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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 macroeconomic effects. Using external instruments in a structural VAR, we first 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. We then estimate the response to an exogenous shock to debt or equity-based capital inflows in a structural VAR model that includes 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. An 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.

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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.

Since capital inflows are driven by both foreign "push" factors and domestic "pull" factors, they have a component that can be considered exogenous from the perspective of the country receiving the capital and a component that can be considered endogenous.Thus we

cannot simply rely on a recursive identification scheme where capital inflows are ordered either before or after the domestic macroeconomic variables in order to identify an exogenous shock to capital inflows. We will instead rely on the method of using "external instruments in a structural VAR" as described in Stock and Watson (2012), Mertens and Ravn (2013), and Gertler and Karadi (2014). This is a two step proceedure where we will use external instruments, like the VIX, to identify the component of capital inflows that are exogenous from the perspective of the receiving country, and use that as the exogenous shock from which to calculate impulse responses of various macroeconomic 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. 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 a direct comparison of FDI and non-FDI capital inflows. 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

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

$$\mathbf{B}_0 \mathbf{Y}_t = \mathbf{B}(L) \mathbf{Y}_{t-1} + \boldsymbol{\varepsilon}_t \tag{1}$$

where the vector $\mathbf{Y}_t$ contains total capital inflows (TI), total capital outflows (O), the output gap (OG), the inflation rate (π), the change in the exchange rate (dFX), the change in the stock price index (dP^k), the change in the ratio of private non-financial sector credit to GDP ($dCredit$), the level of the short-term nominal interest rate (i), and the change in the stock of foreign exchange reserves ($Reserves$). The vector $\boldsymbol{\varepsilon}_t$ is a vector of structural white-noise shocks.

In order to identify the separate effects of debt-based and equity-based capital inflows, replace the first term in the vector $\mathbf{Y}_t$, total capital inflows, with the following two variables, equity-based capital inflows (EI) and debt-based capital inflows (DI).

In both of these VAR specifications, the lag length is chosen to minimize the Schwartz Info Criterion.

2.1 Identifying exogenous shocks to capital inflows

To identify the macroeconomic effects of exogenous changes to capital inflows we will calculate impulse responses and variance decompositions from the structural VAR model in (1). To estimate this model, convert this structural VAR into a reduced form VAR by multiplying both sides by $\mathbf{B}_0^{-1}$:

$$\mathbf{Y}_t = \mathbf{A}(L)\mathbf{Y}_{t-1} + \mathbf{u}_t \tag{2}$$

where $\mathbf{\Sigma} = E(\mathbf{u}_t\mathbf{u}_t') = \mathbf{S}E(\boldsymbol{\varepsilon}_t\boldsymbol{\varepsilon}_t')\mathbf{S}' = \mathbf{S}\mathbf{S}'$, and $\mathbf{S} = \mathbf{B}_0^{-1}$. With a recursive identification strategy we would impose a certain ordering of variables in order to then identify $\mathbf{S}$ through a Cholesky decomposition of $\mathbf{\Sigma}$. For instance, if capital inflows were ordered first in the Cholesky ordering, we would assume that shocks to the other variables in the model have no effect on contemporaneous capital inflows and thus any innovations in capital inflows, as captured by the first component in the vector $\mathbf{u}_t$ must be exogenous shocks to capital inflows.

As discussed in Forbes and Warnock (2012), a significant fraction of capital inflows into a country can be considered exogenous to that country. This is the share of capital inflows that fluctuate due to events in the rest of the world, like changes in financial risk or investors' risk aversion (as captured by the VIX index). But at the same time a share of capital inflows can be considered endogenous fluctuations in capital inflows that are due to macroeconomic conditions within a country, so the assumption that capital inflows are unaffected by contemporaneous shocks to the other variables in the model is too strong.

To identify exogenous shocks to capital inflows and their effects on the other variables in the model, we employ the method of using external instruments in a structural VAR, as discussed in Stock and Watson (2012), Mertens and Ravn (2013), and Gertler and Karadi (2014). This is a two-step procedure. The first is to use a set of exogenous instruments to identify the exogenous component of the reduced form innovations to capital inflows, and

then identify how the reduced form innovations to the other variables in the model respond to changes in the exogenous component of capital flows. With this method of external instruments we will identify the first column in the matrix $\mathbf{S}$ in the specification where we are only considering total capital inflows and the first two columns in the specification where debt- and equity-based capital inflows enter as two separate variables.

First, estimate the reduced form representation of the structural VAR model in (2). Calculate the residuals from the capital inflows equation in this reduced form VAR. In the first specification, where total capital inflows have not been separated into debt and equity-based inflows, name this time series u_t^{TI}, the first component of the residual vector $\mathbf{u}_t$. In the second specification, where total capital inflows have been separated into debt and equity-based inflows, name these two time series u_t^{EI} and u_t^{DI}. The variable u_t^{EI} is the time series of residuals from the reduced form equation where equity-based capital flows are the dependent variable, and u_t^{DI} is the time series of residuals from the reduced form equation where debt-based capital flows are the dependent variable.

Let $\mathbf{Z}_t$ be a set of external instruments that are correlated with shock to capital inflows but are not correlated with shocks to any of the other variables in the model:

$$\begin{aligned} E\left(\mathbf{Z}_t u_t^{p\prime}\right) &\neq 0 \text{ for } p = TI, DI, EI \\ E\left(\mathbf{Z}_t u_t^{q\prime}\right) &= 0 \text{ for } q = O, OG, \pi, dFX, dP^k, dCredit, i, Reserves \end{aligned}$$

In the first stage regression, regress u_t^p on $\mathbf{Z}_t$ and calculate the fitted value $\hat{u}_t^p$. Then in the second stage regression, regress u_t^q on $\hat{u}_t^p$:

$$u_t^q = \frac{s^q}{s^p}\hat{u}_t^p + \epsilon_t \tag{3}$$

This second stage regression yields a consistent estimate of $\frac{s^q}{s^p}$, where s^q is the value in the qth row of the matrix $\mathbf{S}$. In the specification with total capital inflows (so $p = TI$), s^q

is in the first column of $\mathbf{S}$. In the specification where capital inflows have been divided into debt- and equity-based capital inflows, if $p = EI$ then s^q is in the first column of the matrix $\mathbf{S}$ and if $p = DI$ then s^q is in the second column of $\mathbf{S}$. The value s^p is simply the standard deviation of u_t^p, where $p = TI, DI, EI$.

Since we are just considering the effect of shocks to capital inflows, there is no need to identify shocks to the other variables in the model, assume that the remaining columns of $\mathbf{S}$ simply contain zeros in the off-diagonal elements.

2.1.1 Variables and Data

The capital flow data is taken from the IMF's balance of payments statistics (BPM6). This study will make use of this data at a quarterly frequency from 2005Q1 to 2013Q4 for 30 countries (16 developed countries and 14 emerging markets).[1] 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 liabilities and portfolio equity liabilities are combined to form equity-based capital inflows and the portfolio debt liabilities and other liabilities are combined to form debt-based capital flows. Total capital inflows is simply the sum of these two. Total capital outflows are simply the sum of foreign direct, portfolio equity, portfolio debt, and other assets. The capital flow variables EI, DI, TI, and O are simply these capital inflows and outflows normalized by a country's nominal GDP.

The other variables that make up $\mathbf{Y}_t$, the vector of country-specific economic and financial variables in the panel VAR in (1) 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

[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, and Sweden. 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.

the ratio of private non-financial sector credit-to-GDP, as taken from the BIS, the level of the short-term nominal interest rate, and the change in the stock of foreign exchange reserves, nomalized by nominal GDP.

The variables that make up the instrument vector $\mathbf{Z}_t$, the vector of global economic and financial conditions that are exogenous to country i, are taken from recent literature describing the global factors that drive swings in capital inflows. The first variable in $\mathbf{Z}_t$ is the VIX index, the implied 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 investors' risk perceptions or risk aversion is high, capital inflows into many countries fall, and when the VIX is low, indicating that investors' 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 $\mathbf{Z}_t$. Specifically the remaining variables in $\mathbf{Z}_t$ 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, the short-term nominal interest rate, and the stock of central bank reserves across the U.S., the U.K., Japan, France, and Germany and Switzerland.

The mean, standard deviation, and first-order autocorrelation for each of the variables in the model is presented in table 1. The table shows that equity-based and debt-based capital inflows are similar in size, both average about 5% of GDP per quarter. Also, the first-order autocorrelation for each is about 0.2. The significant difference between debt-based and equity-based capital inflows is volatility. Debt-based capital inflows are about 2.5 times as volatile as equity-based capital inflows.

The unconditional correlation between each of the variables in the model is presented in table 2. The table shows that debt-based capital inflows are nearly uncorrelated with equity-based inflows. In addition, the unconditional correlations between capital inflows and the macroeconomic variables in the model show that debt-based inflows are more likely to

be associated with a positive output gap, rising inflation, rising stock prices, and exchange rate appreciation.

The results from the first and second stages of the VAR with external instrument estimation is presented in table 3. The first two lines of the table present the key results from the first-stage regression of the capital inflow measure (EI, DI, or TI) on the vector of external instruments. The first line presents the p-value from a cross-section fixed effects test. The results show that we can reject the hypothesis that a cross-section fixed effect is needed in the first-stage regression of total capital inflows or debt inflows, but we cannot reject the hypothesis in the first-stage regression of equity inflows. Thus country-specific fixed effects are an important part of explaining equity capital inflows, but are redundant for explaining either total capital inflows or debt inflows. The next line presents the p-value of the F-test of the first-stage regression of the capital inflow measure on the vector of external instruments (where country-specific fixed effects are included in the regression of equity inflows). The results show that in each case, the vector of external instruments can explain part of the fluctuations in capital flows (relevance condition).

The rest of the table presents the results from the second stage regression in (3). The table presents the estimated coefficients $\frac{s^q}{s^p}$ where $q = O, OG, \pi, dFX, dP^k, dCredit, i,$ or $Reserves$ and $p = TI, DI,$ or EI. Thus the results in the table measure how the reduced form innovations to the other variables in the model respond to changes in the exogenous component of capital flows. The results show that the innovations to the macroeconomic variables in the model respond strongly to a exogenous shock to total capital inflows or debt inflows, but respond very little to a shock to equity inflows.

3 Results

3.1 Impulse responses

The responses of the domestic output gap, the quarter-over-quarter inflation rate, the change in the exchange rate, the change in stock prices, credit growth, short-term interest rate, and the change in the stock to foreign exchange reserves 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, an increase in the inflation rate, an appreciation in the exchange rate, an increase in stock prices, an increase in the credit-to-GDP ratio, an increase in the short-term nominal interest rate, and the stock of foreign exchange reserves is largely unchanged.

The responses of the same variables, but to separate shocks to equity inflows and debt inflows are presented in figure 2. 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 figure shows that the responses to an exogenous shock to debt inflows are very similar to the responses to a shock to total inflows. There is a statistically significant increase in the output gap, inflation, stock prices, and the credit ratio, and a significant appreciation of the exchange rate. However, the figure shows that there is almost no response to the same variables following a shock to equity capital inflows. The shock to equity inflows does not lead to a statistically significant change in the output gap, inflation, the exchange rate, or the growth in credit, and leads to only a small increase in stock prices.

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 external instruments identification scheme from the impulse response analysis.

The results from these variance decompositions are presented in table 4. The the table presents the results for the pooled sample of 30 developed and emerging market countries. In the next section we consider the pool of developed countries separately from the pool of emerging market countries.

These variance decompositions are calculated for the 1, 3, and 5 year forecast horizon. Shocks to total capital inflows are responsible for about 30-40% of the forecast error variance of the output gap, inflation, and credit growth at the 1-5 year horizon and for about 50% of the forecast error variance of the fluctuations in the exchange rate, stock prices, and short-term interest rates. However, when total exogenous capital flows are divided into debt flows and equity flows, shocks to debt inflows are responsible from 30-40% of the forecast error variance of these macroeconomic variables, but the share attributed to shocks to equity inflows is much less. Less than 5% of the forecast error variance of these macroeconomic variables can be attributed to shocks to equity capital inflows.

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 30 countries. Figure 3 presents the same impulse responses for only the subset of 16 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.

The results from variance decompositions in the smaller panels of 16 developed or 14 emerging market countries are presented in table 5. The table shows that within each subsample, shocks to total capital inflows are responsible for about 30-50% of the forecast error variance of these macroeconomic variables. The table shows that this share is slightly larger in the developed economies, owing to the fact that capital inflows into developed economies are on average larger. When debt- and equity-based capital inflows are considered separately, again nearly all of the variance due to shocks to total capital inflows is due to shock to debt inflows. After the sample of 30 countries is divided into developed and emerging market subsamples, the share of the forecast error variance attributable to shocks to equity capital inflows is still only around 1-5% in each subgroup.

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 by regressing innovations in capital inflows from the reduced form VAR, u_t^p for $p = TI, EI, DI$, on a set of external instruments. This is stage 1 of the external instruments structural VAR estimation and yields the component of the innovations in capital inflows that is exogenous from the perspective of an individual country in the panel estimation, $\hat{u}_t^p$. An alternative way to identify the same exogenous component of capital inflows is to find the component of innovations in capital inflows that is common across all 30 countries in the sample. To do this, simply regress u_t^p on a fixed time effect in a panel data regression:

$$u_t^p = \mu_t^p + \varepsilon_t^p$$

This fixed time effect is now the $\hat{u}_t^p$ from the first-stage of the instrumental structural VAR estimation.

The responses of the output gap, inflation, the exchange rate, stock prices, credit growth,

the nominal interest rate, and foreign exchange reserves 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 5. The figure is very similar to the same responses under the primary identification scheme using the vector of external instruments, $\mathbf{Z}_t$, 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 inflows also lead to a statistically significant increase in inflation and stock prices, whereas that was only true for debt under the primary identification scheme.

Variance decompositions, where exogenous capital flows are identified with this alternative scheme are presented in table 6. These variance decomposition results are very similar to the results under the primary identification scheme. The share of the forecast error variance of inflation and stock prices attributed to equity flows is higher under this alternative identification scheme, 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 FDI vs. Non-FDI Inflows

Throughout this paper we have followed the convention in the literature and grouped both portfolio equity flows and FDI flows into one variable, equity flows. This is because the distinction between portfolio equity and FDI is a matter of degree, namely an investment of more than 10% of total voting shares is counted as FDI.[2] In some emerging market countries in the sample portfolio equity and FDI are not recorded as separate entries, so to maximize the country coverage in this study, we simply combine portfolio equity and FDI into one entry.

[2]See International Monetary Fund (2009)

Due to these data limitations, any attempt to separate the portfolio equity from FDI will not be perfect, but to a first approximation we can split total capital inflows into FDI inflows and non-FDI inflows by simply moving portfolio equity into the group with portfolio debt and other capital flows. We can then perform the same exercise as before, but instead of contrasting debt and equity inflows we contrast FDI and non-FDI inflows. The impulse responses of the various macroeconomic variables in the model to a shock to FDI or non-FDI inflows is presented in figure 6. The figure shows that most of the distinction between equity and debt-based capital inflows can be attributed to a difference between FDI and non-FDI capital inflows.

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 analysts in the financial press or from policy makers 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 sacrificing the benefits of a financial market openness.

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Table 1: The mean, standard deviation, and first-order autocorrelation of exogenous capital inflows and country-specific variables.

Variable	Mean	Standard Deviation	Autocorrelaion
TI	10.16	13.33	0.26
EI	4.65	4.88	0.18
DI	5.51	12.04	0.21
OG	0.16	2.05	0.82
π	0.94	0.57	0.39
dFX	0.09	3.94	0.25
dPk	2.02	10.86	0.36
$dCredit$	1.19	2.63	0.30
i	5.01	1.85	0.92
$Reserves$	3.19	10.20	0.14

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, i is the short term nominal interest rate, and Reserves is the stock of foreign exchange reserves normalized by nominal GDP.

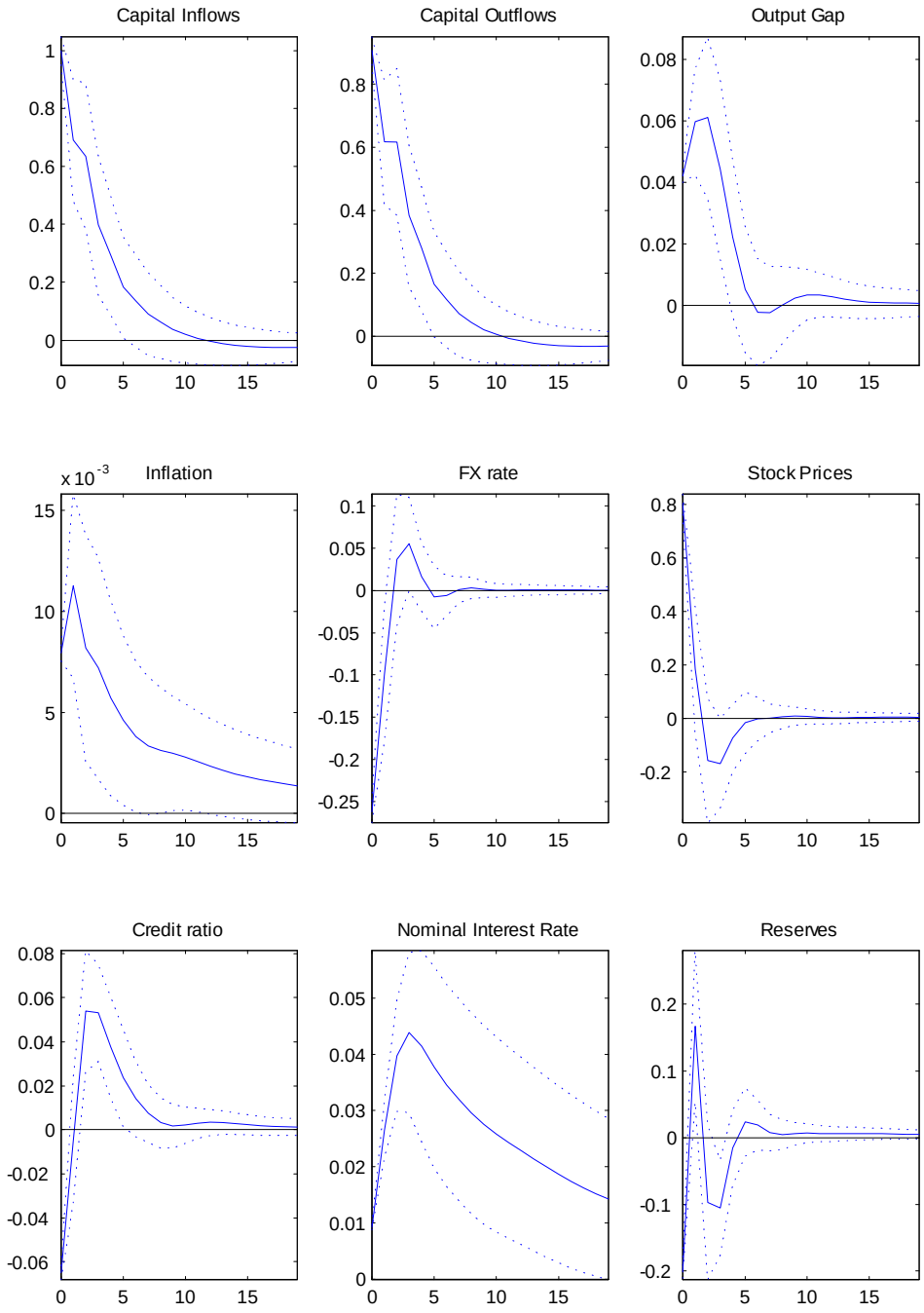

Figure 1: Responses to an exogenous 1 percenatge point increase in the ratio of capital inflows to GDP. Dotted lines represent 95% confience bands.

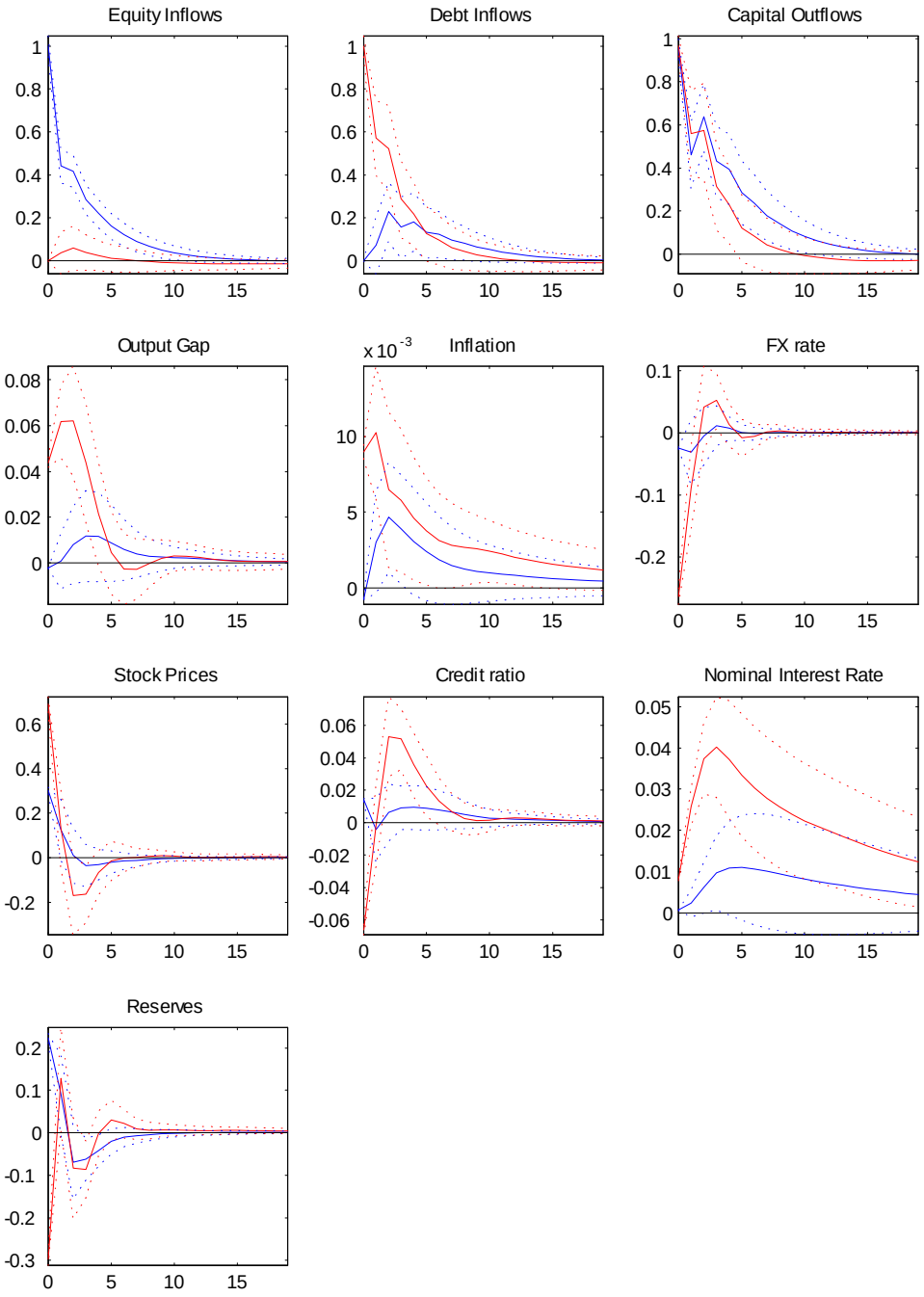

Figure 2: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands.

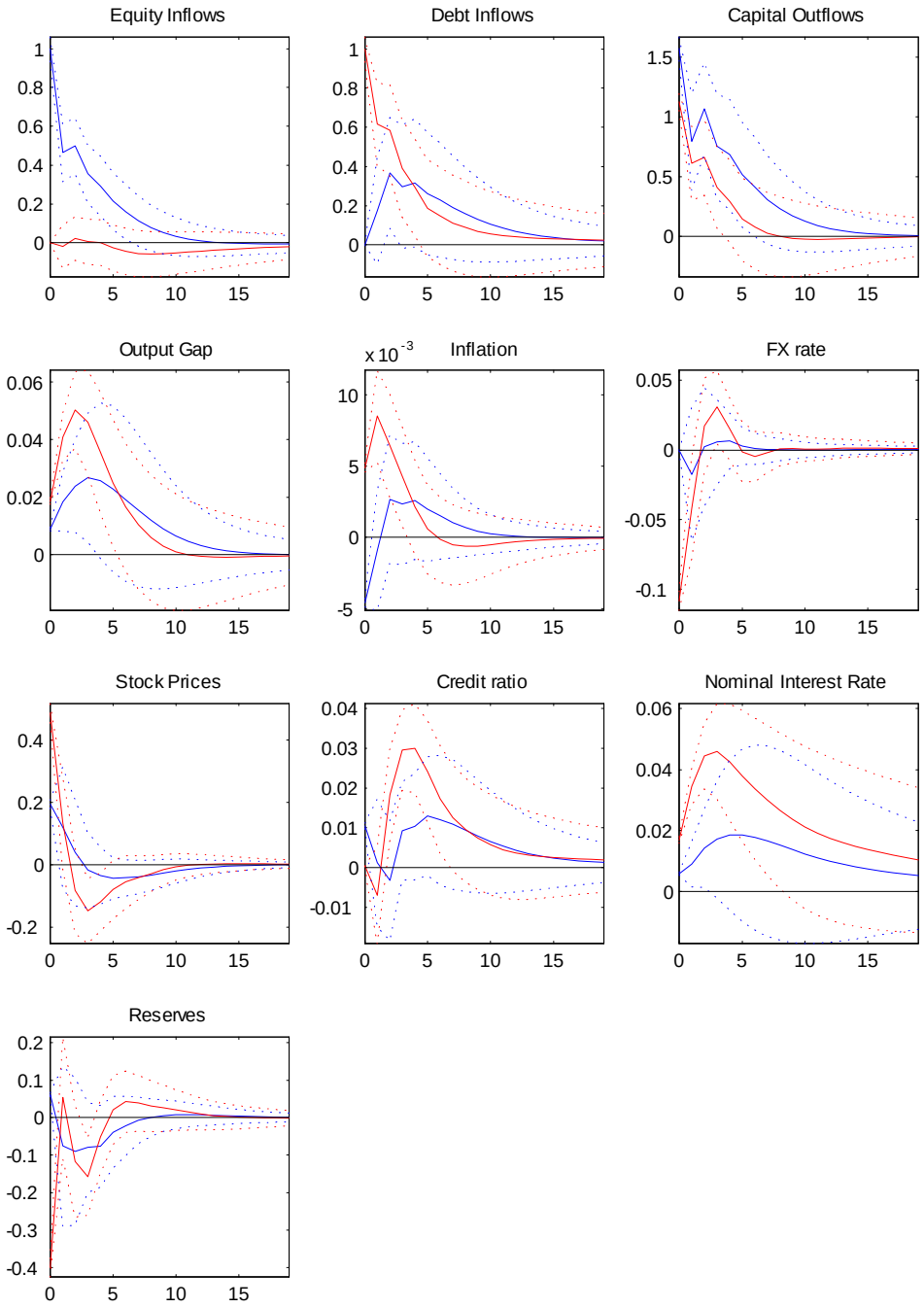

Figure 3: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands.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

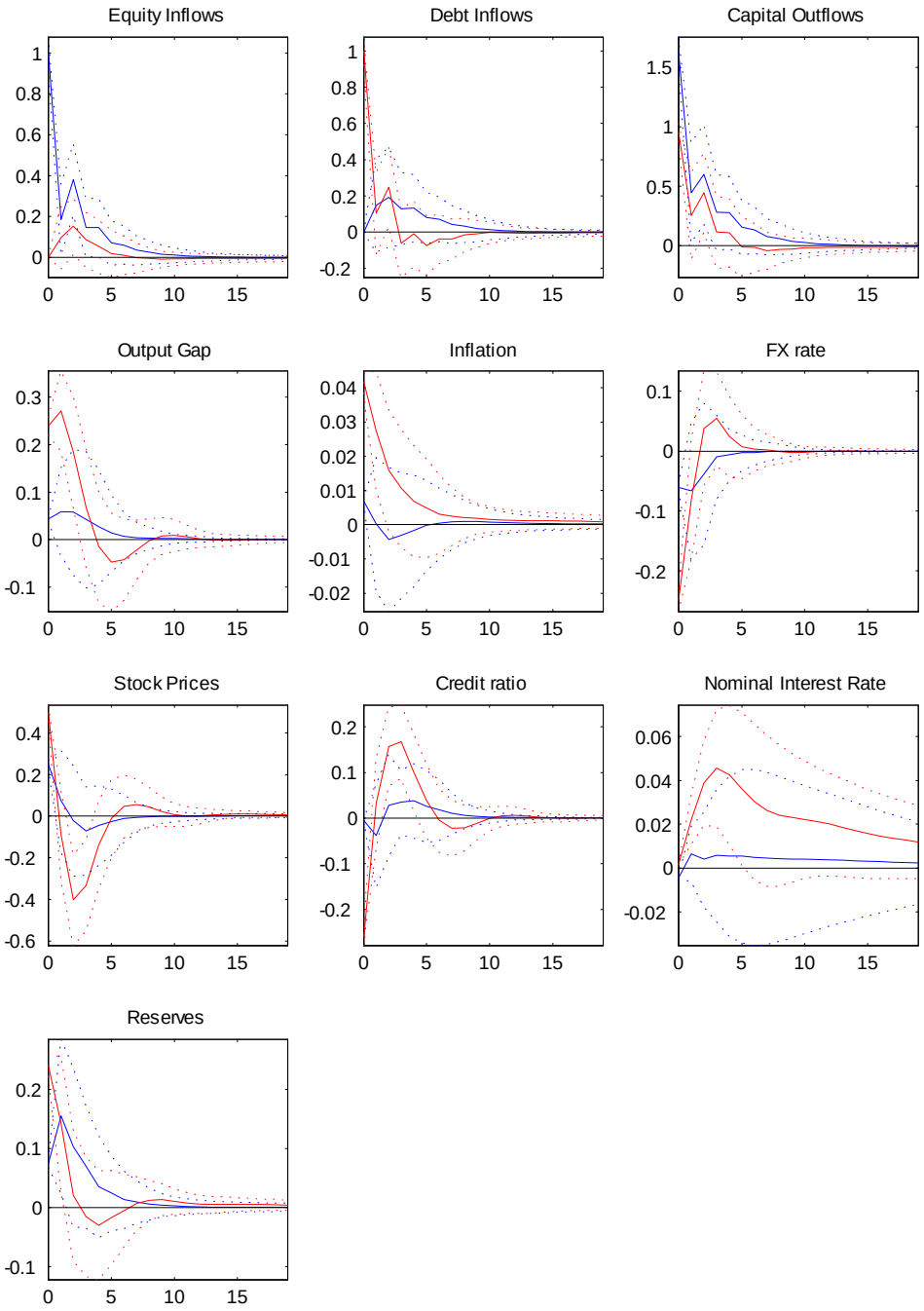

Figure 4: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands.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

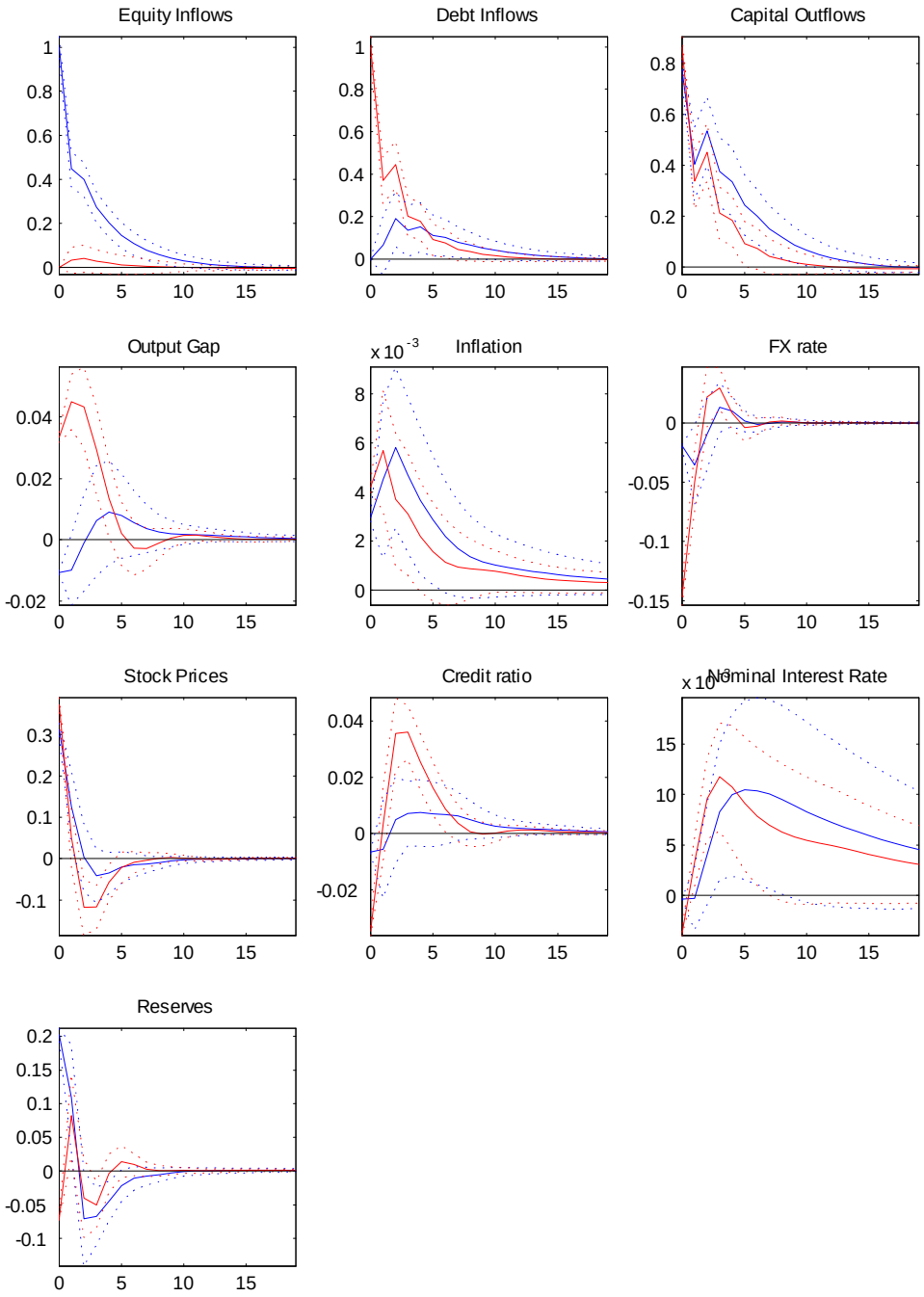

Figure 5: Responses to an exogenous 1 percenatge point increase in the ratio of debt- or equity-based capital inflows to GDP. Responses following a shock to equity inflows are represented by the blue line, responses to a debt shock are given by the red line. Dotted lines represent 95% confience bands. Exogenous capital flow shocks are identified using common time fixed effects.

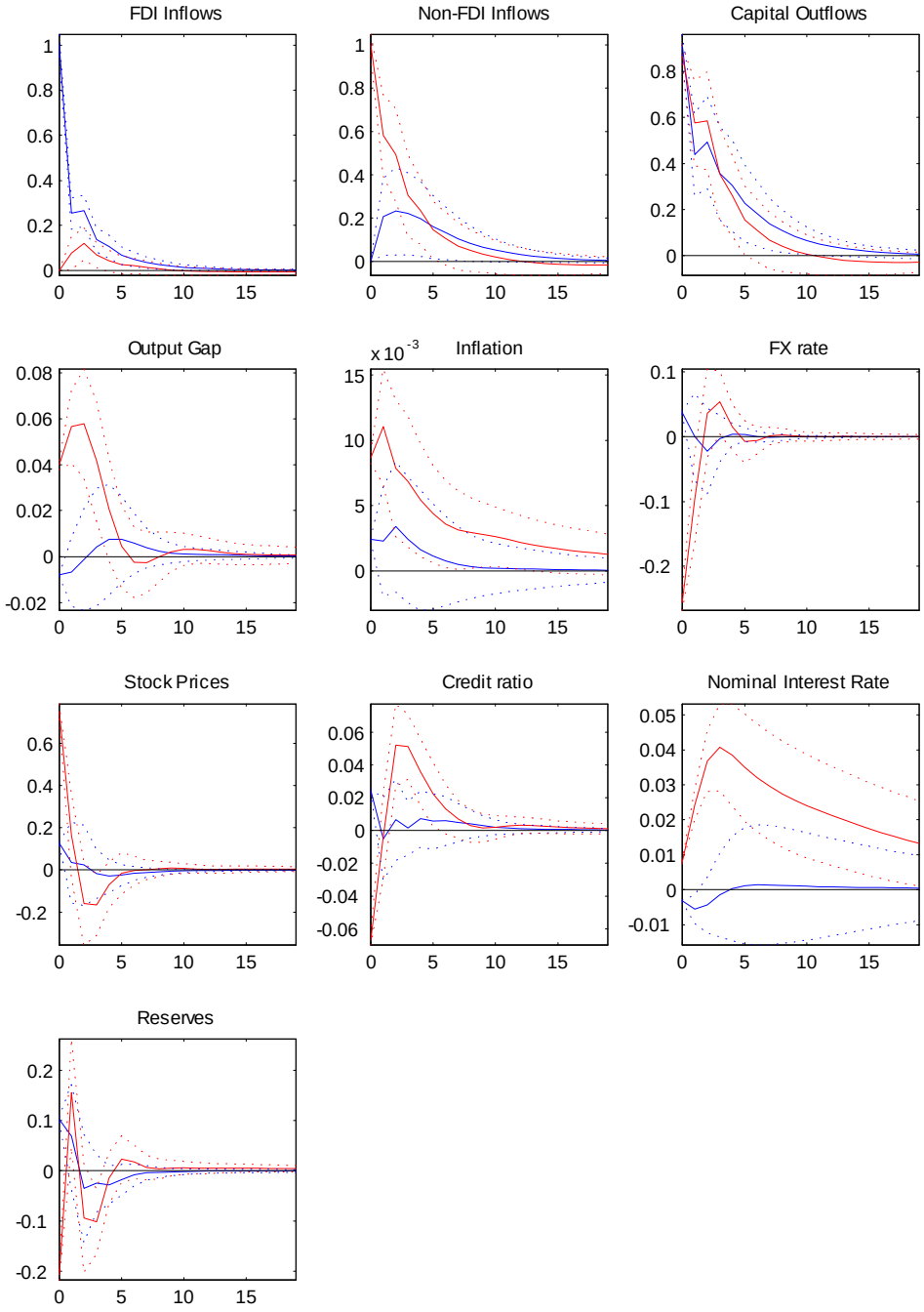

Figure 6: Responses to an exogenous 1 percenatge point increase in the ratio of FDI or non-FDI capital inflows to GDP. Responses following a shock to FDI inflows are represented by the blue line, responses to a shock to non-FDI inflows are given by the red line. Dotted lines represent 95% confience bands.

Table 2: The unconditional correlation between exogenous capital inflows and country-specific variables.

	TI	EI	DI	OG	π	dFX	dPk	$dCredit$	i	$Reserves$
TI	1.00									
EI	0.40	1.00								
DI	0.90	0.01	1.00							
OG	0.25	0.11	0.23	1.00						
π	0.15	0.09	0.14	0.39	1.00					
dFX	−0.28	−0.13	−0.26	−0.05	−0.09	1.00				
dPk	0.30	0.17	0.27	−0.22	0.00	−0.52	1.00			
$dCredit$	−0.04	−0.02	−0.04	0.16	−0.07	0.27	−0.35	1.00		
i	0.00	0.02	−0.01	0.44	0.20	0.07	−0.22	0.28	1.00	
$Reserves$	0.27	0.11	0.26	0.01	−0.09	−0.19	0.23	−0.18	−0.11	1.00

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, i is the short term nominal interest rate, and Reserves is the stock of foreign exchange reserves normalized by nominal GDP.

Table 3: Results from a regression of equity, debt, and total capital inflows on both country-specific charactics and exogenous financial center characteristics.

	Capital Inflow:		
	TI	EI	DI
P-value of cross-section fixed effects in 1st stage regression:	0.319	0.000	1.000
P-value of F-test to 1st stage regression:	0.004	0.001	0.001
Coefficients $\frac{s^q}{s^p}$ from 2nd stage regression:			
OG	0.042^{**}	-0.002	0.044^{**}
	(0.013)	(0.015)	(0.013)
π	0.008^{*}	-0.001	0.009^{**}
	(0.004)	(0.005)	(0.004)
dFX	-0.262^{**}	-0.024	-0.263^{**}
	(0.022)	(0.029)	(0.024)
dP^k	0.802^{**}	0.301^{**}	0.689^{**}
	(0.059)	(0.077)	(0.065)
$dCredit$	-0.065^{**}	0.014	-0.066^{**}
	(0.021)	(0.025)	(0.022)
i	0.009^{**}	0.001	0.008^{*}
	(0.004)	(0.005)	(0.004)
$Reserves$	-0.201^{**}	0.223^{*}	-0.298^{**}
	(0.099)	(0.119)	(0.106)

Notes: The equity, debt, and total capital flow variables are capital inflows normalized by a country's nominal GDP. OG is the output gap, $\pi$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, i is the short term nominal interest rate, and Reserves is the stock of foreign exchange reserves normalized by nominal GDP. In the results from the second stage regression, standard errors are in parenthesis, *denotes significance at the 10% level, **denotes significance at the 5% level.

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:								
	Shock to Total Inflows			Shock to Equity Inflows			Shock to Debt Inflows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
TI	91.91	90.20	89.89						
EI				94.79	92.36	91.49	1.26	1.34	1.63
DI				1.38	2.69	2.73	88.78	86.60	86.47
O	87.33	85.57	85.10	22.10	24.16	24.00	67.35	63.34	63.03
OG	40.79	41.00	41.02	0.21	0.48	0.49	37.11	37.15	37.16
π	26.61	30.72	31.59	1.14	1.54	1.56	19.92	22.59	23.25
dFX	47.31	47.21	47.21	0.31	0.32	0.32	45.58	45.47	45.47
dPk	46.50	46.34	46.34	2.64	2.65	2.65	41.70	41.51	41.50
$dCredit$	32.79	35.62	35.68	0.32	0.56	0.57	29.10	31.46	31.49
i	51.91	54.83	54.95	0.53	1.29	1.39	44.28	45.67	45.54
$Reserves$	21.95	21.87	21.91	3.69	3.76	3.76	20.51	20.50	20.51

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, i is the short term nominal interest rate, and Reserves is the stock of foreign exchange reserves normalized by nominal GDP.

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.

Developed Countries:

	Shock to Total Inflows			Shock to Equity Inflows			Shock to Debt Inflows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
TI	93.90	91.53	91.45						
EI				90.79	84.33	82.54	0.17	3.21	4.50
DI				3.46	6.73	6.83	88.22	83.49	83.13
O	90.48	88.11	88.04	33.79	36.43	36.42	54.53	50.20	50.16
OG	64.01	65.43	65.42	4.33	7.10	7.12	58.36	58.10	58.07
π	44.09	44.57	44.58	2.19	3.01	3.01	34.14	34.36	34.38
dFX	41.32	41.52	41.52	0.26	0.30	0.30	38.82	38.94	38.95
dPk	50.02	51.14	51.14	2.51	2.72	2.73	45.73	46.66	46.65
$dCredit$	27.40	45.19	45.32	1.00	3.09	3.22	21.03	37.42	37.53
i	64.94	65.45	64.71	1.98	3.58	3.71	61.89	61.56	60.72
$Reserves$	27.33	28.17	28.18	0.90	1.17	1.18	26.28	26.74	26.75

Emerging Markets:

	Shock to Total Inflows			Shock to Equity Inflows			Shock to Debt Inflows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
TI	83.37	77.96	77.76						
EI				82.59	79.90	79.68	5.98	6.13	6.15
DI				2.33	3.08	3.08	72.54	67.30	67.23
O	74.66	70.20	69.90	42.51	41.45	41.31	33.68	32.05	31.99
OG	43.86	43.22	43.22	1.25	1.32	1.32	44.82	44.23	44.23
π	30.09	30.65	30.66	0.38	0.39	0.39	31.19	30.80	30.74
dFX	26.17	26.24	26.25	1.67	1.65	1.65	28.04	27.99	27.99
dPk	33.42	33.57	33.56	2.00	1.99	1.99	31.75	31.94	31.92
$dCredit$	35.99	36.83	36.83	0.51	0.81	0.81	39.24	39.50	39.50
i	25.49	30.15	30.42	0.23	0.24	0.26	18.31	20.24	20.19
$Reserves$	28.49	28.25	28.26	5.76	5.84	5.82	22.20	21.96	21.95

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 6: 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.

	Alternate identification of exogenous inflows:								
	Shock to Total Inflows			Shock to Equity Inflows			Shock to Debt Inflows		
	1 year	3 year	5 year	1 year	3 year	5 year	1 year	3 year	5 year
TI	94.96	92.77	92.44						
EI				96.68	94.23	93.70	0.75	0.81	0.82
DI				1.26	2.44	2.46	92.40	89.88	89.74
O	88.48	86.42	85.93	22.15	24.06	23.92	64.36	59.87	59.44
OG	27.69	27.92	27.93	0.35	0.62	0.63	25.82	25.80	25.79
π	13.32	14.25	14.27	2.87	3.65	3.68	7.72	8.13	8.11
dFX	40.39	40.31	40.31	0.86	0.91	0.91	36.18	36.07	36.07
dPk	41.61	41.53	41.52	6.78	6.75	6.75	30.84	30.84	30.83
$dCredit$	20.07	22.63	22.65	0.21	0.48	0.50	16.42	18.78	18.78
i	10.09	12.62	12.71	0.67	2.49	2.77	6.23	6.72	6.60
$Reserves$	7.37	7.42	7.42	5.34	5.51	5.51	4.19	4.23	4.23

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, i is the short term nominal interest rate, and Reserves is the stock of foreign exchange reserves normalized by nominal GDP.