The Macroeconomic Effects of Debt- and Equity Based Capital Inflows*

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Abstract

This paper will consider whether debt- and equity-based capital inflows have different effects on marcroeconomic variables. First we identify the component of capital inflows that is driven not by domestic economic and financial conditions but by conditions in the rest of the world (foreign push factors vs. domestic pull factors). We then put these exogenous "foreign push" components of debt- and equity-based capital inflows into a VAR model that contains domestic variables like GDP, inflation, the exchange rate, stock prices, credit growth, and interest rates. An exogenous increase in debt inflows leads to a significant increase in GDP, inflation, stock prices and credit growth and an appreciation of the exchange rate. The same exogenous increase in equity-based capital inflows has almost no effect on the same variables. Thus the macroeconomic effects of exogenous capital inflows are almost entirely due to changes in debt, not equity-based, capital inflows.

JEL Classification: F3; F4

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1 Introduction

Many advanced and emerging market countries have seen rapid swings in capital inflows over the last few years. Many have blamed these swings in capital flows for causing excessive macroeconomic volatility, and some have even called for policy measures, up to and including capital controls "to manage the macroeconomic and financial stability risks associated with inflow surges or disruptive outflows"(International Monetary Fund, 2012).

Forbes and Warnock (2012), Fratzscher (2012), and Rey (2013) have all shown that global liquidity and risk has been the major driving force behind these capital inflows. They argue that these "global push factors" have more of an impact on capital flows into a country than any country-specific "pull factors". Using data where capital flows are disaggregated into debt flows and equity flows, Milesi-Ferretti and Tille (2011) and Lane and Milesi-Ferretti (2012) show that bank loans and other types of debt-based capital flows have seen the largest swings over the past few years. Forbes and Warnock (2013) show that while both debt- and equity-based capital inflows are driven by "global push factors", these forces are stronger for debt flows (debt consists of both bank loans and portfolio debt flows). Equity flows, which are made up of portfolio equity flows and foreign direct investment (FDI) tend to place greater emphasis on factors specific to the receiving country.

Given that a significant fraction of these large swings in capital inflows are driven by exogenous "global push factors" (exogenous from the point of view of the receiving country), this paper will seek to quantify in a VAR analysis the effect that these capital flows have on macroeconomic and financial conditions in the receiving country. Furthermore, given that different factors seem to be driving debt- and equity-based capital flows, a natural question to ask is whether different types of capital flows have different effects on these same macroeconomic and financial variables.

We find that, in accordance with anecdotal evidence and comments from both economic analysts and policy makers, exogenous increases in capital inflows do lead to increases in output, inflation, asset prices, and credit growth and exchange rate appreciation. However,

these macroeconomic effects of capital inflows are entirely due to debt inflows (either bank loans or portfolio debt). An exogenous shock to equity inflows does not have near the same effect on fluctuations in these macroeconomic and financial variables.

This paper is related to a number of papers that have sought to explain the macroeconomic effect of international capital flows. Reinhart and Reinhart (2008) study the effect of capital inflows on domestic macroeconomic variables in a number of emerging markets and show that a surge in capital inflows leads to an increase in inflation and exchange rate appreciation. Cardarelli et al. (2010) show the same for a group of both emerging and developed economies. Justiniano et al. (2014) show that capital inflows explain a large share of the increase in house prices and household debt in the United States prior to the recent crisis. Sá et al. (2014) shows that this is true across OECD economies. While Tillmann (2013) shows this is true across a number of Asian emerging market economies.

In addition, a number of papers, some focusing on emerging markets and some studying both emerging markets and developed economies, have shown that a surge in capital inflows leads to an increase in credit growth. (see e.g. Kaminsky et al. (2004), Mendoza and Terrones (2008), Mendoza and Terrones (2012), Kaminsky and Reinhart (1999), McKinnon and Pill (1996), Magud et al. (2011), Reinhart and Rogoff (2011))

When considering the effect of disaggregated capital flows, Frankel and Rose (1996) use a panel of annual data of over 100 developing countries and show that a small share of foreign direct investment (FDI) in total capital inflows is a good predictor of a currency crash. Calderon and Kubota (2005) look at the impact of disaggregated capital flows on the probability of a crisis. They find that debt inflows are a type of "bad" capital flow that lead to crises, but FDI can mitigate the credit boom (and thus crisis) following a surge in capital inflows. Jongwanich and Kohpaiboon (2013) show that the composition of capital inflows matters in determining the impact of the flows on real exchange rates. Other forms of capital flows, especially portfolio investment, are associated with faster real exchange rate appreciation than FDI flows. Lane and McQuade (2014) show that domestic credit growth

is strongly related to debt inflows, but not equity inflows. They show this is true both across European countries prior to the recent crisis and in a broad sample of advanced and emerging market economies. Using firm level data, Tong and Wei (2011) show that the credit crunch during the recent crisis was greater for firms that are more dependent on external finance for working capital. They show that greater dependence on non-FDI capital inflows before the crisis worsens the credit crunch during the crisis, while exposure to FDI alleviates the liquidity constraint.

This paper will proceed as follows. The data and econometric model used to quantify the effect of disaggregated capital flows on various macroeconomic and financial variables is described in section 2. This will proceed in a few parts. Since we are aiming to quantify the effect of exogenous swings in capital flows, the first step is to identify exogenous swings in capital flows. This is done by finding a component of capital inflows that it driven by global risk and liquidity and not by any country-specific factors. We then discuss how these exogenous capital flows are incorporated as variables in a panel VAR model to quantify the effect of exogenous shocks to capital inflows. The results from this analysis are presented in section 3. Here we examine impulse responses to show first the effect of a shock to total capital inflows on various macroeconomic variables, and then we consider the responses of the same variables to separate shock to debt inflows or equity inflows. Then with variance decompositions we show that while shocks to debt inflows play a significant role in driving fluctuations in many macroeconomic variables like output and inflation, shocks to equity inflows have almost no effect on the same variables. Section 4 discusses the robustness of these results to alternative country sub-groupings, alternative methods to identify the exogenous component of capital flows, and alternative orderings in the recursive identification scheme. Finally section 5 concludes with some directions for further research, specifically the all important normative question of how these findings can be used to design policies "to manage the macroeconomic and financial stability risks associated with inflow surges or disruptive outflows"(International Monetary Fund, 2012).

2 Data and Econometric Model

2.1 Identifying the exogenous component of capital inflows

Debt- and Equity-based capital flows into a given country can either be driven by domestic economic and financial conditions (domestic pull factors) or by exogenous foreign economic and financial conditions (foreign push factors). Identifying the macroeconomic effect of shocks to capital inflows requires isolating this exogenous "push" component. To do this, we estimate the following panel data regression:

$$CapFlow_t^i = \mu^i + \mathbf{X}_t\boldsymbol{\beta}' + \mathbf{Y}_t^i\boldsymbol{\gamma}' + \varepsilon_t^i \tag{1}$$

where $CapFlow_t^i$ denotes capital flows into or out of country i at time t, either debt-based, equity-based, or total capital flows, $\mathbf{X}_t$ is an $n \times 1$ vector of foreign economic and financial variables, $\mathbf{Y}_t^i$ is an $m \times 1$ vector of domestic economic and financial variables, and μ^i is a country fixed effect. After estimating this panel data regression, the exogenous "push" component of capital flows into country i is simply:

$$\widehat{CapFlow}_t^i = \mathbf{X_t}\hat{\boldsymbol{\beta}}'$$

In section 4 we will instead identify the exogenous component of capital flows as a time fixed effect, common to all countries in a panel data regression. The exogenous component of capital flows identified with these global push factors, $\mathbf{X}_t$, is highly correlated to the exogenous component simply identified as a common time fixed effect, and the macroeconomic effects of exogenous debt and equity inflows are the same regardless of how the exogenous component of capital flows is identified.

2.1.1 Variables and Data

The capital flow data, used as the dependent variable in the panel data regression in (1) is taken from the IMF's balance of payments statistics (BPM6). The balance of payments statistics divide capital flows into four categories. Foreign direct investment, portfolio equity, portfolio debt, and other (other is mostly made up of bank lending). The foreign direct investment and portfolio equity are combined to form equity-based capital flows and the portfolio debt and other are combined to form debt-based capital flows. The balance of payments statistics for each category report the accumulation of assets (capital outflows) and the accumulation of liabilities (inflows). This country-specific capital flow data is then normalized by the country's GDP, and thus $CapFlow_t^i$ represents six different variables, equity-based inflows and outflows, debt-based inflows and outflows, and total inflows and outflows. This study will make use of this data quarterly frequency from 2005Q1 to 2013Q4 for 31 countries (17 developed countries and 14 emerging markets).[1]

The variables that make up $\mathbf{Y}_t^i$, the vector of country-specific economic and financial variables in the panel data regression in (1) are the same variables that are later included as the country-specific variables in the VAR. These are the output gap (defined as the deviation of real GDP from its HP filtered trend), the quarter-over-quarter log change in the consumer price index, the quarter-over-quarter log change in the exchange rate (domestic currency per SDR), the quarter-over-quarter log change in the stock price index, the quarter-over quarter change in the ratio of private non-financial sector credit-to-GDP, as taken from the BIS, and the level of the short-term nominal interest rate.

The variables that make up $\mathbf{X}_t$, the vector of global economic and financial conditions that are exogenous to country i, is taken from recent literature describing the global factors that drive swings in capital flows. The first variable in $\mathbf{X}_t$ is the VIX index, the implied

[1] The 17 developed countries in the study are: Australia, Austria, Belgium, Canada, Hong Kong, Denmark, Finland, Greece, Ireland, Korea, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland. The 14 emerging market countries are: Argentina, Brazil, the Czech Republic, Hungary, Indonesia, Malaysia, Mexico, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, and Turkey.

volatility of the S&P 500. Rey (2013) argues that this is one of the major factors driving global capital flows over the past few years. When the VIX is high, indicating that investor's risk perceptions or risk aversion is high, capital inflows into many countries fall, and when the VIX is low, indicating that investor's risk tolerance is high, capital inflows increase.

In addition to the VIX, we add measures of economic and financial conditions in certain "financial centers" as potential explanatory variables in $\mathbf{X}_t$. Specifically the remaining variables in $\mathbf{X}_t$ are the GDP weighted average of the output gap, the inflation rate, the change in the exchange rate, the change in stock prices, the change in the credit-to-GDP ratio, and the short-term nominal interest rate across the U.S., the U.K., Japan, France, and Germany.

The results from the panel data regression in (1) are presented in table 1.

The table shows that, in accordance with the findings of Rey (2013) and others, the VIX of the S&P 500 is a major driver or total capital inflows. Specifically the coefficient on the VIX is negative and significant, implying that when investor's risk perceptions or risk aversion is high, capital inflows decrease. Quantitatively, the results show that a 10% increase in the VIX results in nearly 1 percentage point fall in the ratio of total capital inflows to GDP. Furthermore, the table shows that this is entirely due to the effect of investor risk tolerance on debt inflows. When total capital inflows are divided into debt-based and equity-based capital inflows in two separate panel data regressions, the coefficient on the VIX in the debt regression is negative and significant, but the coefficient in the equity regression is not significantly different from zero. This implies that investor risk aversion is be a significant driver of debt inflows, but it doesn't drive equity inflows.

The reactions of debt- and equity-based capital inflows to the other exogenous economic and financial variables tell a similar story. The coefficient of the output gap in the 5 financial center countries in the debt flows regression is negative and nearly significant at the 10% level, this implies that there is some evidence that an economic boom in the financial center countries leads to more capital staying in these financial center countries and thus lower capital inflows into the rest of the world. Similarly, the coefficients on the performance of

the stock market or the growth in private sector credit in the financial center countries are both negative and significant, implying that a booming stock market or a credit boom in the financial center countries leads to the diversion of debt-based capital flows away from the rest of the world. This is not true at all for equity inflows. Here the coefficients on almost all foreign financial center variables are insignificant. Thus while debt inflows tend to be driven strongly by economic and financial conditions in these 5 financial center counties, equity flows are much less responsive to these exogenous factors.[2]

With the regression results in table 1 the exogenous components of debt- and equity-based capital inflows and outflows can be constructed. The mean, standard deviation, and first-order autocorrelation of the exogenous capital inflow series and the country-specific macroeconomic time series in the model are presented in table 2. The exogenous components of debt, equity, and total capital flows when identified by projecting capital flows onto the common vector of global push factors, $\mathbf{X}_t$, are represented by $Debt^1$, $Equity^1$, and $Total^1$. The variables $Debt^2$, $Equity^2$, and $Total^2$ represent the exogenous components of debt, equity, and total capital flows when identified with a common time fixed effect in the panel data regression. This method of identification will be discussed in section 4. Furthermore the unconditional correlations between these capital inflow series and country-specific macroeconomic time series are presented in table 3.[3]

Table 2 shows that the exogenous component of debt inflows is about four times more volatile than the exogenous component of equity flows, and equity flows are more persistent. Furthermore, the results in the table of unconditional correlations show that debt-based exogenous capital inflows are almost perfectly correlated with total exogenous capital inflows, implying that debt is by far the main driver of total capital inflows at the business cycle frequency. Debt inflows are more negatively correlated with movements in the exchange rate, implying that debt inflows are more highly correlated with exchange rate appreciation. In

[2]In terms of the language used in Forbes and Warnock (2013), debt flows are very responsive to "foreign push" factors, but equity flows are not.

[3]The descriptive statistics are calculated for each of the 31 countries and the data in these tables is a GDP weighted average of the country-specific results.

addition, debt flows are more highly correlated with inflation and growth in the stock market index, implying that debt inflows are more highly correlated with rises in both consumer prices and stock prices.

2.2 Identifying the macroeconomic effect of exogenous capital inflows

In order to identify the macroeconomic effects of exogenous changes in capital inflows, we now calculate impulse responses from a structural panel VAR model:

$$\mathbf{Y}_t = \mathbf{A}(L)\,\mathbf{Y}_{t-1} + \mathbf{u}_t$$

where $\mathbf{Y}_t$ is an 8×1 vector that contains: the exogenous component of total capital inflows, the exogenous component of total capital outflows, the output gap, the inflation rate, the change in the exchange rate, the change in the stock price index, the change in the ratio of private non-financial sector credit to GDP, and the level of the short-term nominal interest rate. The lag length is chosen to minimize the Schwartz Info Criterion. In the next section, this ordering is used in a Cholesky decomposition to compute impulse responses and variance decompositions. Since the capital flow variables are by definition exogenous, they are ordered before the domestic economic and financial variables. Since we are only concerned with the effect of an exogenous shock to capital inflows on domestic variables, the other orderings don't matter.

In order to identify the separate effects of debt-based and equity-based capital inflows, replace the first two terms in the vector $\mathbf{Y}_t$, the exogenous component of total capital inflows and total capital outflows, with the following four variables, the exogenous components of equity-based capital inflows, debt-based capital inflows, and equity and debt based capital outflows. Again these exogenous components should be placed first in the ordering, and since we are only concerned with the effect of exogenous changes in capital flows on domestic

macroeconomic variables, the ordering of the other variables doesn't matter. In this ordering, equity inflows are placed before debt inflows. In the sensitivity analysis in section 4 we show that the results are nearly identical when this ordering is reversed.

3 Results

3.1 Impulse responses

The responses of the domestic output gap, quarter-over-quarter inflation rate, exchange rate, stock prices, credit growth, and short-term interest rate to an exogenous 1 percentage point increase in the ratio of capital inflows to GDP are given in figure 1. The figure shows that an exogenous 1 percentage point increase in the ratio of capital inflows to GDP leads to a significant increase in the output gap, the inflation rate, stock prices, the credit-to-GDP ratio, and the short-term nominal interest rate and an appreciation in the exchange rate.

The responses of the same variables, but to separate shocks to equity inflows and debt inflows are presented in figure 3. The responses following an exogenous 1 percentage point increase in the ratio of equity capital inflows to GDP are presented in blue, the responses to an exogenous 1 percentage point increase in the ratio of debt capital inflows to GDP are presented in red.

The responses of debt flows and equity flows show that an exogenous shock to equity inflows is much more persistent, and has a half-life of nearly five years. The response of the output gap shows that an exogenous increase in debt inflows leads to a large and statistically significant increase in the output gap but an exogenous increase in equity inflows has an insignificant effect. Similarly, the responses of stock prices and credit growth all show that a shock to debt inflows has a positive and statistically significant effect, but the same shock to equity flow does not have a significant effect. Furthermore, a shock to debt flows leads to a statistically significant appreciation in the exchange rate but the exchange rate is unresponsive to an increase in equity inflows.

3.2 Variance decompositions

To identify the contribution of exogenous shocks to capital flows to the variance of domestic economic and financial variables like the output gap, inflation, the exchange rate, stock prices, credit growth, and interest rates, we calculate variance decompositions using the same recursive identification scheme used in the impulse response analysis, namely, exogenous capital inflows are ordered ahead of these domestic variables.

The results from these variance decompositions are presented in table 4. The top panel in the table presents the results for the pooled sample of 31 developed and emerging market countries. In the next section we consider the results from the bottom two panels where the results for the pool of developed countries is considered separately from the pool of emerging market countries.

These variance decompositions are calculated for the 1, 3, and 5 year forecast horizon. Total exogenous capital flows are responsible for about 2% of the forecast error variance of the output gap, inflation rate, credit growth, and the interest rate at the 1-5 year horizon and for about 4% of the forecast error variance of the fluctuations in the exchange rate or stock prices. However, when total exogenous capital flows are divided into debt flows and equity flows, equity flows are responsible for a very small fraction, usually less than 0.5% of the forecast error variance of these macroeconomic variables, whereas the share attributable to shock in debt inflows is 10 to 15 times greater. Thus the ability of exogenous debt inflows to drive fluctuations in domestic macroeconomic variables is about an order of magnitude greater than the ability of exogenous equity inflows to drive fluctuations in the same variables.

4 Sensitivity Analysis

4.1 Country subgroups: Developed countries or emerging markets

The analysis presented in the previous section was conducted using a panel dataset with 31 countries. Figure 3 presents the same impulse responses for only the subset of 17 developed countries and figure 4 presents these impulse responses in a panel with only the subset of 14 emerging markets. The figures show that for the most part, the results do not change.

One interesting result from the panel with the full set of 31 countries in the previous section was the fact that shocks to exogenous equity flows were so much more persistent than shock to the exogenous component of debt flow. It was noted how the half life of shock to equity flows was nearly 5 years, but the half life of shocks to debt flows was only a few quarters. The results from the smaller sub-grouping in figures 3 and 4 show that it is equity inflows into developed economies is very persistent. Equity flows into emerging markets is still slightly more persistent than exogenous debt flows, but the half life is still just a few quarters.

In addition the previous results from the full panel of 31 countries show that a shock to debt inflows led to a statistically significant increase in the output gap, the inflation rate, and a statistically significant appreciation in the exchange rate, and the results from the two sub-groupings show that those results continue to hold. In the full panel of countries, a shock to debt inflows led to a significant increase in stock prices but a shock to equity inflows did not have a significant effect on stock prices. The sub-groupings show that this is true in emerging markets, but in developed economies, the reactions of stock prices following a shock to either debt or equity inflows are nearly the same. Similarly, the results from the large panel of 31 countries show that an exogenous increase in debt inflows leads to a statistically significant increase in credit growth, but an exogenous change in equity inflows does not affect credit growth. The results in figures 3 and 4 show that this is true in developed economies, but in emerging markets both a shock to debt inflows and a shock to equity inflows lead to a

significant increase in private sector credit growth.

The results from variance decompositions in the smaller panel of 17 developed or 14 emerging market countries is presented in the bottom two panels of table 4. The table shows that exogenous total capital inflows are slightly more responsible for the volatility of these domestic macroeconomic variables in developed countries than in emerging markets. In emerging markets total capital inflows are responsible for about 2-4% of the forecast error variance of these domestic macroeconomic variables but this share is around 4-6% in developed economies. However, the fact that the share of the forecast error variance attributed to debt inflows is on average an order of magnitude greater than the share that is attributed to equity inflows continues to hold in each sub-panel of countries.

4.2 Alternative ways to identify the exogenous component of capital flows

In the results presented in the last section, the exogenous component of capital flows is identified from a panel data regression of country-specific capital flows on common global variables and country-specific variables. Then the exogenous component is simply the projection of the country-specific capital flows on these common global factors. An alternative way to identify the same exogenous component of capital flows is to simply replace these global factors $\mathbf{X}_t\boldsymbol{\beta}'$ with a time fixed effect in the panel data regression in (1):

$$CapFlow_t^i = \mu^i + \mu_t + \mathbf{Y}_t^i\boldsymbol{\gamma}' + \varepsilon_t^i$$

Now the exogenous components different types of capital flows are simply given by $\hat{\mu}_t$. The mean, standard deviation and first-order autocorrelation of the exogenous component of debt, equity, and total capital flows are presented in table 2. Recall that $Debt^1$, $Equity^1$, and $Total^1$ are the exogenous components of capital flows identified with a vector of global factors, $\mathbf{X}_t$, and $Debt^2$, $Equity^2$, and $Total^2$ are these exogenous components identified with

a common time fixed effect. Similarly the unconditional correlations between these capital flow components are presented in table 3.

Table 2 shows that the exogenous components of debt, equity, and total capital flows when identified with a common time fixed effect are slightly more volatile than when they were identified using the vector of global factors, $\mathbf{X}_t$, but the difference is slight. The fact that the exogenous component of debt flows is much 3 to 4 times more volatile than the exogenous component of equity flows continues to hold under this alternative identification. The exogenous components of debt, equity, and total capital flows are much less persistent under this alternative identification, the first order autocorrelation is reduced by nearly two-thirds.

Table 3 shows that the exogenous components of capital flows are highly correlated across the two methods of identification. The correlation between the exogenous component of total capital flows under the two methods is over 0.8, and for debt flows it is nearly 0.8. For equity flows, it is a little lower, just above 0.6. Similarly, under this alternative identification, the correlation between the exogenous components of debt and equity flows is only 0.26, as opposed to 0.55 in the primary identification scheme.

The responses of the output gap, inflation, the exchange rate, stock prices, credit growth, and the nominal interest rate to a 1% shock to either exogenous equity flows or exogenous debt flows, when the exogenous component is identified with a time fixed effect, are presented in figure 6. The figure is very similar to the same responses under the primary identification scheme using the vector of global factors, $\mathbf{X}_t$, that is presented in figure 2. Exogenous debt inflows lead to an increase in the output gap, an increase in credit growth, and an appreciation in the exchange rate, whereas equity flows do not. The only major differences between the impulse responses from the two identification schemes in that under the alternative scheme, there is evidence that exogenous equity flow also lead to a statistically significant increase in stock prices, whereas that was only true for debt under the primary identification scheme. Exogenous equity flows also seem to lead to an increase in inflation, although this is not

significant at the 95% level.

Variance decompositions, where exogenous capital flows are identified with this alternative scheme are presented in table 5. These variance decomposition results are very similar to the results under the primary identification scheme. The share of variance attributed to equity flows is higher under this alternative identification scheme. Earlier, the share of the variance of most macroeconomic variables that could be attributed to equity flows was less than 0.5%. Now that share is closer to 1%, but the key result from the previous section continues to hold; the share of the forecast error variance that is explained by shocks to debt inflows is on average an order of magnitude larger than the share explained by equity inflows.

4.3 Changing the ordering between debt and equity

Earlier we noted how since the capital flow variables in the VAR are simply the capital flows driven by exogenous foreign components, the capital flow variables can safely be place ahead of the domestic macroeconomic variables in the recursive identification scheme. Since this paper is only concerned with the effect of shocks to these capital flows, the recursive ordering among the set of domestic macroeconomic variable doesn't matter. However, when debt and equity inflows enter as two separate terms in the VAR, the recursive ordering between them may matter.

The earlier results were presented under the recursive ordering where equity came ahead of debt. There was no reason for this, just one had to go first! Figure 5 presents these same impulse responses instead under the recursive ordering where debt inflows are ordered ahead of equity inflows. The results are nearly identical.

5 Summary and Conclusion

This paper shows that exogenous shocks to capital inflows have a significant effect on many macroeconomic and financial variables. It is common to hear from analyst in the financial press or from policy markets how shocks to capital inflows lead to increases in inflation, asset prices, credit growth, and exchange rate appreciation. The panel VAR analysis in this paper shows that this is true. However, this paper shows that these short-term macroeconomic effects of capital inflows are entirely due to debt inflows. Equity-based capital inflows do not have the same effect.

The policy implications and next steps are obvious. Given that a large component of capital inflows can be considered as exogenous from the point of view of the receiving country and these capital inflows can lead to greater macroeconomic and financial volatility, there may be a role for policy to "manage" these capital flows in the interest of macroeconomic and financial stability. This research shows that debt-based capital inflows, not equity-based inflows, provide the real threat to stability. Both because these exogenous debt flows are around four times as volatile as exogenous equity flows and because the macroeconomic effects of capital flows are almost entirely due to debt flows. Thus any policy to "manage" these capital inflows in the interest of stability should focus on debt flows, not equity flows. An obvious direction for further research would be to design policy, capital controls policy if necessary, in a way that minimizes the excess volatility that comes from exogenous debt-based capital flows without destroying the benefits of a financial market openness.

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Table 1: Results from a regression of equity, debt, and total capital inflows on both country-specific charactics and exogenous financial center characteristics.

	Equity Inflows	Debt Inflows	Total Inflows
$ln\,(VIX)$	1.014	-9.090^{**}	-8.112^{*}
	(1.796)	(4.057)	(4.431)
OG^{fc}	0.357	-1.645	-1.286
	(0.469)	(1.063)	(1.162)
π^{fc}	-0.548	2.974	2.394
	(1.296)	(2.931)	(3.201)
dFX^{fc}	-0.417	2.193	1.856
	(0.838)	(1.889)	(2.063)
dPk^{fc}	0.068	-0.766^{**}	-0.705^{*}
	(0.149)	(0.337)	(0.368)
$dCredit^{fc}$	-0.605	-7.013^{**}	-7.601^{**}
	(0.811)	(1.830)	(2.001)
i^{fc}	0.904^{*}	4.588^{**}	5.454^{**}
	(0.530)	(1.217)	(1.331)
Cap flow (-1)	0.246^{**}	0.201^{**}	0.220^{**}
	(0.031)	(0.031)	(0.031)
OG	0.053	0.814^{**}	0.848^{**}
	(0.165)	(0.371)	(0.405)
π	0.886	1.127	1.995
	(0.552)	(1.249)	(1.367)
dFX	0.154	0.455	0.616^{*}
	(0.128)	(0.290)	(0.317)
dPk	0.153^{**}	0.280^{*}	0.437^{**}
	(0.064)	(0.147)	(0.160)
$dCredit$	0.437^{**}	0.655^{**}	1.087^{**}
	(0.133)	(0.299)	(0.327)
i	-0.206	0.836	0.614
	(0.293)	(0.671)	(0.733)
$\bar{R}^2$	0.490	0.160	0.340
Obs	1185	1186	1067

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. fc (financial center) represents the GDP weighted average of the U.S., Japan, the U.K., France, and Germany. OG is the output gap, π is the inflation rate, dFX is the percent change in the exchange rate (negative = appreciation), dPk is the percent change in the stock market index, dCredit is the change in the ratio of private non-financial sector credit-to-GDP, and i is the short term nominal interest rate. *denotes significance at the 10% level, **denotes significance at the 5% level.

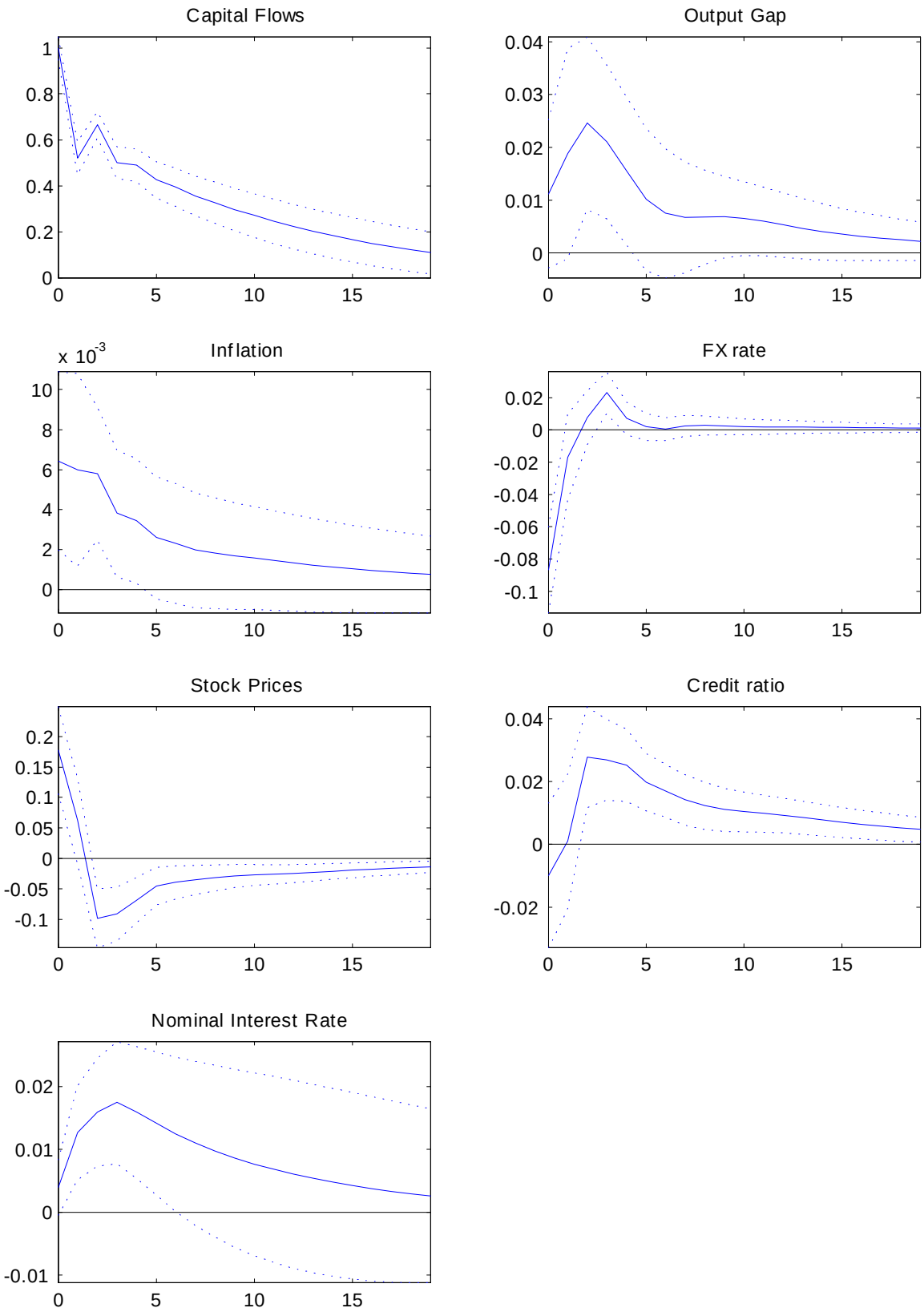

Figure 1: Responses to an exogenous 1 percenatge point increase in the ratio of capital inflows to GDP. Dotted lines represent 95% confience bands.

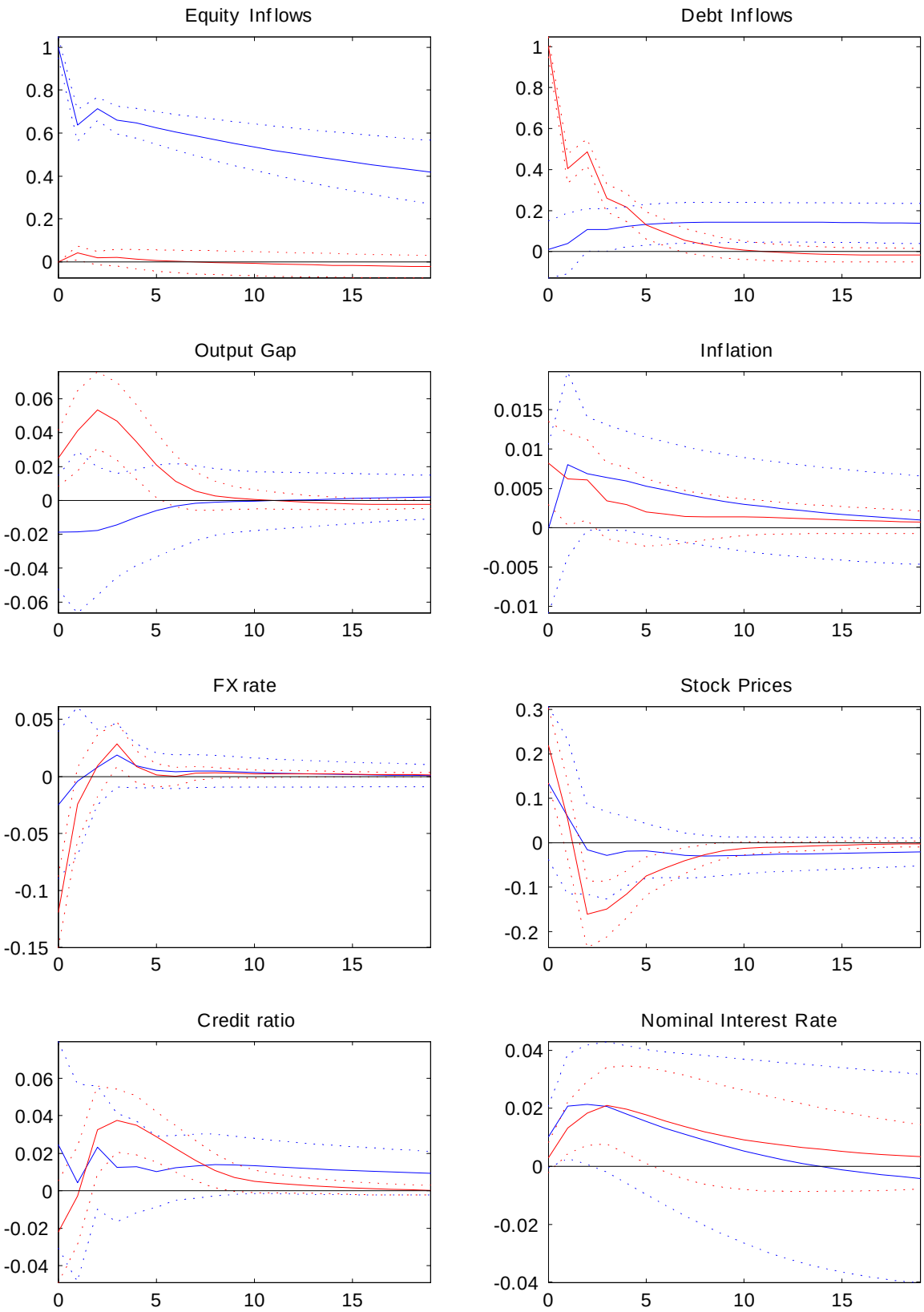

Figure 2: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands.

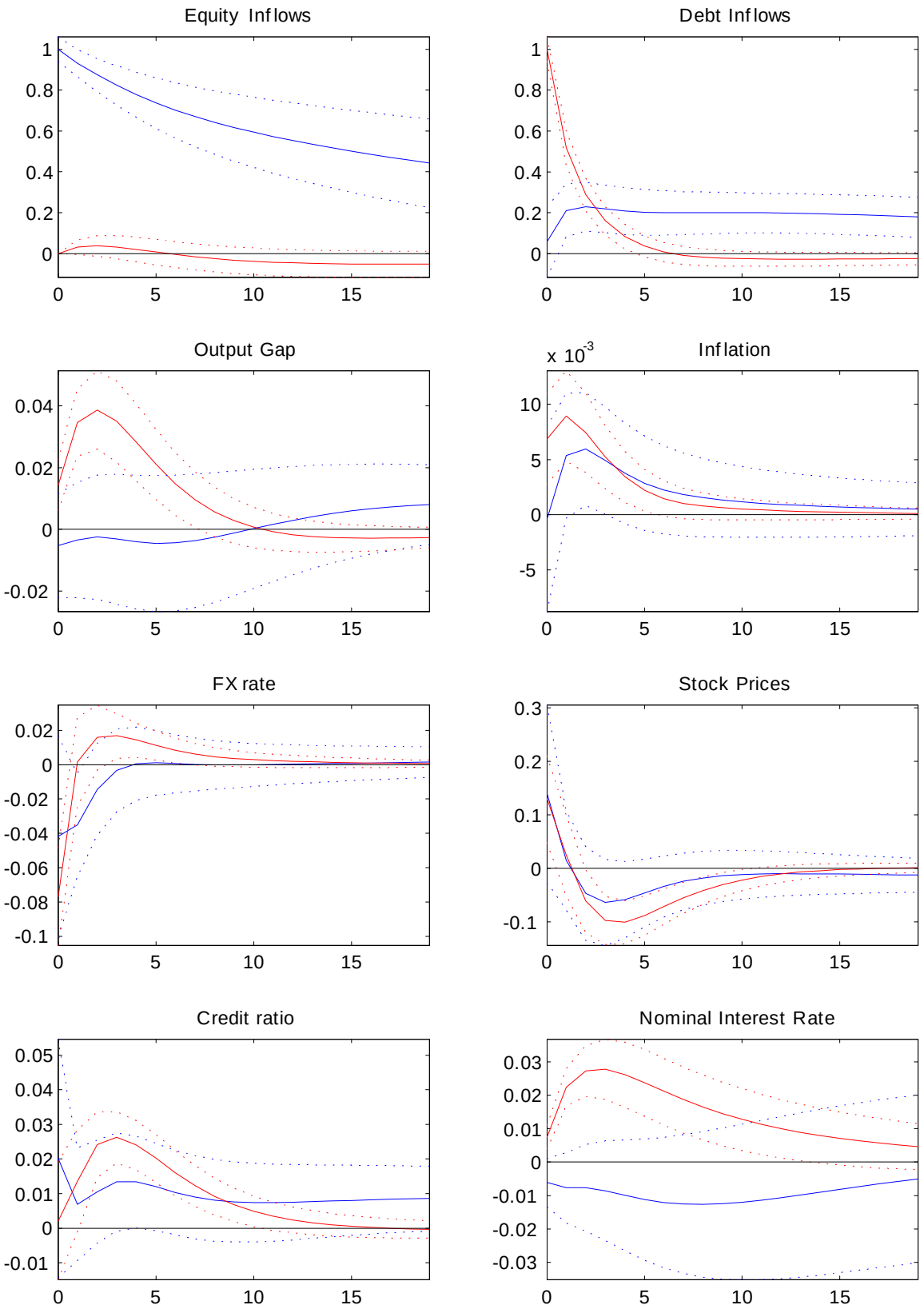

Figure 3: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands. Results from a panel VAR that includes only developed countries.

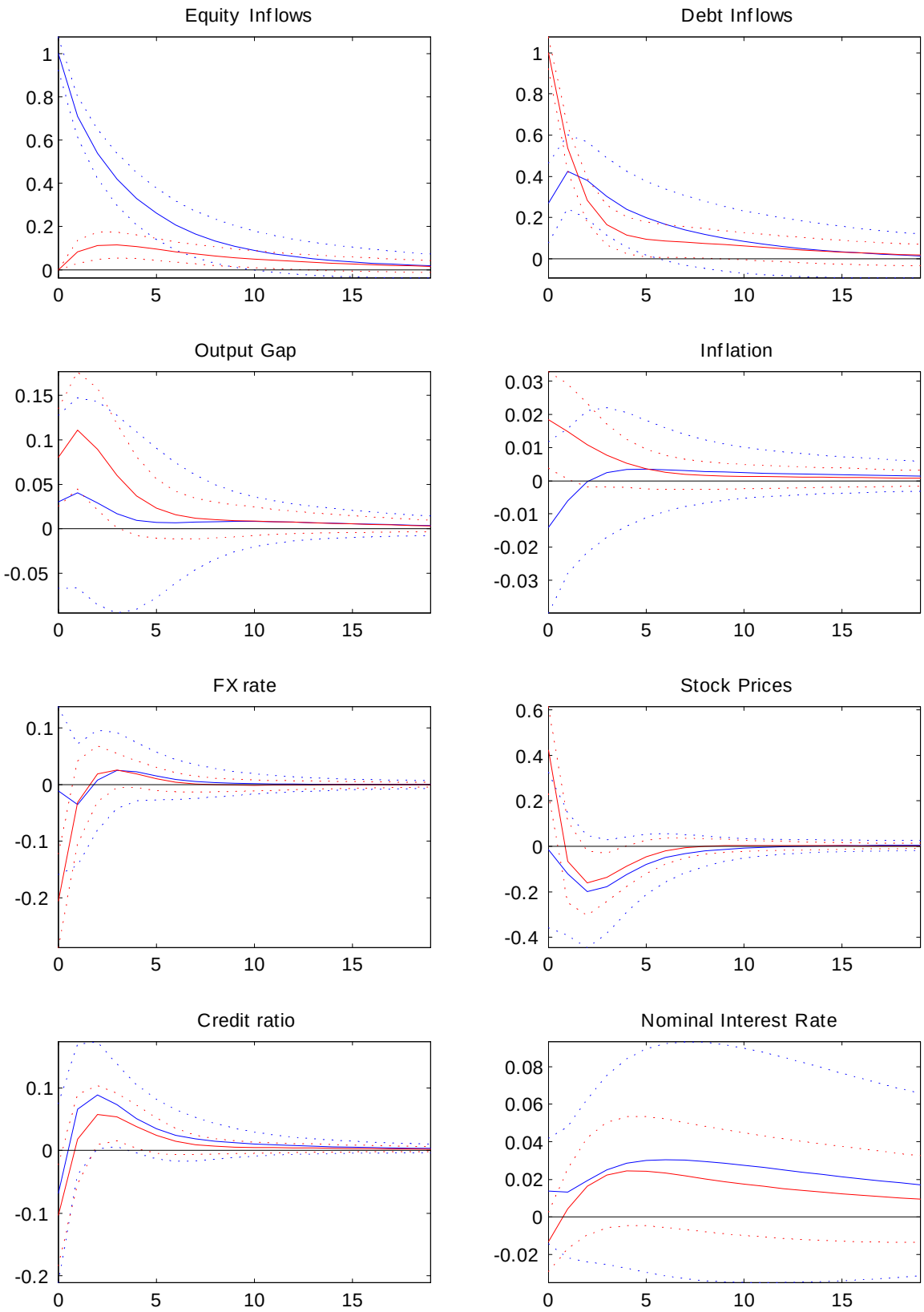

Figure 4: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands. Results from a panel VAR that includes only emerging market countries.

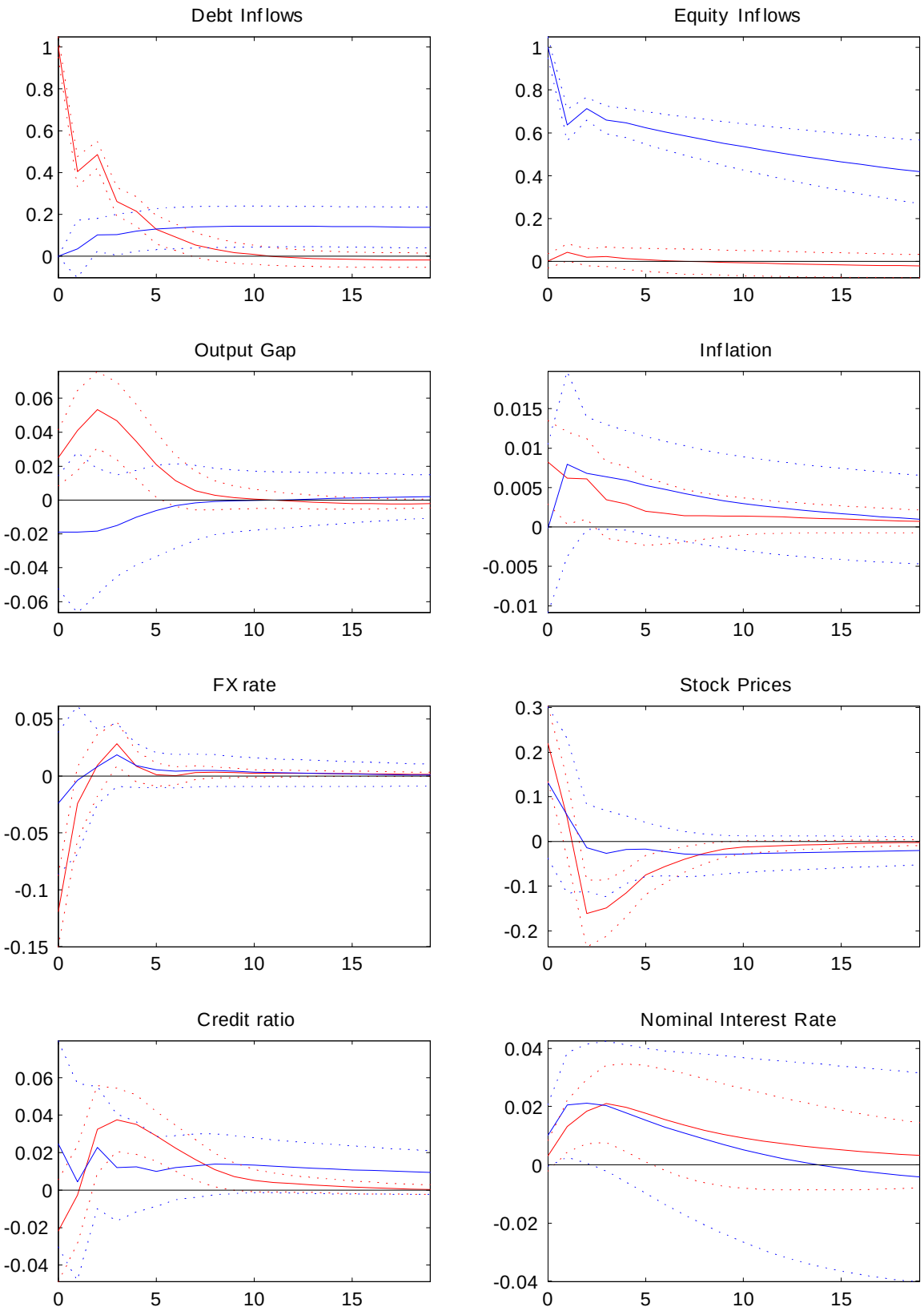

Figure 5: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands. Using the Cholesky order where debt inflows are placed ahead of equity inflows.

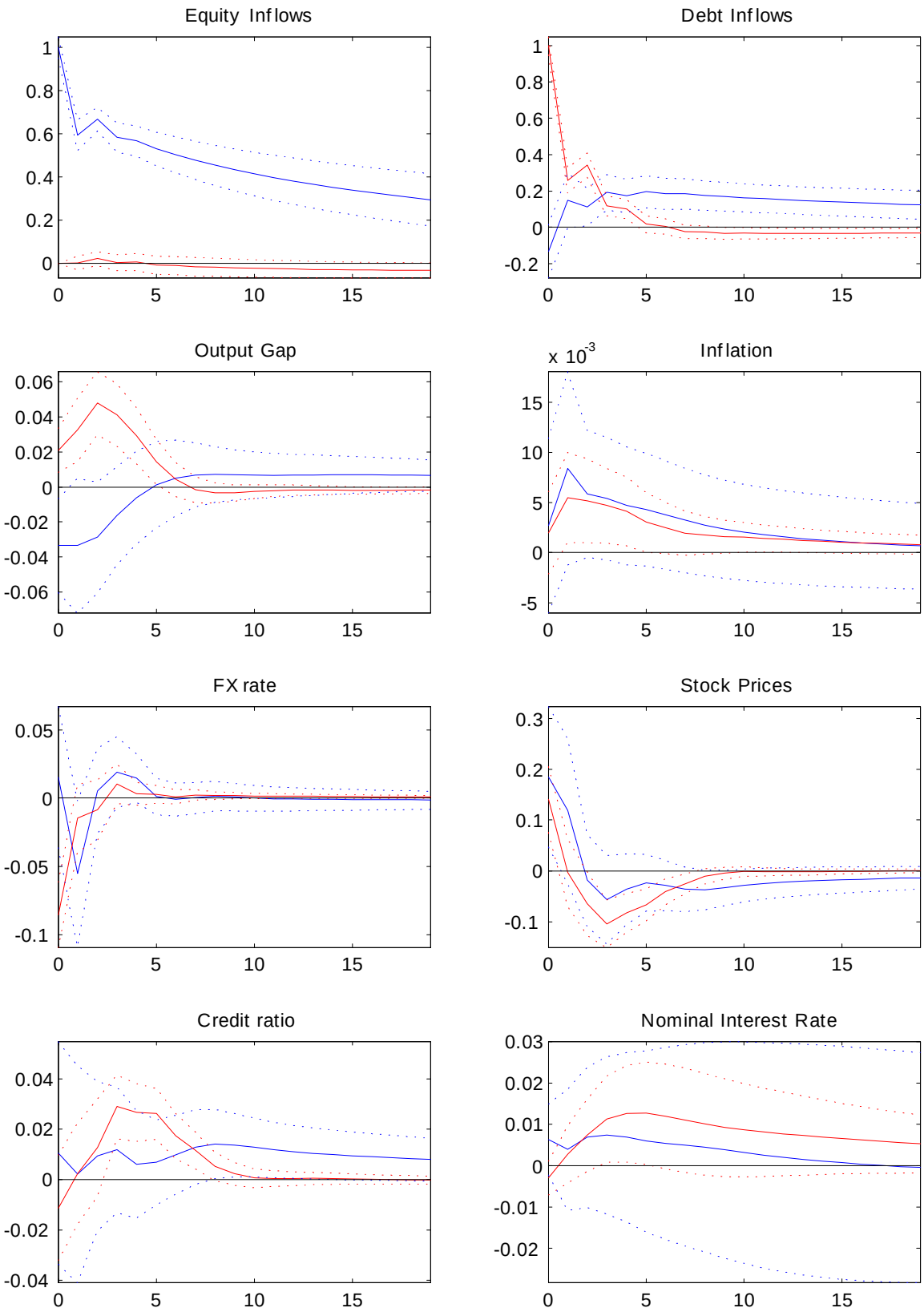

Figure 6: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands. Exogenous capital flow shocks are identified using common time fixed effects.

Table 2: The mean, standard deviation, and first-order autocorrelation of exogenous capital inflows and country-specific variables.

Variable	Mean	Standard Deviation	Autocorrelaion
$Equity^1$	4.179	2.072	0.660
$Debt^1$	-0.576	7.967	0.570
$Total^1$	3.664	9.221	0.637
$Equity^2$	4.409	3.187	0.152
$Debt^2$	-1.486	10.098	0.203
$Total^2$	2.985	11.399	0.333
OG	0.164	2.030	0.821
π	0.919	0.569	0.397
dFX	0.068	3.908	0.246
dPk	2.024	10.767	0.364
$dCredit$	1.175	2.595	0.302
i	4.896	1.823	0.921

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. OG is the output gap, π is the inflation rate, dFX is the percent change in the exchange rate (negative = appreciation), dPk is the percent change in the stock market index, dCredit is the change in the ratio of private non-financial sector credit-to-GDP, and i is the short term nominal interest rate.

Table 3: The unconditional correlation between exogenous capital inflows and country-specific variables.

	$Equity^1$	$Debt^1$	$Total^1$	$Equity^2$	$Debt^2$	$Total^2$	OG	π	dFX	dPk	$dCredit$	i
$Equity^1$	1.000											
$Debt^1$	0.555	1.000										
$Total^1$	0.683	0.984	1.000									
$Equity^2$	0.622	0.362	0.442	1.000								
$Debt^2$	0.428	0.790	0.775	0.264	1.000							
$Total^2$	0.549	0.803	0.813	0.502	0.965	1.000						
OG	0.449	0.321	0.370	0.224	0.229	0.266	1.000					
π	0.116	0.202	0.202	0.135	0.124	0.147	0.392	1.000				
dFX	-0.157	-0.345	-0.326	-0.149	-0.362	-0.359	-0.050	-0.093	1.000			
dPk	0.145	0.314	0.295	0.298	0.318	0.357	-0.224	0.010	-0.503	1.000		
$dCredit$	0.163	-0.100	-0.052	-0.039	-0.087	-0.084	0.150	-0.084	0.258	-0.353	1.000	
i	0.422	0.230	0.289	0.207	0.127	0.173	0.443	0.212	0.072	-0.213	0.262	1.000

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. OG is the output gap, π is the inflation rate, dFX is the percent change in the exchange rate (negative = appreciation), dPk is the percent change in the stock market index, dCredit is the change in the ratio of private non-financial sector credit-to-GDP, and i is the short term nominal interest rate.

Table 4: The share of forecast error variance that is due to shock to total capital inflows or equity and debt inflows at the 1, 3, and 5 year forcast horizons.

All Countries:

	Total Flows			Equity Flows			Debt Flows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
OG	1.29	1.74	1.82	0.18	0.19	0.20	4.49	5.27	5.27
π	1.89	2.28	2.34	0.40	0.72	0.76	1.65	1.77	1.80
dFX	4.48	4.48	4.49	0.10	0.12	0.12	5.90	5.89	5.90
dPk	3.53	4.17	4.34	0.26	0.30	0.35	4.64	5.55	5.56
$dCredit$	1.13	2.36	2.61	0.16	0.30	0.40	1.48	2.78	2.79
i	2.25	2.29	2.10	0.75	0.55	0.48	2.09	2.29	2.12

Developed:

	Total Flows			Equity Flows			Debt Flows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
OG	4.77	5.59	5.53	0.04	0.08	0.25	12.16	13.41	13.30
π	3.60	4.32	4.57	0.64	0.90	0.93	6.29	6.80	6.80
dFX	4.40	4.41	4.41	0.60	0.59	0.59	4.97	5.26	5.26
dPk	2.90	3.89	4.02	0.53	0.62	0.64	2.55	4.51	4.51
$dCredit$	2.46	6.33	6.98	0.39	0.70	0.93	3.17	5.83	5.76
i	6.33	5.93	5.42	0.40	0.95	1.10	15.04	14.40	13.02

Developing:

	Total Flows			Equity Flows			Debt Flows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
OG	4.27	4.77	4.78	0.21	0.23	0.24	5.26	5.55	5.57
π	1.33	1.70	1.73	0.30	0.38	0.41	2.91	3.01	3.00
dFX	4.93	5.02	5.02	0.10	0.14	0.14	6.70	6.65	6.65
dPk	4.35	4.66	4.65	0.65	0.80	0.80	5.32	5.30	5.29
$dCredit$	2.95	3.44	3.45	1.01	1.20	1.21	2.43	2.66	2.67
i	0.75	3.07	3.62	0.48	1.17	1.33	1.04	2.04	2.02

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. OG is the output gap, π is the inflation rate, dFX is the percent change in the exchange rate (negative = appreciation), dPk is the percent change in the stock market index, dCredit is the change in the ratio of private non-financial sector credit-to-GDP, and i is the short term nominal interest rate.

Table 5: The share of forecast error variance that is due to shock to total capital inflows or equity and debt inflows at the 1, 3, and 5 year forcast horizons. Exogenous debt and equity flows are identified using the alternative scheme using a common time fixed effect.

	Total Flows			Equity Flows			Debt Flows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
OG	1.30	2.07	2.12	0.77	0.79	0.87	5.69	6.44	6.44
π	1.34	2.18	2.35	0.57	0.83	0.84	1.49	2.11	2.19
dFX	3.53	3.51	3.51	0.53	0.55	0.55	4.92	4.89	4.90
dPk	2.59	3.31	3.39	0.92	1.01	1.05	2.75	3.65	3.65
$dCredit$	0.87	2.08	2.22	0.07	0.24	0.37	0.96	2.37	2.36
i	0.34	0.91	1.16	0.13	0.12	0.10	0.73	1.71	1.89

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. OG is the output gap, $\overline{\pi}$ is the inflation rate, dFX is the percent change in the exchange rate (negative = appreciation), dPk is the percent change in the stock market index, dCredit is the change in the ratio of private non-financial sector credit-to-GDP, and i is the short term nominal interest rate.