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Capital Account Management
in an Era of Globalization

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Taming Capital Flows: Capital Account Management in an Era of Globalization

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Introduction

Currency flows have always been a leading policy concern, especially in emerging markets. The long Japanese slump, the ensuing very low interest rates in Japan that have lasted 20 years, and the carry trades this fostered made currency flows a hot topic again, even before the global financial crisis increased liquidity in all developed economies and led to a new wave of currency flows to emerging market economies.

Emerging market economies – and developed economies, for that matter – have a love-hate relationship with capital flows. On the one hand, in principal, capital flows can help intertemporal smoothing by allowing increased current consumption and investment against future income, which these countries welcome. On the other hand, these are often short-term flows – so-called hot money – which may be reversed at any time and pose repayment difficulties. Moreover, in practice, such capital flows are often pro-cyclical, rather than countercyclical, leading to greater volatility in consumption and investment. Further, there may be externalities from foreign borrowing-led exchange rate exposure and domestic credit growth.

Policymakers take these issues seriously and devote considerable time and energy to thinking about policies related to currency flows and implementing them. This duty almost always falls to central banks, which are asked to lean against the wind and set policy tools to control, or at least stabilize, currency flows. Accordingly, this volume on currency flows leads off with two essays from central bankers on the experiences of Peru and Turkey with these flows and their attempts to manage them. The discussion then turns to current trends in capital flows, particularly with analyses of the Chilean, Brazilian and Chinese cases, and concludes with discussions of policy effectiveness, spillovers and coordination.

The chapters in this volume were presented as papers in their draft forms at the International Economic Association roundtable, hosted by the Central Bank of Turkey in Izmir in 2012. There was a very lively debate, on both policy issues and theoretical considerations. The papers were revised based on feedback received, and their final forms are presented here.

The narratives of the Peruvian and Turkish experiences with capital flows set the tone of the volume. Both countries had similar periods of booms and busts, fueled by capital flows, and both have seen the nature of these flows change over time. Importantly, capital flows that were once driven by government borrowing are now driven by private borrowing.

This post-twin deficits era poses its own problems. Peru, which had moved away from large budget deficits and the associated capital flows before Turkey did, experienced a period of large capital inflows with low budget deficits. The capital flows were not seen as problems because the policy reflex was that so long as the budget deficit was controlled, the economy was on a sound footing. Tellingly, it later turned out that large capital inflows can be reversed and cause major problems quickly, regardless of who the domestic borrower is. Of course, this is a lesson that should have been learned from the East Asia crisis: those countries had long had sound budgetary finance, but the region experienced a severe crisis nonetheless.

Both Peru and Turkey had heterodox policy responses to capital flows to control the capital account. These ranged from explicit capital controls in the form of taxes on short-term capital inflows to deliberately increasing the variance of the overnight interest rate to increase the risk of capital flows.

In "Peru's Recent Experience in Managing Capital Flows," Paul Castillo explains the Peruvian experience and stresses the importance of jointly prudential monetary and fiscal policies. Fiscal discipline helped limit capital flows, and credible monetary policy prevented high dollarization and excessive exchange rate risks. Hence, even the sudden capital flow reversal associated with the global financial crisis did not lead to a crisis in Peru.

Turning to the Turkish experience, in "The Turkish Approach to Capital Flow Volatility," Yasin Akçelik, Erdem Başçı, Ergun Ermişoğlu and Arif Oduncu present the Turkish response to the financial crisis-induced capital flow reversal. The Turkish case was marked by the use of unconventional monetary policy tools for macroprudential purposes. Reserve requirements, active liquidity management tools and a wide interest rate corridor were employed at different times or in tandem.

The Chinese experience is fundamentally different, as China has yet to liberalize its capital account and allow unhindered capital flows. It is slowly opening up its capital account and distinguishing between different types of capital flows in placing or removing barriers to flows.

Ming Zhang focuses on the Chinese case in "The Liberalization of Capital Account in China: Retrospect and Prospect." This paper is different from the rest of the volume in that, while all other countries are looking for ways to control existing capital flows, China is looking for

ways to open up and increase capital flows in a controlled way, without causing macroeconomic fluctuations.

The question of cross-border policy spillovers appears in the work of Brittany Baumann and Kevin Gallagher, who study the effectiveness of Brazilian capital controls and their spillover to Chile. In "Navigating Capital Flows in Brazil and Chile," Baumann and Gallagher show that Brazilian policies effectively lengthened the maturity of capital flows but also led to increased flows to Chile.

Controlling capital flows requires policy coordination, be it in the form of coordination between policymaking institutions within a country, or coordination across countries. An important question for each country is who shall be responsible for capital account management. In many countries, this duty is shouldered by the central bank, but it is not clear that this is the optimal allocation of responsibility. In particular, if the capital flows are driven by fiscal policy, either because of budget deficits or due to balanced-budget expansionary policies, the central bank taking the responsibility for currency flows may actually make it easier for fiscal policymakers to pursue policies that foster an unsustainable volume of capital inflow, with the monetary authorities taking the blame from any untoward effects of the capital market interventions. Hence, intra-country policy coordination becomes important in thinking about optimal controls on capital accounts. The current regime of central banks taking responsibility for all cyclical policies may not be the best one (even more so as we have come to understand the limitations of monetary policies in the aftermath of the crisis).

Refet Gürkaynak highlights this issue in "Appropriate Policy Tools to Manage Capital Flow Externalities." Gürkaynak argues that central banks shouldering the duty of managing capital flows has led to them also shouldering the blame for the effects of these flows. This, especially in the Turkish case, gave the government wrong incentives to pursue unsustainable expansionary policies, which increased foreign borrowing and made the central bank's job even harder.

Inter-country policy coordination has traditionally been studied in much deeper detail. In particular, policies directly targeting the capital account and foreign exchange interventions may help in dealing with currency flows but may also have spillover effects to other countries. In this case, international policy coordination will likely enhance welfare by making it less likely that such measures are not merely diverting flows to other countries.

An important case in this regard is the US quantitative easing, which has had worldwide effects. The United States is not a small open economy; hence studying it requires modeling a world with at least two large countries. In such a world, each of the actions of a large country (both conventional monetary actions as well as those associated with capital account management) has consequences for the macroeconomic equilibrium in other countries, and the rules governing a large country's responses to shocks of various sorts have implications for the consequences of alternative rules adopted by other countries. Moreover, the spillovers from the United States to the rest of the world make the policy less effective in the United States, as part of the stimulus is diverted to other countries in the form of capital flows.

Joseph Stiglitz tackles this issue in "Monetary Policy in a Multi-Polar World." His findings imply that controls on capital flows may make monetary policy more effective, that including such controls in the toolkits of countries enhances the possibility of a cooperative equilibrium, and that the equilibrium of the coordinated game is welfare superior to that of the uncoordinated Nash equilibrium. Hence, international monetary policy coordination is imperative, especially if the policy action is being taken by large open economies. Further, it was a mistake by the international community to try to proscribe capital account management tools – a mistake which has now been recognized by the IMF, but which trade negotiators, particularly from the United States, seem not to have fully taken on board.

Returning to the issue of capital control spillovers, Jonathan Ostry presents an empirical study of capital controls and foreign exchange interventions in emerging markets, in "Managing Capital Flows – Capital Controls and Foreign Exchange Intervention." Ostry argues that while these policies may have spillover effects to other countries, their use may still be warranted, but coordinated policy actions would perform better than isolated policies of individual countries, reinforcing Stiglitz's theoretical analyses. He also notes that the same policies may be used to prevent painful but necessary external adjustment, in which case they would not be welfare- enhancing.

This volume, as a whole, presents the current state of the art in policymaking and academic thinking on currency flows in a non-technical, accessible manner. The editors hope it will spur more research in this critical policy area.

Part 1
Country Experiences

1.1

Peru's Recent Experience in Managing Capital Flows

Paul Castillo B.

Abstract: *This paper highlights the role played by the buildup of international liquidity buffers and the introduction of preventive measures aimed at reducing financial vulnerabilities during capital surges as key elements of Peru's recent experience in managing capital flows. It shows how the emphasis of monetary policy on minimizing risks associated with financial dollarization and the improvement in fiscal policy has further contributed to the effectiveness of the policy response against capital reversal episodes, such as in the wake of the collapse of Lehman Brothers.*

1   Introduction

Capital flows are an important source of funding for investment in Peru. In the last two decades, they have accounted for 6 percent of GDP on average, mostly foreign direct investment (FDI) and long-term loans. However, they also have created important challenges to macroeconomic management, particularly in periods when portfolio and short-term capital flows have become more important, such us during the Asian and Russian crises and, more recently, during the global financial crisis.

In 1998, the Russian crisis triggered a 50 percent decline in short-term external credit lines in only 12 months, coupled with a real currency depreciation of 13 percent, in a context of high financial dollarization (79 percent of credit was denominated in foreign currency). The end result was a deep contraction in banking credit that doubled the ratio of non-performing loans in foreign currency and halved the number of banks operating in the economy. The outcome was different during the most recent financial crisis, when the Peruvian economy showed more resilience to a similar type of shock. The economy not only recovered faster after the sudden stop of capital flows that the economy experienced in 2009, but also the financial system was almost unaffected, banking credit continued to grow, lending interest rates fell, and non-performing loan ratios remained at historical minimums. The considerable reduction in the vulnerabilities affecting the Peruvian economy and the policy framework that the authorities put in place after the Russian and Asian crises shaped these outcomes.

A key feature of Peru's strategy to manage capital flows in the last decade has been the application of a coherent macroeconomic framework that emphasizes the buildup of international liquidity buffers and the introduction of preventive measures aimed at reducing financial vulnerabilities during capital surges. On the monetary side, in 2002, the Central Reserve Bank of Peru (BCRP) adopted an inflation targeting (IT) regime with a target of 2.5 percent ± 1 percent. In contrast with other IT economies, Peru's IT regime also takes into account the risks associated with financial dollarization by using, in addition to the short-term interest rate, other less conventional instruments, such us high reserve requirements for bank liabilities in foreign currency and exchange rate intervention amid decreasing exchange rate volatility to prevent negative balance sheet effects. On the fiscal side, there has been an improvement in the fiscal position, which has contributed to a significant decline

in public debt, from 46 percent in 2001 to 20 percent in 2012, and has fostered a deepening of the market for government bonds in domestic currency. These in turn have reduced the government's exposure to exchange rate movements and enhanced its ability to enlarge the average maturity of the debt stock.

This policy framework has contributed to maintaining low inflation levels during this period – 2.5 percent on average in 2001–2010 – and average growth rates close to 6.5 percent. It has also fostered financial resilience against sudden stops of capital flows, as was evident after the recent global financial crisis.

An important lesson from Peru's experience is that a credible monetary policy and a strong fiscal position, together with prudential policies aiming at reducing financial vulnerabilities, such us building a high stock of international reserves and introducing high reserve requirements in foreign currency, can significantly increase the resilience of an economy during episodes of capital surges, even in dollarized economies such as Peru's.

The rest of the chapter is organized as follows: the second section describes the taxonomy of capital flows in Peru, the third analyzes the policy strategy put in place by the Peruvian authorities and their policy responses before and after episodes of capital surges, and the final section presents some concluding remarks.

2   Taxonomy of capital flows to Peru

Peru regained access to international capital markets in the mid-1990s, after the government signed a Brady plan in 1997, and the economy's macroeconomic fundamentals showed a significant improvement. Previously, capital flows to Peru were mainly FDI, linked to the privatization of state-owned companies, and official funds associated with the IMF programs that were in place during those years.

After a period of considerable macroeconomic instability during the 1980s, which ended in a hyperinflation process, the government successfully implemented a stabilization program that brought inflation rates down from an average of 7,300 percent in 1990 to less than 7 percent in 1997. During this period, the government also put in place an aggressive program of structural reforms that included the liberalization of both the current and capital accounts and the privatization of state-owned

companies across a wide range of economic sectors, which contributed to increasing the productivity and competiveness of the real sector of the economy.

FDI has remained Peru's main source of capital inflows, mostly associated with large investment projects in the tradable sector linked to the production of minerals, oil, and gas. Between 1993 and 2011, capital flows to Peru represented 6 percent of GDP on average, and 92 percent of these flows were FDI and long-term loans.

Short-term capital flows account for only 0.1 percent of total capital flows on average, whereas capital flows to the public sector account for 0.4 percent on average. Nevertheless, there have been departures from those averages are observed, particularly during Peru's two episodes of surges in capital flows: first in 1996–1997, just before the Asian and Russian crises, and more recently before the global financial crisis.

During the first episode (1996–1997), Peruvian banks increased their short-term external liabilities from less than 0.5 percent of GDP in 1996 to 4.5 percent of GDP at end-1997, in a context of low international interest rates and improving access to international financial markets. As result, bank credit expanded rapidly (particularly dollar-denominated loans), fuelling an accelerated increase in aggregate demand and widening the current account deficit to 7.3 percent of GDP at end-1997, thereby increasing the vulnerability of the financial system and the economy to sudden stops of capital flows.

The second episode of surge in capital flows occurred just before the global financial crisis, during the first quarter of 2008. During the latter, capital flows increased to 23 percent of GDP, more than twice the level of capital flows in the fourth quarter of 2007; portfolio flows accounted for 9.3 percent of GDP, more the four times the end-2007 level (2.2 percent of GDP). These flows quickly reverted in the following quarters.

In contrast to the 1996–1997 episode, which was linked to the increase in banks' short-term liabilities, this time the surge in capital flows was mainly driven by portfolio flows under the form of non-residents' holdings of government bonds and BCRP certificates of deposit (BCRP-CDs). The interest rate differential and Nuevo Sol appreciation expectations were the main drivers behind the portfolio flows. As the next table shows, non-residents' holdings of BCRP securities increased from 12.4 to 40 percent of the total outstanding stock. Similarly, the share of non-residents' holdings of treasury bonds increased from 30.2 to 41.8 percent of the total stock.

	1991	1992	1993	1994	1995	1996	1997	1T.98	2T.98	3T.98	4T.98	1998	1999	2000	2001
– – Capital flows	-.2	1.7	5.1	8.6	7.0	7.0	9.8	4.9	6.8	3.8	-3.4	3.1	.11	1.9	2.9
—— Foreign direct investment	-.0	-.2	2.2	7.4	4.7	6.2	3.5	3.5	3.3	1.8	2.4	2.8	3.5	1.5	2.0
····· Portfolio flows	-1.3	.6	1.4	-.1	.7	-.1	5.1	1.5	2.0	.1	-7.6	-.9	-3.3	-.6	-1.2
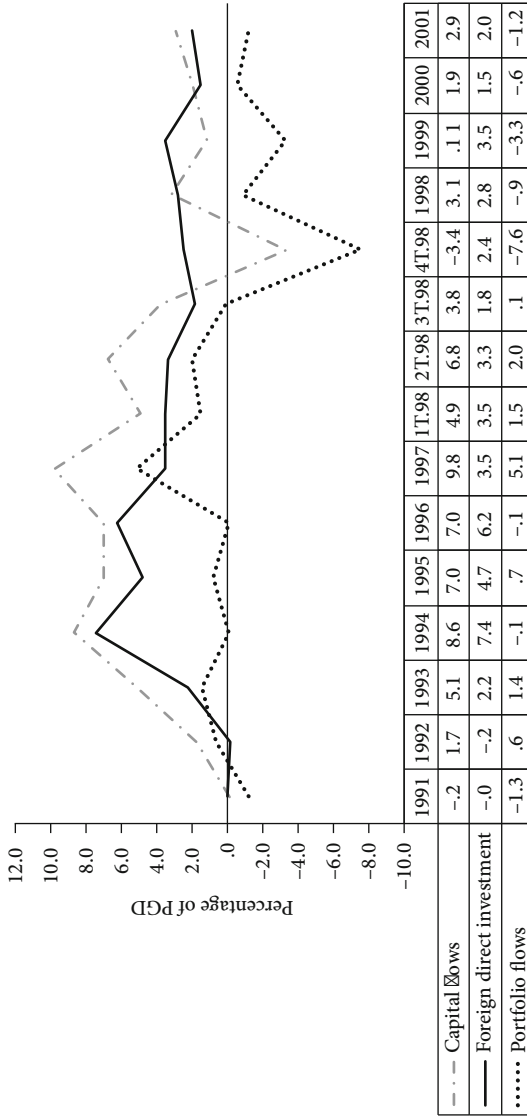
FIGURE 1.1.1   *Capital flows to Peru: 1991–2001*

	2005	2006	2007	1T.08	2T.08	3T.08	4T.08	2008	2009	2010	2011	2012
Capital flows	.2	.4	8.0	23.2	6.6	5.2	–8.2	6.7	1.9	8.8	5.2	10.9
Foreign direct investment	3.2	3.8	5.0	10.1	4.7	6.4	–1.8	4.9	4.7	5.3	4.6	5.7
Portfolio flows	–.8	–1.9	2.2	9.3	–3.9	–2.7	–5.0	–.7	–2.8	.1	–1.2	1.1
Loans and private sector bonds	–1.2	.2	2.7	1.2	2.0	1.8	3.4	2.1	.8	2.6	1.6	3.0
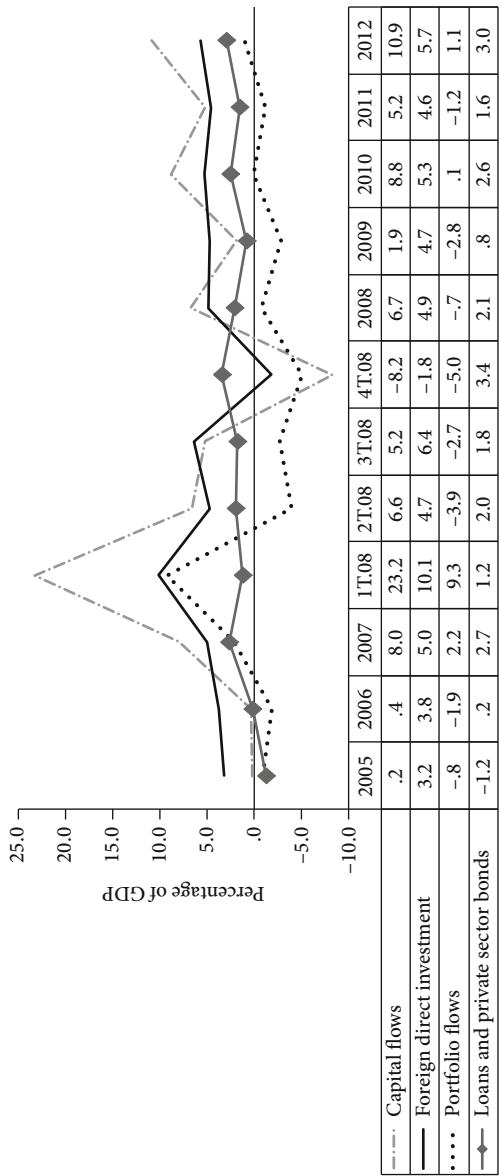
FIGURE 1.1.2 *Capital flows to Peru: 1995–2012*

TABLE 1.1.1   *Holdings of non-residents of domestic assets (in percentages)*

	Pre-Lehman				Post-Lehman				
	Dec-07	Mar-08	Jun-08	Sep-08	Dec-08	Dec-09	Dec-10	Dec-11	Sept-12
1. Holdings of central bank securities (as percentage of total)	12.4	36.9	40.3	40.7	28.5	1.7	0.0	0.0	0.0
2. Holdings of treasury bonds denominated in soles (as percentage of total)	30.2	40.9	41.8	37.1	30.4	21.4	41.0	43.6	53.7
3. Investment in the stock market (as percentages of total stocks)	39.9	44.8	45.1	40.3	38.2	38.6	40.0	37.1	37.6
4. Total holdings (as percentage of GDP)	26.1	28.6	26.2	20.3	15.9	20.6	25.8	18.5	18.5

As in 1997, this episode also generated a rapid expansion of banking credit, which reached an annual growth rate of 39 percent by end-2007, and contributed to a 12.3 percent expansion in aggregate demand by the first quarter of 2008.

Since 2010, after the announcement by the Federal Reserve of its QE2 program, capital flows have returned to Peru. The total amount of capital flows increased from 1.9 percent of GDP in 2009 to 8.8 percent in 2010, and 9.3 percent as of the third quarter of 2012, mainly driven by a recovery in FDI and private sector bonds. Low interest rates and a substantial reduction in the country risk premium, together with Peru's solid growth rates, explain this development. Also, banks have increased substantially their external borrowing levels, from -1.3 percent of GDP in 2008 to 0.8 percent in 2012. However, in contrast with in the situation in 1997, banks had been taking mainly long-term debt from abroad (84 percent of total external borrowing is loans with an average maturity longer than three years), not short-term.

3   Policy strategy to manage capital flows

3.1   Lessons from the Asian and Russian crisis

In 1997, at a time when Peru was starting to experience greater growth and price stability, leaving behind the macroeconomic instability and

hyperinflation that characterized the economy during the 1980s, the Asian crisis hit emerging market economies; a year later, in 1998, the Russian crisis deepened its impact. Despite the economic authorities' important efforts to prevent major damages, both episodes had dramatic effects on the financial system and on the flow of credit to the corporate sector, triggering a drop in output and investment. Average output growth rates fell from 5.3 percent in 1991–1997 to 2.5 percent in 1999–2002, and investment growth went down from 11.5 percent to -6.5 percent during the same period. Also, the credit crunch that followed the sudden stop of capital flows contributed to the failure of both small financial institutions and non-financial institutions. During this period, the number of non-financial firms that filed for bankruptcy increased from 349 in 1997 to 824 in 1999, whereas the number of financial institutions fell from 26 to 14.

Two key factors magnified the impact of these shocks on the Peruvian economy. First, the over-borrowing carried out by banks during 1996–1997 increased their exposure to sudden stops of capital flows, and the high levels of financial dollarization of the domestic financial system extended the currency mismatch risk to the corporate sector. As Calvo et al. (2004) highlight, a sudden stop of capital flows in an economy with high financial dollarization can trigger a large exchange rate depreciation that can affect the payments system, thereby damaging the banking system's solvency.[1]

By 1996, Peru's access to financial capital markets was still very limited, even for the government, as it had defaulted on its external debt in 1986. Capital flows to Peru were mainly FDI, attracted by the large privatization program launched in 1992. In 1997, the government signed a Brady plan, which facilitated domestic firms' access to international capital markets; in particular, banks were the first ones to take advantage of this new opportunity. In 1997, banks' short-term debt increased from US $388 million to US $1,345 million (i.e., from 5 to 16 percent of banks' total foreign currency liabilities).

Foreign banks limited their lending to Peruvian banks in the second half of 1998, thereby creating a significant shortage of international liquidity. Even though since the beginning of the 1990s the BCRP had maintained a 30 percent reserve requirement for foreign currency deposits on average, which by that time amounted to around 24 percent of total deposits in the financial system, bank liquidity was not enough to face the shortage of liquidity triggered by the sudden stop of capital

flows in 1998. In response, Peruvian banks started to borrow locally in domestic currency and to purchase foreign currency to pay back their short-term debts. This strategy, however, was very costly for the banks because the BCRP sharply raised the short-term interest rate to avoid a larger depreciation of the nominal exchange rate. As a result, banks' profits rapidly decreased, and the availability of bank credit to the private sector declined sharply.

Meanwhile, the large levels of financial dollarization – which by end-1997 reached 65 percent of total deposits and 75 percent of total bank loans – coupled with a 22 percent real exchange rate depreciation between 1998 and 2000, contributed to increasing the solvency risk of the banking sector. In fact, the increase in the non-performing loan ratio in 1998–1999 was partially explained by the negative effect of the real exchange rate depreciation on the balance sheets of the banks' borrowers.

The authorities' policy response limited a larger impact from these shocks, to the extent that no systemic failure occurred in the financial system. Only small banks with weak financial links failed. Particularly important for this outcome was the provision of BCRP liquidity through cuts in the foreign currency reserve requirements ratio (RRR), which injected liquidity by US $420 million (around 12 percent of the 1997 current account deficit).[2] The liquidity injection through foreign currency RRR cuts was instrumental in alleviating the liquidity shortage without putting pressure on domestic currency money markets.

All in all, the Asian and Russian crises showed the need for some kind of prudential regulation to induce banks to internalize the risk of short-term over-borrowing in foreign currency. In 1997, the rapid increase in banks' short-term borrowing was one of the main channels through which the Asian crisis affected the economy. Another important lesson was that adequate international reserves and financial system liquidity is fundamental to facilitate a rapid and effective policy response by the BCRP, and by the beginning of the 1990s, it was key to put in place a monetary policy framework geared to anchor inflation expectations and minimize risks associated with financial dollarization.

3.2   The new monetary policy framework

In 2002, the BCRP adopted an inflation target regime, with a target of 2.5 percent and a tolerance range of ± 1 percent. This target was reduced

in 2007 to 2.0 percent and a tolerance range of 1 to 3 percent. This framework departs somewhat from international standards in that the BCRP uses other instruments in addition to policy interest rates, with an aim to reduce balance sheet effects associated with financial dollarization.

In response to Peru's high financial dollarization, reserve requirements for dollar obligations have been higher than for soles obligations since the onset of the dollarization process at the beginning of the 1970s. Differential rates seek to encourage banks to internalize the risk of extending dollar loans to economic agents that do not earn dollar incomes, and to create a foreign exchange liquidity buffer with an aim to reduce systemic liquidity risks, given that the BCRP cannot act as lender of last resort in foreign currency.

Since 2008, RRRs have also been used in a more cyclical fashion by raising their average and marginal levels during periods of capital flow surges and by cutting them during capital reversion episodes. Also, to induce banks to borrow long-term, a higher RRR for banks' short-term foreign liabilities has been put in place. Currently, marginal RRRs for dollar deposits are 55 and 60 percent for banks' short-term foreign liabilities. More recently, the BCRP has also established an additional reserve requirement of 20 percent for banks' long-term foreign liabilities and bonds when they exceed 2.5 times a bank's net worth.

Higher reserve requirements affect monetary and credit conditions through several transmission mechanisms. First, they aim to reduce financial entities' primary lendable funds. Lower lendable funds imply a decrease in liquidity and credit, which in turn has an impact on aggregate expenditure and inflation. The lower the balance of liquid assets held by financial entities, the more effective this mechanism is.

Second, higher reserve requirements reduce banks' financial margins. Banks will seek to preserve them by widening the spread between lending and deposit rates. They can achieve this by raising lending rates, reducing deposit rates, or both. Higher market interest rates induce economic agents to diminish expenditures, thereby attenuating inflation pressures.

By increasing reserve requirements in foreign currency during periods of capital inflows, the BCRP reduces banks' incentive to lend in dollars, and at the same time creates a buffer of foreign currency liquidity that reduces the vulnerability of banks to capital flow reversals.

Within this framework, the BCRP also intervenes in the foreign exchange market to reduce exchange rate volatility, but without influencing the trend of the exchange rate. Lower exchange rate volatility,

in particular in periods of financial turbulence, helps to lessen the risks associated with financial dollarization by reducing the negative balance sheet effects created by abrupt exchange rate fluctuations.

The new monetary policy framework has not only delivered low and stable inflation, which is contributing to a substantial reduction in financial dollarization, but also a large pool of international reserves, which increased the BCRP's capacity to inject liquidity during periods of financial turbulence. International reserves have increased from 10 billion in 2002 to close to 63 billion at end-2012. This level of international reserves is equivalent to 32 percent of GDP and two times the total amount of short-term foreign debt and banks' domestic liabilities in foreign currency.[3]

3.3   The role of fiscal policy

Fiscal policy plays a fundamental role in managing capital flow surges. On the one hand, a decrease in the fiscal deficit contributes to reducing

TABLE 1.1.2   *Indicators of international soundness*

	2009	2010	2011	2012
NIR/STFL[1] (number of times)	4.8	5.3	5.7	6.3
NIR/(STFL[1]+DLFE[2]) (number of times)	1.4	1.7	1.6	2.0
NIR/(GDP) (as percentages)	26	29	28	32

Note: [1] STFL: Short-term foreign liabilities.
[2] DLFE: Domestic liabilities in foreign exchange.
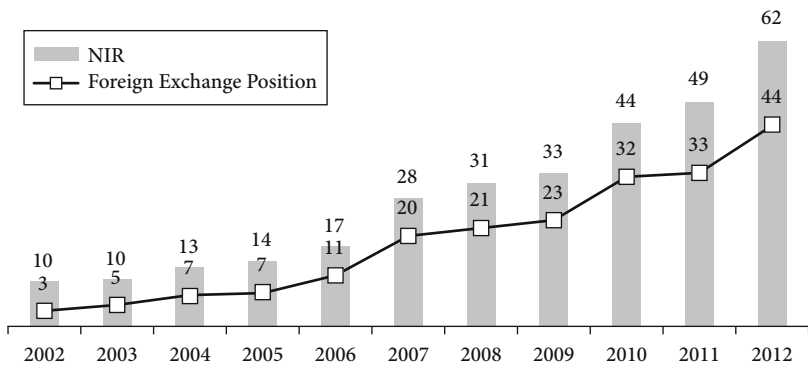
FIGURE 1.1.3   *Net international reserves (in billions of USD)*

pressures on aggregate demand that capital inflows can trigger, thereby reducing the need for the BCRP to hike interest rates. On the other hand, by reducing demand pressures on non-tradable goods, a more conservative fiscal policy can limit the impact of capital flows on the real exchange rate, and through this channel, dampen its effects on the non-tradable sector. A third mechanism through which the fiscal position contributes to managing capital flows is by reducing the need for the BCRP to sterilize its foreign exchange interventions by
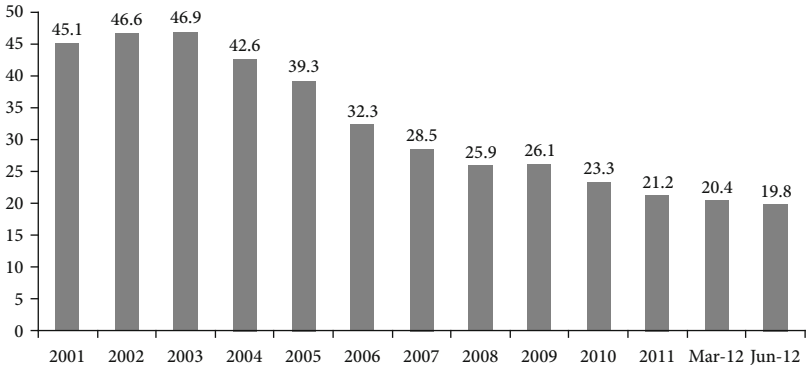
FIGURE 1.1.4   *Public debt: Peru (as percentage of GDP)*
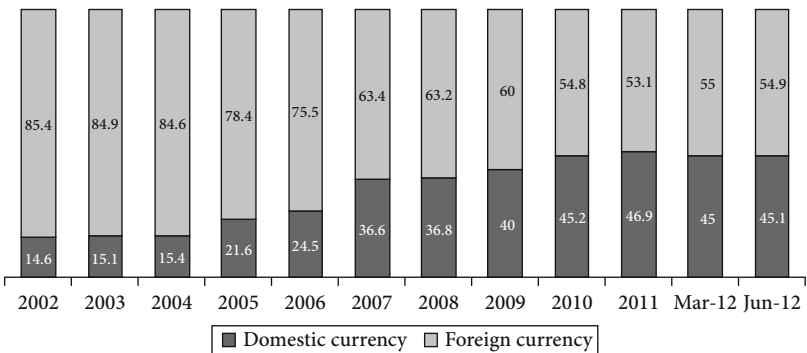
FIGURE 1.1.5   *Public debt: Peru (currency composition)*

increasing its deposits at the BCRP. In the case of Peru, government deposits account for 39 percent of the BCRP's holdings of international reserves.

Since 2001, the average fiscal balance has been close to zero and even higher for 2006–2008 and 2011–2012. This improvement in the fiscal accounts has allowed the government to cut public debt as a percentage of GDP, from 45 percent of GDP in 2001 to 26 percent in 2008 and 20 percent in 2012. Additionally, the dollarization of public debt has declined to 53 percent, from around 85 percent in 2001, and its maturity has increased from less than five years to more than 12 years.

4   Confronting capital flows (2007–2009)

To limit the type of vulnerabilities that the Peruvian economy experienced before the Asian and Russian crises, in 2004, the BCRP established a special RRR of 20 percent for banks' foreign short-term liabilities, with a maturity of less than two years; in February 2008, it raised it to 40 percent. In response, banks rapidly shifted from borrowing short term (less than two years) to longer term, mainly four to five years, which reduced their exposure to capital outflows during 2008 and 2009. This RRR was also increased to 60 percent during 2010.

In January 2008, the BCRP started to increase RRRs in both domestic and dollar deposits, with an aim to avoid excessive credit growth. Additionally, high RRRs on foreign currency deposits contributed to building a buffer of foreign currency liquidity, which reduced banks' exposure to the sudden stops of capital flows that materialized after the collapse of Lehman Brothers.

The BCRP also took additional measures to discourage portfolio flows into the money market. In February 2008, the BCRP replaced its primary auctions of BCRP-CDs, which were fully tradable, by auctions of BCRP-CDs-NR (CDs that can only be traded among participants in the Peruvian money market, mainly financial institutions). In March, the BCRP established a 4 percent transfer fee for operations in the secondary market with BCRP-CDs, when one of the counterparts does not participate in the primary auctions. These actions limited the portfolio
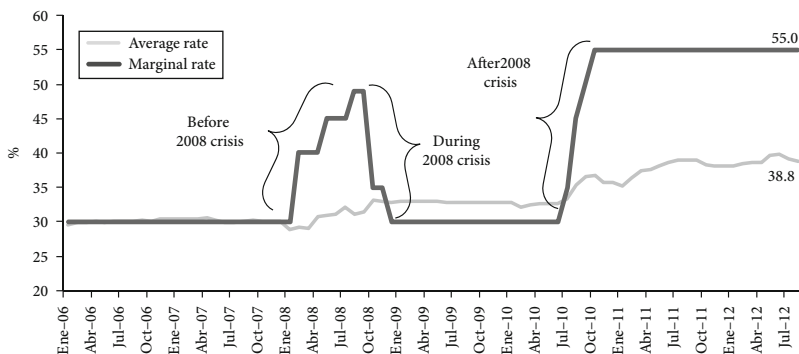
FIGURE 1.1.6   *External liabilities of banking institutions (balance in US millions and ratios in percentage)*

flows to the money market and enhanced BCRP control on the money market interest rate.

In response to these actions, portfolio flows moved away from secondary BCRP-CDs towards short-term deposits in local banks. As Table 1.1.3 shows, the amount of deposits by non-resident agents in domestic currency at local banks increased from US $81 million in January 2008 to US $1.115 million in March. In response, a 120 percent RRR on deposits in domestic currency of the non-resident financial institutions was put in place.

These actions were instrumental in reducing the volume of portfolio flows in the money market, which in turn decelerated the pace of growth of short-term capital flows to Peru after the second quarter of 2008, given the limited amount of assets available to non-resident agents to take long-positions in domestic currency.

In the same period, the BCRP boosted the frequency and intensity of foreign exchange intervention, leading to an $8.4 billion increase in official reserves in January–August 2008. This precautionary reserve buildup enhanced the BCRP's ability to inject foreign liquidity and prevent an abrupt currency depreciation during the capital reversal that took place in the first half of 2008.

In September 2008, the BCRP responded immediately to the turbulence caused by the Lehman Brothers bankruptcy by injecting liquidity amounting to 9.3 percent of GDP through a wide range of instruments, such as a reduction of RRRs to end-2007 levels, foreign exchange sales
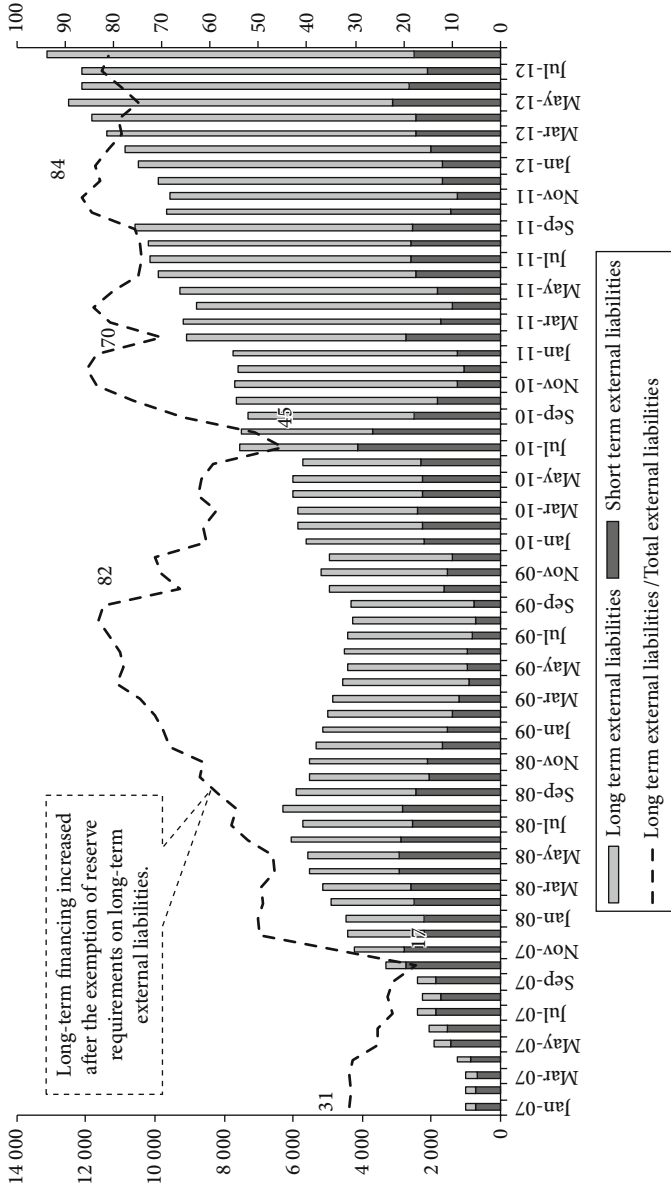
FIGURE 1.1.7 *Foreign currency reserve ratios (as percentage of bank's total liabilities)*

Long-term financing increased after the exemption of reserve requirements on long-term external liabilities.

Long term external liabilities   Short term external liabilities

Long term external liabilities /Total external liabilities

TABLE 1.1.3   *Non-resident holdings of Peruvian fixed-income assets (millions of USD)*

	2006	2007	Jan-2008	Feb-2008	Mar-2008	Apr-2008	May-2008
1. Central Bank CDs	0	695	2403	2371	2627	2514	2207
2. Government Bonds	1147	1851	1989	2516	2726	2771	2887
3. Banks' Deposits	60	76	81	344	770	1015	388
Total	1207	2622	4473	5231	6123	6300	5482

by $6.8 billion in September 2008–February 2009, repo operations, and currency swaps.

Non-conventional instruments were also used to protect vulnerable market participants. The crisis resulted in a segmentation of the money market, which in turn reduced funding for smaller or higher-risk entities. The BCRP responded by increasing the number of participants in liquidity injection facilities and extending the kinds of assets acceptable as collateral to include high-rating credit instruments. Additionally, repo maturities were expanded, and government instruments were auctioned to prevent interest rates in these markets from increasing abruptly.

These measures cushioned the domestic financial system from the impact of the crisis and facilitated a swift and sustained recovery of credit and growth from the second half of 2009. Peru's GDP and credit cumulative growth since end-2007 remains the highest in the region. During the worst of the crisis (October 2008–March 2009), access to credit was preserved, and non-performing bank loans remained low.

Peru's response capacity during the crisis was made possible by the BCRP's ability to mobilize foreign exchange liquidity against capital outflows, credit reversals, and depreciation pressures. Large reserve buffers built up in the years prior to the crisis through RRR management, foreign exchange intervention, and a strong fiscal position, in a context of favorable terms of exchange, were key in this respect. The policy mix and timing under the crisis illustrates the importance of ensuring adequate liquidity on three fronts: official reserves, financial liquidity, and the maturity and composition of foreign debt.

In 2010, after the FED's announcement of QE2, capital flows resumed to emerging market economies. As a result, Peru experienced
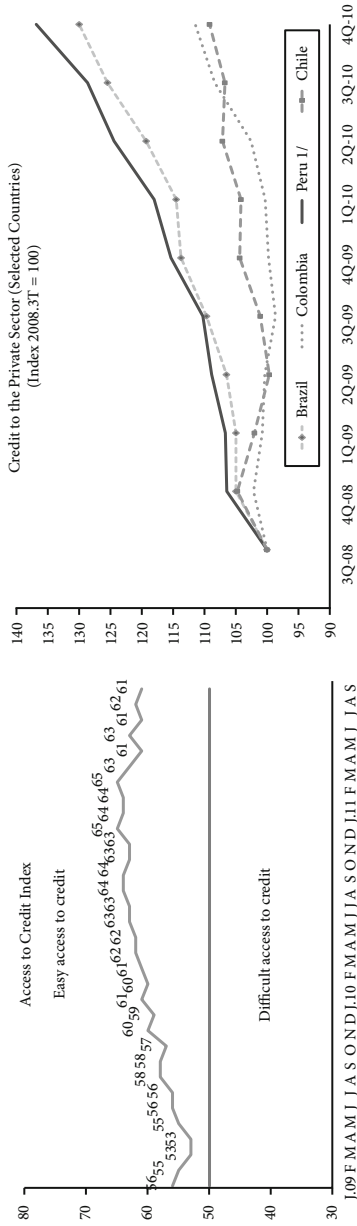
FIGURE 1.1.8 *Peru selected indicators*

GDP: Selected LA Countries
(seasonally adjusted , 4Q07=100)

Non-performing Bank Loans (Percentage)
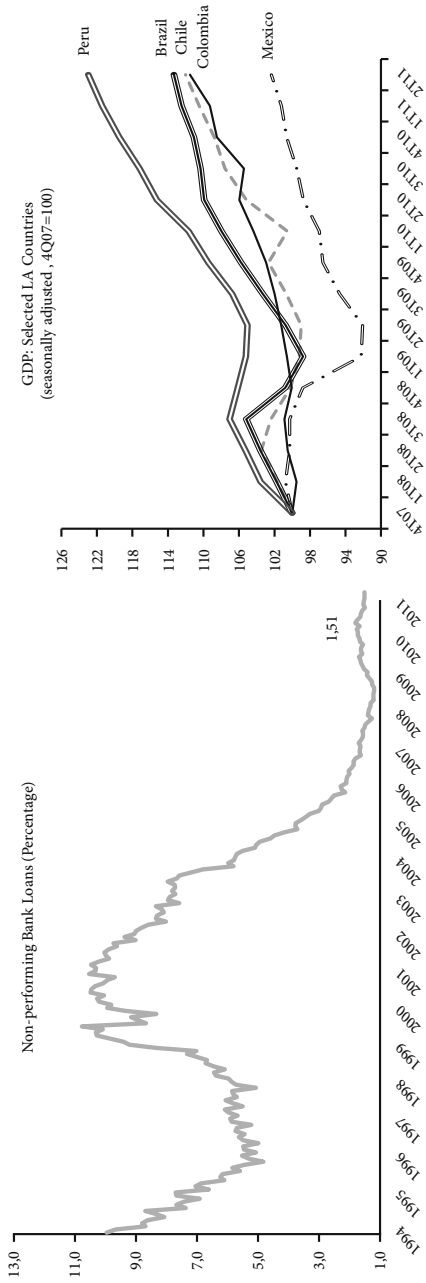
FIGURE 1.1.8 *Continued*
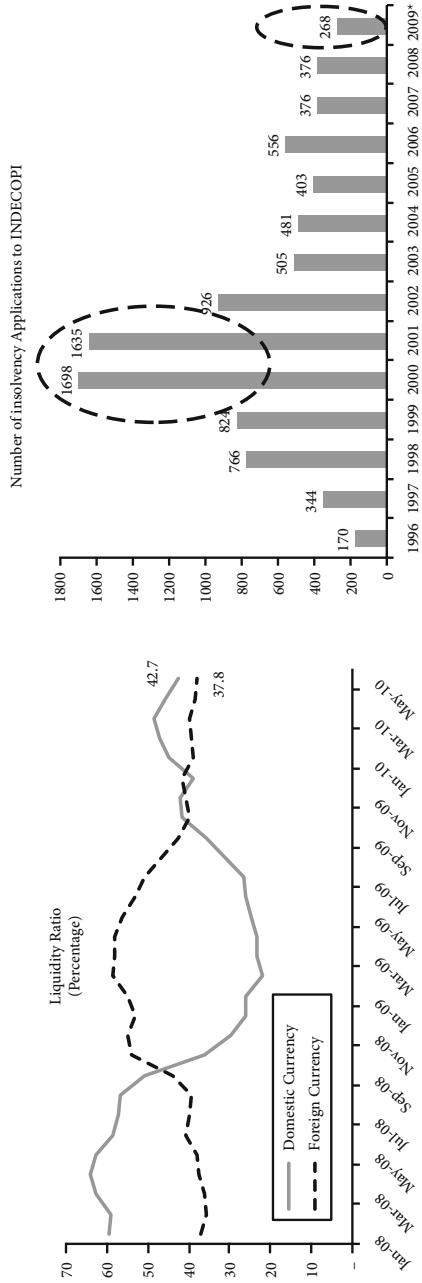
FIGURE 1.1.8 *Continued*

a jump in capital inflows from 0.9 percent of GDP in 2009 to 8.8 percent in 2010. In response, the BCRP put back in place the set of macroprudential polices it had used before the collapse of Lehman Brothers to avoid a buildup of vulnerabilities in the financial system. Since July 2010, the BCRP

- ▸ Raised the RRR in domestic currency from 6 to 30 percent.
- ▸ Increased the RRR on foreign currency deposits from 30 to 55 percent.
- ▸ Increased the RRR for banks' short-term liabilities from 30 to 60 percent.
- ▸ Increased the transfer fee in the secondary market for purchases of BCRP-CDs by non-participants in the money market to 4 percent.
- ▸ Increased the RRR for domestic currency deposits of non-resident financial institutions to 120 percent.
- ▸ Reestablished the transfer fee for purchases of BCRP-CDs in the secondary market to 4 percent by agents that do not participate directly in the primary auctions of these CDs.
- ▸ Hiked several times the average RRRs both in domestic and foreign currency.[4]

During the last episode, the Superintendence of Banks (SBS), in coordination with the BCRP, has taken additional measures aimed at moderating the growth of foreign currency-denominated loans and limiting the risk-taking behavior of banks, including

- ▸ Reduction of banks' long foreign exchange position from 70 to 50 percent, and of the short foreign exchange position from 15 percent to 10 percent.
- ▸ Reduction of banks' foreign exchange derivative position from 30 percent of banks' net worth to 20 percent.
- ▸ Addition of capital requirements for consumer loans and mortgages when they are denominated in foreign currency, or when they are established at variable rates, or the LTV is high.
- ▸ Addition of capital requirements and provisions during periods of high economic growth.

On the other hand, the government's fiscal position has recovered rapidly, with fiscal surpluses of around 2 percent of GDP on average since 2010. This policy mix has contributed to limiting the impact of the

TABLE 1.1.4 *Capital flows to Peru (millions of USD)*

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1 Long-term capital flows	-407	1,641	3,698	2,900	3,921	3,337	1,863	2,059	1,758	1,355	2,849	489	1,861	410	1,560	6,407	7,948	3,789	13,864	10,468	14,945
1.1 Private capital	4	1,300	3,958	3,072	4,338	2,833	1,805	1,678	1,481	983	2,369	301	983	896	2,495	8,036	9,569	3,498	11,396	9,620	13,191
1.1.1 Foreign Direct Investment	-79	761	3,289	2,549	3,488	2,054	1,582	1,812	810	1,070	2,156	1,275	1,599	2,579	3,467	0	6,188	0	8,189	8,119	8,365
1.1.2 Loans	100	318	153	346	662	464	630	158	970	204	-146	-166	-281	-967	202	4,390	2,677	2,189	3,935	2,787	4,373
1.1.3 Stocks	0	222	465	171	316	156	-346	-107	123	43	-9	1	-74	25	-45	760	85	259	87	147	17
1.1.4 Bonds and Others	-17	0	51	6	-128	158	-62	-185	-422	-334	369	-808	-262	-740	-1,129	2,886	619	1,050	-815	-1,434	435
1.2 Public	-411	341	-260	-172	-417	505	58	381	277	372	480	187	879	-486	-935	-1,629	-1,621	291	2,468	848	1,754
1.2.1 Debt with Multilateral Institutions	-411	341	-260	-172	-417	505	58	381	277	372	1,056	630	988	-1,441	-738	-2,473	-1,404	1,030	-1,045	-151	-139
1.2.2 Bonds	0	0	0	0	0	0	0	0	0	0	-577	-443	-109	954	-197	844	-217	-739	3,513	998	1,893
1.2.3 Others																					
2 Short-term capital flows	1,034	137	137	843	-5	2,471	-72	-1,476	-735	189	-794	147	230	-236	-1,229	2,065	562	-2,085	-258	-1,307	1,102
2.1 Financial Institutions	232	279	-570	216	-237	2,684	-100	-1,425	-9	-358	-474	97	115	46	-567	2,539	-1,597	-745	806	-757	1,140
2.2 Non-Financial Institutions	802	-142	706	627	232	-213	28	-51	-726	547	-320	51	115	-283	-662	-474	2,159	-1,340	-1,063	-549	-38
Total (1)+(2)	627	1,778	3,835	3,743	3,916	5,808	1,792	583	1,023	1,544	2,055	636	2,091	173	331	8,472	8,510	1,704	13,606	9,161	16,047

TABLE 1.1.5   *Capital flows to Peru (percentage of GDP)*

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1. Long–term capital flows	–1.1	4.7	8.3	5.4	7.0	5.6	3.3	4.0	3.3	2.5	5.0	.8	2.7	.5	1.7	6.1	6.3	3.5	9.0	5.9	10.2
1.1 Private capital	.0	3.7	8.9	5.7	7.8	4.8	3.2	3.3	2.8	1.8	4.2	.5	1.4	1.1	2.7	7.6	7.5	3.3	7.4	5.4	9.0
1.1.1 Foreign Direct Investment	–.2	2.2	7.4	4.7	6.2	3.5	2.8	3.5	1.5	2.0	3.8	2.1	2.3	3.2	3.8	5.0	4.9	4.7	5.3	4.6	5.7
1.1.2. Loans	.3	.9	.3	.6	1.2	.8	1.1	.3	1.8	.4	–.3	–.3	–.4	–1.2	.2	2.7	2.1	.8	2.6	1.6	3.0
1.1.3 Stocks	.0	.6	1.0	.3	.6	.3	–.6	–.2	.2	.1	–.0	.0	–.1	.0	–.0	.1	.1	.0	.1	.1	.0
1.1.4. Bonds and Others	–.0	–.0	.1	.0	–.2	.3	–.1	–.4	–.8	–.6	.6	–1.3	–.4	–.9	–1.2	–.2	.5	–2.3	–.5	–.8	.3
1.2. Public	–1.1	1.0	–.6	–.3	–.7	.9	.1	.7	.5	.7	.8	.3	1.3	–.6	–1.0	–1.5	–1.3	.2	1.6	.5	1.2
1.2.1 Debt with Multilateral Institutions	–1.1	1.0	–.6	–.3	–.7	.9	.1	.7	.5	.7	1.9	1.0	1.4	–1.8	–.8	–2.3	–1.1	.8	–.7	–.1	–.1
1.2.2 Bonds	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	–1.0	–.7	–.2	1.2	–.2	.8	–.2	–.6	2.3	.6	1.3
1.2.3 Others																					
2. Short–term capital flows	2.8	.4	.3	1.6	–.0	4.2	–.1	–2.9	–1.4	.4	–1.4	.2	.3	–.3	–1.3	1.9	.4	–1.6	–.2	–.7	.8
2.1. Financial Institutions	.6	.8	–1.3	.4	–.4	4.5	–.2	–2.8	–.0	–.7	–.8	.2	.2	.1	–.6	2.4	–1.3	–.6	.5	–.4	.8
2.2. Non–Financial Institutions	2.2	–.4	1.6	1.2	.4	–.4	.0	–.1	–1.4	1.0	–.6	.1	.2	–.4	–.7	–.4	1.7	–1.1	–.7	–.3	–.0
Total (1)+(2)	1.7	5.1	8.6	7.0	7.0	9.8	3.1	1.1	1.9	2.9	3.6	1.0	3.0	.2	.4	8.0	6.7	1.9	8.8	5.2	10.9

surge in capital flows on banking credit, aggregate demand and asset prices. During 2012, the growth of banking credit diminished from 24 percent in the previous year to 16.4 percent, as GDP growth decelerated from 6.9 percent in 2011 to 6.3 percent in 2012.

5   Concluding remarks

Peru's experience illustrates the benefits of good macroeconomic policy and prudential regulation in managing capital flows. The enhanced credibility of monetary policy, together with the improvement of the fiscal stance during the last two decades, have proven to be effective tools to induce a positive balance between the beneficial long-term effects of capital flows and their potentially damaging short-term impact. Also, the emphasis of monetary policy on minimizing risks associated with financial dollarization have further contributed to the effectiveness of the policy response against capital reversal episodes, such us in the wake of the collapse of Lehman Brothers.

Notes

The opinions expressed in this paper correspond to the author and they are not necessary those of the board of the Central Bank of Peru. Email: paul.castillo@ bcrp.gob.pe.

1 Other authors also find evidence that financial dollarization increases the fragility of the financial system and constrains monetary policy. For instance, De Nicoló et al. (2003), Domac and Martinez (2003), Levy Yeyati (2006), and Céspedes et al. (2005) find that financial dollarization increases the likelihood and ex post costs of a financial crisis. Calvo and Reinhart (2002) explain that financial dollarization induces "fear of floating" in the behavior of central banks, limiting the use of the exchange rate as an adjustment mechanism in response to foreign shocks.

2 The average reserve requirement was reduced 4.5 percentage points between October and December 1998. Similarly, the marginal reserve requirement was trimmed down from 35 to 20 percent.

3 For a more detailed discussion of the role of fiscal policy in the design of monetary policy in Peru, see Rossini et al. (2012).

4 The BCRP uses both changes in the marginal and average RRR. The former applies to the increase in deposits and other bank liabilities from their values

in a reference period; therefore, its impact depends on the pace of increase of bank liabilities. The average RRR applies directly to the stock of bank liabilities; therefore, it has a direct effect on banks' liquidity requirements and bank profits.

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1.2

The Turkish Approach to Capital Flow Volatility

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and Arif Oduncu*

Abstract: *The shock waves of the 2008–2009 global financial crisis and the 2011–2012 Eurozone debt crisis hit emerging markets from the trade, finance and expectations channels. We focus on the finance channel in this chapter. We first discuss the challenges arising from capital flow volatility in emerging economies in general. We then focus on the Turkish approach and describe in detail the new policy mix implemented by the Central Bank of the Republic of Turkey during the 2008–2012 period and the results obtained. This approach differs from others in its emphasis on the use of macroprudential policy measures rather than capital flow measures for improving domestic financial stability in the face of volatile capital flows.*

1   Introduction

The global financial crisis that intensified after the collapse of Lehman Brothers in 2008 is not over yet. Notwithstanding the rate cuts that brought policy rates close to the zero lower bound, major central banks have opted to implement radical balance sheet measures to lift up their economies from the demand side. The balance-sheet repair process and deleveraging still continues for firms and households, even four years after the crisis, and the recovery in economic activity is still far from desired levels. Lately, the negative feedback loop between debt problems of sovereigns and their banking system fragilities does not make things easier for the policymakers in these economies.[1]

While advanced economies are facing problems of low domestic demand due to deleveraging, emerging economies have their own problems to deal with, mainly as side effects of the former's difficulties. The shock wave of the global financial crisis, as well as the Eurozone debt crisis, hit emerging market shores in three channels (trade, finance and expectations), and we will focus on the finance channel for the scope of this chapter. Quantitative easing, an unprecedented move from the central banks of the advanced economies in the face of the crisis, created abundant liquidity within the global financial system that looked for a higher yield in an environment with interest rates close to zero, and emerging market assets were the answer to this search. However, risk sentiment has increased, both in levels and volatility, as advanced countries faltered in their attempts to get back to the pre-crisis levels due to the sovereign debt problems and the fragilities existing in the financial system (Figure 1.2.1). This resulted in the volatility of short-term capital flows to emerging economies (Figure 1.2.2). In this volatile financial environment, emerging countries have started introducing new measures to tackle the sudden capital shifts, which are known to have devastating effects and are dubbed "sudden stop" in the literature.[2]

The next section presents a brief review of the literature on capital flow liberalization. Section 3 describes the recently changing landscape of central banking both in advanced and emerging economies. After discussing the framework for emerging market policies against volatile short term capital flows in general, Section 4 focuses on the Turkish approach and detail the new policy mix that the CBRT implemented in order to contribute to the domestic financial stability while preserving price stability. Section 5 concludes the chapter.
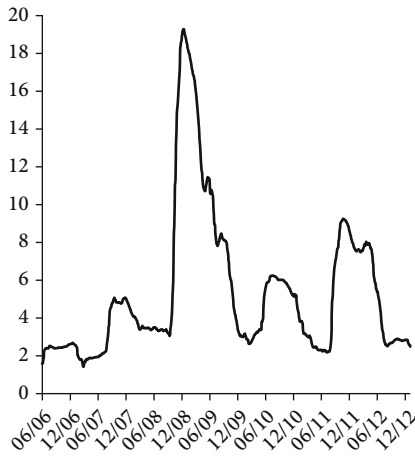
FIGURE 1.2.1   *Volatility in risk appetite (150 days moving standard deviation in VIX index)*

Source: CBRT, Bloomberg.
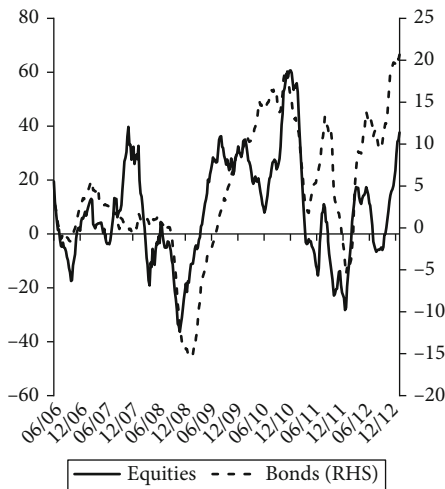
FIGURE 1.2.2   *Fund flows to EMs (150 days cumulative, billion USD)*

Source: CBRT, EPFR.

2   Literature review

After the financial crises in the late 1990s, there has been a concern about the liberalization of capital flows as distinct from the liberalization of trade flows. Specifically, the economic literature intensified the debate about the negative or positive impact of short-term capital flows. There are two opposite views and many views in between.[3] Proponents of the first view support the idea that capital market liberalization leads to economic growth.[4] The opposite view argues that there is no correlation between openness of capital account and growth.[5] Stiglitz (2004), for example, argues that liberalization of capital flows has often led to increased economic instability. Others in between these two opposing views argue that capital openness has benefits as well as costs, and the benefits are largest when countries achieve a certain threshold level of institutional development.[6]

Capital flow liberalization has often been followed by financial crises, as is discussed in Demirgüç-Kunt and Detragiache (1998), Dell'Arricia et al. (2008) and Pinto and Ulatov (2010). Therefore, countries have started to implement capital flow measures (CFMs) in order to prevent the negative effects of the volatility of short-term capital flows. These measures can be in various forms, such as those imposed on inflows or outflows, on different maturities or on different types of flows. During the Asian crisis, Malaysia imposed CFMs, and Kaplan and Rodrik (2001) claim that they had beneficial impacts. On the other hand, Dornbusch (2001) argues that they were imposed after the country had already stabilized. De Gregorio, Edwards and Valdes (2000) claim that the capital flow measures imposed by Chile were effective in increasing the quality of the financing of debt from short-term towards longer term. In contrast, Forbes (2005) argues that short-term credit was penalized; hence, small and medium-sized firms, which typically find it harder to issue long-term bonds, faced much higher costs of capital.

For a long time, IMF has been on the supportive side of the free capital flows and taken a stance against all types of capital controls. However, recently IMF reversed its opposition to capital controls as stated in its latest institutional view: "Capital flow liberalization carries risks, which are magnified when countries have yet to attain sufficient levels of financial and institutional development. In certain circumstances, capital flow management measures can be useful. They should not, however, substitute for warranted macroeconomic adjustment."[7]

3   Post-crisis central banking

Global financial crisis was a wake-up call for policymakers. Before the crisis, it was a nearly universal rule that prudential policy should be taken care of by regulatory and supervisory institutions at a micro level, while central banks should solely be responsible for the price stability. Guaranteeing the soundness of each individual institution was deemed sufficient for the whole financial system to function well. It was also argued that if each central bank were to keep its house in order, there would be an appropriate global monetary stance for the stability of the global financial system. These microprudential approaches to price stability and financial stability, which seemed to be working well for a while, laid the fragile foundations of the global financial system that was shaken with the collapse of Lehman Brothers.[8]

For the past couple of years, academicians and policymakers have been discussing possible solutions to incorporate financial stability in the implementation of monetary policy without diluting central banks' price stability objective. Bean (2009) argues that financial stability is best ensured through the newly established macroprudential frameworks, and Brunnermeier et al. (2009) attribute this role to central banks with a macroprudential orientation. Goodhart (2010) stresses this point: "... a separate additional set of (macroprudential, regulatory) instruments will need to be developed for the specific purpose of maintaining financial stability."(p. 9). Even though there is not yet any consensus on the tools of monetary policy in the post-crisis era, it is well accepted that using only short-term interest rates as a policy tool is not sufficient to maintain price stability and contribute to financial stability at the same time. In other words, the rate required to ensure price stability may not be the same rate that is needed to preserve financial stability. Hence, central banks have expanded their toolset to achieve both goals – trying to spur the demand in advanced economies or to contain adverse effects of sudden reversal of capital flows in emerging markets.

3.1   Advanced economies

After Lehman Brothers' collapse, central banks in developed economies started to aggressively cut interest rates, driving them close to zero. However, these reductions have not been enough to stimulate demand for goods and services, so they started to use unconventional monetary policies such as large-scale asset purchases or long-term funding. These new balance sheet policies have been repeated as deemed necessary since the policy rates had
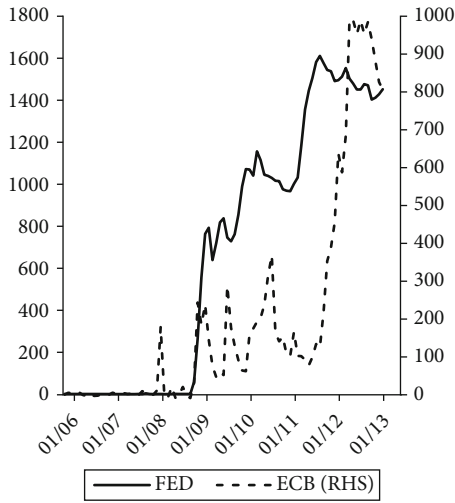
FIGURE 1.2.3   *Excess reserves held in central banks (billion USD, billion Euro)*

Note: ECB Excess Reserves = Current Account Holdings – Reserve Requirements + Deposit Facility + Fixed Term Deposits.

Source: Bloomberg, CBRT.

reached the zero lower bound long before (Figure 1.2.3). However, critics voiced their concerns about this accommodative stance, stating that it would be very difficult to use exit strategies after a long horizon with low rates. Adrian and Shin (2010) show that low interest rates may encourage excessive risk-taking and create further fragilities within the system.

3.2   Emerging markets

While advanced economies try to introduce and use unconventional policies, emerging markets face a different type of challenge in the post-crisis episode. No doubt most emerging markets have withstood the global turmoil better than the advanced economies, and decoupling was apparent (Figure 1.2.4). Fiscal discipline, low public and private debt and resilience of their banking systems made emerging market economies an attractive choice for the abundant liquidity created by the central banks of advanced economies, and capital flows to EMs flourished. However, these excessive capital flows posed significant challenges for the EM policymakers. First and foremost, they made credit more accessible due to the low cost of funding that led to rapid credit growth. Coupled with
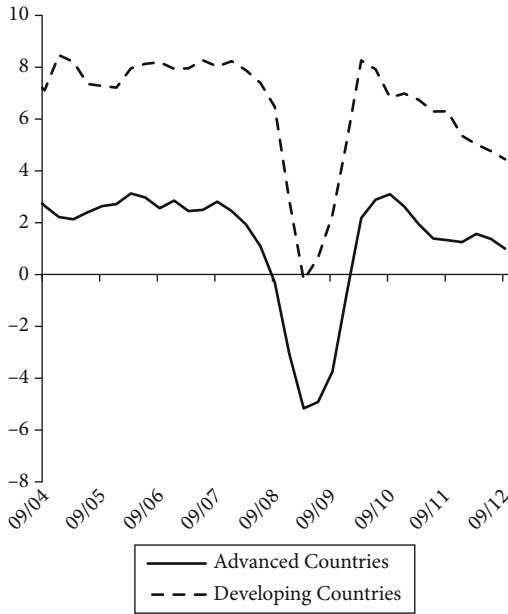
FIGURE 1.2.4   *Global growth rates (percent, YoY)*
Source: Bloomberg, CBRT.

the weak external demand from advanced economies and the significant appreciation in EM currencies, current account imbalances soared. Combined, these factors raised fears of a sudden stop and related future problems for emerging economies, hence necessitating action on the policymakers' side.

Extraordinary times demand extraordinary measures. Taking this principle to heart, when dealing with the adverse consequences of capital flow volatility, EMs utilized various novel policy measures in addition to conventional macroeconomic policies, in order to sustain financial stability, correct macro imbalances and prevent any possible asset price bubbles. The appropriate policy mix for addressing these risks depends on a variety of country-specific considerations, including macroeconomic and financial stability, the level of financial development, and the institutional infrastructure. However, these policies are broadly seen in two categories: capital flow measures and macroprudential measures.

In its Code of Liberalization of Capital Movements, the Organization for Economic Cooperation and Development (2011) classifies measures

under the name of capital controls if they discriminate between residents and nonresidents. Capital flow measures, as described by the IMF,[9] are price-based or administrative measures designed to contain the scale or affect the composition of capital flows. According to the IMF's institutional view, introducing CFMs can be useful for supporting macroeconomic policy adjustment and safeguarding financial stability in certain circumstances. During the global financial storm, Brazil used a tax on financial transactions (IOF) to curb excessive short-term and speculative capital inflows and lengthen flow composition;[10] at first, IOF for nonresidents' portfolio investment in fixed income instruments was increased from 0 percent to 2 percent, and later it was raised to 6 percent.

Magud, Reinhart, and Rogoff (2011) suggest that countries that maintain capital controls on inflows seem to be able to change the composition of flows towards longer-term flows and have a more independent monetary policy. However, Ostry et al. (2011) stresses that capital controls, due to their discriminatory nature, must be utilized only after other macroeconomic and macroprudential tools are exhausted, regardless of whether they are imposed for macroeconomic reasons or financial stability concerns. Even then, they may not be sufficient to achieve external adjustment or significantly influence capital flows.[11] This is in part due to their effectiveness diminishing over time, owing to the incentives to circumvent the restrictions.[12]

Since capital flow measures are, in general, hard to implement and rather easy to circumvent, macroprudential measures (MPMs) have come to spotlight as more effective alternative policy tools for EM policymakers. They are designed to contain the buildup of systemic financial risks and maintain financial stability through countercyclical measures. Some commonly implemented MPMs are countercyclical provisioning and loan-to-value restrictions, capital and liquidity surcharges on the banking system, outright caps on credit growth, higher and maturity based reserve requirements, and countercyclical capital buffers.

Since November 2010, instead of capital flow measures, Turkey has been using a mix of MPMs, along with varying the degree of monetary policy predictability in the face of the volatile short-term capital flows, and has successfully curbed domestic credit growth, avoiding the overvaluation pressure on its currency and the divergence between foreign and domestic demand. The details of the new policy mix of the Central Bank of the Republic of Turkey (CBRT) are described in the following section.

4   The new policy mix in Turkey

Similar to other emerging market economies, real output growth rates and cross border capital flows are closely linked in Turkey. During rapid inflows, economic growth picks up, whereas periods of sudden outflows lead to sudden economic downturns (Figure 1.2.5).

The recent phase of expansionary monetary policies of advanced economies had significant implications for the Turkish economy, as the availability of ample and low-cost short-term foreign financing led to a rapid credit growth, an undue appreciation pressure on domestic currency, and a resulting deterioration in the current account (Figure 1.2.6). The appreciation in the Turkish lira and the increase in domestic consumption accelerated import growth, but weak foreign demand in the aftermath of the crisis led to a limited increase in export growth. Consequently, the deterioration in current account balance and the increasing share of short-term capital flows that finances the deficit increased the sensitivity of the Turkish economy to sudden changes in global risk appetite (Figure 1.2.7).

These conditions as indicated above necessitated a new approach and a new policy mix.[13] While maintaining price stability as the primary objective, contributing to financial stability was recognized as a supportive objective in monetary policy. In addition to the policy rate, complementary instruments such as reserve requirements, interest rate corridor and liquidity management were also utilized. CBRT started actively using the new policy instruments during the period between November 2010 and
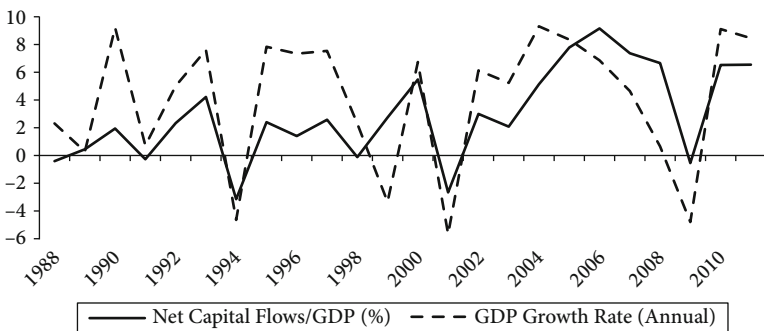
FIGURE 1.2.5   *Capital flows and GDP growth in Turkey (percent, annual)*
Source: CBRT, Turkstat.
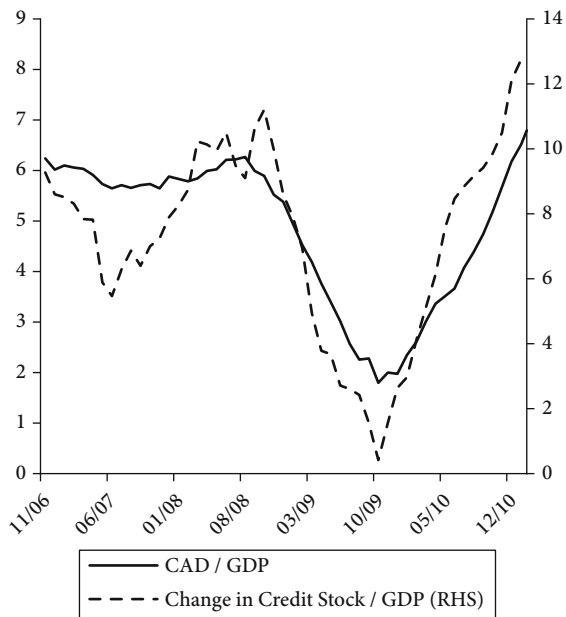
FIGURE 1.2.6 *Current account deficit and credit growth (12-month cumulative*, percent)*

Source: CBRT, Turkstat.
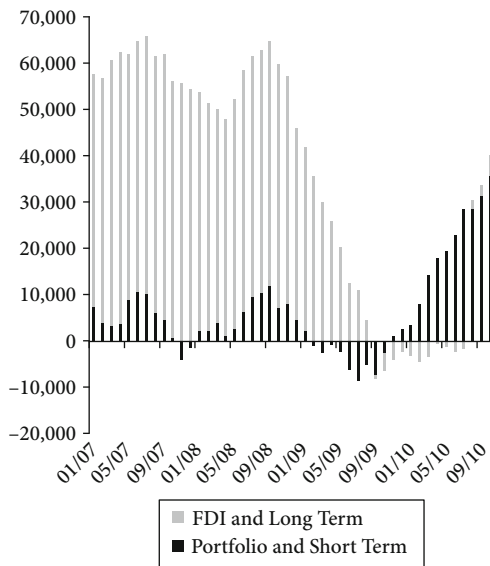
FIGURE 1.2.7 *Sources of external finance (12-month cumulative, billion USD)*

Source: CBRT.

August 2011, when strong global risk appetite drove short-term capital flows to emerging markets. During this period, CBRT aimed to lengthen the maturity of inflows and prevent excessive appreciation of the Turkish lira. Moreover, CBRT targeted a more controlled domestic demand and domestic credit growth in order to rebalance the widening current account deficit.

   In November 2010, CBRT decreased the overnight borrowing rate from 5.75 to 1.75 while keeping the lending rate at 8.75 and the policy rate at 7.00. In December 2010, the interest rate corridor was widened further, and the difference between lending and borrowing rate became 750 basis points. During this period, the overnight interest rates were occasionally allowed to materialize significantly below the policy rate, so that short term carry trade was discouraged by reducing the return to risk ratio (Figure 1.2.8). Also, in the same period, reserve requirement ratios were increased to prevent excessive credit growth and to control domestic demand. After November 2010, the behavior of the Turkish lira against the US dollar was clearly differentiated relative to the currencies of other developing countries. While currencies of other emerging countries continued to appreciate (Figure 1.2.9), the overvaluation of the Turkish lira was corrected to a large extent by the policies implemented
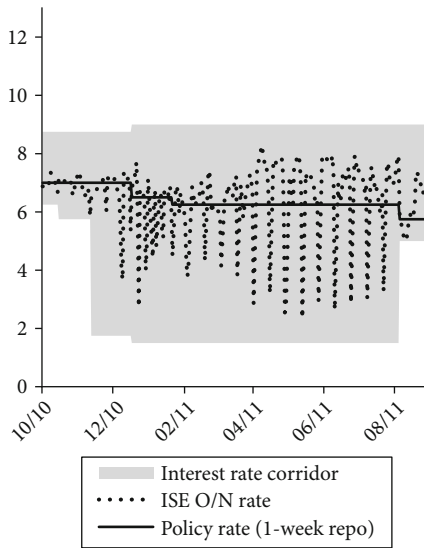
FIGURE 1.2.8   *Monetary policy and interest rates (daily, percent)*
Source: CBRT, ISE.
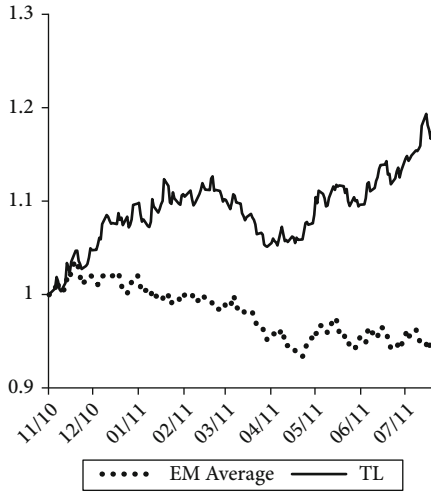
FIGURE 1.2.9   *TL and emerging market currencies (daily, 01.11.2010=1)*

Note: EM Average: Brazil, Chile, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Malaysia, Mexico, Philippines, Poland, Romania, South Africa, South Korea and Thailand.

Source: CBRT, Bloomberg.
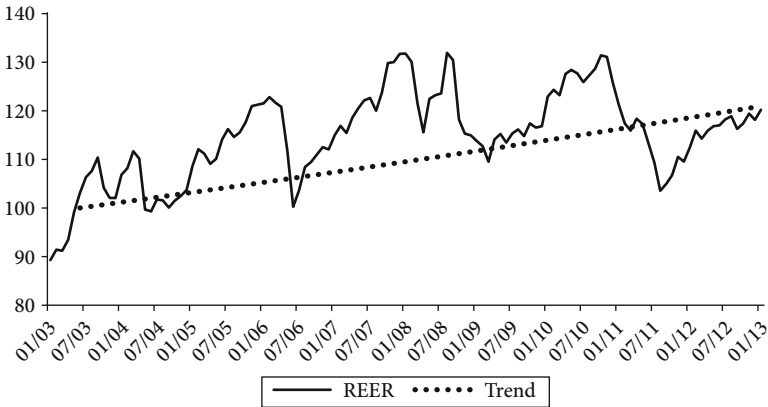
FIGURE 1.2.10   *Real effective exchange rate in Turkey (CPI Based, 2003=100)*

Source: CBRT.

(Figure 1.2.10). Furthermore, the share of long-term capital flows began to pick up during this period (Figure 1.2.11).

In the period between August 2011 and June 2012, sovereign debt problems in some Eurozone countries led to an escalation of global risk
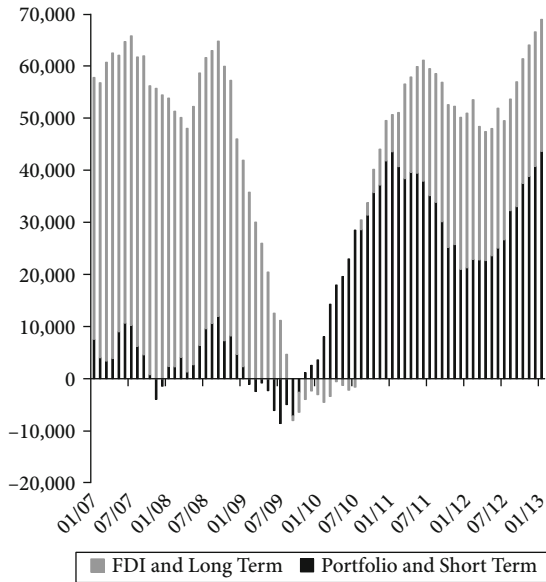
FIGURE 1.2.11 *Sources of external finance (12-month cumulative, billion USD)*
Source: CBRT.

aversion, thus resulting in capital outflows from developing countries. CBRT responded in the opposite direction of what had been done during the period of rapid inflows. As a result of the deterioration in global risk appetite, CBRT narrowed the interest rate corridor by increasing the lower limit of the corridor from 1.50 to 5.00 in August 2011. In October 2011, in order to prevent the adverse effects of excessive currency weakening on medium-term inflation expectations, the interest rate corridor widened upwards this time, and the difference between upper and lower limit of the corridor rose to 750 basis points (Figure 1.2.12). In addition, Turkish lira reserve requirements were cut in order to reduce the burden of liquidity requirements on the banking sector.

As an important pillar of the new policy mix, overnight interest rates were adjusted via day to day liquidity policy in response to the course of economic and financial developments without changing the weekly repo rates (i.e., the main policy rate) (Başçı, 2012). Accordingly, CBRT maintained a tightening bias, and indeed, occasionally resorted to episodes of additional monetary tightening (AMT) in order to prevent undesired exchange rate movements from deteriorating the inflation

outlook via pass-through and expectations. In the days of ATM, CBRT reduced or even cut the funding supplied at the policy rate. Instead, the market was funded via market price-based auctions, and hence, overnight rates settled at or close to the upper bound of the interest rate corridor. Ermişoğlu et al. (2014) show that additional monetary tightening had a significant role in reducing the excessive volatility in the exchange rates.

As a result of the stability measures taken in the Eurozone, global risk appetite has started to improve, and capital flows to emerging markets have accelerated since June 2012. After these measures, and better than expected outturns in inflation and the current account deficit, the risk perception about the Turkish economy has improved. Accordingly, in the second half of 2012, CBRT reduced its average funding rate gradually, and subsequently, the secondary market overnight interest rates fell significantly as well (Figure 1.2.12). There have been clearer signs of a more robust rebalancing process on the current account due to strong exports and lower import demand (Figures 1.2.13 and 1.2.14). In addition,
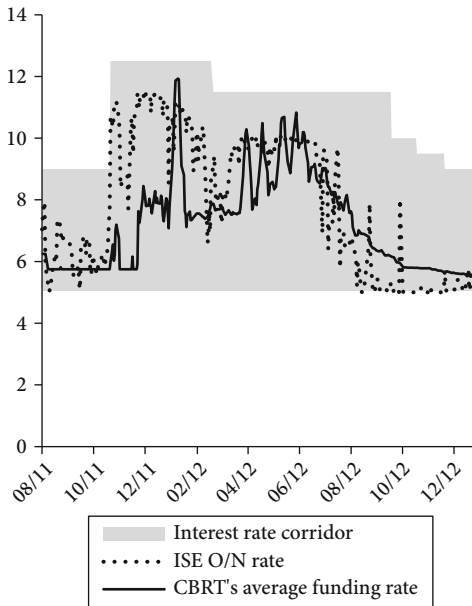
FIGURE 1.2.12   *Monetary policy and interest rates (daily, percent)*
Source: CBRT.
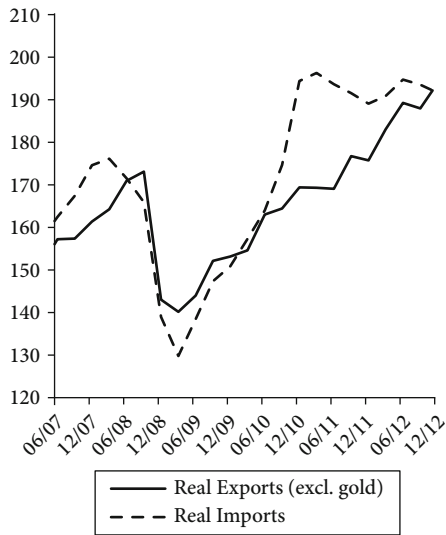
FIGURE 1.2.13   *Exports and imports index (seasonally adjusted, quarterly, 2003=100)*

Source: CBRT, Turkstat.
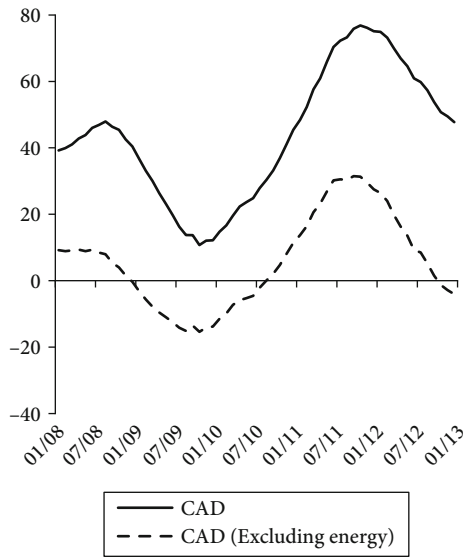
FIGURE 1.2.14   *Current account deficit (CAD) (12-month cumulative, billion USD)*
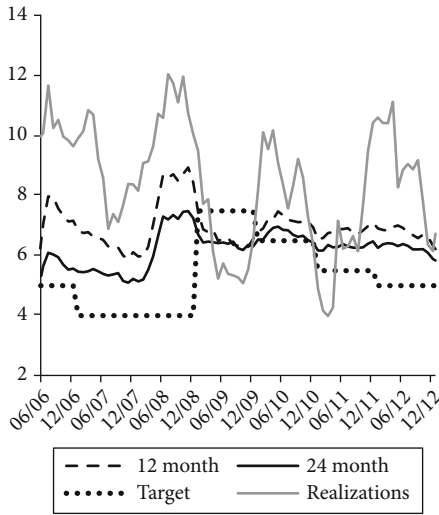
Source: CBRT.

FIGURE 1.2.15   *Inflation expectations and realizations (percent, annual)*
Source: CBRT, Turkstat.

the disinflationary impact of domestic demand has become more significant, and inflation has started to decline (Figure 1.2.15). Thanks to the positive inflation outlook and to support financial stability, CBRT started to narrow the interest rate corridor by decreasing the upper bound of the corridor since September 2012 (Figure 1.2.16).

   In the meantime, CBRT has added a new policy tool called the reserve options mechanism (ROM). ROM gives Turkish banks the option to hold FX or gold reserves at the Central Bank, instead of their Turkish lira required reserves. Up to 60 percent of TL required reserves can be held in FX, and up to 30 percent can be held in gold. Furthermore, with this mechanism, the amount of FX or gold to be held per unit of TL requirements (i.e., reserve option coefficients [ROC]) is an increasing function of the usage of this facility (Figures 1.2.17 and 1.2.18). ROM not only provides Turkish lira liquidity to banks in a more permanent way, and lowers their funding costs, but it also supports the CBRT's gross foreign exchange and gold reserves (Figures 1.2.19 and 1.2.20). This new mechanism increased the flexibility of Turkish monetary policy by working as an automatic stabilizer in face of volatile short-term capital flows.[14] Oduncu et al. (2013) show the effectiveness of ROM on decreasing the volatility of Turkish lira empirically.
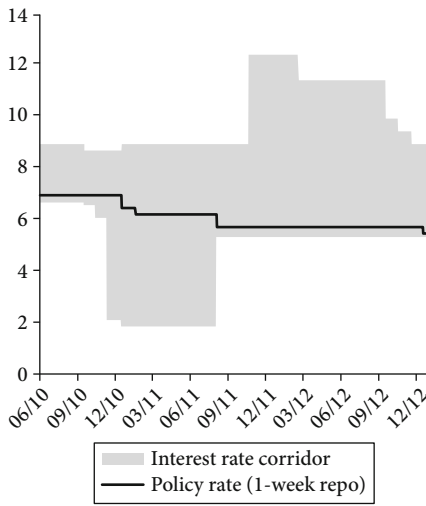
FIGURE 1.2.16   *Monetary policy and interest rates (daily, percent)*
Source: CBRT.
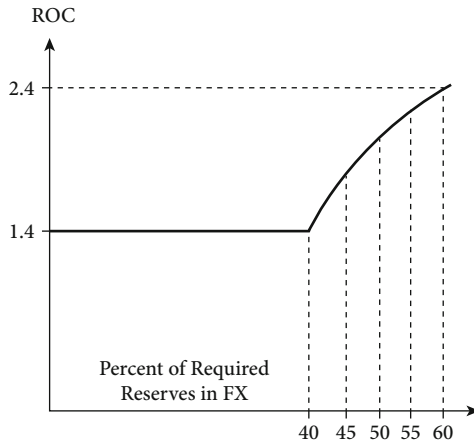
FIGURE 1.2.17   *Reserve options mechanism (FX)*
Source: CBRT.

In summary, macroeconomic indicators show that the policies pursued successfully delivered the intended results. With the implementation of the new policy mix, the rebalancing between the domestic and external demand became evident, the quality of financing the current account
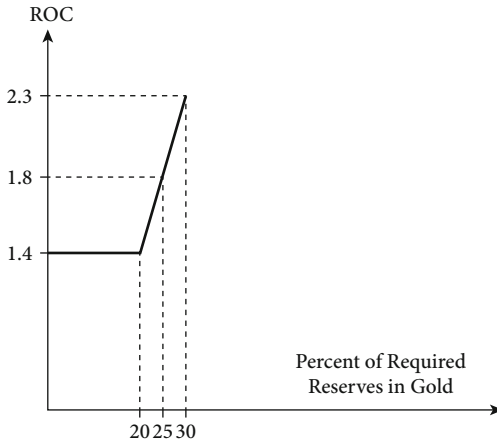
FIGURE 1.2.18   *Reserve options mechanism (gold)*
Source: CBRT.
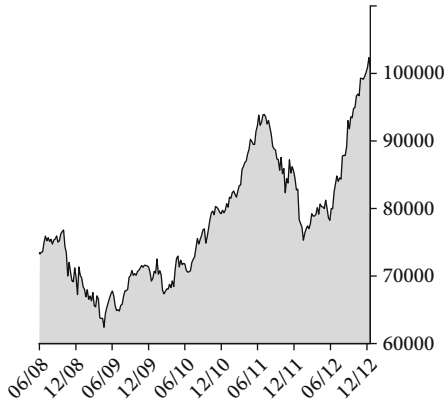
FIGURE 1.2.19   *FX reserves (million USD)*
Source: CBRT.

deficit improved in terms of maturity, the credit growth slowed down to desired levels (Figure 1.2.21), the volatility of TL with respect to other emerging economies fell visibly (Figures 1.2.22 and 1.2.23), and the infla- tion expectations have been anchored throughout this period at levels slightly above the target of 5 percent.
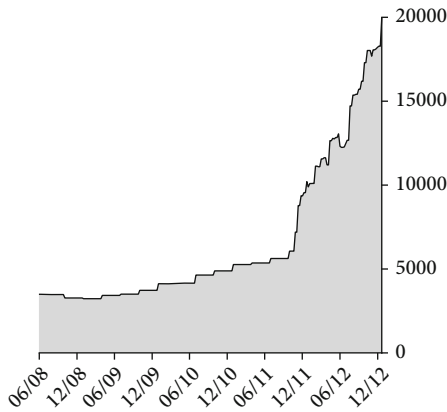
FIGURE 1.2.20 *Gold reserves (million USD)*
Source: CBRT.
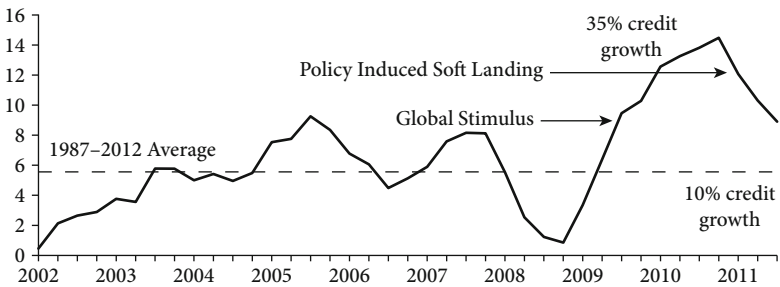
FIGURE 1.2.21 *New borrowing (change in total debt/GDP, percent)*
Source: CBRT.

5 Conclusion

After the global financial crisis, both academicians and policymakers understood that price stability alone is not sufficient for maintaining macroeconomic stability, and financial stability is integral to the domestic and global financial markets functioning well. How to incorporate financial stability in the monetary policy frameworks without diluting the price stability objective has become a significant question for all central banks.
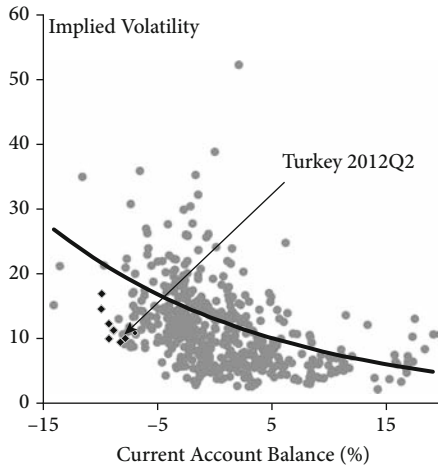
FIGURE 1.2.22   *FX implied volatility and current account (1 month, ratio to GDP, emerging economies)*

Note: Markers with darker color indicate data on Turkey from 2010Q2 to 2012Q2. Emerging Economies: Argentina, Brazil, Chile, Colombia, Czech Rep., Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Romania, Russia, S. Africa, Taiwan, Thailand and Turkey.

Source: CBRT, IMF.
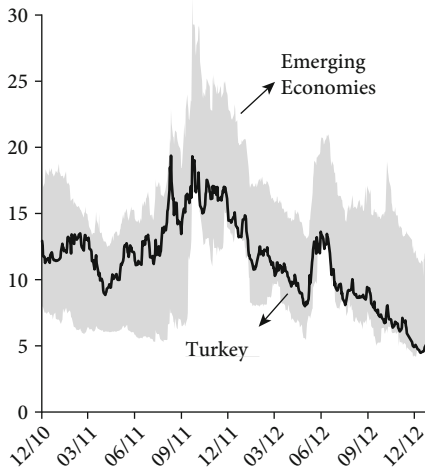
FIGURE 1.2.23   *FX implied volatility and current account (1 month, countries with CAD)*

Note: Countries with a current account deficit: Poland, Brazil, Chile, South Africa, Indonesia, Columbia, Mexico, Czech Rep., Romania and Turkey.

Source: CBRT, Bloomberg.

The Central Bank of the Republic of Turkey has adopted a new monetary policy framework since November 2010 in order to offer a country-specific solution to this question. In the new framework, reserve requirements, other macroprudential tools, weekly repo rates, the interest rate corridor and the funding strategy are jointly used as complementary tools for credit, interest rate and liquidity management.[15] In utilizing these tools, expectations, credit growth and exchange rate are monitored as key indicators related to price stability and financial stability. Moreover, the reserve options mechanism, which is the option to hold FX or gold reserves instead of Turkish lira required reserves of Turkish banks, was introduced during the same period. Here, the aim was to increase the resilience of the financial system against external shocks through increasing international reserves of the banking system held within the Central Bank, and to provide more flexibility to monetary policy by allowing the separate management of domestic liquidity and foreign liquidity.

Flexible monetary policy has proven its merits globally. This has recently been recognized by the IMF managing director, Christine Lagarde, who said, "flexible monetary is key to overcoming the debt crisis, once and for all."[16] In the discussions of post-crisis central banking, Turkey's experience with a newly introduced set of policy instruments has the potential to serve as a useful example for both economists and policymakers in dealing with capital flow volatility.

Notes

1   Brunnermeier (2012).
2   Calvo and Reinhart (2000).
3   See Eichengreen (2000) for a detailed survey.
4   See Fischer (1998) and Summers (2000).
5   Among others, see Bhagwati (1998) and Stiglitz (2000).
6   Chinn and Ito (2006), Klein and Olivei (2006), Prasad and Rajan (2008).

7   IMF (2012).
8   Borio (2011).
9   IMF (2012).
10 Pereira da Silva and Harris (2012).
11 IMF (2012).
12 Ostry et al. (2010).
13 See Başçı and Kara (2011) for details of the policy mix.
14 See Alper et al. (2012) and Küçüksaraç and Özel (2012) for details of ROM.
15 For liquidity management of central banks, see Goodhart (2009).
16 Lagarde (2012).

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Part 2

Recent Trends in Currency Flows

▶

2.1

The Liberalization of Capital Account in China: Retrospect and Prospect

Ming Zhang

Abstract: *As the result of the increasing integration into global financial market, China has been facing larger and more volatile international capital flows. Chinese government adopted a gradual and cautious strategy to liberalize its capital account, which was reflected not only in the transition of regulating emphasis on capital inflow or outflow, but also in the sequencing for liberalization of different types of capital flows. There is a hot debate in China now about whether Chinese government should speed up the capital account opening, and we argue against this idea for several reasons. The further liberalization of Chinese capital account should follow an appropriate sequencing. Price-based tools should replace the traditional quantitative methods. The capital control should be used along with macroeconomic policies and macro prudential regulations. Chinese government should take an active part in the multilateral co-operations to manage global capital flows.*

1   Introduction

In the past three decades, along with the financial deregulation and globalization, both the scale and volatility of international capital flow increased dramatically. The conventional wisdom was that the free cross-border capital flow could improve the efficiency of resource allocation and thus enhance the welfare of both source countries and recipient countries. However, the massive capital inflow and the following sudden stop, or even reverse, played a very important role in all major international financial crises, including the Latin American debt crisis in 1980s, the East Asian financial crisis in the 1990s, and the current global financial crisis. The pro-cyclicality of international capital flow might aggravate business cycles and impair financial stability, which has been proved repeatedly in numerous financial crises.

After the US subprime mortgage crisis and European Sovereign debt crisis burst, the international community began to rethink the traditional preference for free capital flow and capital account liberalization (Gallagher et al., 2012). A great deal of of evidence showed that the emerging market economies (EMEs) with some extent of capital control performed better than others, both during and after the crisis. During the current crisis, some EMEs that had already opened their capital account, such as South Korea, Brazil and Thailand, again picked up some price-based capital flow management measures to prevent the huge short-term capital inflow. Even the IMF, which had been an active advocator of capital account liberalization, changed its attitude toward capital control and admitted that capital control measures should be included in the EMEs' toolkit to manage international capital flow (IMF, 2012).

As for the EMEs that have already opened their capital accounts, the question now is whether they should readopt some capital flow management measures under certain circumstances. However, for China, which has not fully opened its capital account, the current question is whether the capital account liberalization should be accelerated. In the past, the Chinese government gradually and cautiously opened its capital account. However, in February 2012, a report released by a bureau under People's Bank of China (PBC) claimed that the time had arrived to speed up capital account liberalization (Bureau of Investigations and Statistics under PBC, 2012). Although this report did not put forward an aggressive timetable, it ignited the market's imagination: the Chinese

government might accelerate the liberalization process. Some analysts suggested that the Chinese government should achieve the full liberalization of capital account by 2015 (Ma, 2012), and one major argument was that a faster capital account liberalization helped to promote a quicker RMB internationalization.

This paper tries to analyze the evolution of China's international capital flows and the Chinese government's strategy and process to open capital account. We also participate in the current debate about whether Chinese capital account liberalization should be accelerated. We don't that it is a time window now for the Chinese government to speed up the capital account opening, considering the unfriendly external environment, the change of conventional wisdom, the appropriate sequencing and the potential negative impacts. Before RMB interest rate and exchange rate have been further liberalized, and the development of Chinese financial market has reached a certain threshold, capital control is still the last firewall for China to fight against the volatile international capital flow. It would be dangerous for the Chinese economy if the capital account is liberalized too hastily.

The rest of the paper is structured as follows: The second part analyzes the evolement of China's international capital flows in the past three decades; the third part reviews the Chinese government's strategy and progress to liberalize the capital account up to now The fourth part discusses whether China should speed up the capital account liberalization in the near future; the fifth part concludes.

2   China's international capital flows: a retrospect

China has been facing persistent "twin surplus" (current account surplus plus capital account surplus) in its international payments since 1999.[1] As the result, China's foreign exchange reserve soared in the first decade of the 21st century, increasing from 166 billion USD by the end of 2000 to 3.18 trillion USD by the end of 2011. As shown in Figure 2.1.1, the average annual reserve accumulation exceeded 400 billion USD from 2007 to 2011. From 2005 to 2009, the current account surplus was the major source of reserve accumulation. But after the global financial crisis, the capital account surplus surpassed the current account surplus to become the major source of reserve accumulation in 2010 and 2011.
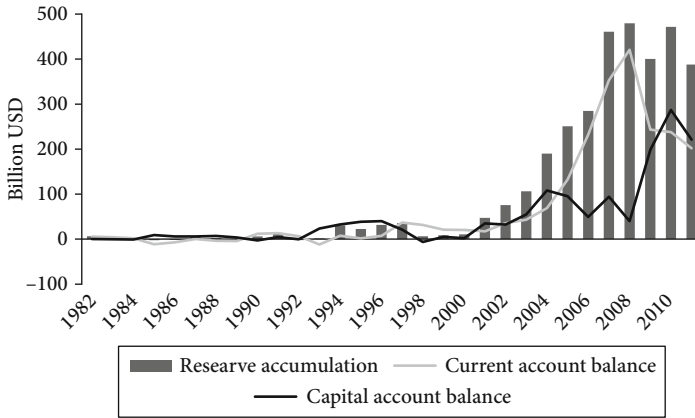
FIGURE 2.1.1   *The contribution to annual reserve accumulation in China*
Source: CEIC.

Chinese gross current account flow and gross capital account flow both increased substantially in the past 30 years (Figure 2.1.2). The ratio of gross current account flow to GDP rose from 16 percent in 1982 to 60 percent in 2011, and peaked in 2006 (76%). The ratio of gross capital account flow to GDP rose from 2 percent in 1982 to 35 percent in 2011, and peaked in 2007 (54%). Compared with the steady increase of the ratio of gross current account flow to GDP in the past three decades, the ratio of gross capital account flow to GDP stayed flat in 1980s and the 1990s but then jumped up dramatically in 2000s, which might reflect that China's capital account liberalization had already been accelerated in 2000s. The ratio of net current account flow to GDP increased from 3 percent in 2003 to 10 percent in 2007, but then decreased to 3 percent in 2011. The ratio of net capital account flow to GDP didn't show any clear trend compared with other series.

As shown in Figure 2.1.3, non-direct investment inflows dominated the capital account inflows in 1980s, and direct investment inflows then dominated the capital inflows in the 1990s and the first half of 2000s. However, non-direct investment flows became more important again in the second half of 2000s, which caused the ratio of direct invest-ment inflow to overall capital inflow to decline to 40 percent in 2009. To compare, direct investment flow was relatively stable, but portfolio and other investment flows were much more volatile. During the period from 1982 to 2011, the coefficients of variation of direct investment,
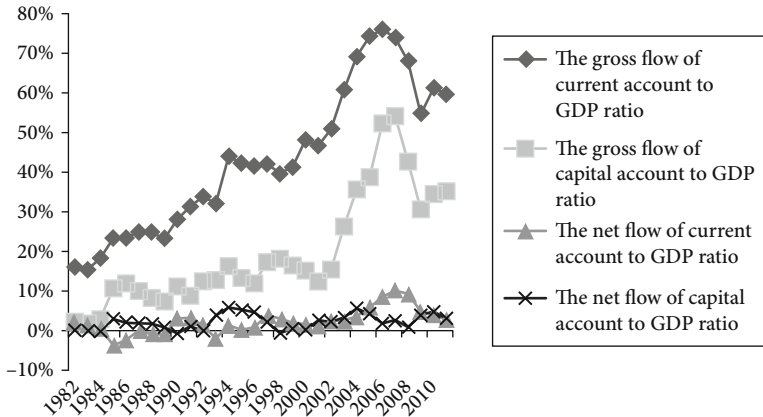
FIGURE 2.1.2   *The gross and net cross-border flows in China*

Note: The gross current account flow is defined as the sum of debit and credit flows of current account on China's balance of payments, and the gross capital account flow is defined as the sum of debit and credit flows of both capital account and financial account on China's balance of payments.

Source: CEIC.

portfolio investment and other investment in China were 1.09, 9.42 and −11.74 respectively, which meant that other investment flow had been the most volatile type.[2] Figure 2.1.3 also shows that, after the burst of every international financial crisis, China would face the reverse of other investment inflow. For example, during the periods from 1997 to 2000 and from 2007 to 2008, China faced significant other investment outflow, among which bank lending played a major role.

Foreign direct investment (FDI) has dominated the direct investment flows in China since the 1980s. FDI inflow increased sharply from 2003 to 2010, although it was interrupted by global financial crisis in 2009. China's outward direct investment (ODI) was very small before 2005, but it expanded fast in the second half of the 2010s. As the result, the ratio of ODI flow to FDI flow reached 33 percent in 2008 and 2009, but then declined to 23 percent in 2011 due to another surge of FDI inflow. By the end of 2011, China's FDI and ODI stocks reached 1.80 trillion and 364 billion USD respectively. China was the 2nd largest FDI recipient country (in terms of flow) (UNCTAD, 2012), and the 13th largest ODI source country (in terms of stock) in 2011 (MOFCOM PRC, 2012).
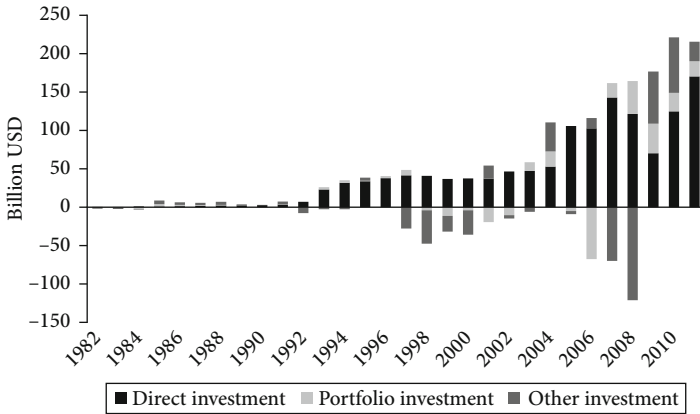
FIGURE 2.1.3   *The decomposition of China's financial account*
Source: CEIC.
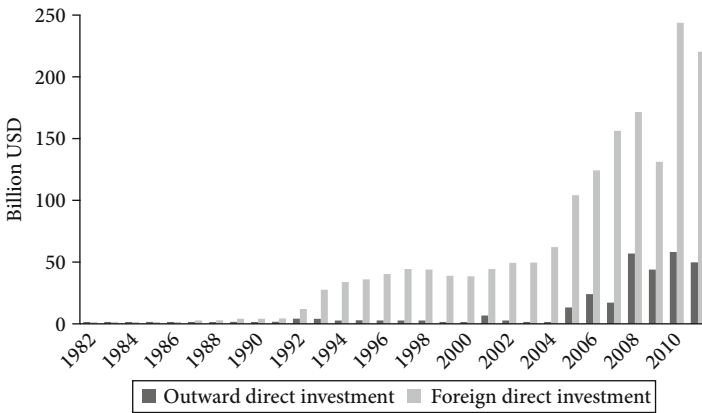
FIGURE 2.1.4   *China's FDI and ODI*
Source: CEIC.

The portfolio flow had been much smaller than direct investment flow because the Chinese government still exerted relatively strict control on the former. There was an interest imbalance about the structures of China's inward and outward portfolio investments. As shown in Figure 2.1.5, the debt investment dominated outward portfolio investment (please note that this did not include the investment of China's foreign exchange reserve), and the equity investment dominated inward
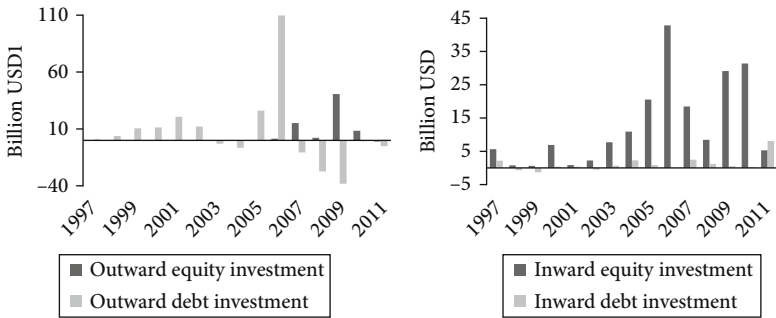
FIGURE 2.1.5   *China's inward and outward portfolio investment*
Source: CEIC.

portfolio investment. By the end of 2011, China's outward equity and debt investments reached 62 and 198 billion USD respectively, and China's inward equity and debt investments reached 211 and 37 billion USD respectively. Considering the average yield of equity investment was much higher than that of debt investment, the imbalanced investment structures meant that the returns of Chinese residents' overseas portfolio investment tended to be much lower than the returns of non-residents' portfolio investment in China. Another notable phenomenon was that China's outward debt investment flow declined significantly after the breakout of the US subprime crisis.

The Chinese government had been always cautious about the liberalization of foreign debt inflow. As shown by Figure 2.1.6, China's foreign debt stock increased slowly and gradually from 1985 to 2011. By the end of 2011, the accumulated foreign debt was around 700 billion USD, only 10 percent of China's GDP and 20 percent of China's foreign exchange reserve. It should be noted that the ratio of short-term debt stock to overall debt stock increased from 9 percent in 2000 to 72 percent in 2011. However, the ratio of short-term debt stock to foreign exchange reserve was still under 20 percent in 2011, which meant the current foreign debt burden was still affordable for the Chinese government.

The error and omission is the gap between the accumulation of foreign exchange reserve and the sum of current account balance and capital account balance. However, the direction and scale of error and omission might reflect the part of capital flow that tries to circumvent the government regulations. As shown in Figure 2.1.7, China's net error and omission item had been persistently negative from 1990 to 2001; it peaked in 1997.
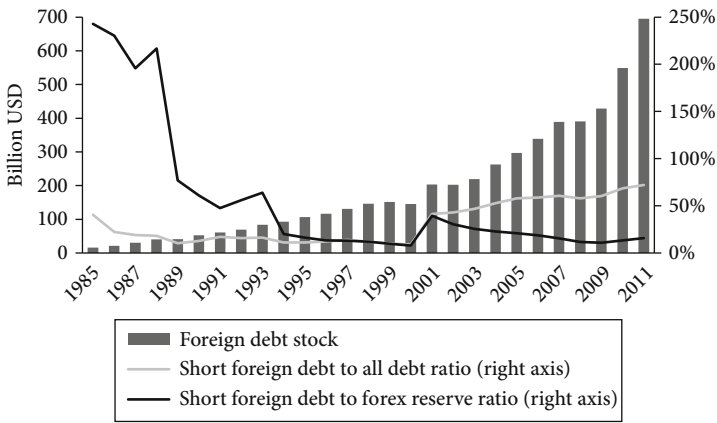
FIGURE 2.1.6   *China's foreign debt and its structure*

Source: CEIC.
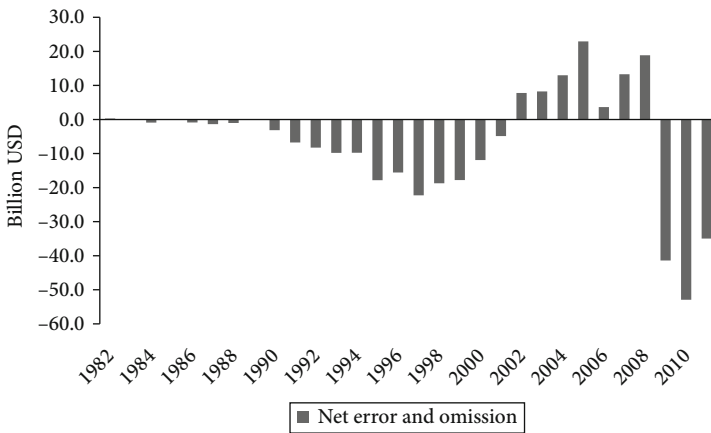
FIGURE 2.1.7   *The net error and omission of China's balance of payment*

Source: CEIC.

After the burst of the current global financial crisis, China's net error and omission item had turned to be negative again since 2009. In China, the negative net error and omission item might reflect the illegal capital outflow through underground banking or other channels. However, the maximum of annual capital outflow under error and omission in China was only 50 billion USD in 2010, which was still limited compared with China's annual increase of foreign exchange reserve.

3   The capital account liberalization in China up to now

3.1   The features of China's traditional capital control regime

China's traditional capital account regulation regime was based on a three-layer regulatory framework (Xia and Chen, 2011). The first layer was the direct regulation of cross-border capital transactions, which was performed by different industry regulators such as the National Development and Reform Committee (NDRC), PBC, China Banking Regulatory Commission (CBRC), China Securities Regulatory Commission (CSRC) and the Ministry of Commerce of China (MOFCOM). For example, if a domestic commercial bank wanted to borrow abroad, it must obtain not only the qualification for foreign borrowing issued by CBRC but also the borrowing quota determined by NDRC. The second layer was the regulation of the currency exchange process of cross-border capital transactions – such as the validity of cross-border remittance and the convertibility of specific international transactions – which was performed by the State Administration of Foreign Exchange (SAFE). The third layer was the prudential regulation of the foreign exchange transactions of domestic financial institutions, which was performed by SAFE, such as the management of the foreign exchange asset-liability ratio of commercial banks. To summarize, the first two layers were the direct capital flow management measures through controlling transactions and currency exchanges, and the third layer was the indirect capital flow management measure which worked by reducing financial frangibility.

China's traditional capital account regulation regime had three major characteristics. First, the regulations were mainly based on administrative approval and quantitative limitation (such as a direct prohibition or an explicit quota limit), and not on price measures or prudential regulations (Zhang, 2003). To compare, other EMEs in East Asia or Latin America preferred more indirect price-based tools to mange capital flows, such as non-remunerated reserve ratio, withholding tax, or a stamp tax on specific capital inflow. Second, China's capital control regime deliberately discriminated among different types of companies, under which different entities were subject to different degrees of control (Xia and Chen, 2011). Generally speaking, domestic enterprises faced more constraints than foreign peers, and domestic non-financial companies faced more

constraints than domestic financial institutions. A negative byproduct of this discriminative regime was that institutional arbitraging activities were encouraged under this regime, such as the round-tripping FDI phenomenon in China. Third, capital outflows faced more strict controls than capital inflow under the regime. This characteristic originated in the 1980s and the 1990s when the Chinese economy lacked foreign exchange. After China had accumulated a huge foreign exchange reserve in the 2000s, the controls on capital inflows and outflows became more balanced.

3.2   The Chinese government's strategy to liberalize the capital account

The Chinese government achieved the full convertibility of current account transactions in December 1996. According to the initial planning, Chinese capital account would have been liberalized around 2000 (Prasad and Wei, 2007). However, the burst of the East Asian financial crisis forced the Chinese government to slow down the pace of capital account liberalization, because during the crisis, several East Asian EMEs with open capital accounts suffered greatly from the sudden stop and reverse of short-term international capital inflow. After the crisis, the Chinese government adopted a more gradual and cautious strategy to liberalize its capital account.

The gradual and cautious strategy was reflected in two aspects. On the one hand, the Chinese government took a pragmatic and flexible attitude about deciding whether capital inflow or outflow should become the emphasis of regulation at different stages. In the 1990s, when China had a very limited foreign exchange reserve and faced the pressures of both capital outflow and RMB depreciation, an "easy in, difficult out" strategy was adopted to manage international capital flows. In the early 2000s, when China began to face significant current account surpluses and RMB appreciation pressure, a more balanced strategy was formulated which continued to encourage FDI inflows, but at the same time, began to encourage overseas direct investment (the "Going Global" policy). In the second half of the 2000s, when China faced massive short-term capital inflow and strong RMB appreciation pressure, the Chinese government turned to an "easy out, difficult in" strategy to prevent further short-term capital inflow. For example, Chinese households were encouraged to make global portfolio investment through the channel of QDII in 2006.

Another example was that Chinese commercial banks got the permission to lend abroad in 2008. To summarize, it seemed that the Chinese government had adopted a countercyclical capital control strategy to avoid both huge capital inflow and huge capital outflow (Zhang, 2012a).

On the other hand, the gradual and cautious strategy was also reflected in the sequencing of the liberalization of different types of capital flows: that is, to liberalize long-term capital flows first and short-term capital flows later. FDI inflows were liberalized first in the 1990s, because it was deemed relatively stable compared with portfolio investment or bank lending, and it could bring in the advanced technologies and management expertise which were beneficial to Chinese economic growth. The Chinese government began to promote ODI in the early 2000s, with the aim of helping domestic enterprises secure the overseas supply of commodities or climb up the value chain. Another important objective for the Chinese government in promoting ODI was to alleviate RMB appreciation pressure by increasing capital outflow. Compared with direct investment, the liberalization of cross-border portfolio investment was more gradual and controllable. The qualified foreign institutional investors (QFII) mechanism was established in 2002, which allowed certain foreign financial institutions to direct in Chinese financial markets under quota limits. The Chinese government initiated the qualified domestic institutional investors (QDII) program in 2006, which allowed Chinese residents to invest in global financial markets through collective investment vehicles operated by Chinese financial institutions. The liberalization of cross-border borrowing and lending also occurred in a gradual and controllable way. Drawing lessons from other EMEs' historic experiences, the financial derivatives and short-term debts transactions were still under tight control in China.

3.3   Why the Chinese government adopted a cautious strategy to liberalize the capital account

First, capital control had been a key element of Chinese characteristic financial repression, which underpinned the traditional investment-driven economic growth paradigm. The Chinese government tried to push down the prices of all kinds of inputs (including the interest rate) to stimulate fixed asset and infrastructure investments. If capital account were fully open, Chinese household would move their money out of China to achieve much higher yields. Therefore, to maintain the

operations of the old growth model, the Chinese government needed to keep some controls on international capital flows, especially on the overseas investment of Chinese households.

Second, the Chinese government preferred an independent monetary policy because China was a large economy and had its own business cycles. Although the Chinese government had made significant progress on the reform of RMB exchange rate mechanism, RMB exchange rate against US dollar was still not very flexible. If China's capital account were fully opened, it would have been difficult for PBC to execute a different monetary policy compared with the Fed's policy. In the short term, PBC could enhance the independence of its monetary policy by sterilization, but considering that continuous sterilization would cause the heavy valuation loss of central bank or exacerbate the domestic financial repression, the sterilization would be unsustainable. Therefore, capital control could help PBC to operate a more independent monetary policy before the full liberalization of the RMB exchange rate.

Third, the Chinese financial market was still underdeveloped. The financing structure was still dominated by bank lending. The stock market was very speculative due to the lack of matured institutional investors and the weak corporate governances. The bond market was shallow and fragmented; there was not even a sound benchmark yield curve. Inexperienced domestic investors could not afford the dramatic boom and bust of asset prices. Considering the above financial fragilities in Chinese financial market, if the capital account were liberalized too quickly, the probability of a serious financial crisis breaking out would be very high. Moreover, the lessons provided by other EMEs showed that the volatile international capital flows tended to hurt domestic financial stability if they were out of control. The only reason China could avoid involvement in the East Asian financial crisis and the current global financial crisis was that it still kept capital account control.

3.4   The liberalization process of specific capital flows

Direct investment flows

The Chinese government began to loosen its control of FDI in the early 1990s. FDI in China's manufacturing sectors has already been fully liberalized, with the only exception being some "strategic" sectors (Lardy and Douglas, 2011). However, FDI in the service sectors is facing more

restrictions, especially in the finance and telecommunication industries. Foreign investors could not only remit the profit or dividend back to their home countries, but also convert the RMB earnings into other currencies before sending them out of China.

In 1999, the Chinese government announced the Going Global. From then on, the Chinese government began to promote ODI by providing tax cuts, simplifying approval and annual review process, allowing all profits to be reinvested abroad, and improving the access to offshore financing provided by Chinese banks (Ma and McCauley, 2007). In December 2008, CBRC allowed that commercial banks would provide loans to domestic enterprises to help them make greenfield investment abroad or engage in overseas M&A activities. In May 2009, MOFCOM announced a new rule that increased the authority of provincial MOFCOM bureaus so as to shorten approval time and raise approval efficiency. Also in May 2009, SAFE introduced a new regulation rule that allowed domestic enterprises to report the source of their foreign exchange financing only after they had made overseas investments, rather than getting approval in advance of the transactions. However, before making ODI, Chinese enterprises still needed to obtain the approval from SAFE, NDRC and Ministry of Finance (MOF).

Portfolio investment flows

China's traditional liberalization strategy for portfolio investment was "segmenting the markets with different investors" (Xia and Chen, 2011; Huang et al., 2011). Before the birth of QFII, foreign investors could only purchase foreign currency denominating assets such as B shares in the mainland and H shares or red chip stocks in Hong Kong, and the purchase of other RMB denominating mainland assets such as A shares, bonds and money market instruments had been prohibited. Before the establishment of QDII, Chinese non-financial residents had not been allowed to purchase, sell or issue overseas financial products. The starts and expansions of QFII and QDII reflected the Chinese government's objective to liberalize cross-border portfolio investments gradually. However, both QFII and QDII have been still under approval procedures, quota limits, foreign exchange conversion rules, instruments restrictions and intensive reporting requirements (Ma and McCauley, 2007).

QFII allowed qualified foreign financial investors to invest in specified types of Chinese domestic financial products. There was a quota for

each foreign investor and for the overall investment scale of QFII. At the initial stage, only closed-end funds were allowed, and there was a 3-year locking period, which reflected the Chinese government's intention to encourage mid-term and long-term investments and to deter short-term investments. After some time, the open-end funds were allowed, and the locking period had been shortened. By the end of November 2012, the Chinese government had approved 165 foreign financial investors to join the QFII program, and the accumulated approved investment scale reached 36 billion USD. As a new measure to promote RMB internationalization, the Chinese government launched the R-QFII (Renminbi QFII) program in August 2011, which allowed qualified foreign financial investors to invest in Chinese domestic financial products using RMB funds allocated from offshore markets. By the end of October 2012, 21 foreign investors had obtained the certificate, and the accumulated approved investment scale reached 48 billion RMB.[3] In April 2012, the Chinese government announced that the overall quota for QFII would be expanded from 30 billion USD to 80 billion USD, and the overall quota for R-QFII would be expanded from 20 billion RMB to 70 billion RMB. According to a current market rumor, the overall quota for RQFII could be increased another 200 billion RMB.

When QDII was started in 2006, domestic investors could only invest in fixed-income assets. Investment in overseas stock markets was permitted in 2007. By the end of November 2012, 106 domestic financial institutions had obtained the certificate of QDII, and the accumulated approved investment scale reached 87 billion USD. The investment scale of QDII increased very quickly in 2006 and 2007. However, due to the appreciation of RMB against major currencies, and the poor performance of overseas financial products after the burst of global financial crisis, the increase of the QDII investment scale slowed down significantly after 2008.

Other investment flows

For cross-border borrowing and lending, the controls on foreign companies were much looser than on domestic enterprises. Restrictions on a foreign enterprise borrowing abroad were quite relaxed, as long as the enterprise's accumulated foreign borrowing didn't exceed the gap between its total investment scale and its registered capital. However, if a domestic enterprise wanted to borrow abroad, it was required to obtain not only the qualification and quota for overseas borrowing but also the

approval of SAFE. Furthermore, even qualified domestic enterprises could not obtain the permission to borrow short-term foreign debt until early 2010.

As for debt outflows, Chinese commercial banks have been authorized to lend overseas since 2008, and qualified domestic enterprises have been approved to lend money to their overseas subsidiaries from 2009. Policy banks provided a major proportion of China's external lending, and their loans were mainly used to support stated-owned enterprises (SOEs) to purchase commodities abroad or make overseas direct investments. Moreover, when domestic financial institutions made external loans, they had to obey the rules of foreign exchange asset-liability ratio management.

4   Whether the Chinese government should accelerate the capital account liberalization

The Chinese government has made considerable progress in the capital account openness after 20 years of gradual liberalization. As shown by Table 2.1.1, among the 40 capital account transactions defined by IMF, 14 items are basically convertible and 22 items partly convertible in China now, and only 4 items are non-convertible. The cross-border direct investment is the most liberalized capital flow, whereas the money market transactions and financial derivatives are still under strict controls. There are at least some limited accesses for non-residents to enter the stock and bond markets, but the money market and financial derivatives market are still closed to non-residents. Compared with other major EMEs, China still has relatively tight capital account control (Bureau of Investigations and Statistics under PBC).

There is a hot debate in China now about whether the Chinese government should speed up the liberalization of capital account. To ignite the debate, in February 2012, a policy report released by a bureau under PBC announced an official timetable about capital account liberalization for the first time, which provided a three-stage plan (Bureau of Investigations and Statistics under PBC, 2012). For the short-term arrangement (the next 1 to 3 years), the regulation on the direct investments that have real transaction background will be further loosened, and the outward investment of Chinese enterprises will be encouraged. For the mid-term arrangement (the next 3 to 5 years), the regulations

TABLE 2.1.1   *The current state of China's capital account openness*

	Non convertible	Partly convertible	Basically convertible	Fully convertible	Sum
Capital and money market tool transaction	2	10	4		16
Derivatives and other tool transaction	2	2			4
Credit tool transaction		1	5		6
Direct investment		1	1		2
Liquidation of direct investment			1		1
Real estate transaction		2	1		3
Personal capital transaction		6	2		8
Sum	4	22	14		40

Source: Bureau of Investigations and Statistics under PBC (2012).

on trade financings that have real trade background will be loosened to facilitate RMB internationalization. For the long-term arrangement (the next 5 to 10 years), the Chinese government would open the regulations on capital inflow first, then on capital outflow. Furthermore, real estate, stock and bond transactions would be liberalized one by one, and the quantitative methods would gradually be replaced by the price methods. The timetable was not very aggressive, but the title of the report was "The Situation is Matured to Accelerate the Opening of Capital Account," which stimulated the market's imagination. Some market participants even suggested that the Chinese government should complete the capital account liberalization in 5 years (Ma, 2012).

The major arguments supporting a faster liberalization of China's capital account include (1) It is now the time for the Chinese government to speed up capital account liberalization, because there is a strong demand for Chinese funds in developed countries after the global financial crisis. The much lower valuations on global capital markets provide Chinese enterprises good opportunities to make direct investment abroad. (2) China's capital control is no longer effective, because residents and non-residents can find considerable loopholes to circumvent the capital account regulations under the current circumstances. (3) Faster capital account liberalization could promote RMB internationalization; otherwise the momentum of the latter would attenuate. (4) The liberalization of capital outflow could effectively alleviate the appreciation pressure of RMB exchange rate, thus mitigating the impact of RMB appreciation to

China's export growth. (5) The full liberalization of China's capital account could be used as a commitment device to push forward domestic structural reforms. (6) The capital account liberalization could promote the development of China's financial market and improve the efficiency of resource allocation. For example, the further opening of capital account could not only help Chinese households to diversify their wealth around the world but could also reduce the financing cost of domestic small and medium-sized enterprises.

However, we don't think that it is time now for the Chinese government to speed up capital account liberalization, and we suggest that China's capital account should continue to be opened in a gradual and cautious way. In the following paragraphs, we will explain why the above major arguments to support faster capital account liberalization might be wrong.

At present, the external environment is not appropriate for the Chinese government to accelerate capital account liberalization. After the burst of global financial crisis, all major developed economies have been implementing very loose monetary policies to stabilize financial markets and stimulate their domestic economies. As the result, there has been a persistent global excess liquidity, and the EMEs have been facing a new wave of short-term capital inflow. That's why some EMEs, which have already liberalized their capital accounts, are reintroducing some capital flow management tools again, and that's also why the IMF has changed its attitude toward capital control. With this background, if the capital account were liberalized overnight, China would undoubtedly face massive capital inflow and outflow, which would impair the macroeconomic and financial stability and even lead to financial crisis. Considering that the Chinese financial market is still immature, shallow and fragmented, if there is a financial crisis, the negative impact may be more devastating than other EMEs' experiences.

Numerous empirical studies show that, although it has some leaks, China's capital control has still been largely effective. Xiao and Kimball (2005) pointed out that China's capital control had been particularly useful in restricting actual cross-border capital flows and skewing capital flow structure toward FDI. Ma and McCauley (2007) found that there had been sustained and significant gaps between offshore and onshore RMB interest rates and persistent USD/RMB interest rate differentials, which showed that China's capital account control was still effective. Peng (2010) claimed that Chinese capital control was at least partially effective

based on two points: first, there had been a substantive and persistent A-H shares premium, which indicated stock market segregation; second, there had been a significant and persistent covered interest rate parity deviation, which suggested that cross-border arbitraging activities faced sizable cost. Otani et al. (2011) also found evidence in interest rate parity to indicate that the Chinese government could affect capital movements by exerting capital controls.

Some scholars argue that, because the Chinese government has already liberalized its current account, for some transactions which share the characteristics of both current account transactions and capital account transactions, it is difficult for the regulators to distinguish the correct type of specific transaction, thus leaving some loopholes for residents or non-residents to circumvent the capital control (Zhang, 2003). One example is the capital flow through the channel of transfer pricing in goods or service trade. Historically, however, the Chinese government could still find some ways to deal with the disguised capital flows. For example, China faced a huge short-term capital inflow in the first half of 2008. To prevent further capital inflow, three measures were adopted: First, a data exchange program was established with Chinese Customs, MOFCOM and SAFE to screen unwanted capital inflow through transfer pricing in international trade. Second, MOFCOM, SAFE and Chinese commercial banks founded another data exchange program to check whether the registered capital or foreign borrowing of foreign enterprises flows into domestic asset markets. Third, the government strengthened regulations on the underground banking system, which had facilitated cross-border money circulation. These three measures lead to remarkable progress: the short-term capital inflow declined significantly in June and July of 2008, even before the bankruptcy of Lehman Brothers.

Undoubtedly, faster capital account liberalization helps to promote RMB internationalization, and Table 2.1.2 summarizes the Chinese government's major efforts to push RMB internationalization through opening capital account. However, we don't think that RMB internationalization should become the top priority on the Chinese government's agenda at this time. Zhang and He (2012) find that the exchange rate arbitraging and interest rate arbitraging between Hong Kong's offshore RMB and the mainland's onshore RMB markets had played an important role not only in the fast development of RMB internationalization in 2010 and the first half of 2011, but also the stagnation of RMB

TABLE 2.1.2   *The capital account liberalization measures adopted to promote RMB internationalization*

Time	Event
June 2007	The issue of RMB denominating bond in HK (dim-sum bond)
February 2010	HKMA expanded the scope of RMB banking business and approved Mainland's non-financial corporate to issue RMB bonds in HK
July 2010	PBoC and HKMA signed a supplementary memorandum of cooperation in RMB cross-border trade pilot scheme, expanding the scope of RMB business and increasing the flexibility in RMB denominated financial services
August 2010	Pilot scheme launched for overseas eligible institutions to invest in Mainland's interbank bond market (central banks, clearing centers in HK and Macau, and banks which are participating in the cross-border RMB settlement scheme)
January 2011	Pilot RMB settlement of ODI launched. Eligible enterprises in China with approvals can use RMB for overseas direct investments such as setting up subsidiaries, buying out equity stakes (M&A) and conducting project investments
April 2011	First RMB IPO in HK
August 2011	R-QFII program launched, with initial quota of RMB 20 bn
October 2011	RMI FDI introduced by MOFCOM and PBC

Source: PBC, HKMA and MOFCOM.

internationalization in the second half of 2011 and 2012. The roots of the onshore-offshore arbitraging activities are the Chinese government's regulations on the RMB exchange and interest rates. In other words, before the RMB exchange and interest rates have been further liberalized, the RMB internationalization process would be driven mainly by arbitraging incentives, not by real demand. Moreover, RMB internationalization should become a natural result if the Chinese economy could continue to experience relatively fast and healthy growth in the next decade. However, if a serious financial crisis breaks out in China as the result of hasty capital account liberalization, Chinese economic growth might stagnate, and RMB internationalization might pause or even reverse.

The reform of a RMB exchange rate regime has achieved significant progress, and the process of the one-way appreciation of the exchange rate of RMB against USD might have already been completed. Table 2.1.3 shows the Chinese government's effort to reform the RMB exchange

TABLE 2.1.3   *The reform of RMB exchange rate regime*

Time	Event
July 2005	PBC announced the transfer of China's exchange rate regime from pegging to USD to a managing floating system, and the exchange rate determination would be based on market supply and demand, with reference to a currency basket
May 2007	The daily fluctuation band of RMB's exchange rate against major currencies was expanded from ±0.3% to ±0.5%
June 2010	PBC resumed the reform of RMB exchange rate regime, after two years' re-pegging to USD after the burst of US subprime crisis
April 2012	The daily fluctuation band of RMB's exchange rate against major currencies was expanded from ±0.5% to ±1%

Source: PBC.

rate mechanism since July 2005. From July 2005 to December 2012, the exchange rate of RMB against the USD appreciated over 35 percent, and RMB's real effective exchange rate also appreciated over 30 percent.[4] As the consequence of both RMB appreciation and the sluggish external demand, the ratio of China's current account to GDP decreased from over 10 percent in 2007 to less than 3 percent in 2011 and 2012, which shows that the current RMB exchange rate is much nearer to the equilibrium level compared with the RMB exchange rate of 5 years ago. Therefore, there is no need to speed up capital account liberalization only to alleviate RMB appreciation pressure. On the contrary, if the capital account is fully opened, there may be a tremendous capital outflow because of the diversifying investment of China households' wealth or because of sudden deterioration of expectations about China's economic growth prospects, which would exert great depreciation pressure against RMB's exchange rate.

China's economic reform has entered into a difficult stage. To sustain the economic growth in the future, the Chinese government has to change the growth model from investment and export driven into domestic demand driven. To achieve the transition of growth model, the Chinese government must push the domestic structural reforms such as the redistribution of national income across different sectors, the opening of service sectors to domestic private capital, and the liberalization of various commodity prices. However, each of the above structural reform would unavoidably be confronted with the opposition of vested interest groups. Because the resistance against capital account liberalization is

much smaller than the resistance against domestic structural reforms such as the liberalization of RMB exchange rate or interest rate, it is easier for the Chinese government to accelerate capital account liberalization at the current stage. However, we doubt that the liberalization of China's capital account could be used as a commitment device to help the Chinese government push forward domestic structural reforms such as the national income redistribution and the break of state monopoly. The only rosy scenario is that after the full liberalization of capital account, it would be much more difficult for the Chinese government to continue to regulate RMB exchange rate and interest rate, thus the liberalization of RMB exchange rate and interest rate might be accelerated. However, if a serious financial crisis breaks out as the result of capital account liberalization in the near future, the domestic structural reforms might be delayed for a long time or even forever.

The faster capital account liberalization doesn't necessarily lead to the faster development of Chinese financial market and more efficient resource allocation. Kose et al. (2006) argued that only in those economies in which some key thresholds have been reached – such as the level of development of domestic financial markets, the quality of institutions and the certain standard of corporate governance – the capital account liberalization could stimulate the economic growth. In other words, it is better to say that a well-functioning domestic financial market is the prerequisite, not the result, of full liberalization of capital account. Under some circumstances, capital account liberalization could improve the efficiency of resource allocation. However, if the international capital flow were very huge and volatile, the domestic economic and financial stability would face unnecessary external disturbances under a liberalized capital account. Finally, the burst of financial crisis would not only hurt economic growth but also impair the economy's ability to allocate resources efficiently.

To sum up, we don't think that the Chinese government should accelerate capital account liberalization now. The preferred liberalization process in the future should still be gradual, cautious and controllable. Among our major policy suggestions: First, the Chinese government should follow the appropriate sequencing to liberalize the capital account. Otani et al. (2011) point out that the liberalization of capital flows should be accompanied by the domestic financial market – which is based on interest rate and exchange rate liberalization – functioning well, and a deep and liquid secondary market for financial assets. Cappiello and Ferrucci (2008) argue that capital account liberalization

would only provide new arbitraging or excessive risk-taking opportunities for various financial institutions if the domestic financial liberalization has not been effectively implemented. Therefore, there are at least three preconditions for the full openness of Chinese capital account: the market-determined RMB exchange rate, the liberalization of interest rate, and the liberalization of domestic financial market. It should be noted that the Chinese government has achieved significant progress in RMB exchange rate reform and limited progress in RMB interest liberalization. However, the Chinese financial market is still dominated by state-owned financial institutions. We argue that, before the Chinese government fully liberalizes its capital account, the domestic financial market should be fully opened to domestic private financial institutions.

Second, as for the capital flow management tools, the Chinese government should adopt more price-based tools and cancel the quantitative controls gradually. Generally speaking, the distortion of quantitative measure tends to be much larger than price-based tools. The Chinese government should introduce those price-based tools that have proved effective in other EMEs, such as non-remunerate reserve requirement, withholding tax, stamp tax, and so forth. Moreover, sometimes the price-based capital control measures could be integrated with the macroprudential regulations, such as the tax on the foreign exchange liabilities of domestic financial institutions, which is beyond a certain threshold.

Third, during the gradual liberalization of capital account, the Chinese government should also fully utilize macroeconomic policies and macroprudential regulations to manage international capital flow (IMF, 2012). According to the impossible trilemma which states that a country could not achieve stable exchange rate, free capital flow and independent monetary policy at the same time to ensure the independence of Chinese monetary policy, the RMB exchange rate should be more flexible. In the past, the Chinese government relied heavily on sterilization to alleviate the appreciation pressure of RMB; however, the persistent sterilization would aggravate domestic financial repression and restrain the income growth of Chinese households (Zhang, 2012b). Therefore, the further liberalization of the RMB interest and exchange rates could offer the Chinese government more policy space to deal with international capital flows. For example, if China starts to face huge capital outflow, the Chinese government could raise the policy interest rate, let the RMB depreciate against the USD, or intervene on the foreign exchange market

by selling foreign exchange reserve. However, if the macroeconomic policies and macroprudential regulations are not enough to handle capital outflow, the Chinese government could still utilize capital control tools: first price-based measures, then quantitative measures.

Fourth, the Chinese government should actively participate in the multilateral co-operations to manage international capital flow. On the one hand, as a major capital recipient country, the Chinese government could persuade the source countries to take some measures to mitigate the negative externalities of their domestic monetary policies through the platform of G20 or IMF. On the other hand, the Chinese government should also coordinate with other EMEs to avoid the beggar-thy-neighbor result of the unilateral action to strengthen capital control.

5   Conclusion

As the result of the gradual integration into global financial market, China has been facing larger and more volatile international capital flows. The persistent twin surplus in balance of payments brought about rapid accumulation of foreign exchange reserve. In the past, the direct investment inflow had been the largest contributor to China's capital account surplus; however, portfolio investment and other investment flows became more important after the burst of global financial crisis. Considering the volatility of international capital flow, and the structural change of the Chinese economy, China may begin to face capital account deficit in the near future.

The Chinese government adopted a gradual and cautious strategy to liberalize its capital account, which had been reflected not only in the transition of regulating emphasis on capital inflow or outflow, but also in the liberalization sequencing for different types of capital flows. The direct investment has been liberalized first and fully, and the portfolio investment has been liberalized cautiously and partly. The Chinese government still exerts a strict control on financial derivatives, money market tools and short-term foreign debt.

There is a hot debate in China now about whether the Chinese government should speed up capital account liberalization. We argue against this idea. The major arguments include (1) The external environment is not friendly. (2) The current capital control is still effective. (3) RMB internationalization should not become the major task of the Chinese

government at the current stage. (4) It is not necessary for the Chinese government to alleviate RMB appreciation pressure by accelerating capital account liberalization. (5) Capital account liberalization will not necessarily push domestic structural reforms forward. (6) Capital account liberalization may hurt the development of domestic financial market and impair the efficiency of resource allocation.

The Chinese government should fully liberalize its capital account only after the liberalization of the RMB exchange rate, the interest rate, and domestic financial markets has been achieved. Price-based tools to reduce the relating distortions should replace the traditional quantitative capital management measures. The capital control should be used along with macroeconomic policies and macro prudential regulations. The Chinese government should take an active part in the multilateral cooperation to manage global capital flows.

Notes

1 Here the capital account denotes the capital account and the financial account in China's balance of payments.
2 The above data come from the author's calculations based on the original data from CEIC.
3 The above data come from CEIC.
4 The data come from the author's calculations based on the original data from CEIC.

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2.2

Appropriate Policy Tools to Manage Capital Flow Externalities

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Abstract: *Central banks are at the forefront of cyclical policymaking. They therefore become natural candidates to take over all cyclical policy objectives. This is often the case in policies for controlling capital inflows. Giving the duty of controlling capital flows to central banks, explicitly or implicitly, without giving them the appropriate policy tools, leads to inefficient outcomes. It is clear that when a central bank has to use its interest rate tool to satisfy multiple objectives, it will have to make sacrifices. More subtly, but perhaps more importantly, when central banks incur the cost of capital inflows, mostly in terms of taking the public blame, other policymakers often engage in policies that have the side effect of increasing these flows. It then becomes doubly important to give the capital flow management mandate to the policymaker who fosters the inflows, so their possible negative effects will be internalized.*

1   Introduction

Capital flows continue to be an important topic of policy discussion and academic research. A large part of the policy discussion and most of the recent academic research is about the monetary policy response to capital flows. I will argue that this poses an ill-formed question that effectively implies a particular answer and that asking the question in a monetary policy-centric way most likely leads to suboptimal policy advice.

A precursor question to appropriate policies for controlling capital flows is why capital flows need to be controlled. The literature offers several answers to this question, including the pain associated with sudden stops, boom-bust episodes associated with capital flows, non-internalized systemic currency risk created by borrowing in foreign currencies, and currency appreciations being followed by devaluations rather than depreciations. In this essay, I will remain agnostic about why capital flows need to be controlled or regulated, and assume that capital inflows that are too high by some metric are detrimental to social welfare. My concern is about the domestic policy game played by various policymaking bodies, each of which may have several policy objectives, loss functions, and relevance to capital flows, both in causing and regulating them.

It is easiest to think of a policy environment that is populated by a fiscal and monetary policymaker, although adding a separate bank regulator or other economic policymakers would not change the substance of the argument. There is little literature on monetary and fiscal policy coordination, but monetary policy questions dominate the optimal policy literature. Hence, the question of how best to regulate capital flows gets turned into how best to use monetary policy to regulate capital flows. The additional constraint imposed within the second question, that policy is to be carried out by the monetary policymaker, under most circumstances already answers the question and leads to a policy mix that is inferior to the one that would be realized had the first question been answered.

As I will argue below, without building a formal model, to the extent that monetary policy has any impact on currency flows, which it surely does, optimal monetary policy will include a response to currency flows, if currency flows are in the social welfare function. In fact, this is true for about anything in the social welfare function: monetary policy

affects output and inflation, and there is very little in a country that is not affected by these two; hence, anything that enters the social welfare function will turn out to elicit a monetary policy response, at least by changing the weights of the monetary policy response to output and inflation. Thus, monetary policy is affected by and responds to a plethora of concerns, over and above targeting inflation, which is the only viable long-run objective for monetary policy.

My argument is that the standard line of reasoning is fundamentally flawed. If the policy focus is limited to a single policy instrument, optimally that instrument will be set to satisfy all arguments of the social welfare function that it can affect and will respond to each, depending mostly on their weights in the social welfare function. This does not mean that that policy instrument should be used to address all of those concerns to some extent; it only means that if that is the only policy tool available, it will have to be used to address all welfare relevant variables.

If there are multiple policy instruments, each of these may be optimally utilized to address some of the variables that enter the social welfare function. In that case, it may not be optimal for monetary policy to respond to capital flows significantly, if at all. Capital flows may be better dealt with by bank regulation or fiscal policy – taxes on capital inflows. But this is not the only reason why the burden of all policy relevant issues should not be on the central bank.

Other than the fact that monetary policy may not be particularly effective in dealing with many kinds of economic issues, having the central bank responsible for dealing with everything creates two other problems. First of all, by pursuing multiple goals, the central bank has to sacrifice its primary goal of inflation stabilization. This is a large cost. More subtly, but as importantly, if it is the duty of the central bank to control capital flows (or meet other objectives), and the cost of not being able to do so, in terms of shame, criticism, or reappointment, is borne by the central bank, then other policymakers will have incentive to engage in behavior that disregards the consequences of their policies on capital flows. In particular, a fiscal policymaker who prefers more growth to less may engage in expansionary policies that, as a byproduct, increase capital inflows, and not care about these because dealing with capital flows is in the central bank's objective. This would lead to a suboptimally high increase in demand by the fiscal authority, which makes the job of the central bank even harder.

In the rest of this essay, I expand this argument.

2   The policy game and competing objectives

An extremely important paper by Leeper (1991) focuses on the interaction between monetary and fiscal policymakers. Leeper makes the observation that fiscal and monetary policymakers have different objectives. The monetary policymaker wants to control inflation, and hence limit monetizing the government debt, whereas the fiscal policymaker prefers to spend but not tax. These two are bound together by the government budget constraint, which has to hold over time. That is, in present value terms, spending either has to be funded by taxes or by monetary expansion.

If both policymakers insist on maximizing their objectives without regard for the behavior of the other, the budget constraint is violated, as spending will neither be funded by taxes nor by seigniorage. This, then, cannot be an equilibrium. If neither tries to maximize their objectives (follow activist policies) then the price level will be indeterminate, which again is not an equilibrium.[1]

This leaves two equilibria: one where monetary policy is dominant and fiscal policy takes monetary policy as given; another where fiscal policy is dominant and monetary policy works to satisfy the government budget constraint. Clearly, in the first case, inflation is low, and the fiscal policy is bounded by tax revenues, whereas in the second case, monetary policy has to create seigniorage revenue to fund the fiscal policy, which it takes as given.

One could imagine extending this framework in many dimensions, including a policy game between the central bank and the bank regulator. Here, I would like to apply this line of thought to capital flows. In particular, I would like to think of an open economy framework where there are fiscal and monetary policymakers as well as a bank regulator. It would suffice to consider the fiscal and monetary policymakers but adding the bank regulator as a separate entity helps make a fuller case.

I think of a central bank that prefers to control inflation, a bank regulator who is not troubled by foreign borrowing or credit expansion of banks, and a fiscal policymaker who prefers expansionary policies. I will abstract from the government solvency concern by assuming that the fiscal policymaker does not run intertemporally unsustainable policies but prefers to choose the most expansionary policies among the admissible (in satisfying the government budget constraint sense) in the absence of other concerns.

Standard open economy models tell us that capital inflows are stoked by fiscal expansion, due to both the borrowing requirement of the government and the higher activity and interest rates that entice foreign investors. Thus, high capital inflows are a byproduct of expansionary fiscal policy.

Before thinking about the consequences of the policy game this setting implies, a detour into optimal policy discussions is in order.

3   Optimal policy considerations

The modern literature on optimal monetary policy begins with the influential work of Rotemberg and Woodford (1997). They were the first to show that one can analyze optimal policy in a general equilibrium framework without assuming an ad hoc loss function for the policy-maker but rather by using the utility function of the representative agent as the welfare metric. Doing this is technically demanding and requires a second order approximation to the utility function.

This method is now standard in the literature and has been used to show that monetary policy in the standard models maximizes welfare by putting a high weight on inflation stabilization. The subsequent research used this methodology to study optimal monetary policy in a variety of settings. In some cases, the question was whether and to what extent to respond to exchange rates, in some others, the optimal monetary policy reaction to credit growth, and so forth.

In these studies, to the extent that a model variable affects utility over and above its impact on inflation and output, optimal monetary policy always responds to this variable. Otherwise, the additional variables change the reaction to inflation and output, rather than affecting optimal policy directly. But in either case, it is optimal for monetary policy to change when these variables change.

At this point, it is worth asking why the question is phrased as an optimal monetary policy question rather than an optimal policy question. The answer is not obvious. Cyclical economics research, until the crisis, has focused on monetary policy because this is the standard cyclical stabilization tool. Rotemberg and Woodford asked their question as an optimal monetary policy question and defined the literature in this way. It is likely that this is research "habit."

Political economy also clearly plays a role. Difficulties in political decision-making in many countries force independent central banks to

take on additional roles and to think about how best to fulfill these new mandates. A detailed discussion of the political economy aspect – of why central banks are becoming ever more central to all kinds of policymaking – is beyond the scope of this paper, but I will argue that the outcome of this has not been welfare-maximizing for the public.

Thus far, we have briefly covered both components of the central argument of this essay: when there are multiple policymaking bodies, economic policy also involves a game between these decision-makers with important welfare consequences, and when we phrase optimal policy questions as optimal monetary policy questions, it turns out that optimal monetary policy responds to everything that affects households' welfare.

It is possible to put these two ideas together in the context of optimal policies to manage capital flows.

4   Optimal policies to manage capital flows

The optimal policy to manage capital flows is almost always thought of as a monetary policy application. In practice, the more successful capital inflow deterrents have been non-monetary policy, in particular non-interest rate policies. The South Korean experiment is a good example of using non-monetary policy tools to stem capital inflows (Shin, 201x). The academic literature, however, focuses on monetary policy, and in many emerging economies (and certainly in Turkey), politicians are happy to give the responsibility of dealing with capital flows to the central bank, without regard to whether the central bank has the right tools for the duty. Very often, dealing with capital flows requires lowering interest rates to discourage large inflows, but low interest rates are also expansionary for the domestic economy and may not be the right policy choice, say, for an inflation-targeting central bank.

The fact that giving multiple objectives to a policymaker with a single policy tool will lead to a trade-off between various objectives is clear. I will dwell on this point briefly and then turn to the subtler but equally important issue of distorting incentives for other policymakers by making the central bank suffer for the increased capital inflows, which are often driven by other policies in the country.

Basic control theory tells us that one control variable cannot exactly satisfy two objectives, unless those objectives happen to overlap. For

example, in the simplest Dynamic New Keynesian models, closing the output gap and achieving price stability turn out to be the same objective (the divine coincidence), and therefore optimal monetary policy produces both zero inflation and output at its potential level. This, however, only happens in the simplest of models. The normal outcome involves a trade-off between competing objectives.

Monetary policy – the setting of short-term interest rates – does have an effect on capital flows. That effect, however, works in two different, offsetting ways. Lower interest rates discourage capital flows, as returns to portfolio investment are reduced. On the other hand, lower interest rates induce higher demand and higher output, creating a cyclical upswing and encouraging foreign capital flows. Further, if lower short-term interest rates are seen as too expansionary, inflation expectations and inflation risk pricing may go up sufficiently to make long-term interest rates go up, which may again encourage capital inflows.

Assuming that the net effect of lower interest rates on capital inflows is negative and non-negligible, as is often assumed in policy debates, monetary policy may be used to control inflows. Then the problem will be to use interest rates to simultaneously bring inflation to target (assuming that is the main monetary policy goal) and to stem capital inflows. In good times, capital will be flowing in, demand will be high, and there will be inflationary pressures. Lowering the policy rate will deter capital inflows but will also further stimulate demand and increase inflation, rather than controlling it. One the other hand, increasing the policy rate will lower demand and inflation but will also encourage higher capital inflows.

Such trade-offs are standard in economics, and the optimal control solution provides an interior solution, giving some weight to all concerns, depending on how different variables (inflation, output, and capital flows, for example) enter the welfare function, and how the control variable affects these. But to the extent that the control variable has any influence on a variable entering the welfare criterion, the optimal policy response will put at least some weight on it. Hence, optimal policy in this case will sacrifice some inflation – by lowering or not sufficiently increasing the policy rate – to discourage capital inflows. This is the standard channel through which giving an additional duty to the central bank deters it from fulfilling its primary objective of controlling inflation. This is usually why optimal policy (not just optimal monetary policy) entails using a tax – the fiscal tool – to address the capital flow externality,

leaving monetary policy free to pursue stable prices. It is not surprising that two policy tools – interest rates and a tax – produce a better outcome than interest rates alone. Constraining policy only to interest rates naturally delivers a lower welfare due to the policy trade-off.

There is, however, a second and perhaps more important channel through which additional duties given to central banks are welfare reducing. The usual argument, presented above, treats the behavior of other policymakers, if any, as exogenous to monetary policy. This is often not the case. In particular, behavior of policymakers depends on who takes the blame for bad outcomes. This is where the policy games described above become relevant.

Think of a country with two policymakers: a fiscal authority and a central banker. (The idea extends naturally to more realistic settings where there are separate bank regulators, a ministry of trade, as well as a ministry of finance, etc.) Fiscal expansions lead naturally to higher capital flows both because in many cases governments borrow from abroad directly but also because market interest rates increase due to crowding-out mechanisms, which attract capital inflows. Fiscal expansions fuel demand and also tend to increase inflation.

On the inflation front, the central bank takes the blame because it is the monetary authority's duty to control inflation. Although the fiscal policymaker creates the inflationary impetus, the central bank has to make sure inflation does not increase, which it is able to do with the policy tool available to it. But observe that if the fiscal policymaker internalized the "cost" of higher inflation, there would be less fiscal expansion to begin with. In a situation where an activist central bank is able to undo the inflationary impact of fiscal policy, this does not create a major problem. But when capital flows are also included in the policy considerations, this desirable (in terms of level of GDP, not its composition, which now has higher government spending and lower investment) outcome is no longer attainable.

The issue here is the assumed externality that arises from capital inflows and who bears that cost. It is easy to translate the capital flow externality into a non-pecuniary cost that is borne by a policymaker. In effect, she is criticized for capital flows and suffers a utility cost due to this. This is a reasonable shortcut way of thinking about policy consequences of capital flows. If capital flows only mattered because they affect output and inflation, policy responding to these variables would be sufficient, and there would be no scope for capital flows-specific

policies. An externality makes capital flows important in its own right and captures the need for policies to cope with capital flows. In a model, a policymaker would act to stem capital flows either because she is trying to maximize welfare, which depends on capital flows, or because she is mandated to do so and not successfully fulfilling the mandate will lead to a utility loss. In this chapter, I think of policymakers as agents with preferences and mandates rather than benevolent welfare maximizers. Hence, the utility cost of capital flows device works nicely. The question is who bears this cost.

This is a key question, as it determines incentives in creating as well as limiting capital flows. This is where the Leeper (1991) framework is helpful in providing a framework to assess the effects of different policymakers bearing the cost of capital flows. One can imagine an equilibrium where the fiscal policymaker bears the cost, as well as one where the monetary policymaker incurs the cost of capital flows.

When the fiscal policymaker bears the cost of capital inflows, she will internalize the capital flow effects of expansionary policies, and hence will stimulate demand less (even if the fiscal policymaker is unable to use the optimal policy tool of imposing a tax on capital flows). The central bank is then free to pursue its inflation-targeting goal, which does not lead to overly expansionary policies and associated capital inflows anyway.

When the monetary policymaker is the one who incurs the cost of capital inflows, as would be the case when controlling capital flows is de facto the central bank's job, fiscal policy will no longer internalize the capital flow costs of expansionary policies, and hence will be too expansionary. In this case, the equilibrium will entail a larger fiscal expansion, more capital inflows, and the central bank that less effectively controls both capital inflows and inflation. Hence, the country will end up having higher capital flows and higher inflation. Notice that this is a different argument from the central bank facing a trade-off between inflation and capital inflow stabilization (that concern is still present); here, the argument is that the size of capital inflows also depends on the behavior of the fiscal policymaker, and that when not given the proper incentive, she will pursue policies leading to increased capital inflows, making the job of the central bank even more difficult.

In the recent past, Turkey experienced a massive increase in government spending, followed by greater demand, and accompanying current account deficits and very large short term capital inflows. Although not

in its legal mandate, the central bank de facto had the duty of controlling the current account deficit and capital inflows, which, not surprisingly, it was unable to do with its interest rate tool. Although the central bank came up with a variety of creative policies, none of these successfully undid the expansionary effects of fiscal policy and limiting capital inflows (but the capital inflows concern led to lower interest rates and higher inflation). This led the government to criticize the central bank for failing to sufficiently lower interest rates and stem capital inflows. Hence, the government on the one hand implemented the policies that led to the capital inflows, and on the other hand, criticized the central bank for these inflows. Clearly, had the government thought that they would be the ones taking the blame and facing the criticism for the short-term capital inflows, they would have been more hesitant to engage in the fiscal expansion.

Similar concerns arise for a variety of policy objectives such as bank credit growth, exchange rate appreciation, and so forth. In most cases, there is a natural policymaker who should have the mandate to choose policies, but if such policies are not forthcoming, central banks step in to fill the policy void. But this distorts the incentives of other policymakers. This is most apparent for capital flows in emerging market economies. Thus, it is important for central banks to resist the temptation to be the policymaker of last resort.

5   Conclusions

Central banks are at the forefront of cyclical policymaking. They therefore become natural candidates to take over all cyclical policy objectives. This is often the case in policies for controlling capital inflows. Giving the duty of controlling capital flows to central banks, explicitly or implicitly, without giving them the appropriate policy tools, leads to inefficient outcomes. It is clear that when a central bank has to use its interest rate tool to satisfy multiple objectives, it will have to make sacrifices. More subtly, but perhaps more importantly, when central banks incur the cost of capital inflows, mostly in terms of taking the public blame, other poli-cymakers often engage in policies that have the side effect of increasing these flows. It then becomes doubly important to give the capital flow management mandate to the policymaker who fosters the inflows so that their possible negative effects will be internalized.

The theory of externalities and optimal taxation is very clear in taxing the externality and making the party creating the externality internalize it as optimal policy. This advice is often ignored when dealing with macroeconomics, but it is no less valid here. If capital flows are deemed hazardous at large quantities, they should be taxed. Central banks cannot impose taxes, and thus they have to resort to second-best policies that detract from their primary duties as well. Further, capital flows are often caused by expansionary policies in the recipient county, and fiscal authorities undertake such policies. In this case, giving the capital flow management duty to fiscal authorities would make them internalize the negative side effects and lead to more restrained capital flows to begin with. Hence, it is very rarely the best allocation of duties when central banks shoulder capital flow management mandates.

Note

1   This is a subtler argument that relies on the technical fact that expectations of inflation and the price level will be determinate either if the central bank reacts strongly to inflation, hence high inflation expectations cannot be rational, or if fiscal policy is lax enough that debt will have to be monetized, hence low inflation expectations cannot be rational. If neither condition holds inflation expectations and the price level will be indeterminate in models with rational agents.

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2.3
Navigating Capital Flows in Brazil and Chile

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Abstract: *In the wake of the global financial crises, Brazil and Chile each attempted to mitigate the negative impacts of a surge in capital inflows into their economies. Brazil deployed a range of capital account regulations, Chile intervened in currency markets. In this chapter, we examine the effectiveness and impacts of these measures.*

1   Introduction

The regulation of cross-border capital flows was the norm during the Bretton Woods era. Beginning in the 1970s, however, many developed countries significantly liberalized their capital markets and began encouraging their developing country counterparts to follow suit. The move to capital market liberalization has theoretical justification, but did not hold up to the empirical evidence, at least in the case of the liberalization of short-term capital flows in emerging market and developing countries. Indeed, the role that unstable capital flows played in the East Asian financial crisis in the late 1990s led many economists and policymakers to question the merits of capital account liberalization in developing countries. Leading up to the global financial crisis, attention had thus shifted to identifying the "threshold" level of income and institutional development whereby capital market liberalization could become associated with growth and financial stability in developing countries.

The global financial crisis has elevated this debate once again. Many economists have pointed out that how unstable cross-border capital flows were at the root of the crisis – with the United States borrowing \$5 trillion from foreigners between 2001 and 2008, and one-third of the nation's housing debt and two-thirds of government debt by 2008 owed to foreigners (Chinn and Frieden, 2011). What is more, a landmark International Monetary Fund (IMF) position paper found that those emerging market and developing nations that deployed capital controls (this term will be used interchangeably with "capital account regulations" and "capital flow measures" throughout this chapter) were among the least hard hit during the crisis, leading the IMF to proclaim that capital account regulations are a legitimate part of the macroeconomic policy toolkit (Ostry et al., 2010).

In the wake of the financial crisis, low interest rates and slow growth in the industrialized countries has triggered mass inflows to emerging market and developing countries where interest rates and growth have been relatively higher. However, when global capital markets have felt chilled, such as with the emergence of the Eurozone crisis, there have been sudden stops of capital flows to developing countries and capital flight to "safety" in industrialized country (chiefly US) markets. The IMF and others have expressed concern that such capital flow volatility is making it difficult for emerging market exchange rates, asset markets and beyond (IMF, 2011a).

Numerous countries have responded to this volatility either by deploying capital controls or by intervening in foreign exchange markets. In this comparative study, we examine the financial interventions of two EMEs – Brazil and Chile – and the relative effectiveness of their respective policies. In late 2009, Brazil imposed a foreign exchange transactions (IOF) tax on foreign purchases of equities and bonds (i.e., a tax on capital inflows). On the other hand, beginning in January 2011, the Chilean central bank pursued foreign exchange market intervention through daily dollar purchases. Both countries implemented such measures in response to steep appreciation in their exchange rates and heavy capital inflows that resulted in the aftermath of the 2008 global financial crisis. Hence, our timeframe of analysis is the post-crisis period, beginning in early 2009, during which EMEs recovered substantially and even experienced booms in their exchange

TABLE 2.3.1 *Summary of measures to manage capital flows in Brazil and Chile*

Country	Total Inflows	Composition	Asset Prices	Exchange Rate	Monetary Autonomy
Brazil	Increased total inflows	Long-run impact: Decreased short-term, increased long-term flows. Short-run: announcements were in reverse (increased short-term, decreased long)	No long-run impacts. Short-run: Announcements reduced asset prices but the cumulative effect was offset by ADR announcement	Long-run impact: decreased level and volatility of Real. Short-run impact: decreased level and volatility only in first announcement	Increased monetary autonomy
Chile	No effect	No effect	No long-run impact. Short-run: Made domestic stock market more independent from the regional index. Temporary spillover effects for IOF in Brazil	No long-run impact. Short-run: Decreased level of peso after the announcement. Temporary IOF spillover effects	No effect

rate and asset price markets. The analysis ends in late 2011, when capital flows to developing nations suddenly stopped due to the accentuation of the Eurozone crisis.

We investigate several macroeconomic outcomes in order to quantify the overall efficacy of these measures. We test the impact on three main variables: each country's equity market indices, the level and volatility of exchange rates, and the volume and composition of net capital inflows. Our findings are summarized in Table 2.3.1. In Brazil, we find that the introduction of capital controls was associated with an increase in total inflows, but the composition was shifted from short- to longer-term inflows. We also find that Brazil's measures had a lasting impact on the level and volatility of the exchange rate. In terms of asset prices, only announcements of controls were effective, and they were offset by regulations on the ADR market that send investors back to Brazil. We also find that Brazil's measures modestly increased its ability to pursue an independent monetary policy. Chile's currency interventions were less successful. The announcement of currency intervention reduced the level of the exchange rate, but not the volatility, and made the domestic stock market more independent from the region as a whole. Chile's interventions had no statistically significant impact on total inflows of capital, the composition of inflows, or the ability of Chile to pursue an independent monetary policy.

This chapter is divided into six parts. Section 2 very briefly reviews some of the literature on the theory and evidence pertaining to capital market liberalization and the use of capital account regulations in general. Section 3 presents the experiences of Brazil and Chile with respect to capital flows in the period of study and discusses the use of data in the study as a whole. Section 4 outlines our modeling approach and methodology, while section 5 presents the results of our analysis. A final section summarizes our conclusions and suggests further work for research and policy.

2   Literature review

The pendulum has swung back and forth, and now back again, in regard to the benefits of capital market liberalization. In the wake of the Great Depression and World War II, the architects of the Bretton Woods system were adamant that current transactions should be freely transferable,

but that capital account transactions should not. Beginning in the late 1970s and 1980s, that consensus began to change, and capital market liberalization became a norm in theory and a policy goal in practice. The pendulum swung yet again in the aftermath of the East Asian financial crisis. Since then, a large body of theory and evidence has arisen that justifies the regulation of cross-border finance.

Theoretical applications in the 1970s and 1980s point out that cross-border capital account liberalization would reap benefits because then capital would flow to areas that had a higher return investment (i.e., EME and other countries in need of capital), and make markets more stable by incentivizing international risk sharing and diversification. It was further posited that capital market liberalization would enhance financial market development, and thus spur economic growth (Henry, 2007).

The empirical evidence, however, is more mixed. Numerous influential studies have concluded that – prior to the global financial crisis –capital market liberalization was associated with economic growth in industrialized countries, but associated with a lack of growth and an increase in financial instability in developing countries (Stiglitz, et al., 2006). Recent studies have shown that the benefit of growth can only arise in economies that have reached a certain institutional threshold (Kose, Prasad, and Taylor 2009, Prasad et al. 2003). Henry (2007) provides a survey of the theory and evidence regarding capital market liberalization and growth, and the two main conclusions are that institutional development is a key ingredient to reaping the benefits of capital openness, and empirical studies can be improved by employing a policy experiment approach. Such an approach is utilized in this study to measure the impact of a policy before and after its onset.

Other studies have emphasized specific costs associated with capital openness, such as exchange rate appreciation, negative externalities such as over-borrowing, increased vulnerability to capital flight and crises. Hence, another subclass of this literature centers on the analysis of the cost of short-term capital flows – an important source of volatility, excessive risk-taking, and economic vulnerability. Short-term flows can be distortions to the competitive equilibrium since they are influenced heavily by private investor activity (e.g., in the form of noise trading, speculation bubbles, etc.).

Theories examining the costs of capital market openness relate to the incidence of crises, sudden stops, and capital flight. A vast literature has

emerged to define the relationship between capital market openness and bank and currency crises. The foundation of the recent literature has stemmed from the Mundell-Fleming model, an open economy framework addressing the effects on foreign exchange markets, monetary policy, and fiscal policy. A notable conclusion of this model influencing theory and policy is the so-called trilemma: perfect capital mobility, a fixed exchange rate regime, and independent monetary policy cannot all coexist; countries can maintain at most two of the three. The trilemma is one explanation for the eruption of currency crises in EMEs and the subsequent use of capital controls.

Stiglitz et al. (2006) outline adverse consequences of capital market liberalization, with a focus on developing countries. First, open capital markets can create negative externalities, in the form of currency appreciations, depreciations, or reductions in credit supply. Externalities arise because individual investors do not internalize the social impact of their borrowing and lending behavior. Second, open capital markets allow for coordination failures to more readily occur, due to heightened rollover risk, which can lead to capital flight. Third, loss of monetary discretion may happen, particularly because interest rate fluctuations can cause large inflows or outflows. Fourth, imperfect information among investors results in herd behavior that propagates panics. Fifth, currency and maturity mismatches due to incomplete markets are prevalent and only heighten exchange rate and interest rate risk. Finally, incomplete equity markets and informational asymmetries make it difficult for countries to issue new equity in order to raise capital, thereby resorting more to self-financing so that the gains from globalization are not had. All in all, the consequences of open capital markets are costly, and raise the need for market interventions such as capital controls, which, according to Stiglitz et al. (2006), are the most effective policy instruments.

Theoretical studies have specifically modeled these costs in order to derive the optimal policy. In particular, studies by Aizenman (2010), Jeanne and Korinek (2010), and Korinek (2011) have modeled capital flows as sources of negative externalities, showing how they create a wedge between private and social marginal benefits. These models then advocate capital controls as the optimal policy that corrects the wedge and restores efficiency.

Empirical studies on the effectiveness of capital flow management are usually country-specific and target specific capital control policies. The results then range across countries and across types of controls. However, Magud, Reinhart, and Rogoff (2011) offer a comprehensive assessment of the existing literature. Their review first acknowledges the lack of a unified theoretical framework, no common empirical methodology, and the heterogeneity of empirical findings across studies. They then address these drawbacks by synthesizing the literature to date through a metric that ranks study by the rigor of analysis.

The authors argue that capital controls are imposed by EMEs to combat fear of appreciation, fear of hot-money (short-term) flows, fear of large inflows, and fear of loss of monetary autonomy. Two additional fears, also addressed in our chapter, are the fear of asset price bubbles and the fear of capital flight (Ocampo and Palma 2008; Grabel 2003; Epstein 2003). Ostry et al. (2010) find that those nations that deployed capital controls in the run up to the global financial crisis were among the least hard-hit during the crisis. Magud, Reinhart, and Rogoff (2011) find that controls on inflows increased monetary policy independence, altered the composition of capital flows, and reduced exchange rate volatility; controls did not reduce the volume of net flows in most studies. Nevertheless, the effects, though statistically significant, are temporary and small in magnitude. Finally, their review presents a theory to justify the impact on flow composition. Using a portfolio balance approach, their model shows how capital flow restrictions can raise the share of short-term investments. This outcome will be tested in our study.

3   Background and data

Brazil and Chile each intervened in the market to address the fears and concerns that were outlined in the last section. Brazil deployed capital account regulations; Chile intervened in its currency markets. Figure 2.3.1 depicts the rise in the Brazilian exchange rate, which appreciated over 40 percent between 2009 and 2011 before dropping during the worst of the Eurozone crisis in September of 2011. Figure 2.3.2 exhibits Brazil's potential stock market bubble that followed a similar trajectory during the same period. Figure 2.3.3 shows the corresponding rise in capital flows.

FIGURE 2.3.1   *BRL*

FIGURE 2.3.2   *Bovespa*
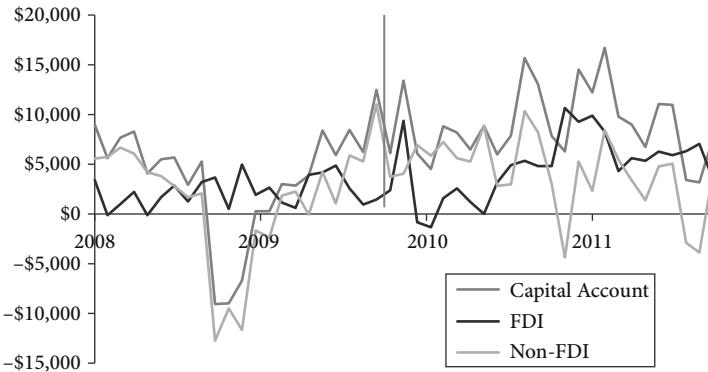
FIGURE 2.3.3   *Brazil net inflows*

In our regressions for Brazil, all data for the asset price and exchange rate regressions are daily frequency and are obtained from Bloomberg. For the Brazil regressions, our time period spans 5 January 2009 to 13 December 2011. For this time period, Figures 2.3.1 and 2.3.2, respectively, display the course of the Bovespa, Brazil's national stock exchange, and of the Brazilian nominal exchange rate (Real) in terms of US dollars. The vertical line in each figure gives the date at which the IOF tax was first announced on October 19, 2009. The first announcement was followed by a string of tax hikes and modifications, as well as other types of capital flow management. As can be seen, the first announcement proceeded a period of steep appreciation in both asset prices and the exchange rate.

The dates of the announcements of controls were specified from news articles and previous studies. Our event dates of interest are shown in Table B below. The dates are important since they help determine the time frame of analysis.

The frequency of data on capital and current account flows is monthly and is available on the Central Bank of Brazil website. Additional variables in the capital flow regressions are taken from Bloomberg. These regressions cover November 2008 to November 2011. We begin our time frame at the end of 2008 in order to avoid the structural break caused by the 2008 financial crisis. Figure 2.3.3 below depicts this structural break in the capital flow data, in which substantial capital outflows resulted in the second half of 2008, but reversed their direction by the end of the year, resulting in positive net inflows by the start of 2009. Here, we define the capital account as the sum of the capital account and financial account, as given by the central bank data website. The financial account is composed of direct investment, portfolio investment, derivatives, and other investments, while the capital account is much smaller. Another feature to note is the relative volatility of FDI and non-FDI net inflows, as the latter includes more volatile, short-term investment and governs the overall trend in the capital account.

After a significant domestic debate regarding which measure to use in order to stem exchange rate appreciation and to prevent an asset bubble, Chile chose to conduct daily dollar purchases. For Chile, our time period spans slightly longer, from 5 January 2009 to 30 March 2012, in order to include a period after which the intervention ended. Even though Chilean interventions did not commence until the end of 2010, we use the early start date to incorporate spillover effects of the IOF in our

TABLE 2.3.2   *Capital account regulations in Brazil, 2009–2012*

Announcement Date	Effective Date	Event
19 October 2009	20 October 2009	IOF tax of 2% on equities and bonds
19 November 2009	19 November 2009	ADR tax of 1.5%
4 October 2010	5 October 2010	IOF tax increases to 4% on bonds and equity funds
18 October 2010	19 October 2010	IOF tax increases to 6% on bonds and derivatives
15 December 2010	4 January 2011	Tax reductions for longer maturity bonds and private equity
6 January 2011	4 April 2011	Reserve requirement of 60% for USD positions
29 March 2011	29 March 2011	IOF tax increased to 6% on bonds with maturities up to 1 year
6 April 2011	7 April 2011	IOF tax modified to cover maturities up to 2 years
27 July 2011	27 July 2011	Tax of 1% to 25% on FOREX derivatives
1 December 2011	2 December 2011	Removal of 2% IOF tax on equities and certain debentures
1 March 2012	1 March 2012	IOF tax on bonds extended to cover maturities up to 3 years
12 March 2012	12 March 2012	IOF tax on bonds extended to cover maturities up to 5 years

analysis. For this time period, Figures 3 and 4, respectively, display the course of Chile's national Santiago Stock Exchange, and of the Chilean nominal exchange rate (peso) in terms of US dollars. The vertical lines denote the announcement and the termination of the Chilean currency market intervention. Again, as in Brazil, we see that the intervention took place after a period of appreciation in both the asset price and exchange rate markets.

Chile pursued a different policy of currency market intervention. As seen in the table below, the Chilean Central Bank conducted daily purchases of $50 million US dollars, which lasted almost one year. A month prior to the intervention, the central bank also raised the limit on foreign investment in pension funds to 80 percent from 60 percent. The last increase occurred in October 2008. The dates and policies are given below in Table C.
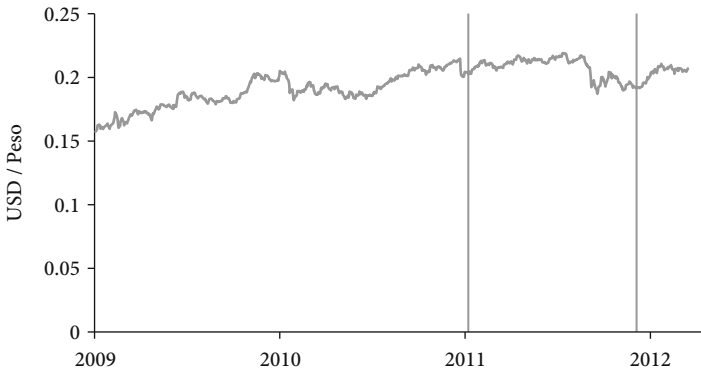
FIGURE 2.3.4   *Chilean peso*

FIGURE 2.3.5   *Santiago stock exchange*

To our knowledge, three studies have investigated the impact of the Brazilian IOF tax. Forbes et al. (2011) examines the IOF tax in Brazil, but tests only the impact on portfolio flows, using the Emerging Portfolio Fund Research database. Their novel dataset gives fund-level investments by country, but only accounts for 5 percent to 20 percent of total country market capitalization. They find evidence that controls reduce investor portfolio allocations to Brazil. They also find that spillovers occur due to Brazil's actions. Levy-Yeyati and Kiguel (2009) quantify the effectiveness of the IOF tax on the Brazilian exchange rate by running regression analyses that are similar to our own. The study, however, tests only the impact of the announcement of the tax, and not subsequent

TABLE 2.3.3   *Currency market intervention in Chile, 2010–2011*

Announcement Date	Effective Date	Event
4 November 2010	2 December 2010	Increase in foreign investment limits on pension funds to 80% from 60%
3 January 2011	5 January 2011	Intervention program at a rate of $50 million USD a day
8 February 2011	9 February 2011	Continuation of daily USD purchases
8 March 2011	9 March 2011	Continuation of daily USD purchases
8 April 2011	11 April 2011	Continuation of daily USD purchases
7 October 2011	8 October 2011	Continuation of daily USD purchases
8 November 2011	9 November 2011	Continuation of daily USD purchases
9 December 2011	16 December 2011	Termination of currency intervention program

changes. Finally, the IMF (2011b) tests for spillover impacts of Brazil's capital controls.

As the next sections show, we build on these studies by incorporating additional policy and modifications to the IOF tax through the end of 2011. We also examine a broader range of macroeconomic variables (e.g., equity prices, exchange rates, and disaggregated net inflows).

4   Methodology

In this study, we examine the extent to which the interventions by Brazil and Chile had an independent impact on exchange rate levels and volatility, asset appreciation, as well as the scale, composition, and spillover impacts of capital inflows. The model specification for each is discussed in this section.

4.1   Exchange rates

We assess the impact of the capital controls on changes in the Brazilian and Chilean nominal exchange rates by running a GARCH (General Autoregressive Conditional Heteroskedasticity) (1,1) regression. A GARCH (1,1) model with one lag in the error term and one lag in the variance term, allows us not only to study the impact on the level of the exchange rate, but also its volatility. Before running this regression, we must first test for heteroskedasticity, or ARCH effects, using Engle's

Lagrange-multiplier (LM) test. Here we fit the model by OLS to test the null hypothesis of no ARCH effects. The LM test gives p-values well below 0.05; hence, we can reject the null of no heteroskedasticity.

The model testing the impact on the level and volatility of exchange rates is given below. The first equation gives the level regression, while the second gives the variance regression. For the Chilean peso regression, we do not include the lagged variance term in the second regression.

$$\Delta BRL_t = \beta_0 + \sum \beta_n Announce_{nt} + \beta_8 \Delta Controls_t +$$
$$\beta_9 \Delta Controls_t * \Delta Interest\ Rate_t + \beta_{10} \Delta Interest\ Rate_t +$$
$$Other\ CoVariates + \varepsilon_t \tag{1}$$

$$\sigma_t^2 = \eta_0 + \eta_1 \varepsilon_{t-1} + \eta_2 \sigma_{t-1}^2 + \eta_3 \Delta Controls_t + \eta_4 \Delta Controls_t *$$
$$\Delta Interest\ Rate_t + \eta_5 \Delta Interest\ Rate_t + Other\ CoVariates + \varepsilon_t \tag{2}$$

With $\varepsilon_t \sim N(0, \sigma_t^2)$

Our variables of interest here are the dummy for the day of the first announcement, the dummy for the entire period for which the controls were in place, and the interaction variable – the dummy for the entire period times the change in the domestic interest rate. The coefficients on the dummies are the abnormal returns after controlling for the other covariates. Description and calculation of abnormal returns and cumulative abnormal returns are given in the next section. The interaction term measures the extent to which controls improved monetary autonomy: controls are successful in improving autonomy if changes in the domestic interest rate have smaller or negative effects on the exchange rate. The covariates are the regression are the change in the foreign interest rate (LIBOR) as well as log changes in the dollar exchange index (DXY), commodity price index (GSCI), and the JP Morgan Global Spread (EMBI).

4.2 Asset prices

In order to assess the effectiveness of the controls on curbing asset price appreciation, we conduct an event study on the Brazilian national stock exchange (Bovespa) and the Chilean national stock exchange (Santiago). Controlling for changes in the regional stock market, proxied by the MSCI EM Latin America index, we compute the marginal and cumulative abnormal returns of capital control announcements. Abnormal returns capture whether the controls caused a significant reaction in the stock market, controlling for changes in the overall

market. Hence they effectively measure the difference between the actual and expected return of the local stock market. We obtain cumulative abnormal returns by aggregating the marginal abnormal returns of each announcement, which are given by the coefficients of the event dummy variables.[1] Cumulative returns provide a better measure for the overall effect of the tax.

Similar to an event study, we run regression of the log change in the Bovespa on dummies for the announcement of the IOF tax and for subsequent policy modifications and on a dummy for the period during which the equity tax was in place. The model regression, along with the definition of abnormal returns, is shown below.

$$\Delta Stock_t = \beta_0 + \beta_1 \Delta Market_t + \sum \beta_n Announce_t + \beta_9 Controls_t + \beta_{10} Controls_t * \Delta Market_t + \varepsilon_t \quad (3)$$

$$\Delta Abnormal\ Ret_t = \Delta Stock_t - \Delta Expected\ Ret_t$$

Announcement dummies are specified for the day after the announcement if announced after trading hours. Along with the dummy variables, we include an interaction variable – the regional market index times the overall control dummy – to capture the effect on local equity market independence.

4.3   Scale, composition, and spillover effects of capital flows

Analysis of the impact on the capital account was fourfold. First, we conduct a cross-sectional regression of the Brazilian net capital inflows on capital control event dummies, interest rate differentials, and other covariates. Second, we study the impact on the composition of capital flows by studying the following capital flow outcomes: FDI less non-FDI flows and short-term versus long-term flows. Third, we run a panel regression of several Latin American economies in order to better explain the deviation of Brazilian net inflows from the regional trend in response to capital controls. Finally, we test for spillover effects by studying the impact on Chilean flows in response to the Brazilian capital controls. Here, we run a cross-sectional regression of Chilean flows. All flows are given as a percentage of GDP.

The model of the panel regressions is given by the general equation below. We use a two-month dummy for the announcement of the introduction of the IOF tax in order to obtain a better measure of the effect as well as more reliable standard errors. We use a multi-month dummy

specified for all announcements (to measure a cumulative effect of all announcements) and another multi-month dummy specified for the entire period the tax is in place (to measure the overall effect of the IOF implementation period). We also include time (month-specific) effects to capture the overall trend of flows as well as any unobservable effects altering the level of flows. Additional country-specific covariates include the current account, as a percentage of the country's GDP, and the interbank domestic-US interest rate differential.

$$NetInflow_{it} = \beta_o + \beta_1 Cur\,Acc_{it} + \beta_2 C_i + \beta_3 Q_t + \beta_4 Announce_{it} + \\ \beta_5 All\,Announce\,Dummy_{it} + \beta_5 Controls_{it} + \varepsilon_t \qquad (4)$$

The cross-sectional regressions are similar and include more covariates. However, a substantial drawback is the low number of observations as well as the presence of endogeneity of the regressors. We address endogeneity by running IV regressions, using the lagged dependent variable as the instrument. We again use two-month dummies for each announcement in order to obtain valid standard errors, as well as dummy for the entire period when they are in place and a dummy for all announcements. Covariates are a lagged dependent variable, the current account, VIX volatility index, EMBI global spread, a Bloomberg carry trade index, the FX premium, and interbank interest rates. The carry trade index measures the US short rate and the Brazilian long interest rate differential; thus, a positive coefficient is expected since a higher index should attract flows into Brazil. The model equation is given below.

$$NetInflow_t = \beta_o + \beta_1 Cur\,Acc_t + \sum_j \beta_j Announce_{jt} + \beta_7 All\,Announce \\ Dummy_t + \beta_8 Controls_t + \sum_j \beta_j CoVariates_{jt} + \varepsilon_t \qquad (5)$$

We conduct analyses for total flows and disaggregated flows by decomposing net capital inflows into short-term and long-term measures. The short-term, long-term decomposition is similar to the FDI, non-FDI decomposition; non-FDI is composed largely of short-term investment while FDI can be regarded as long-term investments. We improve the FDI, non-FDI measure by stripping out long-term investment from portfolio investment and other investments. Long-term investment is thus measured by the sum of these long-term investments and FDI. Short-term investment is defined as short-term portfolio plus other investment (trade credits, currency and deposits, loans) plus derivatives.

5   Results and analysis

Consistent with the literature reviewed above, we find that Brazil's capital account regulations had a small but significant impact on exchange rate levels and volatility, asset appreciation, on monetary policy independence, and on the scale, composition, and spillover effects of capital flows. In each of the other cases, the impacts of the controls were temporary "speed bumps" that allowed Brazil to lean against the wind but were far from enough to change the course of the monetary "tsunami" that afflicted Brazil during the period. Chile's interventions were less successful.

5.1   Exchange rates

In Table 1, both the mean and variance regressions of the Brazilian exchange rate are displayed. The first 8 variables listed are dummies of the day of each regulation announcement. The ninth variable, controls dummy, is a dummy for the entire period for which the controls were in place. As given by the coefficients of the daily announcement dummies, in the mean regression, all announcements of controls have significant returns, with the largest return of –1.9 percent coming from the first announcement of the IOF. The cumulative returns of the announcements, however, amount to only –0.3 percent. The control dummy for the entire period is also significant and negative, yet at a very small magnitude of –0.1 percent. The control dummy also has a significant effect on exchange rate volatility, with a coefficient of –0.77: a negative coefficient implies that the controls decreased exchange rate volatility. All covariates – interest rate differential, DXY, GSCI, and EMBI – are significant in both regressions. The signs of the coefficients make economic sense as well: an increase in the foreign interest rate, dollar exchange index, and EMBI spread yields a lower nominal exchange rate, while an increase in the commodity price index appreciates the exchange rate. Given the structure of the regression equation, all coefficients in this regression are an approximate measure of the impact on the log variance of the exchange rate. Finally, we find evidence of increased monetary autonomy, given by the negative coefficient on the domestic interest rate interaction variable.

According to Table 2, currency market intervention also had significant effects on the Chilean peso. We also find evidence of spillover effects from the IOF. The first five variables listed are dummies for the day each policy was announced. The sixth variable, "Intervention Period Dummy", is the dummy for the entire period of the intervention. As captured by the intervention announcement dummies, the announcement first had a positive impact of 0.4 percent on the peso level, but then a negative and larger impact the following two days of −4.4 percent and −1.5 percent. The announcement of foreign investment limits also had a fairly large effect of 1.4 percent. Overall, though, the intervention period did not have significant effects on either the level or volatility, as indicated by the intervention period dummy. Since the coefficient on the interaction variable is not significant, we find no evidence of improved monetary autonomy. The IOF announcement had a positive and significant impact on the peso level, and a negative and significant impact on the volatility. We conclude that the onset of Brazil capital controls influenced currency markets in Chile.

5.2   Asset prices

The results are reported in Tables 3 and 4. In Table 3, Brazil stock prices, the first nine variables listed apply to dummies of each announcement day, while the tenth variable, "controls dummy" is a dummy for the entire period of equity tax. According to Table 3, the first announcement of the IOF tax induced a statistically significant, but small, drop of −0.3 percent in the Bovespa. All subsequent tax hikes yielded significant (except the second increase), positive and small returns of less than one percent. The modification announcement, which extended the tax to bonds with maturities from 360 days up to 720 days, had a significant and negative effect of almost −1 percent. The announcement of a 60 percent reserve requirement of US dollar positions for banks also had a significant and negative, but smaller, effect of −0.4 percent. Surprisingly, cumulative abnormal returns – computed by aggregating the coefficients of all announcements – amounted to almost −1 percent, if we exclude the ADR announcement and equity removal announcement. Brazil noted that some investors were circumventing the 2 percent IOF tax by going through the ADR market, so

they put in place an ADR tax, implemented about a month after the original IOF tax. As could be expected, the ADR coefficient is positive – taxes on ADRs closed the window on ADR purchases and thus re-triggered flows to Brazil. The coefficient is also approximately –1 percent and somewhat neutralizes the cumulative impact of the IOF measures. In summary, the IOF had a lasting impact on Brazilian asset prices as well, but one that was perhaps reversed given the tax on the ADR market.

The control dummy for the entire control period did not yield a significant return, nor did the return from the interaction variable, which measures stock market independence. Hence, we do not have evidence that changes in the Bovespa became more independent of the regional markets with the implementation of the controls. We also cannot conclude that the controls cooled a supposed asset price bubble, as the control dummy can measure. The abnormal returns for days following each announcement are also not significant.

In Table 2.3.4, we run a similar analysis for the Chilean Santiago Stock Exchange. Not only do we test the effects of Chilean currency intervention but also the presence of spillover effects from the Brazilian IOF tax. The first four variables are dummies for announcement days, while the fifth variable is the dummy for the entire period of intervention. The spillover effect can be quantified by the IOF announcement dummy, which, according to the table below, is significant and positive. However, the magnitude of the effect is small and under 0.6 percent. The announcement of Chilean intervention had no significant effects. Interestingly, the announcement of the end of the daily dollar purchases had a significant and fairly large effect on stock prices: over 1 percent. The announcement of increases in foreign investment limits also was significant, with a magnitude of almost –1 percent. In contrast to Brazilian stock regression, we find evidence of increased stock market independence, given by the coefficient of the interaction term of 0.29. Hence, during the period of intervention, the Santiago exchange and the regional stock index were less correlated, but only by 0.01 percent. Nonetheless, we find no evidence that the period of intervention had any effect of domestic stock prices. The announcements of both foreign investment limits and the Brazilian IOF, however, did have significant effects. We conclude that our analysis gives evidence of spillover effects, as well as significant but small effects of intervention on asset prices and stock market independence.

TABLE 2.3.4   *Brazilian real*

	BRL	
	Mean Equation	**Variance Equation**
IOF Announcement	−0.0186***	
	(0.000328)	
ADR Announcement	0.00303***	
	(0.000507)	
IOF Increase	0.0131***	
	(0.000537)	
IOF Increase	0.00711***	
	(0.000933)	
Reserve Requirement	0.00622***	
	(0.000519)	
IOF Increase	0.0105***	
	(0.000456)	
IOF Modified	−0.0160	
	(0.0107)	
Tax on Derivatives	−0.00508***	
	(0.000583)	
Controls Dummy	−0.00144***	−0.772***
	(0.000685)	(0.192)
Domestic Interest Rate ∗ Controls	−0.232***	13.06
	(0.0478)	(8.451)
Domestic-Foreign Interest Rate Diff.	−0.0589***	4.557*
	(0.0193)	(2.632)
DXY	−0.542***	−35.63
	(0.0584)	(22.78)
GSCI	0.153***	−24.65
	(0.0236)	(16.91)
EMBI	−0.0644***	26.82***
	(0.0125)	(5.849)
Constant	0.00127**	−11.32***
	(0.000640)	(0.466)
Observations	762	
Wald	7.06e + 10	

Notes: Robust standard errors in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.

5.3   Scale, composition, and spillover effects of capital flows

The impact of the IOF on the scale and composition of inflows is also fairly consistent with the literature. As in the other cases above, we find small but temporary effects of capital account regulations. Tables 5 and 6 show the effects on composition of net capital inflows. Table 2.3.5 provides a more discerning decomposition of net inflows, and more interesting results. In this table, while the announcements are not

TABLE 2.3.5   *Chilean peso*

	CLP	
	Mean Equation	**Variance Equation**
IOF Announcement	0.00562***	−1.281**
	(0.00147) (0.536)	
Investment Limits Dummy	0.0137***	
	(0.000458)	
Intervention Announcement	0.00393***	−217.2
	(0.000402)	(166.8)
Announcement Day+1	−0.0444***	
	(0.000616)	
Announcement Day+2	−0.0146***	
	(0.000725)	
Intervention Period Dummy	−0.000125	−0.218
	(0.000420)	(0.161)
Domestic Interbank Interest Rate	0.000766	−0.712
	(0.000566)	(0.545)
Interest Rate * Intervention Dummy	0.000554	0.430
	(0.000621)	(1.866)
LIBOR	−0.0436	−23.82
	(0.0444)	(17.67)
DXY	−0.328***	−19.06
	(0.0473)	(14.01)
GSCI	0.0715***	−3.953
	(0.0176)	(5.622)
EMBI	−0.0563***	−1.330
	(0.00897)	(3.186)
Constant	0.000357	−10.45***
	(0.000239)	(0.113)
Observations	844	
Wald	7.81e + 08	

Notes: Robust standard errors in parentheses, $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

significant in the OLS regressions, the first IOF announcement, as well as the announcement of the reserve requirement, becomes significant in the IV regressions. Surprisingly, the effect of these announcements is positive on short-term flows and negative on long-term flows – precisely the opposite intended effect of policymakers. However, according to the dummy on all announcements, the effect on short-term flows is negative, yet under 0.01 percent.

Contrastingly, Table 2.3.6 of total flows and flows decomposed into FDI and non-FDI flows do not yield significant effects from the first IOF announcement. The all-announcement dummy is positive and

TABLE 2.3.6   *Brazilian stock exchange*

	Bovespa
IOF Announcement	−0.00321***
	(0.000784)
ADR Announcement	0.0133***
	(0.000535)
IOF Increase	0.00263***
	(0.000421)
IOF Increase	0.000718
	(0.000817)
Reserve Requirement	−0.00447***
	(0.000287)
IOF Increase	0.00115***
	(0.000291)
IOF Modified	−0.00903***
	(0.000284)
Tax on Derivatives	0.00314***
	(0.000656)
Equity Tax Removal	−0.00617***
	(0.000288)
Controls Dummy	−0.000338
	(0.000614)
MSCI EM Latin America	0.769***
	(0.0238)
MSCI*Controls	0.0227
	(0.0332)
Constant	0.000197
	(0.000547)
Observations	728
R^2	0.828

Notes: Robust standard errors in parentheses,
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

significant in the OLS regressions of total and FDI flows, yet it loses its significance with the instrument. Yet, not only are most of the variables insignificant, but they also very small in magnitude.

To complement the cross-sectional analysis, we create a panel of three Latin American countries in order to obtain a better measure of the effect of the IOF on Brazilian flows in relation to neighboring EMEs. The other countries are Chile and Colombia. We preferred to include a wider dataset; however, other Latin American EMEs have substantially less developed markets and also do not have monthly data for capital flows or GDP. Here, we do not include all other announcement dummies, as

TABLE 2.3.7 *Chilean stock exchange*

	Santiago
IOF Announcement	0.00553***
	(0.000568)
Investment Limits Dummy	−0.00971***
	(0.000486)
Intervention Announcement	−0.000336
	(0.000953)
Intervention Ended	0.0122***
	(0.000743)
Intervention Period Dummy	−0.00110
	(0.000680)
MSCI EM Latin America	0.303***
	(0.0156)
MSCI*Intervention	0.293***
	(0.0505)
Constant	0.000968***
	(0.000267)
Observations	816
R_2	0.495

Notes: Robust standard errors in parentheses,
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

they were not significant. In the panel regression, the covariates – except the forward exchange rates – are significant. The IOF announcement has positive and significant effects on total and non-FDI inflows of 0.014 percent and 0.033 percent, respectively. The all-announcement dummy, however, yields a positive, significant effect on FDI of 0.013 percent. Again, the findings are somewhat puzzling. However, both in Brazil and in the larger literature, there is increasing concern that in the face of capital controls, investors "disguise" short-term capital flows through financial FDI (Spiegel, 2012). The signs on these coefficients lend some credence to such claims, but cannot confirm them. The results are depicted in Table 2.3.7.

Table 2.3.8 gives the potential spillover effects of Brazil's controls on Chilean inflows. Here we run a cross-sectional regression of the Chilean capital account. Since the results did not report any significant coefficients beyond for the dummies of interest, we find no evidence of spillover effects.

TABLE 2.3.8   *Brazil long-term and short-term net inflows*

	Long-Term	Long-Term(IV)	Short-Term	Short-Term(IV)
IOF Announcement	−0.0415	−0.0450*	0.0317	0.0503***
	(0.0245)	(0.0256)	(0.0242)	(0.0289)
IOF Increase	−0.0262	−0.0304	0.0232	0.0305
	(0.0222)	(0.0248)	(0.0195)	(0.0289)
Reserve Requirement	−0.0144	−0.0195	0.0273*	0.0315***
	(0.0162)	(0.0194)	(0.0157)	(0.0130)
IOF Increase	−0.0146	−0.0181	0.00620	0.0115
	(0.0195)	(0.0191)	(0.0198)	(0.0155)
Tax on Derivatives	0.0181	0.0151	−0.00338	−0.00634
	(0.0141)	(0.0186)	(0.0166)	(0.0179)
All Announcement Dummy	0.0250	0.0290	−0.00952	−0.0170*
	(0.0187)	(0.0192)	(0.0156)	(0.00870)
Controls Dummy	−0.000294	0.00287	−0.00355	−0.00573
	(0.00829)	(0.0100)	(0.0123)	(0.0239)
Lagged Long-Term	−0.382*	−0.213		
	(0.190)	(0.551)		
Current Account	0.357	0.647	−0.0937	−0.657
	(0.467)	(0.527)	(0.889)	(1.223)
VIX	−0.286**	−0.330**	0.148	0.235*
	(0.130)	(0.126)	(0.180)	(0.120)
EMBI	0.0256	0.0344	−0.0262	−0.0412**
	(0.0191)	(0.0224)	(0.0279)	(0.0156)
Carry Trade Index	0.0542	0.0726*	−0.0242	−0.0651*
	(0.0378)	(0.0418)	(0.0544)	(0.0336)
Forward Premium	0.0170	−1.331	2.169	4.614
	(2.094)	(3.203)	(2.661)	(3.796)
Domestic Interest Rate	−0.203	−0.635	−0.438	0.466
	(0.748)	(0.855)	(1.150)	(0.609)
US Interest Rate	4.298	8.763	6.474	7.351
	(12.02)	(17.80)	(17.39)	(22.61)
Lagged Short-Term			−0.290	−0.434
			(0.269)	(0.984)
Constant	−0.0779	−0.124	0.180	0.238*
	(0.107)	(0.149)	(0.117)	(0.129)
Observations	36	35	36	35
R^2	0.627	0.677	0.495	0.641

Notes: Robust standard errors in parentheses, *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

TABLE 2.3.9 *Brazil total, non-FDI, and FDI net inflows*

	Total	Total (IV)	Non-FDI	Non-FDI (IV)	FDI	FDI (IV)
IOF Announcement	-0.0191	-0.0505	0.0200	0.00360	-0.0262	-0.0254
	(0.0237)	(0.230)	(0.0229)	(0.235)	(0.0188)	(0.0259)
IOF Increase	-0.0321	-0.108	0.0239	-0.00745	-0.0326	-0.0339*
	(0.0324)	(0.465)	(0.0192)	(0.285)	(0.0196)	(0.0193)
Reserve Requirement	0.00235	-0.0226	0.0109	0.0195	-0.00558	-0.0135
	(0.0167)	(0.161)	(0.0221)	(0.0464)	(0.0180)	(0.0303)
IOF Increase	-0.0142	-0.0287	0.0303	0.0100	-0.0351*	-0.0297
	(0.0179)	(0.101)	(0.0228)	(0.207)	(0.0201)	(0.0295)
Tax on Derivatives	0.00770	-0.00606	0.0295*	0.0153	-0.0155	-0.0124
	(0.0157)	(0.0865)	(0.0153)	(0.110)	(0.0131)	(0.0149)
All Announcement Dummy	0.0198**	0.0313	-0.00776	-0.00490	0.0233	0.0242
	(0.00907)	(0.0937)	(0.0120)	(0.0757)	(0.0156)	(0.0164)
Controls Dummy	-0.0131	-0.0391	0.000125	-0.0166	-0.00464	-0.00276
	(0.0176)	(0.149)	(0.0144)	(0.102)	(0.00825)	(0.00803)
Lagged Total Flows	0.324	2.004				
	(0.373)	(10.04)				
Current Account	-0.195	-1.353	0.109	-1.055	0.118	0.364
	(0.605)	(4.961)	(0.813)	(5.042)	(0.423)	(0.447)
VIX	-0.131	-0.122	0.142	0.113	-0.250**	-0.236
	(0.144)	(0.276)	(0.221)	(0.945)	(0.117)	(0.190)
EMBI	0.0126	0.0469	-0.0331	-0.0213	0.0334*	0.0349
	(0.0286)	(0.237)	(0.0360)	(0.208)	(0.0179)	(0.0222)
Carry Trade Index	0.0444	0.0875	-0.0354	-0.0434	0.0672*	0.0779**
	(0.0504)	(0.353)	(0.0631)	(0.224)	(0.0327)	(0.0344)
Forward Premium	-2.451	-14.64	1.618	0.267	-1.113	-2.773
	(3.396)	(78.54)	(2.559)	(24.60)	(1.663)	(4.197)
Domestic Interest Rate	-0.748	-1.122	-0.575	0.299	-0.188	-0.595
	(0.957)	(4.551)	(1.217)	(1.419)	(0.653)	(0.692)
US Interest Rate	13.02	14.14	0.791	-9.109	14.47	18.56
	(13.31)	(20.06)	(17.94)	(67.81)	(10.11)	(15.03)
Lagged Non-FDI Flows			-0.204	0.567		
			(0.233)	(6.460)		
Lagged FDI Flows					0.0154	0.319
					(0.199)	(1.078)
Constant	-0.0544	-0.452	0.269*	0.142	-0.206**	-0.228**
	(0.161)	(2.471)	(0.151)	(1.416)	(0.0889)	(0.0954)
Observations	36	35	36	35	36	35
R_2	0.652	0.586	0.259	0.558	0.588	

Notes: Robust standard errors in parentheses, $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

TABLE 2.3.10   *Total, non-FDI, and FDI net inflows*

	Total Flows	Non-FDI Flows	FDI Flows
IOF Announcement	0.0272*	0.0487**	−0.0215
	(0.00756)	(0.0109)	(0.0185)
All Announcement Dummy	0.00935	−0.00803*	0.0174*
	(0.00671)	(0.00187)	(0.00483)
Controls Dummy	0.0317	0.0308	0.000860
	(0.0162)	(0.0137)	(0.00427)
Current Account	−1.251**	−1.119**	−0.132*
	(0.197)	(0.232)	(0.0358)
Domestic-US Interest Rate Diff.	−0.0855	−0.140	0.0542
	(0.143)	(0.387)	(0.345)
Constant	0.0695	0.0160	0.0535
	(0.0981)	(0.0676)	(0.0433)
Observations	111	111	111
R^2	0.458	0.405	0.346

Notes: Robust standard errors in parentheses, *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

TABLE 2.3.11   *Chilean net inflows and spillover effects*

	Total Flows	Non-FDI Flows	FDI Flows
IOF Announcement	0.0274	0.0234	0.00664
	(0.181)	(0.220)	(0.0847)
Brazil Controls	−0.0579	−0.0629	0.0118
	(0.0604)	(0.0890)	(0.0535)
Chile Intervention Dummy	0.00719	−0.00673	0.00520
	(0.142)	(0.181)	(0.0925)
L. Total Flows	−0.290***		
	(0.101)		
Current Account	−1.223*	−1.333	0.117
	(0.704)	(0.862)	(0.512)
VIX	0.515	−0.204	0.550
	(1.044)	(1.362)	(0.598)
EMBI	0.0321	0.0849	−0.0629
	(0.0821)	(0.0916)	(0.0470)
Carry Trade Index	−0.335	1.014	−0.810
	(7.893)	(9.149)	(3.143)
Forward Exchange Rate	8.368	1.550	2.122
	(49.37)	(57.58)	(20.06)
Domestic Interest Rate	−0.519	−1.703	1.355
	(2.239)	(2.103)	(1.349)
US Interest Rate	36.44	121.2	−71.62
	(195.0)	(230.2)	(70.51)
L. Non-FDI Flows		−0.171	
		(0.141)	
L.FDI Flows			−0.326
			(0.198)
Constant	−1.432	−1.795	0.729
	(1.099)	(1.263)	(0.668)
Observations	36	36	36
R^2	0.246	0.206	0.224

Notes: Robust standard errors in parentheses, *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

7   Conclusion

In this chapter, we have examined the effects of attempts to navigate volatile capital in Brazil and Chile. We find Brazilian controls had statistically significant impact. However, we would characterize our findings as evidence of temporary "speed bumps" that helped Brazil lean against the wind rather than reversing "tsunami" of capital inflows that afflicted the country during this period.

We find that the introduction of capital controls in Brazil was associated with an increase in total inflows, but that the composition was shifted from short to longer-term inflows. We also find that Brazil's measures had a lasting impact on the level and volatility of the exchange rate. In terms of asset prices, only announcements of controls were effective, and they were offset by regulations on the ADR market that send investors back to Brazil. We also find that Brazil's measures modestly increased the ability of Brazil to pursue an independent monetary policy. Chile's currency interventions were less successful. The announcement of currency intervention reduced the level of the exchange rate, but not the volatility, and made the domestic stock market more independent from the region as a whole. Chile's interventions had no statistically significant impact on total inflows of capital, the composition of inflows, or the ability of Chile to pursue an independent monetary policy.

More specifically, effects on the Brazilian exchange rate are similar: all announcements have a statistically significant impact, with the first IOF announcement having the largest negative effect, though small in magnitude. The overall effect of the controls is significant, but small. In regards to asset prices, we find that the announcements of the IOF and subsequent policy changes have statistically significant effects on the Bovespa. Particularly, the cumulative impact of all announcements is negative, yet small. However, the overall effect on the period during which the controls are in place is not significant.

In Brazil, controls did have a significant impact on total inflows as well as the composition of flows, yet the effects are fairly small. The impact of announcements and the overall impact are significant, but again, small.

For Chile, we find that Brazil's cross-border financial regulations seemed to increase capital inflows to Chile for a short period, but not a lasting one. Moreover, Chile's reserve accumulation measures had only temporary effects in Chile and did not withstand the markets over time.

Our findings are consistent with the research on capital account regulations as reported by Magud et al. (2011) and Ostry et al. (2010). From a policy perspective, we can further confirm that these measures can impact exchange rate appreciation and the development of asset bubbles. However, it is not clear from our analysis that such measures should be conducted alone; rather, they should be part of a wider package of macroprudential policies. From our analysis, capital controls alone will not be sufficient to address the concerns about capital flow volatility unless they are much stronger and better enforced. Indeed, our finding that the controls were associated with a shift toward FDI may lend credence to claims that capital account regulations encourage some investors to circumvent regulation by disguising short-term capital flows as FDI. Finally, our parallel analysis of Chile finds that intervening in currency markets can have an even weaker effect than capital flow management measures and can be costly in terms of their opportunity costs (Aizenman, 2010).

Note

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1   In other words, cumulative abnormal returns, where n is the final period, are computed by the following approximation: $(p_{t+n} - p_t)/p_t = [(1 + ((p_{t+n} - p_{t+n-1})/p_{t+n-1}))^* ... * (1 + ((p_{t+1} - p_t)/p_t))] - 1$.

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Part 3
Effects and Multilateral Aspects of Currency Flows

3.1

Monetary Policy in a Multi-Polar World

Joseph E. Stiglitz

Abstract: *This paper focuses on monetary policy in the context of a global economy with two or more large countries. It attempts to deal with several questions raised by the domestic ineffectiveness and unintended global results of the United States' policy of quantitative easing. Our analysis shows that in a world of truly free capital mobility, the effects of monetary policy may be different – typically weaker – than in a closed economy. Restrictions on free capital may therefore be advantageous.*

That monetary policy in an open economy is markedly different from that in a closed economy has long been recognized – but typically, discussions have focused on small economies, where the effects are mediated largely through the exchange rate.[1] After all, with perfect capital markets, a small country takes the global real interest rate as given. An increase in the supply of its currency naturally leads to a decrease in its price. Dynamics can be complicated, since the cost of holding on to a currency entails capital gains and losses as well as foregone earnings.

This chapter focuses, by contrast, on a global economy with two (or more) large countries, where the action of each has a non-negligible effect on the global equilibrium, in a context in which the market equilibrium, in the absence of government action, would not itself be Pareto optimal.[2] Thus, we explicitly focus on situations where markets are not self-correcting, and there is a need to use monetary policy (e.g., to bring the economy closer to full employment).[3]

The motivation for this chapter's inquiry is partly the consequences of the US policy of quantitative easing (QE). In a closed economy, central bank purchases of long-term government bonds would drive up the price, lowering long-term interest rates, and encouraging long-term investments, like housing. Banks, rather than investing in long-term government bonds (the value of which may well fall in the future when the monetary policy is reversed) are induced to lend, making funds more available, on better terms.

The chain of reasoning linking expansionary monetary policy in the United States with increased activity in the United States is complicated. Several questions must be answered: (a) Why should central bank purchases of long-term bonds lower long-term interest rates? (b) Why should the lowering of long-term government rates actually lead to more lending, at more favorable terms? (c) Why, in a globalized world, should the increased liquidity lead to increased investment in the United States (or more generally, the country making available the increased liquidity)? (d) Why, in a globalized world, shouldn't the effect of the increased liquidity be offset (at least partially) by counteractions on the part of other central banks?

(There are, of course, a number of other mechanisms through which the effects of QE are allegedly felt, which we discuss later in this chapter. Even if present, they are likely to be small, and indeed, some of the effects are likely to be adverse.)

Thus, critics of the US QE2 and QE3 claim: (a) the effects on long-term government interest rates have been small; (b) the effects on rates

at which private parties can borrow has been even smaller;[4] (c) it has not led to substantial increases in lending to the only sector which is really constrained, small and medium sized enterprises;[5] (d) the major impact of the increased liquidity has been to increase demand in emerging markets (and perhaps to support asset price increases globally), and (e) in response to the overheating to which it has contributed in the emerging markets, the central banks there have engaged in "currency wars," and have constructed impediments to the free flow of capital. In effect, they have tried to undo the effects of what they view as the United States' competitive devaluation, and to offset, in their country, the expansionary effect of US Fed policy. In short, money has been going where it's *not* needed, and not going where it *is* needed.

Why should an investor with access to funds invest them in the United States or Europe, where there is excess capacity and a long-term slump, rather than in the booming, high-return emerging markets? In the older, closed economy models, they had no choice, but in a globalized world with free capital markets, they do.

By the same token, some have criticized the attempt of emerging markets to protect themselves against a surge of capital inflows by imposing a variety of forms of capital controls. They have suggested that there are externalities imposed by such controls on others,[6] and that such measures should either be banned or severely restricted.[7]

This analysis has four broad implications: First, in a world of truly free capital mobility, the effects of monetary policy may be markedly different – and typically weaker – than in a closed economy. Second, restrictions on the free flow of capital may therefore have an advantage, in that they may enhance the ability of the government to maintain the economy near full employment, possibly more than offsetting any disadvantages of such controls.[8] Third, it emphasizes the benefits of coordination among monetary authorities. Not surprisingly, the uncoordinated Nash equilibrium is Pareto inferior to a coordinated equilibrium. Fourth, by expanding the set of instruments (to include capital controls and quantitative instruments) countries can both reduce the impact of unwanted externalities imposed on them by foreign central banks, and increase the scope for cooperative agreements on monetary policy among central banks.

An analysis of the effects of monetary policy must be predicated on an understanding of the structure of the economy and the channels through which the effects of monetary policy are exercised. Much of the

recent literature has focused on impacts through "the" interest rate, and earlier literature emphasized the major determinant of that as the supply of money, "M." But there are compelling reasons to believe that these models do not really capture one of the main mechanisms by which monetary policy exerts its effects – through the effect on the availability of credit, especially via the banking system (Greenwald and Stiglitz 2003). Indeed, an earlier theoretical literature, described briefly in section V, explains why, under the conventional perfect markets model, an extension of the Modigliani-Miller theorem demonstrated the ineffectiveness of monetary policies, including "operation twist" and QE. The financial crisis has heightened awareness of the importance of the credit channel and market imperfections. But credit availability is affected not just by the T-bill rate, but by a host of government regulations, as well as by changes in banks' net worth, portfolio valuations, and risk perceptions. Hence, an analysis of monetary policy has to expand beyond just a focus on the interest rate to include a host of regulatory measures (capital adequacy requirements, reserve requirements, and liquidity requirements) and how they are implemented and enforced. We include this entire panoply of instruments within the umbrella of what we refer to as "monetary policy." The instruments of monetary policy thus include not just the standard ones (open market operations, discount rates, and reserve requirements) but also those that are sometimes referred to as prudential regulations, macroprudential regulations, and capital controls.

This chapter thus touches on a number of distinct literatures:[9] on those entailing optimal macro and monetary policy within closed and open economies, on global coordination of macroeconomic and monetary policies, and on regulatory policies and their coordination, especially when they touch on cross-border flows. Each of these literatures has developed largely in isolation. There have, for instance, been important developments in the analysis of monetary policies in closed economies with credit constraints, and in the analysis of coordination in simple models with a single (or limited number) of instruments. One of the contributions of this chapter is to argue that these strands have to be brought together, and in contexts in which the credit channel and credit market imperfections play a central role.[10] Thus, while there is a body of literature identifying the benefits and costs of financial market liberalization, that literature has not addressed either the impact of such liberalization on the magnitude of spillovers from monetary policies or

the impact that such liberalization might have on the ability to achieve cooperation.

This chapter is divided into five sections. In the first, we explore a limiting and peculiar case, a country with two central banks, which highlights the need for cooperation. In the second, we consider the more general case where there are two or more large countries, each with their own currency. In the third, we focus on the role of credit and related constraints. In the fourth, we note that there may be positive as well as negative spillovers, but so long as there are spillovers, there are benefits to coordination. In the final section, we argue that the analysis of monetary policy must focus on market imperfections (such as credit, collateral, and regulatory constraints). In the absence of such "imperfections," there is a strong presumption that monetary policy would have, at most, very limited effects; hence, the magnitude and nature of the impacts of different policies depends critically on the magnitude and nature of the market imperfections.

1   A limiting case

Consider, for a moment, a large closed economy sharing a single currency, but suppose it decided to create two independent central banks (CBs) – one providing liquidity to the East and the other to the West. It should be obvious – at least in the standard model – that something was awry. There would be no reason that the money (we'll call it dollars) created in the East would remain there. Since M_E and M_W are perfect substitutes, all that matters (in the standard model) is $M_E + M_W = M$, the total money supply. Surely, one might argue, the two monetary authorities would understand that, and act together. But assume that the two monetary authorities have utility functions, each representing the interests and circumstances of their part of the country.[11] While each knows that what matters is the total money supply, each knows that it can influence the money supply with its own actions, which might not be in accord with what the other monetary authority wishes. For simplicity, we assume that there is a simple relationship between the level of aggregate activity in each region and the aggregate money supply. The two utility functions are $V^i(M, T, \theta^i)$, where T is the net transfer received (paid) by one region to the other, and θ is the state of nature in country i, a random variable affecting the state of the ith economy. V is a reduced form representation

of societal welfare, a function of the one control variable: the money supply. Societal –well-being could depend, for instance, on inflation and employment. A change in M changes the inflation rate and employment level, and V summarizes the impact on societal well-being. Societal welfare may also depend on the distribution of income or the composition of output (particularly when that in turn might affect the rate of growth of the economy).[12]

If there is no cooperation (and no transfers), each would try to set the money supply to maximize its own utility:

$$V^E {}'(M_E + M_W, o, \theta^E) = o, \tag{1a}$$

$$V^{W'}(M_E + M_W, o, \theta^W) = o \tag{1b}$$

But both countries cannot have their own way. Let $M^E {}^*$ be the solution of (1a); M^{W*} to (1b). If the West if facing a deficiency in demand, and the East is having a boom, one might expect $M^E {}^* < M^{W*}$.

As the WestCB expands money supply beyond M^{E*}, the WestCB will seek to take the liquidity out of the system. The WestCB winds up with a very large portfolio of T-bills (TBs). The EastCB will continue to sell its holdings of TBs, so long as it can. (For much of the rest of the chapter, we will omit the dependence of each country's monetary policy on θ, the state of nature.)

Each CB, in setting its monetary policy, focuses only on the effects in its own region, ignoring the spillovers. But there are important spillovers from the West to the East and vice-versa. If some of the firms in the West are national firms, they can use the greater availability of finance in the West to undertake projects in the booming East, or to speculate through a "carry trade." Some of the firms receiving money may in fact be financial intermediaries (arbitrageurs), taking advantage of the low interest rates in the West to finance (or to provide finance for) projects in the East. And higher growth in the West will increase demand for imports from the East. Through all three mechanisms, expansionary monetary policy in the West exacerbates inflationary pressures in the East. The East would prefer that the West be less expansionary, and the West might prefer that the East be more expansionary.

The intuition for what is happening in this case is clear: if the East Coast is experiencing a boom, it will want to contract the money supply, but if the West is in recession, it will want to expand the money supply. The money supply, in this model, is determined jointly; it is like a public

good, in that what matters is the total value of M, not how much is supplied by any particular CB. As in the case of any public good, there can be different views about the optimal supply of the public good; what is best for one group may not be for another.

Of course, within even a closed economy with a single monetary authority, the same issue arises: that is, policies which may be optimal for one group may not be for others. Our macro models typically slide over by assuming a representative agent. One of the criticisms of unrepresentative central banks—where the voices of workers are not heard, while that of the financial community is overrepresented—is that the collective decision represents more the interests and perspectives of the financial community. The problems would not be so bad if those who benefitted from the particular choice of a monetary policy could or would compensate the losers. The issue would not arise only if it could be shown that a particular monetary policy Pareto dominated all others, which is obviously not the case.[13]

Assume, on the other hand, that it is possible for the two regions to provide lump sum transfers to each other. Social welfare (or Pareto efficiency) is achieved by

$$\text{Max } V^E(M, T, \theta^E) + V^W(M, -T, \theta^W) \tag{2}$$

so

$$V^E_M + V^W_M = 0 \tag{3a}$$

$$V^E_T = V^W_T \tag{3b}$$

Equation (3a), which makes it clear that Pareto optimality requires that the sum of the marginal returns to an increase in the money supply should be zero, not each individually. Achieving this cooperative solution may not be possible in the absence of compensating payments.

The creation of an independent central bank, not part of a broader political process, exacerbates the problems, because it makes it more difficult to design Pareto improving compensations (i.e., to offset the distributional consequences of monetary policy). This cost has to be offset against any putative benefit associated with any improvement in monetary policy from independence associated with either a better ability to make time-consistent commitments or with less "politicization" of monetary policy.

1.1   Using other instruments

Matters are not quite as bad as I have just described, because monetary authorities may have access to a range of other instruments, the effects of which may have lower spillovers outside the particular region concerned. A long-standing criticism of the standard model is that it does not describe and analyze clearly the process of credit creation through the banking system and the ability of regulators to affect this credit creation. Much of the effect of monetary policy is mediated through the supply of bank lending – both the availability of credit and the terms on which it is available. Even in the absence of credit rationing, the terms at which credit is made available do not necessarily move in close tandem with T-bill rates. The spread (between lending rate(s) and the T-bill rate) is an endogenous variable, which has to be explained, and which can be affected by policy.[14]

For simplicity, we assume that there is a vector of policy variables, α^i is under the control of each monetary authority, societal welfare is a function of M, α^w, and α^E, and that each of the monetary authorities chooses α to maximize its own welfare:

$$V^i_{\alpha i} = 0$$

Again, a coordinated solution would be preferable:

$$V^E_{\alpha i} + V^W_{\alpha i} = 0$$

For instance, by lowering reserve requirements, the CB in the West can encourage more lending by its banks, which is needed, given its weak economy. Western banks have an informational advantage concerning Western firms; as a result the bulk of their lending is to Western firms, and the direct beneficiary of their lending is the economy of the West. Thus, if the Western region undertakes a regulatory policy the effect of which is to expand lending mostly to SMEs, the financial spillovers to the East will be smaller, and similarly, if the Eastern region undertakes policies aimed at contracting lending to the SMEs.

It should be emphasized that the use of any one instrument affects the optimal value of other instruments. If, for instance, the government were to require that a certain fraction of all lending be directed to SMEs, then the optimal interest rate (the interest rate required to restore the economy to full employment) might be markedly higher than it would be in the absence of such a constraint.

One of the criticisms of the Fed in the current crisis is that it seemingly failed to pay sufficient attention to these concerns. Its bailout strategy was focused on the larger international banks, which disproportionately lend to large multinational enterprises, not SMEs; indeed, large numbers of local, community, and regional banks that are central to SME lending remain weak.[15] As a result, the cross-border spillovers are larger than they otherwise would have been.

2   Variable exchange rate

In the simple model of a single country with a single currency, the conclusion that problems arise when there are multiple central banks might seem so obvious that it does not even need to be mentioned, let alone modeled. But in a globalized world, where there might be, for instance, multiple currencies that are strong enough to serve as reserve currencies, then the cross-elasticities of currencies – the extent to which they can serve as substitutes for each other – may be sufficiently large that the model just described provides a good approximation to what is happening. As the CB increases liquidity (money) in its country, there are large spillovers to other countries, through the financial and trade mechanisms described above. In the extreme case of the previous section, the money supply was jointly determined, and we observed an inconsistency in the value of M that each CB strove for.

Now each CB controls its own money supply, but of course each country is affected by what the other does, not least through the exchange rate – the relative price of the two currencies.

In this highly reduced form analysis, we do not need to model specifically how an increase in "M^i" or α^i affects the exchange rate. But if an increase in M^i leads to a lower exchange rate for country i, then its exports will increase, and other countries' imports will increase (i.e., some of the gains to country i are at the expense of others).[16]

In the simplest case, we now write the utility of country i as a function of the vector of money supply:

$$V^i(M^1, M^2)$$

And the Nash Equilibrium is given by the solution to

$$V^1_1 = 0, \ V^2_2 = 0.$$

The two equations define two reaction functions, and the Nash equilibrium is at the intersection of the two.

Without cooperation, the Nash equilibrium will be Pareto inferior to what could have been achieved with cooperation, but full cooperation is hard to achieve without compensatory payments, and even more so, if the set of instruments that are focused on is excessively narrowed (which has been the case in discussions of the conduct of monetary policy in recent decades, where the focus has been on using interest rates).[17]

Notice that in this model, in setting its monetary policy, the country claims to be only pursuing its own domestic goals (e.g., restoring the country to full employment). But if the country is large, the policies it pursues have spillovers on others, for instance through the global liquidity supply and the exchange rate. The fact that the country claims that it is not doing this to improve its terms of trade or to change the global interest rate from what it otherwise would have been does not change the significance of the spillover.[18]

In the previous section, we noted that monetary authorities have a range of other instruments besides the money supply (or interest rate). They can change reserve requirements, liquidity requirements, capital requirements, etc. They can be more or less lax in enforcement of the requirements that they have adopted. We denoted these other instruments available to the monetary authority, besides the money supply, by α^i.

We now introduce a new set of variables that monetary authorities can use, to reduce the extent of externalities that they impose on others or that are imposed on themselves. Such policies may, at the same time, have benefits or costs to the countries undertaking them. If there are costs to engaging in expansionary monetary policy (increasing money supply by a given amount), then if more of the "liquidity" is directed at the home country, and less elsewhere, the magnitude of the expansion of the monetary supply necessary to achieve a given expansion of domestic credit will be smaller. At the same time, such policies that limit the spillovers will mean that the country that is already experiencing a boom will not suffer from further expansion of its credit. Capital controls directed at flows into or out of a country are examples of policies of which the direct effect is on the spillovers into or out of a country.

We denote these externality-controlling actions by β. Country i's (expected) utility is given by

$$V^i(M^i, M^j, \alpha^i, \alpha^j, \beta^i, \beta^j, T).$$

And it maximizes this by setting

$$V^i_{Mi} = V^i_{\alpha i} = V^i_{\beta i} = 0.$$

Again, cooperation could achieve Pareto superior outcomes, especially if cross-border lump sum transfers were allowed, but also even if they weren't. Cooperation would entail

$$V^1_{Mi} + V^2_{Mi} = 0$$

$$V^1_{\alpha i} + V^2_{\alpha i} = 0$$

$$V^1_{\beta i} + V^2_{\beta i} = 0.$$

In setting the value of each variable, the effect on both countries is taken into account. As before, optimal transfers require

$$V^1_T = -V^2_T$$

And again, we can observe that restricting the policy set may make achieving cooperation more difficult.[19]

But this is what the international community has been doing for almost three decades, as they have erected prohibitions against barriers to the free flow of capital, barriers which could, if appropriately designed, mitigate some of the cross-border externalities.

Ironically, the presumptive reason for imposing constraints on such policies is that such policies exert an adverse effect on others, even if they exert a positive effect on the country imposing them. Efforts at financial market liberalization were influenced by the earlier efforts at trade liberalization, where there was a compelling argument behind reciprocity of mutual trade liberalization: if all countries removed their trade barriers, under certain conditions, all countries could be better off (though literature over the last quarter-century has shown the severe limitations under which that conclusion was valid).[20]

One could perhaps make a corresponding argument for allowing free mobility of *all* factors, but the factor market liberalization agenda has never gone in that direction – it has focused on eliminating all barriers to the movement of capital, while retaining extensive movements to the barriers of labor. In this world, there is no "exchange."

If a country engages in trade liberalization, in the conventional static analysis, the country itself is better off, and so are the countries from which it imports. Mutual trade liberalization is therefore even more beneficial to all parties. But when we say the country is better off, what we mean is that the gains of the winners from trade liberalization are so great that the winners could compensate the losers. But such compensation is often not made, so trade liberalization does *not* result in a Pareto improvement, and there is, accordingly, resistance.[21]

Capital and financial market liberalization provide an opportunity of countries with high endowments of capital to earn a higher return on their abundant factor by investing it in other countries. There may be benefits that accrue to the recipient country, for example, expanded output, higher wages, etc. But if these benefits do exist, there would presumably be no reason that the recipient country would impose the barrier (i.e., there is a presumption that forcing countries to liberalize lowers their welfare at the expense of the country opening its markets).[22]

Indeed, recent years have produced a plethora of theoretical and empirical analyses explaining why full financial and capital market liberalization may be welfare-decreasing, going well beyond the concern that such liberalization undermines the ability to have "targeted" monetary policies with diminished spillovers to other countries and/or that it effectively expands the policy space.[23]

Full liberalization exposes countries to more shocks, and there is a high economic cost to the resulting volatility (which cannot be insured against),[24] including the actions that governments may take to mitigate the volatility, such as building up reserves.

In particular, as Jeanne and Korinek point out, in the absence of government intervention, those who have access to international capital (like, perhaps, large real estate projects) borrow excessively from abroad. Looking forward, they do not take into account the effect of higher borrowing on the future exchange rate (e.g., in the event of an adverse shock). Each borrower takes the probability distribution of exchange rates as given, but when they all borrow more in foreign denominated currency, in the event of an adverse shock, the exchange rate will fall more, with adverse effects on all those who owe money in foreign exchange.[25] Thus, imposing constraints on the free flow of capital leads to a more stable exchange rate, and the imposition of such constraints by one country can lead to a Pareto improvement within that country At the same time, such constraints imposed by one country have affects

(possibly negative, possibly positive) on other countries, which the country won't take into account when it decides to impose them.

To return to our earlier, reduced form formulation: we showed that a coordinated equilibrium is better than an uncoordinated one. But assume full coordination is unachievable. Countries can only agree on whether an instrument should or should not be allowed. Would global welfare be higher if capital controls were banned as an instrument? Let β_1 denote the level of capital controls. Let β_1^* be the value of β_1 in the symmetric Nash equilibrium. Let $\beta_1 = 0$ denote the value of β_1 under the "no capital control" regime. The question is, is $\Sigma V^i (...\beta_1^*, ...) > \Sigma V^i(...., 0, ...)$ (i.e., is welfare higher in the Nash equilibrium with controls or without?). It is straightforward to establish that so long as the direct benefits of increasing β_1 exceed the indirect costs imposed on others, the regime with capital controls generates a higher level of global societal welfare.

We can use the envelope theorem to assess the magnitude of the effects of the change by any country in its policy on others. Consider a change in β_1 (the analysis for changes in M or α are similar.)

$$dV^j/d\beta_1^i = \partial V^j/\partial \beta_1^i + \{\Sigma (\partial V^j/\partial P^j)(\partial P^j/\partial \beta_1^i)\} = \partial V^j/\partial \beta_1^i,$$

where $\partial P^j/\partial \beta_1^i$ is the change in policy $\{M, \alpha, \beta\}$ undertaken by j in response to the change in β_1^i. The impact of the change in policy on welfare, taking into account all of the country's adjustments, is exactly the same as it would be if it did not make any adjustment (for a small perturbation).

In particular, if an increase in i's money supply leads to a surge of inflows into country j, and that results in increased inflation there, the externality of i on j is just equal to the direct cost of the induced inflation. We do not have to ask the question of how the country should optimally respond to the inflation. We only need to ascertain the direct impact. If, as some have suggested is the case, the Fed's expansion actions had little effect on aggregate demand in the United States, but had much greater effects on the already booming emerging markets, then the impact on global social welfare may well be negative.[26]

3   Liberalization in a world of credit and other constraints

So far, we have conducted our analysis at a highly abstract level. We have related actions of monetary authorities to the level of well being

in each country. Because the countries are large, the action each takes has significant effects on others. There are important spillovers. (Later, we will discuss in more detail the circumstances in which spillovers are likely to be negative or positive or non-existent). The effects of monetary policy depend, of course, on the structure of the economy.

In standard neoclassical models, investment is determined by the real rate of interest; thus, controlling the real rate of interest provides the central channel for controlling the level of economic activity. It is also the case in standard models of utility maximization over an infinite lifetime, changes in interest rates also can, but need not, have a powerful effect on current consumption. There is, in fact, scant direct empirical evidence in support of either hypothesis; only in models in which there are strong prior constraints (where the effects of changes in nominal interest rates are, for example, constrained to be zero) can the effects of the real interest rate on investment be detected, and this is especially true both when the country is experiencing a real estate boom/bubble and when it is in deep recession. In the latter case, there is typically large excess capacity; one should not expect that, just because one can obtain capital at a lower interest rate, firms would be willing to invest in more excess capacity. Indeed, real interest rates are already negative, and yet investment in real estate (and consumption) remains constrained.[27] This is also the case in a real estate bubble. If markets (often irrationally) expect returns on real estate of, say, 25 percent per year, then raising interest rates from 4 percent to 6 percent won't dampen investment much.[28]

In the case of consumption, there are offsetting income and substitution effects, so it should not be a surprise that empirical results are ambiguous. For the large number of those who are saving for a target (retirement, funding a child's education, making a down payment on the purchase of a house), the interest elasticity of savings is negative.

Increasingly, economists are recognizing that monetary policy affects the economy not just through the T-bill rate, but through the availability of credit and the terms on which it is offered. Credit and collateral constraints matter. (In section 5, we return to this theme, explaining that in the absence of such constraints, monetary policy would have little or no effect, so the analysis of such constraints should be at the center of any analysis of monetary policy.[29]

For more than 30 years, there has been a well-established literature explaining why, in the presence of imperfect and asymmetric information, markets are often characterized by credit rationing. Central bank

doctrine in many countries at various times has focused on credit availability, though in the more recent dominance of neoclassical doctrines, such perspectives were put aside.

Consider a simple Greenwald-Stiglitz model [2003] where lending is mediated through the banking system, where the lending rate r^l is a function of the T-bill rate, r, where the monetary authority controls the T-bill rate, but where the monetary authority does not control the inflow of funds and thus the availability of credit. Assume lending, L, is constrained not by demand, but by the supply of funds (as it is in a world of credit rationing), that higher interest rates attract an inflow of foreign capital, which in turn leads to more lending, and a higher level of lending leads to a higher level of aggregate demand, Y^d. Raising interest rates thus has just the opposite effect that it has in a standard closed economy model.

For simplicity, we assume aggregate supply is fixed at Y^*, and that the optimal level of aggregate demand is Y^*, where aggregate demand equals aggregate supply. Thus, in this model national "welfare" is given by[30]

$$V (Y(L(r)),$$

with $V' >$ or < 0 as $Y <$ or $> Y^*$,
   with the optimal value of r given by

$$V'Y'L' = 0,$$

that is, by the solution to

$$Y(L(r^*)) = Y^*.$$

What is driving monetary policy (defined here as setting the interest rate) is the impact on the flow of funds into the country, not the creation of domestic credit. (We will come to the more general case shortly.)

Consider now a perturbation to the economy that results in an exogenous increase in aggregate demand: that is,

$$Y^d = Y^d(L(r), \varepsilon).$$

The increase in aggregate demand would lead to inflation, as Y^d at the old r exceeds Y^*, and in the standard "inflation targeting" remedy to the resulting inflation is to increase the interest rate. But under the assumptions given earlier,

$$L' > 0 \text{ and } Y' > 0.$$

Hence, increasing r leads to an inflow of capital, increasing lending and aggregate demand, and increasing inflation. A recipe based on the neoclassical model provides precisely the wrong advice for an economy confronting credit rationing. It is easy to show that the optimal response is to lower interest rates, not raise them.

Of course, governments have additional instruments, and these should be employed. Denote, as before, a regulatory instrument (reserve or capital requirements) by α. Assume now, for simplicity, that α and r also affect social welfare directly (e.g., as a result of distributional consequences or costs of implementing a regulation):

$$V (Y^d(L(r, \alpha)), \alpha, r).$$

Then optimal policy entails

$$V_Y \, Y' \, L_r + V_r = 0$$

$$V_Y \, Y' \, L_\alpha + V_\alpha = 0.$$

The first equation says that in setting the interest rate, we don't just target the level of aggregate supply: we also take into account the effect of a change in the interest rate on welfare. If higher interest rates, for instance, represent an adverse distribution from (on average poor) debtors to creditors, then we choose an interest rate that is lower than the rate that would entail aggregate demand equaling supply. The second equation says that we can improve upon the equilibrium so attained by adjusting other regulations. For instance, loosening capital or reserve requirements might lead to more lending at any given level of r, so even if there is some cost to such an adjustment, it would be optimal to do so.

3.1   Impacts on composition of output

The desirability of using regulatory instruments is even stronger when there is a concern about the composition of output. (One might be concerned about the composition of output if some sector, such as real estate, is systematically associated with instability, as a result of credit bubbles, or some other sector, such as high tech export sector, is systematically associated with learning spillovers,[31] or some sector, such as SMEs, is systematically more closely linked to job creation, and the country faces a severe and persistent problem of unemployment.)[32]

Consider a monetary authority trying to offset an increase in the inflow of capital going into one sector (e.g., the real estate sector), which is causing inflation and/or distorting the economy. Earlier, we suggested that the standard response – raising the interest rate – might be counterproductive. But raising interest rates might dampen the other sector, and if it does so enough, the net effect is deflationary. But fighting inflation in this manner comes at the expense of the SME sector, which may be the employment and technology-driving sector. Hence, while the increase in interest rates might dampen inflation arising from shortages in some sectors, it has an adverse effect on the composition of output – and on welfare. There is an alternative welfare enhancing policy: tightening the constraints on capital inflows (e.g., a tax on short-term capital inflows) might, by reducing the flow of funds to the real estate sector, decrease aggregate demands arising there. The perturbation to the economy arises from an increase in capital inflows. It may be desirable to target the response to the source of the perturbation.

More formally, assume a social welfare function of the form

$$V(Y^{d_1}(\beta L^1(r, \alpha), r), Y^{d_2}(L^2(r, \alpha), r), \alpha, \beta, r).$$

Social welfare is a function of the demand for (output of) goods of type 1 and 2, each of which is a function of the interest rate and/or credit availability. But the credit availability functions differ, and in particular, for good 1 (which we can think of as "unproductive" real estate) credit availability depends on foreign capital inflows, so $L^1_r > 0$, and a tightening of cross-border capital flows (reflected in a reduction in β) reduces credit availability, while loan supply to sector 2 (which we can think of as local SMEs, information about which is not readily available to international investors, so they shun the sector) depends just on domestic sources, so $L^2_r < 0$ (when returns on government bonds increase, banks find it less attractive to lend),[33] and lending does not depend on restrictions on cross-border flows.

This leads to the first order condition for r

$$V_{Y_1}[Y^{d_1}_L \beta L^1_r + Y^{d_1}_r] + V_{Y_2}[Y^{d_2}_L L^2_r + Y^{d_2}_r] + V_r = 0.$$

In setting the interest rate, we pay attention to the direct distribution effects (V_r), as well as to the effects on the composition of output. Assume that an increase in interest rates leads to an expansion of the "unproductive" sector 1 and a contraction of sector 2[34] (i.e., $Y^{d_1}_L \beta L^1_r + Y^{d_1}_r > 0$ while $Y^{d_2}_L L^2_r + Y^{d_2}_r < 0$), then we will set the interest rate at a lower rate than we

would otherwise. For example, we might be more tolerant of moderate inflation, realizing that, at the margin, the cost of a slight increase in inflation is less than the cost of the "distortion" in the composition of output.

But if we can restrict capital inflows by lowering β, then the adverse compositional effects can be reduced.[35] We now have an additional first order condition

$$V_{Y_1} Y_L^{d_1} L^1 \beta + V_\beta = 0.$$

With two additional regulatory instruments, α and β, we can obtain still better outcomes. The additional first order condition is given by

$$V_{Y_1} Y_L^{d_1} L_\alpha^1 + V_{Y_2} Y_L^{d_2} L_\alpha^2 + V_\alpha = 0.$$

For instance, assume that inflationary pressures are related to the sum of demands for the two goods (in more realistic models, composition will matter as well). Then, we can choose $\{\alpha, \beta, r\}$ such that

$$Y^{d_1} + Y^{d_2} = Y^*,$$

and then, among the non-inflationary policies, choose the one which maximizes welfare, taking into account compositional and distributional concerns. This result is hardly a surprise: in this simple model, we have three objectives – full employment, distribution, and the composition of output, and we can do better with three instruments than with one, or even two.[36]

In this model, without the use of regulatory constraints, even moderate changes in the interest rate may not be able to dampen demand significantly, when a country faces inflationary pressures, because of countervailing effects of increases in interest rates on Y^1 and Y^2: higher interest rates may dampen sector 2, but lead to an expansion of sector 1 because of capital inflows. By the same token, if the country faces unemployment, and a shortage of aggregate demand, lowering interest rates may be ineffective, because while it may lead to an expansion of the second sector (if the financial system is working well), it may lead to a flow of funds abroad (or reduced inflows of funds), weakening the first sector.

But even if increasing interest rates worked in reducing overall demand, in an attempt to countervail a surge of capital from abroad that led to inflationary pressures, a policy of increasing the reserve requirements and lowering interest rates (or increasing them less

than they would otherwise be increased) may be preferable to just raising the interest rates. Assessing the impacts entails analyzing the differential effect on the availability of domestic credit to SMEs, and the terms on which it is made available. More generally, in comparing two policies that have analogous effects on inflation, one has to ascertain the differential compositional effects. These will depend on the supply elasticities of foreign capital and the response functions of banks (which in turn depends on their risk aversion, risk positions, and risk perceptions.) But the CB can "steer" credit toward the desired sector, either through hard constraints – a requirement that at least a certain fraction of lending go to SMEs – or softer constraints – differential reserve requirements or deposit insurance rates, depending on the composition of lending.

Even better outcomes can be obtained by employing such policies in combination with a policy of capital inflow constraints (β) (with the interest rate set to hit the target levels of inflation), if it is feasible to impose such constraints. Both policies have the benefit of reducing excessive inflows of capital, the short run distortions that result (as the foreign capital inflows go disproportionately into one sector, one associated either with less positive externalities or more negative externalities than the other sector), and the long run instability associated with these "excessive" capital inflows.

Such policies, designed to offset the source of the perturbation to the economy, are, not surprisingly, superior to the employment of a single regulatory constraint, and that in turn is superior to the employment of no regulatory constraint, relying only on interest rates.

Obviously, the optimal mix of policies will depend on the economic environment (the state of the business cycle), both because what needs to be done will differ (e.g., whether the intent of monetary policy is to dampen excess demand or to stimulate demand, to offset what otherwise would be a deficiency in aggregate demand), and because the responses of both domestic and foreign agents will depend on the economic environment. In a recession, lowering interest rates may not, for instance, lead to a substantial increase in Y^2, but, because capital inflows are so limited, may not have much effect on capital inflows and therefore on Y^1. In a boom, especially one associated with a real estate bubble, the effect of raising interest rates on Y^1, in enhancing a flow of funds into the country, may be significant, far greater than the adverse effects on Y^2.

3.2   Micro-foundations and alternative channels and instruments

While the above discussion described policy using highly reduced form equations representing the welfare effects of changes in interest rates and regulations, it should be clear that there are well-developed micro-foundations underlying the analysis. While we do not fully articulate these micro-foundations here, it may be worth clarifying some of the channels/mechanisms through which the effects of monetary policies are felt.

For instance, there is a large literature, growing out of the work of Stiglitz and Weiss (1981, 1986), on credit rationing, where the amount that those in the SME sector can borrow depends on the value of their collateral (Kiyotaki-Moore, 1997). Greenwald-Stiglitz (1986) had shown that the effects of changes in prices (interest rates, wages) from competitive levels had a second order direct effect on utility, but a first order effect on selection, incentive compatibility, participation, credit rationing, or other constraints arising out of imperfect and asymmetric information and/or imperfect and incomplete risk markets. Accordingly, markets are essentially never (constrained) Pareto efficient, taking into account the costs of information and of creating markets; government interventions that are welfare-enhancing essentially always exist. This provides the fundamental critique of the neo-liberal position that begins with the presumption that one should not interfere with market allocations. This presumption simply has no basis in economic theory.[37]

Different instruments of the monetary authority affect different sectors differently. Raising interest rates, in the standard analysis, has a more significant impact on interest sensitive sectors. Relying on interest rate adjustments for offsetting perturbations to the economy distorts the economy, moving resources out of these sectors. But in the presence of collateral constraints, there can be further effects. Higher interest rates or the reduced availability of credit (in effect, an increase in the shadow price of capital) reduce the value of assets (like land) that are used for collateral. They therefore tighten credit constraints.

They therefore tighten credit constraints in the SME sector. In effect, the collateral constraint makes the SME sector more interest-sensitive than it otherwise would have been. There are other instruments that monetary authorities could employ to mitigate these effects: for example,

constraints on where funds are lent, so that even with an increase in the interest rate, an increased fraction of the funds are made available to the SME sector (and less to consumption).

4   Negative and positive spillovers

In the heated debates surrounding the US policy of quantitative easing, one response to complaints by emerging markets that they were being adversely affected by US policy was that there wouldn't be these adverse effects if the country's had managed their economy well. China, for instance, could have easily undone any inflationary pressure simply by letting its exchange rate rise. The problem was not with QE, but with China's management of its exchange rate.

At the same time, as we noted in the introduction, critics of capital controls argued that there were negative spillovers to other countries of such controls, for if funds were restricted from entering one country, there would be increased pressure on other countries.[38]

These two perspectives are, of course, inconsistent: the former seems to suggest that a surge of funds coming into a country has adverse effects on the country only if that country is doing something wrong; while the latter, recognizing surges may have an effect, shifts the focus to the spillovers not of the original source of the liquidity, but to those attempting to divert the funds away from themselves.

In our earlier analysis, the actions of each (large) country – its choice of {M, α, β} – does have effects on others, which it won't take into account in an uncoordinated equilibrium. The spillovers can be either positive or negative. For countries whose macro economy is correlated with the large country upon which we are focusing, the spillovers of demand creating policies (e.g., an increase in M) is positive; for countries whose macro economy is negatively correlated, the externalities will be negative.

If the monetary authority in country i is expanding M to stimulate the economy, but much of the increased liquidity is being used to make investments in country j, j's imposition of capital controls may exert a positive externality on country i: more of the funds may actually go to where they were intended.[39]

In section 2, we analyzed the externality of country i's monetary policy on country j, showing that the magnitude of the impact of welfare can be assessed simply by looking at the *direct* impact, assuming that there were

no adjustments in policy (assuming that in the initial situation, policies were optimally determined).

There is one special case that deserves attention. In a standard neoclassical model (no credit constraints, collateral constraints, etc.), if the impact of i's policy on j is solely through the interest rate, then the effects are purely distributive. If country j is borrowing B dollars from country i, then country j is better off by the amount of the savings in interest payments, and those in country i are worse off by the same amount. The converse is true when there is an increase in the interest rate. In such a situation, one should not expect the borrower to complain about interest rate reductions.[40] But the United States, a large borrower on global capital markets, complained about the "savings glut" from China the effect of which was to lower the interest rate it paid.

But the analysis above highlighted the many channels through which monetary policy has its effects. An unexpected lowering of global interest rates as a result of US monetary policy hurts lenders and helps borrowers. There can be large real effects from these within country redistributions which more than outweigh the cross-country redistributions.[41] Thus, foreign countries can be hurt both by the lowering of global interest rates and by the subsequent increase. (Greenwald and Stiglitz, 1993).

There can be a host of other effects. For instance, assume that the jth government's policy is defined by the magnitude of the intervention in the exchange rate market. The exchange rate itself is endogenous. With a fixed intervention, the lowering of i's interest rate leads to an increase in j's exchange rate, e. Then

$$dV^j/dr^i = \partial V^j/\partial r^i + (\partial V^j/\partial e)\,(\partial e/\partial r^i).$$

The first term represents the direct effect (e.g., on the cost of borrowing from abroad), and the second term represents the impact on welfare from the change in the exchange rate. The second term can (and often seems to) dominate the first.

Alternatively, assume that the government's policy is defined as setting the exchange rate, but to do that, it must alter the level of intervention in the foreign exchange market, denoted by I, and there are real costs to doing so. The exchange rate itself was set so as equalize the marginal benefits of adjusting the exchange rate with the marginal costs. Then

$$dV^j/dr^i = \partial V^j/\partial r^i + (\partial V^j/\partial I)\,(\partial I/\partial r^i),$$

where $\partial I / \partial\, r^i$ is the changed level of intervention in the foreign exchange market required to maintain the exchange rate at a fixed level. Again, we've seen how i's monetary policy can impose costs on country j.

So far, we have focused on the costs imposed by a particular *action* in country i. But there are costs associated with particular *policies*.[42] For instance, a monetary policy by the large country associated with larger variations in the interest rate will lead to the design of policy frameworks in other countries more capable of responding to these large changes. The country might, for instance, have larger reserves, so that it could better manage the resulting exchange rate volatility. But, of course, there is a large cost associated with holding larger reserves. (Rodrik, 2006, Korinkek and Serven, 2011).

5   Why monetary policy has any effect: the centrality of constraints

This chapter is about how the actions of one monetary authority spill over into other countries. To assess that, as we have repeatedly said, one has to understand the channels through which monetary policy affects the economy. We have argued that it is not only through interest rates but also through credit availability and collateral constraints. It can affect the flow of capital into a country, as well as exchange rates. In the standard neoclassical model, the main effect, however, is through interest rates. In this section, we argue that if the neoclassical model were correct, monetary policy would have little or no effect, and therefore monetary authorities *must* focus on market imperfections, in particular on capital market imperfections. We also explain how these constraints may have played an important role in simultaneously limiting the effectiveness of QE in the United States and in enhancing the magnitude of the spillovers to other countries.

5.1   The Modigliani Miller theorem and the (almost) irrelevance of monetary policy

The starting point of any neoclassical analysis of monetary policy should be the most important theorem in finance: the Modigliani Miller (MM) theorem. Some years ago, I proved a generalization of the MM theorem for the public sector, which argued that, under the idealized conditions

under which the MM theorem held, public financial operations, such as a change in the maturity structure of government debt, should have no effect (Stiglitz, 1981, 1983). (The result could also be thought of as a generalization of the Barro-Ricardo theorem, suggesting that government debt itself had no effect.)[43]

The intuition, of course, is simple, and it is the same that underlies the Barro-Ricardo analysis. Putting aside any distributive effects, we owe money to ourselves, so government debt is simultaneously a liability and an asset. This fact provides the basis for an important critique to those excessively worried about government debt, at least when it is internally held. (It's another matter when the debt is held by foreigners, because then the debt amounts to a diminution in the country's "net worth.")

If the government borrows more now (instead of paying for current expenses by raising taxes), to be repaid at some later date, the effect can and will be precisely offset by the representative consumer saving more, and using the funds to repay the government debt later. But in the general equilibrium formulation, there can be multiple heterogeneous individuals, and the result holds, assuming, of course, that those who would have paid the taxes now pay the "equivalent" amount later (i.e., that there are no distributive consequences to the postponement of the taxes). And the same holds if the government decides to raise more funds by a sequence of short-term borrowings, rather than by long-term debt.

The empirical evidence is overwhelming that the Barro-Ricardo theorem – and my generalization of it – do not describe the world in which we live.[44] The question is not the validity of the analytic proposition, but why it fails. And what insights does this provide us into capital markets and the workings of monetary policy?

5.2   Distributive effects, capital constraints, and seeing through the public veil

It should be obvious, from the start, that it is hard to avoid distributive effects, the absence of which are essential to the validity of the Barro-Ricardo result. With finitely lived individuals, the decision to postpone financing for current expenditures through taxes has potentially important intergenerational effects. To be sure, there may be partially offset through changes in intergenerational transfers, but the fact is that most individuals do not leave any significant bequests to their children,[45] in which case there can't, and won't, be such offsetting bequests.

A variety of capital market imperfections provide the basis of the strongest theoretical critique. If individuals would, for instance, want to have borrowed more, but are constrained from doing so, the existence of an incremental future liability will not induce them to start saving. The borrowing constraint will simply be less binding than it was before. By the same token, were the government to decide to tax more and borrow less, the individual facing a borrowing constraint won't be able to offset the effect through increased borrowing.

In reality, most individuals do not fully incorporate future tax liabilities into their budget constraints – and they incorporate the "risk pattern" even less. Thus, as a result of a change in the maturity structure of debt (or a shift from unindexed debt to indexed debt), changes in the risk pattern are not offset by corresponding changes in their portfolios.

5.3   Institutional constraints, Credit availability, profit maximizing risk-averse firms, and the liquidity trap

It is clear that the idealized world of Modigliani-Miller provides an inadequate description of the economy.[46] There is a widespread assumption that monetary policy – even quantitative easing – has some effects.

And it is easy to understand why it would have at least some effects in a world in which there are not only distributive consequences to monetary policy but deep capital market imperfections, both those arising from imperfections of information and from institutional rigidities. For instance, an increase in deposits held by the banking system in the Federal Reserve ("base money") as a result of an open markets operation, can, through the credit multiplier, lead to increased lending. I say *can,* not necessarily *will,* for banks are (for the most part) profit- maximizing, risk-averse firms,[47] and they may decide the best way to allocate their portfolios is not to issue new loans to, for instance, SMEs, but to buy government bonds from the household sector or from abroad, or simply to hold the excess liquidity at the Fed. This can give rise to a liquidity trap, though one that is distinctly different from that discussed by Keynes and some more recent commentators, which focuses on the zero lower bound on the interest rate.

The distinction is important: Keynes was confronting a situation where prices were falling at 10 percent a year; real interest rates remained in excess of 10 percent, so it was plausible that the inability to lower real interest rates represented a constraint on the ability of monetary

authorities to ignite the economy. Today, however, there is moderate inflation of less than 2 percent, so real (T-bill) interest rates are negative. To be sure, at a sufficiently negative real interest rate, individuals might be spurred to consume more and firms to invest more. But within reasonable ranges, changes that further lower (expected) real interest rates to −4 percent – even were they feasible – are unlikely to spur much further investment or consumption.

For many smaller businesses, the real constraint is the lack of availability of credit (a problem that simply cannot be analyzed in a model with perfect capital markets). Providing more liquidity to banks does not necessarily lead either to more lending or to lower lending rates (Greenwald-Stiglitz, 2003).

5.4   The ineffectiveness of temporary interventions

To understand whether, and how, monetary policy affects the economy, one must thus go beyond the neoclassical model, to an analysis of the role of banks, credit rationing, and capital market imperfections more broadly.

This is especially important when we consider the impact of what are proposed as short-term, temporary interventions. There is an understanding, for instance, that at some time quantity easing will be reversed. But in the standard neoclassical analysis, all market participants are forward-looking. They know that it will be reversed, and they take that into account in their decisions today. This presents a puzzle as to how behavior can be affected, except through the relatively small changes in intertemporal substitution that occur over the period of the intervention.

Consider, for instance, a temporary intervention – buying long-term bonds now, under the presumption that the economy will recover in a couple of years, in which case the action will be reversed. Apart from slight changes in endowments (increases in the levels of state variables like human and financial capital) that might have been induced by the temporary intervention, at t + 2, asset prices will be the same as they would have been before the intervention. Knowing this, it is hard to see why there should be large changes in asset prices (share prices) at t and t + 1. With lifetime budget constraints essentially unchanged, it is hard to see why there should be any significant changes in consumption at t and t + 1, even if there should be some changes in asset prices.

There is even an argument for why consumption might be depressed. As the Fed bought long-term bonds, there was the obvious risk that when it reverses the purchases as the economy recovers, there would be a capital loss. The expectation of such a capital loss, with full integration of the public and private budget constraints, should have contracted consumption, offsetting the intended effect of expanding consumption. The Fed suggested it might hold the bonds to maturity, using other ways of tightening credit, for example, by paying interest on deposits at the Federal Reserve, in effect enabling it never to realize the capital losses. But these actions only mask the reality that (the present discounted value of) government revenues are less than they otherwise would have been; they don't change the predicted adverse effect on consumption, assuming full integration and rationality.[48]

Of course, in models with less than perfect rationality, market imperfections and high degrees of risk aversion, such temporary interventions can have effects. One of the arguments of the advocates of QE is that it leads to higher stock market prices, and higher stock market prices lead to more consumption. There are two questions: why should one expect a *temporary* intervention to lead to higher stock market prices (today), and why should higher stock market prices today lead to more consumption. Individuals focusing on cash flows that had much of their wealth in bonds that roll over see cash reductions in cash flows. As the financial press continually describes the response to low interest rates, it leads to a "search for yield." There is, of course, no general theory that would suggest that as yields go down, individuals act in a less risk-averse manner; quite the contrary, the adverse wealth effects might more plausibly lead to more risk-averse behavior. But if individuals do behave in this way, it in turn leads to an increase in the price of stocks – even if those individuals "rationally" realize that the forces leading to this increase (above what the prices would otherwise be) are just temporary.

But even if this policy did lead to higher stock prices, it does not necessarily imply that the policy leads to significantly increased consumption. If the reason for the increase in stock prices is the "search for yield," then it reflects a worsening of the lifetime budget constraint as a result of lower interest rates, and net that should have ambiguous effects on consumption, with wealth and substitution effects operating in opposite directions.

But there is another set of effects that may be operating. The standard model ignores the intergenerational distributive effects of monetary

policy, which become apparent in models of "overlapping generations": those who go into retirement at t and t + 1, and had been planning to sell their assets, will now receive more from them than they otherwise would have received, and this group may consume more than they otherwise would have. But once we start focusing on distributive effects, we need to take into account those associated with the lowering of interest rates: those prudent older people who had invested in short-term government bonds will find their incomes lowered as interest rates are reduced, and for many of these, a lowering of income translates quickly into a lowering of consumption. It is at least conceivable that in a situation where there is excess capacity in industry and real estate, and excess leverage in households, that this adverse consumption effect among the elderly could outweigh any inducement toward more investment or consumption among firms or non-elderly households. Therefore, lowering interest rates could have an adverse affect on aggregate demand.

5.5 Other adverse effects of QE

There are many other potentially significant effects that are typically ruled out in the "standard" model: lower interest rates lead to more capital intensive technologies, laying the seeds for a "jobless" recovery; lower interest rates can lead to asset price booms, increasing the prices of oil and other commodities which act much like a tax on consumers.

Here, I do not wish to argue for the quantitative importance of any of these effects. What I do contend is that once one moves away from the "perfect markets" model, or the "almost perfect markets" model, in which we know that monetary policy should have no (or negligible) effects, we have to be careful in thinking through the source of "imperfections." Too much reasoning has been based on a pastiche of analyses based on "rationality," "rational expectations," and "well-functioning markets" overlaying a variety of forms of imprecisely specified and explained market imperfections. I've alluded to some examples already: while there is ample discussion of markets "discounting" future actions, temporary measures, it is still believed, can have significant effects.[49]

5.6 A clogged credit channel

Capital market imperfections help explain why monetary policies have a greater effect than might be the case in neoclassical models, but they also help explain why in some instances, the effects are limited. Some of the

disappointments with QEII and QEIII arise from market imperfections – as they existed at the time of the implementation of these policies. It should have been no surprise that QE would have limited effects on SME lending, given the role that local (community) and regional banks play in the provision of credit to SMEs, given the weaknesses that persisted in these banks, given the role that collateral plays for such lending, given that real estate is the predominant form of collateral, and given that real estate prices remained persistently and markedly below the level before the crisis. (There might have been a slight positive effect on lending, as a result of the increased value of real estate – loosening the collateral constraint.[50] Given that large firms were sitting on large amounts of cash, it should be no surprise that QE might have little effect on lending to large firms and/or investment by these firms.

One of the hoped-for effects was that lower long-term interest rates would lead to lower mortgage rates, which in turn would lead to large numbers of Americans refinancing their mortgages, and the lower interest rates would effectively put cash in the pockets of households, leading to more consumption. Note that underlying this analysis are implicit assumptions about distributive effects of interest rate changes. Lower interest payments by households correspond to lower receipts of interest by lenders. In representative agent models, the effect would be a wash. In models focusing on capital and institutional constraints, the effects are more complex and ambiguous. In the absence of either constraint, the redistribution from creditor to debtor should increase consumption (as the advocates of QE hoped).[51] In the presence of capital constraints (limiting borrowing by households), the effect is even stronger.

But in the presence of institutional constraints on banks, lower revenues/profits for the banks translate into less lending, an effect that could be stronger than that generated by differences in marginal propensities to consume. That conclusion, however, would itself be incorrect, for it fails to take on board the many and growing imperfections in the mortgage market. There has been increasing concentration[52] – to the point where no one would describe the market as a competitive one. Without precisely specifying the appropriate model of tacit collusion or oligopoly, it is certainly conceivable that the banks would not increase the supply of mortgages so much as to decrease their spread (their profit margins). Thus, some analysts have claimed that the consumer benefits (and thus the increase in aggregate demand through that channel) are less than had been touted, and that, like so many of the Fed's programs, the real

beneficiaries are the banks, especially the large banks that control the lion's share of the mortgage market. If that is the case, the short-run benefit to the economy, at least through this channel, will be limited.

Another market imperfection may have reduced the benefits derived from QEIII even more. Mortgages that could easily be refinanced already have been; borrowers who have not refinanced either have insufficient income or are "underwater." The mortgage could be refinanced only if there were a principal write-down. In a standard model with rationality, it would pay both lenders and borrowers to engage in debt restructuring. Foreclosures are expensive for everyone involved, including the communities in which they occur. There is enormous dead weight loss. But principal write-downs entail recognition of losses faster than would otherwise be the case, especially since the 2009 change in accounting regulations that allowed even impaired mortgages *not* to be written down. That would make the *seeming* profits in the short run lower, even if it would make long-run profits higher.

Agency problems pervade the banking system, and bank management has incentives to focus on the short run. Moreover, some banks may face high costs in raising funds (a natural capital market constraint, arising from the high level of non-transparency of the banks.) Were they to engage in extensive write-downs of principal, they would have to raise more capital.[53] In short, the level of refinancing may be far smaller than would be the case if financial markets were perfect, but analyzing the extent to which there will be refinancing, and the impact on banks and aggregate demand, entails a complex analysis of institutional constraints and imperfections.[54] Monetary policy ignores these at its peril.

These concerns are important in understanding the nature and extent of spillovers arising from the conduct of monetary policy by one country on others. Thus, if America's financial system had been less clogged, more of the liquidity created by the Fed would have gone to stimulating the American economy – the intent of the policy – and the effects on others would have been reduced.

5.7   Liquidity versus solvency

Not only is this kind of institutional analysis important for understanding monetary policy, it is essential for understanding central banks' conduct in performing one of their central roles: lender of last resort. Much is made of the distinction between lack of liquidity and insolvency, and while this

distinction is central to central banks' decisions about which banks to support, and which to let die, the distinction itself is questionable, and illustrates prevalent inadequacies in the analysis of market imperfections.

Typically, if everyone agreed that a bank is solvent, it would have access to funds; it would be liquid. The problem arises because bankers – those who have borrowed too much and put too much of their money into risky assets – believe that the asset prices will recover, and that their "fundamentals" are strong. The fact that other market participants don't agree should give government pause. But the bankers worked hard to convince the government that – in this particular instance – the market is wrong. But when the market was irrationally exuberant, they fought equally hard to ensure that the government took at face value asset prices; it would have been viewed as unacceptable to question the market, to take 20 or 30 percent off market prices, in assessing bank balance sheets, on the grounds that prices were inflated by a bubble.

Even in their conduct in the role of lenders of last resort, central banks need to be mindful of spillovers. Large banks in large economies engage in global lending, and (as became evident in the crisis of 2008), the failure of a large multinational bank will have global consequences. While the citizens of the country engaged in the bailout bear the costs, some of the benefits of the bailout are reaped abroad. This suggests that, without global coordination, there might be an undersupply of bailouts.[55]

6   Concluding comments

There are five essential insights of the Greenwald-Stiglitz [2003] approach to monetary theory and policy:

1   One of the main channels through which monetary policy affects the economy is through impacts on credit availability.
2   If that is the case, then the analysis of credit availability should be front and center in monetary policy.
3   In most countries, banks play a dominant role in the provision of credit, and for good reason,[56] and if that is the case, then the analysis of bank behavior should be front and center in monetary policy.
4   The interest rate that matters for much economic activity is the firm borrowing rate, and the spread between that rate and the T-bill rate is an endogenous variable.

5 One cannot and should not separate out regulatory instruments from the conventional instruments of macroeconomic policy (e.g., open market operations), and monetary authorities should employ a full panoply of instruments.

The Greenwald-Stiglitz analysis is based on a critique of traditional models in which the effects of monetary policy are mediated just through interest rates, and the only interest rate that mattered was the T-bill rate.[57] In these models, there is no credit rationing, and prices (including real interest rates) are set to ensure demand equals supply. In the Greenwald-Stiglitz models, monetary policy is largely mediated through the banking system. The lowering of interest rates may (or may not) be reflected in a commensurate lowering of lending rates or a commensurate increase in credit availability. Indeed, there is a new version of a liquidity trap – not caused (as Keynes suggested) by a high elasticity of the demand for money, but by a low responsiveness of banking sector lending, even as the central bank provides the banking sector with more liquidity. This is precisely what has been happening in the United States and Europe, and the theory developed by Greenwald and Stiglitz anticipated and predicted this kind of liquidity trap well before it became evident in the aftermath of this crisis.

This chapter has focused on a "global" model of monetary policy and credit creation, where the actions of monetary policies in one jurisdiction can and do have effects on the level of macroeconomic activity in other jurisdictions.

The analysis has shown that (a) cooperation is desired among monetary authorities; (b) cooperation can be achieved more easily if there are a multiplicity of instruments, because it is easier to achieve outcomes that Pareto dominate the Nash equilibrium; (c) there are instruments (like restrictions on cross-border capital flows) that reduce externalities and increase the effectiveness of monetary policy on the domestic economy; it was wrong for these policies to be eschewed for so long; (d) there are good reasons for monetary authorities to be concerned about the structure of the economy and the distribution of income, and if they are, it is important for them to make use of a multitude of instruments; (e) in particular, seemingly unconventional policies, like responding to an influx of capital by simultaneously lowering interest rates, raising reserve requirements, and restricting capital inflows may be highly desirable.

Some central banks have shown a predilection for using only one instrument – the interest rate (typically adjusted through open market operations). This is predicated on the belief that price instruments are superior to other forms of intervention, based on some variant of a neo-classical model. But underlying such analyses is a fundamental cognitive dissonance: government control of a fundamental price is a massive intervention in the market, only justifiable because of major (macroeconomic) market failures. There is no theorem that says, in general, that when there are such market failures, optimal interventions should be through a single instrument, or that that instrument should be a price instrument (the interest rate), or that the adjustment in that instrument should be simply related to a single signal of market disequilibrium, the inflation rate (the Taylor rule), regardless of the source of the perturbation to the economy, though there may be highly idealized circumstances in which that may be true.[58] In general, given the pervasiveness of market imperfections and the multitude of disturbances that can throw an economy off kilter (disturbances on the demand and supply side, disturbances originating within the domestic economy or from abroad, and if from abroad, from trade or from finance), it is desirable to have at one's disposal a panoply of instruments. Monetary authorities do have multiple instruments. Not using this full panoply has resulted in self-inflicted wounds.[59]

Neoliberal policy doctrines are flawed, not only in constraining unnecessarily the set of instruments, but also in not identifying the full range of market failures. We have argued that the government needs to be concerned about the distribution of income and the composition of output, both of which are affected greatly by monetary policy and the choice of instruments utilized by monetary authorities. Relying on interest rate adjustments imposes greater costs of adjustment for macroeconomic disturbances in sectors and firms that are more interest sensitive, and even more so, when credit availability is mediated through the banking system (as it typically is), in those sectors and firms that are more reliant on bank finance (such as the SME sector) and/or more constrained by collateral. If firms are risk (volatility) averse – a hypothesis for which there are both strong theoretical and empirical foundations (Greenwald-Stiglitz, 1990, 1993) – then the economic structure is distorted away from such sectors. So, too, a broad set of welfare costs and benefits are associated with policies that expose a country to greater or less exchange rate variability.

In section IV, we explained that the pecuniary externalities associated with interest rate and exchange rate adjustments have real welfare consequences. This chapter has delineated the important macroeconomic spillovers on others that arise from the monetary policy of a large country. Achieving global (Pareto) efficiency requires global coordination. Expanding the set of instruments makes it easier to achieve Pareto improvements over the Nash equilibrium that otherwise would have occurred. But in the absence of global coordination, we have shown how governments, by using a wider range of instruments, including capital controls, can reduce the impact of such actions on their economy. While a coordinated use of such instruments is preferable to their uncoordinated use, there is a presumption that some use of such instruments, even in an uncoordinated way, is better than no use. The attempt by the United States to unduly restrict the use of these instruments (including through trade agreements now under negotiation) is, from the perspective of global welfare, a mistake.

We have argued that to understand the impacts of various instruments and the cross-border externalities that they exert, one must go beyond neo-classical models, in which the effects of many of the key policies are at most limited, and others simply impose distortions. Not only credit and collateral constraints need to be taken into account, but also market "irrationalities." And this is especially so in the case of temporary interventions, where the presumption is that rational forward looking markets would take into account the consequences of the future reversal of the policy, limiting the effectiveness of such policies. Should asset prices be affected, the effect of these changes in asset prices on consumption or collateral constraints should be limited.[60]

While the analysis of this chapter has focused on equilibrium models, market responses to perturbations, especially in models with credit rationing and unemployment, may be unstable: unemployment may, for instance, lead to a lower share of wages, lowering aggregate demand, and increasing unemployment still further. Standard policy prescriptions may make matters worse: a supply side shock, part of which gets passed on in the form of higher prices, under inflation targeting will lead to higher interest rates, exacerbating the adverse effects of the supply shock on the macroeconomy. To these instabilities, we have now added a third: with long and variable effects of actions, especially as the effects are felt on distant shores, in the absence of cooperation among monetary authorities, the global economy may not converge quickly or smoothly even to the (inefficient) equilibrium. But this is a topic for a later chapter.

Notes

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1   See, for example, papers by McCallum and Nelson (2000) and Smets and Wouters (2002).

2   A similar analysis applies to a large economy with a large competitive fringe that responds in a similar way to any action by the large economy, except in that case, it is more natural to describe the equilibrium as a Stackleberg equilibrium than as a (symmetric) Nash equilibrium.

3   It makes little sense to analyze the role of monetary policy in the context of models in which markets on their own are efficient, and there would, accordingly, be no need for monetary policy.

4   Krishnamurthy and Vissing-Jorgensen (2011) found the most sizeable impacts and argue, using an event study method, for a "significant drop in nominal interest rates on long-term safe assets," but a much smaller impact on less safe assets such as corporate Baa rates. They also find expected inflation impacts, implying lower real rates. However in contrast, Chen et al. (2011) find more "moderate" effects: GDP growth of less than a third percentage point and a "very small" effect on inflation. Other related papers adding to this point: Wright (2011) finds that "stimulative monetary policy shocks lower Treasury and corporate bond yields, but the effects die off fairly fast, with an estimated half-life of about two months." Kiley (2013) examines the impact of the unconventional monetary on private yields and finds the effectiveness is attenuated in recent years at the zero lower bound compared to prior 2008.

5   The Cleveland Fed has found that lending to small and medium businesses is likely still more than 20 percent below its pre-crisis levels. "In the fourth quarter of 2012, the value of commercial and industrial loans of less than $1 million – a common proxy for small business loans – was 78.4 percent of its second-quarter 2007 level, when measured in inflation-adjusted terms" (Federal Reserve Bank of Cleveland, 2013). Large enterprises are sitting on large amounts of cash. It is not the availability of finance that is constraining investment, and it is unlikely that reductions in interest rates will likely lead to more investment. The effects on consumption are taken up more directly below.

6   See Ostry et al. 2012

7   Korinek (2013) has provided a deep analysis of the circumstances under which coordination in the imposition of such controls might be desirable.

8   This has, of course, been a longstanding argument of advocates of capital account management. See, for instance, Stiglitz et al. 2006 and the references cited there.

9   Too extensive to provide adequate referencing.

10 Thus, several of the results noted above (that monetary policy in an open economy is markedly different from that in a closed economy; that the imposition of capital controls increases the policy space available to a country; that policy coordination is desirable, and that there can be benefits from the use of additional instruments) have been noted in each of the separate literatures referred to earlier.

11 The utility functions can be the same (i.e., the only difference can be the economic circumstances, reflected in θ^E and θ^W).

12 As recently suggested by the work of Greenwald and Stiglitz (2006, 2014), where some sectors of the economy are more amenable to learning and have larger spillovers to other sectors, so that changes in the composition of output affect the growth rate.

13 For a broader discussion of these issues, see Stiglitz (1998b, 2012, chapter 9).

14 For a further elaboration of the ideas presented here, see Greenwald and Stiglitz, 2003.

15 The number of insured institutions on the FDIC's "Problem List" was 772 during the first quarter of 2012. 140 banks failed in 2009, 157 in 2010 and 92 in 2011 (FDIC Failed Bank List, 22 October 2012).

16 An increase in M^i can have other externalities on country j, (e.g., as a result of the expansion of income in country i, which increases imports).

17 For a broader critique of the excessive reliance on interest rates by central banks, see Greenwald and Stiglitz, 2003 and 2013, and Stiglitz et al., 2008.

18 There is a long-standing literature (Persson and Tabellini 1995) showing the benefits of coordination if countries have incentives to employ monetary policies to exert monopoly power over international prices, and that capital controls (to be discussed shortly) can have such effects (MacDougall, 1960, Kemp, 1962, Hamada, 1966, Jones, 1967, and Obstfeld and Rogoff, 1996). But in a world with large countries, there will always be such effects.

19 Cooperation requires that both parties are better off than in the Nash equilibrium. Even without transfer payments, by bargaining over αi , β^i, and M^i, a Pareto improvement can be achieved.

20 See, for example, Newbery and Stiglitz (1984), where trade liberalization lowers welfare as a result of the increased uncertainty. Moreover, even in the conventional trade story, there are distributional effects of trade liberalization. Redistributions are not costless, and taking this into account, it is not necessarily the case that social welfare is increased.

21   As we noted in the previous footnote, in the presence of risk, without good
      risk markets, trade liberalization may in fact be Pareto inferior. Moreover,
      in more dynamic contexts, where there is learning, trade liberalization may
      have adverse effects on growth and long-term well being. See Greenwald and
      Stiglitz (2006, 2014).

22   The same argument goes for "forcing" labor market liberalization. Allowing
      free mobility of labor has greater efficiency benefits than allowing the free
      mobility of capital, given the larger disparities in wages than in returns
      to capital. But even given the seeming benefits to labor immigration,
      that parallel those associated with capital inflows, most countries impose
      restrictions, partly because of the significant distributive consequences than
      cannot easily be offset.

23   For a survey and discussion of the debate over capital market liberalization,
      see Stiglitz and Ocampo (2008) and Stiglitz (2000 and 2002). For an analysis
      explaining why capital market liberalization can lead to more volatility, see
      Stiglitz, 2003. For a discussion of why financial market integration can lead
      to poorer global economic performance as a result of contagion, see Stiglitz
      (2010b and 2010c.) For a discussion and empirical evidence of why financial
      market liberalization may lead to lower growth and more instability, see
      Rashid (2011).

24   There is, in this sense, an underlying market failure: the absence of a full set
      of risk markets.

25   This kind of argument – that in a world with incomplete risk markets, each
      investor takes the price distribution as given, but when they all invest more
      in, say, the risky asset, the price distribution changes – was first developed
      in Stiglitz (1982). More recently, it has been used to explore a wide variety of
      macroeconomic failures (e.g., associated with fire sales). See, for example,
      Korinek (2010, 2011) and Jeanne and Korinek (2011). See also Korinek,
      Roitman, and Vegh, 2010 and Diamond and Rajan, 2011.

26   The equivalent dollar value of these changes in utility can be similarly
      analyzed, using the expenditure function.

27   That is why the focus by some monetary economists on the zero lower
      bound to interest rates is misplaced, and why the analogy sometimes given
      to the Keynesian liquidity trap is also misconceived. See the discussion
      below.

28   Between 30 June 2004 and 29 June 2006, the Federal Funds rate was raised
      from 1 percent to 5.25 percent, but this did fairly little to curb the real estate
      bubble.

29   There are a large number of other theoretical and empirical arguments
      explaining why a standard neoclassical model provides an adequate
      description of the economy, and, in particular, does not provide the basis for
      the analysis of the impacts of monetary policy. For instance, in a standard

neoclassical model, prices convey all the relevant information; information about "quantities," such as the exposure of a country to short-term foreign denominated debt, would be irrelevant. Yet, at least since the East Asia crisis, international policy makers have emphasized the importance of such information. For a fuller discussion of these issues, see Greenwald and Stiglitz (2003).

30 In a more general version of this model, government might be concerned with the distribution of income, for example, between banks, firms, and consumers, which is affected directly by r and r^l. We can then write

$V(Y, r, r^l(r))$. An increase in the T-bill rate may affect not only the level of aggregate demand (through the level of lending activity) but also affect welfare through impacts on the distribution of income.

31 See, for example, Greenwald Stiglitz (2006 and 2014) and Stiglitz (2012).

32 Note that the persistence of unemployment is, itself, evidence that the standard neoclassical model provides an inadequate description of the economy.

33 For an analysis of the theory of loan supply, see Greenwald and Stiglitz (2003).

34 While the higher cost of capital might by itself lead to the contraction of the sector, the effect is more than offset by the greater availability of credit.

35 Though the optimal interest rate may still be lower than it would have been without the capital inflow, since inflationary pressures emanating from sector 1 would have been reduced.

36 In general, if there is an imperfect set of risk markets, then we will want to use as many instruments as we have available. See Stiglitz (2014).

37 We also showed that whenever risk markets are incomplete (as they always are), markets are not constrained Pareto efficient. See also Geanakoplos and Polemarchakis, 1986.

38 Forbes et al. (2011) and Lambert et al. (2011) attempt to identify the magnitude of the spillovers arising out of Brazil's imposition of capital controls.

39 Alternatively, though, they could go to countries with lower yielding returns, implying an adverse effect on the investors in country i that have had access to the funds.

40 Korinek (2013) has identified the set of circumstances – in particular, if the controls are designed to correct for domestic externalities – in which the imposition of currency controls by one country imposes no externalities on others, so that global coordination is not necessary.

41 The within-country redistributions are complex. A lower (than expected) interest rate may help corporate borrowers and hurt lenders. In a world in which there are credit constraints, the adverse effect on lenders may be particularly harmful. In a world in which many borrowers are fragile, the positive effect on borrowers may be particularly beneficial.

42   We can think of a policy as a rule that maps a realization of θ into a set of monetary actions {M, α, β}.

43   That work itself was based on my generalization of the MM theorem (Stiglitz, 1969, 1974), work which itself, together with Stiglitz (1982b), explained the limitations of the theorem.

44   See for example, Johnson, Parker and Souleles (2006). Anecdotally, when Bush cut taxes dramatically in 2001 and 2003, the average savings rate fell to near zero – it did not increase, as the Barro-Ricardo analysis would have suggested. Of course, there were many other things going on, and defenders of the theory might argue that were it not for the tax cut, savings would have been even lower (i.e., minus 2 or 3 percent of GDP). But with credit constraints already binding for so many individuals – and with the bottom 80 percent of America already consuming 110 percent of their income – it is hard to believe that in the absence of the tax cuts, the savings rate would have been that low.

45   In fact, large fractions of the population have little wealth – and hence no bequests of significance. According to the US Census Bureau, in 2010, almost 20 percent of American households had zero or negative wealth, and almost 50 percent of those with at most a high school diploma had zero or negative wealth. The median holdings of financial assets by the 20 percent of families with lowest income was only $1100, and for the next quintile, it was only $5200, according to the 2010 (down from $1800 and $7300, respectively, in 2007) Federal Reserve Board Survey (Bricker, J., Kennickell, A. B., Moore, K. B., and Sabelhaus, J. (2012) "Changes in US Family Finances from 2007 to 2010: Evidence from the Survey of Consumer Finances." *Federal Reserve Bulletin,* June, 98(2)). Wolff and Gittelman (2011) find that between 1989 to 2007, only "21 percent of American households at a given point of time received a wealth transfer and these accounted for 23 percent of their net worth" (32). They also find that wealth transfers as a proportion of current net worth fell sharply over this period, from 29 to 19 percent. For earlier periods, Paul Menchik and Martin David (1983), using probate records of men who died in Wisconsin between 1947 and 1978, estimated that the average intergenerational bequest amounted to less than one-fifth of average household wealth in 1967 and about 10 percent of the average household wealth of families headed by those ages 65 or over. Michael Hurd and Gabriella Mundaca (1989) found from the 1984 "Survey on the Economic Behavior of the Affluent" data that only 12 percent of households in the top 10 percent of the income distribution reported that more than half their wealth came from gifts or inheritances, and only 9 percent in the 1983 "Survey of Consumer Finances."

46   My own earlier work on asymmetric information and stressing the importance of bankruptcy provided part of the critique. Higher debt

ratios may entail higher (expected) losses from bankruptcy and may have signaling/screening effects. (Stiglitz, 1969, 1982). But these "limitations" are not relevant, at least for countries like the United States, where there is essentially no risk of default.

47   I should be more cautious: given the agency issues that were revealed so vividly in the crisis, they might be better described as managerial enterprises, maximizing the well being of the managers, subject to certain constraints on the access to credit. In either case, we have to describe the *behavioral* responses to a change in, say, base money or T-bill interest rates.

48   The irony is that government insists that banks use mark to market accounting, but the central bank doesn't do so itself.

49   They can, but typically only through substitution effects (a temporary investment tax credit or VAT tax), or through redistributive effects (e.g., the recapitalizations of the banking system, transferring, often in a non-transparent way, resources to the banks at the expense of others).

50   But even this effect might be limited: lenders, realizing that the monetary policy was temporary, might base lending not on the value of collateral today, but on its expected future value, which might be diminished with the end of the low interest rate regime. Still, there is considerable evidence that there are institutional rigidities, so that the collateral requirements do *not* adjust as they might in a world with rational expectations.

51   It should be noted, however, that some of the holders of mortgages (the lenders) are elderly, with a high level of marginal propensity to consume.

52   William C. Dudley, president of the Federal Reserve Bank of New York, noted in a recent speech, "Federal Reserve MBS purchases have succeeded in driving down mortgage rates to historically low levels. But these purchases would have had still more effect on the economy if pass-through rates from the secondary market to the primary market had been higher ... The incomplete pass-through from agency MBS yields into primary mortgage rates is due to several factors – including a concentration of mortgage origination volumes at a few key financial institutions and mortgage rep and warranty requirements that discourage lending for home purchases and make financial institutions reluctant to refinance mortgages that have been originated elsewhere." (2012, "The Recovery and Monetary Policy." Remarks at the National Association for Business Economics Annual Meeting, New York City, 15 October. http://www.newyorkfed.org/newsevents/ speeches/2012/dud121015.html).

53   Alternatively, they could reduce lending, which would be counterproductive, exacerbating the economic downturn.

54   The list of imperfections in the mortgage market is not meant to be exhaustive. Institutional arrangements, for instance, make it difficult for lender A to refinance a mortgage held by lender B, and lender A often has

little incentive to refinance the mortgage – it will simply lower his revenues. More broadly, the mortgage servicers have little incentive to facilitate mortgage restructurings. In the last few years, Congress has attempted to grapple with these issues, with limited success. Perverse incentives of service providers have impaired bank restructurings, as have the conflicts of interest among holders of first and second mortgages.

55 Or that would be the case, if monetary authorities were not unduly influenced by the financial sector. See Stiglitz, 2010a.

56 This is beyond the scope of this chapter, except to note that they relate to problems of imperfect and asymmetric information. Securitization undermines incentives to select good mortgages and monitor; it creates enormous moral hazard problems, and credit rating agencies – the purported "solution" is inherently inadequate. Securitization makes information (about the quality of, say, the mortgages included in the securitization package) a public good, and there is no efficient and effective way by which that information can be provided privately. (The problem is similar to that discussed by Grossman-Stiglitz, 1980). The performance of securities markets in the years before and after the crisis illustrates all of these points.

57 They also provide a critique of the standard explanation of the determination of the interest rate as the intersection of the demand and supply for money. They point out that, with most "money" being interest bearing, the traditional view that the interest rate is the opportunity cost of holding money is wrong; furthermore, most transactions are not income generating, but rather than exchange of assets, so if money were required for transactions, there would be no simple and stable relationship between money and the level of economic activity (since the ratio of asset transactions to income can be highly variable), Further, most transactions do not require money; credit is typically an effective substitute, and when it is not, one needs to explain why not. (Cash-in-advance models simply *assume* that it is not an effective substitute.)

In the 1930's there was an active debate between two approaches to the determination of the interest rate: the Keynesian, based on the demand for money used for transactions purposes, and that of Robertson's (1951), which centered on the demand and supply of loanable funds. In some ways, our approach represents a further development of the work of Robertson, with two important changes. First, in his model, the supply of loanable funds was based just on savings. In ours, there is a critical role for banks, which make assessments of the credit worthiness of potential borrowers. Imperfect and asymmetric information is central. Such information tends to be local and specialized; foreign lenders (suppliers) of funds have different information than domestic lenders, so that their allocation of funds is markedly different.

Second, in both Keynes and Robertson, demand always equals supply; yet in models with imperfect and asymmetric information, there can exist rationing equilibrium. Indeed, such equilibria are pervasive.

Moreover, traditional models (of both the Keynesian and Robertsonian version) have little to say about the determination of the spread – the difference between the T-bill rate and the lending rate. If there is a difference, it only reflects a difference in (objectively determined) risk. With risk-neutral lenders and identical expectations, the expected payments are the same. If borrowers' economic activity depended only on their expected payments, and if there were no bankruptcy costs, then the spread would, in fact, be largely irrelevant. But bankruptcy costs are significant, expectations do differ, and firms are risk averse (See Greenwald and Stiglitz 1990, 1993 and Stiglitz 1972).

58 In the context of taxation, that was the major insight of Frank Ramsey. See also Stiglitz et al. (2008, 2014).

59 Such self-imposed constraints arise out of incomplete and sometimes incoherent views about market failures and the role and scope for government intervention. It also arises from the excessive influence of Tinbergen's "targets and instruments" approach, which was based on a highly oversimplified model of the economy.

60 That is, lenders, knowing that the impact on collateral values from the temporary intervention is temporary, would adjust the collateral required for any long-term lending in an offsetting way.

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3.2

Managing Capital Flows – Capital Controls and Foreign Exchange Intervention

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Abstract: *This chapter looks at the role of capital controls and foreign exchange market intervention within the policy toolkit for managing boom-bust cycles in capital flows. It considers the role of policies at the country level as well as the spillovers from those policies and the possible need for multilateral coordination. It argues that both types of policy have an important role to play, but that neither should substitute for warranted external adjustment nor be used to sustain misaligned currency values. Spillovers from the use of such policies are likely, but are not an argument against their use, per se. Nevertheless, when policy interventions themselves carry costs, coordination is likely to enhance global economic welfare, and may well need to include both source and recipient countries.*

1   Introduction

Cross-border financial flows have become an increasingly important feature of the global economy in recent decades, reflecting ongoing global financial integration that has proceeded alongside trade integration. While the advanced countries have historically dominated international asset trade, the emerging and frontier markets have increasingly become an important part of the landscape, especially when one considers the importance of net flows. No doubt this reflects the fact that capital account liberalization has been part of the development strategy of a number of emerging market economies (EMEs). But many countries today are cognizant not only of the benefits that capital account openness can bring, but also of the risks that capital flow volatility necessarily confers.

The global financial crisis has reinforced the profound financial linkages across countries, and the resulting rise in volatility generated by capital flows. Looking at the EMEs, with which this chapter is primarily concerned, inflows peaked at $665 billion in 2007, plunged to less than $170 billion in 2008, and surged again in 2009–2010 as global economic recovery gathered some initial momentum, but dried up following the US sovereign debt downgrade in the third quarter of 2011, and have been bouncing around quite a bit ever since. Taking a longer view, the boom-bust cycles of net capital flows that have been part of the landscape for a number of decades seem, if anything, to be growing in intensity, as well as affecting a greater number of countries. Managing capital flow volatility is thus a challenge that seems to be gaining in importance.

EMEs have not stood idly by, but have tried to respond in an efficacious way to these challenges, deploying a variety of policy tools. In using the instruments at their disposal, they have attempted to mitigate both the macroeconomic and the financial stability challenges that volatile capital flows may bring. The macroeconomic challenges center around the volatility of the exchange rate – sharp and excessive appreciations that can be followed by destructive depreciations when capital flows reverse. Financial stability challenges center on the excessive growth of credit, and especially worrisome in this context are short-term foreign currency loans to unhedged domestic borrowers that create negative externalities for the economy as a whole when a sudden stop occurs. Emerging market policymakers have deployed a variety of tools to manage these risks, including fiscal policy, monetary policy, exchange rate policy,

foreign exchange market intervention, prudential regulations and capital controls.

This chapter looks at how some of these tools are best deployed. It begins (section 2) with a discussion of how capital controls might be used to mitigate the macroeconomic and financial stability challenges posed by volatile flows, looking at an individual country in isolation, but taking into account that capital controls are one element of a larger policy toolkit, and examining how this particular tool is best deployed within that overall toolkit. Section III then turns to the use of sterilized foreign exchange market intervention as a potential tool to manage excessive currency volatility, which is of deep concern to policymakers. Section IV examines how policies pursued at the country level add up multilaterally, and whether there should be multilateral rules of the road to guide policies at the country level. Section V concludes.

2   The role of capital controls within the policy toolkit

It is conceptually useful to think about capital flow volatility giving rise to two distinct types of risks: macroeconomic and financial stability. On the macroeconomic side, the concern is that a temporary surge will lead to an appreciation of the exchange rate and undermine competitiveness of the tradables sector – possibly causing lasting damage even when inflows abate or reverse. The main worry on the financial stability side is that large inflows may lead to excessive foreign borrowing and foreign currency exposure, adding fuel to a domestic credit boom, an FX-denominated lending boom, and domestic asset price bubbles. How should capital controls be used alongside other instruments to manage these distinct risks?

2.1   Macroeconomic risks

As was implicit in the foregoing, the response is likely to be multipronged, and depend on the specific circumstances facing the country:

External adjustment

▸ To the degree that the *currency* is undervalued, and the current account balance exceeds its multilaterally warranted level, it is likely to be appropriate – both from the country's perspective and

critically from a multilateral perspective – to allow the exchange rate to strengthen in response to inflows. This means that in these situations, the country would be expected to refrain from intervening in the foreign exchange market to contain appreciation. If the country's exchange rate regime were a peg, rather than a free or managed float, the country would be expected to allow the real exchange rate to appreciate in response to inflows, by not sterilizing whatever intervention it undertook in the FX market (necessary to respect the peg).

▸ When the exchange rate is overvalued (or close to being so), it is likely to be appropriate to moderate upward pressures on the currency through official purchases of foreign exchange. The *intervention* would likely over time be two-way, since its purpose is to moderate the exchange rate volatility arising from capital flow volatility, rather than to achieve a specific target for the currency's value. How much intervention is appropriate for the country is likely to be guided by country insurance perspectives. These in turn depend on a variety of considerations, including the volatility of different components of the balance of payments, the openness of the economy to trade and foreign capital (especially short-term debt), etcetera. The point is simply that accumulation of reserves is likely to be bounded given possible metrics for an appropriate level of the stock from a country insurance perspective.

▸ It goes without saying that judgments about the appropriateness of the exchange rate's value or the level of reserves are complex – much more art than science. Methodologies exist to gauge misalignment or to benchmark adequacy of reserves, but they cannot function without the judgment of the policymaker and an assessment of country circumstances.

Domestic adjustment

▸ Adjustment of domestic (macroeconomic) policies (monetary and fiscal policies) may well be useful in the context of managing capital flows, but it is important to bear in mind that macro policies are likely to have designated targets of their own. Monetary policy is likely to be targeted at achieving low and stable inflation, and thereby helping to stabilize the cyclical position of the economy. Fiscal policy may also have a role in offsetting cyclical fluctuations, but it is also likely to be geared to securing sustainability of the public debt over

the medium term. As long as adjustments in the policy settings do not move the economy away from the primary targets of the policies, they can and should be used to help manage capital flows. For instance, in response to a surge in inflows, fiscal policy could be tightened and monetary policy loosened, provided this did not go against the achievement of those policies' primary targets.

▶ It is sometimes argued that there is a pecking order in respect of the use of different policies to manage the macroeconomic risks from capital flows, and it is sometimes alleged that capital controls should be imposed as a last resort, after all the other policies have been tried and residual risks remain. What is clear is that it is both in the unilateral interest of the country, as well as in the multilateral interest (more on this, below), that capital controls should not be used before the exchange rate has been allowed to rise to its multilaterally consistent level (undervaluation being in neither the country's nor the rest of the world's interest).[1] It is also clear that domestic macroeconomic policies should be set at levels consistent with their primary targets and that, to the degree that adjustments in those policies would aid also in the goal of managing capital flows without compromising domestic targets, it would seem sensible to use those tools. The inference I draw is that capital controls are probably best left until external and macroeconomic adjustments have taken place because these adjustments will probably be helpful in dealing with the inflow problem efficaciously.[2] I infer also that controls pursued for the purpose of thwarting or avoiding those adjustments are likely to be undesirable. Finally, I infer that controls used to manage the macroeconomic risks associated with inflow surges are likely to be temporary, since in all likelihood a permanent inflow is likely to require a permanent adjustment in the exchange rate. Thus, controls used for macroeconomic reasons would likely be reduced/removed once the inflow surge abated.

3 Financial fragility

Beyond their macroeconomic effects, capital inflows – especially certain types of liabilities – can make the country more vulnerable to financial crisis. The risks stem from two sources: direct lending from abroad (or

that otherwise bypasses the regulated financial sector in the recipient country), and flows that are intermediated by domestic banks.

An obvious example of the former is debt vs. equity flows, because equity allows for greater risk-sharing between creditor and borrower. More generally, it is not implausible that herd behavior and excessive optimism on the part of foreign lenders, coupled with myopic borrowers who underestimate foreign exchange and liquidity risks, can lead to foreign borrowing that is excessive from a financial fragility perspective. Based on these considerations, the theoretical literature yields a pecking order of capital inflows, in decreasing order of riskiness, with short-term instruments more risky than long-term ones within each category:

- ▸ Foreign-currency debt
- ▸ Consumer-price-indexed local currency debt
- ▸ Local currency debt
- ▸ Portfolio equity investment
- ▸ Foreign direct investment

Capital inflows that are intermediated through the banking system might also fuel domestic lending booms, including foreign-exchange-denominated credit, which may be especially dangerous – to both the bank and to the end-borrower – if extended to borrowers lacking a natural hedge (for example, households rather than exporters).

For flows that are intermediated by domestic banks, both prudential regulation and capital controls (on the financial sector) are potential instruments. Which to choose depends on the nature of the risks and, indeed, the distinction between prudential regulations and capital controls may be blurred in practice. For instance, a regulation prohibiting banks from extending FX-denominated loans to unhedged borrowers is a prudential measure; yet, in the context of capital inflows, it might act as a capital control if most of the loans being extended in FX by domestic banks correspond to their own foreign borrowing (with the prohibition reducing banks' foreign borrowing because they face limits on their open FX positions). In general, the instrument employed should target the relevant risk. Therefore, if the concern is FX-denominated lending, then prudential regulation of bank lending (for example, prohibiting loans to unhedged borrowers, or requiring higher capital charges against these loans) is indicated. But if the risk pertains mainly to the nature of external borrowing by banks (for example, excessive reliance on short-term

wholesale funding from abroad), then financial sector or economy-wide capital controls may be called for.

When flows bypass the domestic banks (either direct lending from abroad or intermediated through finance companies or other unregulated segments of the domestic financial system), then by definition prudential tools will have little traction, and capital controls may be required. For example, unremunerated reserve requirements on foreign currency debt can be used to reduce external foreign currency denominated borrowing, and even if this encourages substitution in to other forms of external debt, the risks are reduced. Inflow taxes on short-term debt reduce the price differential between short- and long-term debt and induce longer maturities. The optimal size of the tax depends on the risk of liquidity panics, the size and social cost of the associated fiscal adjustment, and the elasticity of substitution between debts of different maturities. Financial transaction taxes are relatively more costly for short-term carry trades and may deter such flows. Minimum stay requirements are a direct method of lengthening the maturity of liabilities.

As discussed above, capital controls should only be imposed in response to macroeconomic concerns when the flows are expected to be temporary (because the economy should adjust to permanent shocks). An important difference when controls are contemplated for financial stability reasons is that they can be imposed on flows that are expected to be more persistent. Indeed, persistent flows are more likely to fuel credit booms and asset price bubbles, making the case for policy intervention stronger. Since no capital inflow surge will truly be permanent, the prudential and capital controls measures can be reduced when the inflow abates (with the administrative apparatus for these measures kept in place for when they are next required).

3.1   Synthesis

The discussion so far is synthesized in Figures 3.2.1–3.2.3. Figure 3.2.1 portrays the policy toolkit available to deal with macroeconomic and financial stability risks (portrayed along the left and right arms of the figure, respectively). Along the left arm, the logic is that capital controls should not substitute for external adjustment or warranted macroeconomic adjustment, so logically the use of capital controls comes after such adjustments. Along the financial stability arm, however, prudential policies and capital controls could be used simultaneously to deal with particular
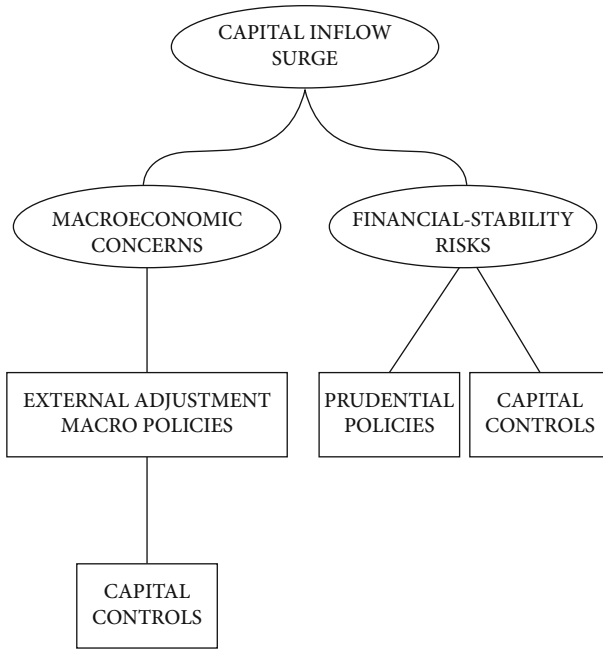
FIGURE 3.2.1   *Policy responses to manage inflow surges*

types of risk, the former more intensively to deal with risks created by flows intermediated through the regulated financial system, the latter for flows not intermediated through the regulated financial system.

Figures 3.2.2 and 3.2.3 go into more detail about the toolkit available to deal with the financial stability risks. Each figure argues that prudential measures and capital control tools can be tailored to the specific risks that need to be addressed – maturity risk, credit risk, currency risk, risk of asset price bubbles, etcetera. Figure 3.2.2 deals with the case of flows intermediated through the regulated financial sector, while Figure 3.2.3 deals with the case of direct borrowing and thus beyond the reach of the prudential regulator.

4   Managing the exchange rate – the role of forex market intervention

This section examines the use of sterilized foreign exchange intervention to address currency volatility associated with volatile capital flows. The use of this instrument was discussed briefly in Section 2, above, but here

```
                    flows to
                 domestic banks
```

| fragile external liability structure (maturity mismatch/ sudden-stop risk) | currency risk (due to open FX position) or credit risk (due to unhedged borrower) | credit boom/ assest price bubble |

capital controls — *FX-related prudential* — *other prudential*

| capital controls on banks (esp. short-term debt), e.g., taxes/reserve requirements | open FX limits/higher capital requirements on loans to unhedged borrowers | cyclical capital requirements, LTV limits |

legal or other impediments to capital controls? — *concerns about access to finance/ distortions?*

FX-related prudential — *capital controls*

FIGURE 3.2.2 *Choice of instruments: flows intermediated through the financial sector*

I go into the issues in more detail and with somewhat greater formality. The context is an EME that has adopted inflation targeting (IT) to guide its monetary policy, and where it is often claimed that free floating of the exchange rate is the only currency regime that is compatible with
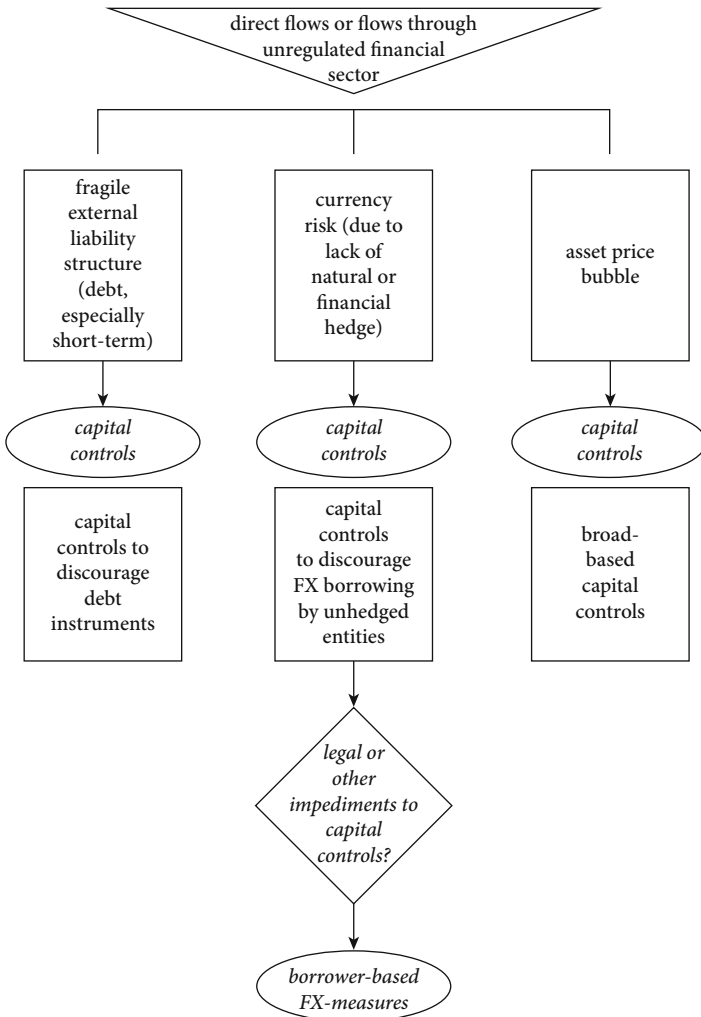
FIGURE 3.2.3   *Choice of instruments: flows not intermediated through the financial sector*

genuine IT. Indeed, early adopters of IT, primarily among the advanced economies, very much held this view. Their logic was simply that, as long as inflation targets coexist with other objectives of monetary policy, tension between the different policy goals would be unavoidable. Allowing free floating was thus considered by many to be a litmus test for a country's commitment to IT with low and stable inflation.

The crisis has cast doubt on the wisdom of this line of reasoning. Low and stable inflation, while laudable goals, are not sufficient to deliver other important goals of economic policy (divine coincidence is more coincidence than reality). Moreover, policymakers have discovered that the instruments at their disposal include more than just the policy rate. Thus, policymakers have multiple goals and multiple instruments. In the context of EMEs, significant balance sheet mismatches imply that it is rarely optimal to ignore exchange rate volatility that involves large and possibly sustained deviations of the currency from its fundamental value. On the contrary, reacting to such changes can deliver better economic outcomes under IT than benign neglect of the exchange rate (Stone et al., 2009). As such, there are potentially two policy targets for the central bank: inflation and the exchange rate.

But are there two instruments? While emerging market countries are certainly more integrated in global financial markets than a couple decades ago, their tendency proneness to experience sudden stops suggest that this integration is far from perfect. Given also their smaller stocks of outstanding local-currency denominated assets than most advanced economies, emerging market countries have greater scope for sterilized intervention. This opens up the fortuitous possibility that policymakers may be operating in a two-target, two-instrument world. This section explores the contours of monetary/exchange rate policy in this two-target/two-instrument world.

Before proceeding with the analysis, it is worth considering some objections. First that modern EME central banks may be largely indifferent to the level of the exchange rate because their economies are now much better able than in the past to absorb currency volatility. Second, that EME central banks do not really have two instruments because sterilized intervention is ineffective. And third, even if there are two targets and two instruments, making use of the second instrument might actually undercut credibility of the IT regime, given the risk of sending conflicting signals about the primacy of the inflation target.

I will present some evidence below to strongly suggest that EMEs are not indifferent to exchange rate volatility, and that sterilized intervention is unlikely to be completely ineffective to combat such volatility in an EME setting. On the issue of whether having a second policy objective undermines the credibility of the inflation target, one could argue just the opposite, provided the central bank indeed has two instruments. In such a case, explicit recognition of the central bank's preferences over

the exchange rate may actually strengthen credibility. The reason is that, when the currency gets too far out of line or has moved too far too fast, refusing to acknowledge the resulting policy challenge is itself untenable. By acknowledging the problem, and the need to do something about it, policymakers may actually enhance the credibility of the monetary policy regime.

4.1   What do central banks in EMEs do?

It has long been recognized that the exchange rate plays a more important role in emerging market economies than advanced economies, where most domestic and foreign transactions are in local currency, markets are deeper, and the private sector is better equipped to absorb exchange rate changes. Given the above, and importantly the currency mismatches on domestic balance sheets, country authorities in many EMEs worry about sharp depreciations that could result in widespread bankruptcies and economic dislocation. Given less developed financial markets and the pervasiveness of credit constraints, firms in EMEs are less able to absorb mean-reverting appreciations of the exchange rate, so the loss of competitiveness associated with a surge in capital inflows is likely to have persistent effects. Therefore, even if they do not set a particular target for the exchange rate, most EME central banks are likely to have an implicit comfort zone beyond which they will not want to see the exchange rate move, and this is reflected in the conduct of their monetary and FX intervention policies.

   A number of studies have found that EME ITers often implicitly include the exchange rate in their interest rate reaction function – Mohanty and Klau (2005) and Aizenman et al. (2011). Table 3.2.1 reports reduced-form Taylor rules for a sample of EME central banks. The explanatory variables include a lagged dependent variable, since policy rates adjust slowly, the difference between expected inflation and the inflation target, and the lagged output gap. The Taylor rule is augmented to include the deviation of the exchange rate from the level implied by a rolling HP filter. Since the regression controls for expected inflation, any effect of the exchange rate on the policy rate will be over and above what could be justified by its pass-through to inflation. As seen in the table, the deviation of the exchange rate from its medium-run value is highly significant, with the point estimate suggesting that a 10 percent appreciation of the currency lowers the policy rate by nearly 0.3 percentage points. This is substantial,

TABLE 3.2.1   *Taylor rules in emerging market inflation targeters: panel regression (^{1}/)*

	Dependent Variable: policy rate - inf. Target		
	(1)	(2)	(3)
Lagged (policy rate - inflation target)		0.744 *** [0.039]	0.727 *** [0.046]
Expected inflation - inflation target	1.353 *** [0.168]	0.649 *** [0.097]	0.699 *** [0.094]
REER deviation from trend			−0.029 *** [0.009]
Lagged output gap			0.064 * [0.030]
Dummy for global financial crisis	−0.271 [0.438]	−0.801 *** [0.251]	−0.840 *** [0.286]
Constant	2.233 *** [0.081]	0.383 *** [0.097]	0.462 *** [0.113]
Observations	522	516	470
R-squared	0.334	0.821	0.812
Number of Countries	14	14	14

Notes: ^{1}/ Standard errors in brackets. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively. REER is defined such that an increase denotes an appreciation of the currency.

especially as it represents the reaction of the policy rate to the exchange rate over and above any impact of the currency on expected inflation. It is also worth noting that the estimated coefficient is almost surely smaller than the true response because of simultaneity bias (the exchange rate may well respond to the interest rate, but the latter relationship goes in the opposite direction, yielding a positive coefficient).

Turning to foreign exchange market intervention, Table 3.2.2 reports the results of a regression of the change in international reserves on the log deviation of the exchange rate from its medium-run value. The point estimate suggests that a 10 percent appreciation of the currency would be associated with a nearly 4 percent increase in reserves (again, this is probably an underestimate because simultaneity would tend to bias the coefficient toward zero; if the exchange rate reacts to intervention, purchases of FX will tend to depreciate the exchange rate, yielding

TABLE 3.2.2   *Change in reserves as a function of the change in the REER* [1]

	Change in reserves	
	IT	Non-IT
	OLS	OLS
REER deviation from trend	0.380 **	1.405 ***
	[0.156]	[0.321]
Dummy for global financial crisis	−8.795 *	−23.495 ***
	[4.410]	[4.681]
Constant	10.769 ***	15.349 ***
	[0.388]	[0.446]
Observations	452	399
R-squared	0.087	0.327
Number of countries	14	10

Notes: [1] Standard errors in brackets. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively. An increase in the REER denotes an appreciation of the currency.

a positive coefficient). The bottom line from the table seems to be that ITers do intervene actively in the FX market (although somewhat less aggressively than their non-IT counterparts), and certainly do not follow free-floating exchange rate regimes.

4.2   Is sterilized intervention effective in EMEs?

The argument that inflation targeting EME central banks might intervene to stabilize currency values is premised on the notion that FX intervention is an effective policy tool. Is it? Stone et al. (2009) survey intervention practices as of late 2007, including 14 inflation-targeting EMEs. Excess volatility of currency values is indeed a motivation for intervention in eight of those cases, with three others having volatility-related motives (e.g., stabilize FX markets, maintain orderly conditions, and maintain exchange rate stability). Other common motives include reserve management (e.g., accumulation of reserves for prudential reasons) in five EMEs, managing the exchange rate so as to help achieve the inflation targets in two EMEs, managing the exchange rate within a band in two cases, and signaling in one EME.

Adler and Tovar (2011) survey official central bank statements for the motives of intervention in 15 economies, with a focus on Latin America. The two reasons most often stated are building international reserve buffers and containing exchange rate volatility.

Several individual country studies survey the effectiveness of sterilized intervention in EMEs. Guimaraes and Karacadag (2004), using intervention data from Mexico and Turkey, find that FX intervention has a small statistically significant effect on the level of the exchange rate in Mexico, but not in Turkey; they also find that such intervention reduces exchange rate volatility in Turkey (but not in Mexico). Although methodological differences across studies makes comparisons difficult, on the whole, the evidence that such intervention can affect the level of the exchange rate tends to be weaker than evidence that it can affect the volatility, but on both scores, most studies find at least some impact (Table 3.2.3). Overall, the evidence on the effectiveness of sterilized intervention in EMEs is mixed, but generally more favorable than in the advanced economies. The extensive use of sterilized intervention in many EMEs suggests that at least they believe it to be an effective instrument in their own currency markets, especially in relation to the policy goal of reducing exchange rate volatility and limiting short-run movements.

TABLE 3.2.3   *Studies on sterilized intervention in emerging market economies*

		Effectiveness on	
Study	Country	Level	Volatility
Stone, Walker, and Yosuke (2009)	Brazil	Yes	Yes
Tapia and Tokman (2004)	Chile	Yes	
Mandeng (2003)	Colombia		Yes (mixed)
Kamil (2008)	Colombia	Yes (weak)	Yes
Holub (2004)	Czech Republic	Mixed	
Disyatat and Galati (2005)	Czech Republic	Yes (weak)	No
Barabás (2003)	Hungary	Mixed	
Pattanaik and Sahoo (2003)	India	Yes (weak)	Yes
Rhee and Song (1999)	Korea	Yes	
Domaç and Mendoza (2002)	Mexico and Turkey	Yes	Yes
Guimarães and Karacadag (2004)	Mexico and Turkey	Yes (weak)	Mixed
Abenoja (2003)	Philippines	Mixed	Yes (mixed)
Sangmanee (2003)	Thailand	No	
Adler and Tovar (2011)	Mainly Latin America	Yes	

4.3   Using the policy rate and FX intervention in the face of capital flow shocks

How should an EME central bank, which has committed to an IT regime, respond to capital flow shocks? I consider a small open economy model with imperfect capital mobility, such that capital flows respond positively to the interest rate differential (taking into account expected exchange rate changes), but at a finite pace. The central bank's objectives are to minimize the deviation of inflation from its target, to minimize the output gap around potential output, and to minimize the deviation of the exchange rate around its warranted medium-run level. The latter reflects concerns about competitiveness on the appreciation side, and balance sheet risks of unhedged foreign currency exposure on the depreciation side.

In addition, recognizing that there are costs to holding reserves, the central bank is assumed to minimize the accumulation of excess reserves (relative to the coverage required for country-insurance purposes) (see Box 1.3.2. for a description of the model). How does the conduct of policy differ between an IT regime with and without use of the FX intervention instrument?

BOX 3.2.1   *A simple dynamic model of an emerging market economy*

To simulate policy responses, we adopt a simple dynamic model of a small open emerging economy. All variables are expressed in logs, except for *ca*, which is defined as the current account balance as a ratio to the foreign liability position, *k*; all parameters (Greek letters) are positive. Capital flows are specified as a partial adjustment process, converging to a finite stock for a given expected return differential:

$$\Delta k_t = \gamma_r(r_t - r_t^* + E_t \Delta e_{t+1}) - \gamma_k k_{t-1}$$

where *e* is the real exchange rate (an increase is an appreciation), *r* and *r** are the domestic and foreign real interest rates. In a world without frictions, the capital stock should adjust instantaneously, arbitraging away any expected return differential. But we assume that uncovered interest rate parity (UIP) does not hold (as is the case in practice, where, if anything, a currency tends to appreciate in the presence of an interest rate differential – the *forward premium puzzle*).

The foreign real interest rate follows an AR(1) process: $r_t^* + \rho_r$ $r_{t-1}^* + \eta_t$).

The current account is given by $ca_t = -\phi_e\, e_t - \phi_y\, y_t$.

The balance of payments (BOP) equation is given by $ca_t + \Delta k_t = \sigma \Delta R_t$ (where $\sigma = R/k$).

The Phillips curve for domestic inflation is given by $\pi_t = \beta E_t \pi_{t+1} + \kappa y_t$.

Aggregate demand (the IS curve) depends on the real exchange rate and the real interest rate:

$$y_t = -\varphi_r r_t - \varphi_e e_t + u_t,$$

where the shock is an AR(1) process with parameter ρ_u.

The central bank's objective function depends on the output gap, inflation, the deviation of the real exchange rate from its multilaterally consistent level (normalized to zero), and the deviation of reserves from their optimal steady-state level (say based on country-insurance metrics):

$$\min_{r,R} EPDV\, ((y_t - \bar{y}_t^e)^2 + a\pi_t^2 + be_t^2 + cR_t^2)$$

where $\bar{y}_t^e$ is the public's estimate of the central bank's inflationary bias. We calibrate the model assuming the following initial ratios and parameters:

$\phi_e = 0.15;\ \gamma_r = 1;\ \gamma_k = 0.5;\ \alpha = 1;\ \sigma = 0.5;\ \beta = 0.99;\ \rho_r^\star = 0.75$
$\phi_y = 0.3;\ \varphi_r = 1;\ \varphi_e = 0.25;\ \rho_u = 0.75$
$a = 1;\ b = 0.1;\ c = 0.01$

Finally, in the discretionary policy regimes, the public sector's estimate of the inflation bias is calibrated so as to generate inflationary expectations equal to 0.9 times the previous period's inflation rate, and set equal to zero in the IT regimes.

In the face of a capital inflow shock (modeled as a decline in foreign interest rates, which is gradually reversed – see Figure 3.2.4), the central bank would lower the policy interest rate, thereby reducing the incentive for capital to cross the border. Comparing the interest rate response across regimes shows that the central bank would lower interest rates by less when it also intervenes in the FX market. This is because in the absence of intervention, the only instrument the central bank has to dampen inflows is to lower the policy rate. Even with a lower policy rate, however, the central bank is forced to accept a more appreciated exchange rate (relative to the level warranted by

Policy Interest Rate (percent per year)

Reserves (percent deviation from steady-state)

Inflation (percent per year)

Real Exchange Rate[2]/ (percent deviation from steady-state)

Output Gap (percent deviation from steady-state)

Capital Inflow (cumulative flow)

—— IT with FX intervention
- - - IT (no FX intervention)
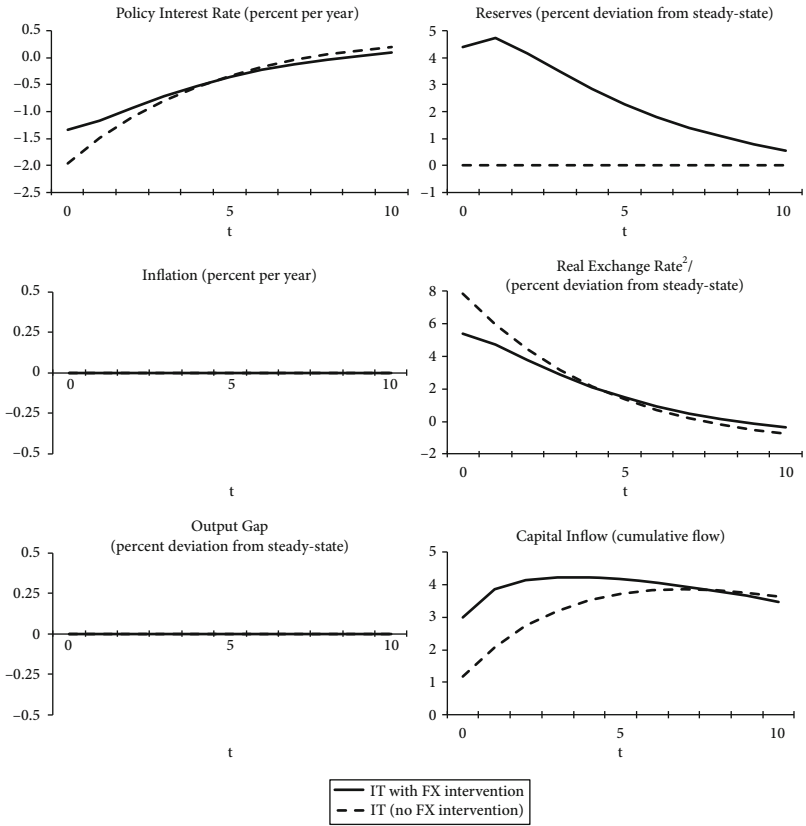
FIGURE 3.2.4   *Policy response to a capital inflow shock ([1]/)*

Notes: [1]/The capital inflow shock is based on a 5-percentage point decline in the world interest rate.

[2]/*An increase in the exchange rate is an appreciation of the domestic currency.*

medium-term fundamentals) when it does not intervene in the foreign exchange market. Note importantly also that intervention is two-way, with initial purchases of FX followed by sales, with no steady-state change in the stock of reserves.

Note that with or without FX intervention, the IT framework ensures that the central bank meets its inflation target, so intervention is without prejudice to that target. But without intervention, the central bank must tolerate a more appreciated currency, lowering welfare relative to its goal of keeping the exchange rate close to its warranted level.

Thus, even though intervention is assumed to be costly in the central bank's objective function, the welfare implication is clear: having both the policy interest rate and FX intervention as instruments dominates having only the policy rate. While the extent of the welfare gain varies with the parameters of the model (in particular the interest sensitivity of capital flows) and the characteristics of the process driving capital flows (in particular the persistence of shocks to the foreign interest rate), the value of having the second policy instrument is a general one.

5   Multilateral dimensions

The pursuit of policies (in particular capital controls, prudential regulations, and foreign exchange market intervention) to manage the risks from volatile capital flows has led to concerns that the spillovers from such policies may be detrimental, and that some form of multilateral oversight and coordination of country level policies is desirable. Some emerging market countries have voiced concerns about the spillovers from policies pursued by other recipient countries, and many have voiced concerns about the spillovers resulting from source-country policies, especially ultra-easy monetary policy which, while justified by domestic considerations, may have been the trigger for increased and increasingly risky and volatile capital flows to EMEs. The G-20, in its deliberations on managing capital inflows, has urged, "Any country that has the potential to affect others through its national policy decisions should take the potential spillovers into account when setting national policies."[3] The IMF (2011) has warned of the "risk that capital flow management measures, were they to proliferate, could have escalating global costs." And informed observers have feared that the use of foreign exchange market intervention may be forcing excessive and unwarranted external adjustment on other countries (e.g., Rajan, 2010).

There seem to be several salient areas of multilateral concern. The first is that policies pursued at the country level (whether capital controls or foreign exchange market intervention) may saddle other countries with adjustments that are in neither the individual nor the global interest (for example, when policies in one country sustain currencies that are misaligned from a multilateral perspective). The second is that source-country policies fail to take into account the externalities they create through cross-border financial flows, and accordingly lead to adverse

outward spillovers from excessive or excessively risky outflows. The third is that recipient-country policies (e.g., capital controls or prudential regulations that mimic controls) may deflect flows to other recipients, exacerbating the macroeconomic or financial stability risks they face (in the latter case, "bubbling thy neighbor" as argued by Forbes et al., 2012). These concerns lead to the question of whether, from a multilateral perspective, discretion to pursue policies should be circumscribed and, relatedly, the possible gains from coordinating policies.

It bears noting that worries about the multilateral aspects of capital flow management have a very long history, and were a prime concern of the founding fathers of the IMF in their deliberations about the IMF's Articles of Agreement. Both Keynes and White considered that coordination was desirable to achieve appropriate management of capital flows, highlighting that "control will be more difficult by unilateral action than if movements of capital can be controlled at both ends" (Keynes) and that "without the cooperation of other countries, such control is difficult, expensive, and subject to considerable evasion" (White).[4] The desirability of coordination has been reinforced lately, with statements by several emerging market policymakers (e.g., Brazil, Korea) to the effect that excess global liquidity is severely complicating management of capital inflows and running the risk of currency wars and proliferation of capital control measures.[5]

The state of empirical knowledge about the unilateral effects of capital controls and the nature and size of spillovers is as yet insufficient to serve as a persuasive guide for policymaking. To begin with, there is considerable uncertainty about the unilateral effects of capital controls, with more persuasive evidence that such controls alter the composition of flows than the aggregate level (Magud et al., 2011, Ostry et al., 2012c). Of course, to the degree that controls are ineffective at the country level, there would be no multilateral impact either (since this would depend on controls having an impact on aggregate flows), and accordingly no multilateral reason to proscribe their use. Direct evidence on the size of cross-border spillovers is also remarkably scant, with Forbes et al. (2012) finding some evidence at the level of portfolio flows but not aggregate flows. Jeanne (2012) draws some persuasive connections between the use of capital controls and the pursuit of exchange rate and external objectives. There is a much older, well-established (and convincing) literature on the nature and size of spillovers from source-country policies (especially monetary policy) to recipient countries (e.g., Calvo et al,

1993; Reinhart and Reinhart, 2008; Ghosh et al., 2012). The experience of Sweden and Latvia, for example, during the recent crisis also serves to underscore the importance of spillovers from regulatory and supervisory policies in source countries for recipient countries. The mixed nature of the overall evidence on spillovers, however, means that economic logic, rather than empirical evidence, is likely to be the more important driver of advice to policymakers.

The policy debate on the multilateral aspects of capital flow management seems to gravitate around four cases. The first is the use of capital controls as a substitute for warranted external adjustment, where the constructive intent of the policy is essentially to sustain, for example, an undervalued currency. If there is no underlying distortion (e.g., a production externality) that might justify the undervaluation policy, it is clear that this use of capital controls is not in the self-interest of the country. This is why, in the left-hand arm of Figure 3.2.1, capital controls lie below external adjustment. More relevant for the discussion in this section, however, is that using capital controls as the vehicle to sustain undervaluation is also multilaterally undesirable, since it implies that the rest of the world is forced to sustain external balances and currencies that are also not multilaterally desirable, and as such the warranted adjustment of global imbalances towards their equilibrium levels is frustrated. This case therefore seems reasonably straightforward. Capital controls should never substitute for warranted external adjustment.

A second case relates to terms of trade manipulation. The reason for thinking about terms of trade manipulation clearly stems from the case of goods trade, where we worry about the exploitation of monopoly/monopsony power. There is at a conceptual level a perfect analogy with intertemporal asset trade, where large players in global capital markets can restrict the supply of or demand for capital, and thereby alter the intertemporal terms of trade, the world interest rate. Creditors would have an interest in supplying less capital to boost their terms of trade, and debtors would have an interest in demanding less capital (e.g., by putting on inflow controls). From the point of view of an arbitrary net debtor in global markets, the best-case scenario is where another debtor imposes inflow controls, lowering the world interest rate, and allowing the country to borrow the same volume of inflows at a lower cost (and vice-versa for a net creditor supplying capital to the markets). Since there is no underlying distortion, the reduction in the volume of intertemporal trade is a deadweight loss for the system as a whole, and is thus multilaterally inefficient and objectionable

(in the same way as use of tariffs to manipulate global trade in goods is objectionable). One may think that the above scenario is far-fetched, in that countries do not typically use capital controls to manipulate world interest rates. However, before dismissing the issue altogether, one may wish to consider whether other policies do not occasionally have the effect of moving the world interest rate in a direction consistent with the terms of trade manipulation scenario: for example, whether there are cases where large debtors pursue policies that lower world interest rates (e.g., monetary policy), or large creditors maintain restrictions on capital outflows that raise world interest rates.

A third case relates to financial stability externalities. The issue here is that there is a domestic externality that results in excessive foreign borrowing in risky forms (short-term, foreign currency debt). The national welfare perspective may therefore call for some form of tax on foreign borrowing, particularly on the more risky instruments (Korinek, 2011). The capital control in such a case incentivizes the private sector to internalize the financial stability externality generated by its borrowing. While there will be spillovers from the imposition of the capital control, whether they are a problem from a global efficiency perspective is not obvious. Remember that from a domestic standpoint, the imposition of controls is justified to offset a distortion; if the diversion of flows to other countries exacerbates distortions in those other countries (say, because they, too, suffer from a financial stability externality), the answer may simply be for those other countries to impose controls of their own. A capital control war in which each country gradually works toward a level of controls and tolerance of financial stability risk that suits its domestic needs may even be optimal. Whether it is or not depends upon whether offsetting the domestic distortion with capital controls itself does damage or creates costs (the costs may be standard bureaucratic costs, or more likely, costs from imperfect targeting of the riskiest flows – collateral damage). When using controls is costly, then in general there will be a benefit to coordination. Intuitively, the decentralized Nash equilibrium will no longer be efficient because each country now has two targets (the domestic distortion and the cost of using the capital control instrument) but only one instrument (what is going on at the country level is that each country overestimates the financial stability benefit from controls because it fails to take account of the mutual deflection of flows that occurs in the Nash equilibrium). Interestingly, if the costs associated with imposing the capital control are convex, the globally efficient outcome

will require coordination between source and recipient countries (what Keynes referred to as "operating at both ends of the transaction"). The incentive of source countries to engage in coordination is far from clear, however – a thorny problem when putting coordination into practice.

The fourth and final case concerns production externalities. Here, the situation is that production of exportables is associated with, for example, a learning-by-doing externality (external to the firm) that results in underproduction of exportables. The optimal policy in such a situation would be a production subsidy. However, there may be constraints so that the first best policy is not feasible – for example, budgetary resources to fund the subsidy are unavailable, or alternative tax policies (e.g., taxing production of nontradables) are also infeasible, say, because the relevant sectors are informal and thus would escape the tax net. In such a situation, the country may opt for a policy of undervaluation supported by capital controls. Like the other cases considered above, there will be spillovers associated with this policy, as the undervalued currency will force other countries to run larger trade deficits than they would otherwise run. Is this multilaterally problematic? This is clearly a judgment call, but note that because the policy of undervaluation chosen by the country is not the first best means to address its domestic distortion (since the policy distorts consumption decisions as well as production decisions, but only the latter are affected by the externality), and because it has stronger negative spillovers for the rest of the world than the first best policy, it is likely that the use of capital controls in such a case would invite multilateral scrutiny. In any case, given the likelihood that countries could disguise the true intent of the policy, the bar should be set quite high in condoning the possible use of capital controls as a response to production externalities.

6   Conclusions

This chapter has examined the use of capital controls and foreign exchange market intervention within the overall policy toolkit to manage capital flow volatility. It has argued that both policies have their place in the policy toolkit (which also includes macroeconomic and macroprudential policies) to address the macroeconomic and financial stability challenges that volatile capital flows may bring. Foreign exchange market intervention may be useful in mitigating the volatility of currency values

that can wreak havoc in an environment where sharp appreciations can permanently undercut the competitiveness of the traded goods sector, while sharp depreciations can do damage to the corporate sector exposed to currency balance sheet risk. Capital controls can also help to manage the upward pressures on currency values when the currency has risen beyond its multilaterally warranted level, and can help to mitigate financial stability risks alongside prudential policies, particularly when the latter policies lack traction, as when the flows are not intermediated through the regulated financial system.

The chapter has also explored multilateral dimensions of the use of these policies, especially capital controls. It has argued that the use of capital controls is multilaterally problematic when their purpose is to short-circuit external adjustment, engage in terms of trade manipulation, or offset domestic production externalities when other policies can get the job done at lower cost. When the goal of capital controls is to offset domestic financial stability externalities, the existence of spillovers does not mean that the controls are multilaterally problematic per se. Spillovers are an inherent part of how market systems function, and their existence does not mean that the policy that gives rise to the spillover is multilaterally problematic. However, when the use of capital controls itself creates costs for the country (e.g., bureaucratic cost or the collateral damage from imperfect targeting of the risky flows), then there may well be a need for policy coordination to achieve a globally efficient outcome. If costs are convex, the coordination is likely to require involvement of both source and recipient countries, what Keynes referred to as "operating at both ends of the transaction." The right answer is not that countries should choose policies that run counter to the domestic interest. It is rather that they should choose from among those policies that support domestic objective those policies that have less damaging outward spillovers, in consonance with the philosophy underlying the "integrated surveillance decision" recently adopted by the IMF's membership (IMF, 2012).

Notes

1   I assume for the moment that there are no domestic distortions to which undervaluation would be the appropriate policy response.

2   Controls might be useful to cope with the time lags involved in implementing macro policies or in making those policies effective.

3   Source: http://www.g20-g8.com/g8-g20/g20/english/for-the-press/news-releases/g20-leaders-summit-final-communique.1554.html.

4   Source: Helleiner (1995).

5   Sources: http://www.ft.com/cms/s/0/69c0b800-032c-11e2-a484-00144feabdc0.html; http://www.koreatimes.co.kr/www/news/biz/2012/09/182_120013.html; http://online.wsj.com/article/SB10000872396390444165804578006513150635592.html.

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