

# Capital Controls in the 21<sup>st</sup> Century<sup>\*</sup>

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Comments Welcome

### Abstract

Governments have rarely imposed or removed capital controls in response to short-term fluctuations in output, the terms of trade, or financial-stability considerations. We show empirically that controls on the international flow of financial capital are highly durable, often remaining in place for decades; their duration is striking compared with related phenomena such as exchange rate regimes. This represents a challenge to any proposed use of capital controls as an instrument of macroeconomic and macro-prudential management, since we have little experience in using capital controls at high- or medium frequencies. Any new policy initiative mandating frequent shifts in controls will be based on theory rather than data-driven experience.

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## 1. Introduction

Capital controls are back. The International Monetary Fund has softened its earlier opposition to their use (see IMF 2012). Some emerging markets, Brazil for example, have made renewed use of controls since the global financial crisis of 2008-9 (Forbes, Fratzscher, Kostka, and Straub, 2012; Jinjara, Noy and Zheng 2013).

A growing number of academic commentators have lent at least indirect support to this movement by suggesting tightening and loosening controls in response to a range of economic and financial issues and problems. While the rationales for these recommendations vary, they tend to have in common the assumption that first-best policies are unavailable, and that capital controls can be thought of as a second-best form of intervention. One set of studies considers a setting in which output fluctuates because nominal wages are rigid and monetary policy is not available to manipulate the price level. Thus, Schmitt-Grohe and Uribe (2012a, b) analyze a country with rigid nominal wages and a fixed exchange rate.<sup>1</sup> They show that, absent the ability to implement policies that address the nominal wage distortion or that change the exchange rate and price level directly, controls should be tightened temporarily in periods of large capital inflows to prevent wages from rising to levels from which they are then unable to fall when the capital inflows dry up, resulting in unemployment. Farhi and Werning (2012) show that the argument for temporary controls that are adjusted counter-cyclically (i.e., that are imposed or tightened in response to inflow surges or declines in the world interest rate, and then loosened when the surge subsides or world interest rates recover) carry over to the cases of imperfectly flexible wages and exchange rates.<sup>2</sup>

A second, closely related strand of literature characterizes capital controls as a device for optimally manipulating the international terms of trade. In some periods countries may benefit from higher export prices (stronger terms of trade) as a way of increasing domestic purchasing power vis-à-vis the rest of the world, insofar as the countries in question possess market power. In other periods they may instead prefer higher import prices (weaker terms of trade) as a way of shifting demand toward domestic goods and encouraging their production, insofar as other distortions result in a suboptimal level of output. De Paoli and Lipinska (2013) describe a model in which import and export taxes and subsidies (which might be used to manipulate the terms of trade directly) are unavailable, and capital controls are instead tightened and loosened as these competing concerns gain and lose importance over the business cycle.<sup>3</sup>

A final strand of literature argues for the flexible use of capital controls to buttress financial stability. Ostry, Ghosh, Chamon and Gureshi (2012) and Forbes, Fratzscher and Straub (2013) recommend tightening capital controls to limit capital-inflow surges that create financial risks, and then loosening them when such risks subside. The argument is analogous to that made for flexible capital and liquidity requirements to limit the pro-cyclical movement of money and credit aggregates that results from the failure of agents to internalize the impact of their collective actions on asset prices (and therefore on the collateral constraints on which lending depends). First-best policy in this case would directly address the distortion with which the ready availability of foreign funding interacts. If that distortion arises from the failure of agents to internalize the effect of their actions on collateral constraints, then the first-best response is to raise loan-to-value regulation and other collateral-oriented regulatory policies, to

prevent an excessive surge of lending when the value of collateral rises. If the risk is a sudden outflow of foreign funds from domestic banks that threatens a liquidity crisis, then the first best response is to hold those banks to higher liquidity standards, or otherwise insure against this risk. If the problem is that banks receiving foreign funding extend riskier loans as they expand their balance sheets, then the first-best solution is to strengthen supervision and regulation so as to limit the balance-sheet expansion and prevent the deterioration in asset quality. But if these first-best policies are not available, there may then be an argument for tightening controls on capital inflows as a second-best response. Such are the conclusions of Korinek (2010), Jeanne and Korinek (2010), Bianchi (2011), Bianchi and Mendoza (2013), Benigno, Chen, Otrok, Rebucci and Young (2013) and Korinek (2013).

These are intriguing arguments for using capital controls as a second-best alternative to conventional monetary and financial policies. They have in common that they recommend substituting controls for policies that are adjusted frequently in response to, inter alia, business cycle fluctuations. But however intriguing the arguments, the approach they recommend is, in a sense, one with which we have strikingly little experience. As we show in this paper, governments have rarely imposed or removed capital controls in response to short-term fluctuations in output, the terms of trade, or financial-stability considerations. In this respect, our results echo those in an earlier paper of Fernandez, Rebucci, and Uribe (2013). Further, capital controls have rarely been adjusted in response to changes in the exchange rate regime, as one might think would be the case on the basis of models in which controls are a second-best substitute for an independent monetary policy. Thus, countries that impose and maintain them when the exchange rate is fixed do not, in general, quickly eliminate them when the

currency peg is abandoned. More striking still is that it is relatively rare for controls to be adjusted in response to financial crises, as suggested by models in which controls are a second-best substitute for first-best prudential policies. To be sure, countries are impelled to resort to controls in instances of extreme financial instability: Iceland in 2008 and Cyprus in 2013 are recent cases in point. But, all rhetoric to the contrary notwithstanding, once controls are put in place it often takes a long time for them to be taken back off.

Controls in practice are persistent. Once imposed, they tend to stay in place for long periods. Once removed, they are rarely restored. The capital control regime is slow moving, almost glacial. Rather than fluctuating at a business cycle frequency, as envisaged in the recent literature on controls as macroeconomic management and prudential supervision instruments, the intensity of controls tends to evolve over long periods in line with variables like domestic financial depth and development, the strength of democratic checks and balances, and the quality of regulatory institutions, which similarly evolve slowly over time. As we also show, countries with deeper financial markets are less likely to maintain controls; the causal interpretation is that as financial markets develop they are better able to withstand the impact of financial inflows and outflows to and from the rest of the world. Similarly, countries with more responsive political institutions are less likely to maintain capital controls; the causal interpretation here is that countries with stronger and more responsive political institutions are better able to pursue first-best policies. And countries with better higher quality regulation quality are less likely to maintain controls; the causal interpretation in this case is that such countries are better able to apply first-best regulatory policies and thus have less need for controls as a second-best approach to regulation.

The appropriate analogy, this evidence suggests, is not with monetary or prudential policies but with trade policy. Policy governing the international trade of goods and services is also highly persistent. Countries tend to maintain their trade policy regimes, whether relatively open or closed, for long periods. At some point, when domestic markets and policy-making institutions have been strengthened sufficiently, they may move from a relatively closed trade regime to a relatively open one. But after opening, they rarely revert to the earlier regime. They do not generally adjust their trade policies in response to short-term fluctuations in domestic economic activity and world market conditions. To be sure, economists have built models of how trade policies can be used as an instrument of macroeconomic management that is adjusted at business-cycle frequencies (see e.g. Krugman 1982). But this is not something that is commonly observed in practice.<sup>4</sup> What is true of controls and taxes on transactions on the current account of the balance of payments is similarly true in practice, as we show in this paper, of controls and taxes on transactions on the capital account.

Why capital controls, like tariffs, are (or at least have been) hard to adjust at a business-cycle frequency is a matter of speculation. The explanation may lie in the fact that such measures are, by their nature, discriminatory. They address domestic problems by discriminating against foreigners (or attracting attention to existing discrimination against foreigners), which is politically contentious. The political costs of using them, deriving from the negative reaction abroad, may be considerable. In addition, controls, like tariffs and non-tariff barriers, have prominent spillover effects, which is why countries negotiate international conventions for policies toward trade and capital flows (as incorporated into the agreements of the World Trade Organization and the OECD's Code of Liberalization, respectively) that limit

their use.<sup>5</sup> It may be that unlike conventional monetary policy, which affects the entire economy, and conventional prudential policy, which is highly technical and obscure, the redistributive aspect of capital controls (and tariffs) is highly visible, causing coalitions of support to form around prevailing policies, making the latter hard to change.

Our bottom line is that, the recommendations of currently fashionable models notwithstanding, there is little evidence that governments have been able to adjust capital controls at a business cycle frequency in response to the changing needs of macroeconomic management and prudential policy. More realistic, we suspect, is to focus on developing the relevant first-best policy instruments and to rely on capital controls only as a last resort.

## **2. The Evidence**

We begin this section by demonstrating that capital controls are persistent, both absolutely and relative to the frequency of business cycles. We show that their incidence has generally been unrelated to a variety of conventional macroeconomic phenomena, such as the exchange rate regime, financial crises, growth, and the terms of trade. However, the incidence of capital controls is not random; it is systematically associated with financial development and institutions.

### Persistence

In 1997, the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* began tabulating data on capital controls in a new manner. Previously, the Fund had presented a single binary variable, representing "Restrictions on payments for capital transactions."

Starting in 1997, the report instead presented a dozen (a thirteenth would be added the following year). The series are provided with a one-year delay; the most recently released 2013 *AREAER* contains data for 2012.<sup>6</sup>

In 1996, 169 countries and territories provided data concerning controls on capital market securities; 127 of these had restrictions. That is to say, these controls were *pervasive*. Of those same 127 countries, some 116 (91.3%) still had such controls in 2012.<sup>7</sup> That is, controls on were *persistent*. And, as demonstrated in Table 1, what was true of controls on capital market securities was true of other capital control measures as well.<sup>8</sup>

\*\*\* Table 1 about here \*\*\*

Figure 1 contains a series of histograms which show the length of spells of different types of capital controls. Consider the top-left graph, which presents the length of spells for controls on capital market securities. A subset of countries – 21 in number – had no such controls between 1996 and 2012; these countries make up the peak at the extreme left tail of the graph, since the spell length is zero. As the eye moves to the right, the graph falls – few countries had controls in place for periods of one, two, three or more years – until one arrives at the extreme right of the graph where the series ends with a dramatic spike. Fully 98 countries had capital market security controls in place for all seventeen years between 1996 and 2012. And controls on capital market securities are typical of the other types of controls; the spikes at the extreme left and right of the histograms indicate that controls are either in place for all or none of the seventeen years. In the bottom row, second panel from the left, the



different kinds of controls are aggregated together, and the resulting aggregate displays the same pattern.

\*\*\* Figure 1 about here \*\*\*

Mundell's Trilemma points to the incompatibility of capital mobility, fixed exchange rates and monetary independence. It suggests that policy makers must trade off these three desiderata. It is therefore interesting to ask whether a histogram for the length of spells for, e.g., a particular exchange rate regime resembles that for the different capital controls. While there are difficulties in measuring the exchange rate regime, two series are available. The IMF provides a series of *de facto* regimes in its *Annual Report on Exchange Arrangements and Exchange Restrictions*, but only since 2001; a histogram for the spell-lengths of these regimes is presented on the middle-right of the bottom row of Figure 1. Exchange rate regimes show a large spike at unity; a large number of exchange rate regimes persist for only a single year, in other words.<sup>9</sup> There is also considerable density towards the left-hand part of the histogram; many exchange rate regimes are short-lived. Still, the spike at the extreme right of the histogram indicates that a number of regimes persist for the entire sample period. An alternative *de facto* measure of exchange rate regimes, created by Reinhart and Rogoff and available from 1996 through 2010, is shown in the right-most panel in the bottom row. It shows the same pattern but with a less pronounced spike at the left.

One disadvantage of relying on the IMF's disaggregated capital controls series is that the IMF has never formally defined how intense controls have to be for an aspect of a country's

capital account to be classified as closed rather than open; we return to this point later. The data are measured at a point in time (usually December 31), and only capture restrictions on residents.<sup>10</sup> Finally, the data are only available since 1996.<sup>11</sup> Brune and Guisinger (forthcoming) have assembled another disaggregated data set of information on twelve categories of current and capital account transactions. Using their data set is a natural robustness check on our work and enables us to relax a number of these restrictions. The Brune and Guisinger series includes: 1) proceeds from exports; 2) proceeds from invisible transactions; 3) payments from invisible transactions; 4) inward controls on money market transactions; 5) outward controls on money market transactions; 6) inward controls on credit operations; 7) outward controls on credit operations; 8) inward controls on foreign direct investment; 9) outward controls on foreign direct investment; 10) real estate transactions; 11) controls on provisions and operations of commercial and credit institutions; and 12) exchange rate arrangements - multiple/dual v. unified. This data set includes data for up to 187 countries and spans the period 1970-2004.<sup>12</sup>

Figure 2 presents histograms of the Brune and Guisinger capital-control series comparable to those in Figure 1. In almost all cases, the results are similar to those from the IMF series in Figure 1; there is a moderate spike at the extreme left, indicating that the particular capital control was *never* used by a number of countries, and a more pronounced spike at the extreme right, indicating that the control was *always* in effect throughout the 35-year sample period. The only exception is the practice of using multiple exchange rates; as shown by the observations piled to the left of the graph, this policy tends to be used for short spells. The two *de facto* measures of exchange rate regimes available for long periods of time – those collected by Reinhart and Rogoff and Levy-Yeyati and Sturzenegger – also have most of

their mass at the left-hand side of the histograms, indicating that most exchange rate regimes tend to be short-lived, in stark contrast to capital controls.<sup>13</sup>

\*\*\* Figure 2 about here \*\*\*

Figure 3 presents Kaplan-Meier survival plots; these plot the probability (on the y-axis) that a capital control survives a certain number of years (on the x-axis). We present these for the Brune and Guisinger data set, along with analogous estimates for our coarse *de facto* measures of coarse exchange rate regimes. As with Figures 1 and 2, the durability of individual capital controls is striking. This more refined view suggests that they are significantly more durable than even coarsely aggregated exchange rate regimes.

\*\*\* Figure 3 about here \*\*\*

Another way of judging persistence is to look at reversals of policy on capital controls. That is, we examine cases where capital controls were re-imposed after a period of liberalization. For instance, Uruguay began the sample period in 1996 without any controls on capital market securities but re-imposed them in 1998 in the turbulence that followed the Asian financial crisis. In all, there were 51 cases when controls on capital market securities were re-imposed after periods without restrictions. In the case of Uruguay, the 1998 controls were short-lived; Uruguay removed them in 1999 and then remained liberalized through the end of

the sample period. But this second liberalization was the exception; of the 51 cases where countries with liberalized capital accounts re-imposed controls on capital market securities, there were only eight cases of subsequent liberalization. Liberalizations following the re-imposition of controls was also rare for most types of capital controls, as shown in Table 2.

\*\*\* Table 2 about here \*\*\*

To summarize: capital controls are highly persistent.

### Exchange Rate Regimes and Financial Crises

What determines the prevalence of capital controls? Two natural variables to examine are the country's exchange rate regime and susceptibility to financial crises; both are linked in theory and accepted wisdom to the incidence of controls. The role of the exchange rate regime is particularly relevant, given the importance of Mundell's Trilemma, which emphasizes, among other things, potential tradeoffs between capital mobility and exchange rate stability. While this theoretical presumption is clear, the durability of capital controls does not naturally lead one to examine the exchange rate regime, many of which tend to be transient.

In practice, exchange rate regimes are only weakly correlated with controls, as shown in Table 3. Each row of this table shows coefficient estimates from a regression of a particular capital control (listed in the left column) on dummy variables for hard fixes and floats. The equations we estimate take the form:

$$\text{CapControl}_{it} = \{\alpha_i\} + \{\beta_t\} + \gamma \text{ERR}_{it} + \varepsilon_{it}$$

where  $\text{CapControl}_{it}$  is a particular type of capital control present in country  $i$  at time  $t$ ,  $\{\alpha_i\}$  and  $\{\beta_t\}$  are mutually exclusive and jointly exhaustive sets of fixed country- and time-specific effects,  $\text{ERR}$  denote dummy variables for hard fix and floating exchange rate regimes (constructed from the IMF *de facto* definition of exchange rate regime (from 2001), backfilled with Reinhart-Rogoff series back to 1996), and  $\varepsilon$  denotes a composite disturbance.<sup>14</sup> The vector of coefficients of interest  $\gamma$  should be interpreted as deviations from the omitted intermediate regime of managed-floating; robust standard errors are shown in parentheses.

\*\*\* Table 3 about here \*\*\*

Almost none of the coefficients tabulated in Table 3 are significantly different from zero at conventional confidence levels; of the twenty-six coefficients, just two are significantly different from zero at the five percent confidence level. Clearly, variation in the exchange rate regime explains little of the persistence of capital controls.<sup>15</sup>

Because the fixed country effects wipe out observations for the many countries that did not experience changes over the sample period, simple cross-sectional regressions may be more revealing. Appendix Table A1 shows the results for 2000, which convey an identical message; just one of the twenty-six coefficients is significantly different from zero, albeit at the one percent confidence level.

Similarly, substituting the longer series for capital controls from Brune and Guisinger, and the alternative measure of de facto exchange rate regimes from Levy-Yeyati and Sturzenegger does not alter the finding of weak correlations between controls and regimes; results are presented in Appendix Table A2. While a fixed exchange rate regime is associated with a lower incidence of capital controls in a few cases, the results are weak overall.<sup>16</sup> Succinctly, exchange rate regimes do not seem closely linked to the incidence of capital controls, at least recently.

What about the correlation between crises and controls? Table 4 presents results analogous to those of Table 3 but using financial crises instead of exchange rate regimes as regressors. We take advantage of data for different types of crises from the celebrated work of Reinhart and Rogoff.<sup>17</sup> There are a small number of plausible significant correlations – that between banking crises and the incidence of restrictions on financial credits and derivatives, for example. But what is most strikingly surely, is the infrequency of significant correlations.

\*\*\* Table 4 about here \*\*\*

Again, the weak linkage between financial crises and capital controls does not depend on the particular measure of capital controls used, or the time period. In Table A3, we extend our work back to 1970, substituting the Brune-Guisinger measures of capital controls in place of those produced by the IMF.

Macroeconomic, Financial and Institutional Correlates

As we noted above, recent theoretical literature points to the possibility that governments may adjust controls in response to cyclical developments and macro-prudential considerations. We are skeptical of the empirical relevance of these arguments; it seems difficult to understand the sluggish nature of capital controls with cyclic macroeconomic and financial phenomena. Still, these are eminently testable hypotheses.

We therefore regressed the incidence of capital controls on inflation, GDP growth, the terms of trade, the lagged capital account as a percentage of GDP, and domestic credit growth adjusted for inflation. Our results are presented in Table 5, which shows coefficient estimates for a large number of bivariate regressions, each with a full set of fixed time and country effects. As expected and consistent with the earlier paper of Fernandez et al (2013), our results show that there is little sign that governments in fact impose or remove controls in response to changes in these variables.<sup>18</sup> One partial exception is domestic credit growth, where there is appears to be some tendency for governments to loosen or remove controls when credit growth accelerates – the opposite of what the macro-prudential rationale would imply.<sup>19</sup>

\*\*\* Table 5 about here \*\*\*

Once again, our results hold if we substitute the Brune-Guisinger measures of capital controls in place of those produced by the IMF, as is clear from Table A4.

It seems safe to conclude that capital controls are not strongly correlated with exchange rate regimes, financial crises, or fluctuations in other macroeconomic and financial variables. But are they simply noise, uncorrelated with anything of interest? Since controls are persistent

and slowly moving, it seems plausible to attempt to relate them to country characteristics like financial depth and development, the strength of democratic checks and balances, and the quality of regulatory institutions that are themselves slowly moving. We now turn briefly to this task, mostly in the interest of providing motivation for future research.

To explore the possible linkages between capital controls, financial development and institutions, we present some simple cross-sectional regressions in Table 6. We do this since the sluggish nature of capital controls implies most variation of relevance is cross-sectional rather than time-series. We use data from 2000, and link the incidence of capital controls to: a) domestic credit to the private sector, measured as a percentage of GDP (taken from the World Bank's *WDI* data set); b) the polity2 measure taken from the Polity IV Project, which ranges from 10 (full democracy) to -10 (autocracy); and c) a measure of regulatory quality (one of the *Worldwide Governance Indicators* collected by the World Bank). We run individual cross-sectional regressions of each of our (25) measures of capital controls on each of the three regressors of interest (intercepts are included but not recorded), and tabulate the regression coefficients along with robust standard errors.

\*\*\* Table 6 about here \*\*\*

Similar results can be obtained by using the Brune-Guisinger measures of capital controls in place of those provided by the IMF, as can be seen in Table A5.

The results in Tables 6 (and A5) could not be more different from those above in Tables 3-5 (and A1-A4). There is a robust, statistically significant negative correlation between the



incidence of capital controls, on the one hand, and these measures of financial development, political development and institutional development, on the other. The same is true for almost all measures of capital controls considered.

To summarize: our evidence indicates that capital controls are first applied and maintained, and then relaxed and removed as countries develop, much in the manner of restrictive trade policy regimes. They are not adjusted in response to fluctuations in inflation, growth, the terms of trade, capital inflows, and domestic credit to the nonfinancial private sector, nor do they vary consistently with the exchange rate regime or a variety of financial crises.

### **3. The Exceptions**

A handful of countries have succeeded in adjusting their capital controls counter-cyclically, tightening them when large amounts of foreign capital are flowing in and loosening them when the surge subsides, sometimes in order to insulate asset prices and domestic credit extension from the effects of the inflow, other times to prevent the real exchange rate from appreciating undesirably, and still other times for a combination of these reasons. Brazil is a prominent case in point, having repeatedly tightened and loosened its controls with the ebb and flow of capital movements. A handful of other examples – Indonesia, Thailand and South Korea – can similarly be cited. But, as our evidence shows, they are exceptions to the rule.

There likely are several reasons why we pick up few such episodes in our analysis of the data. First, the cases in question appear to be relatively few in number. Second, most of them are relatively recent, where the two data sets available to us on capital controls end in either

2004 or 2012. Third, and importantly, the measures in question tend to take the form of the intensification or relaxation of existing controls, rather than the application of entirely new ones (these infra-marginal adjustments being insufficient to switch our binary indicators). Recall that cross-country tabulations of the incidence of capital controls, whether from the IMF or Brune and Guisinger, distinguish controls by the type of financial transaction involved but not by the intensity of the measure.<sup>20</sup> While the evidence marshaled above rules out the presumption that countries regularly impose and remove capital controls in response to changing cyclical conditions, it does not rule out that they further tighten or relax an existing control apparatus when cyclical conditions call for doing so.<sup>21</sup>

We think the distinction is meaningful and that it has two explanations. First, imposing controls in a country with no recent history of them runs the risk of sending a negative signal, an idea first explored formally by Bartolini and Drazen (1997). It indicates that the presumption stated above – that first-best policies are unavailable or insufficient to deal with the challenges created by ebbs and flows of foreign capital – is reasonable. Resorting to controls to damp down the inflation associated with capital inflows may be taken as an indication that more conventional instruments, such as a tighter monetary policy, are not available because of, *inter alia*, the adverse impact that might be felt by a fragile banking system. Resorting to controls to limit real exchange rate appreciation may be taken as an indication that the political system lacks the capacity to implement a more conventional tightening of fiscal policy. Thus, imposing controls where they were not utilized previously may be seen as signaling that these underlying problems in the banking and political systems or elsewhere in the economy are more serious than earlier thought. This argument was advanced in connection with the imposition of capital

controls by Cyprus in 2013. That the country was forced to resort to a measure that was not in its normal policy armory was seen as signaling that it, and the monetary union of which it was part, had deeper policy problems than previously thought.<sup>22</sup> Occasionally one hears arguments that other OECD countries that have long since removed their residual controls should reimpose them for macro-prudential or macroeconomic-management-related reasons. The countries in question, without exception, display a decided reluctance to do so, which we interpret in signaling terms.

This adverse signal will be absent or at least significantly weaker for a country that regularly utilizes capital controls and has adjusted their intensity previously. For such a country, capital controls are normal policy. Changes in their intensity do not convey new information about the strength of other policies and institutions.

Second, adjusting controls at a cyclical frequency is likely to be easier and less costly, from a technical efficiency standpoint, for a country with some form of controls already in place. It will already possess the relevant bureaucracy, obviating the need to set up a new one. It will have systems in place for monitoring financial transactions, which is more convenient than having to establish entirely new ones. Brazil, for example, had a long history of capital controls, most of which it finally removed by the middle of the last decade, at which point it had an all but fully open capital account.<sup>23</sup> But a legacy of this long period of controls was that it had systems, electronic and otherwise, for extensively monitoring capital inflows and outflows. As Chamon and Garcia (2013, p.6), write, “banks’ assets and liabilities in foreign currency have always been closely monitored by the Brazilian Central Bank...” All entities have been legally obliged to register all capital transfers into the country with the central bank since

1962. Currently all such transactions are tracked by an on-line, real-time registration system, the so-called International transactions Reporting System, or ITRS.<sup>24</sup> The maintenance of these systems thus made it relatively straightforward for the government to reintroduce taxes first on international transactions in debt securities and then on international transactions in equities starting in March 2008 and then to repeatedly adjust the tax rate up and down as circumstances warranted. As Chamon and Garcia (2013, p.5) write further, “Brazil’s case is unique because the inflow tax already existed, and the Executive can change its rate by decree (including setting it to zero) without congressional approval.” To be clear, this is not to argue that controls are likely to be fully effective or necessarily watertight in such circumstances, only that tightening them will be easier for a country where the relevant monitoring and tax apparatus is already in place.

The evidence from other countries is broadly similar. Thus, Thailand undertook extensive capital account liberalization prior to the global financial crisis and the financial turbulence affecting emerging markets in 2013, as described by Jongwanich and Kohpaiboon (2013), but it never entirely eliminated its controls or dismantled its control apparatus. While the central bank progressively liberalized capital outflow restrictions after the financial crisis of 1997-8, it continued to monitor baht credit facilities provided by individual financial institutions to nonresidents. This allowed it to then relax outflows restrictions and add capital inflow restrictions as capital flooded back into the economy, putting uncomfortable upward pressure on the real exchange rate, starting in 2003. It allowed the central bank to further instruct financial institutions to refrain from buying and selling certain types of debt securities to nonresidents in 2006 and then to add a Chilean-style unremunerated reserve requirement on

inward foreign investment at the end of the year. The initiative did not go well, but that is another story; what is important is that these adjustments were undertaken by a country with an extensive capital-flow monitoring apparatus already in place. Similarly, that the authorities already had systems in place made it relatively straightforward to reinstate earlier withholding taxes on nonresident interest earnings and capital gains on government bonds in 2010.

#### **4. Conclusion**

Recent years have seen a reassessment of capital controls as instruments of macroeconomic and macro-prudential management. The IMF has softened its earlier hardline opposition to controls. Academics for their part have offered a variety of models illustrating cases in which controls might be used to improve economic and financial outcomes.

This reassessment is welcome. The IMF's new policy papers lend further support to an older view that restrictions on capital flows should be regarded as a back-up, second-best, form of prudential regulation in situations where normal instruments of financial regulation are not up to the task (Eichengreen and Mussa 1998), while academic contributions provide formal analyses of the argument and generalize its points.

In practice, however, resort to these instruments for the purposes of macroeconomic and macro-prudential management identified in these recent papers is rare, as we have shown in this paper. Most developing countries maintain controls, though some do not; advanced countries resort to them only in exceptional circumstances. But the application and removal or intensification and relaxation of controls, as suggested by this recent literature, remains the exception to the rule, a few high-profile cases (such as Brazil) notwithstanding to the contrary.

We have pointed to several explanations for this disjuncture between theory and practice. First, policy makers continue to attempt to implement first-best policy responses where possible, using conventional monetary and fiscal policies in response to macroeconomic fluctuations and conventional regulatory instruments at the domestic level in response to financial risks. Bhagwati and Ramaswami (1963) famously made the argument in the context of trade policy – that when there exists a domestic distortion, intervening with the first-best domestic intervention beats responding with a second-best tariff or quota. That argument applies in the current context as well.

Second, governments are understandably reluctant to resort to controls where a control apparatus is not already in place. Doing so may send an adverse signal: it may be taken as an indication that the first-best policies on which policy makers previously relied are not available or not up to the task. Enforcement may be difficult where the relevant bureaucratic apparatus has been dismantled entirely. The lesson here is that countries anticipating having to resort to controls for purposes related to macroeconomic or macro-prudential management should hesitate before dismantling their control apparatus. Having done so and moved all the way to capital account convertibility, it can be difficult and costly to go back.

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**Table 1. Percentage of 1996 controls persisting in 2012**

IMF AREAER Control	Controls in 2012/Controls in 1996 (percentage)
Capital Market Securities	116/127=91.3%
Money Market Instruments	94/111=84.7%
Collective Investment Securities	89/105=84.8%
Derivatives and other Instruments	52/78=66.7%
Commercial Credits	72/103=69.9%
Financial Credits	87/112=77.7%
Guarantees, Sureties, Fin'l Backup Facilities	52/82=63.4%
Direct Investment	128/144=88.9%
Liquidation of Direct Investment	32/54=54%
Real Estate Transactions (1997, series start)	105/119=88.2%
Personal Capital Movements	47/64=73.4%
Commercial Bank, other Credit Institutions	129/133=96.7%
Institutional Investors	57/60=95%

**Table 2. How Many Liberalizations Followed the Reimposition of Controls?**

IMF AREAER Control	Re-impositions	Subsequent Liberalizations
Capital Market Securities	51	8
Money Market Instruments	58	16
Collective Investment Securities	56	10
Derivatives and other Instruments	62	19
Commercial Credits	32	16
Financial Credits	51	14
Guarantees, Sureties, Fin'l Backup Facilities	30	14
Direct Investment	42	10
Liquidation of Direct Investment	28	13
Real Estate Transactions (1997, series start)	43	14
Personal Capital Movements	26	4
Commercial Bank, other Credit Institutions	23	4
Institutional Investors	65	9

**Table 3: Capital Controls and Exchange Rate Regimes**

IMF <i>AREAER</i> Control	Hard Fix	Float
Capital Market Securities	.01 (.02)	.00 (.03)
Money Market Instruments	-.03 (.03)	-.00 (.04)
Collective Investment Securities	-.03 (.03)	-.00 (.04)
Derivatives and other Instruments	-.04 (.04)	-.01 (.04)
Commercial Credits	.00 (.02)	-.03 (.03)
Financial Credits	-.03 (.03)	.06 (.03)
Guarantees, Sureties, Fin'l Backup Facilities	.03 (.03)	.03 (.03)
Direct Investment	-.05* (.02)	-.04 (.03)
Liquidation of Direct Investment	.02 (.03)	-.01 (.02)
Real Estate Transactions (1997, series start)	.01 (.03)	.01 (.03)
Personal Capital Movements	-.03 (.03)	-.04 (.03)
Commercial Bank, other Credit Institutions	-.01 (.02)	.00 (.02)
Institutional Investors	.07 (.04)	-.08* (.04)

IMF *de facto* definition of exchange rate regime (from 2001), backfilled with Reinhart-Rogoff (to 1996). Least squares panel regressions with fixed country and time effects; robust standard errors in parentheses. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level. Omitted variable is intermediate exchange rate regime.

**Table 4: Capital Controls and Financial Crises**

IMF <i>AREAER</i> Control	Banking	Currency	Inflation	Sovereign, Domestic	Sovereign, External	Stock Market
Capital Market Securities	.09 (.05)	-.00 (.03)	.15 (.10)	-.11* (.04)	.08 (.05)	.00 (.04)
Money Market Instruments	.05 (.06)	.02 (.03)	.21* (.09)	-.06 (.11)	.00 (.05)	.02 (.04)
Collective Investment Securities	.15* (.06)	.05 (.03)	.24 (.12)	-.20* (.08)	.04 (.05)	.01 (.03)
Derivatives and other Instruments	.15* (.08)	.08 (.05)	.11 (.14)	-.19 (.13)	-.03 (.07)	-.01 (.03)
Commercial Credits	.04 (.05)	.01 (.03)	.26* (.11)	-.09 (.14)	.01 (.06)	.01 (.02)
Financial Credits	.13* (.06)	-.01 (.05)	.29* (.11)	.08 (.23)	-.06 (.06)	.00 (.03)
Guarantees, Sureties, Fin'l Backup Facilities	-.03 (.07)	.03 (.04)	.14 (.13)	.12 (.16)	.09 (.11)	-.04 (.03)
Direct Investment	.11* (.05)	.02 (.03)	.10 (.12)	-.08 (.06)	.04 (.07)	.02 (.03)
Liquidation of Direct Investment	-.05 (.04)	-.02 (.02)	.02 (.07)	.07 (.18)	.05 (.06)	.03 (.03)
Real Estate Transactions (1997, series start)	.01 (.06)	.03 (.04)	.07 (.11)	-.07 (.04)	.07 (.07)	-.01 (.03)
Personal Capital Movements	-.02 (.06)	.03 (.04)	.22 (.13)	.02 (.26)	-.05 (.08)	.00 (.02)
Commercial Bank, other Credit Institutions	.01 (.05)	.02 (.02)	-.01 (.02)	-.00 (.01)	-.01 (.01)	-.02 (.03)
Institutional Investors	.01 (.05)	.02 (.03)	.08 (.09)	.02 (.10)	-.07 (.16)	-.01 (.03)

Reinhart-Rogoff crises. Least squares panel regressions with fixed country and time effects; robust standard errors in parentheses. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level.

**Table 5: Capital Controls and Cyclic Macroeconomic Phenomena**

IMF <i>AREAER</i> Control	Inflation	Growth	Terms of Trade	Capital Account	Credit Growth
Capital Market Securities	.00 (.02)	-1.4 (1.0)	-.01 (.05)	.7 (.5)	-.02 (.01)
Money Market Instruments	.00 (.02)	-.3 (1.4)	-.07 (.07)	.3 (.5)	-.04* (.02)
Collective Investment Securities	-.00 (.03)	-.9 (1.5)	-.09 (.06)	.4 (.5)	-.03* (.01)
Derivatives and other Instruments	.01 (.08)	-.0 (2.1)	-.13 (.08)	.9 (.5)	.00 (.02)
Commercial Credits	.04 (.03)	.9 (1.6)	-.08 (.06)	.0 (.6)	-.04 (.05)
Financial Credits	.01 (.02)	-1.6 (1.2)	-.18* (.07)	.1 (.4)	.01 (.03)
Guarantees, Sureties, Fin'l Backup Facilities	.01 (.03)	1.2 (1.3)	-.09 (.07)	.1 (.3)	.04 (.03)
Direct Investment	.01 (.02)	-.4 (.9)	-.05 (.04)	.5 (.4)	.01 (.02)
Liquidation of Direct Investment	-.03 (.02)	.2 (1.2)	.06 (.08)	-.1 (.3)	-.00 (.02)
Real Estate Transactions (1997, series start)	-.03 (.03)	-.1 (1.1)	-.12* (.05)	-.6 (.5)	.02 (.02)
Personal Capital Movements	.04 (.05)	-.7 (1.1)	.00 (.07)	-.2 (.5)	.01 (.02)
Commercial Bank, other Credit Institutions	.01 (.01)	.0 (.3)	.02 (.02)	-.1 (.1)	.02 (.03)
Institutional Investors	.02 (.03)	-1.0 (1.6)	.05 (.08)	-.1 (.8)	.04 (.04)

Each cell records the slope coefficient from a panel regression of the capital control (recorded in the left column) on an intercept and the regressor (recorded at the top of the column); fixed time- and country- effects included but not recorded, robust standard errors recorded parenthetically. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level. GDP inflation; log of barter terms of trade; lagged capital account as % GDP (only available since 2005); credit growth adjusted for inflation, all series from WDI. All estimates except terms of trade scaled up by 1000.

**Table 6: Capital Controls, Financial Development, and Institutions**

IMF <i>AREAER</i> Control	Domestic Private Sector Credit	Polity	Regulatory Quality
Capital Market Securities	-.003** (.001)	-.019** (.006)	-.16** (.03)
Money Market Instruments	-.003** (.001)	-.020* (.009)	-.23** (.05)
Collective Investment Securities	-.005** (.001)	-.028** (.010)	-.30** (.07)
Derivatives and other Instruments	-.006** (.002)	-.039* (.015)	-.41** (.09)
Commercial Credits	-.004** (.001)	-.023** (.006)	-.29** (.03)
Financial Credits	-.004** (.001)	-.023** (.006)	-.26** (.04)
Guarantees, Sureties, Fin'l Backup Facilities	-.004** (.001)	-.019** (.007)	-.28** (.04)
Direct Investment	-.001 (.001)	-.005 (.006)	-.07* (.03)
Liquidation of Direct Investment	-.003** (.001)	-.020** (.006)	-.24** (.03)
Real Estate Transactions (1997, series start)	-.003** (.001)	-.015** (.006)	-.09* (.03)
Personal Capital Movements	-.005** (.001)	-.019* (.008)	-.29** (.05)
Commercial Bank, other Credit Institutions	-.003** (.001)	-.014** (.004)	-.17** (.05)
Institutional Investors	-.002 (.001)	.009 (.012)	-.12 (.09)

Each cell records the slope coefficient from an individual cross-sectional regression of the capital control (recorded in the left column) on an intercept and the regressor (recorded at the top of the column); robust standard errors recorded parenthetically. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level.

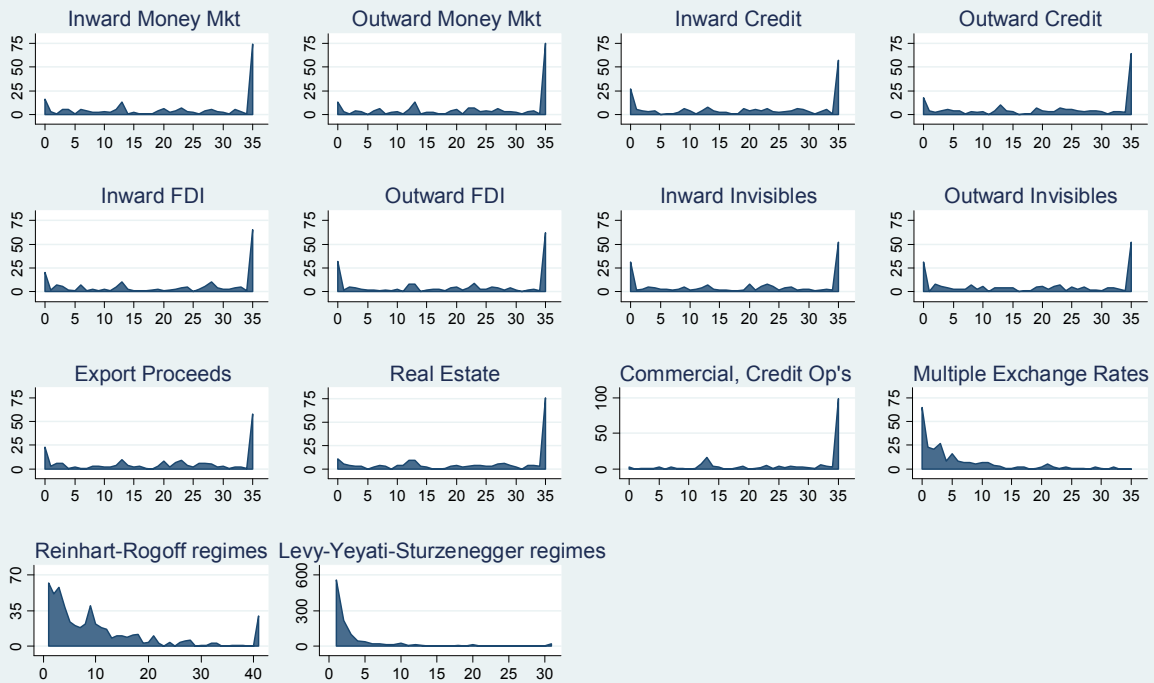
## Spell Length Histograms Capital Controls from IMF AREAER, 1996-2012



Reinhart-Rogoff data 1996-2010; IMF De Facto Regimes 2001-2012

**Figure 1: Histograms of Capital Control Duration, IMF AREAER database.**

## Spell Length Histograms Capital Controls from Brune-Guisinger, 1970-2004



Reinhart-Rogoff regimes 1970-2010; Levy-Yeyati-Sturzenegger 1974-2004

**Figure 2: Histograms of Capital Control Duration, Brune-Guisinger database.**



## Durability of Capital Controls



Kaplan-Meier Survival Estimates; Controls data from Brune-Guisinger, 1970-2004

**Figure 3: Kaplan-Meier Graphs Capital Control Survival, Brune-Guisinger database.**

**Table A1: Capital Controls and Exchange Rate Regimes: A Cross-Section for 2000**

IMF <i>AREAER</i> Control	Hard Fix	Float
Capital Market Securities	-.06 (.08)	-.01 (.18)
Money Market Instruments	-.02 (.08)	.08 (.18)
Collective Investment Securities	.06 (.08)	-.12 (.20)
Derivatives and other Instruments	-.03 (.09)	-.10 (.20)
Commercial Credits	.01 (.08)	-.01 (.20)
Financial Credits	.02 (.08)	-.03 (.20)
Guarantees, Sureties, Fin'l Backup Facilities	-.01 (.08)	-.10 (.20)
Direct Investment	.04 (.07)	-.01 (.16)
Liquidation of Direct Investment	.04 (.08)	-.13 (.14)
Real Estate Transactions (1997, series start)	.00 (.07)	-.04 (.18)
Personal Capital Movements	.00 (.09)	.05 (.20)
Commercial Bank, other Credit Institutions	-.16** (.05)	-.21 (.16)
Institutional Investors	.02 (.09)	-.39 (.18)

IMF *de facto* definition of exchange rate regime. Least squares regressions from 2000; robust standard errors in parentheses. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level. Omitted variable is intermediate exchange rate regime.

**Table A2: Capital Controls and Exchange Rate Regimes, Brune-Guisinger database**

Brune and Guisinger Control	Fix	Free Float
Export Proceeds	-.09** (.03)	-.01 (.02)
Commercial, Credit Operations	-.04* (.02)	.02 (.01)
Inward Money Market	-.06 (.03)	.02 (.02)
Inward Credit	-.08** (.03)	.02 (.02)
Inward FDI	.04 (.02)	-.00 (.02)
Inward Invisibles	-.09** (.03)	-.02 (.02)
Outward Money Market	-.01 (.03)	.04* (.02)
Outward Credit	-.05 (.03)	.01 (.02)
Outward FDI	-.03 (.03)	.02 (.02)
Outward Invisibles	-.05 (.03)	-.01 (.02)
Multiple Exchange Rates	-.05 (.03)	-.03 (.02)
Real Estate	-.01 (.03)	.02 (.02)

Levy-Yeyati and Sturzenegger *de facto* definition of exchange rate regime. Least squares panel regressions with fixed country and time effects; robust standard errors in parentheses. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level. Omitted variable is intermediate exchange rate regime.

**Table A3: Capital Controls and Financial Crises, Brune-Guisinger database**

Brune and Guisinger Control	Banking	Currency	Inflation	Sovereign, Domestic	Sovereign, External	Stock Market
Export Proceeds	.02 (.04)	.03 (.03)	.13** (.05)	.02 (.09)	.09 (.07)	.04 (.03)
Commercial, Credit Operations	-.00 (.02)	-.01 (.02)	-.01 (.02)	.06 (.03)	-.00 (.02)	.04 (.02)
Inward Money Market	.03 (.02)	.03 (.02)	-.01 (.05)	.05 (.05)	.06 (.05)	.04 (.03)
Inward Credit	.01 (.04)	.05 (.03)	.06 (.04)	.14 (.11)	-.06 (.06)	.05* (.02)
Inward FDI	-.02 (.04)	-.03 (.02)	.02 (.06)	.09* (.04)	.06 (.07)	-.00 (.02)
Inward Invisibles	.03 (.04)	.02 (.03)	.06 (.05)	.11 (.09)	.08 (.07)	.04 (.03)
Outward Money Market	.01 (.03)	-.02 (.02)	.01 (.04)	.16** (.05)	-.01 (.04)	.05* (.03)
Outward Credit	.03 (.04)	.02 (.03)	.03 (.05)	.17 (.10)	-.07 (.06)	.03 (.02)
Outward FDI	.00 (.04)	.06* (.03)	.07 (.05)	.04 (.08)	-.06 (.05)	.03 (.02)
Outward Invisibles	.01 (.04)	.06* (.03)	.07 (.06)	.15 (.09)	-.01 (.07)	.04 (.03)
Multiple Exchange Rates	.03 (.04)	.01 (.03)	.14* (.06)	-.21 (.12)	.09 (.07)	-.02 (.03)
Real Estate	.01 (.03)	.03 (.02)	.05 (.05)	.02 (.10)	.02 (.04)	.01 (.02)

Reinhart-Rogoff crises. Least squares panel regressions with fixed country and time effects; robust standard errors in parentheses. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level.

**Table A4: Capital Controls and Cyclic Macroeconomic Phenomena, Brune-Guisinger database**

Brune and Guisinger Control	Inflation	Growth	Terms of Trade	Credit Growth
Export Proceeds	.02* (.01)	-.3 (.7)	-.01 (.05)	.0004** (.0001)
Commercial, Credit Operations	-.000 (.001)	-.3 (.3)	-.00 (.02)	-.00004 (.00002)
Inward Money Market	-.02 (.01)	-.1 (.8)	.03 (.05)	.00003 (.00004)
Inward Credit	.01 (.01)	-.2 (.7)	-.03 (.07)	.0002 (.0001)
Inward FDI	-.01 (.01)	.4 (.8)	.03 (.06)	-.00006* (.00003)
Inward Invisibles	.03 (.02)	-.7 (.7)	.00 (.05)	-.00006 (.00005)
Outward Money Market	-.01 (.01)	.0 (.8)	-.01 (.05)	.00001 (.00005)
Outward Credit	.01 (.01)	.3 (.6)	-.06 (.05)	-.00002 (.00006)
Outward FDI	.00 (.02)	.8 (.6)	-.05 (.06)	-.00008 (.00004)
Outward Invisibles	.01 (.02)	.1 (.9)	-.06 (.05)	.0003** (.0001)
Multiple Exchange Rates	.03 (.02)	-2.4* (1.1)	-.14 (.09)	.00000 (.00004)
Real Estate	.01 (.01)	-.3 (.7)	-.03 (.05)	.0003* (.0001)

Each cell records the slope coefficient from a panel regression of the capital control (recorded in the left column) on an intercept and the regressor (recorded at the top of the column); fixed time- and country- effects included but not recorded, robust standard errors recorded parenthetically. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level. GDP inflation; log of barter terms of trade; credit growth adjusted for inflation, all series from WDI. All estimates except terms of trade scaled up by 1000.

**Table A5: Capital Controls, Financial Development, and Institutions, Brune-Guisinger database**

Brune and Guisinger Control	Domestic Private Sector Credit	Polity	Regulatory Quality
Export Proceeds	-.004** (.001)	-.022** (.006)	-.25** (.02)
Commercial, Credit Operations	-.003** (.001)	-.010** (.004)	-.08** (.03)
Inward Money Market	-.003** (.001)	-.020** (.005)	-.15** (.03)
Inward Credit	-.004** (.001)	-.021** (.006)	-.23** (.03)
Inward FDI	-.000 (.001)	-.013** (.005)	-.06 (.03)
Inward Invisibles	-.003** (.001)	-.020** (.006)	-.23** (.02)
Outward Money Market	-.003** (.001)	-.021** (.005)	-.18** (.03)
Outward Credit	-.004** (.001)	-.022** (.006)	-.23** (.03)
Outward FDI	-.002* (.001)	-.019** (.006)	-.20** (.03)
Outward Invisibles	-.004** (.001)	-.025** (.006)	-.22** (.02)
Multiple Exchange Rates	-.0014** (.0004)	-.014** (.004)	-.11** (.03)
Real Estate	-.002* (.001)	-.019** (.005)	-.09** (.03)

Each cell records the slope coefficient from an individual cross-sectional regression of the capital control (recorded in the left column) on an intercept and the regressor (recorded at the top of the column); robust standard errors recorded parenthetically. One (two) asterisk(s) indicate significantly different from zero at .05 (.01) significance level.

## Endnotes

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<sup>1</sup> Equivalently, a country that is a member of a monetary union.

<sup>2</sup> Davis and Presno (2014) combine the sticky-wage rationale for controls discussed in this paragraph with the financial-stability rationale discussed below.

<sup>3</sup> The models of Costinot, Lorenzoni and Werning (2011) and Cordero and Montacino (2010) are closely related.

<sup>4</sup> Bagwell and Staiger (2003) point to a number of studies suggesting that trade barriers vary countercyclically, with levels of protection rising in recessions and falling in expansions. Our reading of the evidence is that such tendencies are weak, and that variations in levels of protection do little to substitute for first-best instruments of macroeconomic management.

<sup>5</sup> On the spillover effects of capital controls, see Lambert (2011) and Forbes, Fratzscher, Kostka and Straub (2012).

<sup>6</sup> One series, for real estate transactions, began a year later, in 1997.

<sup>7</sup> Hereafter, we use “countries” to mean “countries and territories” for the sake of brevity.

<sup>8</sup> We prefer to use dis-aggregated series rather than derived aggregated measures such as the popular series developed by Chinn and Ito.

<sup>9</sup> Unlike capital controls, exchange rate regimes must have positive durations.

<sup>10</sup> It could also be objected that our annual data are missing changes in capital controls occurring at a higher frequency. It is conceivable that some governments are first tightening and then loosening controls, both within the same calendar year, something that our annual data would miss. The problem with testing this hypothesis is the absence of data on more continuous measures of the incidence of controls for a large panel of countries. One partial exception is Forbes, Fratzscher, Kostka and Straub (2012), who use the chronological narrative in the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions to construct weekly measures of the incidence of controls for 60 countries from 2009 through 2011. The period is relatively brief, although it is also one in which a few high-profile changes in controls occurred (as we discuss below) and in which a number of academics argued for tightening controls to insulate emerging markets from capital inflows induced by quantitative easing in the advanced economies. In fact, Forbes et al. find only 99 changes out of a total of 9360 (52x3x60) occasions, that is, barely one per cent of the time.

<sup>11</sup> Other disadvantages are discussed by Quinn, Schindler and Toyoda (2011).

<sup>12</sup> We thank Nancy Brune and Alexandra Guisinger for providing us with their data set.

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<sup>13</sup> We use the “coarse” measure provided by Reinhart and Rogoff.

<sup>14</sup> The Reinhart-Rogoff exchange rate regimes are available at <http://personal.lse.ac.uk/ilzetzki/data/ERA-Annual%20coarse%20class.xls>. Further detail on the construction of the exchange rate regime measures is available in the output freely available online.

<sup>15</sup> These regressions can be fancied up in different ways. For instance, since the regressand is a set of dummy variables, panel logit or probit can be used. Also, one can use lags of the regressors rather than simply contemporary values. We have experimented with such perturbations, and they seem to make little difference in practice.

<sup>16</sup> The Levy-Yeyati and Sturzenegger data is available at <https://sites.google.com/site/md4stata/linked/exchange-rate-classification>. Using the Reinhart and Rogoff measure of the exchange rate regime instead of Levy-Yeyati and Sturzenegger’s does not deliver strong signs of a tight link between the exchange rate regime and capital controls.

<sup>17</sup> These series are available at <http://www.carmenreinhart.com/data/browse-by-topic/topics/7/>.

<sup>18</sup> We also substituted lags for contemporaneous values of the explanatory variables and, alternatively, included lags along with those contemporaneous values without changing the picture.

<sup>19</sup> This correlation may also reflect causality flowing in the other direction, from the loosening of controls to more rapid credit growth, although this too is inconsistent with the macro-prudential use of controls.

<sup>20</sup> Edison and Warnock (2001) usefully considered the intensity of capital controls, but only for equity market related transactions, only for 29 emerging markets, and only for a period ending in the 1990s.

<sup>21</sup> Reassuringly, the IMF’s *AREAER* dummy variables exhibit seventeen changes for Brazil between 2005 and 2012, while four switches are visible in the Thai data over the same period.

<sup>22</sup> See for example Wolff (2013).

<sup>23</sup> For details see Carvalho and Garcia (2008).

<sup>24</sup> Since it is illegal for transactions to be settled in foreign currency, foreign funds entering the country must be converted into real, at which point they are recorded by the ITRS and a set of Electronic Declaratory Registration Systems. See the discussion of Hennings and Rocha (2013). As they put it, “In this way, the ITRS registers transactions between residents and nonresidents in or out of the country on a cash basis, without any threshold...the registration for enterprises



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that receive capital from non residents is also mandatory and should be done in the session for FDI on the [Electronic Declaratory Registration Systems]...Foreign portfolio investors also have to register themselves at the Securities Exchange Commission (CVM, in Portuguese), that has a register for assets held by non residents in the Brazilian stock market and in domestic-issued fixed income securities.”