

Summary

The transmission of abundant global liquidity and the accompanying surge in capital flows to economies with comparatively higher interest rates and a stronger growth outlook pose policy challenges as appreciation pressures and rising asset valuations return. In addition to the influence of domestic growth prospects and liquidity conditions, this chapter finds strong links between global liquidity expansion and asset prices, such as equity returns, in the “liquidity-receiving” economies, as well as official reserve accumulation and portfolio inflows.

There are a number of policy options available to policymakers of liquidity-receiving economies in response to surges in global liquidity and capital inflows. The menu of policy responses for mitigating risks related to capital inflow surges includes the following:

- A more flexible exchange rate policy, in particular when the exchange rate is undervalued. The analysis shows that a floating exchange rate provides a natural buffer against surges in global liquidity and ensuing valuation pressures on domestic assets.
- Reserve accumulation (using sterilized or unsterilized intervention as appropriate).
- Reducing interest rates if the inflation outlook permits.
- Tightening fiscal policy when the overall macroeconomic policy stance is too loose.
- Reinforcing prudential regulation.

If conditions allow, liberalization of outflow controls can also prove useful. The appropriate policy mix will depend on country-specific conditions.

When these policy measures are not sufficient and capital inflow surges are likely to be temporary, capital controls may have a role in complementing the policy toolkit. However, more permanent increases in inflows tend to stem from more fundamental factors, and will require more fundamental economic adjustment. Of course, well-formulated macroeconomic policies throughout the economic cycle can help to avoid a surge or abrupt reversal of capital inflows.

The evidence on the effectiveness of capital controls is mixed. There is some indication that controls can lengthen the maturity of inflows—although they do not reduce the volume of inflows—and create greater room for monetary independence. The chapter outlines some case studies to highlight those that have and have not been successful in the past.

Even if capital controls prove useful for individual countries in dealing with capital inflow surges, they may lead to adverse multilateral effects. The adoption of inflow controls in one country, if effective, can divert capital flows to its peers, prompting the introduction of capital controls in those countries as well. A widespread reliance on capital controls may delay necessary macroeconomic adjustments in individual countries and, in the current environment, prevent the global rebalancing of demand and thus hinder the recovery of global growth.

The global liquidity cycle started in 2003 and accelerated from the second half of 2007 when country authorities began to undertake unprecedented liquidity-easing measures to mitigate the effects of the crisis (Figure 4.1). While helping stabilize the financial system and support the return to growth, current easy global liquidity conditions and the accompanying surge in capital flows pose policy challenges to a number of countries where the crisis did not originate, with the primary challenge being an upside risk of inflation expectations in goods and asset markets. Such “liquidity-receiving” countries have had to ease domestic monetary conditions in response to both the slowdown in global demand and the acceleration in global liquidity, adding further pressure to asset prices.

The policy challenge posed by easy monetary conditions is greater in economies—primarily emerging markets—that, in addition to strong growth prospects, have fixed or managed exchange rate regimes.¹ The associated surges in capital inflows also raise early concerns about vulnerabilities to sudden stops once the global liquidity is unwound, with implications for financial stability.

This chapter primarily covers the acceleration of the global liquidity cycle from the outset of the crisis in mid-2007 until end-2009, and addresses the following questions: (1) How do we recognize the liquidity transmitted from the “source” to “receiving” economies and what are the liquidity transmission channels? (2) What policy challenges do receiving economies face in absorbing global liquidity? and (3) To what degree are policy tools effective in managing a surge in capital flows as well as their potential sudden stop?

The next section notes that in the context of abundant global liquidity at the tail end of the crisis, the resumption of capital flows to countries with a strong growth outlook or appreciation expectations brought back appreciation pressures and rising asset valuations. The chapter

then analyzes and finds strong links between global liquidity expansion and asset prices such as equity returns in the receiving economies, as well as official reserve accumulation and equity portfolio inflows. The discussion then turns to the policy response options that countries have at their disposal, in the absence of monetary policy tightening in the countries where the liquidity expansion originated. It focuses in particular on policies that aim to affect the capital account, concluding that, when these policy measures are not sufficient and capital inflow surges are likely to be temporary, easing controls on capital outflows or introducing capital controls may usefully complement the policy toolkit.

The chapter then analyzes the effectiveness of tightening capital controls on inflows and of liberalizing outflows using evidence from earlier studies, selected country experience, an event study, and a short presentation of private sector views. It finds that the evidence on the effectiveness of capital controls is mixed, but there is some indication that controls can lengthen the maturity of inflows and create some room for monetary independence. The conclusion of the chapter notes that, although effective under certain circumstances, capital controls may have adverse multilateral consequences by delaying necessary macroeconomic adjustments in individual countries and, in the current circumstances, hinder global recovery and growth by preventing the global rebalancing of demand.

Overview of the 2007–09 Global Liquidity Expansion

In response to the financial crisis that started in the summer of 2007, the United States began to aggressively reduce its policy interest rate in September 2007, followed by the United Kingdom in December.² Emerging markets and advanced economies with little or no exposure to the first phase of the financial crisis did not reduce rates for some time, and actually raised them on average in response to rapidly rising commodity prices. It was not until late 2008 that these countries began to ease monetary conditions in response to declining global

Note: The authors of this chapter are Annamaria Kokenyne, Sylwia Nowak, Effie Psalida (team leader), and Tao Sun. Oksana Khadarina provided research support.

¹See Chapter 1 for an assessment of emerging market inflows and their drivers, including whether asset prices have become stretched and conditions are ripe for the formation of asset price bubbles. The assessment concludes that concerns about capital inflows leading to inflation pressure or asset price overvaluation in emerging markets have risen.

²The European Central Bank (ECB) and the Bank of Japan did not begin to reduce their policy rates until about a year later in October 2008, with the ECB raising its rate in the interim to prevent inflation expectations from rising in view of high commodity prices.

demand in the second phase of the crisis, reducing their rates by more than the G-4 on average (Figure 4.2).³

In 2008, global capital inflows retreated to 16 percent of their 2007 volume.⁴ However, in the second and third quarters of 2009 capital flows resumed to many emerging markets, which is to be welcomed. The flows consisted primarily of portfolio equity and fixed-income investment, with net cross-border bank flows remaining negative. (Figure 4.3 shows capital inflows for 37 liquidity-receiving economies; see Annex 4.1 for a complete list.) Foreign direct investment (FDI) diminished, but was more stable than other types of flows over the crisis period.

In the context of abundant global liquidity, the resumption of capital flows to countries with a strong growth outlook or appreciation expectations brought back pressures on the exchange rate and rising asset valuations, including equities (Figure 4.4).

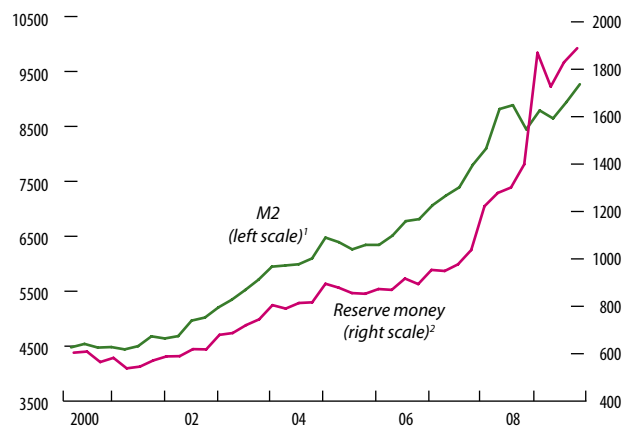
Effects of the Global Liquidity Expansion on the Liquidity-Receiving Economies

Although, as a rule, asset valuations in the receiving countries are not yet at precrisis levels, observers are asking whether asset prices may be rising too fast. Are capital flows into receiving economies primarily driven by the countries’ strong economic fundamentals and, therefore, likely to remain stable over the medium to long term, or are they primarily driven by the abundant global liquidity?

We find that for the period starting in 2003, when the global liquidity cycle began, to 2009, domestic liquidity (M2 or reserve money) is positively associated with equity returns and negatively with real interest rates for all the 41 countries in our sample—both the G-4 and the receiving economies. (See Box 4.1 and Annex 4.1 for more details on the econometric results and methodology.) Specifically, rising global liquidity—defined as G-4 M2, reserve money, or excess liquidity growth⁵—is associated with rising equity returns and declining real interest rates in the 34 receiving econo-

Figure 4.1. Global Liquidity

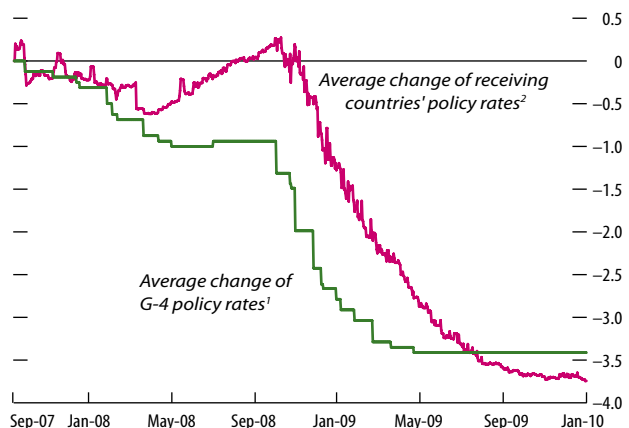
(In billions of U.S. dollars; GDP-weighted; quarterly data)



Sources: Datastream; IMF, International Financial Statistics database; and IMF staff estimates.
¹Sum of GDP-weighted M2 for the euro area, Japan, the United Kingdom, and the United States.
²Sum of GDP-weighted reserve money for the euro area, Japan, the United Kingdom, and the United States.

Figure 4.2. Change of Central Bank Policy Rates

(In percentage points; September 1, 2007 = 0)



Sources: Bloomberg L.P.; and IMF staff estimates.
¹G-4 includes the euro area, Japan, the United Kingdom, and the United States.
²Receiving countries are Argentina, Australia, Brazil, Canada, China, India, Indonesia, Korea, Mexico, Norway, Russia, Saudi Arabia, South Africa, Sweden, Switzerland, and Turkey.

³For the purposes of this chapter, the euro area, Japan, the United Kingdom, and the United States constitute the G-4.

⁴Capital inflows refer to changes (increases/decreases) in the liabilities of countries’ financial account.

⁵Excess liquidity is the difference between broad money growth and estimates for money demand in the G-4.

Box 4.1. Global Liquidity Expansion and Liquidity Transmission

This box discusses global liquidity expansion and liquidity transmission during 2003–09 from the G-4 sources of “global” liquidity, defined here as the euro area, Japan, the United Kingdom, and the United States, to those economies in our sample that were at the receiving end of global liquidity, namely 32 emerging market economies, Australia, Canada, Iceland, New Zealand, and Norway.¹

Global liquidity expansion is measured by the growth of excess liquidity and G-4 monetary aggregates—broad money and reserve money, where the latter is used to exclude the impact of the volatile money multiplier. The effect of the G-4 monetary aggregate growth on the “receiving” countries is measured by its link to “receiving” economies’ asset valuations, real interest rate, and credit.

Three types of econometric tests are performed:

Panel specifications are used to test the effects of G-4 broad money growth (or reserve money growth and excess liquidity growth) on “receiving” economy asset returns (equity valuations and overvaluation, real interest rates, and—on a limited data sample—housing data), and excessive credit growth.

Note: This box was prepared by Tao Sun.

¹For a complete list of the countries in the sample and a description of the econometric methodology see Annex 4.1.

Utilizing an EGARCH model, which is designed to model asymmetric variance effects, we test whether volatility in the G-4 money growth spills over into volatility in the “receiving” economies.

Panel specifications are used to examine the transmission channel of global liquidity to receiving economies by examining their official reserve accumulation. In addition, Granger causality tests—using both growth rates and long-term level variables—examine whether G-4 broad money (or reserve money) explains future values of receiving countries’ broad money (alternatively reserve money, or central bank net foreign assets), and vice versa.

To capture the links between global liquidity and capital flows to the “receiving” countries, capital inflows (by component) were regressed on global liquidity, while controlling for domestic and other global factors. The regression results show that global liquidity is positively associated with equity investment between 2003 and 2009, but has no statistically significant link with foreign direct investment and portfolio bond flows.²

²These results are consistent with the panel estimation results in IMF (2007, Chapter 3).

mies, even after controlling for domestic (receiving-economy) liquidity.⁶ This relationship supports the view that both global and domestic liquidity may have provided support to the rising asset prices during 2003–09.

A test with three distinct geographic groupings (Asia-Pacific, Europe-Middle East-Africa, and Western Hemisphere) shows that global liquidity is positively associated with equity returns in each of the three groups, while

⁶Results using housing price data indicate no statistically significant link to global liquidity, although domestic liquidity is statistically significant with a positive sign. These results need to be interpreted with caution, however, given the limited housing data sample (Annex 4.1). A test using the change in the yield of domestic three-month government bills in receiving economies shows a statistically significant negative association to global liquidity.

the 34 economies’ domestic liquidity (M2) is now only statistically significant for Asia-Pacific equities.

In addition, the effect of global liquidity on equity returns is five times as large as that of domestic liquidity; case studies using Brazil, Chile, China, and Hong Kong SAR—in individual EGARCH specifications—also support the view that global liquidity is positively associated with equity returns in these countries.⁷

⁷China and Hong Kong SAR are chosen for their rapid accumulation of official foreign reserves—taken as a transmission channel of global liquidity to domestic liquidity given their limited exchange rate flexibility. Brazil and Chile are chosen for their experience with volatile portfolio flows. EGARCH refers to an exponential generalized auto-regressive conditional heteroskedasticity model (Annex 4.1).

When receiving economies are separated into those with fixed exchange rate regimes and those with flexible exchange rate regimes, we find that, as exchange rate flexibility increases, the association of global liquidity with equity valuations declines, as indicated by the smaller positive coefficient for global liquidity starting from the left and moving to the right side of Table 4.1. Furthermore, the coefficient for domestic liquidity becomes statistically significant and negative in the group of independently floating regimes. These results further support the view that the higher the flexibility of the exchange rate, the lower the spillover of global liquidity and the more the cushioning impact of domestic liquidity on domestic asset returns.

The transmission of global liquidity to liquidity-receiving economies can be seen by examining the relationship between G-4 liquidity growth and official reserve accumulation in the receiving economies. As with the pattern exhibited with equity returns—discussed above—this transmission mechanism is stronger for economies with fixed exchange rates than for those with floating ones (Table 4.1).

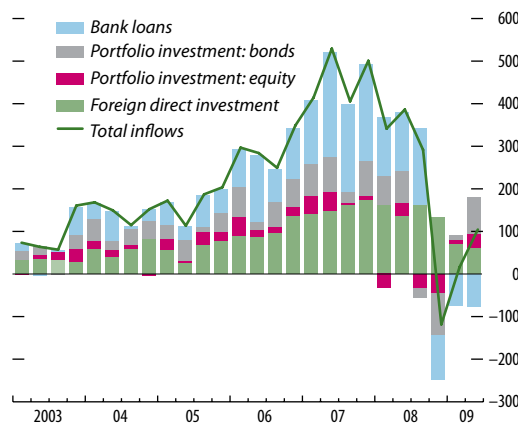
In addition, spillovers between global liquidity and receiving-economy liquidity (M2 and reserve money) are shown by the results of Granger causality tests, which indicate movements in both directions. Specifically, G-4 liquidity growth spills over into the other countries in our sample—economies where the crisis did not originate—but liquidity also spills over from these economies into the G-4, although the strength of the relationship is weaker.⁸ Evidence of these relationships is further strengthened by the long-run Granger causality tests using nonstationary level data (Pedroni, 2007). These results indicate that both global and domestic liquidity are determinants of asset returns (see details in Table 4.6 in Annex 4.1).

Using the panel regression model, a “what if” scenario is carried out to check the effect of a liquidity “sudden stop” on equity returns. The results show that a 10 percent decline in global liquidity growth is associated with a 2 percent drop in liquidity-receiving economies’ equity returns, based on data for October 2009 and holding all other variables constant.

⁸This is indicated by a smaller probability of rejecting the null hypothesis of no Granger causality.

Figure 4.3. Liquidity-Receiving Economies: Composition of Capital Inflows

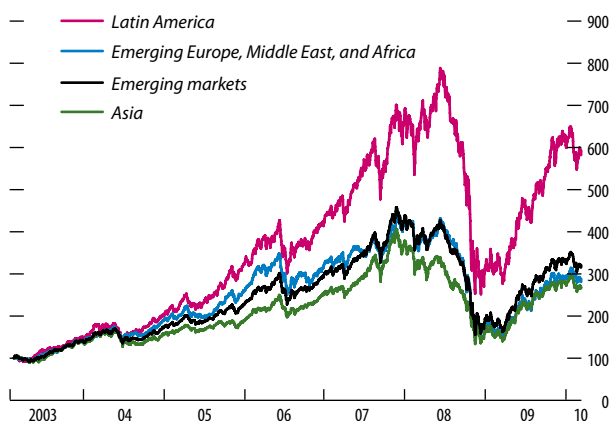
(In billions of U.S. dollars)



Source: IMF, International Financial Statistics database.
Note: See Annex 4.2 for a complete list of countries.

Figure 4.4. Emerging Markets Equity Indices

(January 1, 2003 = 100)



Source: Bloomberg L.P.

Table 4.1. Relation between Equity Returns, Official Foreign Exchange Reserve Accumulation, and Liquidity under Alternative Exchange Rate Regimes

	Full Sample (fixed and floating)	Fixed I (currency board; conventional peg; crawling peg)	Fixed II (currency board; conventional peg; crawling peg; managed float)	Floating I (independent float; managed float)	Floating II (independent float)
Equity Returns					
Global liquidity (G-4 M2)	1.14 (0.00)***	1.51 (0.00)***	1.44 (0.00)***	0.74 (0.00)***	0.43 (0.03)**
Domestic liquidity (34 economies M2)	0.22 (0.00)***	0.52 (0.00)***	0.35 (0.00)***	-0.18 (0.13)	-0.49 (0.00)***
No. of observations	1,527	394	925	1,133	602
Official Foreign Exchange Reserve Accumulation					
Global liquidity (G-4 M2)	0.86 (0.00)***	0.76 (0.00)***	0.94 (0.00)***	0.79 (0.00)***	0.32 (0.08)*
Domestic liquidity (34 economies M2)	0.41 (0.00)***	0.35 (0.00)***	0.46 (0.00)***	0.26 (0.00)***	-0.25 (0.06)*
No. of observations	1,576	450	977	1,126	599

Sources: IMF, World Economic Outlook, Annual Report on Exchange Arrangements and Exchange Restrictions, and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: Probability values that the coefficient above is significantly different from zero are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level).

Policy Response Options for Liquidity-Receiving Economies⁹

What options are available to policymakers in response to a rapid global liquidity expansion and surges in capital inflows attracted by comparatively higher domestic interest rates and a stronger growth outlook? This section briefly discusses the various policy options before delving in more detail into the effectiveness of restricting or relaxing capital controls as a tool for stemming surges in capital flows and the risk of their sudden stop or reversal.¹⁰

Despite their beneficial effects, capital inflow surges can pose challenges to receiving economies. Specifically, their benefits include providing additional financing to countries with limited savings, allowing risk diversification, and contributing to the depth and development of financial markets.¹¹ However, surges of capital inflows can complicate macroeconomic management as the real economy may not be able to adapt to large swings in the exchange rate. They can fuel a

boom in domestic demand leading to overheating and a combination of accelerating inflation and a widening current account deficit through the appreciation of the real exchange rate. They may also lead to asset price bubbles and increase systemic risk in the financial sector, even sometimes in the case of a generally effective prudential supervisory and regulatory system.

The menu of policy responses for mitigating risks related to capital inflow surges includes fiscal and monetary policies, exchange rate flexibility, reserve accumulation, prudential regulation, and, in some cases, liberalization of capital outflows or a restriction on capital inflows. The adequate response depends on the specific conditions in each country but the sequence of options outlined below could generally be considered.¹²

Exchange rate adjustment. Using the exchange rate as an automatic stabilizer may be the first policy option for countries with an undervalued exchange rate. Allowing the exchange rate to adjust toward its equilibrium level can mitigate the transmission of global liquidity and capital inflows attracted by appreciation expectations. Appreciation in countries where the exchange rate is not misaligned, however, may have significant repercussions on the economy.

⁹Although all the main policy response options are noted, the discussion focuses primarily on policies aimed at affecting the capital account.

¹⁰For a discussion on policy options see also Ostry and others (2010).

¹¹For more on financial globalization see Dell'Ariccia and others (2008) and Kose and others (2009).

¹²See also Baqir and others (2010).

The tradables sector, which loses competitiveness when the exchange rate appreciates, may not be able to recuperate for a prolonged period even if the exchange rate returns to its previous level. In countries with a fixed exchange rate regime, the need to preserve the credibility of the peg may exclude the policy option of a temporary change in the exchange rate level.

Intervention. Economies may intervene to keep the exchange rate at the current level or to slow appreciation. Intervention may be useful in economies that need to increase their reserves. However, sterilization of the liquidity injected by interventions may be necessary to address inflation concerns, which can involve a significant cost. The difference between the interest paid by the central bank to commercial banks for draining liquidity and the interest received on official reserves will likely reduce central bank profitability, especially under the current high global liquidity conditions that keep interest rates in advanced economies low.¹³ Potential associated risks could be concerns about central bank financial independence and possible fiscal costs. Moreover, sterilization may (1) elicit further inflows by maintaining the differential between domestic and international lending rates, in particular when market participants expect an eventual appreciation; (2) encourage domestic borrowers to switch to foreign currency liabilities, potentially raising financial stability concerns; and (3) be limited by the size of the country’s financial market.

Monetary policy. Monetary easing can narrow the interest rate differential between foreign and domestic interest rates and, thereby, reduce the incentives for carry trade, in which investors borrow in low-yielding currencies and invest in high-yielding ones. Monetary easing, however, without the support of appropriate fiscal tightening, is not advisable in countries where inflation is a concern. Conversely, increasing interest rates to keep inflation in check can be counterproductive by attracting further capital inflows. Monetary tightening may occur through increasing reserve requirements (RR), which is mostly used for managing structural liquidity in emerging market economies.

¹³Interest rate differentials between some emerging markets and advanced economies reached 4 to 8 percent on an annualized basis on three-month local currency deposits in the second half of 2009, suggesting losses for emerging market central banks.

However, in many countries these are remunerated at, or close to, market interest rates. If the RR is high or not remunerated, it can increase the banks’ deposit-to-lending margin, leading to disintermediation and higher direct external borrowing and lending by the nonbank private sector (see more below). Increasing the remuneration, on the other hand, would also increase the cost of sterilization, thereby limiting the central bank’s ability to drain excess liquidity from the domestic market.

Fiscal policy. Fiscal tightening can support monetary policy by reducing the budget’s financing needs and thus allowing for lower interest rates. Fiscal austerity could also mitigate asset bubbles directly by lowering aggregate demand growth and supporting a capital account adjustment, thereby cushioning the cost of a sudden reversal in inflows. For fixed exchange rate regimes, fiscal policy response is the main lever. However, material fiscal adjustment is not always feasible at the particular time when the adjustment should be made, and it may involve a lag.

Prudential regulation and supervision. Prudential ratios in the financial sector are used with both microprudential and macroprudential objectives. Either together with the conventional policy responses noted above or on their own, strengthened prudential measures such as liquidity ratios, which differentiate according to currencies, or reserve requirements that vary according to maturity, can provide a useful tool for dealing with capital inflow surges and their financial risks. A countercyclical use of prudential ratios or limits can help financial institutions withstand the effects of a liquidity or currency crisis.^{14,15}

Adequate supervision of prudential regulations helps contain systemic risk in the financial sector. However, the ability of supervision to appropriately assess the risks faced by market participants and their risk management practices is often limited by capacity

¹⁴Prudential ratios and limits are set by the financial sector regulator to ensure financial stability of financial institutions; they include inter alia capital adequacy and liquidity ratios, net open foreign exchange position limits, and limits on the concentration of risks, such as limits on credits to large borrowers.

¹⁵For example, tight prudential measures in Serbia, aimed at curbing excessive credit growth during the economic expansion, provided a buffer to the banking system from the initial financial crisis spillovers.

constraints. The effectiveness of prudential ratios can be limited by regulatory arbitrage when transactions subject to prudential ratios are moved to nonregulated entities or foreign-denominated assets are booked abroad on the parent bank's balance sheet. Prudential limits are also less effective in dealing with risks posed by capital inflows outside of the financial sector, such as direct external borrowing by the nonfinancial—corporate or household—sector, although such borrowing may increase the systemic risk in the financial sector indirectly.

Occasionally, in addition to conventional prudential ratios, other measures, which specifically target external borrowing by banks, have been used to reduce the risk of large capital inflows into the financial sector. These measures may be implemented for prudential reasons, such as to mitigate financial sector risks, and can be helpful in dealing with rapid credit growth or in preventing the dollarization of the banking sector's balance sheet and the buildup of asset price bubbles driven by capital inflows. However, they are likely to have an element of capital control. In such cases, their use should be subject to similar considerations as other types of capital controls (see Box 4.2 on the distinction between capital controls and prudential measures).

Liberalization of capital outflows. Countries may respond to a surge in capital inflows by liberalizing existing restrictions on capital outflows (see Box 4.3 on capital controls on outflows versus inflows). A relaxation of capital controls on residents' outward investment may help to alleviate exchange rate pressures from large capital inflows without adversely affecting the financial integration of the economy. Strong inflows can create a favorable backdrop for advancing the liberalization of outward capital transactions.¹⁶ However, the relaxation of outflow controls

¹⁶In the precrisis period several countries did so. South Africa has been relaxing controls on residents' outward investments as a response to increased capital inflows over time, most recently in October 2009 when South African companies were allowed to open foreign bank accounts without prior approval, and the amount they can invest abroad without prior approval of the central bank has been increased tenfold while resident individuals' foreign capital allowance was doubled. Thailand has also permitted certain large Thai companies to invest in foreign securities directly, where previously such foreign investment had to be channeled through financial funds.

depends critically on meeting the other preconditions of capital account liberalization and, therefore, may not be appropriate in all cases.¹⁷ For example, although institutional investors' (insurance companies, pension funds) outward investment may represent a significant volume, such investment should generally be liberalized only if adequate prudential regulation and risk management are already in place. Furthermore, for credibility reasons the liberalization of outflows should be maintained even after the inflows ebb; therefore, a country's ability to maintain liberalized outflows should be assessed based on longer-term expected flows and not only on the basis of temporary surges in inflows.

Imposition of capital controls on inflows. When the available policy options and prudential measures do not appear to be sufficient or cannot provide a timely response to an abrupt or large increase in capital inflows, capital controls may be a useful element in the policy toolkit. However, if the inflows are not temporary, but are driven by more fundamental factors, policymakers should adjust their macroeconomic policies to address the root causes, instead of mitigating the effects of inflows or attempting to limit them through various measures.

Types of Capital Controls on Inflows

There are two main groups of capital controls: market-based and administrative. The choice generally depends on the aim of the controls (e.g., lengthen the maturity structure) and the type of the flows. It also depends on the authorities' experience with the specific type of controls, as countries typically prefer to use controls they have implemented in the past. The more familiar the authorities and the banking system are with the types of controls selected, the smoother the implementation can be.¹⁸

Price or market-based controls increase the cost of the targeted capital transaction. These controls are generally more transparent, since the additional cost involved can be calculated before the transaction takes place.

¹⁷For a sequencing of capital account liberalization see Ishii and others (2002).

¹⁸The banking system is typically required to assist in the administration of controls.

Box 4.2. Capital Controls versus Prudential Measures

Sometimes prudential measures implemented to help ensure financial stability contain an element of capital control and, conversely, certain capital controls have been described as serving a macroprudential function. The delineation of prudential measures and capital controls is often difficult, and the terms have often been used interchangeably and in partially inconsistent ways. This box provides the basic premises for the differentiation used in practice.

There is no unique generally accepted legal definition of capital controls. In the broadest sense they are measures that are meant to affect the cross-border movement of capital. In its *Code of Liberalization of Capital Movements*, the Organization for Economic Cooperation and Development (OECD, 2009) considers measures to be capital controls subject to liberalization obligations if they discriminate between residents and nonresidents. For example, if residents may buy domestic assets, such as securities, while nonresidents may not, the measure is considered a capital control. Capital controls can affect capital flows by imposing limitations on a type of capital account transaction or on a payment and transfer related to these transactions. Therefore, a prohibition of residents' purchase of foreign assets, and a prohibition of making a payment for the acquired asset are both capital controls.¹ Capital controls have often

Note: This box was prepared by Annamaria Kokenyne.

¹IMF member countries have the right to regulate capital transactions according to Article VI, Section 3, of the IMF's

Articles of Agreement. However, this right is limited by their obligations to ensure unrestricted payments and transfers for current international transactions and to collaborate with the IMF and other members to promote a stable system of exchange rates.

been used to achieve prudential goals in the absence of a developed regulatory framework or adequate risk management practices in the financial sector. Prudential measures regulate risks taken by financial institutions, including risks related to cross-border financial transactions to ensure the soundness of the financial sector. They can focus on individual institutions or on the financial system as a whole and can take the form of quantitative and qualitative standards on capital adequacy, risk management, asset concentration, and liquidity, among others. In some cases, they discriminate between international and domestic capital transactions and, as such, may be economically equivalent to capital controls. For example, a higher reserve requirement on nonresident deposits than on resident deposits contains an element of capital control and needs to be considered as such. Measures that differentiate between the use of domestic currency and foreign exchange, such as limits on banks' net open foreign exchange position, are internationally accepted as prudential measures. However, asymmetric open position limits, which introduce different limits on short and long positions, can discourage the respective flows (for example, a lower short position can limit capital inflows).

In addition, they do not prohibit transactions; only discourage them by increasing their cost. In the recent inflow episodes, two types of measures in this group were typically applied on capital inflows, albeit in a very small number of countries. As Annex 4.2a indicates, since 2003 only four countries introduced unremunerated reserve requirements (URRs) and one implemented taxes on capital inflows (Box 4.4 defines URRs).

Both taxes and URRs reduce the rate of return to investors on the targeted financial transactions and can be applied on cross-border transactions. The rate of

the tax and the URR can be differentiated to discourage certain transaction types (portfolio versus FDI) or maturities (short versus long). Since they affect short-term flows more than longer-term flows, they are also used to lengthen the maturity of inflows.

The implementation of direct taxation on inflows can be less demanding than that of the URR, although the banking system, which generally needs to support the execution of both, can incur significant costs. The implementation of URR requires that the subjected transactions be properly recorded and the reserves permanently

Box 4.3 Capital Controls on Outflows versus Inflows

Controls on inflows and outflows are defined as controls affecting nonresidents' investment in the country and residents' investment abroad, respectively. This box examines the typical forms of these types of controls.

According to this definition, controls on outflows aim to affect residents' investment abroad by regulating the type or the volume of their investments. The controls often differentiate between the forms of investments, such as by allowing foreign direct investment while limiting lending to nonresidents. Occasionally different controls apply to individuals, public and private sector entities, and the financial sector. Controls on outward investment by the banking sector, mainly in the form of lending and deposits, are often liberalized earlier than controls on other residents' investments, to facilitate international trade operations. Controls can be both administrative, such as a ceiling on the foreign exchange residents can pur-

Note: This box was prepared by Annamaria Kokenyne.

monitored to ensure that they are returned to the investor when the withholding period expires. Because the tax and the URRs usually affect a wide range of capital account transactions, countries need to ensure that administering these controls does not delay unnecessarily the execution of capital transactions. Both controls can be circumvented if transactions are misreported as inflow types that are either not subject to controls or are subject to a lower tax or URR rate. The complexity of administering controls increases significantly with the number of rates, withholding periods, and exemptions. As with other controls, the coverage of the tax and URR may need frequent adjustment to prevent circumvention, which may further increase control costs.

Administrative controls can be less transparent than market-based controls. They restrict capital transactions and/or the associated payments and transfers of funds through outright prohibitions or explicit quantitative limits. They can involve the approval of the transaction by the authorities, often on a discretionary basis. While these controls allow for a relatively flex-

ible application, the nontransparency of their application criteria renders them prone to arbitrary selection. They impose administrative obligations on the banking system and often involve significant documentation requirements. Enforcement of administrative controls also requires adequate administrative capacity in the foreign exchange authority (usually the central bank).

chase in the domestic financial markets for outward investments, or market-based, such as an unremunerated reserve requirement. Capital controls on inflows aim to affect capital inflows by reducing the volume or changing the composition of nonresident investment in the country. Inflow controls can be applied at both the entry and the exit points of a nonresident investment. At entry, they are applied on the acquisition of domestic assets by nonresident investors, such as on the purchases of securities or on lending to the domestic financial or nonfinancial sectors. At the exit, a similar effect can be achieved by implementing controls on the transfer of the proceeds from such investments, such as when, after liquidating an investment, nonresidents receive or remit the proceeds. Such controls can take the form of an administrative control, such as a minimum stay requirement, requiring that the funds stay in the country for a certain period, or as a ceiling on the amount that can be transferred in a certain period. They can also be market-based in the form of a tax on remittance of the proceeds abroad from an investment.

ible application, the nontransparency of their application criteria renders them prone to arbitrary selection. They impose administrative obligations on the banking system and often involve significant documentation requirements. Enforcement of administrative controls also requires adequate administrative capacity in the foreign exchange authority (usually the central bank).

Effectiveness of Capital Controls

This section discusses the effectiveness of tightening capital controls on inflows and of liberalizing outflows based on earlier studies, selected country experience, an event study using the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database, and a short presentation of private sector views.¹⁹

¹⁹The AREAER database is maintained by the IMF and updated yearly based on information from country authorities. For the country case studies, information from the relevant IMF staff reports was also used.

Box 4.4. Reserve Requirements and Unremunerated Reserve Requirements

Reserve requirements (RRs) and unremunerated reserve requirements (URRs) are differentiated according to their distinct objectives: an RR may have a range of objectives (monetary policy, prudential or liquidity management–related), while a URR functions as a capital control. This box looks at the features of RRs and URRs.

RRs applied for monetary policy purposes aim to affect the spread between deposit and lending interest rates: higher RR will increase lending rates (discourage borrowing) and reduce deposit rates (discouraging deposits, and so reducing bank access to funding) (see table). If used for prudential reasons, they may be more akin to a liquidity ratio; this is rarely now the purpose of RRs. In many cases, RRs with averaging during the maintenance period are used to facilitate liquidity management and to reduce short-term rate volatility. Sometimes RR levels are different for local currency and foreign currency liabilities, reflecting the authorities’ other objectives, such as the desire to attract or discourage foreign currency deposits. Different ratios can also be applied depending on the

maturity of the liabilities. Reserve requirements may also contain an element of capital control; differentiated RRs on liabilities according to the residency of the depositor is considered a capital control because it discriminates between liabilities of residents and non-residents and thus affects cross-border capital flows.

URRs can be imposed on both inflows and outflows in both the financial and nonfinancial sector and are not remunerated. They are often coupled with a minimum stay requirement during which capital may not be repatriated without an often-stiff penalty. Nonresidents or residents are required to deposit for a fixed period with the central bank an amount of domestic or foreign currency equivalent to a proportion of the inflows, at zero interest. URRs may function as a selective exchange tax that may be differentiated to discourage particular types of transactions. The effective rate of the tax depends on the period of time during which the funds stay in the country, as well as on the opportunity cost of these funds. URRs can also impose a burden on the central bank, which holds the deposits, and on the banking system, which has to implement the controls, especially if the corresponding administrative system is not already in place.

Note: This box was prepared by Annamaria Kokenyine.

Features of Unremunerated Reserve Requirements and Reserve Requirements

	URR	RR
Purpose	Limit certain types of capital flows.	Provide liquidity buffer, limit credit growth, facilitate liquidity management, sterilize excess liquidity.
Base	Applied on the amount of the inflow/outflow/exchange of foreign exchange to local currency. No averaging is allowed.	Applied on average daily balance of reservable liabilities; RR may be met by average reserve balance held at central bank over maintenance period.
Payment	Immediately (shortly) upon receipt.	Fixed date/period following the calculation period.
Maintenance period	Maintenance period longer than one month and does not depend on the maturity of the liability.	Maintenance period is not usually longer than one month, and may be as short as one week.
Remuneration	Never remunerated.	Often remunerated.
Transactions covered	Only on foreign exchange inflows/transactions.	Generally on both foreign exchange and domestic reservable liabilities.
Additional measures	Minimum stay requirement.	No additional measures.
Form of holding	Maintained on account with the central bank.	Reserve balances at the central bank.

Review of the Literature

The literature assesses the effectiveness of capital controls on inflows by their ability to (1) reduce their overall volume; (2) alter their composition; (3) alleviate appreciation pressure on the exchange rate; and (4)

gain monetary policy independence (Magud and Reinhart, 2007). In practice, however, it is often difficult to delineate one objective from another.

Evidence in the literature regarding effectiveness is mixed. Ariyoshi and others (2000), who analyze effec-

tiveness of controls imposed in the 1990s, note that the main macroeconomic motivation for the controls is to maintain a suitable difference between domestic and foreign interest rates and to reduce pressures on the exchange rate.²⁰ The controls had short-term value; they were effective initially, but countries generally could not achieve both interest rate and exchange rate objectives. The controls lengthened the maturity of foreign exchange inflows but were less successful in reducing their overall volume.

In general, controls tend to lose effectiveness as market participants find ways to circumvent them. Circumvention occurs as long as the return on the controlled transaction exceeds the cost of circumvention. Because of the relatively lower possibility for circumvention, controls appear to be more effective in countries where they are extensive.

The conclusions of recent literature on the effectiveness of capital controls are broadly consistent with earlier mixed findings. Many studies find no effect of controls on the volume of inflows, although some recent cross-country analyses conclude that countries with capital controls experience smaller inflow surges.²¹ Also, according to most studies, controls on inflows do not succeed in stemming exchange rate appreciation pressures, although there are some

cases where they are successful.²² Williamson (2000) argues that controls on inflows have a better chance of working because incentives to evade them are not as high-powered as the incentives to evade outflows. Regarding monetary policy autonomy, studies often find inflow controls effective in that they allow for larger differences between domestic and foreign policy rates.²³ In addition, an empirical study by Ostry and others (2010) based on 37 emerging market economies finds that in the recent crisis the output decline of the countries that had maintained capital controls in the run-up to the crisis was lower than in other countries without capital controls.²⁴

While the evidence on the effectiveness of capital controls in the literature is far from conclusive, this is partially due to the complexity of measuring effectiveness. In addition to the difficulties in establishing an appropriate measure of the intensity of capital controls, there are issues of endogeneity—capital controls are usually not implemented in isolation but rather as a part of a policy package that includes macroeconomic and structural policies and other measures, which renders the disentangling of the effects of the capital controls difficult.

Selected Country Experiences

The results of the country case studies assessing effectiveness of capital controls appear to support previous studies' conclusions. For each of the following countries individually, we examined the effect of a specific inflow control tightening in Brazil (2008), Colombia (2007–08), Croatia (2006–07), and Thailand (2006–08) and outflow liberalization in Korea (2005–08) using a vector autoregression (VAR) framework.²⁵ The analysis suggests that while controls

²⁰The study by Ariyoshi and others (2000) examined inflow surge episodes in Brazil (1993–97), Chile (1991–98), Colombia (1993–98), Malaysia (1994), and Thailand (1995–97).

²¹Magud and Reinhart (2007), who provide a comprehensive assessment of the capital controls literature up to 2006, conclude that capital controls on inflows are not effective in reducing the volume of net flows. For the most recent evidence, see Binici, Hutchison, and Schindler (2009) for a cross-country study; Balin (2008) for India; and Concha and Galindo (2009) and Clements and Kamil (2009) for Colombia. The two recent studies that report some effectiveness are Coelho and Gallagher (2010) and Jittrapanun and Prasartset (2009). In particular, Jittrapanun and Prasartset (2009) suggest that direct restrictions on portfolio inflows caused a short-term decline of portfolio inflows in Thailand. Similarly, Coelho and Gallagher (2010) find that the URRs introduced in Colombia and Thailand during 2007–08 were modestly successful in reducing overall volume of inflows, though at the cost of exchange rate volatility. Cardarelli, Elekdag, and Kose (2009) find that countries that had capital controls experienced lower capital inflows during episodes of inflow surges. Kim, Qureshi, and Zalduendo (2010), examining a panel of emerging market economies, similarly conclude that countries with capital controls experienced smaller inflow surges.

²²Studies show URRs had no or small impact on the exchange rate (Gallego, Hernandez, and Schmidt-Hebbel, 2002, and De Gregorio, Edwards, and Valdes, 2000, for Chile; Clements and Kamil, 2009, for Colombia). The only exceptions are Edwards and Rigobon (2009) and Coelho and Gallagher (2010).

²³In a vector autoregression framework, De Gregorio, Edwards, and Valdes (2000) find Chile's central bank was able to target a higher domestic interest rate for six to 12 months.

²⁴For more references on the relevant literature see Ostry and others (2010).

²⁵An impact of restrictions on capital transactions is assessed in a VAR framework, which treats capital control indices, interest

are generally associated with a decrease of inflows and a lengthening of maturities, these results are statistically significant in only a few cases. Controls are rarely successful in dampening exchange rate appreciation pressures. However, they are often able to provide room for some monetary independence for a limited time. (See Annex 4.3 for a detailed description of the five country case studies mentioned above and Annex 4.2b for a summary on effectiveness.)

Foreign Exchange Tax

Foreign exchange taxes appear to be mostly ineffective in reducing exchange rate pressures, but they can alter the composition of inflows toward longer-term maturities and reduce somewhat the volume of flows in the short run.²⁶ These taxes can be flexibly adjusted—in terms of both rate and coverage—in response to the challenges posed by capital flows, but can be circumvented over time by misreporting and misclassification. For example, Brazil adopted a tax on capital inflows—the “entrance tax”—on certain foreign exchange transactions and foreign loans during 1993–97, in combination with a number of administrative controls on certain types of inflows.²⁷ The regulations were adjusted at times of depreciation pressures on the exchange rate (during the Mexican and Asian crises), and the tax was reimposed later in 2008 (see Annex 4.3 for more details on Brazil) and in the fall of

2009 when the surge of capital inflows returned. The 2008 tax episode did not have a statistically significant effect on net inflows or on the maturity composition of inflows according to our VAR estimation.

Unremunerated Reserve Requirements

URRs—typically accompanied by other policies—have been effectively applied in reducing short-term inflows in overall inflows, but their effect diminishes over time. Chile (1991–98) and Colombia (1993–98) used URRs to limit short-term capital inflows with a view to maintaining a wedge between domestic and foreign interest rates while reducing pressures on the exchange rate. They were accompanied by a liberalization of outflow controls, an adjustment or progressive increase in the flexibility of the exchange rate, and a further strengthening of the prudential framework for the financial system.

The more recent imposition of URRs in Thailand (2006–08) and Colombia (2007–08) to stem capital inflows appears to have had some initial effect on the volume of net flows (see Annex 4.3).²⁸ However, this effect diminished over time. Controls on capital inflows also had a temporary maturity-lengthening effect in Colombia, but there is no evidence regarding the longer-term effectiveness of controls.

Prudential Measures as Capital Controls

There is some evidence that prudential-type capital controls can be effective in reducing capital inflows. For instance, the increased reserve requirements in Thailand (1995–97) accompanied by other prudential-type capital controls were effective in reducing net capital inflows. In Croatia, the marginal reserve requirement seems to have a statistically significant effect on reducing net inflows and slightly depreciating the exchange rate. However, its effect on decreasing bank flows is not significant (see Annex 4.3).

rate spreads, net capital flows, and real exchange rates as potential endogenous variables. Exogenous variables include domestic and foreign business cycles and investment risk indicators. The intensity of capital controls is captured by three indices—administrative inflow controls, administrative outflow controls, and price-based inflow controls—each tracking cumulative changes in regulations on capital transactions reported in the AREAER database. Variables are first differenced, if necessary, to ensure stationarity. We estimate the VAR system for each country with quarterly data for the period 2000:Q1 to 2008:Q2 with one lag and, if available, with monthly data for the period January 2000–August 2008. The capital flow data are from the IMF’s Balance of Payments Statistics website and from central bank websites.

²⁶Cardoso and Goldfajn (1998); Carvalho and Garcia (2008); and Reinhart and Smith (1998).

²⁷A study on the controls in Brazil in the 1990s shows that taxes on certain short-term inflows resulted in a large increase of longer-term transactions such as FDI; however, this was only a result of disguising short-term flows as long-term ones. Therefore, the de facto maturity-lengthening effect was much less pronounced than evidenced by the reported numbers (Carvalho and Garcia, 2008).

²⁸In Thailand, the increase in outflows resulted in a decrease of net flows, while in Colombia a VAR estimation covering the period ending two quarters after the introduction of the controls shows a statistically significant decrease in inflows for a short period and a lengthening of maturities.

Administrative Measures

The URRs are sometimes accompanied by administrative controls. For example, Chile combined the URR with administrative (minimum stay requirement for direct and portfolio investment) and other regulatory measures (minimum rating requirement for domestic corporations borrowing abroad and extensive reporting requirements on banks for all capital account transactions).²⁹

The effectiveness of controls largely depends on the existence of other capital controls in the country. For example, our analysis shows that while the URR in Thailand in 2006–08 was not successful in reducing the volume of inflows, the other capital controls in effect could allow monetary independence for a short period. The administrative controls implemented in Malaysia in 1994 were found to be effective in reducing the volume of inflows and exchange rate pressures. Countries with extensive capital controls in place can generally implement capital controls more effectively, since they have significant administrative capacity for and experience in operating such systems (see Annex 4.3 for a discussion on China and India).

Liberalization of Capital Outflows

Responding to a surge in capital inflows by liberalizing outflows is likely to have a lagged effect, and thus may not be appropriate as an immediate response. The lag depends on pent-up demand for such investments and the extent of the country's integration in the global financial system (see Annex 4.3 for a discussion of the effectiveness of Korea's outflow liberalization). The more experienced a country's residents with investments abroad, the greater the number of channels that have been built up previously for the intermediation of such transactions, and hence the sooner the outflows pick up. Thus, capital outflow liberalization is likely to be more effective if it involves a significant liberalization of the controls and in countries with a largely liberalized capital account or where capital flows were free before the introduction of the controls.

²⁹See Cardoso and Goldfajn (1998) for more details regarding Chile.

Analytical Assessment of Effectiveness: Results of an Event Study

The event study results indicate no clear effect of inflow-control tightening on the total volume of inflows. However, measures aimed at liberalizing outflows contributed to higher capital outflows, thereby reducing net flows and possible pressure on the exchange rate (see Box 4.5 for details).

Although the results do not point to a reduction in the volume of total capital inflows, they suggest that general prudential measures reduce portfolio inflows, whereas URRs and prudential measures that specifically target nonresidents reduce bank loans from abroad. There is also evidence that the application of URRs may contribute to lengthening the maturity of capital inflows, as they were associated with more reported FDI flows and less foreign bank borrowing. There was also some indication from the event study that countries that experienced a surge in capital inflows and imposed controls often observed smaller ensuing inflows than their counterparts, although this difference is not statistically significant.

Private Sector Views

Discussions with market participants revealed a uniform view that capital controls are ineffective in the long run, although views differed about effectiveness as an immediate response. Some noted that if the yield differentials are sufficiently high, investors will find a way to gain exposure to a country and, unless administrative restrictions are prohibitive, to circumvent capital controls (Box 4.6).

Conclusions

A number of policymakers worldwide are asking what would be effective policies in managing capital inflows and are considering the applicability and effectiveness of capital controls. The argument is that (1) recent capital movements have been partly generated by the low interest rate policy in the G-4 and abundant liquidity in the global financial system; and (2) capital inflows can come to a sudden stop once monetary policy in the G-4 is tightened. Not only is there uncertainty about the timing and speed

Box 4.5. Capital Account Measures—Event Study Results

This box examines the effectiveness of capital account measures introduced by the “liquidity-receiving” economies between 2003 and mid-2009. It finds that the implementation of controls generally does not stem total capital inflows, although, in some cases, it can lengthen their maturity. Measures aimed at liberalizing capital outflows yielded a significant growth of outflows, thereby effectively reducing net flows.

The effectiveness of capital controls is measured by their ability to stem surges in net capital flows. This box first examines the ability of controls on capital inflows to reduce the net volume of total capital inflows and each of the three main components of capital inflows, namely foreign direct investment (FDI), portfolio inflows, and bank loans (proxied by “Other Investment Liabilities” as defined in the IMF’s *Balance of Payments Statistics Manual*). The box then analyzes the effectiveness of outflow liberalization strategies to increase the net volume of total capital outflows and each of the three main components of capital outflows, namely outward direct investment, portfolio outflows, and “Other Investment Assets.” The analysis is conducted using quarterly capital flow data from 2003:Q1 to 2009:Q2, scaled by GDP, from the IMF’s International Financial Statistics database.

Of the 211 capital-account-related measures introduced by the “liquidity-receiving” economies¹ during 2003–09, 52 percent aimed to ease capital outflows and 48 percent to tighten capital inflows. Among the tightening events, administrative measures are most popular (17 percent), followed by prudential measures that do not discriminate against nonresidents (14 percent), prudential measures that discriminate between residents and nonresidents (12 percent), and unremunerated reserve requirements (URRs) (5 percent).² The capital account data come from the

IMF’s *Annual Report on Exchange Arrangements and Exchange Restrictions*.³

The impact of a control on inflows is expected to be felt—if at all—immediately after implementation of the measure. Therefore, the impact of each type of control is tested over the period between the introduction of the control and the end of the following calendar quarter,⁴ controlling for preexisting capital inflow volumes during the quarter prior to the introduction of the control. The significance of the impact is measured here by averaging the differences between the post-control and prior-control inflows across country events over the sample period. The significance of the average impact on each inflow type (total capital inflows, FDI, portfolio investment, and bank loans) is then tested using a standard one-sided t-test.

In contrast, liberalizing outflows is likely to have a lagged effect. Therefore, we study the response to outflow-easing measures over a longer period of two years and control for the average preexisting capital outflow volumes over a period of four years prior to liberalization.⁵ That is, for each capital outflow variable (total capital outflows, outward direct and portfolio investment, and outward loans) we assume that the expected outflows each quarter post-liberalization should be at least as big as the average quarterly outflows during the previous four years. The differences between the actual outflows over a period of two years post-liberalization

³While the analysis is based on all capital-account-related measures introduced by the liquidity-receiving economies between 2003 and mid-2009, only a few countries tightened capital inflows considerably. Indeed, measures introduced by many countries were not so far-reaching as to expect a significant effect.

⁴Capital inflows during the quarter when the control was introduced are calculated as the proportion of days in the quarter that the measure was effective times the volume of this flow during this quarter.

⁵As a robustness check, we test the impact of both inflow control tightening and outflow liberalization measures on the inflows/outflows over periods of one quarter, one year, and two years. Within each post-event observation period, we examine average responses to controls while controlling for the preexisting capital inflow volumes during one quarter, one year, and four years prior to the control introduction. The results support our priors that the response to inflow-restricting controls—if any—is immediate, while the impact of outflow-easing measures is gradual and depends on the countries’ outward investment environment.

Note: This box was prepared by Sylwia Nowak.

¹The “liquidity-receiving” economies are the emerging market economies, Australia, Canada, Iceland, New Zealand, and Norway. See Annex 4.1 for a complete list.

²Taxes on inflows are not tested due to a small sample size (there are only two Brazilian events in the first and second quarter of 2008; Brazil also reintroduced this type of measure in the fourth quarter of 2009, however, capital flow data are not yet available for this period).

Box 4.5 (concluded)
Average Impact of Capital Controls
(In percentage points of GDP and average effectiveness rate)

Type of flows	Tightening Inflows			Unremunerated reserve requirements	Easing outflows
	Administrative	General prudential	Prudential aimed at foreign inflows		
Total inflows/outflows			-3.0 [56]		13.7 [84]
Foreign direct investment					4.2 [76]
Portfolio investment		-1.6 [62]			2.2 [57]
Bank loans/other investment			-2.0 [56]	-1.7 [81]	7.1 [83]
Sample size	36	29	25	11	110

Sources: IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*; IMF, International Financial Statistics database; and IMF staff estimates.

Note: Only unique events, for which capital flows data are available, are considered in the analysis. The impact of each type of inflow control (and easing outflows) is tested over a period of one quarter (two years for easing outflows), controlling for preexisting capital flow volumes during one quarter (four years) prior to the introduction of the capital inflow control (outflow liberalization measure). For each capital flow variable, differences between the post-control and prior-control flows are averaged and tested for significance using a standard one-sided t-test. Only statistically significant results are reported. Average effectiveness rates, reported in square brackets, represent the percentage of all inflow-tightening (outflow easing) measures of a given type that resulted in a decline in the volume of net capital inflows (increase in the volume of net capital outflows) over the next quarter (the next two years).

and their expected values are summed up, averaged across all liberalization events, and tested for significance using a one-sided t-test.

On average, capital controls seem unable to stem the volume of total inflows in a statistically significant manner, even if the average response is often in the right direction. Specifically:

- Large variations in responses to implemented capital controls imply that controls are often as likely to decrease the net inflows as they are to increase them. However, the results suggest that prudential measures that specifically address nonresidents and URRs significantly reduce bank loans by 2 and 1.7 percentage points of GDP, respectively (see table). In addition, general prudential measures reduce portfolio inflows by 1.6 percentage points, perhaps as a result of a drop in the foreign funding of local banks in the form of debt securities issued by banks.
- On average, prudential-type capital controls aimed at foreign inflows are most likely to stem total inflows, with an average reduction of 3 percentage points.
- A counterfactual analysis performed on the sample indicates that, although countries that experienced a surge in capital inflows and imposed controls

often observed smaller ensuing inflows than their counterparts with a similar surge that did not tighten controls, the difference is not statistically significant.

- If the observation window is lengthened to two years, and we control for average quarterly inflows over the previous four years, prudential measures significantly lower portfolio inflows by 2.9 percentage points of GDP, while no other measure is significant (not shown).
- URRs are statistically significant in lengthening the maturity of inflows. The application of URRs resulted in a significant increase in FDI of 4.5 percentage points of GDP over the first two years, as cross-border bank loans declined.

Outflow easing strategies yield a significant increase of outflows, with the ratio of total outflows to GDP increasing by 13.7 percentage points within the first two years. Outflow liberalization measures resulted in increases of total outflows 84 percent of the time, with outward loans being most responsive (an average increase of 7.1 percentage points occurred 83 percent of the time) followed by outward FDI (an average increase of 4.2 percentage points, 76 percent of times).

Box 4.6. Market Participant Views Regarding Effectiveness of Capital Controls

Market participants report that, in general, capital controls are of secondary importance when they make investment decisions regarding emerging markets.

In discussions with market participants, the generally shared view was that capital account restrictions are circumvented in the long run, although views varied as to their effectiveness as a first response.

Some participants were of the opinion that, for example, Brazil’s tax imposition had only a marginal effect, if any, on investment decisions, and was not effective in preventing appreciation pressures. However, hard capital controls, such as unremunerated reserve requirements of nonresident deposits, could effectively keep investors out.

Other asset managers noted that when emerging market yields were high relative to other asset classes, capital controls did not have a large influence on invest-

tor decisions, posing only an administrative burden but not affecting the volume of flows. However, investor allocation decisions of active fixed-income portfolios may be affected, either marginally or even significantly if returns decline further, especially in terms of further spread compression relative to other asset classes.

Analysts noted, as a positive policy evolutionary development, that some emerging markets have used countercyclical measures, such as lowering interest rates, as a response to the surge in capital inflows.

The surge in capital inflows poses the additional challenge of a sudden stop or reversal of flows. Market participants questioned whether countries such as Brazil and Colombia can effectively address a sudden stop in capital inflows, although the larger the domestic investor base the better a country would be able to deal with such reversals, participants noted.

of future tightening—in itself a significant policy challenge in countries receiving inflows—but the inflows may in the meantime lead to exchange rate overshooting and risks to financial sector stability. Indeed, policymakers in the G-4 need to be cognizant of the potentially adverse effects of a prolonged accommodative monetary policy stance.

While domestic liquidity is also important, the analysis supports the argument that global (G-4) liquidity is indeed transmitted to liquidity-receiving economies as evidenced by

- higher portfolio equity inflows;
- official reserve accumulation; and
- changes in asset valuations, including rising equity returns and declining real interest rates.

On the other hand, in this study, global liquidity was not found to be positively correlated with FDI, portfolio bond investment, and cross-border bank lending.

For economies with a floating exchange rate regime, the statistical link between global liquidity and domestic asset valuations declines, and the correlation between domestic liquidity and asset valuations turns negative. This suggests that a flexible exchange rate could reduce the transmission of global liquidity to liquidity-receiving economies, including valuation pressures on domestic

assets. Thus receiving economies may want to consider a more flexible exchange rate policy in the presence of large liquidity inflows from abroad.

There are a number of policy options available to policymakers in response to capital inflows. The menu of traditional policy responses for mitigating risks related to capital inflow surges includes a more flexible exchange rate policy, in particular when the exchange rate is undervalued, reserve accumulation (using sterilized or unsterilized intervention as appropriate), reducing interest rates if the inflation outlook permits, tightening fiscal policy when the overall macroeconomic policy stance is too loose, and reinforcing prudential regulation.³⁰ If conditions allow, liberalization of outflow controls can also prove useful. The appropriate policy mix will depend on country-specific conditions.

When these policy measures are not sufficient and capital inflow surges are likely to be temporary, capital controls may have a role in complementing the policy toolkit. However, more permanent increases in inflows

³⁰Although a tightening of fiscal policy as a medium-term objective may signal a better policy environment and thereby attract inflows.

tend to stem from more fundamental factors, and will require more fundamental economic adjustment.

The conclusions of recent economic research, including our own analysis, on the effectiveness of capital controls are broadly consistent with earlier findings.

- Most studies find no effect of controls on the volume of total inflows, nor do they find that controls succeed in stemming exchange rate appreciation pressures, although some measures, such as URRs, may reduce valuation surges on some domestic assets, such as equities, by lengthening the maturity structure of inflows toward more stable flows.
- Tightening controls on capital inflows can lengthen the maturity of inflows toward potentially less-volatile components.
- Controls tend to lose effectiveness over time, as market participants find ways to circumvent them.
- There is no clear empirical evidence that market-based controls are more effective than administrative controls. However, they tend to be more transparent and predictable and less prone to governance issues than administrative controls.
- Our event study and VAR analysis results indicate no clear effect of capital control measures on the volume of inflows, although outflow liberalization appears to increase capital outflows, thereby reducing net flows.

Even though they may be useful under certain circumstances, capital controls have significant drawbacks. They distort the efficient allocation of resources and, even if introduced as a temporary measure, tend to remain a longstanding feature of the foreign exchange regulatory system. They are expensive for both the authorities, who administer the controls, and the banks, which usually assist the authorities in their implementation, in particular in those countries that have already liberalized their capital account and first would have to build up the necessary institutional framework. The private sector can also incur significant compliance costs. In some cases, the country's commitments under international agreements may prevent the introduction of controls or allow it only under specific conditions.

Even if capital controls prove useful in dealing with capital flows for individual countries, they may lead to adverse multilateral effects. The adoption of inflow controls in one country, if effective, can divert capital flows to its peers, prompting the introduction of capital controls in those countries as well. A widespread reliance

on capital controls may delay necessary macroeconomic adjustments in individual countries and, in the current environment, prevent the global rebalancing of demand and thus hinder global recovery and growth.

Overall, the message is that one size does not fit all. There are a number of different types of controls that can be imposed with varying degrees of success under different country circumstances. Since the use of capital controls is advisable only to deal with temporary inflows, in particular those generated by external factors, they can be useful even if their effectiveness diminishes over time. However, the decision to implement capital controls should consider their distortionary effects not just on the individual country, but also on the global economy in the event their use were to become widespread.

The design of the appropriate capital controls is highly country-specific. While it is generally advisable to use market-based controls because they are more transparent, the choice between administrative and market-based controls is also determined by the previous experience of the authorities with controls, the country's administrative capacity, and the extent to which the banking sector can be relied upon to implement the controls. Countries that have a relatively well-functioning set of administrative controls in place may find it more useful to introduce administrative measures.

The preferred control type also depends on the type of inflows the authorities intend to reduce and the macroeconomic objectives the controls aim to support. If, for instance, the main concern is financial sector stability, prudential-type capital controls may be appropriate, while if the concern is appreciation pressure and loss of external competitiveness, more broad-based control measures need to be introduced. It is also important to strike the right balance in the trade-off between comprehensiveness, which minimizes circumvention, and precision in targeting the specific type of inflows that are of concern.

Annex 4.1. Econometric Study on Liquidity Expansion: Data, Methodology, and Detailed Results³¹

Panel data specifications are employed to estimate the impact of global liquidity on asset returns for a monthly

³¹This annex was prepared by Tao Sun.

sample of 41 advanced and emerging market economies covering the period from January 2003 to December 2009.³² The dependent variables tested in the estimations are asset returns in the receiving economies approximated by nominal equity returns (in U.S. dollars) and the real interest rate denoted as the difference between three-month interbank rate, London Interbank Offered Rate (LIBOR) or treasury rate, and inflation rate.

We use two groupings of explanatory variables in the panel specifications:

(1) Domestic or fundamental factors include economic growth, the forward exchange rate, the growth in money supply (M2) or reserve money, net foreign assets of the central bank, the three-month interbank rate, the LIBOR or treasury rate, and the inflation rate based on consumer prices.

(2) Global factors include proxies for (1) global liquidity defined as the growth rates of broad money, reserve money, and excess liquidity in the euro area, Japan, the United Kingdom, and the United States;³³ (2) credit risk premium defined as the level of the 10-year U.S. dollar swap spread, which is the difference between the 10-year U.S. dollar swap rate and the 10-year U.S. treasury bond, as a proxy for aggregate default risk; and (3) a market risk premium defined as the implied volatility of the at-the-money option on the S&P 500 index (VIX).³⁴

The economies examined are:

- Asia-Pacific: Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.
- Europe, Middle East, and Africa: Bulgaria, Croatia, Czech Republic, Estonia, euro area, Hungary, Iceland, Latvia, Lithuania, Nigeria, Norway, Poland, Romania, Russia, Saudi Arabia, South Africa, Turkey, and the United Kingdom.
- Western Hemisphere: Argentina, Brazil, Canada, Chile, Colombia, Mexico, Peru, and the United States.

³²This period is chosen because it can capture the rapid increase in global liquidity; GDP-weighted G-4 M2, for instance, have increased twofold during this period.

³³Baks and Kramer (1999) use similar approaches to define global liquidity.

³⁴See similar frameworks in (IMF, 2008a, 2008b) and Psalida and Sun (2009).

Table 4.2. Fixed-Effects Panel Least-Square Estimation of the Determinants of Asset Returns—41 Economies, January 2003–December 2009

	Equity Returns	Real Interest Rate
Constant	63.1 (0.00)***	4.39 (0.00)***
Global Market Conditions		
VIX	-1.57 (0.00)***	0.010 (0.29)
Credit risk premium	-13.45 (0.01)**	0.65 (0.45)
Domestic Macroeconomic Factors		
M2 (1 lag)	0.18 (0.03)**	-0.04 (0.00)***
Exchange rate (1 lag)	-1.05 (0.00)***	-0.01 (0.54)
Change in GDP growth	7.85 (0.00)***	-0.25 (0.09)*
Inflation (1 lag)	-1.77 (0.00)***	
Adjusted R ²	0.57	0.59
Monthly sample	1/03–12/09	1/03–11/09
No. of cross-sections	31	30
No. of observations	1,792	1,713

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P. Consensus Forecasts; and Datastream.

Note: Probability values for a test that the coefficient is different from zero are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level).

Relationship between Domestic Liquidity and Asset Returns

We first examine the relationship between domestic liquidity (M2) growth and real asset returns using a panel data specification for a total of 41 economies, separated into the G-4 “liquidity-creating” economies and 37 “liquidity-receiving” economies. Specifically, we have two panel specifications, which have nominal equity returns and the real short-term interest rate as dependent variables, respectively. VIX, the credit risk premium, domestic money, the forward exchange rate, inflation, and change in GDP growth are taken as independent variables.

Table 4.2 shows that domestic liquidity is positively associated with equity returns. Inflation, credit risk, and VIX are negatively associated with equity returns. In addition, an expectation of exchange rate appreciation and a positive change in GDP growth contribute to rising equity returns. Also, domestic liquidity has a significant negative impact on the real interest rate.

Table 4.3. Fixed-Effects Panel Least-Square Estimation of the Determinants of Asset Returns, 34 Economies, January 2003–December 2009

	Equity Returns	Real Interest Rate
Constant	62.28 (0.00)***	4.86 (0.00)***
Global Market Conditions		
G-4 M2 (1 lag)	1.14 (0.00)***	-0.09 (0.00)***
VIX	-1.64 (0.00)***	-0.004 (0.80)
Credit risk premium	-41.84 (0.00)***	-2.54 (0.03)**
Domestic Macroeconomic Factors		
M2 (1 lag)	0.22 (0.00)***	-0.021 (0.16)
Exchange rate (1 lag)	-0.89 (0.01)**	-0.05 (0.02)**
Change in GDP growth	7.18 (0.00)***	-0.4 (0.02)**
Inflation (1 lag)	-1.5 (0.00)***	
Adjusted R ²	0.62	0.54
Monthly sample	1/03–12/09	1/03–12/09
No. of cross-sections	27	26
No. of observations	1,527	1,450

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: Probability values for a test that the coefficient is different from zero are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level).

Liquidity Spillovers from the G-4 to 34 Liquidity-Receiving Economies

We perform three types of tests to estimate cross-country liquidity spillovers: (1) a panel estimation of the effect of G-4 liquidity on the asset returns and excessive credit growth of receiving economies; (2) a panel estimation of the effect of G-4 liquidity on receiving economies' capital inflows; and (3) Granger causality tests relating G-4 and receiving economies' liquidity.

Effect of G-4 Liquidity on Receiving Economies' Asset Returns Using a Panel

We perform a panel estimation to gain a better understanding of the relation between asset returns in the 34 liquidity-receiving countries (excluding Pakistan, Sri Lanka, and Saudi Arabia) in our sample and G-4 (global) liquidity. Table 4.3 shows that, in the case of 34 economies, global liquidity is positively (nega-

tively) associated with equity returns (the real interest rate). This relationship further supports the view that both global and domestic liquidity may have provided support to rising asset prices during 2003–09.³⁵ In addition, the effect of global liquidity is five times as large as that of domestic liquidity, and the expectation of exchange rate appreciation can also drive up equity prices. Moreover, global liquidity also drives down the real interest rate.

We separate the full sample into three geographic groupings to test the impact of global liquidity on equity returns by region: Asia-Pacific; Europe, Middle East and Africa; and the Western Hemisphere. The results show that global liquidity is positively associated with equity returns in each of the three groups, while the 34 economies' domestic liquidity (M2) is statistically significant only for Asia-Pacific equities, given this group's higher proportion of economies with fixed or managed exchange rates (Table 4.4). This is consistent with the results on fixed versus flexible-rate economies as shown in Table 4.1.

When we include contemporaneous capital control dummies in the panel regressions to test the impact of capital control measures on asset returns, we find no statistically significant impact, except for URRs (significant at the 10 percent confidence level).

We also check whether high global liquidity affects a measure of financial stability by replacing equity returns with equity overvaluation (defined as the deviation of equity returns from their one-year moving average) and excessive credit growth (defined as the deviation of private credit growth from its one-year moving average) as dependent variables. As expected, global liquidity is positively associated with equity overvaluation and excessive credit growth.

A further test was conducted to check whether a reverse association holds, that is, whether liquidity growth in the 34 economies is associated with positive asset returns in the G-4. We replaced the

³⁵An alternative test that replaces G-4 M2 with G-4 overnight index swaps (OIS) as a proxy for global liquidity indicates similar results for the period January 2003–April 2008, that is, a negative association between the GDP-weighted G-4 OIS and equity returns. But this relationship breaks down when the global crisis period (May 2008 to December 2009) is included. This is not surprising given the lessened effectiveness of interest rates as a policy tool during the crisis.

Table 4.4. Fixed-Effects Panel Least-Square Estimation of the Determinants of Equity Returns—Regional Disaggregation, January 2003–December 2009

	Asia	Europe, Middle East, and Africa	Western Hemisphere
Constant	59.55 (0.00)***	56.89 (0.00)***	64.09 (0.00)***
Global Market Conditions			
G-4 M2 (1 lag)	1.59 (0.00)***	1.15 (0.04)**	0.68 (0.00)***
VIX	-1.65 (0.00)***	-1.93 (0.00)***	-1.34 (0.00)***
Credit risk premium	-61.12 (0.00)***	-4.84 (0.76)	-48.12 (0.00)***
Domestic Macroeconomic Factors			
M2 (1 lag)	0.68 (0.00)***	0.12 (0.60)	0.14 (0.15)
Exchange rate (1 lag)	-0.92 (0.00)***	-0.48 (0.07)*	-1.3 (0.00)***
Change in GDP growth	6.98 (0.00)***	5.49 (0.01)**	7.55 (0.00)***
Inflation (1 lag)	-1.82 (0.00)***	-3.24 (0.00)***	-0.1 (0.76)
Adjusted R ²	0.59	0.62	0.65
Monthly sample	1/03–12/09	1/03–12/09	1/03–12/09
No. of cross-sections	9	11	7
No. of observations	606	341	580

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: Probability values for a test that the coefficient is different from zero are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level).

34 economies’ equity returns with G-4 equity returns (for both individual countries and the average) as the dependent variable, while using the same explanatory variables as in Table 4.3. The results show no statistical significance, indicating that the 34 economies’ liquidity growth is not associated with equity returns in the G-4.

Housing price data—where available—were also tested as an additional asset indicator of their association with the growth in global liquidity. Using quarterly house prices in 11 economies, we estimate the growth of nominal and real house prices using the same independent variables as in Table 4.4.³⁶ Global liquidity is statistically insignificant, while domestic liquidity is statistically significant with a positive

³⁶The 11 economies are Australia, Canada, China, Iceland, Indonesia, Korea, Malaysia, New Zealand, Norway, South Africa, and Thailand.

sign. These results indicate that domestic liquidity plays a role in driving up housing prices, but point to no role for global liquidity. These results need to be interpreted with caution, however, given the limited housing data sample.

As a robustness test, we replaced G-4 M2 as a liquidity measure with G-4 reserve money and excess liquidity, respectively, and the 34 economies’ M2 with their reserve money and net foreign assets of the monetary authorities separately as explanatory variables. These alternative variables for global and domestic liquidity are generally statistically significant with a positive coefficient. These results further support the notion that the contribution of global liquidity to the change in asset returns remains robust under alternative measures for global liquidity.

Relation between Global Liquidity and Capital Flows

We perform regressions using capital flows as dependent variables to capture the links between global liquidity and capital flows. In this test, we take global liquidity as an independent variable and control for domestic and other global factors. The results in Table 4.5 show that global liquidity has a significant impact on portfolio equity inflows.

Relation between G-4 Liquidity and 34 Receiving Economies’ Liquidity Using Granger Causality Tests

We perform Granger causality tests to see whether global liquidity Granger-causes domestic liquidity, that is, the growth of monetary indicators in the 34 liquidity-receiving economies in our sample. We look specifically at broad money and reserve money growth in the G-4, as an approximation of global liquidity, and at domestic broad money and reserve money in the 34 liquidity-receiving economies. Table 4.6 indicates that both global and domestic liquidity Granger-cause each other. In addition, we can also see the long-run causality relations between global liquidity and domestic liquidity by using the level of the variables in the panel. The advantage of this approach is that we can use nonstationary data to capture the long-run causal relationships.

Impact of Global Liquidity on Asset Returns: Case Study for Brazil, Chile, China, and Hong Kong SAR

We test the impact of global liquidity on asset returns in four economies over the period 2003–09. Specifically, we test the effect of G-4 liquidity growth on equity returns in Brazil, Chile, China, and Hong Kong SAR, while controlling other vari-

ables in an EGARCH (1,1) specification. The results in Table 4.7 show that global liquidity is positively associated with equity returns, and the signs of the coefficient of the EGARCH variable (β) are statistically significant, indicating that the volatility in global liquidity spills over into the volatility of all liquidity-receiving economies.

Table 4.5. Fixed-Effects Panel Least-Square Estimation of the Determinants of Capital Flows, 34 Economies, January 2003–December 2009

	Foreign Direct Investment	Equity Securities	Debt Securities	Other Investments
Constant	-11.6 (0.02)**	-23.05 (0.17)	26.7 (0.14)	19.08 (0.07)*
Global Market Conditions				
G-4 M2 (1 lag) ¹	-0.38 (0.07)*	1.62 (0.02)**	0.7 (0.36)	-0.61 (0.18)
VIX	-0.34 (0.00)***	-0.86 (0.02)**	-0.2 (0.61)	-0.54 (0.02)**
Credit risk premium	53.42 (0.00)***	9.64 (0.76)	-102.27 (0.00)***	-13.19 (0.51)
Domestic Macroeconomic Factors				
Exchange rate (1 lag)	0.08 (0.46)	0.65 (0.06)*	-0.73 (0.04)**	-0.60 (0.01)**
Change in GDP growth	0.16 (0.90)	5.69 (0.19)	-3.6 (0.43)	-0.14 (0.96)
Real interest rate (1 lag)	0.21 (0.28)	-1.06 (0.09)*	-4.57 (0.00)***	-0.92 (0.03)**
Adjusted R ²	0.09	0.04	0.15	0.04
Monthly sample	1/03–12/09	1/03–12/09	1/03–12/09	1/03–12/09
No. of cross-sections	25	24	23	25
No. of observations	1,283	1,210	1,132	1,283

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: Probability values for a test that the coefficient is different from zero are in parentheses (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level).

¹The decline in foreign direct investment during the global financial crisis likely contributes to the coefficient of G-4 M2 being negative; it is positive but insignificant during the subperiod January 2003–September 2007.

Table 4.6. Granger Causality Relations between Global and Domestic Liquidity

Data	Probabilities ¹			
	M2 in 34 economies does not Granger-cause G-4 M2	G-4 M2 does not Granger-cause M2 in 34 economies	Reserve money in 34 economies does not Granger-cause G-4 reserve money	G-4 reserve money does not Granger-cause reserve money in 34 economies
Growth rate	7.8×10^{-14}	18.2×10^{-38}	3.2×10^{-4}	4.5×10^{-7}
Level	0	0	0.05	0

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: The null hypothesis is that there is no Granger causality between the respective pairs of variables.

¹Probability of rejecting the null hypothesis.

Table 4.7. Determinants of Equity Returns, EGARCH (1,1) Specifications, January 2003–November 2009

	Brazil	Chile	China	Hong Kong SAR
Mean Equation				
Constant	229.24 (0.00)***	-1.05 (0.92)	-78.51 (0.00)***	-19.85 (0.00)***
Global Market Conditions				
G-4 M2 (1 lag)	3.03 (0.00)***	1.45 (0.00)***	2.20 (0.00)***	0.87 (0.00)***
VIX	-1.44 (0.01)**	-1.16 (0.00)***	-1.38 (0.00)***	-1.21 (0.00)***
Credit risk premium	-20.77 (0.45)	11.58 (0.53)	48.18 (0.00)***	19.11 (0.01)**
Domestic Macroeconomic Factors				
M2 (1 lag)	-1.65 (0.00)***	0.38 (0.04)**	2.88 (0.00)***	1.33 (0.00)***
Exchange rate (1 lag)	-2.04 (0.00)***	0.62 (0.04)**	4.36 (0.00)***	0.94 (0.76)
Change in GDP growth	1.43 0.71	-3.87 (0.13)	-5.75 (0.08)*	0.29 (0.62)
Inflation (1 lag)	-2.63 (0.09)*	-6.09 (0.00)***	-4.46 (0.02)**	-2.71 (0.00)***
Variance Equation				
ω	1.92 (0.02)**	1.68 (0.00)***	2.73 (0.00)***	1.67 (0.00)***
α	0.08 (0.21)	-0.52 (0.00)***	-0.63 (0.00)***	-0.13 (0.21)
β	0.65 (0.00)***	0.67 (0.00)***	0.54 (0.00)***	0.60 (0.00)***
γ	-0.21 (0.05)*	0.77 (0.00)***	1.00 (0.00)***	0.80 (0.00)***
Adjusted R ²	0.85	0.75	0.75	0.89
Monthly sample	1/03–11/09	1/03–11/09	1/03–09/09	1/03–11/09
No. of observations	83	83	81	83

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; Bloomberg L.P.; Consensus Forecasts; and Datastream.

Note: The specification for the mean equation is: equity returns_t = constant + θ_1 G4 M2_{t-1} + θ_2 VIX_t + θ_3 Credit risk_t + θ_4 M2_{t-1} + θ_5 Exchange rate_{t-1} + θ_6 GDP_t + θ_7 Inflation_{t-1} + ε_t , where the conditional variance of ε_t is denoted:

$$\log(\sigma_t^2) = \omega + \sum_{j=1}^q \beta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^p \alpha_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \sum_{k=1}^r \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}}$$

Annex 4.2a. Global Liquidity Expansion—Capital-Account-Related Measures Applied in Selected Liquidity-Receiving Economies

Type of Measure	Country
Tax	Brazil (2008), (2009) ¹
Unremunerated reserve requirements	Argentina (2005–) Colombia (2007–08) Russia (2004–06) Thailand (2006–08)
Prudential-type capital controls: marginal reserve requirements on external borrowing; high reserve requirements on foreign exchange liabilities; limited foreign exchange lending to residents; other.	Colombia (2004–05, 2007) Croatia (2003, 2004–08) India (2006–07) Indonesia (2005) Korea (2004, 2006, 2008) Peru (2008) Romania (2005–06) Russia (2004) Turkey (2008)
Administrative measures: Include ceilings and maturity requirement for external borrowing, limits on the amounts nonresidents can repatriate from their investments, authorization requirement for nonresidents investments.	Argentina (2005–08) China (2007) Colombia (2004) India (2003, 2006–07) Indonesia (2005) Mexico (2006) Philippines (2007) Russia (2004) Slovenia (2007) Taiwan Province of China (2009) ¹ Thailand (2003, 2006, 2008) Vietnam (2007)
Liberalization of outflows ²	Argentina (2003–04, 2008) Brazil (2005–06) Bulgaria (2003, 2007) Canada (2005) Chile (2003, 2005, 2008) China (2006–07) Colombia (2003, 2005, 2008) Croatia (2003, 2006–07) Hungary (2007–2008) India (2003–04, 2006–07) Indonesia (2007) Korea (2005–08) Latvia (2003) Lithuania (2004) Malaysia (2003–08) Mexico (2007–08) Moldova (2009) Nigeria (2008) Pakistan (2003, 2005) Peru (2004, 2007–08) Philippines (2004–05, 2007–08) Poland (2007) Romania (2003, 2007) Russia (2004, 2006–07) Singapore (2004) Slovak Republic (2003–04) Slovenia (2003–04) South Africa (2003–08) Sri Lanka (2003, 2006–08) Thailand (2003, 2007–08) Turkey (2006, 2008) Vietnam (2006–07)

Source: IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*, 2003–08.

Note: This annex was prepared by Annamaria Kokenyne. The annex does not include capital controls that were introduced before, and remained in effect during, the period in the selected liquidity-receiving economies or other countries, and therefore cannot be considered indicative of the restrictiveness of the capital control regime in these countries. Also, the measures are not equally significant; some of them have only a minor potential effect.

¹Based on press articles.

²The measures include the easing or lifting of controls on one or more type of capital account transaction of residents abroad.

Annex 4.2b. Global Liquidity Expansion—Policy Responses Affecting the Capital Account in Selected Liquidity-Receiving Economies

Type of Measure	Type of Capital Flow	Aim of Measure	Effectiveness/Limitations			Countries
			Reduced net inflows	Lengthened the maturity structure	Stemmed appreciation pressure	
Tax	Short-term capital inflows, loans and fixed-income securities	Ensure monetary independence, ease exchange rate appreciation pressures	Yes (temporarily)	Yes, but large-scale circumvention due to sophisticated financial markets	No	Brazil (1993–97) Complemented by various administrative measures
	Loans and fixed income securities	Ease appreciation pressures	No	No	No	Brazil (March–October 2008)
Unremunerated reserve requirements	Banks' external borrowing, later extended to nondebt flows	Ensure monetary policy independence, preserve export competitiveness	No	Yes	No	Chile (1991–98) Complemented by various administrative measures
	Banks' short-term external borrowing	Preserve competitiveness	No	Yes	No	Colombia (1993–98)
	External borrowing and fixed-income portfolio flows	Preserve competitiveness	Yes ¹ (temporarily)	No	No	Thailand (2006–08)
	Banks' external borrowing, portfolio inflows	Preserve competitiveness	No Yes ² (temporarily)	No Yes ² (temporarily)	No No	Colombia (2007–08)
Administrative measures	Short-term debt inflows	Ensure monetary policy independence, reduce financial sector external debt	Yes	Yes	Yes	Malaysia (1994)
Prudential measures with an element of capital control	Short-term external borrowing and lending in local currency	Maintain fixed exchange rate and tight monetary policy	Yes	Yes	Yes	Thailand (1995–97)
	Banks' external borrowing	Reduce rapid credit expansion, ensure financial sector stability	Yes	n.a.	Yes	Croatia (2004–06) Complemented by strengthened macroprudential measures
Capital outflow liberalization	Short-term external borrowing	Stem appreciation pressures and preserve financial sector stability	No	n.a.	No	Korea (2005–08)

Note: This annex was prepared by Annamaria Kokenyne. Assessments are based on previous studies as summarized in Ostry and others (2010) and IMF staff calculations.

¹Unremunerated reserve requirement decreased the net flows (inflows minus outflows) by increasing outflows.

²The period covered by the vector autoregression estimation ends one year after the introduction of controls.

Annex 4.3. Country Case Studies³⁶

Foreign Exchange Tax—Brazil

Brazil has attracted increasing foreign exchange inflows since the early 2000s, with the 2008–09 financial crisis prompting a sharp but temporary interruption. During this decade, the exchange system has been liberalized significantly, reaching almost full liberalization by 2006. Against the backdrop of strong economic growth, FDI has been the largest single source of inflows, but portfolio inflows, to both bond and equity markets, have been growing. These have been attracted by high relative interest rates, a stable macroeconomic environment, and appreciation expectations in the context of a liquid and diversified domestic capital market (Figure 4.5).

Following a series of foreign exchange interventions, concerns about the potential effects of further hot money inflows on external competitiveness led to the introduction of capital controls in the form of taxes in 2008.³⁷ Taxes on capital account transactions were reintroduced in March 2008 at the rate of 1.5 percent. Exemptions were applied to funds related to equities, equities derivatives, initial public offerings, and subscription of shares. In May, the tax was extended to cover “simultaneous operations” that intend to circumvent the inflow tax. The tax was lifted in October 2008 at the peak of the global financial crisis, when the exchange rate came under depreciation pressures.

Facing a surge in portfolio flows, a 2 percent tax on fixed-income and equity inflows was reintroduced in October 2009. To limit circumvention, the authorities implemented a 1.5 percent tax on certain trades involving American Depositary Receipts (ADR) issued by Brazilian companies in November.

³⁶This annex was prepared by Annamaria Kokenyne and Chikako Baba.

³⁷Taxes on foreign exchange transactions are not a new feature in the Brazilian foreign exchange system, as they had been implemented in the second half of the 1990s when large, mainly portfolio inflows, had put pressure on the exchange rate. A tax with rates of up to 7 percent was applied to fixed-income funds, interbank exchange operations, and short-term asset holdings by nonresidents. In 1999, a 5 percent tax was imposed on foreign borrowing with maturities shorter than 90 days.

Our VAR estimates indicate that the taxes introduced in 2008 did not have a significant effect on the overall volume and maturity structure of capital inflows or the real exchange rate. This may be explained partially by the ability of some market participants to circumvent the controls. However, it seems that the tax has provided for greater monetary independence, as it contributed to maintaining an increasing interest rate spread for two quarters.

Unremunerated Reserve Requirements—Colombia

In 2007, the Colombian authorities responded to surges in capital inflows with a combination of policies. Early that year, Colombia had experienced a significant appreciation of the peso due to increased capital inflows, mainly in the form of FDI, whose surge was partially driven by higher-than-average growth in the region and high interest rates (Figure 4.6). The authorities initially responded with sterilized foreign exchange interventions followed by tightening capital controls and prudential measures.

Capital controls on foreign borrowing, which were soon extended to portfolio inflows, took the form of a 40 percent URR to be held with the central bank. The measure was complemented by a ceiling on banks' gross derivative positions—not allowed to exceed 500 percent of capital—to prevent the circumvention of controls and reduce the amount of position-taking against the peso. Withdrawals of funds before the six-month period were subject to penalties of 1.6 to 9.4 percent of the reserve, depending on the length of time they were held. Colombian institutional investors, which were major participants in both the domestic and the offshore capital markets, were exempt from the URR.

The controls, which also aimed at macroprudential concerns, were adjusted several times before they were eliminated. In June 2007, equities issued abroad were exempted, which allowed ADR trading without a URR. In December, the URR on initial public offerings was eliminated and early-withdrawal penalties were reduced. Although foreign borrowing declined, appreciation pressures persisted and, as a result, the URR was increased to 50 percent in May 2008. To prevent the circumvention of controls, a two-year minimum-stay requirement was implemented on

inward FDI. The limit on banks’ derivative positions was raised slightly but the penalty for the early withdrawal of funds was increased in June 2008. In the second half of 2008, controls were backed up by renewed sterilized interventions to fend off an appreciation and higher reserve requirements to support sterilization of large foreign exchange purchases. The onset of the global crisis set the stage for lifting capital controls in October 2008. The minimum stay requirement was eliminated and equities were exempt from the URR in September 2008. Ultimately, the controls (except for the ceiling on the gross derivative position of banks) were lifted in October 2008.

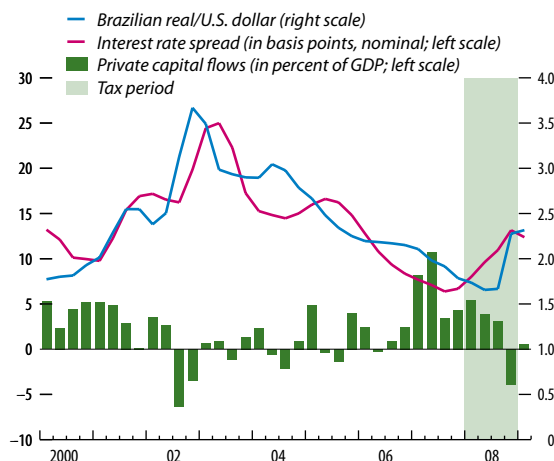
Short-term loans decreased substantially following the introduction of controls; however, our VAR estimations show no statistically significant effect on short-term flows or total net inflows.³⁸ A VAR estimation covering the period ending two quarters after the introduction of the controls, however, finds that controls reduced short-term inflows and the overall volume of inflows for about four months. The large and stable volume of FDI inflows throughout the period and the gradual increase of portfolio and short-term debt inflows, despite the later tightening of controls, may have contributed to this result. Since the overwhelming majority of inflows consisted of FDI, which was not affected by the controls, exchange rate appreciation pressures could not be reduced effectively. The controls may have temporarily allowed for increased monetary independence, estimated to have lasted less than six months.

Unremunerated Reserve Requirements—Thailand

Large capital inflows led to a significant appreciation of the Thai baht in 2006 and ultimately prompted the introduction of capital controls (Figure 4.7). In the authorities’ view, appreciation was not in line with fundamentals and would have adversely affected competitiveness. Following extensive foreign exchange interventions, and unsuccessful attempts to curb inflows through tightened capital controls since

³⁸This result holds for both quarterly and monthly data (due to data limitations, the monthly data analysis begins in January 2004).

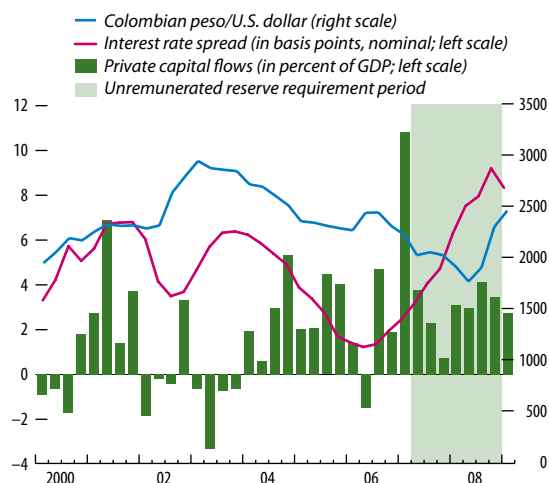
Figure 4.5. Brazil



Sources: IMF, International Financial Statistics, Balance of Payments Statistics, and Annual Report on Exchange Arrangements and Exchange Restrictions databases.

Note: The spread is between the domestic and the U.S. money market rate.

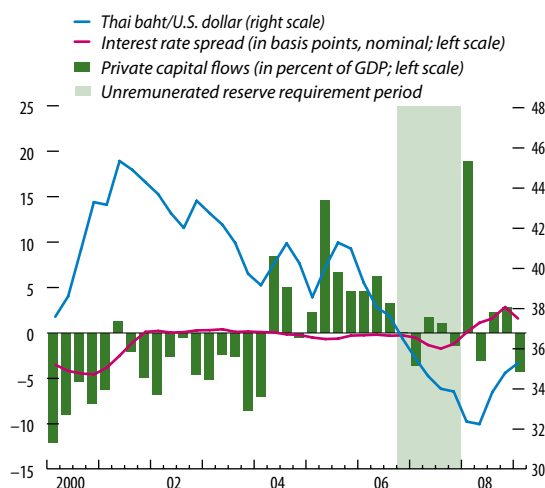
Figure 4.6. Colombia



Sources: IMF, International Financial Statistics, Balance of Payments Statistics, and Annual Report on Exchange Arrangements and Exchange Restrictions databases.

Note: The spread is between the domestic and the U.S. money market rate.

Figure 4.7. Thailand



Sources: IMF, International Financial Statistics, Balance of Payments Statistics, and Annual Report on Exchange Arrangements and Exchange Restrictions databases.

Note: The spread is between the domestic and the U.S. money market rate.

November 2006, the authorities introduced new capital controls on all capital inflows in December 2006.

The main element of the capital controls was a 30 percent URR. Financial institutions were required to withhold 30 percent of the foreign currency purchased or exchanged against the baht exceeding \$20,000. The amount withheld was refunded after one year upon proof that the funds had been kept in Thailand for at least one year. If the funds were transferred abroad within one year, only two-thirds of the amount withheld could be refunded. The measure was meant to discourage short-term capital investments by imposing a 10 percent tax on withdrawals within one year.

The URR was adjusted several times until it was finally eliminated in early 2008 and was complemented by other measures, including the easing of controls on capital outflows. Stock market equity inflows were exempt after one day as the introduction of the URR resulted in a sharp decline of 15 percent in equity prices. Further adjustments took place, including a change in focus from controlling inflows to easing controls on outflows by increasing or eliminating the limits on the amount Thai firms and individuals were permitted to invest and transfer abroad. The controls were ultimately lifted in March 2008.

The URR was successful in reducing net capital flows (inflows-outflows) by increasing outflows; however, it did not have a statistically significant effect on the volume and composition of inflows, according to our VAR estimates. The URR was associated with a decrease in short-term inflows, but this effect dissipated in two to three quarters. The higher outflows may have been the result of a loss of residents' confidence in domestic policies due to the introduction of the controls. Although the URR could not stem the appreciation of the real exchange rate or increase the independence of the monetary policy, the other inflow controls implemented in the same period seem to have contributed to increasing monetary independence for two quarters. Capital outflows reversed toward the end of the URR regime, and surged as soon as the controls were eliminated.

Prudential Measures as Capital Controls—Croatia

Sustained economic growth and prospects of accession to the European Union have attracted

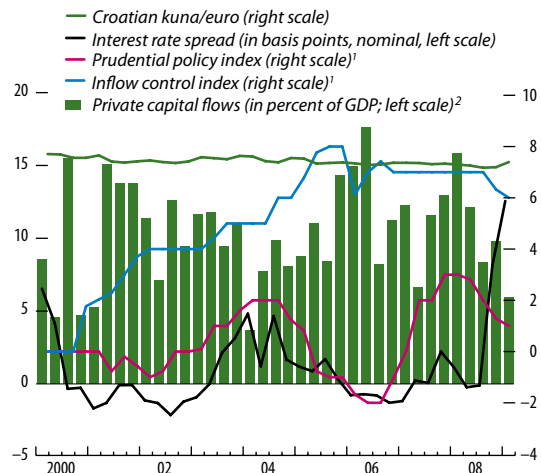
large capital inflows to Croatia since the early 2000s (Figure 4.8). While FDI represented a substantial part of inflows, foreign borrowing in the context of a stable exchange rate increased banks’ dependence on external financing and fueled unhedged credit expansion in foreign currency.

The authorities relied on a combination of prudential (including macroprudential) measures and capital controls to reduce financial sector vulnerabilities. The measures implemented from 2004 onward were aimed at reducing credit expansion and the related foreign borrowing. They remained in effect until late 2008, when local banks’ foreign funding dried up due to the crisis. The authorities also strengthened supervision of the banking sector and implemented measures to prevent regulatory arbitrage through leasing companies.

Both the controls and the prudential measures increased the cost of foreign borrowing and domestic lending. A marginal reserve requirement (MRR) was introduced and gradually increased on banks’ new foreign borrowing. To close a loophole, a special reserve requirement (SRR) was introduced at the rate of 55 percent on increases in banks’ liabilities arising from issued debt securities in 2006. Credit controls, previously used in 2003, were reintroduced in 2007, requiring that banks purchase low-yield central bank bills for 50 percent of the increase in their credit growth exceeding the allowed limit, which was increased to 75 percent in 2008. In addition, banks were required to comply with a monthly 1 percent sublimit on credit growth. The liquidity ratio of 32 percent for assets maturing in three months was extended to foreign-exchange-indexed instruments, while the general RR was reduced in several steps but remained relatively high at 17 percent until December 2008. The MRR and the SRR were ultimately eliminated in October 2008.

Banks’ external borrowing started to decline in 2006, credit growth decelerated, and the share of foreign exchange loans declined. Following the introduction of the MRR, loans and advances owed by Croatian banks to nonresident banks declined by 10 percent. The implementation of the SRR was followed by a close to 20 percent drop in inflows. The measures also led to some disintermediation. To avoid the reserve requirements, the corporate sector increased its direct cross-border borrowing from abroad. The

Figure 4.8. Croatia



Sources: IMF, International Financial Statistics, Balance of Payments Statistics, and Annual Report on Exchange Arrangements and Exchange Restrictions databases; and IMF staff estimates.

Note: The spread is between the domestic and the euro area money market rate.

¹Higher values indicate more restrictive policy.

²The series is seasonally adjusted.

high MRR also encouraged parent banks to fund Croatian subsidiaries by beefing up their equity (FDI inflows) rather than by debt financing. This raised banking system capital buffers (which paid off during the crisis), but also enabled banks to extend more credit to the private sector.

The capital controls and the prudential measures have achieved some success. The impulse responses based on our VAR estimates show that the MRR and the SRR reduced the overall volume of inflows and contributed to the depreciation of the exchange rate for about two quarters. In addition, the prudential (including macroprudential) measures reduced capital inflows for one quarter and led to a short-lived minor depreciation. The prudential measures also increased monetary independence marginally for about a year.

Administrative Measures—China and India

Despite progress in liberalization over the past six years, China and India retain extensive administrative controls on the capital account. Both countries have taken a gradual and cautious approach to liberalizing the capital account supported by a vast foreign exchange administrative system and strong enforcement capacity.

China maintains control on most capital transactions. Inward FDI is relatively free, but portfolio equity and fixed-income investments are allowed only to qualified foreign institutional investors and are subject to yearly quotas, individual investment limits, and a minimum stay requirement.

India also maintains controls on the majority of capital account transactions. Although there is no overall ceiling portfolio, equity investments by foreign institutional investors are subject to individual limits as a proportion of the issued share capital of the Indian company. A yearly ceiling applies on investment in fixed-income securities. Inward FDI is free in many sectors; however, in some sectors foreign ownership is limited or prohibited. Cross-border lending and borrowing are controlled.

Recent strong inflows led to tightening inflow controls and a limited liberalization of outflows. While the global crisis resulted in significant outflows in both countries, the relatively closed foreign exchange control regime may have contributed to limiting swings

in the capital account. Furthermore, the persistent difference between the onshore and offshore renminbi yields may suggest that Chinese controls continue to bind (Ma and McCauley, 2007).

Liberalization of Capital Outflows—Korea

Korea has experienced significant net capital inflows since the early 2000s. Foreign investors, encouraged by stable fundamentals, the gradual foreign exchange liberalization, and the generally well-developed and open financial markets, increased their investment, which led to an exchange rate appreciation. A significant share of short-term inflows was channeled through foreign banks' branches in Korea as part of hedging operations and investments in the sovereign bond market in anticipation of further appreciation of the won (Figure 4.9).

Policy responses to stem appreciation pressures and preserve financial sector stability included monetary and financial regulatory measures. Raising interest rates from the fourth quarter of 2005 was aimed at reining in inflation and cooling speculative pressures in the property market. In addition to implementing strict liquidity ratios in the banking sector, the authorities restricted foreign currency lending to residents to specific transactions in August 2007 and extended the thin capitalization rules on foreign bank branches in Korea.³⁹ To allow greater flexibility in managing foreign exchange transactions, banks' open foreign exchange position was increased in two steps to 50 percent from 20 percent in 2006 while banks' long nondeliverable forward position was limited to 110 percent of their long nondeliverable forward positions on January 14, 2004.⁴⁰

To stem appreciation pressures, the authorities also actively liberalized capital outflows, eliminating most

³⁹The rule, which is a common element of many tax systems, limits the tax deductibility of interest paid on loans exceeding three times the capital of foreign bank branches in Korea.

⁴⁰The regulation on long nondeliverable forward positions ended in September 2008. Further strengthening of prudential regulation in the banking sector has been announced by the authorities, including limits on the hedging of export proceeds to 125 percent of exports and a tighter liquidity ratio on long-term funding, a minimum safe-asset requirement on foreign assets, and stricter liquid asset classification requirements. The measures will take effect step by step from the beginning of 2010 to July 1, 2010.

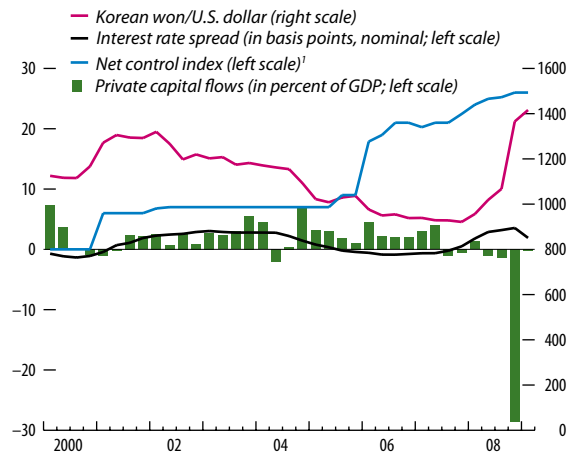
of the controls by 2007. While Korea had a capital account liberalization plan, the relaxation of the controls on some of the measures has been accelerated against the backdrop of strong capital inflows. The upper limit on Korean insurance companies’ assets in foreign currency was increased to 30 percent in March 2005 and repatriation requirements on proceeds from resident capital transactions abroad were relaxed in 2006. Limits were gradually increased on resident investments abroad and finally eliminated by lifting the ceilings on individuals’ FDI and real estate purchases abroad in March 2006 and May 2008, respectively. In the same year, the previous approval requirement on certain capital transactions was changed to a notification requirement, reducing the administrative burden on market participants. In 2007, reporting requirements related to capital transactions were further relaxed, allowing more freedom in extending won loans to nonresidents.

The capital account liberalization measures implemented may have helped in mitigating the effects of capital inflows. The VAR analysis shows a response of net flows in line with the prediction, although the impact is not significant in a statistical sense. The liberalization of outflows was carried out simultaneously with some inflow liberalization, and the resulting inflows decreased somewhat the effect of the increase in outflows. The combined effect of inflow and outflow liberalization is associated with a slight increase in outflows, possibly alleviating some of the appreciation pressures on the exchange rate in 2006–07. A potential explanation of the weak response is that the liberalization measures affected relatively minor elements of the control system and less-significant capital transactions that do not affect outflows significantly.

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Figure 4.9. Korea



Sources: IMF, International Financial Statistics, Balance of Payments Statistics, and Annual Report on Exchange Arrangements and Exchange Restrictions databases; and IMF staff estimates.

Note: The spread is between the domestic and the U.S. money market rate.

¹Difference between the inflow control index and outflow control index. Higher values indicate more liberalized outflow or more restricted inflow controls.

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