

# Capital Controls: Myth and Reality<sup>1</sup>

Nicolás E. Magud, Carmen M. Reinhart, and Kenneth S. Rogoff<sup>2</sup>

This draft: December 2013—Preliminary version, under revision

## Abstract

The literature on capital controls has (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 Control 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 capital controls are effective, implying than more often than not, in practice they do not work.

*Keywords:* Capital Controls, meta-analysis.

*JEL Classification:* F30.

---

<sup>1</sup>We would like to thank 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), and 2006 LACEA (Mexico). Also, we thank Volodymyr Tulin and Jiri Podpiera for recent measures of capital controls.

<sup>2</sup>International Monetary Fund, Harvard University and NBER, and Harvard University and NBER, respectively.

## I. 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 paper 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 controls on a uniform basis. Once done, it should be easier to understand the cross-country and time-series experience.

Capital controls is not 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 appreciating pressures on their domestic currency ensue, capital inflows start to look “too large” to be absorbed, and capital controls re-appear in the discussion. This would happen until the next crisis put capital controls aside and capital account openness returns. These capital controls 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 that capital controls resurface, the apples-to-oranges 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 (with its yet new name, capital flows measures). The IMF, historically a strong supporter of free capital mobility, accepted that under specific circumstances capital controls could complement (yet not replace) macroeconomic policies to mitigate bouts of volatility in exchange rates—to avoid disruptions in domestic financial markets. Also, following the banking crises in Greece, Iceland, Ireland, and Cyprus, controls on capital outflows re-emerged—this time in richer countries that in more recent past episodes. Against this backdrop, a theoretical literature in capital controls and macroprudential policies resurfaced. The focus has been of

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—starting to incorporate nominal variables, which were importantly missing. (Fahri and Werning, 2013). In the appendix we list some of 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 can capital controls achieve in practice. It does not seem that much as theoretical models suggest.

One caveat is that most of the literature on “old” capital controls was based on the impossible trinity, thus under 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, the so-called fear of floating taught us that many countries that claim to float actually intervene in foreign exchange markets quite heavily to avoid large fluctuations in the exchange rate. (If anything, it would be better to focus on *de facto* exchange rates for a proper analysis.) Thus, may be flexibility still needs to become flexible.

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.

The standardization was done by constructing two indexes of capital controls: Indices of Capital Controls Effectiveness (CCE), and Weighted Capital Control Effectiveness (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 it reduce real exchange rate pressures. But capital controls on inflows seem not to reduce the volume of net flows (and hence the current account balance). As to controls on outflows, there is Malaysia and there is everybody else. In Malaysia, controls reduced outflows and may have given room for more independent monetary policy (the other poster child does not fare as well, in that our results are not as conclusive as for the Chilean

controls on inflows). Absent the Malaysian experience, there is little systematic evidence of “success” in imposing controls, however defined.

All of the above implies that either imposing capital controls 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 in 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 very effective (or 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 that its effectiveness 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 capital controls are effective in achieving its 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 a rough capital controls index. Section IV results 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 the 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 models to illustrate these effects; it also contains detailed information on the specific controls on inflows and outflows measures that have been implemented in several countries, including recent events.

## II. 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 loftier 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.

### A. 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”) is typically manifested in the accumulation of foreign exchange reserves. Over time, though, sterilizing such reserve accumulation (the topic of Reinhart and Reinhart, 1998) becomes more difficult and more direct intervention more appealing.

### B. 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 pre-empt the pain associated with the inevitable outflow.

### C. 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.

### D. 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 (as discussed in Frankel, 2001). If there is some attraction to retaining some element of monetary policy flexibility, something has to give up. However, in the presence of the aforementioned fear of floating, giving up capital mobility may seem more attractive than surrendering monetary policy autonomy.<sup>3</sup>

Whatever the reason for action, some forms of capital control were intended to control exchange rate pressures, stem large inflows, and regain an element of monetary autonomy. And this is more relevant for those policymakers who impose controls to reduce capital flight, because investors seeking safety—including, most important, domestic residents as well as foreigners—are seldom dissuaded by regulatory restraint.

### III. 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.<sup>4</sup>

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 developed institutions and practices that are integrated in varying degrees to international capital markets.<sup>5</sup>

---

<sup>3</sup> Recent literature such as Rey (2013) and Fahri and Werning (2013) argue about the trilema evolving into a dilemma instead.

<sup>4</sup>There is, of course, the important issue of temporary versus permanent policies which is a distinction not addressed here. This is owed 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).

<sup>5</sup>Countries like China and India still have substantial capital and exchange controls. They are progressively levying there many restrictions. As such, isolating the effects of capital controls to make them comparable is a more difficult task. Additionally, many countries use reserve requirements as an alternative to capital controls, which although could have similar effects—depending on specifics such as, e.g., whether the funds are owned by residents or non-residents, etc.—are not considered capital controls. (They would belong to the currently labeled “macro-prudential” regulations.) For details on reserve requirements, see Reinhart and Reinhart (1999).

Tables 1-2, which squarely focus on measures targeted to affect inflows and outflows in countries that had already gone the route of capital account liberalization,<sup>6</sup> indeed highlight the heterogeneity in both subtlety and “market-friendliness” of capital control measures. It illustrates 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.<sup>7</sup> It also details the more recent experience with controls on capital outflows in some European countries. In particular, we provide evidence of capital controls measures implemented in Cyprus, Greece, and Iceland.

[INSERT TABLES 1-2 HERE]

#### **IV. THE EMPIRICAL LITERATURE: FINDING A COMMON GROUND**

This section aims to overcome (or at least take a step in that direction) 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 as 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 lesser well known episodes other 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 the methodology and results where possible so as to facilitate comparisons. This not only enables us to assess the effectiveness of alternative capital controls events, but also permit us to evaluate some of the policy implications of imposing controls on capital inflows and/or outflows under alternative scenarios.

##### **A. 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 (MC)—the latter including the analysis of capital inflows, capital outflow, or both. We collected studies of capital controls for the following countries (the number of papers is shown in parentheses): For CI,

---

<sup>6</sup>Hence, these cases involve the reintroduction of controls.

<sup>7</sup>For a measure that “quantifies” the intensity of these measures see Montiel and Reinhart (1999).

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.<sup>8</sup>

### **B. 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

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 in 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 not 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.

[INSERT TABLES 3-5 HERE]

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

---

<sup>8</sup>For example, one of the more comprehensive multi-country papers uses monthly data for the period 1971-1998 for a panel of 26 countries.

informative regarding the effectiveness of capital controls in reducing the volume of capital flows and reducing real exchange rate pressures.

[INSERT TABLE 6 HERE]

### **C. Indices of Capital Control Effectiveness**

But this is not informative enough, since it still lacks some rigor to evaluate the effectiveness of capital controls 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 weighs the results obtained in each paper by the degree of methodological rigor applied to drawing conclusions; we discuss this 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, it corresponds to a value of 0.

These values are designed to equally weigh the existence or non existence of effects as a result of the imposition of capital controls and to give no weight to questions not addressed. This 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 requested from 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 controls effectiveness, by averaging out the four CCE Indexes for each country, and then compare a global CCE Index across countries.

However, as it 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 the degree of methodological rigor in, LOW, INTERMEDIATE, and HIGH according to the following criteria<sup>9</sup>:

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

Appendix Tables 1-3 summarize the methodology used in each paper, as well as the corresponding classification as Low, Intermediate, High, following these definitions.

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

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

With these values at 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 more useful in all. 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 3 clusters into which we separated the papers: CI, CO, and MC.

---

<sup>9</sup>The reader should understand that our low, intermediate, high characterization 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.

#### D. Summary of Results

Summary results of the CCE and WCCE Indexes are presented in Table 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; it seems to suggest that it was also able to reduce real exchange rate pressures (but the evidence on the latter is more controversial and partly weighed 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 1990's, along with the continuing reforms during the 1990's, 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 appears as the most successful example of capital controls on inflows.

We now focus on capital controls on outflows. The received wisdom is that Malaysia (1997) 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, the results from WCCE Index are not as conclusive as those on the Chilean controls on inflows.

If we focus on the reduction in capital flows, 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 the aggregate, Malaysia appears to be the most successful in its experience of capital controls on outflows.

[INSERT TABLES 7-9 HERE]

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” type of problem is 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 regression 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 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 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 if they are designed in advance. Here, once more, we lack information about it because we rely only on what the papers conclude. It is worth mentioning, though, that by inspection it appears that the Malaysian (1997) 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), a great quantity of the controls was imposed on September 1st, 1997. Furthermore, the level of detail seems to suggest that they were not decided upon and designed just in response to the crises.

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 toward capital mobility, despite the costs and benefits of such controls. This is another dimension in which temporary capital controls might become “permanent.”

## V. CONCLUSIONS

In sum, capital controls on inflows seem to: make monetary policy more independent and alter the composition of capital flows; to a lesser extent it seems to reduce real exchange rate pressures (but the evidence here is more controversial).<sup>10</sup> 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 there is everybody else. In Malaysia, controls reduced outflows and may have made room for more independent monetary policy.<sup>11</sup> There is little evidence of “success” in other countries attempting to control outflows, either in terms of altering the volume of flows or regaining monetary policy independence. These findings are in line with those of the earlier literature 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).

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!<sup>12</sup>

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 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.

---

<sup>10</sup>According to the WCCE Index, Chile stands out in achieving these goals.

<sup>11</sup>Yet, the results for Malaysia based on the WCCI are not as conclusive as for the Chilean controls on inflows.

<sup>12</sup>See Reinhart, Rogoff, and Savastano (2003) for details.

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 been again using them—both on inflows and outflows. So, here we go again...

Table1. Restrictions on Inflows and “Prudential Requirements:” Asia

---



---

<b>Country and date (in parentheses) denoting the first year of the surge in inflows</b>
<b>Indonesia (1990)</b>
<i>March, 1991:</i> 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 percent of capital. The three-month swap premium was raised by 5 percentage points.
<i>October, 1991:</i> 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 five years.
<i>November, 1991:</i> 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 two years) would be undertaken only at the initiative of Bank Indonesia.
<b>Indonesia (2010)</b>
<i>June, 2010:</i> Required holding period on foreign capital inflows and central bank notes were increased to 1 month, and central bank's instruments with longer maturity (6 month and 9 month) were introduced.
<b>Malaysia (1989)</b>
<i>June 1, 1992:</i> Limits on non-trade-related swap transactions were imposed on commercial banks.
<i>January 17, 1994-August 1994:</i> Banks were subject to a ceiling on their non-trade- or noninvestment-related external liabilities.
<i>January 24, 1994-August 1994:</i> Residents were prohibited from selling short-term monetary instruments to nonresidents.
<i>February 2, 1994-August 1994:</i> 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 in Vostro balances.
<i>February 23, 1994-August 1994:</i> Commercial banks are not allowed to undertake non-trade related swap and outright forward transactions on the bid side with foreign customers.
<b>Philippines (1992)</b>
<i>July, 1994:</i> Bangko Central begins to discourage forward cover arrangements with non-resident financial institutions.
<b>Philippines (2009)</b>
<i>October, 2010:</i> Caps on over-the-counter FX purchases for non-trade purposes by residents without documentation were raised from USD30,000 to USD60,000. Cap tourists' purchases upon departure without documentation was increased from USD200 to USD5000. Caps on residents' FX purchases for advance payments of import transactions without documentation increased from USD100,000 to USD1million. 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 USD30million to USD60 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.

**South Africa (2010)**

**February, 2010:** to encourage outflows, banks were allowed to invest up to 25% of non-equity 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 percent of capital.

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

**April, 1990:** Banks and finance companies net foreign exchange positions limit raised to 25 percent 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 non-resident baht accounts were raised from 2 percent to 7 percent. While reserve requirements on domestic deposits are also 7 percent, up to 5 percent can be held in the form of interest-bearing public bonds.

**December 1995:** The 7 percent reserve requirement is extended to finance companies short-term (less than one year) promissory notes held by non-residents.

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-percent 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 non-resident clients' outstanding cash assets.

**South Korea (2009)**

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

**November, 2009:** Required domestic banks 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.** Increase in FII investment limits in government securities and corporate bonds 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 availed with for 1 to 3 year tenors.

**Swap window.** RBI USD-Rupee swap window for fresh dollar funds introduced for deposits of 3 years and above 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.

---

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

Table1. (continued) Restrictions on Inflows and Prudential Requirements: Eastern Europe and Latin America

---

**Country and date (in parentheses) denoting the first year of the surge in inflows**

---

**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 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 percent 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 percent to 7 percent of the total. Eliminated on March 10, 1995.

The tax paid by foreigners on fixed interest investments in Brazil was raised from 5 percent to 9 percent. Reduced back to 5 percent 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 zero.

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

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

**October, 2010:** IOF increased to 4% for fixed income investments and equity funds (IOF on individual equities left at 2%). 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.

**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%), an non-resident 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, 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:** Nonrenumerated 20 percent reserve requirement to be deposited at the Central Bank for a period of one year on liabilities in foreign currency for direct borrowing by firms.

The stamp tax of 1.2 percent 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 percent. Hence, all foreign currency liabilities have a common reserve requirement.

### Colombia (1991)

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

**February, 1992:** Banco de la Republica increases its commission on its cash purchases of foreign exchange from 1.5 percent to 5 percent.

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

**September, 1993:** A nonrenumerated 47 percent 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.

**August, 1994:** Nonrenumerated 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 five years or less, except for trade credit with a maturity of four months or less. The percentage of the requirement declines as the maturity lengthens; from 140 percent for funds that are 30 days or less to 42.8 percent for five year funds.

### Colombia (2002)

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

### Colombia (2007)

**May, 2007:** 40 percent unremunerated reserve requirements (URR) on external borrowing on the back of ceiling on currency derivative positions (banks should keep overall gross positions on these instruments no larger than 500 percent of their capital). Later, these restrictions were extended to portfolio inflows by foreign residents. Early withdrawals were allowed with penalties from 1.6 percent (if held by 5 months) to 9.4 percent (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 2-year minimum stay on FDI. Gross derivative positions' limits were raised to 550 percent 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 percent 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 one 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 smaller of 30 percent of claims on 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).

#### **Mexico (1990)**

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

#### **Peru (2009)**

**2009:** Foreign purchases of central bank bills were banned, reserve requirements all deposits were increased (local currency deposits held by foreigners 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 to 400 basis points. 30% for transactions through a Peruvian broker and 5% for transactions through a foreign broker Capital gains tax for non-residents' investments in the domestic stock market were 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: a) Long net FX positions reduced to 75% of net equity from 100%, b) 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%.

**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 two-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 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.

**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.

**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.

**January 2009:** Abolishment of tax deductions for mortgage interest.

**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 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 Republica, Colombia (1993 and 1994), Banco de Mexico (1992), Clements and Kamil (2009), Rincon and Toro (2010), and Conselho Monetario Nacional, Brasil (1994 and 1995).

Table 2. Restrictions on Outflows: Asia, Europe, and Latin America

---



---

<b>Country and date (in parentheses) denoting the first year of the surge in outflows (or crisis)</b>
<b>Argentina (crisis ending the Convertibility Plan, 2001)</b>
<i>December, 2001:</i> The Corralito is established, limiting bank withdrawal limits and restrictions on dollar transfers and loans. However, purchases through checks or credit cards available, and purchases of government bonds. Dec.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 withdrawals restrictions followed by an asymmetric pesofication. Pesofication of dollar deposits 1.4 pesos per dollar; dollar debts pesofied at market exchange rate; unification of exchange rate regime in a floating scheme; right to withdraw wages and pension incomes in full; Corralon is imposed: freeze of bank term deposits. In September of that year it is required that stocks should be traded in domestic currency regulation. Since the latter is widely resisted, it was eased, but the new restriction significantly increased transactions costs. In December 2002 the Corralito is rescinded.
<b>Brazil, (crisis ending the Real Plan, 1999)</b>
<i>March 1999:</i> Government ordered local investment funds to increase their holdings of government bonds. The central bank raised to 80 percent from 60 percent 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.
<b>Malaysia (Asian crisis, 1997)</b>
<i>September, 1998:</i> 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 non-residents to sell profits from Malaysian securities, approval required to invest abroad (above certain limits). In December residents are allowed to grant loans to nonresidents to purchase immovable property. In January, 1999 some derivative transactions for nonresidents are permitted. In February there is a gradual ease on the 12-month waiting period and some repatriations funds exempted from exit regulations. In March exports and imports trade ceilings are raised for operations with Thailand. In September commercial banks allowed to enter into some short-term currency swaps with nonresident stockbrokers. In March, 2000 funds from sale of securities purchased by nonresidents can be repatriated without paying exit levy and in June administrative procedures to ease classification of securities as being free from exit levy. September 30 <sup>th</sup> : Some offshore banks are allowed to invest in ringgit assets. December 1 <sup>st</sup> : foreign-owned banks are allowed to increase domestic credit. In February 2001 the exit levy is abolished for some operations. In May of that year the remaining exit levy is abolished. While in June all controls on nonresidents' futures and options are abolished. In July, resident financial institutions allowed to extend ringgit loans to nonresidents investing in immovable property in Malaysia. In November 2002, resident banks credit levels to finance nonresidents projects in Malaysia are raised. On December 3 <sup>rd</sup> : 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. In October of that year the peseta is devalued and some of the controls are re-lifted. In November the remaining foreign exchange controls are rescinded.

**Thailand (Asian crisis, 1997)**

**May, 1997:** Bank of Thailand (BOT) introduces restrictions on capital account transactions. In June BOT introduces additional measures to limit capital flows. Baht proceeds from sales of stocks require to be converted at the onshore exchange rate. Additional controls are introduced and later in the month a two-tier exchange rate is introduced. In September of that year, additional controls on invisible and current account transactions are introduced. In January 1998 it is required that proceeds on exports on invisible transactions and current account transfers must 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 were prohibited and krona-denominated transactions could not be settled in foreign currency. No financial cross-border transactions were allowed. Prohibition to issue or sell 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 to foreign currency. FX cash withdrawals prohibited unless proof of payment for goods and services.

**December 2008:** The inflow restriction was loosened to allow for the inflow of foreign currency for direct investments by foreigners.

**August 2009:** the Central Bank announced its strategy for the phased removal of the capital controls.

**October 2009:** The Central Bank again adopted new rules on capital controls: which enabled the inflow in foreign currency through a so-called “new investment” channel. The same rules introduced new restrictions on inflows in domestic currency (the so-called “off-shore krona”), which are still in place today.

**March 2011:** The government approved a revised strategy for the lifting of capital controls

**September 2011:** The Parliament approved amendments to the Foreign Exchange Act, the Customs Act and the Act on the Central Bank of Iceland. These changes extended the authority to maintain capital controls beyond August 2011, when the enabling legislation was set to expire, to the end of 2013. The amendments included in the law the regulations that had previously been issued by the Central Bank with the approval of the Minister of Economic Affairs. The amendments also opened the possibility of a progressive discretionary relaxation of the controls.

**March 2012:** Parliament amended the Foreign Exchange Act, which inter alia rescinded the exemption for payments from a bankruptcy estate and payments of contractual claims in accordance with composition of creditors' agreements in domestic currency when payment is disbursed from the payer's account with a financial institution in Iceland. Also, the amended act entailed that it was no longer permissible to purchase foreign currency for the value of indexation on bond principal. Finally, the amendment rescinded 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 amended the Foreign Exchange Act, where the sunset clause was revoked. Also, included in the amendment was that exemptions from the capital controls amount

---

---

400 bn.kr. or more will be done in a collaboration with the Minister of Finance, who 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 restrictions (cash withdrawals less or equal than euro 9,000 per month while bank notes exports limited to euro 2,000 per person per journey. Prohibition to cashing of checks. Credit and debit cards only for domestic paymer and transfers; use abroad up to euro 5,000 per month per account holder. Wire transfer of business to exceed euro 300,000 for domestic and euro 20,000 for cross-border payments exempt from restriction otherwise, government approval needed; for individuals, max transfer euro 3,000 and legal persons eu 50,000; salary payments not subject to restrictions. Prohibition to open new accounts. Maturing term deposits extended for 1 month, except euro 5,000 or 20% of the deposit. Term deposits could be used iffset existing loans within same bank.

**August, 2013:** Relaxed some of limits impose in March regarding legal persons cash withdrawals (from 3-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 (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 (5,000 to no limit) exports of euro notes (from euro 1,000 to 3,000), new accounts can be opened, add new beneficiaries to current accounts.

---

Sources: Banco de España, Bank Negara, Annual Report, various issues, and Bank of Thailand reports, various issues, Conselho Monetario Nacional, Brasil, (Dominguez and Tesar (2004).

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

Study	Sample	Did controls on <b>inflows</b>			
		Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
<b>Brazil</b>					
Cardoso & Goldfajn (1998)		Yes (ST)	Yes (ST)		
Edison & Reinhart	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
Chikako and Kokenyne (2011)	2000-2008	No	No	No	Yes
<b>Chile</b>					
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 (2004)	1991:1-1999:9			Yes	
Hernández & Schmidt-Hebbel (1999)		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 (1997)	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 &	1991-1998	No	No	No	Yes

Kirilenko (2000)

---

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.

<sup>1</sup> Note that there are several studies on Malaysia's 1998 capital controls targeting *outflows*. Here, we are referring to the controls on capital *inflows* introduced in January 1994.

Table 3 (continued). The Famous Chilean Case and Other Lesser Deities:  
Summary of Key Findings on “Effectiveness”

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

<sup>1</sup> Note that there are several studies on Malaysia’s 1998 capital controls targeting *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 <b>outflows</b> :			
		Reduce the volume of net capital outflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
<b>Malaysia</b>					
Tamirisia (2004)	1991:1-2002:12			No	Yes
Dornbusch (2001)				No	
Edison & Reinhart (2000)				Yes	Yes
Kaplan & Rodrik (2002)	1992-1996				Yes
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1998-2000	Yes		Yes	Yes
<b>Spain</b>					
Jose Vinals(1992)	1992	No			
Edison & Reinhart	1995-1999			No	No
Ariyoshi, Habermeier, Laurens, Okter-Robe, Canales-Kriljenko & Kirilenko (2000)	1992	Yes		Yes (ST)	Yes
<b>Thailand</b>					
Edison & Reinhart (2000)				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” – Multicountry Studies  
Summary of Key Findings on “Effectiveness”

<b>Did controls on inflows:</b>					
Study	Sample	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 crisis- and from crisis time and 1 year ahead)				Yes
Edison & Reinhart (1999)	Spain (1991-1993), and 1995-1999 for Brazil, Malaysia, and Thailand. Control group: Philippines and South Korea (daily data)			No	No
Miniane & Rogers (2004)	Australia, Austria, Belgium, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Greece, India, Italy, Japan, Korea, Malaysia, Mexico,			Yes (ST)	No

The Netherlands, Norway,  
The Philippines, Portugal,  
South Africa, Spain,  
Sweden, Turkey, UK.  
(monthly data for 1971:1-  
1998:12)

---

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 <b>inflows</b> :			
	Reduce the volume of net capital inflows	Alter the composition of flows	Reduce real exchange rate pressures	Make monetary policy more independent
<b>Complete Sample</b>	Unclear	Yes	Unclear	Yes
<b>Control on Inflows</b>				
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
<b>Control on Outflows</b>				
Malaysia (1998)			Unclear	Yes
Spain	Unclear		Unclear	Unclear
Thailand	Yes		Yes	Yes
<b>Multi-country studies</b>	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.

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

Sources: Appendix Table 1 and sources cited therein.

Table 8. Capital Outflows: 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
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

Sources: Appendix Table 2 and sources cited therein.

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

Sources: Appendix Table 3 and sources cited therein.

## APPENDIX

### A. Selected recent theoretical literature on capital controls

Fahri and Werning (2013) finds 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 regimes), unlike real models as Bianchi and Mendoza (2010), 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 Fahri and Werning the bottom line is that with fixed exchange rates capital controls help re-gain monetary independence (a 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 set up 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 (2013) find that capital controls have only limited effectiveness and only if for a short time period while Cheung and Herrala (2013) 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 result 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 (2013), in a zero lower bound world, show that monetary policy losses effectiveness even in flexible exchange rate regimes. Capital controls can make monetary policy regain its effectiveness. Yet, if 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: they reduce the volatility of currency markets but not the appreciating pressures, but amplify price movement in international stock markets and thus volatility; yet it limits 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 welfare dominates prudential capital controls, 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, some depreciation effects were 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 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, yet not general, model to explain the effects of imposing capital controls, separating controls on capital inflows and on capital outflows<sup>13</sup>

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 are  $r$  for long term capital flows and  $r^*$  for short terms flows. Given risk parameters, without loss of generality, we assume throughout that  $r^* > r$ :

$$F_t = S_t + L_t \quad (1)$$

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

$$S_t = xF_t \quad (2)$$

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

---

<sup>13</sup>It 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 and Smith (2002), and Reinhart (2000), Fahri and Werning (2013).

expected utility maximization in terms 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

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

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

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

and the variance by

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

where  $\sigma_i^2$  stands for the variance of variable  $i$  and  $\sigma_{ij}$  refers to the covariance between  $i$  and  $j$ .

From the FOC's, we obtain

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

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

Notice that the share of capital flows devoted to short term flows increase with the yield differential and decreases with risk aversion, in line with standard portfolio selection models.

Alternatively, we can write this as

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

where

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

and  $\alpha$  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 set up to incorporate capital controls on inflows. Without loss of generality, assume that capital controls,  $\tau$ , can take on only two values: 0 for no capital controls, and  $\bar{\tau}$  if capital controls do exist. Namely,

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

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 control 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 (7), we observe that

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

■

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

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

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

$$V^* = \sum_j x_j W_j \quad (12)$$

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

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

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

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

where, after some manipulation we obtain

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

and where we have defined  $\Phi \equiv \sum_j \frac{\Phi_j}{W_j / \bar{W}}$  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 control results in a reduction of short-term capital flows as a share of total capital flows.*

**Proof:** analogous to Proposition 1

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

■

Notice that so far we have just shown that in response to imposing capital controls, the share of short-term flows to 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. For the moment we can yet safely state that imposing capital controls on short term flows increases the maturity structure of capital flows, but not necessarily reduce the level of capital flows. This is consistent with the evidence in this paper as well as in Magud and

Reinhart (2005). 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 (15) to obtain

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

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 totally differentiation of (15), which looks as follows:

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

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

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

and

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

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 (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  $0 < \eta < \bar{W}$  :  $\frac{dr^*}{dW} < 0$  *Total capital flows levels increase*

2) For  $\eta = \bar{W}$  :  $\frac{dr^*}{dW} = 0$  *Total capital flows levels do not change*

3) For  $\eta > \bar{W}$  :  $\frac{dr^*}{dW} > 0$  *Total capital flows levels decrease*

**Proof:** see (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 the results—and many times of contradicting nature—that the empirical literature has found, as surveyed in Magud and Reinhart (2005), and complemented in this paper.

For example, Proposition 4 reflects the fact that only for sufficiently large values of  $\eta$  we will be able to observe a reduction in the volume of capital flows resulting from imposing capital controls. This is also consistent with the mentioned survey in which the evidence shows how many times capital controls were able to reduce capital flows, but some other they were not. In this regard, a separate paper could empirically assess the value of  $\eta$  to verify if the countries for which capital controls were successful correspond to those with high  $\eta$ -- and those with lower  $\eta$  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 more conclusive in 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  $\eta$  was greater than 1.

### Quantity vs. price restrictions

Given the diversity observed in terms of alternative capital controls episodes, one interesting question to analyze is: what is the required tax rate on rates on returns 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 (15). Re-writing it in a slightly different way:

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

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

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

Manipulating (25), we obtain:

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

Notice how (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, namely 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 (23). ■

Notice the importance of the latter proposition in 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,

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

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.<sup>14</sup>

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 extend to observing whether capital control are able or not 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

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

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 (25). ■

---

<sup>14</sup>This 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.

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 remains the same. The latter result is also consistent with the evidence that we document.

## REFERENCES

- Alfiler, F., "Monetary and Exchange Rate Policy Responses to Surges in Capital Flows: The Case of the Philippines," paper prepared for the Eleventh Pacific Basin Central Bank Conference held in Hong Kong, October 31-November 2, 1994.
- Ariyoshi, A., K. Habermeier, B. Laurens, I. Okter-Robe, J. Canales-Kriljenko, and A. Kirilenko, "Capital Controls: Country Experiences with Their Use and Liberalization," International Monetary Fund Occasional Paper 190, 2000.
- Bartolini, L. and A. Drazen, "Capital Account Liberalization as a Signal," American Economic Review, Vol. 87, no. 1 (March 1997).
- Benigno, G. and L. Fornaro (2013), "The Financial Resource Course," CEPR WP 9489, May, mimeo.
- Benigno, G., H. Chen, C. Otrok, and A. Rebucci (2013), "Capital Controls or Real Exchange Rate Policy? A Pecuniary Externality Perspective," mimeo.
- Bianchi, J. (2011), "Overborrowing and Systemic Externalities in the Business Cycle," American Economic Review.
- Bianchi, J. and E. Mendoza (2011), "Overborrowing, Financial Crises, and Macroprudential Policies, miemo, University of Maryland.
- Bianchi, J. and E. Mendoza (2013), "Optimal Time-Consistent Macroprudential Policy," NBER WP 19704, December.
- 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, "The Capital Inflows Problem: Concepts and Issues," Contemporary Economic Policy, Vol. XII No. 3, July 1994, 54-66.
- Calvo, G. and C. Reinhart, "Fear of Floating," Quarterly Journal of Economics, Vol. CXVII No. 2, May 2002, 379-408.
- Cardoso, L. and I. Goldfajn, "Capital Flows to Brazil: The Endogeneity of Capital Controls," IMF Staff Papers, Vol. 45, March 1998.
- Chamon, M. and M. Garcia (2013), "Capital Controls in Brazil: Effective?," IMF, mimeo.
- Cheung, Y. and R. Herrala (2013), "China's Capital Controls—Through the Prism of Covered Interest Differentials," CESifo WP 4377, August
- Clements, B. and H. Kamil, "Are Capital Controls Effective in the 21st. Century? The Recent Experience of Colombia," IMF Working Paper 09/30, mimeo, 2009.

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., Se. Edwards, and R. Valdés, "Controls on Capital Inflows: Do They Work?," *Journal of Development Economics*, Vol. 3 No. 1, 2000, 59-83.

DeKaplan, E. and D. Rodrik, "Did the Malaysian Capital Controls Work?," in S. Edwards and J. Frankel, eds., *Preventing Currency Crises in Emerging Markets*, Chicago: University of Chicago Press for the NBER, 2002.

Devereux, M. and J. Yetman (2013), "Capital Controls, Global Liquidity, and the International Policy Trilema," NBER WP 19091, May.

Dornbusch, R., "Malaysia: Was It Different?," National Bureau of Economic Research Working Paper 8325, June 2001.

Edwards, S., "Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences," National Bureau of Economic Research, University of Chicago Press, 2007.

Edwards, S., "How Effective Are Controls on Capital Inflows? An Evaluation of Chile's Experience," Mimeograph, UCLA, June 1999.

Edwards, S., "How Effective are Capital Controls?," *Journal of Economic Perspectives* Vol. 13 No.4, Fall 1999, 65-84.

Edwards, S. and R. Rigobon, "Capital Controls, Managed Exchange Rates, and External Vulnerability," Mimeograph, UCLA, February 2004.

Edison, H. and C. Reinhart, "Stopping Hot Money: On the Use of Capital Controls during Financial Crises," *Journal of Development Economics*, Vol. 66 No. 2 December 2001, 533-553.

Fahri, E. and I. Werning (2013), "Dilema not Trilema? Capital controls and Exchange Rates with Volatile Capital Flows," mimeo.

Fernandez, A., A. Rebucci, and M. Uribe (2013), "Are Capital Controls Prudential? An Empirical Investigation," mimeo.

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., Hernandez and K. Schmidt-Hebbel, "Capital Controls in Chile: Effective? Efficient?," Central Bank of Chile Working Paper #59 (December), 1999.

Gronm, A and M. Wallin Fredholm (2013), "Baltic and Icelandic Experiences of Capital Flows and Capital Flows Measures," IMF WP 13/242, December

- Jeanne, O. and A. Korinek (2010), "Excessive Volatility in Capital Flows: A Pigouvian Taxation Approach," *American Economic Review*, 100(2): 403-07.
- Klein, M. and J. Shambaugh (2013), "Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy," NBER WP 19461, September.
- Kiguel, M., S. Lizondo, and S. O'Connell (eds.) "Parallel Exchange Rates in Developing Countries," London: MacMillan and New York: St. Martin's, 1997.
- Korinek, A. (2011), "The New Economics of Capital Controls Imposed for Prudential Reasons," IMF WP 11/298.
- Labán, R., and F. Larráin, "The Return of Private Capital to Chile in the 1990s: Causes, Effects, and Policy Reactions," Faculty Research Working Paper Series R98-02, JFK School of Government, Harvard University, January 1998.
- Laurens, B. and L. Cardoso, "Managing Capital Flows: Lessons from the Experience of Chile," IMF Working Paper 98, 1998.
- Mathieson, D. and L. Rojas Suarez "Liberalization of the Capital Account: Experiences and Issues," IMF Occasional Paper 103, 1993.
- Le Fort, G. and C. Budnevich, "Capital Account Regulations and Macroeconomic Policy: Two Latin Experiences," Mimeo, Banco Central de Chile, March 1997.
- Magud, N. and C. Reinhart, "Capital Controls: An Evaluation," in *Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences*, National Bureau of Economic Research, Sebastian Edwards (editor), University of Chicago Press, 2007.
- Miniane, J. and J. Rogers, "Capital Controls and the International Transmission of U.S. Money Shocks," Board of Governors of the Federal Reserve, mimeograph, June 2004.
- Montiel, P. and C. Reinhart (1999), "Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital Flows? Evidence from the 1990's," *Journal of International Money and Finance*, Vol. 18 No. 4, August, 619-635.
- Obstfeld, M. and K. Rogoff, "Foundations of International Macroeconomics," Cambridge, MA.: MIT Press, 1996.
- Ostry, J., A. Ghosh, K. Habermeier, M. Chamon, M. Qureshi, and D. Reinhardt (2010), "Capital Inflows: The Role of Controls," IMF Staff Position Note 10/04, February.
- Ostry, J., A. Ghosh, K. Habermeier, L. Laeven, M. Chamon, M. Qureshi, and A. Kokenyne (2011), "Managing Capital Flows: What Tools to Use?," IMF Staff Discussion Note 11/06, April.

Reinhart, V., "How the Machinery of International Finance Runs with Sand in its Wheels," *Review of International Economics*, 8(1), 2000, 74–85.

Reinhart, V. and C. Reinhart, "On the Use of Reserve Requirements to Deal With the Capital Flow Problem," *International Journal of Finance and Economics*, Vol. 4 No.1, January 1999, 27-54.

Reinhart, C., K. Rogoff, and M. Savastano "Debt Intolerance," *Brookings Papers on Economic Activity*, Vol. 1 Spring 2003, 1-74.

Reinhart, C. and T. Smith (1998), "Too Much of a Good Thing: The Macroeconomic Effects of Taxing Capital Inflows," in R. Glick, ed. *Managing Capital Flows and Exchange Rates: Perspectives from the Pacific Basin*, (Cambridge: Cambridge University Press), 436-464.

Reinhart, C. and T. Smith, "Temporary Controls on Capital Inflows," *Journal of International Economics*, Vol. 57 No. 2, December 2002, 327-351.

Rincon, H. and J. Toro, "Are Capital Controls and Central Bank Intervention Effective?," *Borradores de Economia* No. 625, Central Bank of Colombia, 2010.

Tamirisia, N., "Do Macroeconomic Effects of Capital Controls Vary by Their Type? Evidence from Malaysia," *International Monetary Fund Working Paper* 04/3, January 2004.

Tobin, J., "A Proposal for International Monetary Reform", *Eastern Economic Journal*, 4, pp. 153-59, 1978.

Valdés-Prieto, S., and M. Soto, "New Selective Capital Controls in Chile: Are They Effective?," *Universidad Católica de Chile*, mimeo, September 1995.

Vinals, J., "Spain's Capital Account Shock," mimeo, CEPR, 1992.