoby and Stratmann, 2008; Arin et al., 2009; Afonso and Sousa, 2011, 2012; Aye et al., 2014)

Eschenbach and Schuknecht (2002) highlight three possible transmission channels in which fiscal variables can affect asset prices: (i) the tax and/or subsidy programs; (ii) the discretionary policies and (iii) government bailouts. The tax/subsidy programs channel their effects to asset prices through the rate of return. Taxing capital gains lessens firms net profits and thus lowers their market values. Turnover taxes can make the assets more or less liquid on the market, which can alter their prices. Conversely, subsidy programs can give rise to the net profits and consequently, the asset prices. Equally, government can influence asset prices by means of discretionary policy. For instance, a policy that allows more tax deduction on mortgage interest would lower net interest rate. This results in higher expected value of the assets. However, the timing of such policies is important as it can have an impact on the magnitude of the outcomes. Government bailout is another possible channel affecting asset prices. Asymmetric information relating to government bailouts can lead to imprudent practice in the market and disturb the volatility of asset prices. Despite that, government can control this moral hazard problem by means of regulations and legislative procedures.

On the other hand, Tavares and Valkanov (2001) consider two channels, both direct and indirect, in which taxes and government spending can have an impact on stock prices. When the fiscal revenue increases without changes in government spending, a government can lessen the supply of bonds. As a consequence, their expected returns would lower, whereas their prices rise. Investors would have less incentive to invest in the bond market and adjust their portfolio accordingly. This results in lower returns of assets. The characteristics of the tax shock will determine its length and magnitude. Another channel that fiscal policy shocks can affect financial market is the impact of fiscal variables on sovereign risk spread (Akitoby and Stratmann, 2008). As for the indirect channel, Tavares and Valkanov (2001) argue that an increase in taxes has a negative impact on economic growth which in turn affects the cash-flows of companies and thus, leads to an instant decline of stock prices and bond returns. Government spending could also affect asset prices in the same manner. In a VAR framework, Tavares and Valkanov (2001) find that the effect of fiscal policy, especially tax receipt, on financial assets has the same magnitude as that of a monetary policy. However, the impact of fiscal policy persists longer. The results are in line with that of Aye et al. (2014) , who study the relationship using data in South Africa. In contrast, Afonso and Sousa (2011) examine the response of asset prices, including housing prices and stock prices, to fiscal policy shocks for the cases of the U.S, the U.K, Germany and Italy. Afonso and Sousa (2011) find that government revenue has positive impact on stock prices while government spending has negative impact on stock prices. Similar results are found in Afonso and Sousa (2012).

Apart from that, public deficit can also make stock prices plunged. A shortfall in public budget deteriorates lending conditions, which in turn creates pressure on the interest rate. Higher interest rate lowers the expected return as the value of future cash-flows drops. Investors also demand a higher risk premium, and eventually, stock prices sink (Agnello and Sousa, 2013) . This view is in the same line with the so called “crowding out” effect as noted in Heim (2011) . By using a panel VAR framework for ten industrialized countries, Agnello and Sousa (2013) find evidence that an upsurge in fiscal deficit triggers a decline in stock prices. Ardagna (2009) finds that a fiscal consolidation accompanying a reduction in public debt would lead to an increase in stock prices.

Agnello and Schuknecht (2011) point out two main channels transmitting the effect of asset prices movement to fiscal balance. The first one is called the direct revenue channel, where an increase in asset prices creates windfall taxes relating to capital gains, households and corporates profit. Thus, the more the assets (financial assets or real estate) appear in the household balance sheets, the larger the revenue effects become. These effects are also dependent on the current tax system. Other than that, Eschenbach and Schuknecht (2002) mention turnover taxes as a significant contributor to the revenue effect, especially in industrial countries. The second channel is considered indirect since a raise in asset prices can boost confidence and wealth of the private sector and thus increase the aggregate demand. This will in turn increase government revenue. On the contrary, a steep decline in asset prices may trigger government stimulus packages and thus change the government spending, not to mention the fact that fluctuation in asset prices can break the consumer’s moral and eventually degrade total demand. At the empirical level, many authors confirmed the impact of asset prices fluctuation on the conduct of fiscal policy (Morris and Schuknecht, 2007; Tujula and Wolswijk, 2007; Agnello and Schuknecht, 2011; Agnello et al., 2012, 2013, 2015; Tagkalakis, 2011; Da et al., 2018).

3 Methodology and data

3.1 Econometric specification and variables

To examine the potential bidirectional relationship between financial market movements and fiscal policy, we employ a reduced-form Panel Vector Autoregressive model (PVAR). This method enables us to control for unobserved country heterogeneous fixed effects, as well as correct possible bias related with a low degree of freedom in a single time-series VAR (Jawadi et al., 2016). The structural PVAR model takes the form of:

$$A_0 Z_{it} = A(L) Z_{i,t-1} + f_i + e_{it} \quad [1]$$

Z_{it} is the ($m \times 1$) vector of endogenous variables; A_0 is the ($m \times m$) matrix capturing all contemporaneous behavior of the endogenous variables; $A(L)$ is a matrix polynomial in the lag operator L; f_i is the individual fixed effect; e_{it} is the ($m \times 1$) vector of structural shocks. By multiplying both sides of equation 1 by A_0^{-1}, we obtain the reduced-form PVAR model:

$$Z_{it} = \tau(L) Z_{i,t-1} + \nu_i + \epsilon_{it} \quad [2]$$

with $\tau(L) = A_0^{-1}A(L)$; $\epsilon_{it} = A_0^{-1}e_{it}$; $v_i = A_0^{-1}f_i$

Estimates of the parameters using OLS for each equation would be biased due to the presence of lagged dependent variables, even with large N (Nickell, 1981). Also, the PVAR setup requires the identical underlying structure for each individual. Love and Zicchino (2006) considered this constraint impractical and introduced individual fixed effect into the model to overcome the restriction on parameters. Estimation of the system 2 requires removing the individual fixed effect. However, elimination of fixed effect using first difference transformation makes estimated coefficients biased and reduces the number of observations, especially in unbalanced panels. To reduce the magnitude of this problem, we use the forward orthogonal deviation proposed by Arellano and Bover (1995). In stead of subtracting the lagged values, the forward orthogonal deviation subtracts the average of all available future observations. Thus, the problem of data loss is minimized. Furthemore, the orthogonal condition between transformed variables and lagged values is preserved. To this end, we use GMM estimators following Abrigo and Love (2016) to consistently estimate our parameters in the model. This process is also followed by Jawadi et al. (2016).

The baseline model considers a (4 × 1) vector of endogenous variables Z_{it}:

$$Z_{it} = \begin{bmatrix} BUD_{it} \\ DEB_{it} \\ GAP_{it} \\ RET_{it} \end{bmatrix} \quad [3]$$

where BUD_{it} denotes the ratio of budget balance to GDP. In this study, we will use two budget balance variables: the primary budget balance (PRI_{it}) and the overall budget balance (OVE_{it}). DEB_{it} denotes the ratio of public debt to GDP, GAP_{it} denotes output gap as a percentage of GDP and RET_{it} denotes the growth rate of equity prices indicator, which is used as a proxy for financial market movements.

The use of primary budget balance as a proxy for fiscal policy is preferable to the use of cyclically adjusted balance in this type of model because of the two main arguments: (i) the complexity of calculating cyclically adjusted balances and (ii) the likeliness of policy makers to adjust contemporaneously to non-cyclically adjusted values (Tagkalakis, 2011). Thus, we will use the primary budget balance without cyclical adjustment. However, our model can still capture the cyclical economic condition by using the output gap variable. Besides, we also use government overall balance as a dependent variable to verify the robustness of our results.

Favero and Giavazzi (2007) stress the importance of introducing public debt in the model with dynamic effects of fiscal shocks. When government have some debt stabilization motive, one could expect a correlation between budget variables and the level of debt ratio. Thus, adding public debt helps to examine whether debt stabilization and sustainability motives exist. In addition, there is evidence that public debt can affect the output variable. Failing to include public debt in such model may result in the omitted variable bias. The next variable

in the system is output gap, which is crucial to determine the cyclical stabilization motive of fiscal authorities.

Using the growth rate of equity prices as a proxy for the movements in financial markets brings us the possibility to examine the response of government to changes in financial market and vice versa. This paper focuses on the bidirectional relationship between fiscal variables and fiancial markets movements. However, Tagkalakis (2011) argues that cyclically economic condition can have an impact on financial markets movements. In addition, stock markets can be affected by an exogenous shock that homogeneously affects all countries (For instance: Financial crises). These impacts would blur the potential effect of fiscal policy on financial markets. To control for this issue, we use a standard instrumental variable regression to remove the possible impact of such exogenous shocks on financial markets. Then, the residuals will enter the model as the financial variable.

From the reduced-form PVAR in Equation 2 and the vector Z_{it} in (3), we can construct the equation for the structural shocks of the system : $e_{it} = A_0 \epsilon_{it}$, which can be expressed in matrix term:

$$\begin{bmatrix} 1 & -\alpha_{pb} & -\alpha_{py} & -\alpha_{ps} \\ -\alpha_{bp} & 1 & -\alpha_{by} & -\alpha_{bs} \\ -\alpha_{yp} & -\alpha_{yb} & 1 & -\alpha_{ys} \\ -\alpha_{sp} & -\alpha_{sb} & -\alpha_{sy} & 1 \end{bmatrix} \times \begin{bmatrix} \epsilon_{it}^{p} \\ \epsilon_{it}^{b} \\ \epsilon_{it}^{y} \\ \epsilon_{it}^{s} \end{bmatrix} = \begin{bmatrix} e_{it}^{p} \\ e_{it}^{b} \\ e_{it}^{y} \\ e_{it}^{s} \end{bmatrix} \qquad [4]$$

Where $\epsilon_{it}^{p}, \epsilon_{it}^{b}, \epsilon_{it}^{y}, \epsilon_{it}^{s}$ are the reduced-form residuals of fiscal policy, public debt, output and equity prices, respectively. $-\alpha_{mn}$ denotes the contemporaneous response of variable m to variable n.

As in a traditional SVAR, imposing restrictions on the elements of matrix A_0 is required to estimated (2). A four-variable PVAR requires at least six restrictions on the elements of of matrix A_0. In previous literature, it is common to assume that fiscal variables, namely budget balance and government debt, are the most exogenous and do not respond contemporaneously to other variables in the system (See Beetsma et al. (2006, 2008); Caldara and Kamps (2008); Arin et al. (2009); Lof and Malinen (2014))[1] . This assumption can be explained by several reasons. Fiscal variables take place before output since government expenditures are part of output, so this assupmtion is feasible. Furthermore, Beetsma et al. (2006); Lof and Malinen (2014) argue that fiscal budget, especially government spending is planned before the fiscal year so the fiscal variable is not likely to react immediately to output shocks. Tavares and Valkanov (2001) attribute the contemporaneously unresponsive behavior of fiscal variables to the sluggishness of legislative and bureaucratic procedures. This assumption requires that:

[1] However, some authors (For instance Favero (2002)) argue that fiscal variables can respond contemporaneously to economic activities, especially in the presence of automatic stabilizers. The paper will also consider this alternative assumption in the robustness test section.

$$-\alpha_{pb} = -\alpha_{py} = -\alpha_{ps} = -\alpha_{by} = -\alpha_{bs} = 0$$

This leaves us with only one restriction. In line with the work of Arin et al. (2009), we model stock market return with the assumption of an efficient market. This implies that stock prices will respond contemporaneously to shocks of other variables, leaving the elements $-\alpha_{sp}$, $-\alpha_{sb}$, $-\alpha_{sy}$ of matrix A_0 unrestricted. Finally, we assume that output is more exogenous than stock prices. Thus, output gap does not respond contemporaneously to stock prices, but with a lag. This assumption requires $-\alpha_{ys} = 0$.

These assumptions imply that: (i) Fiscal variables do not respond contemporaneously to other variables in the system; (ii) Output responds only to fiscal variables in the same period; (iii) Financial market reacts contemporaneously to all other variables; but can only affect them with a lag.

3.2 Data

We use a yearly panel dataset of 12 emerging Asian economies, namely Bangladesh, China, Fiji, India, Indonesia, Malaysia, Maldives, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam from 1990 to 2015. The emerging criterion is based on the definition of International Monetary Fund. Although the use of quarterly data is common in the literature, using annual data has several advantages: (i) Shocks relating to annual data would approximate actual shocks because policy makers often review their policy yearly; (ii) Seasonal adjustment is not necessary with annual data. The macroeconomic variables are taken from World Economic Outlook database, International Monetary Fund, April 2016 including GDP based on purchasing power parity valuation of country GDP, general government revenue, general government expenditure, government overall balance and government primary balance. We also obtain stock market data on the site of the International Monetary Fund. Potential GDP is then calculated using Hodrick and Prescott (1997) filter with recommended smoothing parameter of 6.25 for annual data. Key statistics are reported in Table 1.

4 Empirical results

In this section we discuss the impulse-response functions derived from various panel VAR systems. Before estimating our panel VAR parameters, we made sure that our systems have the optimal lag length based on three selection criteria proposed by Andrews and Lu (2001), namely MBIC, MAIC and MQIC. Lag length with smallest value of these criteria is chosen. A system with insufficient lags would fail to convey the dynamics among the variables and have omitted variable bias, while a system with excess lags would lose its degrees of freedom. We then present the impulse-response functions with 95% two standard-error confidence intervals, which are obtained by bootstrapping method (1000 draws). We tried to estimate the confidence intervals with different draws but the results stay the same.

4.1 Baseline specifications with budget balance

Figure 1 presents the impulse-response functions of the endogenous variables in our first system. In this system, the ordering of endogenous variables in the (4 × 1) vector Z_{it} is [*PRI*, *DEB*, *GAP*, *RET*]′. The first measure of budget balance is the primary balance. The upper panel of Figure 1 shows the responses of all variables in the system to a one standard-deviation shock in equity prices growth rate. Output responds with an increase in the next period, then the shock dies out. Regarding the fiscal variables, which are the public debt and the primary balance, they behave in an interesting manner. We observe an increase in the public debt and a decrease in primary balance after a positive shock in stock prices.

The results of our empirical model are contradict to those of Tagkalakis (2011); Agnello and Sousa (2013) , who study the relationship for developed and OECD countries. Their finding suggests a countercyclical behavior of fiscal policy to a stock price boom, that variation in stock prices could contribute to a sustainable fiscal stance. The fiscal variables in our study, on the contrary, behaves in a pro-cyclical manner to an upsurge in stock price. However, this does not attribute pro-cyclical fiscal policy to all countries in the sample. This simply implies that this trend is dominant in these countries. Governments in OECD countries prefer countercyclical policies, while their counterparts in developing countries incline toward pro-cyclical policies (Kaminsky et al., 2004). Alesina et al. (2008) gives out two reasons fiscal authorities in developing countries prefer using pro-cyclical policy: (i) restricted access to international debt markets during a recession; and (ii) political and institutional preferences create incentive to spend more in an economic boom. Because of their usual low credit rating in the international debt market, developing countries are required to consolidate their fiscal positions during a recession, thus force them to reduce public expenditures and increase taxes. During a boom period, governments in emerging countries have less intention to save, but more to spend because they hold on to the impression that economic expansion can keep going on. For instance, India and Viet Nam have exceptionally turned out to be more pro-cyclical in the past decade. Or, Indonesia and Malaysia, being rich in natural resources, depend largely on taxes from oil or mineral industries, which tends to be pro-cyclical (Duval and Singh, 2013).

The lower panel of Figure 1 shows the responses of stock markets to different shocks in the system, namely stock market shock, output gap shock, public debt shock and primary balance shock. In this first system, stock market return is assumed to react contemporaneously to other shocks. Stock market response to its own shock dies out quickly after a period. We observe that the response of stock market return to shocks in output gap is positive but insignificant. In the same manner, shocks in public debt have a contemporaneously insignificant impact on stock market return.

A rise in primary balance, or a decrease in budget deficit rallies the market and pushes stock return up. The positive effect is insignificant at first but becomes significant after a period. Agnello and Sousa (2013) suggest one possible channel transferring the fiscal shocks to the stock market is the interest rate or the credit channel. Fiscal shocks can influence the interest rates through several ways. A higher budget deficit in a standard IS-LM framework would raise the aggregate demand and short-term interest rates, *ceteris paribus*. The future situation of the fiscal stance will determine the behavior of the long-term interest rate. Given that

investors are forward-looking, they will look at both today short-term interest rate and tomorrow expected short-term rate. For instance, further deterioration in current deficit and higher anticipation of future deficit would give rise to short-term interest rates in both period and current long-term rates. Or, a higher budget deficit would bring up the interest rates if the increase in private saving cannot offset the reduction in aggregate saving and foreign capital inflows are not sufficient to counterbalance the deficit.

Another channel is through the rise of public debt[2]. An increase (decrease) in budget deficit would raise (lower) the interest rate. Higher (lower) interest rate makes investment in stock less (more) attractive and thus, reduces (increases) stock prices [3] . However, in the long run, investors anticipate favorable (unfavorable) effects of a fiscal expansion (tightening) and stock price would recover to the equilibrium level. Furthermore, Ardagna (2009) proposes another explanation based on the 'expectation view', which links the effect of fiscal policy to the sustainability of public debt. Investors can sometimes view the tightening of fiscal balance as a signal of regime switching. It may bring out a sign that the economy has started to recover and does not need another massive stimulus package. Assuming that the government tightens their fiscal policy to stabilize the economy and maintain a sustainable public debt. The investors would take this piece of information as good news and thus reduce the risk premium demanded for their government bonds. The real interest rate would go down next, which could trigger a gain in the return of financial assets.

Next, we consider another setup of the PVAR system by replacing the primary budget balance with the overall budget balance in utilizing the following ordering [*OVE*, *DEB*, *GAP*, *RET*]′. We present the responses of all variables to a shock in stock prices in the upper panel of Figure 2, while the lower panel shows the responses of stock prices to shocks in other variables. Basically, the behaviors of our variables are similar to the first system.

4.2 Other specifications using government revenue and government expenditure

In the following section, we will further investigate the relationships between stock markets movements and fiscal policy by decomposing the budget balance into government expenditure and government revenue. We try to explain the reason for the dynamics between the budget balance and the market return by finding the appropriate transmission channel. The vector of endogenous variables will take the following form [*REV*, *EXP*, *DEB*, *GAP*, *RET*]′, as in Arin et al. (2009). Government revenue is ordered before government expenditure because of the government budget constraint assumption. According to Ricardian Equivalence, there exist intertemporal relations among taxes, expenditure and public debt. This setup allows government expenditure shocks to affect government revenue only with a lag. Both government revenue and expenditure can affect output contemporaneously. We

[2] Although we do not report the response of public debt to a shock in fiscal policy, the impulse response function does exhibit a negative response of debt to a consolidation attempt of fiscal policy, or in another words, positive response of debt to an increase in budget deficit.

[3] See AppendixB for the evidence of a negative response of stock prices to a surge in the interest rate.

show the impulse-response functions of the variables in the system three in Figure 3. The dynamics among stock market prices, public debt and output gap remain identical to the first two systems, which adds to the robustness of the empirical results.

In the upper panel of the Figure 3, government revenue reacts in a negative manner to a surge in stock prices after a period. This result sharply characterizes the pro-cyclical behavior of government revenue after a period of stock market boom. On the contrary, an increase in government revenue can have rewarding effect on stock market return, as can be seen in the lower panel of Figure 3. These results are in line with Afonso and Sousa (2011, 2012), who used an SVAR framework to study the responses of stock markets to fiscal stance in several developed countries. They point out the importance of including debt feedbacks in the empirical model. Investors would anticipate an economic recovery associating a fiscal consolidation in the medium and long term. Thus, optimistic expectation would raise stock prices. However, the positive effect of government revenue is not very significant.

Government expenditure reacts positively and significantly after an upsurge in stock prices. Thus, government expenditure also reacts in a pro-cyclical manner after an upswing in stock prices. As for the impact of a spending shock on stock prices, the market reacts negatively to the shock, penalizing a loose fiscal policy. As in the case of the government revenue, the response is insignificant at first but becomes significant in the next period.

In conclusion, both government expenditure and government revenue respond to shocks in market return, but in opposite manners, which explains for the negative responses of primary balance and overall balance in the upper panel of Figure 1 and Figure 2. Ardagna (2009) shows that a fiscal consolidation accompanying a reduction in public debt would lead to an increase in stock prices.

4.3 Further robustness checks

In this section, we explain further test for the robustness of our PVAR systems with additional setups [4] .

Recent empirical evidences find that financial crisis could alter the behaviors of fiscal authorities and financial markets (Agnello et al., 2013, 2015). The adverse effects of major financial crises can interfere with the effectiveness of the policies and expectations of the financial markets. To test for the possible intervention of the recent financial crisis, we conduct another robustness test by estimating the previous PVAR systems with the sub-sample of the pre-crisis period (prior to 2008). AppendixA reports the impulse-response functions of the sub-sample PVAR models. Then, we compare the results of the full sample with those of the pre-crisis sample to see how the financial crisis affected these findings. Figure A4 shows the impulse response functions for the pre-crisis period of the system [*PR*, *DEB*, *GAP*, *RET*]′. In general, the main results do not change, except for minor changes in the magnitude of the responses. The impulse response functions for the pre-crisis period of the five variable system [*REV*, *EXP*, *DEB*, *GAP*, *RET*]′ are showed in Figure A5. Fiscal variables

[4] We only report several impulse-response functions for this section, the others will be available upon request.

(government expenditure and government revenue) still react in the same manner as the results of the full sample period. However, we notice unsustainable responses of these variables in the sub-sample regression (the functions tend to increase over time), which are not present in the full sample results. These findings could imply persistent procyclical fiscal behavior prior to the crisis, but not over the full period. Governments, although might have not escaped the ”procyclical trap”, have behaved more prudent after the financial crisis. Other impulse response functions confirm the robustness of the previous findings.

Certain authors argue that it is necessary to introduce the monetary policy variables into a VAR framework (Tavares and Valkanov, 2001). In this sense, examination of fiscal shocks should take into consideration the intervention of monetary variables. Furthermore, the inclusion of monetary variables in the empirical PVAR model would also provide a robustness test of the previous results. The PVAR systems with monetary policy would have the following recursive orders: [*PR*, *DEB*, *GAP*, *IR*, *RET*]′ and [*REV*, *EXP*, *DEB*, *GAP*, *IR*, *RET*]′, with *IR* denotes the interest rate. These recursive orders are viable since they assume that: (i) fiscal policy variables in this research (net of interest payment) would not be sensitive to interest rate fluctuations and (ii) monetary policy would react contemporaneously to changes in output gap. The results of these PVAR system are reported in AppendixB. Overall, the impacts fiscal shocks and stock return shocks with the addition of the interest rate variable are similar to previous systems. The findings about monetary shocks are in line with previous literature. A shock in interest rate has a significantly negative impact on stock returns. This negative response of stock prices to a tightening monetary policy is widely discussed in the literature.

Because of the sensitivity of the impulse-response functions to the assumptions of the contemporaneous relationships among the variables, we will try for different settings of the structure. Tavares and Valkanov (2001); Arin et al. (2009) also use this method to check for robustness of the empirical results. Other than that, we experiment with a structure similar to Favero (2002). Favero (2002) assume that fiscal policy does not influence other macroeconomic variables and the stock market. So the fiscal variables including budget balance and public debt are ordered last in all systems. Other than different contemporaneous responses because of the change of assumptions, the empirical results with overall balance, government revenue, government expenditure remain robust. However, the behavior of primary balance becomes insignificant, probably due to lack of observations in this variable. At last, we try for another robustness check by replacing the output gap with the growth of real output. We observe consistent empirical results.

5 Conclusion

The aim of this study is to improve the understanding of the dynamics between fiscal policy and stock market return in emerging market. In this paper we use a PVAR approach to investigate the bidirectional relationship between the two variables. This relationship is examined using an unbalanced panel dataset of 12 emerging Asia-Pacific economies from 1990 to 2015. We then estimate various systems with different variables to test for the robustness of the results. The analysis of the impulse-response functions allows us to interpret

the responses of our endogenous variables. Our results provide evidence that there is a bidirectional relationship between fiscal policy and stock market movements. The results show that output gap and public debt react positively to a shock in stock prices. The results are robust with both measure of government budget balance. The government budget balance and debt exhibit a pro-cyclical behavior after a boom in stock market. In contrast, the responses of stock market to shocks in output gap and public debt are insignificant. An attempt of fiscal consolidation would bring out good news to the stock market and the stock prices increase accordingly.

In the third system, we decompose budget balance into government revenue and expenditure. Using this setup allows us to clarify the behavior between budget balance and stock market return and provides also a test of robustness. Both government revenue and spending react in a pro-cyclical manner to a surge in stock market. Regarding the reverse direction, stock prices respond negatively to an increase in government spending and positively to an increase in government revenue.

This paper has several policy implications. First, it provides empirical evidence to clarify a pro-cyclical behavior of fiscal policy in emerging Asian markets. The escaping trend from pro-cyclical trap is evident. However, only few governments have succeeded. Policymakers in remaining countries should be prudent as continuous using of pro-cyclical policy would exacerbate the business cycle. Furthermore, governments should develop a larger tax base and better tax system as low level of tax base would dampen any attempt to escape from the pro-cyclical trap. Besides, the stock market can punish bad policies and reward good ones. Thus, governments should use this information in developing a better financial market.

AppendixA Impulse response functions for the pre-crisis period

AppendixB Impulse response functions for the systems with monetary policy

AppendixC

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Figure 1 Impulse response functions for the first system. The graphs above present the impulse-response functions in the system with the following recursive order [*PRI*, *DEB*, *GAP*, *RET*]′. The optimal lag length chosen by lowest value of MBIC, MAIC and MQIC is 1. The blue lines denote the responses, while the dashed lines denote 95% upper and lower confidence intervals.

Figure 2 Impulse response functions for the second system. The graphs above present the impulse-response functions in the system with the following recursive order [*OVE*, *DEB*, *GAP*, *RET*]′. The optimal lag length chosen by lowest value of MBIC, MAIC and MQIC is 1. The blue lines denote the responses, while the dashed lines denote 95% upper and lower confidence intervals.

Figure 3 Impulse response functions for the third system. The graphs above present the impulse-response functions in the system with the following recursive order [*REV*, *EXP*, *DEB*, *GAP*, *RET*]′. The optimal lag length chosen by lowest value of MBIC, MAIC and MQIC is 1. The blue lines denote the responses, while the dashed lines denote 95% upper and lower confidence intervals.

Figure A4 Impulse response functions for the system [*PR*, *DEB*, *GAP*, *RET*]′ during the pre-crisis period

Figure A5 Impulse response functions for the system [*REV*, *EXP*, *DEB*, *GAP*, *RET*]′ during the pre-crisis period

Figure B6 Impulse response functions for the system [*PR*, *DEB*, *GAP*, *IR*, *RET*]′

Figure B7 Impulse response functions for the system [*REV*, *EXP*, *DEB*, *GAP*, *IR*, *RET*]′

Table 1 Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Overall balance/GDP	322	-3.14	3.55	-19.52	6.98
Primary balance/GDP	292	-0.84,3.33	-17.63	8.36	
Public debt/GDP	251	50.53	19.91	15.19	102.33
Log of real GDP	432	0.05	0.04	-0.14	0.23
Output gap	432	-0.01	2.18	-9.23	8.8
Stock market index	257	67.3	44.02	4.5	207.78
Government revenue/GDP	334	19.34	5.66	5.68	35.84
Government spending/GDP	322	22.59	6.54	10.03	44.57

HIGHLIGHTS

- Confirm the bidirectional relationship between stock return and fiscal policy.
- Pro-cyclical fiscal policy with respect to stock market movements.
- Both government expenditure and government revenue are pro-cyclical.
- A fiscal consolidation attempt has a rewarding effect on stock prices.

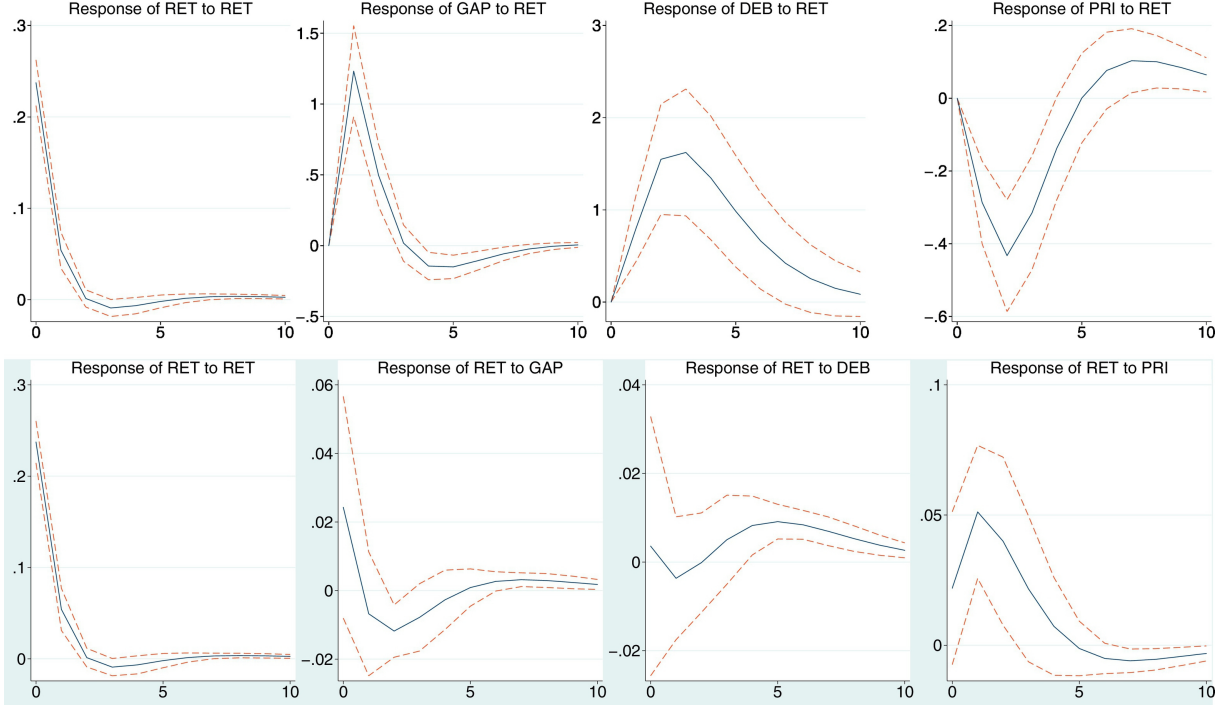
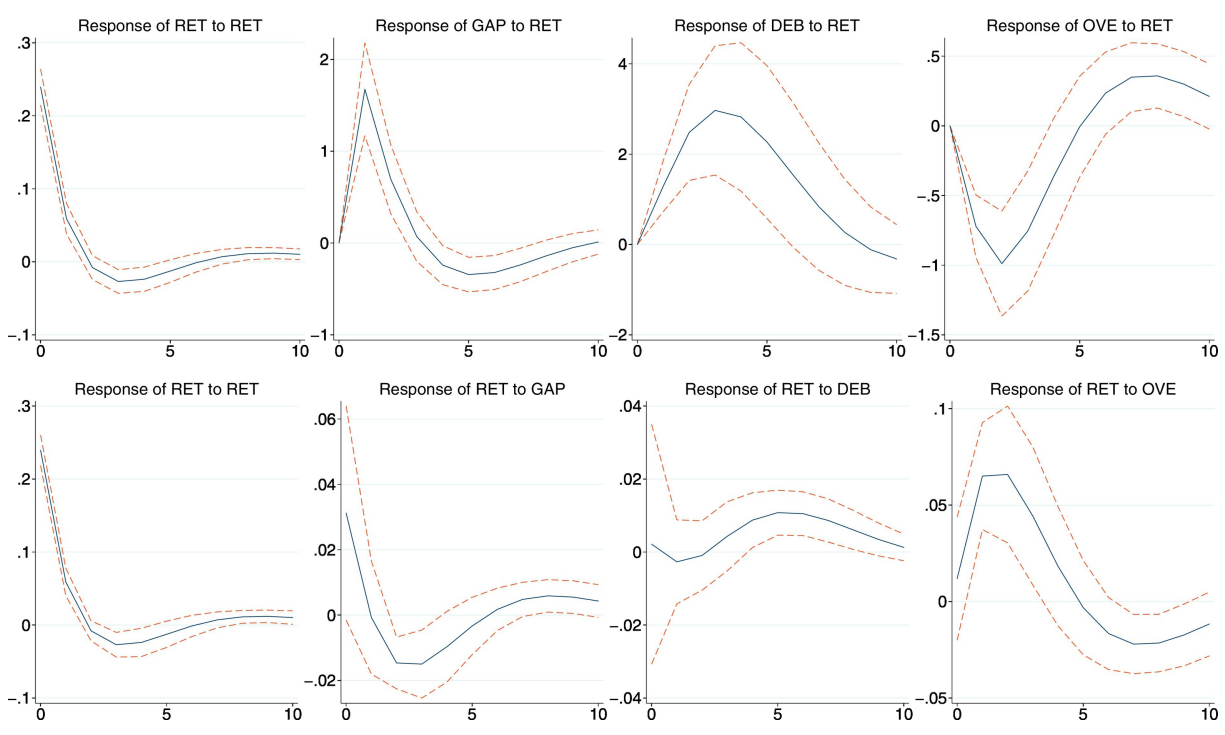

Response of RET to RET
Response of GAP to RET
Response of DEB to RET
Response of PRI to RET
Response of RET to RET
Response of RET to GAP
Response of RET to DEB
Response of RET to PRI

Figure 1


Response of RET to RET
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Response of OVE to RET
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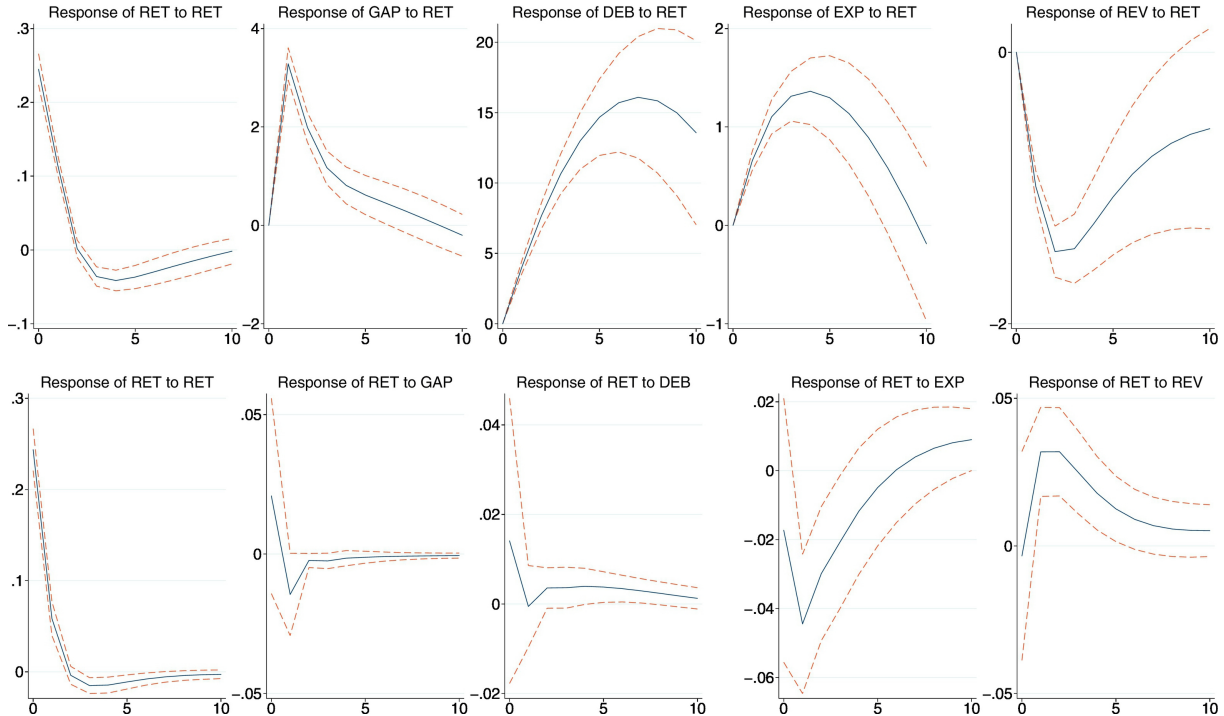
Response of RET to GAP
Response of RET to DEB
Response of RET to OVE

Figure 2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Response of RET to REV

Figure 3

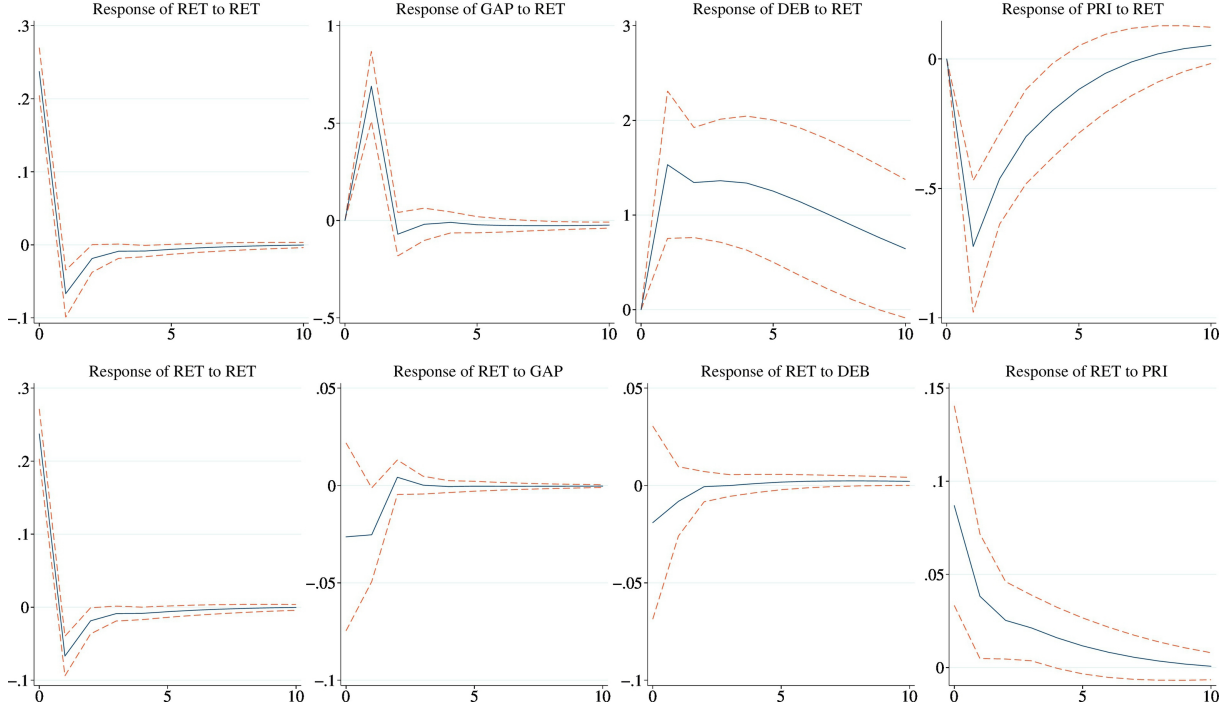
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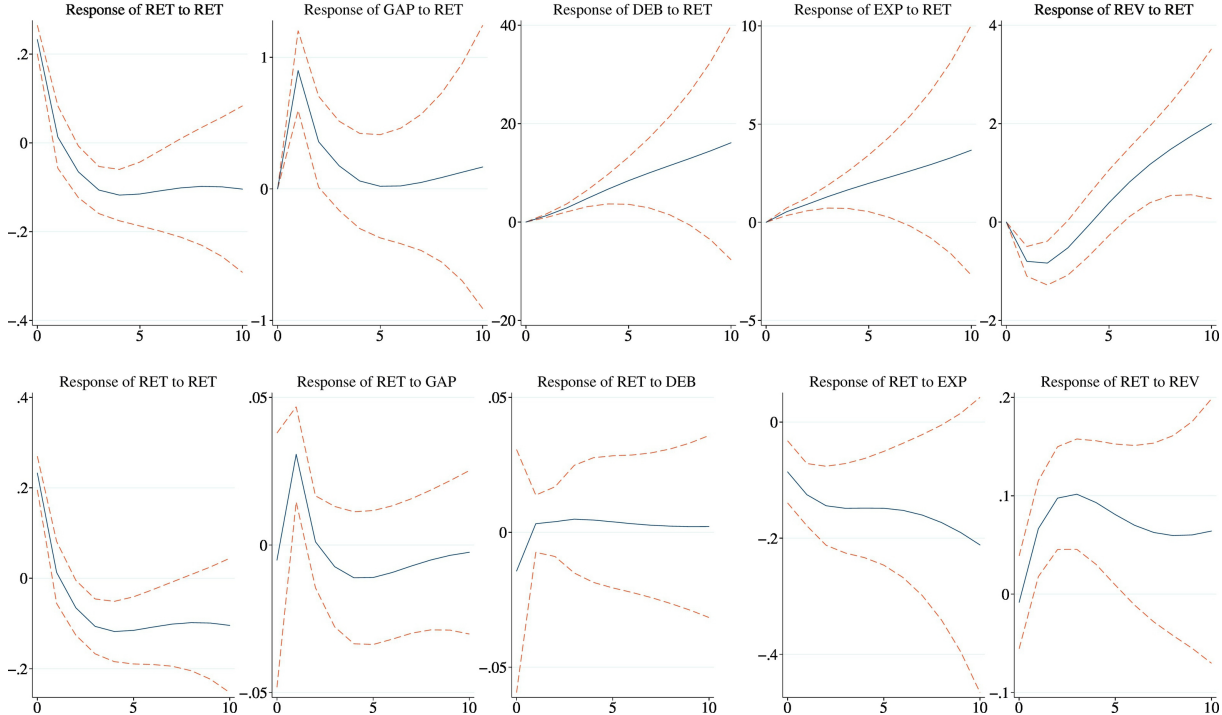
Figure 4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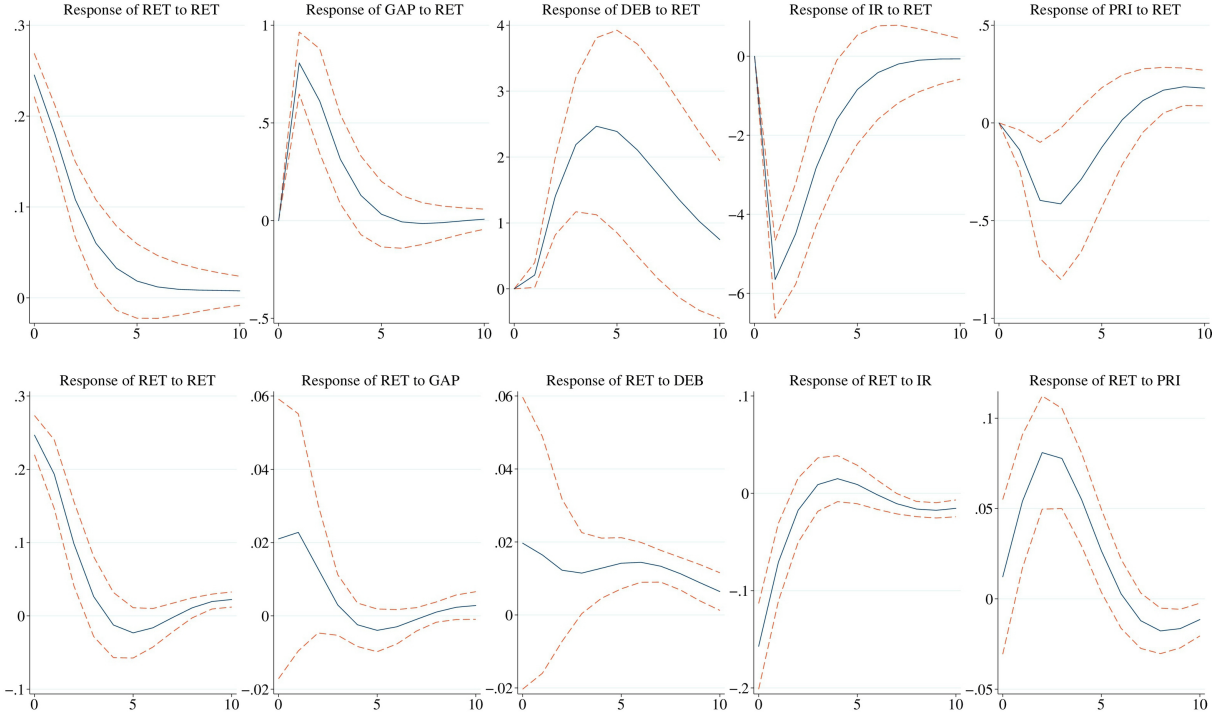
Response of RET to EXP
Response of RET to REV

Figure 5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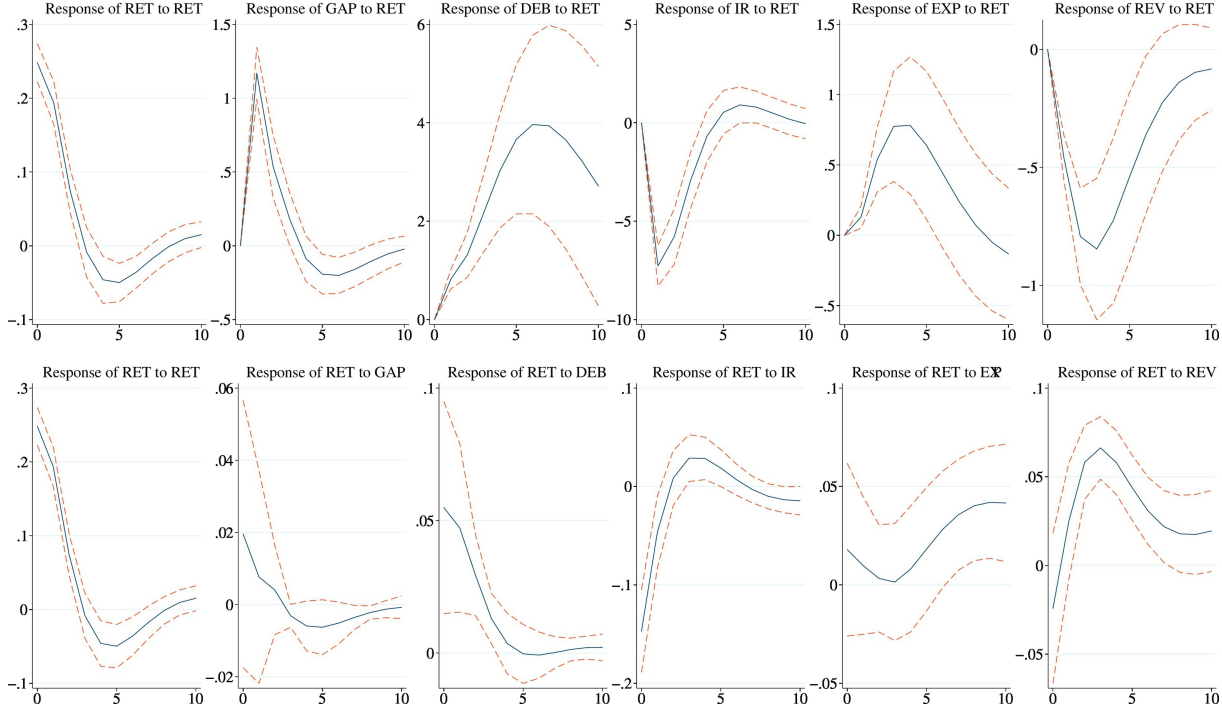
Response of RET to IR
Response of RET to PRI

Figure 6


Response of RET to RET
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Response of RET to REV

Figure 7