

Capital Controls: Myth and Reality*

Nicolás E. Magud, Carmen M. Reinhart, and Kenneth S. Rogoff†

This paper is a meta-analysis of the literature on capital controls that aims to solve (at least) four very serious apples-to-oranges problems: (i) There is no unified theoretical framework to analyze the macroeconomic consequences of controls; (ii) there is significant heterogeneity across countries and time in the control measures implemented; (iii) there are multiple definitions of what constitutes a “success”; and (iv) the empirical studies lack a common methodology—furthermore these are significantly over-weighted by a couple of country cases (Chile and Malaysia). In this paper, we attempt to address some of these shortcomings by being very explicit about what measures are construed as capital controls. Also, given that success is measured so differently across studies, we sought to standardize the results of the close to 40 empirical studies we summarize in this paper. The standardization was done by constructing two indices of capital controls: Capital Controls Effectiveness Index (CCE Index), and Weighted Capital Controls Effectiveness Index (WCCE Index). The difference between them lies in that the WCCE controls for the differentiated degree of methodological rigor applied in each of the considered papers. Inasmuch as possible, we bring to bear the experiences of less well-known episodes than those of Chile and Malaysia, and the more recent controls on outflows in emerging Europe. We find that only under country-specific characteristics are capital controls effective, implying that, more often than not, in practice they do not work. We also show that the equivalence in effects of price vs. quantity capital controls is conditional on the level of short-term capital flows.

Key Words: Capital controls; Meta-analysis.

JEL Classification Number: F30.

* The views in this paper are those of the authors only and not those of the International Monetary Fund, its executive board, or its management. We are grateful for comments received at the International Monetary Fund, the Inter-American Development Bank, Federal Reserve Bank of San Francisco, University of Oregon, 2006 AEA meetings (Boston), 2006 LACEA (Mexico), and 2014 AEA meetings (Philadelphia), as well as suggestions by Javier Bianchi. Also, we thank Volodymyr Tulin and Jiří Podpiera for recent measures of capital controls. All remaining errors are ours.

† Magud: International Monetary Fund; Reinhart: Harvard University and NBER; Rogoff: Harvard University and NBER.

1. INTRODUCTION

The literature on capital controls has (at least) four very serious issues that make it difficult, if not impossible, to compare across theoretical and empirical studies. We dub these the apples-to-oranges problems and they include: (i) There is no unified theoretical framework (say, as in the currency crisis literature) to analyze the macroeconomic consequences of controls; (ii) there is significant heterogeneity across countries and time in the capital control measures implemented; (iii) there are multiple definitions of what constitutes a success (capital controls are a single policy instrument, but there are many policy objectives); and (iv) the empirical studies lack a common methodology and are furthermore significantly over-weighted by the two poster children: Chile and Malaysia.

Our goal in this meta-analysis is to find a common ground among the non-comparabilities in the existing literature. Of course, there is usually a level of generality that is sufficiently encompassing. After all, an apples-to-oranges problem can be solved by calling everything fruit. Our goal is, as far as possible, to classify different measures of capital control on a uniform basis. Once done, it should be easier to understand the cross-country and time-series experience.

Capital controls are hardly a new topic in the international finance arena. Academics and policymakers alike have been discussing the use of controls on capital inflows repeatedly over time. Yet, the topic seems to suffer some type of *loss of memory effect*. Developing countries encourage capital inflows and favor an opening of their financial accounts in their recoveries. However, as these economies grow, and there is pressures on the domestic currency to appreciate, capital inflows start to look too large to be absorbed, and capital controls re-appear in the discussion. This happens until the next crisis leads to a reset and capital account openness returns. These capital control cycles tend to be forgotten once the economy is back in capital openness mode, however. What do remain, though, are the ever-increasing variety of instruments that academics and policymakers create to impose capital controls, currently adding to the traditional capital controls the so-called macroprudential regulations. Each time capital controls resurface, the apples-to-oranges problem expands.

Recently, this phenomenon reappeared following the massive monetary expansion implemented by developed economies to contain the effects of the global financial crisis. On the one hand, there were discussions of the costs and benefits of capital controls (though with their new name, capital flows measures). The IMF, historically a strong supporter of free capital mobility, accepted that under specific circumstances—to avoid disruptions in domestic financial markets—capital controls could complement (yet not replace) macroeconomic policies to mitigate bouts of volatility in exchange

rates. Also, following the banking crises in Greece, Iceland, Ireland, and Cyprus, controls on capital outflows re-emerged—this time in richer countries than in more recent past episodes. Against this backdrop, a theoretical literature on capital controls and macroprudential policies resurfaced. The focus has been on pecuniary externalities (Korinek, 2011; Benigno et al., 2013; Bianchi and Mendoza, 2011; Jeanne and Korinek, 2010), welfare effects of intertemporal price volatilities (real exchange rate targeting such as in Benigno et al., 2013), and more recently—finally—the discussion is starting to incorporate nominal variables, which importantly had been missing (Farhi and Werning, 2013). In the appendix we list some of the more recent contributions to these bodies of literature.

Theoretical models seem to suggest that controls on capital flows do work. Despite all the discussion, however, the debate on the effectiveness of capital controls in policymaking is still not settled. We try to help bridge this gap here by putting together the existing evidence on how much capital controls can achieve in practice. It does not seem to be as much as the theoretical models suggest.

One caveat is that much of the older literature on capital controls was based on the “impossible trinity,” so that capital controls were often linked to a desire for keeping some degree of monetary independence despite relatively rigid exchange rate regimes. In the more recent past, many emerging and developing countries have tended to pursue more flexible exchange rate arrangements. This might mark a difference with past episodes. That said, however, fear of floating taught us that many countries that claim to float actually intervene in foreign exchange markets or adjust policy interest rates to avoid large fluctuations in the exchange rate.

In this context, we attempt to address some of these apples-to-oranges shortcomings by being very explicit about what measures are construed as capital controls. We document not only the more drastic differences across countries/episodes and between controls on inflows and outflows, but also the more subtle differences in types of inflow or outflow controls. Also, given that success is measured so differently across studies, we standardize (wherever possible) the results of the close to 40 empirical studies summarized in this paper. Inasmuch as possible, we bring to bear the experiences of episodes less well known than those of Chile and Malaysia. Standardization was achieved by constructing two indexes of capital controls: the Capital Controls Effectiveness index (CCE), and the Weighted Capital Controls Effectiveness index (WCCE). The difference between them lies only in the fact that the WCCE controls for the differentiated degree of methodological rigor in each of the papers considered.

Our results with these indexes can be summarized briefly. Capital controls on inflows seem to make monetary policy more independent and alter the composition of capital flows; there is less evidence that they reduce real

exchange rate pressures. In Malaysia, controls reduced outflows and may have made room for more independent monetary policy.

All of the above implies that imposing capital controls, whether on inflows or outflows, need not always be effective. In a sense, this paper suggests the need for specific initial conditions for controls on capital flows to be effective.

In the appendix we rationalize what we have learnt in a simple and tractable model. We do this by way of a portfolio balance approach to capital controls. The latter describes foreign investors that have to decide under uncertainty the share of their portfolio investment to allocate to short- vs. long-term flows. The main conclusion of the model is that conditional on the elasticity of short-term capital flows to total capital flows, the same capital controls could result in either an increased, unaltered, or decreased level of short-term flows as well as total capital flows. Thus, capital controls—even if exactly equally implemented—in two different countries will not necessarily be equally effective (or even effective at all!). We also model the conditions under which price capital controls (taxes imposed on the rate of return of short-term capital flows) generate the same effect on capital inflows as quantity capital controls (restrictions to the quantity of capital flows permitted). Interestingly, we find that the effectiveness of the measures depends on the level of short-term capital flows at the moment that the controls are put in place. Thus, we obtain a model that shows that only under very specific conditions are capital controls effective in achieving their goals, as the paper documents.

The paper proceeds as follows. The next section summarizes some of the key reasons why capital controls—particularly capital controls on inflows—are either considered or implemented. Controls, as we note, help deal with what we dub the “four fears.” Section III focuses on the distinctions among types of capital controls—highlighting the fact that not all capital control measures are created equal and therefore they cannot be simply lumped together in one rough capital controls index. Section IV examines the existing empirical evidence by standardizing and sorting studies along a variety of criteria. Specifically, we focus on the following sorting strategy: First, we analyze separately cases where the papers were multi-country or focused on a single case study; second, we distinguish the cases where the controls were primarily designed to deal with inflows or outflows; third, we provide an ad hoc (but uniform) criteria to rank the approach or econometric rigor applied in the study to test hypotheses about the effects of the controls; and last, we evaluate the outcomes reported in the studies according to a more uniform definition of what constitutes a success. The last section discusses some of the policy implications of our findings. The appendix presents a simple portfolio balance approach model to illustrate these effects; it also contains detailed information on the specific controls

on inflows and outflows that have been implemented in several countries, including during recent events.

2. THE RATIONALE FOR CAPITAL CONTROLS AND THE “FOUR FEARS”

Anyone examining the literature on capital controls, which spans many decades and all the regions around the globe, would be well advised to retain a sense of irony. Repeatedly, policymakers have sought refuge in tax laws, supervisory restraint, and regulation of financial transactions to cope with external forces that they deem to be unacceptable. Often they rationalize their actions on lofty grounds, sometimes so effectively as to make it difficult to clearly identify episodes of controls on capital. But in all these episodes, four fears lurk beneath the surface.

2.1. Fear of Appreciation

Being the darling of investors in global financial centers has the decided, albeit often temporary, advantage of having ample access to funds at favorable cost. With the capital inflow comes upward pressure on the exchange value of the currency, rendering domestic manufacturers less competitive in global markets, and especially so relative to their close competitors who are not as favored as an investment vehicle. A desire to stem such an appreciation (which Calvo and Reinhart, 2002, refer to as “fear of floating” and Levy Yeyati and Sturzenegger, 2007, specify as fear of appreciation) is typically manifested in the accumulation of foreign exchange reserves. Over time, though, sterilizing such a reserve accumulation (the topic of Reinhart and Reinhart, 1999) becomes difficult, making more direct intervention more appealing.

2.2. Fear of Hot Money

For policymakers in developing countries, becoming the object of foreign investors’ attention is particularly troubling if such affection is viewed as fleeting. The sudden injection of funds into a small market can cause an initial dislocation that is mirrored by the strains associated with their sudden withdrawal. Such a distrust of hot money was behind James Tobin’s initial proposal to throw sand in the wheels of international finance, an idea that has been well received in at least some quarters. Simply put, a high-enough tax (if effectively enforced) would dissuade the initial inflow and preempt the pain associated with the inevitable outflow.

2.3. Fear of Large Inflows

Policymakers in emerging market economies do not universally distrust the providers of foreign capital. Not all money is hot, but sometimes the

sheer volume of flows matters. A large volume of capital inflows, particularly when it is sometimes indiscriminate in the search for higher yields (in the manner documented by Calvo, Leiderman, and Reinhart, 1994), causes dislocations in the financial system. Foreign funds can fuel asset price bubbles and encourage excessive risk-taking by cash-rich domestic intermediaries. Again, recourse to taxation may seem to yield a large benefit.

2.4. Fear of Loss of Monetary Autonomy

The interests of global investors and domestic policymakers need not always—or even often—align. But a trinity is always at work. It is not possible to have a fixed (or highly managed) exchange rate, monetary policy autonomy, and open capital markets. If there is some attraction to retaining some element of monetary policy flexibility, something has to be given up. However, in the presence of the aforementioned fear of floating, giving up capital mobility may seem more attractive than surrendering monetary policy autonomy.¹

Whatever the reason for action, some forms of capital control are intended to control exchange rate pressures, stem large inflows, and regain an element of monetary autonomy. Policymakers also sometimes impose controls to reduce capital flight, although investors seeking safety—including, most importantly, domestic residents—are seldom dissuaded by capital controls when fear of devaluation or default is large enough.

3. CAPITAL CONTROLS? WHAT DO WE MEAN BY CAPITAL CONTROLS?

In most of the empirical literature there are no distinctions between controls on outflows and controls on inflows—these exercises suffer from the **same problems** as the *de jure IMF* classification of exchange rate arrangements. Even when a distinction is made between inflows and outflows (as here), controls can and do range from the explicit to the subtle, from the market friendly to the coercive.²

Furthermore, when considering the impacts and effectiveness of capital controls one cannot lump together the experiences of countries that have not substantially liberalized (i.e., India and China) with countries that actually went down the path of financial and capital account liberalization and decided at some point to reintroduce controls, as the latter have devel-

¹Recent literature such as Rey (2013) and Farhi and Werning (2014) argue about the trilemma evolving into a dilemma instead.

²There is, of course, the important issue of temporary versus permanent policies, which is a distinction not addressed here. This is owing to the fact that most empirical studies do not focus on this issue. For a model and a discussion of the temporary versus permanent issue see Reinhart and Smith (2002).

oped institutions and practices that are integrated to varying degrees with international capital markets.³

Tables 1 and 2, which squarely focus on measures targeted to affect inflows and outflows in countries that had already gone the route of capital account liberalization,⁴ indeed highlight the heterogeneity in both subtlety and “market friendliness” of capital control measures. They illustrate the wide scope of these measures, which have been tried in Asia, Europe, and Latin America during booms (these involve controls on capital inflows) as well as crashes (and attempts to curb capital outflows). These measures differ not only in subtlety and other features but also in intensity.⁵ Table 2 also details the more recent experience with controls on capital outflows in some European countries. In particular, we provide evidence of capital control measures implemented in Cyprus, Greece, and Iceland.

TABLE 1.

Restrictions on Inflows and Prudential Requirements: Asia

Country and date (in parentheses) denoting the first year of the surge in inflows
Indonesia (1990)
March 1991: Central bank adopts measures to discourage offshore borrowing. Bank Indonesia begins to scale down its swap operations by reducing individual banks’ limits from 25% to 20% of capital. The 3-month swap premium was raised by 5 percentage points.
October 1991: All state-related offshore commercial borrowing was made subject to prior approval by the Government and annual ceilings were set for new commitments over the next 5 years.
November 1991: Further measures are taken to discourage offshore borrowing. The limits on banks’ net open market foreign exchange positions were tightened by placing a separate limit on off-balance-sheet positions. Bank Indonesia also announced that future swap operations (except for “investment swaps” with maturities of more than 2 years) would be undertaken only at the initiative of Bank Indonesia.

³Countries like China and India still have substantial capital and exchange controls. They are progressively levying their many restrictions. As such, isolating the effects of capital controls to make them comparable is a more difficult task in these environments. Additionally, many countries use reserve requirements as an alternative to capital controls, which although they could have similar effects—depending on the specifics such as, e.g., whether the funds are owned by residents or nonresidents, etc.—are not considered capital controls. (They would belong to the currently labeled “macroprudential” regulations.) For details on reserve requirements, see Reinhart and Reinhart (1999).

⁴Hence, these cases involve the reintroduction of controls.

⁵For a measure that “quantifies” the intensity of these measures, see Montiel and Reinhart (1999).

TABLE 1—*Continued***Indonesia (2010)**

June 2010: Required holding period on foreign capital inflows and central bank notes were increased to 1 month, and central bank instruments with longer maturity (6 months and 9 months) were introduced.

Malaysia (1989)

June 1, 1992: Limits on non-trade-related swap transactions were imposed on commercial banks.

January 17, 1994—August 1994: Banks were subject to a ceiling on their non-trade- or non-investment-related external liabilities.

January 24, 1994—August 1994: Residents were prohibited from selling short-term monetary instruments to nonresidents.

February 2, 1994—August 1994: Commercial banks were required to place with Bank Negara the ringgit funds of foreign banking institutions (Vostro accounts) held in non-interest-bearing accounts. However, in the January-May period these accounts were considered part of the eligible liabilities base for the calculation of required reserves, resulting in a negative effective interest rate on Vostro balances.

February 23, 1994—August 1994: Commercial banks are not allowed to undertake non-trade-related swap and outright forward transactions on the bid side with foreign customers.

Philippines (1992)

July 1994: Bangko Sentral begins to discourage forward cover arrangements with nonresident financial institutions.

Philippines (2009)

October 2010: Cap on over-the-counter FX purchases for nontrade purposes by residents without documentation was raised from USD 30,000 to USD 60,000. Cap on tourists' purchases upon departure without documentation was increased from USD 200 to USD 5000. Cap on residents' FX purchases for advance payments of import transactions without documentation increased from USD 100,000 to USD 1 million. No approval required to prepay central bank-registered foreign currency debt of the private sector. For foreign investors' outward remittances, banks are now allowed to convert peso funds. The annual limit on the amount each resident may buy from banks for outward investments and purchases of Philippine offshore debt was raised from USD 30 million to USD 60 million.

Russia (2010)

September 2010: In 2011, interest payments on FX borrowing exceeding 0.8 times the refinance rate of the central bank will be subject to corporate profit tax.

TABLE 1—*Continued***South Africa (2010)**

February 2010: To encourage outflows, banks were allowed to invest up to 25% of nonequity liabilities in external portfolios.

Thailand (1988)

Banks and finance companies net foreign exchange positions may not exceed 20% of capital.

Banks and finance companies net foreign liabilities may not exceed 20% of capital.

Residents are not allowed to hold foreign currency deposits except for trade-related purposes.

April 1990: Banks and finance companies net foreign exchange positions' limit raised to 25% of capital.

August 8, 1995: Reserve requirements, to be held in the form of non-interest-bearing deposits at the Bank of Thailand, on short-term nonresident baht accounts were raised from 2% to 7%. While reserve requirements on domestic deposits are also 7%, up to 5% can be held in the form of interest-bearing public bonds.

December 1995: The 7% reserve requirement is extended to finance companies' short-term (less than 1 year) promissory notes held by nonresidents.

A variety of measures aimed at reducing foreign-financed lending were introduced.

April 19, 1996: Offshore borrowing with maturities of less than 1 year by commercial banks, BIBF offices, finance companies and finance and security companies will be subject to a 7% minimum reserve requirement in the form of a nonremunerated deposit with the Bank of Thailand. Loans for trade purposes will be exempt.

Thailand (2010)

June 2010: Limits on foreign asset accumulation by Thai residents (including outward FDI) were raised.

September 2010: Limits on direct overseas investment were removed, restrictions on lending by Thai firms to foreign borrowers were relaxed, and the cap on offshore property purchase was increased.

October 2010: For new Thai bonds issued by government and government-sponsored entities, a 15% withholding tax on foreigners' interest and capital gains was reinstated. Central bank asked brokerages to start submitting daily reports of nonresident clients' outstanding cash assets.

Sources: Alfiler (1994); Bank Indonesia, Annual Report, various issues; Bank Negara, Annual Report, various issues; and Bank of Thailand, Annual Report, various issues.

TABLE 1—Continued**South Korea (2009)**

2009: To dampen real estate prices, ceilings on LTV ratios lowered in Seoul.

November 2009: Domestic banks required to fully match mid-to-long-term asset holdings with mid-to-long-term funding. Limits on currency forward transactions were lowered from 125% to 100% of real transactions being hedged. Domestic banks are required to manage FX liquidity ratio on a daily basis.

February 2010: Withholding tax of 0-15% on interest, capital gains tax (10% of total selling amount or 20% of net margin), and transaction tax (0.3% of selling price) were removed.

June 2010: Local banks' FX forward positions were limited to 50% of their equity capital. Forward positions for local branches of foreign banks were limited to 250% of capital (with 3 months to meet new ceiling and 2 years to cover existing positions).

November 2010: Tax on profit on government bonds for foreigners: 14%.

Turkey (2010)

2010: Withholding tax was cut to 0% for institutional investors and to 10% for retail investors irrespective of residency.

India (2013)

Gold import. Import duty on gold was incrementally raised to 10% from 4%; restrictions introduced on nominated agencies and trading houses; restrictions on advances against gold coins introduced; at least 20% of every lot of gold import must be exclusively made available for export purposes; customs duty on gold and silver jewelry raised to 15%.

Remittances. Existing limit on outward remittance scheme reduced from USD 200,000 to USD 75,000 per financial year.

FDI outflows. Limit for overseas direct investment was reduced from 400% of the net worth to 100% under the automatic route (partly reversed in August).

Foreign institutional investors' (FII) investment. FII investment limits in government securities and corporate bonds increased by USD 5 billion. Tax rate on interest income on government and corporate debt for foreigner investors lowered to 5% for 2-year period.

External commercial borrowing (ECB). Increase in the infrastructure finance companies' limit on overseas borrowing up to 75% of their owned funds (from 50%) and relaxation of foreign currency hedging requirement to 75% of the exposure (from 100%).

Overseas foreign currency borrowings. Limits on bank borrowing from their head offices increased. RBI concessional rate swap facility (100bps below market rate) for banks making use of 1- to 3-year tenors.

TABLE 1—*Continued*

Swap window. RBI USD-Rupee swap window for fresh dollar funds introduced for deposits of 3 years or more maturity.

Rupee export credit interest subvention. Rate of interest subvention on pre- and post-shipment rupee export credit for employment-oriented exports increased from 2% to 3%.

Oil swaps. Foreign currency swaps offered to oil-importing companies.

Argentina (2001)

December 2001: Put in force prohibition against investors transferring funds abroad.

2003: Registration requirement and 180-day minimum investment period for inflows into equity markets.

2005: Implemented minimum stay period of 12 months. Made compulsory a deposit of 30% (those bringing money into the country must deposit a share of the funds in non-interest-bearing account), and imposed tax/restrictions on capital outflows.

Brazil (1992)

October 1994: A 1% tax on foreign investment in the stock market. Eliminated on March 10, 1995.

The tax on Brazilian companies issuing bonds overseas was raised from 3% to 7% of the total. Eliminated on March 10, 1995.

The tax paid by foreigners on fixed-interest investments in Brazil was raised from 5% to 9%. Reduced back to 5% on March 10, 1995.

The central bank raised limits on the amount of dollars that can be bought on foreign exchange markets.

Brazil (2006)

February 2006: Income tax of 15% cut to 0% for foreign investors in the local fixed-income market—previously, only equity investors were exempt.

March 2008: IOF tax (Tobin-type tax on entry) of 1.5% on fixed-income investments by foreigners.

October 2008: IOF tax on fixed-income investments by foreigners reduced from 1.5% back to 0%.

October 2009: IOF of 2% on stock and bond market purchases.

November 2009: Tax on the issuance of depositary receipts in international markets.

October 2010: (October 4) IOF increased to 4% for fixed-income investments and equity funds (IOF on individual equities left at 2%). (October 18) IOF increased to 6% for fixed-income investments, and from 0.38% to 6% on margin deposits for derivative transactions. Loopholes for IOF on margin requirements closed.

TABLE 1—*Continued*

December 2011: Exemption on IOF on foreign equity investment (from 2% to 0%), on venture capital (from 2% to 0%), on ADR cancelation (from 2% to 0%), and on nonresident applications in private bonds with maturity longer than 4 years (from 6% to 0%).

March 2012: Extension of the 6% IOF tax on external loans for issuances maturing in up to 3 years. Export prepayment limited to 360 days (unlimited before), and only importers allowed to fund it (before, exporters were also allowed). Extension of the IOF tax on external loans for issuances maturing in up to 5 years. IOF exemption on exporters' short positions.

June 2012: Reduced the average maturity of external borrowing that is charged the 6% IOF tax from 5 years to 2 years. Banks and other corporations abroad can now fund export prepayments (still no longer that 360 days).

August 2012: Extension to end-2013 the exemption on reserve requirement for currency exposure of less than 2% of reference assets.

December 2012: Export prepayment extended up to 5 years and funding allowed from any financial institution abroad. Reduced average maturity of external borrowing affected by 6% IOF tax from 2 years to 1 year.

Chile (1990)

June 1991: Nonremunerated 20% reserve requirement to be deposited at the central bank for a period of 1 year on liabilities in foreign currency for direct borrowing by firms.

The stamp tax of 1.2% a year (previously paid by domestic currency credits only) was applied to foreign loans as well. This requirement applies to all credits during their first year, with the exception of trade loans.

May 1992: The reserve requirement on liabilities in foreign currency for direct borrowing by firms is raised to 30%. Hence, all foreign currency liabilities have a common reserve requirement.

Colombia (1991)

June 1991: A 3% withholding tax on foreign exchange receipts arising from personal services rendered abroad and other transfers, which could be claimed as credit against income tax liability.

February 1992: Banco de la República increases its commission on its cash purchases of foreign exchange from 1.5% to 5%.

June 1992: Regulation of the entry of foreign currency as payment for services.

September 1993: A nonremunerated 47% reserve requirement to be deposited at the central bank on liabilities in foreign currency for direct borrowing by firms. The reserve requirement is to be maintained for the duration of the loan and applies to all loans with a maturity of 18 months or less, except for trade credit.

TABLE 1—*Continued*

August 1994: Nonremunerated reserve requirement to be deposited at the central bank on liabilities in foreign currency for direct borrowing by firms. The reserve requirement is to be maintained for the duration of the loan and applies to all loans with a maturity of 5 years or less, except for trade credit with a maturity of 4 months or less. The percentage of the requirement declines as the maturity lengthens; from 140% for funds that are 30 days or less to 42.8% for 5-year funds.

Colombia (2002)

December 2004: Foreigners investing in domestic markets must now keep their money in the country for at least 1 year.

Colombia (2007)

May 2007: 40% unremunerated reserve requirements (URR) on external borrowing on the back of ceiling on currency derivative positions (banks should keep overall gross positions in these instruments no larger than 500% of their capital). Later, these restrictions were extended to portfolio inflows by foreign residents. Early withdrawals were allowed with penalties from 1.6% (if held for 5 months) to 9.4% (for immediate withdrawal) of the reserve requirements.

June 2007: Exemption for equities issued abroad.

December 2007: URR eliminated for equities' IPO.

May 2008: URR on inflows raised to 50% with a 2-year minimum stay on FDI. Gross derivative positions' limits were raised to 550% of capital.

June 2008: Penalties for URR early withdrawal were raised.

September 2007: Minimum stay for FDI revoked, purchases of equities exempted from URR.

October 2008: Controls were eliminated.

Czech Republic (1992)

April 1995: The Central Bank introduced a fee of 0.25% on its foreign exchange transactions with banks, with the aim of discouraging short-term speculative flows.

August 1, 1995: A limit on net short-term (less than 1 year) foreign borrowing by banks is introduced.

Each bank is to ensure that its net short-term liabilities to nonresidents, in all currencies, do not exceed the lesser of 30% of claims of nonresidents or Kc 500 million.

Administrative approval procedures seek to slow down short-term borrowing by nonbanks.

Czech Republic (2008)

2008: 40% non-interest reserve requirement for portfolio flows (IPOs excluded).

TABLE 1—*Continued***Mexico (1990)**

April 1992: A regulation was passed limiting foreign currency liabilities of commercial banks to 10% of their total loan portfolio. Banks had to place 15% of these liabilities in highly liquid instruments.

Peru (2009)

2009: Foreign purchases of central bank bills were banned, reserve requirements on all deposits were increased (for local-currency deposits held by foreigners, requirement was raised to 120%), and reserve requirement on other foreign liabilities with maturity less than 2 years were increased to 75%.

2010: Fee on foreign purchases of central bank liquidity-draining instruments was increased by 400 basis points. Imposed 30% capital gains tax for transactions through a Peruvian broker and 5% for transactions through a foreign broker. Capital gains tax on nonresidents' investments in the domestic stock market was imposed. Imposed a 30% tax on foreign investor gains from PEN-denominated futures maturing within 60 days.

January 2010: 30% income tax introduced for settlement of derivative contract with offshore banks (imposed on local financial institutions).

February 2010: Banking regulator changed limits on net FX positions: Long net FX positions reduced to 75% of net equity from 100%; short net FX positions raised to 15% of net equity from 10%.

June 2010: Private pension funds' limit on trading FX imposed at 0.85% of AUM (for daily transactions) and 1.95% of UAUM (over 5-day period).

Estonia (1997)

July 1997: Net liabilities of credit institutions vis-à-vis foreign banks were added to the reserve-requirement calculation base to diminish structural deviations caused by the massive foreign capital inflow.

October 1997: The minimum capital adequacy ratio was raised from 8% to 10%.

November 1997: A temporary additional liquidity requirement (amounting to 3% of the reserve-requirement base) was established to prevent banks from expanding their loan portfolios at the expense of liquidity buffers in the deteriorating financial environment. This was maintained until July 2000.

August 1998: Financial guarantees were added into the reserve base to avoid channeling the capital inflow via other parts of financial groups.

July 2000: The required reserve ratio increased from 10% to 13%.

March 2006: Risk weight of housing loans was increased from 50% to 100%, implying de facto increase in capital requirement by 13%.

September 2006: The reserve requirement was increased from 13% to 15%.

TABLE 1—Continued

2009: In transition to the Basel II framework, the minimum capital adequacy ratio (CAR) was maintained at 10% and the 100% risk weight was preserved in calculating the floor for the CAR. For housing loans, a 2-year transition period was established before the risk weight was to drop to 35%.

Latvia (2004)

March 2004: The main refinancing rate is raised from 3% to 3.5%.

July 2004: Reserve requirements increased from 3% to 4%.

November 2004: The refinancing rate is raised from 3.5% to 4%.

January 2005: Reserve base is broadened to include liabilities to foreign banks and foreign central banks with a maturity up to 2 years.

August 2005: Reserve requirements increased from 4% to 6%.

December 2005: Reserve requirements increased from 6% to 8%.

May 2006: The reserve base is broadened to include liabilities with a maturity of more than 2 years.

July 2006: The refinancing rate is raised from 4% to 4.5%.

November 2006: The refinancing rate is raised from 4.5% to 5%.

March 2007: The refinancing rate is raised from 5% to 5.5%.

May 2007: The refinancing rate is raised from 5.5% to 6%.

February 2008: In response to the projected economic downturn the reserve requirements are diversified depending on the maturity of the liabilities in order to motivate the financial sector to attract longer-term funding; the reserve ratio for liabilities with a maturity of more than 2 years is set at 7% (for those up to 2 years it remains at 8%, repo 0%).

December 2008: Partial deposit freeze on accounts at Parex Bank. Debit operations in any currency, including through online banking, ATMs and by cash, related to commercial activities for clients are limited to LVL 70,000 per calendar month. The goal of the restrictions is to prevent the outflow of deposits from Parex Bank. The restriction is not applicable to payments into the national budget, payments to the state and local government authorities, transactions with the Bank of Latvia, acquisition of the Republic of Latvia treasury bills, payments to commercial companies whose spheres of activity encompass commodity production and the provision of services to the sectors governed by the state and local government authorities, client payments to Parex Bank and its subsidiaries.

Lithuania (2006)

2006: Tightened the definition of mortgaged residential property that deserves a 50% risk weight.

October 2006: Restrictions on tax deductions for mortgage interest; tax deductions are limited to one mortgage loan per person.

TABLE 1—*Continued*

2008: To enhance the efficiency of risk-management measures, before the crisis, the Board of the Bank of Lithuania approved legal acts regarding the additional requirements for strengthening the processes of internal control and risk management in banks and other credit institutions.

January 2009: Abolishment of tax deductions for mortgage interest.

2009: Internal Capital Adequacy Assessment Process (ICAAP) to assess the underlying risks and calculate capital requirements to cover them. The internal capital adequacy requirements set by banks in Lithuania are higher than the minimum prescribed level.

2010: The Bank of Lithuania approved legal acts regarding the additional requirements for strengthening concentration-risk management in banks and other credit institutions.

May 2011: Announcement of responsible lending requirements for credit institutions. Limitation on the loan-to-value ratio for residential property set at 85%, and debt-service-to-income ratio at 40%. Effective November 2011.

December 2011: The Lithuanian Parliament approved the introduction of a tax on household real estate, effective in 2012. A tax on the value of a household's real estate that exceeds LTL 1,000,000 will be levied at 1% per year.

Sources: Banco Central de Chile (1991 and 1992); Banco de la República, Colombia (1993 and 1994); Banco de Mexico (1992); Clements and Kamil (2009); Rincon and Toro (2010); and Conselho Monetário Nacional, Brasil (1994 and 1995).

4. THE EMPIRICAL LITERATURE: FINDING A COMMON GROUND

This section aims to overcome (or at least take a step towards overcoming) two of the apples-to-oranges problems we have identified in the capital controls literature. Namely, we attempt to: (i) ascertain when and in what capacity capital controls were “successful” in achieving the stated objectives of the authorities (this is not trivial, as what constitutes a success is defined very differently across studies), and (ii) standardize (to the extent possible) the very eclectic array of descriptive and empirical methodologies and approaches that have characterized the applied literature on capital controls. Lastly, we bring to bear evidence on episodes less well known than the “classics” (Chile’s controls on inflows starting in 1990 and Malaysia’s 1998 controls on outflows).

In what follows, we review close to 40 papers that study capital controls on either inflows or outflows around the world. Some are country case-studies, some describe several individual country experiences, and some are multi-country studies that bunch several cases together. As noted earlier, the papers measure success differently; thus, our aim is to standardize

TABLE 2.

Restrictions on Outflows: Asia, Europe, and Latin America

Country and date (in parentheses) denoting the first year of the surge in outflows (or crisis)
Argentina (crisis ending the Convertibility Plan, 2001)
December 2001: The Corralito is established, limiting bank withdrawals and restricting dollar transfers and loans. However, purchases through checks or credit cards are available, and purchases of government bonds.
December 30: Suspension of external payments (debt default).
January 2002: There is a 40% devaluation, and a dual exchange rate regime is introduced (1.4 pesos per dollar for trade operations, while floating regime for all other transactions). Later in the month, there is an easing of bank withdrawal restrictions followed by an asymmetric pesofication. Pesofication of dollar deposits at 1.4 pesos per dollar; dollar debts pesofied at market exchange rate; unification of exchange rate regimes in a floating scheme; right to withdraw wages and pension incomes in full; Corralón is imposed: freeze of bank term deposits. September 2002: Stocks required to be traded in domestic currency. Since the latter is widely resisted, it was eased, but the new restriction significantly increased transactions costs.
December 2002: The Corralito is rescinded.
Argentina (2011)
October 2011: Tax collection agency requires prior authorization for FX transactions.
December 2011: Banks required to inform the government 10 days in advance the FX purchases for clients over USD 500,000. Foreign companies reported problems repatriating dividends through the official FX market, although the only sector with formal barriers to dividend remittances is the financial sector (commercial banks distributing profits are subject to additional capital requirements).
April 2012: Cash withdrawals with debit card from ATMs abroad can only be made from a dollar-denominated account.
May 2012: Tax collection agency authorization required for FX purchases for tourism and for purchasing tourism packages.
June 2012: Extension of period to surrender exports for mining companies.
July 2012: Ban on FX purchases for savings.
August 2012: 15% tax surcharge on credit card purchases abroad.
September 2012: 15% tax surcharge on debit card purchases abroad.
March 2013: Tax surcharge on credit card purchases abroad increased to 20%.
May 2012: Limit on cash advances with credit card abroad.

TABLE 2—*Continued*

June 2013: Central bank prior approval needed for FX purchases of importers above USD 300,000.

October 2013: Central bank prior approval needed for FX purchases of importers above USD 200,000.

November 2013: Restriction on peso loans to grain exporters.

December 2013: Tax surcharge on credit card purchases abroad increased to 35%.

January 2014: Tax agency authorization required for web-based purchases abroad; limits web-based purchases abroad to 2 per year (not to exceed \$25 each, otherwise liable for a 50% tax in addition to the 35% tax on credit and debit cards); lifts ban on FX purchases for savings (not to exceed USD 2,000 per month), but subject to a 20% tax surcharge.

February 2014: Central bank lowers limit on commercial banks' net FX position, requires importers to match the volume of imports with a similar amount of dollar inflows (external loans, FDI).

September 2014: Central bank lowers limit on commercial banks' net FX position (to 20% of RPC); central bank prior approval needed for FX purchases of importers above USD 150,000; surrender of exports made after the legal deadline will be made at the exchange rate of the deadline date if that is lower than the exchange rate of the actual surrender date.

2014: Importers required to provide detailed business information (owners, employees, investment plans, etc.) to get their imports approved. The range of transactions that require prior consent of the central bank expanded in 2014—for example, access to FX to prepay for imports, excluding capital goods, reduced from 1 year to 120 days. In late 2014, some sectors most affected by these measures (e.g., auto manufacturers and assemblers of electronics) were given a monthly quota of dollars to pay for their imports.

February 2015: Central bank completely blocked sales of FX to importers for 3 consecutive days. Since then, commercial banks need to provide detailed information on transactions and obtain central bank approval before issuing letters of credit to importers.

Russia (2015)

2015: The government issued a directive requesting 5 large SOEs to ensure that by March 1, 2015, the size of their net foreign asset holdings is no greater than the level as of October 1, 2014.

Brazil (crisis ending the Real Plan, 1999)

March 1999: Government ordered local investment funds to increase their holdings of government bonds.

The central bank raised to 80% from 60% the minimum amount of sovereign debt that must be held in the country foreign investment fund. This lowered the share that could be held in other countries' debt.

TABLE 2—Continued

Malaysia (Asian crisis, 1997)

September 1998: Bank and foreign exchange controls limiting offshore swap operations, ban on short-selling. 1998: Repatriation of ringgit held offshore, and strict regulation on offshore operations and most international operations in ringgit, export and import operations allowed in foreign currency only, 12-month waiting period for nonresidents to sell profits from Malaysian securities, approval required to invest abroad (above certain limits).

December 1998: Residents are allowed to grant loans to nonresidents to purchase immovable property.

January 1999: Some derivative transactions for nonresidents are permitted.

February 1999: There is a gradual ease on the 12-month waiting period and some repatriations funds are exempted from exit regulations.

March 1999: Export and import trade ceilings are raised for operations with Thailand.

September 1999: Commercial banks allowed to enter into some short-term currency swaps with nonresident stockbrokers.

March 2000: Funds from sale of securities purchased by nonresidents can be repatriated without paying exit levy.

June 2000: Administrative procedures established to ease classification of securities as being free from exit levy.

September 30, 2000: Some offshore banks are allowed to invest in ringgit assets.

December 1, 2000: Foreign-owned banks are allowed to increase domestic credit.

February 2001: The exit levy is abolished for some operations.

May 2001: The remaining exit levy is abolished.

June 2001: All controls on nonresidents' futures and options are abolished.

July 2001: Resident financial institutions are allowed to extend ringgit loans to nonresidents investing in immovable property in Malaysia.

November 2002: Resident banks' credit levels to finance nonresidents' projects in Malaysia are raised.

December 3, 2002: Foreign currency limit for investment abroad by residents is abolished, and payments are liberalized to allow them to be in either ringgit or foreign currency.

Spain (ERM crisis, 1992)

September 1992: Bank of Spain suspends regular money market operations and introduces foreign exchange controls.

October 1992: The peseta is devalued and some of the controls are re-lifted.

November 1992: The remaining foreign exchange controls are rescinded.

TABLE 2—*Continued***Thailand (Asian crisis, 1997)**

May 1997: Bank of Thailand (BOT) introduces restrictions on capital account transactions.

June 1997: BOT introduces additional measures to limit capital flows. Baht proceeds from sales of stocks are required to be converted at the onshore exchange rate. Additional controls are introduced and later in the month a two-tier exchange rate is introduced.

September 1997: Additional controls on invisible and current account transactions are introduced.

January 1998: Requirement that proceeds on exports and invisible transactions and current account transfers be surrendered after 7 days (instead of 15 days). BOT ends two-tier exchange rate regime at the end of that month.

Iceland (2008)

November 2008: FX financial transactions are prohibited and krona-denominated transactions cannot be settled in foreign currency. No financial cross-border transactions are allowed. Prohibition to issue or sale of financial instruments in FX. Loans between domestic and foreign private parties limited to 10,000,000 kr, for no less than 1 year. Prohibition to act as a guarantor in domestic-foreign parties' lending (except trade-related transactions). Prohibition of trading in derivatives involving krona vs. foreign currencies. Prohibition of capital movements larger than 10,000,000 kr. Obligation to submit foreign currency. FX cash withdrawals prohibited unless proof of payment for goods and services.

December 2008: The inflow restriction is loosened to allow for the inflow of foreign currency for direct investment by foreigners.

August 2009: The central bank announces its strategy for the phased removal of the capital controls.

October 2009: The central bank again adopts new rules on capital controls, which enables the inflow in foreign currency through a so-called new investment channel. The same rules introduce new restrictions on inflows in domestic currency (the so-called off-shore krona) some of these measures remain in place.

March 2011: The government approves a revised strategy for lifting capital controls.

September 2011: The Parliament approves amendments to the Foreign Exchange Act, the Customs Act and the Act on the Central Bank of Iceland. These changes extend the authority to maintain capital controls beyond August 2011, when the enabling legislation is set to expire, to the end of 2013. The amendments open the possibility of a progressive discretionary relaxation of the controls.

TABLE 2—*Continued*

March 2012: Parliament amends the Foreign Exchange Act. The amended act entails that it is no longer permissible to purchase foreign currency for the value of indexation on bond principal. Finally, the amendment rescinds the exemption from the statutory prohibition against cross-border movement of foreign currency, which was previously enjoyed by the resolution committees and winding-up committees of the old banks.

March 2013: Parliament amends the Foreign Exchange Act by revoking the sunset clause. Also, included in the amendment is that exemptions from the capital controls amounting to 400 billion kr. or more will be done in collaboration with the Minister of Finance, which will brief the Parliamentary Committee on Economic Affairs on the economic impact that such an exemption will entail.

Cyprus 2013

March 2013: Restrictions on domestic and cross-border transactions. Cash withdrawals restricted to euro 9,000 or less per month, while bank note exports are limited to euro 2,000 per person per journey. Prohibition on cashing of checks. Credit and debit cards only for domestic payments and transfers; use abroad up to euro 5,000 per month per account holder. Wire transfer by business to exceed euro 300,000 for domestic and euro 20,000 for cross-border payments are exempt from restrictions; otherwise, government approval needed; for individuals, maximum transfer is euro 3,000 and legal persons euro 50,000; salary payments are not subject to restrictions. Prohibition on opening new accounts. Maturing term deposits extended for 1 month, except euro 5,000 or 20% of the deposit. Term deposits could be used to offset existing loans within same bank.

August 2013: Relaxed some of the limits imposed in March regarding legal persons' cash withdrawals (from euros 300 to 500), cashless payment/transfers for natural persons (from 0 to euro 15,000), legal persons (from 0 to euro 75,000), for purchasing goods and services (from 0 to euro 300,000 per transaction), to institutions abroad (from 5,000 per day to 500,000 per transaction), payment via credit/debit cards (from 5,000 to no limit), exports of euro notes (from 1,000 to 3,000), new accounts can be opened, and new beneficiaries added to current accounts.

May 2014: Domestic controls removed (end date, after a progressive removal).

April 2015: External controls removed (end date, after a progressive removal).

Nigeria (2015)

April 2015: Central bank limited the amount commercial bank customers can spend using their debit cards abroad.

TABLE 2—*Continued*

June 2015: Central bank curbed access to the interbank currency market for the purchase of foreign currency bonds as well as a range of 41 goods to tighten liquidity and conserve reserves. Importers prohibited from getting hard currency from the interbank market to buy items such as rice, cement, private jets, other construction materials, plastic and rubber products, soap, cosmetics, furniture and Indian incense.

Greece (2015)

June 2015: Withdrawals limited to €60 per day for each account, and cashing of checks suspended; fixed-term deposits locked down. Cash transfers abroad banned; 5-day bank holiday.

Venezuela (2010)

January 2010: Dual exchange rate; two official rates: VEF 2.15 and 2.60 per dollar.

December 2010: Official exchange rates unified at VEF 4.30 per dollar.

February 2013: Official exchange rate devalued to VEF 6.30 per dollar.

July 2013: Official exchange rate remains at VEF 6.30 per dollar for some sectors, while an official market auction (SICAD I) is announced for certain import codes and other foreign transactions. (Auctions established in February, but started to occur regularly in July.)

March 2014: Official exchange rate remains at VEF 6.30 per dollar, SICAD I auctions remained (ranging from VEF 11-12 per dollar); some transactions moved to second auction system (SICAD II).

2015: Official exchange rate remains at VEF 6.30 per dollar, SICAD I auctions remained (ranging from VEF 11-12 per dollar); SICAD II eliminated (ranging from VEF 45-52 per dollar); new auction market created (SIMADI), opening at VEF 185 per dollar.

Ukraine (2014)

2014: Multiple currency practice arising from (i) the requirement to transfer the positive difference between the sale and purchase price of foreign exchange to the state budget if the purchased foreign exchange is not used within 10 days and is resold, and (ii) use of the official exchange rate for government transactions, including transactions of some State Owned Enterprises, without establishing a mechanism to ensure that the official exchange rate does not deviate from the market exchange rate by more than 2%.

September 2014: Multiple currency practice arising from the use of multiple-price foreign exchange auctions conducted by the National Bank of Ukraine (NBU) without a mechanism to prevent (i) a spread deviation of more than 2% in the exchange rates at which the NBU sells foreign exchange to successful bidders; and (ii) a spread deviation of more than 2% between the auction rates and the market exchange rate.

TABLE 2—*Continued*

March 2015: Absolute limits on availability of foreign exchange for certain nontrade international transactions. Certain individual nontrade transfers abroad in foreign exchange, in particular family and personal remittances, are limited to a monthly cap of UAH 150,000 from foreign exchange accounts and with supporting documents or to a cap of UAH 15,000 daily if effected by residents without supporting documents or without opening a foreign exchange account. Extended 2014 ban on the transfer abroad of dividends received by nonresident investors from investments in Ukraine. Requirement to provide a tax clearance certificate evidencing the payment of all taxes, including taxes unrelated to the transaction, before obtaining authorization for making import payments equal to or exceeding USD 50,000.

Sources: Banco de España; Bank Negara, Annual Report, various issues; Bank of Thailand reports, various issues; Conselho Monetario Nacional, Brazil; and various central banks.

the methodology and results where possible so as to facilitate comparisons. This not only enables us to assess the effectiveness of alternative capital control events, but also permits us to evaluate some of the policy implications of imposing controls on capital inflows and/or outflows under alternative scenarios.

4.1. Types of Studies

We proceed as follows. First, we cluster the papers into three broad groups: (i) capital inflows (CI); (ii) capital outflows (CO); and (iii) multi-country studies (MC)—with the latter including the analysis of capital inflows, capital outflows, or both. We collected studies of capital control for the following countries (the number of papers is shown in parentheses): For CI, there are studies on Brazil (6), Chile (11), Colombia (5), the Czech Republic (1), Malaysia (2), and Thailand (1). For CO, we obtained information for Malaysia (5), Spain (3), and Thailand (2). For the MC group, we collected five papers, covering a wide array of countries.⁶

4.2. Objective(s) of Capital Controls

Given the multiple objectives that capital controls are expected to achieve, we approached each paper with a series of questions. We asked whether, according to each paper, capital controls were able to

1. Reduce the volume of capital flows;
2. Alter the composition of capital flows (towards longer-maturity flows);
3. Reduce real exchange rate pressures; and
4. Allow for a more independent monetary policy.

⁶For example, one of the more comprehensive multi-country papers uses monthly data for the period 1971-1998 for a panel of 26 countries.

As a first step in sorting this information, we constructed Tables 3, 4, and 5. Table 3 includes CI episodes, Table 4 displays CO episodes, and Table 5 focuses on MC studies. As can be seen in the tables, possible answers are YES, NO, or a blank space. If the table reads YES in any cell, it means that the paper finds that the corresponding objective of capital controls was achieved. NO stands for the paper finding that there was no such effect as a result of the capital controls. A blank space means that the paper does not address whether there was an effect. Sometimes the answer is followed by (ST). This indicates that the effects were only temporary, i.e. that an objective was achieved only in the short term. To give an example, in Table 3, the paper by Laurens and Cardoso (1998) studying the case of the Chilean experience during the 1990's finds evidence that capital controls were able to reduce the volume of capital flows only in the short term, that they were able to alter the composition of these flows toward longer maturity flows, and that they were not successful in reducing pressures on the real exchange rate. They do not report results regarding the effectiveness of capital controls in making monetary policy more independent.

TABLE 3.
The Famous Chilean Case and Other Lesser Deities: Summary of Key Findings on “Effectiveness”

Study	Sample	Did controls on inflows			
		Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
Brazil					
Cardoso & Goldfajn (1998)		Yes (ST)	Yes (ST)		
Edison & Reinhart (2001)	1994			No	No
Reinhart & Smith (1998)		Yes (ST)	Yes (ST)		
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1993-1997	No	No	No	Yes (ST)
Chamon and Garcia (2013)	2009-2012			No	Yes
Baba and Kokenyne (2011)	2000-2008	No	No	No	Yes

Notes: A blank entry refers to the cases where the study in question did not analyze that particular relationship. An (ST) refers to cases where only short-term effects were detected.

TABLE 3—Continued

Study	Sample	Did controls on inflows			
		Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
Chile					
De Gregorio, Edwards & Valdés (2000)	1988:I-1998:II	Yes	Yes (ST)	Yes (ST)	Yes (ST)
Edwards (1999)a			Yes	No	Yes (ST)
Edwards (1999)b	1991:6-1998:9	No	Yes	No	Yes
Edwards & Rigobon (2005)	1991:1-1999:9			Yes	
Gallego, Hernández & Schmidt-Hebbel (2002)		Yes (ST)	Yes (ST)	No	Yes
Labán, Larraín & Chumacero (1997)	1985-1994	No	Yes		
Labán & Larraín (1998)					
Laurens & Cardoso (1998)		Yes (ST)	Yes	No	
Le Fort & Budnevich (1998)	1990-1994	No	Yes	Yes	Yes
Reinhart & Smith (1998)		Yes (ST)	Yes (ST)		
Valdés-Prieto & Soto (1995)	1987-1995	No	Yes	No	No
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1991-1998	No	No	No	Yes
Colombia					
Le Fort & Budnevich (1998)	1990-1995	Yes (ST)	Yes	Yes	Yes
Reinhart & Smith (1998)		No	No		
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1993-1998	No	No	No	Yes

TABLE 3—*Continued*

Study	Sample	Did controls on inflows			
		Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
Rincon and Toro (2010)	1993-2010			No	
Clements and Kamil (2009)	2006-2009	Yes		No	No
Baba and Kokenyne (2011)	2004-2008	Yes (ST)	Yes	No	Yes
Czech Republic					
Reinhart & Smith (1998)		No	Yes (ST)		
Malaysia (1989)					
Reinhart & Smith (1998)		Yes	Yes		
Malaysia (1994)¹					
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1994	Yes	Yes	Yes (ST)	Yes
Thailand					
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1995-1997	Yes	Yes	Yes	Yes
Baba and Kokenyne (2011)	2000-2008	Yes		No	Yes

Notes: A blank entry refers to the cases where the study in question did not analyze that particular relationship. An (ST) refers to cases where only short-term effects were detected.

¹ Note that there are several studies of Malaysia's 1998 capital controls that targeted outflows. Here, we are referring to the controls on capital inflows introduced in January 1994.

TABLE 4.
The Famous Malaysian Case and Other Lesser Deities: Summary of Key Findings on “Effectiveness”

Study	Episode	Did controls on outflows:			
		Reduce the volume of rate pressures	Alter the composition policy more independent	Reduce real exchange	Make monetary
Malaysia					
Tamirisia (2004)	1991:1-2002:12			No	Yes
Dornbusch (2001)				No	
Edison & Reinhart (2001)				Yes	Yes
Kaplan & Rodrik (2002)	1992-1996				Yes
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1998-2000	Yes		Yes	Yes
Spain					
Vinals (1990)	1992	No			
Edison & Reinhart (2001)	1995-1999			No	No
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1992	Yes		Yes (ST)	Yes
Thailand					
Edison & Reinhart (2001)				No	No
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1997-1998	Yes		Yes	Yes (ST)

Notes: A blank entry refers to the cases where the study in question did not analyze that particular relationship. An (ST) refers to cases where only short-term effects were detected.

TABLE 5.

The “Others” — Multi-country Studies Summary of Key Findings on “Effectiveness”

Study	Sample	Did controls on inflows:			
		Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
Montiel & Reinhart (1999)	Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Czech Republic, Egypt, Kenya and Uganda (1990-1996)	No	Yes (ST)		No
Reinhart & Smith (1998)	Brazil, Chile, Colombia, Czech Republic, Malaysia, Mexico, Thailand, Indonesia, and Philippines	Yes (ST)	Yes (ST)		
Kaplan & Rodrik (2002)	Korea, Thailand, Indonesia, Malaysia (monthly and quarterly data for 1992-1996 [before 1997-1998 crisis] and from crisis time)				Yes
Edison & Reinhart (2001)	Spain (1991-1993); Brazil, Malaysia, and Thailand (1995-1999). Control group: Philippines and South Korea (daily data)			No	No
Miniane & Rogers (2007)	Australia, Austria, Belgium, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, India, Italy, Japan, Korea, Malaysia, Mexico, The Netherlands, Norway, The Philippines, Portugal, South Africa, Spain, Sweden, Turkey, UK. (monthly data for 1975:1-1998:12)			Yes (ST)	No

Notes: A blank entry refers to the cases where the study in question did not analyze that particular relationship. An (ST) refers to cases where only short-term effects were detected.

TABLE 6.

Summary of Results by Country and Multi-country Studies

Study	Did controls on inflows:			
	Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
Complete Sample	Unclear	Yes	Unclear	Yes
Control on Inflows				
Brazil	Unclear	Unclear	No	Unclear
Chile	Unclear	Yes	Unclear	Yes
Colombia	Unclear	Unclear	Unclear	Yes
Czech Republic	No	Yes		
Malaysia (1989)	Yes	Yes		
Malaysia (1994)	Yes	Yes	Yes	Yes
Thailand	Yes	Yes	Yes	Yes
Control on Outflows				
Malaysia (1998)			Unclear	Yes
Spain	Unclear		Unclear	Unclear
Thailand	Yes		Yes	Yes
Multi-country studies	Yes	Yes	Yes	No

Note: Yes stands for yes, it worked; No for no, it did not work; Unclear for mixed results; and blanks for results not reported.

In a first pass through this information, by inspection, we summarize it as follows (see Table 6). We observe that in general, the results obtained in these papers suggest that capital controls were successful in altering the composition of capital flows toward longer maturities and in making monetary policy more independent. However, the papers are not very informative regarding the effectiveness of capital controls in reducing the volume of capital flows and reducing real exchange rate pressures.

4.3. Indices of Capital Control Effectiveness

But this is not informative enough, since it still lacks sufficient rigor to evaluate the effectiveness of capital control episodes. In order to better understand this, we construct two indexes of capital controls effectiveness. We call them the Capital Controls Effectiveness Index (CCE Index), and the Weighted Capital Controls Effectiveness Index (WCCE Index). The only difference in computing them is that the WCCE Index weights the results obtained in each paper by the degree of methodological rigor applied to drawing conclusions; we discuss thus further below.

In both cases, following the information summarized in Tables 3-5, we arbitrarily assigned the following values:

- If the answer is YES, the corresponding value is 1.
- If the answer is NO, the value assigned is -1 .
- If the question is not addressed at all, the assigned value is 0.

These values are designed to weight equally the existence or nonexistence of the effects of imposing capital controls and to give no weight to questions not addressed. This design limits distorting the results in case any objective of capital controls is not addressed by the paper.

With these values at hand, for each country, we computed simple averages of these numbers for each of the four questions we asked of the papers. This gives, for example, a CCE Index for volume reduction for each country, a CCE Index for real exchange rate pressure reduction for each country, and so on. With this information, we are able to compare, for each objective, which country was most effective.

We also used this information to compute an aggregate index of capital control effectiveness by averaging the four CCE Indexes for each country, and then using it to compare a global CCE Index across countries.

However, as has already been mentioned, the methodology used in these papers to evaluate success is highly heterogeneous. Some papers are mainly descriptive, generating conclusions from the movements (or lack thereof) in the time series of the main variables. They lack any rigorous statistical or econometric analysis. Other papers use some statistical or econometric methodology to evaluate capital control (including event analysis), but among them there is still wide variation in the degree of rigor used to extract conclusions from the data.

In order to control for these differences, we made another pass through the information in the papers. We classify each study according to its degree of methodological rigor as LOW, INTERMEDIATE, or HIGH according to the following criteria⁷:

- Low: This includes studies that consist mainly of descriptive analysis of events and/or time series.
- Intermediate: This groups papers that draw conclusions from a more formal evaluation of events but still lack any formal hypothesis testing. An example would be papers that perform time re-scaling to compare the effects of capital controls in a “before capital controls” and “after capital controls” analysis.

⁷The reader should understand that our low, intermediate, and high characterizations should not be construed as evaluating or comparing the overall quality of the various studies incorporated here. Rather, it is only a very narrow index of econometric sophistication. The reader is perfectly free to decide that this index is positively, negatively, or uncorrelated with the overall credibility of the different studies.

- High: This includes only those studies that use highly developed econometric techniques, with well-defined hypothesis testing.

Additionally, in order to compute the WCCE Index, we assigned the following values:

- Low: 0.1
- Intermediate: 0.5
- High: 1.

With these values in hand, we compute the WCCE Index similarly to the CCE Index, in order to determine which country has been most effective in achieving each of the four objectives. We also compute an aggregate (per country) WCCE Index. This enables us to understand which countries' capital controls were most useful in all objectives combined. Furthermore, given this information we can, at least as a first approximation, find conditions under which capital controls tend to be effective. Once more, it is worth mentioning that these exercises were done separately for the three clusters into which we separated the papers: CI, CO, and MC.

4.4. Summary of Results

Summary results of the CCE and WCCE Indexes are presented in Tables 7-9. From these indexes, we can extract the following policy conclusions. Looking at the data on controls on inflows along with the preliminary results in Table 6, we see that capital controls were able to make monetary policy more independent and alter the composition of capital flows toward longer maturities; the data also seems to suggest that capital controls were able to reduce real exchange rate pressures (but the evidence on the latter is more controversial and partly weighted by one study). Interestingly, the usual model economy for this type of controls, Chile, stands out as achieving these goals quite comfortably, as the WCCE Index shows. In this regard, however, initial conditions or characteristics such as those in Chile in the early 1990s, along with the continuing reforms during the 1990s, appear to be necessary conditions in order for capital controls on inflows to be effective. On the other hand, capital controls on inflows were not very effective in reducing the volume of net flows (hence the impact of these flows on the current account balances).

Looking in more detail, we see that Malaysia (1994) stands out as the best performer in terms of reducing the volume of capital flows, while Chile dominates regarding the change in capital flows maturity. Thailand is superior in regards to reducing real exchange rate pressures, and Chile again dominates in monetary policy independence. Overall, as the average of the WCCE Index reflects, Chile and Malaysia appear as the most successful examples of capital controls on inflows. How robust these differences are is beyond the scope of these indices.

We now focus on capital controls on outflows. The received wisdom is that Malaysia (1997-1998) is the example to follow. From our results, we can see that these capital controls were relatively effective in reducing capital outflows and in making monetary policy more independent. Yet, Thailand and Spain dominate Malaysia. Regarding the switch in capital flows towards longer maturity, no conclusion can be extracted. Spain emerges as the best in real exchange rate pressures reduction; on the other hand, Malaysia clearly dominates at making monetary policy more independent. On aggregate, Malaysia appears to be the most successful in its experience of capital controls on outflows.

TABLE 7.

Capital Inflows: The Indices

Country	Index	Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make Monetary Policy Independent	Country Average
Brazil	CCE	0.00	0.00	-0.67	0.00	0
	WCCE	0.35	0.35	-0.275	-0.225	0.05
Chile	CCE	-0.09	0.64	-0.27	0.45	0.18
	WCCE	0.03	0.67	-0.27	0.29	0.18
Colombia	CCE	-0.33	-0.33	0.00	0.67	0.00
	WCCE	-0.17	-0.17	0.00	0.07	-0.07
Czech Republic	CCE	-1.00	1.00	0.00	0.00	0.00
	WCCE	-0.50	0.10	0.00	0.00	-0.10
Malaysia	CCE	1.00	1.00	0.50	0.50	0.75
	WCCE	0.30	0.30	0.05	0.05	0.18
Thailand	CCE	1.00	1.00	1.00	1.00	1.00
	WCCE	0.10	0.10	0.10	0.10	0.10

Some further comments are in order. First, it could be argued that these indexes are not taking into account many other variables that might be affecting the effectiveness of capital controls. This especially applies to the set of “other” reforms being put in place in each country during each capital controls episode. That is true. However, this paper is reviewing and assessing only the conclusions contained in previous papers, not the papers themselves. All the papers that we covered draw conclusions from their information sets, and we just put them together and try to extract the main message that they give as a group. Furthermore, it is precisely because of this kind of “omitted variables bias” problem that our WCCE Index becomes more relevant. For example, any structural reform carried on in parallel with capital controls is not usually specifically reflected in the papers we review. In a sense, for us, this is similar to running a re-

TABLE 8.

Capital Outflows: The Indices

Country	Index	Reduce the volume of net capital outflows	Alter the composition of flows	Reduce real exchange rate pressures	Make Monetary Policy Independent	Country Average
Malaysia	CCE	0.20	0.00	0.00	0.80	0.25
	WCCE	0.02	0.00	0.00	0.62	0.16
Spain	CCE	0.50	0.00	0.50	0.50	0.38
	WCCE	0.05	0.00	0.20	0.20	0.11
Thailand	CCE	0.50	0.00	0.00	0.00	0.13
	WCCE	0.05	0.00	-0.50	-0.50	-0.24

TABLE 9.

Multi-Country Studies: The Indices

Index	Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
CCE	0.00	0.40	0.00	-0.40
WCCE	-0.10	0.30	0.00	-0.40

gression with missing data that we have to control for. This is where the degree of methodological rigor becomes important. The more formal the analysis is, especially if it includes hypothesis testing, the more accurate the information contained in it that can be extracted.

Second, a similar reasoning applies to the endogeneity of capital controls. Some could argue that we should control for it. Again, we rely on the conclusions obtained in previous papers. This gives more relevance to the results we obtain from our WCCE Index. Also, this is important for how controls on capital inflows affect capital outflows. Moreover, that is why we cluster CI and CO separately in our analysis.

Third, it is worth mentioning that the papers we review are clearly not dealing with long-run capital controls. And there are many papers that analyze the long-run effects of capital controls. But we focus on the short run only, as can be seen from the specific questions with which we approach the papers.

Fourth, another interesting point is whether capital control regimes are transitory or permanent. Here, as the questions we focus on clearly reveal, we are interested only in transitory events. This is why episodes such as the Chinese or Indian approaches to capital controls are not covered here;

see the papers on these countries contained in the NBER volume edited by Sebastian Edwards (2007) for this purpose.

Fifth, an interesting point to raise is related to the timing (and related endogeneity) of capital controls: whether they are imposed in response to events—such as crises—or are designed in advance. Here, once more, we lack information because we rely only on what the papers conclude. It is worth mentioning, though, that by inspection it appears that the Malaysian (1997-1998) crisis episode could have been designed in advance, unlike most of the other episodes, and contrary to common wisdom. This hypothesis emerges from the chronologies given in Tables 1 and 2. In the case of Malaysia (1997-1998), many of the controls were imposed on September 1st, 1998. Furthermore, the level of detail seems to suggest that they were not decided upon and designed just in response to the crisis.

Sixth, sometimes temporary capital control events become permanent. This could be because of time consistency problems or just because of the current response to future changes: rational expectations call for incorporating into your current decisions the fact that in a pre-specified future time period capital controls will be levied. Furthermore, even if a country imposed capital controls and did relax them at the pre-established date, this might work as a signal that capital controls could again be imposed in the future if needed. However, this signal says nothing about the controls being either good or bad—many things would influence the latter, especially the controls' effectiveness, as well as their effects on property rights. At any rate, imposing capital controls establishes a precedent regarding a country's position towards capital mobility, despite the costs and benefits of such controls. This is another dimension in which temporary capital controls might become "permanent."

5. CONCLUSIONS

In sum, capital controls on inflows have heterogeneous effects across the country experiences. On the whole, there is some support that these measures seem to provide scope for monetary policy independence and alter the composition of capital flows; to a lesser extent they seem to reduce real exchange rate pressures (but the evidence here is more controversial).⁸ Capital controls on inflows, however, seem not to reduce the volume of net flows (and, hence, the current account balance).

As for controls on capital outflows, there is Malaysia and Spain in an earlier episode. In Malaysia, controls reduced outflows and may have made

⁸According to the WCCE Index, Chile stands out in achieving the first two of these goals.

room for more independent monetary policy.⁹ The findings of the earlier literature, which focused on capital flight (as in Mathieson and Rojas-Suarez, 1996) and dual or parallel exchange markets (as in Kiguel, Lizondo, and O'Connell, 1997), had already pointed to limited success.

While the effectiveness of controls varies across time, country, and type of measures used, limiting private external borrowing in the good times plays a salient role because, more often than not, countries are “debt intolerant.” Indeed, often the critical problem in good times is that countries borrow too much!¹⁰

While our study has made the case for the need to distinguish measures primarily designed to discourage inflows from those that primarily aim at curbing outflows, it would be worthwhile for future research to attempt to ascertain whether there are also important differences in achieving success between measures that are more market friendly (as in the Chilean reserve requirements) versus those that are based on more-blunt quantitative restrictions. Furthermore, in this study, owing to the nature of most of the empirical work reviewed (which treats the control measures as single episodes) the analysis is short term. It would be interesting for policy purposes to examine differences between the short-run and long-run impacts of the measures, to ascertain how quickly control measures lose their effectiveness, and what is the role played by exchange rate flexibility.

As long as capital flows to emerging markets remain volatile and potentially disruptive, the discussion of capital controls in academic and policy circles will remain alive, and hence there is a real need to evaluate their effectiveness, however defined. As noted earlier, it is an old discussion. Tobin's seminal paper dates back to the 1970s. Furthermore, capital controls have historically been used to deal with the fickle capital flow cycle for at least two hundred years. And currently several countries have again been using them-both on inflows and outflows. So, here we go again. . . .

APPENDIX

A. SELECTED RECENT THEORETICAL LITERATURE ON CAPITAL CONTROLS

Farhi and Werning (2014) find the optimal capital controls in a New Keynesian model. The exchange rate regime is relevant, but optimally capital controls should complement exchange rate flexibility. A welcome feature of the model is that it adds money, so (to discuss exchange rate

⁹Yet, the results for Malaysia based on the WCCEI are not as conclusive as for the Chilean controls on inflows.

¹⁰See Reinhart, Rogoff, and Savastano (2003) for details.

regimes) it enriches the analysis of real models as in Bianchi and Mendoza (2011, 2013), Bianchi (2011), Jeanne and Korinek (2010), and Korinek (2011). All these latter papers provide a rationale for prudential policies in response to exogenous pecuniary externalities that result in over-borrowing. In Farhi and Werning the bottom line is that with fixed exchange rates capital controls help to regain monetary independence (à la Mundell), but with flexible exchange rates they help to stabilize the terms of trade (as in a purely real model). Bianchi and Mendoza (2013), in a setup with pecuniary externalities, focus on the optimal time-consistent macroprudential policies of a regulator that cannot commit to future policies, which results in fewer crises.

Klein and Shambaugh (2015) find that capital controls have only limited effectiveness and only if for a short time, while Cheung and Herralá (2014) document evidence of the effectiveness of long-standing controls in China. Fernandez, Rebucci, and Uribe (2013) document the acyclicity of capital controls.

Benigno and Fornaro (2013), in a Dutch disease model, show the theoretical results that capital controls can improve welfare to mitigate the misallocation that results from a capital inflows shock (triggered by a reduction in world interest rates). They focus on the effects of capital controls to re-align the tradable-nontradable relative price to avoid misallocation of resources. Devereux and Yetman (2014), in a zero lower bound world, show that monetary policy loses effectiveness even in flexible exchange rate regimes. Capital controls can make monetary policy regain its effectiveness. Yet the controls are welfare-reducing owing to lower cross-country risk sharing.

Buss (2013) uses a dynamic general equilibrium model to study the effects of capital controls in a multi-good multi-country model with incomplete financial markets and heterogeneous agents. Results vary by market segments: controls reduce the volatility of currency markets but not the appreciating pressures, but amplify price movement in international stock markets and thus volatility; yet they limit spillover effects resulting from external shocks to a country. Benigno, Chen, Otrok, and Rebucci (2013) show that a credible commitment to a real exchange rate target dominates prudential capital controls (in terms of welfare outcomes), as the former can achieve the unconstrained equilibrium, by undoing the binding of the constraint in the pecuniary externality.

Chamon and Garcia (2013) document that controls in Brazil since 2009 had some success in segmenting Brazilian and global financial markets (measured by wedges between onshore and offshore prices of similar assets). Yet, no significant effect was observed on the exchange rate appreciation. Only when controls became expected were some depreciation effects observed, in 2012, but on the back of aggressive interest rate reductions.

Forbes, Fratzscher, Kostka, and Straub (2012) focus on portfolio effects. They show that taxes on capital inflows in Brazil caused a reduction in foreigners' bond and equity holdings (i.e., a signaling effect), but investors increased holdings of countries with exposure to China.

Costinot, Lorenzoni, and Werning (2011) perform a tax analysis of intertemporal prices in a purely real model, using the optimal tariffs approach. As the intertemporal price is the real interest rate, capital controls depend on relative growth rates among countries. Korinek (2011) presents an extensive theoretical analysis of the need to impose capital controls to offset pecuniary externalities-to help internalize them.

B. A PORTFOLIO BALANCE APPROACH TO CAPITAL CONTROLS

This appendix develops a simple, albeit not general, model to explain the effects of imposing capital controls, separating controls on capital inflows from those on outflows.¹

We study a two-period small open economy that receives a flow of external capital of size F_t in period t . For simplicity, these flows will be either short-term flows, S_t , or long-term flows, L_t . The random real rate of return on these capital flows is r for long-term capital flows and r^* for short-term flows. Given risk parameters, without loss of generality, we assume throughout that $r^* > r$:

$$F_t = S_t + L_t \tag{A.1}$$

Short-term flows represent a share x of total capital flows, such that

$$S_t = xF_t \tag{A.2}$$

where x is endogenous and results from the optimization program of foreign investors.

Foreign investors

There is a unit mass of foreign investors. Given the random nature of the rates of return on each type of capital flows, the optimization problem is characterized in terms of solving an expected utility maximization in terms

¹It would be desirable to have a full-blown general equilibrium stochastic model of capital flows. But general equilibrium models do not easily extend to the kind of diverse capital market imperfections and obstacles that characterize the vast majority of countries that have implemented controls. (For example, aggregation becomes much more difficult in the presence of capital market imperfections; see Obstfeld and Rogoff 1996.) Furthermore, the theoretical literature on capital controls is not quite abundant. Notable exceptions being, among others, Bartolini and Drazen (1997), Reinhart (2000), Reinhart and Smith (2002), and Farhi and Werning (2014).

of means and variances-covariances. The representative agent solves for the portfolio composition of these capital flows in terms of the parameters of the model such as its risk preferences. Thus, the agent solves the following problem

$$\max_x U = U(\bar{w}, \sigma_w^2) \quad (\text{A.3})$$

where the expected rate of return on capital flows, \bar{w} , is given by

$$\bar{w} = (1 + r)F_t + (r^* - r)xF_t \quad (\text{A.4})$$

and the variance by

$$\sigma_w^2 = F_t^2[(1 - x)^2\sigma_r^2 + x^2\sigma_{r^*}^2 + 2x(1 - x)\sigma_{rr^*}] \quad (\text{A.5})$$

where σ_i^2 stands for the variance of variable i and σ_{ij} refers to the covariance between i and j .

From the FOC's, we obtain

$$x = \frac{(r^* - r) + \Phi(\sigma_r^2 - \sigma_{rr^*})}{\Phi\sigma} \quad (\text{A.6})$$

Where $\sigma = (\sigma_r^2 + \sigma_{r^*}^2 - 2\sigma_{rr^*})$, and Φ represents the coefficient of risk aversion.

Notice that the share of capital flows devoted to short-term flows increases with the yield differential and decreases with risk aversion, in line with standard portfolio selection models. Alternatively, we can write this as

$$x = \frac{r^* - r}{\Phi\sigma^2} + \alpha \quad (\text{A.7})$$

where

$$\alpha \equiv \frac{\sigma_r^2 - \sigma_{rr^*}}{\sigma^2} \quad (\text{A.8})$$

and α represents the share of capital flows to minimize the variance of flows. Equation (7) separates the speculative component of this flows share and that which corresponds to minimize the portfolio variance. The latter depends only on the relative riskiness of each type of capital flow.

Capital controls on inflows

Let's modify slightly the above setup to incorporate capital controls on inflows. Without loss of generality, assume that capital controls, τ , can take on only two values: 0 for no capital controls, and $\bar{\tau}$ if capital controls do exist. Namely,

$$\tau = \begin{cases} 0 & \text{if } \nexists \text{ capital controls} \\ \bar{\tau} > 0 & \text{if } \exists \text{ capital controls} \end{cases} \quad (\text{A.9})$$

where $0 < \bar{\tau} < 1$. Let's now re-define the real return on short-term flows as r'^* , such that the after-capital-controls real rate of return on short-term flows is now given by $(1 + r^*) = (1 + r'^*)(1 - \tau)$.

Maturity structure of capital flows

Given this simple framework, we now proceed to analyze the outcome of imposing capital controls on inflows. Suppose the economy starts with no capital controls and unexpectedly imposes capital controls on inflows. Simply put, this represents a decrease in r^* . The result is summarized in Proposition 1.

PROPOSITION 1. *Imposing capital controls reduces the share of short-term capital flows.*

Proof. Notice that from (A.7), we observe that

$$\frac{dx}{dr^*} = \frac{1}{\Phi\sigma} > 0 \quad (\text{A.10})$$

This implies that as a result of imposing capital controls, external financing in the form of short-term capital flows is reduced—i.e., the relative size of long-term flows, L , increases. ■

Aggregation

The analysis above refers to each individual investor. This subsection aggregates over the economy. We assume for simplicity that agents share the information but have potentially different wealth and/or risk-aversion parameters, which are idiosyncratic characteristics.

Total demand for short-term flows for investor j with wealth W_j is given by $x_j W_j$ —where, as mentioned, x_j is conditional on the individual investor's risk aversion. The economy's aggregate wealth is given by

$$\bar{W} = \sum_j W_j \quad (\text{A.11})$$

In equilibrium, aggregate demand for short-term flows should equal aggregate supply for these flows, as follows:

$$V^* = \sum_j x_j W_j \quad (\text{A.12})$$

Now, for each individual j , multiply (A.7) by W_j on both sides and then aggregate over j to obtain

$$\sum_j x_j W_j = \left(\frac{r^* - r}{\sigma^2} \right) \sum_j \frac{W_j}{\Phi_j} + \alpha \sum_j W_j \quad (\text{A.13})$$

Plugging (A.12) and (A.11) in (A.13) results in

$$V^* = \left(\frac{r^* - r}{\sigma^2} \right) \sum_j \frac{W_j}{\Phi_j} + \alpha \bar{W} \quad (\text{A.14})$$

where, after some manipulation we obtain

$$r^* - r = \Phi \sigma^2 \left(\frac{V^*}{\bar{W}} - \alpha \right) \quad (\text{A.15})$$

and where we have defined $\Phi = \sum_j \frac{\Phi_j}{W_j / \bar{W}}$ as the aggregate risk aversion.

With the latter, we can state Proposition 2, which is just the aggregate of Proposition 1:

PROPOSITION 2. *In the aggregate, introducing capital controls results in a reduction of short-term capital flows as a share of total capital flows.*

Proof. analogous to Proposition 1

$$\frac{\partial r^*}{\partial (V^* / \bar{W})} = \Phi \sigma^2 > 0 \quad (\text{A.16})$$

■

Notice that so far we have just shown that in response to imposing capital controls, the share of short-term flows in total flows decreases. However, we still have to explain if this results from a reduction in the level of short-term flows, an increase in the level of total flows, or both. Reviewing the studies, a take-away result is that imposing capital controls on short-term flows increases the maturity structure of capital flows, but does not necessarily reduce the level of capital flows. This is consistent with the evidence in this paper as well as in Magud and Reinhart (2007). The next section analyzes this by focusing on the determinants of the composition of capital flows.

Determinants

We want to further analyze the conditions under which the above-mentioned reactions to capital controls hold.

Notice that all else equal, capital control needs a higher level of capital flows. This can be shown by computing the partial derivative of (A.15) to obtain

$$\frac{\partial r^*}{\partial \bar{W}} = -\frac{\Phi\sigma V^*}{\bar{W}^2} < 0 \quad (\text{A.17})$$

The intuition for the latter is that for an investor (or the aggregate market) to obtain the same expected rate of return in response to the introduction of capital controls, total capital flows should increase.

However, the more interesting results emerge by looking at total differentiation of (A.15), which can be stated as follows:

$$dr^* = \Phi\sigma^2 \left[\frac{\bar{W}dV^* - V^*d\bar{W}}{\bar{X}^2} \right] \quad (\text{A.18})$$

Equation (A.18) can be manipulated to obtain the following two expressions:

$$\frac{dr^*}{dV^*} = \Phi\sigma^2 \left[1 - \frac{1}{\eta} \right] \quad (\text{A.19})$$

and

$$\frac{dr^*}{d\bar{W}} = \frac{V^*\Phi\sigma^2}{\bar{W}} [\eta - \bar{w}] \quad (\text{A.20})$$

Where $\eta \equiv \frac{dV^*}{d\bar{W}} \frac{\bar{W}}{V^*}$ stands for the elasticity of short-term capital flows with respect to total capital flows.

These expressions are then summarized in two new propositions:

PROPOSITION 3. *The effects of imposing capital controls on short-term capital flows depend on the elasticity of short-term capital flows with respect to total capital flows such that:*

- 1) For $0 < \eta < 1$: $\frac{dr^*}{dV^*} < 0$ Short-term capital flows levels increase
- 2) For $\eta = 1$: $\frac{dr^*}{dV^*} = 0$ Short-term capital flows levels remain unaltered
- 3) For $\eta > 1$: $\frac{dr^*}{dV^*} > 0$ Short-term capital flows levels decrease

Proof. see (A.19). ■

PROPOSITION 4. *The effects of imposing capital controls on total capital flows depend on the elasticity of short-term capital flows with respect to total capital flows such that:*

- 1) For $0 < \eta < \bar{W}$: $\frac{dr^*}{d\bar{W}} < 0$ Total capital flows levels increase
- 2) For $\eta = \bar{W}$: $\frac{dr^*}{d\bar{W}} = 0$ Total capital flows levels do not change
- 3) For $\eta > \bar{W}$: $\frac{dr^*}{d\bar{W}} > 0$ Total capital flows levels decrease

Proof. see (A.20). ■

The interesting point of Propositions 3 and 4 is that, unlike common wisdom, it is not necessarily the case that by introducing capital controls the maturity structure of the economy will lengthen and that capital flows will be instantaneously reduced. The conditions under which these happen are not trivial. In turn, this supports the wide variety of results—and many times results of a contradictory nature—that the empirical literature has found, as surveyed in Magud and Reinhart (2007), and complemented in this paper.

For example, Proposition 4 reflects the fact that only for sufficiently large values of η will we be able to observe a reduction in the volume of capital flows resulting from imposing capital controls. This is also consistent with the above-mentioned survey in which the evidence shows how many times capital controls were able to reduce capital flows, but some other times they were not. In this regard, a separate paper could empirically assess the value of η to verify if the countries for which capital controls were successful correspond to those with high η , and if those with lower η were not able to reduce capital flows.

Also, as Proposition 3 shows, not every capital control episode should necessarily be able to increase the maturity of capital flows. However, given that the evidence is conclusive that more times than not capital controls were able to achieve this objective, it is probably the case that for many of the countries that put these controls in place the value of η was greater than 1.

Quantity vs. price restrictions

Given the diversity observed in terms of alternative capital control episodes, one interesting question to analyze is: what is the required tax rate on rates of return that should be imposed to obtain any specific level of change in the maturity composition of capital flows? To answer this question we return to (A.15). Rewriting it in a slightly different way:

$$X = \frac{r^* - r}{\Phi\sigma^2} + \alpha \quad (\text{A.21})$$

where X stands for the aggregate share of short-term capital in total aggregate capital. For any change in X and r^* , observe that:

$$\Delta X = \frac{1}{\Phi\sigma^2} \Delta r^* \quad (\text{A.22})$$

Manipulating (A.22), we obtain:

$$\frac{\Delta X/X}{\Delta r^*} = \frac{1}{X\Phi\sigma^2} > 0 \quad (\text{A.23})$$

Notice how (A.23) established the percentage change in the volume of capital flows that will be obtained by any percentage change in the rate of return on short-term capital flows achieved by imposing capital controls. This semi-elasticity reflects how much each percentage point of capital controls reduces the volume of short-term flows.

This leads us to our next proposition:

PROPOSITION 5. *Conditional on the aggregate volume of short-term capital flows observed in the instant prior to the application of capital controls, there exists a quantity restriction of capital flows that will generate the same effects on capital flows as imposing taxes on the rate of return on short-term capital flows.*

Proof. see (A.23). ■

Notice that the importance of the latter proposition is that the quantitative restriction depends on the level of short-term flows when the controls are imposed. The higher the volume of aggregate short-term flows, the smaller the level restrictions should be to generate a similar effect as controls on rates of return.

Monetary policy independence

The reduction in capital flows also creates a wedge in interest rates, giving the central bank an increased monetary independence to implement counter-cyclical policies. This results directly from the expression that defines the relation between short-term interest rates before and after capital controls, $(1 + r^*) = (1 + r'^*)(1 - \tau)$. In the presence of capital controls, the wedge is given by the rate of taxation on the real rates of return, such that $r^* > r'^*$.

Real exchange rate pressure

Given domestic savings, the current account will be financed entirely by external capital flows, such that,

$$F = \bar{W} = CA(e), \quad CA' < 0 \quad (\text{A.24})$$

where e represents the real exchange rate. The latter expression states that if the economy experiences a current account deficit, in equilibrium, the real exchange rate will depreciate.²

If the economy is unexpectedly under capital controls, we have already shown that capital flows will be reduced. This reduces the current account deficit. In equilibrium, this should drive the exchange rate up, i.e. a real depreciation, to equilibrate the current account in the presence of less capital flows to finance the domestic economy.

Notice how the analysis of Propositions 3 and 4 directly extends to observing whether capital controls are able or not able to affect the real exchange rate.

Capital controls on outflows

For controls on capital outflows, the analysis is simpler since these types of controls, by definition, focus on restricting the volume of capital trying to leave the country. In terms of the above model, an easy way to represent this is by a reduction in \bar{W} , exogenously imposed. All else equal, inspection of (15) directly reveals that

$$\frac{dV^*}{d\bar{W}} = \frac{V^*}{\bar{W}} \quad (\text{A.25})$$

which can be summarized in the following proposition:

PROPOSITION 6. *The marginal unit of short-term flows is allocated such that it keeps the average share of short-term capital flows constant.*

Proof. see (A.25). ■

Thus, imposing these controls can reduce the volume of capital outflows, but cannot change the maturity structure of these flows. Regarding exchange rates and monetary policy, the results for capital controls on inflows remain the same. The latter result is also consistent with the evidence that we document.

REFERENCES

Alfilar, F., 1994. Monetary and Exchange Rate Policy Responses to Surges in Capital Flows: The Case of the Philippines, paper prepared for the Eleventh Pacific

²This relationship is easy to obtain from first principles by just assuming a two-good economy in which the production function of tradables is increasing in the real exchange rate and non-tradable output is either exogenously given or decreasing in the real exchange rate. Alternatively, it can be obtained by solving the domestic consumer's problem in a two-good economy—either by introducing a cash-in-advance constraint or money in the utility function.

- Basin Central Bank Conference held in Hong Kong, October 31-November 2, 1994. Published in *Monetary and Exchange Rate Management with International Capital Mobility - Experiences of Countries and Regions Along the Pacific Rim*, Hong Kong Monetary Authority, 1994.
- Ariyoshi, A., K. Habermeier, B. Laurens, I. Okter-Robe, J. Canales-Kriljenko, and A. Kirilenko, 2000. Capital Controls: Country Experiences with Their Use and Liberalization. International Monetary Fund Occasional Paper 190.
- Baba, Chikako and Annamaria Kokenyne, 2011. Effectiveness of Capital Controls in Selected Emerging Markets in the 2000's. IMF Working Paper No. 11/281, December.
- Bartolini, L. and A. Drazen, 1997. Capital Account Liberalization as a Signal. *American Economic Review* **Vol. 87, no. 1**.
- Benigno, G., H. Chen, C. Otrok, A. Rebucci, and E. Young, 2013. Capital Controls or Real Exchange Rate Policy? A Pecuniary Externality Perspective. IDB Working Paper Series No. IDB-WP-393, March.
- Benigno, G. and L. Fornaro, 2013. The Financial Resource Curse. CEPR WP 9489, May.
- Bianchi, J., 2011. Overborrowing and Systemic Externalities in the Business Cycle. *American Economic Review* **101(7)**, 3400-3426.
- Bianchi, J. and E. Mendoza, 2011. Overborrowing, Financial Crises, and Macroprudential Policies. IMF Working Paper No. 11/24, February.
- Bianchi, J. and E. Mendoza, 2013. Optimal Time-Consistent Macroprudential Policy. NBER WP 19704, December, forthcoming *Journal of Political Economy*.
- Buss, A., 2013. Capital Controls and International Financial Stability, A Dynamic General Equilibrium Analysis in Incomplete Markets. European Central Bank WP 1578, August.
- Calvo, G., L. Leiderman, and C. Reinhart, 1994. The Capital Inflows Problem: Concepts and Issues. *Contemporary Economic Policy* **XII (3)**, 54-66.
- Calvo, G. and C. Reinhart, 2002. Fear of Floating. *Quarterly Journal of Economics* **Vol. CXVII No. 2**, 379-408.
- Cardoso, L. and I. Goldfajn, 1998. Capital Flows to Brazil: The Endogeneity of Capital Controls. IMF Staff Papers, Vol. 45, March.
- Chamon, M. and M. Garcia, 2013. Capital Controls in Brazil: Effective? mimeo, IMF.
- Cheung, Y. and R. Herrala, 2014. China's Capital Controls: Through the Prism of Covered Interest Differentials. *Pacific Economic Review* **19(1)**, 112-134.
- Clements, B. and H. Kamil, 2009. Are Capital Controls Effective in the 21st. Century? The Recent Experience of Colombia. IMF Working Paper 09/30.
- Costinot, A., G. Lorenzoni, and I. Werning, 2011. A Theory of Capital Controls as Dynamic Terms-of-Trade Manipulation. NBER WP 17680, December.
- De Gregorio, J., S. Edwards, and R. Valdés, 2000. Controls on Capital Inflows: Do They Work? *Journal of Development Economics* **Vol. 3, No. 1**, 59-83.
- Devereux, M. and J. Yetman, 2014. Capital Controls, Global Liquidity, and the International Policy Trilemma. *Scandinavian Journal of Economics* **116(1)**, 158-189.
- Dornbusch, R., 2001. Malaysia: Was It Different? National Bureau of Economic Research Working Paper 8325, June.
- Edwards, S., 1999. How Effective Are Controls on Capital Inflows? An Evaluation of Chile's Experience. mimeo, UCLA, June.

- Edwards, S., 1999. How Effective are Capital Controls? *Journal of Economic Perspectives* **Vol. 13 No. 4**, 65-84.
- Edwards, S., editor, 2007. Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences. University of Chicago Press for the NBER.
- Edwards, S. and R. Rigobon, 2005. Capital Controls, Exchange Rate Volatility and External Vulnerability. NBER Working Paper 11434, June.
- Edison, H. and C. Reinhart, 2001. Stopping Hot Money: On the Use of Capital Controls during Financial Crises. *Journal of Development Economics* **Vol. 66, No. 2**, 533-553.
- Farhi, E. and I. Werning, (2014). Dilemma not Trilemma? Capital Controls and Exchange Rates with Volatile Capital Flows. *IMF Economic Review (Special Volume in Honor of Stanley Fischer)* **62**, 569-605.
- Fernandez, A., A. Rebucci, and M. Uribe, 2013. Are Capital Controls Prudential? An Empirical Investigation. NBER WP No. 19671, November.
- Forbes, K., M. Fratzscher, T. Kostka, and R. Straub, 2012. Bubble Thy Neighbor: Portfolio Effects and Externalities from Capital Controls. CEPR Discussion Paper 8979, May.
- Gallego, F., L. Hernandez, and K. Schmidt-Hebbel, 2002. Capital Controls in Chile: Were They Effective? in L. Hernandez and K. Schmidt-Hebbel, editors, Banking, Financial Integration, and International Crises, Santiago, Chile: Central Bank of Chile, 361-412.
- Jeanne, O. and A. Korinek, 2010. Excessive Volatility in Capital Flows: A Pigouvian Taxation Approach. *American Economic Review* **100(2)**, 403-07.
- Kaplan, E. and D. Rodrik, 2002. Did the Malaysian Capital Controls Work? in S. Edwards and J. Frankel, editors, Preventing Currency Crises in Emerging Markets, Chicago: University of Chicago Press for the NBER.
- Klein, M. and J. Shambaugh, 2015. Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy. *American Economic Journal: Macroeconomics* **7(4)**, 33-66.
- Kiguel, M., S. Lizondo, and S. O'Connell, editors, 1997. *Parallel Exchange Rates in Developing Countries*. London: MacMillan, and New York: St. Martin's.
- Korinek, A., 2011. The New Economics of Capital Controls Imposed for Prudential Reasons. IMF WP 11/298.
- Labán, Raul M. and Felipe Larraín, 1998. The Return of Private Capital to Chile in the 1990s: Causes, Effects, and Policy Reactions. Faculty research working paper R98-02, Harvard University, John F Kennedy School of Government, January.
- Labán, Raul M., Felipe Larraín, and Rómulo Chumacero, 1997. What Determines Capital Inflows? An Empirical Analysis for Chile. John F. Kennedy School of Government Faculty Research Working Paper Series R97-09, Cambridge, Massachusetts: Harvard University.
- Laurens, B. and L. Cardoso, 1998. Managing Capital Flows: Lessons from the Experience of Chile. IMF Working Paper 98.
- Mathieson, D. and L. Rojas Suarez, 1997. Liberalization of the Capital Account: Experiences and Issues. IMF Occasional Paper 103.
- Le Fort, G. and C. Budnevich, 1998. Capital Account Regulations and Macroeconomic Policy: Two Latin Experiences, in G. K. Helleiner, editor, Capital Account Regimes and the Developing Countries, United Nations Conference on Trade and Development.

- Levy Yeyati, Eduardo and Federico Sturzenegger, 2007. Fear of Appreciation. Research Working Paper Series RWP07-047, Harvard University, John F. Kennedy School of Government.
- Magud, N. and C. Reinhart, 2007. Capital Controls: An Evaluation, in Sebastian Edwards, editor, *Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences*, University of Chicago Press for the NBER.
- Miniane, J. and J. Rogers, 2007. Capital Controls and the International Transmission of U.S. Money Shocks. *Journal of Money, Credit, and Banking* **39** (5), 1003-1035.
- Montiel, P. and C. Reinhart, 1999. Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital Flows? Evidence from the 1990s. *Journal of International Money and Finance* **Vol. 18 No. 4**, 619-635.
- Obstfeld, M. and K. Rogoff, 1996. *Foundations of International Macroeconomics*. Cambridge, MA.: MIT Press.
- Reinhart, V., 2000. How the Machinery of International Finance Runs with Sand in its Wheels. *Review of International Economics* **8**(1), 74-85.
- Reinhart, V. and C. Reinhart, 1999. On the Use of Reserve Requirements to Deal with the Capital Flow Problem. *International Journal of Finance and Economics* **Vol. 4 No. 1**, 27-54.
- Reinhart, C., K. Rogoff, and M. Savastano, 2003. Debt Intolerance. *Brookings Papers on Economic Activity* **Vol. 1**, 1-74.
- Reinhart, C. and T. Smith, 1998. Too Much of a Good Thing: The Macroeconomic Effects of Taxing Capital Inflows, in R. Glick, editor, *Managing Capital Flows and Exchange Rates: Perspectives from the Pacific Basin*, Cambridge: Cambridge University Press, 436-464.
- Reinhart, C. and T. Smith, 2002. Temporary Controls on Capital Inflows. *Journal of International Economics* **Vol. 57 No. 2**, 327-351.
- Rey, Helene, 2013. Dilemma Not Trilemma: The Global Financial Cycle and Monetary Policy Independence. Proceedings of the Federal Reserve Bank of Kansas City, Economic Policy Symposium in Jackson Hole, WY, August, 285-333.
- Rincon, H. and J. Toro, 2010. Are Capital Controls and Central Bank Intervention Effective? Borradores de Economía No. 625, Central Bank of Colombia.
- Tamirisia, N., 2004. Do Macroeconomic Effects of Capital Controls Vary by Their Type? Evidence from Malaysia. International Monetary Fund, Working Paper 04/3, January.
- Tobin, J., 1978. A Proposal for International Monetary Reform. *Eastern Economic Journal* **4**, 153-59.
- Valdés-Prieto, S. and M. Soto, 1995. New Selective Capital Controls in Chile: Are They Effective? Universidad Católica de Chile, mimeo, September.
- Viñals, J., 1990. Spain's Capital Account Shock. CEPR Discussion Paper 477, November.