Introduction

Do gross capital flows import global shocks to emerging markets? If so, what are the output spillovers from such shocks to emerging markets and what tools should emerging market central bankers use to deal with them? Academics and policy makers have fiercely debated these central policy questions.

The textbook open economy model states that countries with open capital markets must choose between monetary autonomy and exchange rate management. In order to be able to deal with global shocks imported by capital flows, countries must use a floating exchange rate as the shock absorber, leaving monetary policy to be the tool for other domestic policy considerations. Hélène Rey (2013) recently challenged this centrepiece of international macroeconomics. Her argument is that widespread co-movement in capital flows, asset prices and credit growth across countries — a global financial cycle — makes the trilemma irrelevant: independent monetary policies are possible if, and only if, the capital account is managed. To put it differently, flexible exchange rates will not absorb
global shocks (such as global financial crisis) that are imported across countries by extensive gross capital flows.¹

Floating exchange rates will absorb some of the shocks, but ultimately we want to know the spillover effects of capital flows on the output of the emerging markets. As long as flexible rates do not absorb all the shocks, or emerging markets do not have fully flexible exchange rate regimes and instead use managed floats, there will be spillover effects, where the output of emerging markets cannot be insulated from global shocks. Of course, capital flows themselves are endogenous responses to different domestic shocks and, hence, it would be naive to see them purely as an exogenous force importing global shocks and affecting emerging markets’ GDP.

The approach adopted in this paper will focus on dynamic correlations in the data by investigating the effects of lagged capital flows on current output, and compare such effects during risk-on, risk-off periods over the course of the global financial cycle as measured by the Volatility Index (VIX) calculated by the Chicago Board Options Exchange. The chapter documents the output spillover effects of capital flows at business cycle frequencies, where the time variation in the data is taken seriously, such that the methodology will differentiate between the contemporaneous effect and lagged effects.

The chapter focuses on country and capital flow heterogeneity, investigating several sub-samples of countries (emerging, developing and advanced) and different asset classes (foreign direct investment [FDI], equity versus debt). Results will always be conditioned on lagged GDP growth and the general economic condition of each country and, combined with country and year effects, will take into account unobserved country and time heterogeneity.

Typically, capital inflow episodes are associated with higher aggregate demand and output, real appreciation of the domestic currency, and trade and current account deficits (see Végh 2013; Reinhart and Rogoff 2009). In a standard two-period model, it is easy to show that an economy’s response to three shocks (high domestic demand, fall in world interest rate and an exogenous capital flow), will be identical, meaning macroeconomic effects of capital flows, such as a consumption boom and a real appreciation, will be the same regardless of the

¹ The empirical evidence on the issue is so far mixed. Michael Klein and Jay Shambaugh (2013) find evidence that more exchange rate flexibility is associated with greater monetary policy autonomy. As also shown by Joshua Aizenman, Menzie Chinn and Hiro Ito (2010), Klein and Shambaugh (2013) and Abdul Abiad et al. (2012), domestic interest rates of countries with less flexible regimes move closely with US monetary policy shocks or with the countries they peg to. According to these authors, this is because countries that are de facto pegged against the US dollar will “import” US monetary policy, while free floaters will have the exchange rate as the shock absorber. Rey (2013), on the other hand, shows that global shocks, measured by VIX (the Chicago Board Options Exchange Volatility Index), are the key determinant of capital flows and credit growth for any country in her sample, regardless of the exchange rate regime.
shock. In a model with nominal rigidities, there will be a real appreciation via higher inflation if the exchange rate regime is fixed, and via a fall in the nominal exchange rate if the exchange rate is flexible. Nevertheless, a real appreciation (depreciation) will take place in both types of model as a result of capital inflows (outflows) and, depending on the model, this may or may not be accompanied by a consumption boom. Hence, capital flows can be counter-cyclical or pro-cyclical, or lead to changes in output. This chapter makes use of the insight from Rey (2013), where capital flows to emerging countries in the short run are mostly determined by global risk appetite, measured by VIX, and will examine the effect on output in a differences-in-differences setting comparing high and low episodes of VIX.

Why is it important to document the dynamic patterns between capital flows and output in emerging markets at business cycle frequencies? These correlations are the root cause of policy makers’ response to capital flows. It is important for policy makers to resist appreciation, that is, “lean against the wind” as a result of capital inflows. As documented extensively in the literature, this “fear of floating” brought about a “managed float” system that is used widely by emerging market central bankers (see Calvo and Reinhart 2002; Kaminsky, Reinhart and Végh 2005). In general, central bankers use foreign exchange (FX) intervention or capital controls to manage the exchange rates. A non-sterilized intervention will mean an increase in money supply via higher international reserves and, hence, limit appreciation as a result of inflows, but will also cause overheating and inflation. Since policy makers do not want such an outcome and want to limit additional liquidity in the system, which will also cause financial stability concerns, they mostly engage in sterilized intervention by selling government bonds to absorb the additional liquidity. However, since what government sells and what foreigners buy are not perfectly substitutable assets (portfolio channel), in general, sterilized interventions are not effective in absorbing the domestic liquidity, although they are effective in managing the exchange rate (see Craig and Humpage 2001; Frankel 1986). It is also possible that the news that central banks are intervening in support of the currency will cause speculators to expect an increase in the price of that currency in the future, buying the currency today and bringing about the expected price change. As a result, many emerging market central bankers also use macroprudential policy to a great extent.

The literature, so far, has produced mixed results on the dynamic relationship between capital flows and output. Menzie Chinn and Eswar Prasad (2003) run panel regressions with annual data of current account and growth, obtaining weak results — sometimes positive, sometimes negative, depending on the control variables used. Most of the literature focuses on the long-run relationship between capital flows and growth, also finding different results depending on the country sample used. See Alfaro, Kalemli-Ozcan and Volosovych (2011) for a survey of this literature.
The effectiveness of macroprudential policies in terms of curbing credit growth seems to be suspect, although, as shown by Kristin Forbes and Michael Klein (2013) and Kristin Forbes, Marcel Fratzscher and Roland Straub (2014).

Figure 1 is a case in point. Here, the experience of Turkey, a typical emerging market country, is plotted. The correlation between capital flows and credit growth (which parallels the output growth) is evident. It is also clear that during periods of heightened global uncertainty, flows go down, and vice versa. What is interesting is that policy reaction is also endogenous to this relationship between VIX and capital flows. Between 2008 and 2013, the Turkish central bank implemented several policies to deal with capital inflows and an overheating economy. In October 2008, it passed the dividend policy, which requires banks to seek approval before distributing dividends. In June 2009, it passed the FX policy, which allows non-FX-earnings companies to borrow in FX from local banks, provided the FX loan amount is greater than US$5 million and the maturity date is longer than a year. The same law bans consumers from taking out FX-linked loans. In December 2010, the Turkish central bank implemented a ceiling for loan-to-value ratio on housing loans to consumers (at 75 percent) and on purchases of commercial real estate (at 50 percent). In spring 2011, there was additional guidance to banks that credit growth (adjusted for FX movements) should not exceed 25 percent. The first true macroprudential policy (MP1 in Figure 1) is in June 2011, introducing higher risk weights for fast-growing consumer loans. In June 2011, there was
also an increase in consumer loans provisioning.³ These are combined with limits to credit card debt. In September 2011, there were changes to minimum capital adequacy requirements for banks with foreign strategic shareholders. The minimum ratio would depend on various factors such as the credit default swap spread of the parent and its sovereign, European Banking Authority stress test results and the public debt ratio in the country of origin. In January 2013, a second set of macroprudential policies started (MP2 in Figure 1) to increase the tax rates taken from interest income of short-term deposits. Overall, these measures seem to have had an effect on curbing the credit growth, in particular, loan to value and macroprudential, in the case of Turkey, and capital flows moved more with the VIX, except in the last period, where, in spite of low VIX, capital flows declined. As a result, it is important to evaluate the dynamic patterns in the data in terms of output growth (credit growth) and capital flows, since this is what the policy makers will look at first, before undertaking the appropriate policy response.

The rest of the chapter proceeds as follows: in the second section, the data is described and dynamic patterns in figures are shown; the third section undertakes a systematic regression analysis; and the final section draws conclusions.

## Data and Dynamic Patterns

International Monetary Fund (IMF)-IFS data were used. The IFS database is the most comprehensive and comparable source of balance-of-payment (BoP) statistics for many countries. Nevertheless, there are several issues with the compilation of the BoP statistics, as discussed in greater detail by Philip Lane and Gian Maria Milesi-Ferretti (2001) and Laura Alfaro, Şebnem Kalemli-Özcan and Vadym Volosovych (2008). There are substantial country differences in terms of time period coverage, and missing, unreported or misreported data, in particular for developing countries. Some countries do not report data for all forms of capital flows. Outflows data tend to be misreported in most countries and, as a result, captured in the “errors and omissions” item.⁴ Unfortunately, it

---

³ For new general-purpose loans with maturities below two years, the capital adequacy risk-weight is increased to 150 percent (from 100 percent). For new general-purpose loans with a maturity greater than two years, the risk-weight is increased to 200 percent (from 100 percent). For details, see, IMF, Turkey: Selected Issues, Country Report 12/339 (Washington, DC, December 2012), available at https://www.imf.org/external/pubs/ft/scr/2012/cr12339.pdf.

⁴ Jeffrey Frankel (2001), for example, argues that data collection is much better for capital flowing into a country than capital flowing out. He gives the example that until 1994, no comprehensive survey of US residents’ holdings of foreign securities had been conducted since World War II.
is hard to verify whether the data is really missing or is simply zero. Due to
the debt crisis of the 1980s, there are several measurement problems related
to different methodologies of recording non-payments, rescheduling, debt
forgiveness and reductions.

The IFS database covers both private and public issuers, and holders of debt
securities. However, it is difficult to divide the available data by private-public
creditor and debtor. Although the IFS reports the transactions by monetary
authorities, general government, banks and other sectors, this information is not
available for most countries for long periods of time. The World Bank’s Global
Development Finance (GDF) database, which focuses on the liability (debtor)
side as the source of the data, provides the detailed debt decomposition into
official and private borrowers, and some information on the identity of creditors.
The GDF data was used in an effort to supplement the data missing in BoP
statistics, and decompose net (total) debt into public and private debt flows by
assigning the components to the appropriate debt category. For example, we
can confidently argue that “Use of IMF credit” is the sovereign-to-sovereign
transaction, but the creditor in “Public and publicly guaranteed [PPG] debt”
could be either the private entity or the sovereign.

The most important issue with the GDF database, however, is the fact that
it covers the data only for the countries that are considered as developing (by
the World Bank) at the moment a given vintage of the GDF is released. If the
World Bank reclassifies a country as “high-income,” it is no longer included
in the database. The historic vintages of the GDF (available at http://data.
worldbank.org/data-catalog/international-debt-statistics) are used to find out
which countries were in the database before and which are there now.

Cross-border capital flows can take the form of foreign direct, portfolio
equity and debt investment, constituting the financial account — the mirror
image of current account in the BoP statistics. Figure 2 plots the average current
account balance with a reverse sign as a measure of total net capital flows from
more than 100 countries, together with different types of flows.

---

5 Several developing countries tend to report data for liabilities only, and no data for assets. This
is especially the case for FDI flows. Some of these data, reported in the liability line, seem
to correspond to net flows, that is, liabilities minus assets. However, it is difficult to verify
whether this is the case as opposed to the asset data simply not being available. For example,
portfolio equity data for most developing countries were negligible until recently.

6 As noted by Lane and Milesi-Ferretti (2001), these issues create large discrepancies between
debt data reported by different agencies.

7 For example, the note on the November 2007 vintage of the GDF (available online at http://
data.worldbank.org/data-catalog/international-debt-statistics) explicitly says: “Barbados,
Czech Republic, Estonia and Trinidad and Tobago are no longer included in the database as
they were reclassified in July [of 2007] as high-income countries.”
The figure shows that the world is running a current account deficit, around roughly five percent of GDP, implying positive net capital flows on average since the 1980s. Since the 1990s, however, countries seem to be net borrowers in FDI and equity investment, and net lenders in debt instruments. This simple plot hints that the current account may not be informative in terms of testing the predictions of certain classes of models for the amount and direction of capital flows, and their implications for economic fluctuations and growth. The appropriate definition (FDI versus debt, public versus private or net versus gross flows) must be used depending on the question being asked.

Figures 3 and 4 show that these patterns are driven by the fact that during the last few decades, emerging markets borrowed more in terms of FDI and equity, while developed countries borrowed more in terms of debt. These observations should not lead to the conclusion that emerging and developing countries are net lenders and developed countries are net borrowers, although (like China and United States), it is simply that most of the high-growth countries are still net borrowers, as shown in Figure 5, but the type of borrowing they do has changed during the last decade.

The figures clearly show the importance of investigating gross flows instead of net flows from the perspective of policy making. Figures 6, 7 and 8 show gross inflows by type and plot how dynamics of different asset classes evolve with VIX. It is very interesting to see that during increased periods of risk, represented by VIX, countries that are members of the Organisation for Economic Co-operation and Development (OECD) lose some flows, but equally from both types. Emerging markets and developing countries, on the other hand, lose a significant chunk of FDI and equity types of flows as opposed to debt.
Figure 3: Total Net Capital Flows — OECD

Data sources: IFS and World Bank Group.

Figure 4: Total Net Capital Flows — Benchmark Emerging Markets

Data sources: IFS and World Bank Group.
Figure 5: Creditors and Debtors among Developing and Emerging Countries

Data sources: IFS and World Bank Group.

Figure 6: Total Flows and VIX — OECD

Data sources: IFS and World Bank Group.
Figure 7: Total Flows and VIX — Benchmark EM

Data sources: IFS and World Bank Group.

Figure 8: Total Flows and VIX — All Developing

Data sources: IFS and World Bank Group.
Regression Analysis

We ran a simple form of a dynamic panel regression, where we regressed change in output from the period capital flow arrives into several future periods on capital flows. This is akin to an impulse response function done via the local projections method:

Controlling country and time effects and lagged GDP growth is very important to capture first order endogeneity, due to unobserved heterogeneity and omitted variables. Simultaneity is less of a concern for us, since we wanted to know how the correlation between flows and output changes over time. We consider $k = 1, 2, 3, 4$.

Table 1 shows that, on impact, there is a positive correlation between all types of capital flows and output growth, conditional on lagged growth and country and year fixed effects. First order endogeneity concerns, such as omitted variables and unobserved country and common time influences, were all controlled here. These correlations are consistent with low-growth countries’ governments borrowing in the form of debt to smooth out transitory shocks, and high-growth countries receiving private flows. They are also consistent with private equity and FDI flows relaxing credit constraints and causing a boom in the domestic economy, whereas public borrowing crowds out private investment and, hence, hurts growth. Debt flows causing an appreciation and hurting exports and, hence, lowering output for a given policy rate, is also a possible story.

In Table 2 and 3, right-hand side variables are lagged two and three periods, and is conditioned on lagged growth; however, here it is not very plausible to think that results are driven by booming economies attracting FDI and equity, and low-growth economies borrowing in debt flows from official agencies.

### Table 1: Capital Flows and Output Growth

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \log(GDP)_{(t-1)}$</td>
<td>0.179***</td>
<td>0.171**</td>
<td>0.148**</td>
</tr>
<tr>
<td></td>
<td>(0.052)</td>
<td>(0.051)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>(FDI and Equity Inflows/GDP)$_t$</td>
<td>0.051**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Debt Inflows/GDP)$_t$</td>
<td></td>
<td>0.051***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.010)</td>
<td></td>
</tr>
<tr>
<td>(All Private Inflows/GDP)$_t$</td>
<td></td>
<td></td>
<td>0.043**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.020)</td>
</tr>
<tr>
<td>Obs.</td>
<td>2,636</td>
<td>2,649</td>
<td>2,353</td>
</tr>
<tr>
<td>Year FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Country FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses.

* $p<0.05$, ** $p<0.01$, *** $p<0.001$
The magnitude of the effect is such that a 10-percentage point increase in FDI and equity, or in debt flows increases growth by 0.51-percentage point contemporaneously. Tables 2 and 3 reveal that this relationship is still positive when lagged flows are used for FDI and equity flows, but becomes negative for debt flows. However, all private flows, which is defined as the sum of FDI, equity and private debt, has a strong positive effect on growth. Table 3 implies total effect of a 10 percentage point increase in debt leading to a 0.54 percentage point decrease in growth, compared to a 0.27 decrease in table 2. On the FDI and equity side, Table 3 implies a 2.63 percentage point increase in growth over three years, even though some of the FDI and equity flows do leave due to a high VIX environment. Both tables show that lagged growth is a very good predictor of current growth.

Next, we focus on the VIX-driven capital flows and compare the effects of such flows on output during high and low episodes of global risk appetite, as done in Table 3. Private flows such as FDI and equity leave the country during periods of heightened uncertainty. During normal times they flow in and have an expansionary effect, since their total effect is positive and significant. Again, total effect is such that a 10 percentage point increase in FDI will increase growth by 2.6 percentage points over three years, even if some FDI leaves the country. This suggests that FDI and equity flows might go to booming economies originally, but also provide an additional expansionary effect. The total effect of debt flows on output, on the other hand, is negative; as argued above, a 10 percentage increase in debt flows will lead to a 0.54 percentage point reduction in growth when the global risk appetite is high, and 0.58 percentage point decrease when it is low. The key point here that helps us to separate the stories is the fact that debt flows do not affect growth differentially during high versus low periods of uncertainty, as shown in Table 3, while FDI and equity flows do affect growth differentially. This means debt either has a contractionary effect overall, as shown in Table 2, or that originally low-growth countries borrow from official agencies.

Conclusion and Policy Implications

This chapter investigates the dynamic correlations between capital flows and output spillovers for different country groups and types of capital flows. It focuses on business cycle frequencies and the effect of global risk appetite in driving capital flows into emerging markets, and tries to shed light on the central policy question of the expansionary versus contractionary effects of capital flows.

The research shows a positive initial impact of debt flows on output, which is followed by a negative impact. FDI inflows have a positive effect on
### Table 2: Capital Flows and Output Growth: Effects after Two Years

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Delta \log(GDP)_{(t-1)})</td>
<td>0.179** (0.052)</td>
<td>0.171** (0.051)</td>
<td>0.148** (0.053)</td>
</tr>
<tr>
<td>(FDI and Equity Inflows/GDP)_{t-2}</td>
<td>0.023 (0.020)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Debt Inflows/GDP)_{t-2}</td>
<td></td>
<td>-0.027** (0.001)</td>
<td></td>
</tr>
<tr>
<td>(All Private Inflows/GDP)_{t-2}</td>
<td></td>
<td></td>
<td>0.053** (0.020)</td>
</tr>
<tr>
<td>Obs.</td>
<td>2,636</td>
<td>2,649</td>
<td>2,353</td>
</tr>
<tr>
<td>Year FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Country FE</td>
<td>yes</td>
<td>yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses.  
\* p<0.05, ** p<0.01, *** p<0.001

### Table 3: Capital Flows and Output Growth: Effects after Three Years and the Role of VIX

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\Delta \log(GDP)_{(t-1)})</td>
<td>0.168** (0.053)</td>
<td>0.170** (0.054)</td>
<td>0.137** (0.053)</td>
</tr>
<tr>
<td>(FDI and Equity Inflows/GDP)_{t-3}</td>
<td>0.2631** (0.091)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FDI and Equity Inflows/GDP)_{t-3} × VIX</td>
<td>-0.010** (0.003)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Debt Inflows/GDP)_{t-3}</td>
<td></td>
<td>-0.054** (0.009)</td>
<td></td>
</tr>
<tr>
<td>(Debt Inflows/GDP)_{t-3} × VIX</td>
<td></td>
<td>-0.004 (0.002)</td>
<td></td>
</tr>
<tr>
<td>(All Private Inflows/GDP)_{t-3}</td>
<td></td>
<td></td>
<td>0.156** (0.068)</td>
</tr>
<tr>
<td>(All Private Inflows/GDP)_{t-3} × VIX</td>
<td></td>
<td></td>
<td>-0.008** (0.003)</td>
</tr>
<tr>
<td>Obs.</td>
<td>2,636</td>
<td>2,649</td>
<td>2,353</td>
</tr>
<tr>
<td>Year FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Country FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses.  
\* p<0.05, ** p<0.01, *** p<0.001
output only, with a three to four year lag; if this period coincides with increased global uncertainty, the effect on output reverses, although the total effect is still positive. This result holds for other types of private flows, suggesting that during increased periods of uncertainty, private capital leaves the emerging markets; when the global risk appetite is high, capital flows in have positive effects on output. Debt flows, on the other hand, lead to a contraction in output and do not have a differential effect on growth during high- and low-risk appetite periods.

Policy implications, from the perspective of the domestic economy, are that FDI and equity flows are better than debt flows in terms of their effect on output. However, these flows are not a panacea and can also cause instability in domestic financial markets, as they are quick to reverse. Real FDI ("green field") flows that cannot be reversed are very small, and their positive effect on growth appears very late. Still, it is important that we shift the composition of capital flows into the emerging markets from debt flows into FDI flows. This is easier said than done. Institutional quality and political uncertainty are first-order determinants of FDI flows, and if these are questionable, it is not easy to change the composition of capital flows from debt to FDI. Hence, it is important to evaluate the macroeconomic framework and institutional framework together with the financial stability considerations relating to capital flows.

Acknowledgements

The author wishes to thank José Antonio Ocampo and Marcos Chamon for helpful comments on an earlier version presented at the October 2014 project workshop at American University.

Works Cited


