EFFECTIVENESS OF CAPITAL ACCOUNT REGULATION: LESSONS FROM BRAZIL AND PERU

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Abstract

This paper econometrically analyses the effectiveness of capital account regulation in Brazil and Peru between 2008 and 2013. The analysis, based on new indices that carefully compute changes in regulation in both countries, offers mixed conclusions. Brazil was successful in shifting the composition toward longer-term inflows, but they could not curb the aggregate volume of inflows. Peru managed to cut short-term inflows addressed to assets issued by the Central Bank, but they were not able to affect short-term inflows received by commercial banks. These case studies suggest that the intensity and the comprehensiveness of regulation matter when regulating capital inflows.

Keywords: capital flows; capital controls; capital account regulation; Brazil; Peru.

JEL codes: F38, G280, F32, F41, F650

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1. Introduction

Gross capital inflows are a valuable driver of economic growth in any economy. But in a context of highly liberalized markets, when inflows are strong and volatile, difficulties can emerge to preserving macroeconomic stability in the recipient economy. Capital flows may reinforce the cyclical behaviour of the economy, reduce the policy space available to governments (Ocampo, 2002), and contribute to the accumulation of certain macroprudential risks (Cardarelli et al., 2010). This is particularly true in the case of developing countries, as they have weak currencies, fragile institutions, and less effective monetary and fiscal instruments to implement counter-cyclical macroeconomic policies.

Since 1980, many developing countries have been hit by financial crises. In most of these cases, capital inflows contributed to an accumulation of risks during the boom phase and to an aggravation of recession during the bust phase. In some cases, these crises caused a prolonged period of economic instability and recession in the affected countries, generated a serious relapse in the population's standard of living, contributed to a weakening of institutions and governance, and fed social unrest (Eichengreen, 2003; Stiglitz, 2002). As a consequence, the prevention of financial instability has become one of the most serious concerns for governments and civil societies in developing countries. On another hand, during the 2000s many emerging economies got concerned also because huge capital inflows could appreciate the exchange rate harming competitiveness. Overall, capital account regulations have emerged as a potential instrument to reduce risks and to widen the space for counter-cyclical and/or pro-export policies.

The assessment of economic experts regarding the appropriateness of capital account regulation has changed over the last two decades. Up to 2000, the dominant position was in favour of deregulating flows. Per the Washington Consensus, developing countries were advised to liberalize capital flows, as a way to improve their access to international financial sources, to avoid economic distortion in domestic markets, and to preserve sound economic policies (Fischer, 1997).

However, in the wake of the Asian crisis of the late 1990s, this position became subject to severe criticism. Several analysts from different academic traditions argued the need for careful evaluation before liberalizing capital flows (Gallagher et al., 2012; Ocampo, 2015; Stiglitz et al., 2006). International experience since the 1990s reinforced that opinion, demonstrating that countries that preserved some control over capital flows, such as Malaysia or Chile, were better able to cope with challenges arising from the volatility of financial markets (De Gregorio et al., 2000; Edwards and Rigobon, 2009; Kaplan and Rodrik, 2002; Magud and Reinhart, 2006) – even though analysis of

the experience of those two countries remains controversial (Forbes, 2007; Rojas-Suárez, 2002).

Currently, the dominant position seems to be that developing countries should be able to regulate capital flows, as the IMF has suggested since 2012 (International Monetary Fund, 2012a). In fact, between 2005 and 2013, cases of capital account regulation increased significantly. During this period international liquidity was remarkably high, broken only temporarily by the collapse of Lehman Brothers. Capital flows moved dynamically, looking for higher risk-adjusted returns, and emerging markets as a whole received more investment than ever before. Some of these countries tried to constrain incoming investment and to modify its profile using different regulations of capital inflows.

In the empirical field, there is an ongoing academic debate around the appropriateness of capital account[1] regulation as a measure of macroprudential policy. Basically, there are two subjects under discussion: (a) whether countries are capable through these measures of affecting capital flows according to their goals; and (b) whether the benefits of these measures are greater than their costs (Ariyoshi et al., 2000; Edwards, 1999; Forbes, 2007).

Our work contributes to the former debate. Recent panel-data analyses suggest that capital account regulation may be effective, but the results are not entirely conclusive (Ahmed and Zlate, 2013; Erten and Ocampo, 2016; Forbes et al., 2015; Forbes and Warnock, 2012; Habermeier et al., 2011; Klein, 2012; Nier et al., 2014; Ostry et al., 2012). That is to say, capital controls and related prudential measures affecting capital inflows seem to achieve their stated objectives in some cases, but not in others (Ariyoshi et al., 2000; Edison and Warnock, 2003; Habermeier et al., 2011). This sounds reasonable, given the high heterogeneity among different national experiences in terms of the financial and macroeconomic context, institutional options, capital inflows received, and regulatory measures applied to deal with them.

Therefore, a cross-country strategy does not seem to be the best way to contribute to the literature. Instead, we opted for a case-study approach based on two recent experiences of capital inflow regulation: Brazil and Peru between 2008 and 2013. Through this methodology, we tried to delve deeper into the complex set of factors that condition the effectiveness of measures aimed at capital account regulation. Brazil and Peru were chosen for three basic reasons: i) both economies have very appealing markets for foreign investors; ii) both have a long tradition, at least since the 1990s, of regulating capital

[1] Even though the IMF VI Balance of Payments Manual suggests registering investment and other financial flows in the financial account (using the term ‘capital account’ for other kinds of transactions), we will use the term ‘capital account’ in its original sense, as in the specialized literature.

flows; and iii) both are part of the same region, sharing close institutional markets and international influences. Moreover, in 2011 the IMF (2011, p. 41) considered that these countries were applying the strictest preventive capital account regulation among emerging countries which had previously attained a substantial degree of capital account liberalization.

The objective of our work is thus to determine statistically whether the measures applied by Brazil and Peru significantly affected the volume and composition of capital inflows, the two main variables for regulators. On the other hand, we have considered gross capital inflows – and not net capital inflows – because the measures whose effectiveness are being tested were designed to mainly affect incoming investment.

For each country, our analysis starts with quantification of the regulation applied, by means of an index created through the patient and systematic computation of each regulation event adopted for the chosen countries. The methodology to build the index is not new (Baba and Kokenyne, 2012; Cardoso and Goldfajn, 1998), but our quantification is, to our knowledge, the first to completely cover the latest capital account regulation cycle in Brazil and Peru. In addition to aggregate indices representing the overall regulation, we also built partial indices that allow us to check separately the effectiveness of specific parts of the regulatory package.

We use time series modeling techniques to test the explanatory power of the regulatory indices over each of the components of gross capital inflows. We use as control variables those factors which the empirical literature identifies as main capital inflow drivers, and we test, as rigorously as possible, whether the capital account regulation adds explanatory power to those variables selected. In order to do this, we first consider a wide set of control variables (30 for Brazil and 26 for Peru) to build the best possible basic models for describing inflows. Then we add capital account regulation indices and, using systematic model selection criteria, we determine whether the inclusion of that variable improves the explanatory capacity of the model.

Our estimates suggest that Brazil changed its composition of capital inflows in favor of long-term investments but, at the same time, that the aggregate volume of inflows (connected with exchange rate appreciation) remained unchanged. Our results are in accordance with other studies focused on the regulatory experience in Brazil (Baumann and Gallagher, 2012; Forbes et al., 2016; International Monetary Fund, 2013, 2012b, 2011; Organisation for economic co-operation and development, 2011). Thus, in the case of Brazil, our main contribution is not the novelty of our conclusions, but the fact that they are based on the most complete and detailed econometric analysis so far undertaken for this specific case in this timeframe.

Regarding Peru, our estimates suggest that short-term inflows to Central Bank assets were completely prevented, but that regulators were unable to affect short-term inflows received by commercial banks, which was one of their main concerns in terms of financial stability and monetary policy. The literature has paid scant attention to the case of Peru. A few works have adopted a descriptive approach, offering at best a preliminary diagnosis on regulatory effectiveness (Choy and Chang, 2014; International Monetary Fund, 2014, p. 27, 2011, p. 38; Rossini et al., 2013, 2011; Terrier et al., 2011, pp. 62-67,102). To our knowledge, our work offers the first systematic analysis which statistically tests the effectiveness of Peru's capital account regulation between 2008 and 2013.

Some additional conclusions emerge from comparison of the results obtained for the two cases. The intensity of the measures applied is key to understanding why regulation has been sometimes effective and sometimes not. Obviously, the intensity of the measures can further affect the costs of capital account regulation, in terms of discouraging other capital inflows.

After this introduction, the paper is organised as follows. The second section briefly describes the risks and problems that Brazilian and Peruvian authorities associated with capital inflows during the period analysed, and what regulatory responses were taken. The third and fourth sections explain the design of our econometric analysis – variables, techniques, and model-building strategies – as well as the diagnosis of the estimated models. The main results are presented in the fifth section and, finally, the sixth section offers some concluding remarks.

2. Capital inflows and regulatory response in Brazil and Peru

Capital inflows received by Brazil between 2008 and 2011, raised some concerns at the Finance Ministry and Central Bank due to their potential effects on exchange rate appreciation (Mantega, 2009), on the accumulation of macroprudential risks, and on the acceleration of domestic credit (Pereira da Silva and Harris, 2012).

The Brazilian regulatory responses included a tightening of some capital account regulation measures, which reached maximum intensity in late 2010 and early 2011. The main purposes of the regulatory responses were: (a) to mitigate total gross inflows, which were contributing to exchange rate appreciation and the overheating of the economy; and (b) to change the composition of inflows, with portfolio flows towards short-term fixed income securities specifically targeted by regulators.

In order to achieve the aforementioned objectives, Brazil applied direct

measures over the capital inflow itself. The main measure was the *Impôsto sôbre Operações Financeiras* (tax on financial operations), or IOF, applied by the Finance Ministry on foreign investors when they purchased domestic currency to participate in the Brazilian stock exchange or derivatives market (Pereira da Silva and Harris, 2012). These tax rates evolved over time, reaching particularly high levels (up to 6%) when domestic currency was acquired in order to buy short-term debt assets. The Central Bank and the National Monetary Council (the public institution with the highest responsibility over regulation of Brazilian financial markets) also applied direct measures to tackle potential ways to circumvent the IOF – for example through advance payments received in foreign currency by exporters.

In addition to direct measures, Brazil also applied some "indirect measures" not specifically addressed to influence capital inflows, but with a relevant impact over domestic agents strongly connected with capital inflows. The Central Bank was the most relevant player in this regard, limiting the ordinary activity of domestic banks in the exchange rate market because of its link with foreign investor speculation on derivatives, as well as its appreciation effect on the domestic currency (International Monetary Fund, 2011, pp. 63–64). Overall, 72 regulatory changes, both direct and indirect, were taken into account for our analysis of the Brazilian case (see Annex A for a detailed list).

In Peru, according to its Central Bank, capital inflows during the 2008-2013 period threatened economic and financial stability, bearing in mind that Peru is still a highly dollarized economy (Rossini et al., 2013, p. 245). In such a context, the effect of monetary policy on aggregate demand is particularly weak, and Peruvian agents (banks, households, and companies) often have significant exchange rate exposure in their balance sheets – along with relevant exchange rate mismatches. Therefore, liquidity, exchange, and credit risks could be highly volatile in response to exchange rate behaviour.

Short-term capital inflows can potentially fuel such threatening dynamics, especially if denominated in a foreign currency. Peruvian banks are the main entry for capital inflows in Peru, which is why the Central Bank opted to impose a reserve requirement affecting the foreign liabilities of domestic banks, specifically designed to slow down short-term and/or foreign currency inflows (Choy and Chang, 2014, p. 13) .

Direct regulation also constrained access by external investors to short-term domestic currency assets issued by the Central Bank for purposes of monetary policy (which were a major target for external investors in 2008), and it introduced a new tax regulation on foreign investors' capital income. Finally, the Peruvian bank supervisor (SBS) applied indirect regulation based on prudential

measures affecting domestic agents in the domestic credit and foreign exchange markets.[2] Overall, 674 regulatory changes, both direct and indirect, were considered in our analysis of the Peruvian experience (see Annex A for a detailed list).

3. Variables and sample

We designed an econometric study to assess the effectiveness of capital account regulation as a policy instrument to change the volume and/or composition of gross capital inflows. The endogenous variable here considered is always the gross capital inflow – change in the liability of the economy vis-à-vis the rest of the world – as a percentage of annual GDP. Various gross capital inflows have been analysed (9 for Brazil and 10 for Peru), allowing us to study not only aggregate inflow, but some of its components that can be targeted by regulators (see Annex B).

The main explanatory variables are the capital account regulation indices designed to capture the changing intensity of the measures applied. Different methodological options can be used to build such indices. The first is to use a numerical value, whenever regulatory measures can be translated into clear figures (for example a tax, or other tax-equivalent measures) (Concha et al., 2011; De Gregorio et al., 2000). This approach is not appropriate, however, when the intensity of the regulatory measure cannot be translated into a single figure.

The second option, widely used in the empirical literature (Ostry et al., 2012) consists in using as explanatory variables indices based on the IMF's *Annual report on exchange rate arrangements and exchange restrictions* (AREAER), such as those built by Fernández *et al*. (2015) and other authors before them (Quinn et al., 2011). The problem in this case is that AREAER data is annual, this frequency is clearly inadequate to testing regulatory effectiveness in the short term.

To build the indices with appropriate time coverage we adopted an eclectic approach. We used quantitative measures when capturing fiscal or administrative taxes, and we registered regulatory events, in a cumulative way, when other qualitative restrictions were applied. Different versions of this methodology have been used by scholars trying to build comparable measure of capital account regulation for different countries (Bruno et al., 2015; Forbes et al., 2015). More specifically, our approach is in line with those that

[2] SBS ("Superintendencia de Bancos, Seguros y Asociaciones de Fondos Privados de Pensiones del Perú") is in charge of regulating and supervising the domestic banks, insurance companies, and private pension funds.

exhaustively register regulation events for specific cases, such as Cardoso and Goldfajn (1998) and Baba and Kokenyne (2012)

We built monthly indices, that seem more adequate to capture any policy change than those based on annual or quarter data (Fernández et al., 2015)(Bruno et al., 2015; Pasricha et al., 2015). Furthermore, we adopted a broad scrutiny of regulatory measures, taking into account all regulatory events that affect capital inflows. This is an important difference from other studies: for example, Forbes *et al*. (2015) computed events on a weekly basis but considered only 9 regulatory events in Brazil and 15 in Peru, for the period 2009-2011, whereas we registered 72 regulatory changes for Brazil and 674 for Peru.

The index is set to "0" at the beginning of the estimation period, and each successive regulatory strengthening (weakening) is computed by adding (subtracting) "1" to (from) the index. To improve the sensitivity of their indices, some authors weight the contribution of each event depending on its relevance, or through analysis of its principal component (Pasricha et al., 2015; Tamirisa, 2001). We choose not to do this, in order to avoid discretionary decisions about the relative importance of the different measures and to preserve a clearer capacity for economic interpretation of the results. Other authors have computed separately measures that strength regulation and those that weaken it, in order to avoid any compensatory effect. But this is not the case in the experiences analyzed, and thus we decided to use a single index.

To test effectiveness, not only for the entire regulation package but for specific parts of it, seven regulation indices have been defined in the case of Brazil, and six in the case of Peru. The specific regulatory dimensions considered are clarified in Tables 1 and 2. For example, in the case of Brazil, two alternative indices were built capturing the regulation on portfolio inflows (second column of Table 1), and these consider IOF taxes affecting both portfolio equity and fixed income inflows. One of the indices, "reg_por1" is equal to the sum of IOF rates affecting these channels; the other, "reg_por2", is built through computation of events affecting them. Annex B offers a detailed explanation of the regulatory fields considered to build each index and the methodology used.

The aggregate capital account regulation indices built for Brazil and Peru show similar behaviour (Figure 1), suggesting that regulation: (a) intensified in 2008; (b) practically vanished after the Lehman Brothers collapse; (c) started again at the end of 2009, reaching maximum levels in 2011 or 2012; and (d) was partially relaxed by the end of 2013.[3] It is not possible to compare our indices

[3] All the indices built for Brazil and Peru show the same qualitative behaviour as the two indices described; all data is available on request.

with those of other scholars, either because the periods covered are not the same (in the case of Brazil) or because no similar index exists (in the case of Peru).

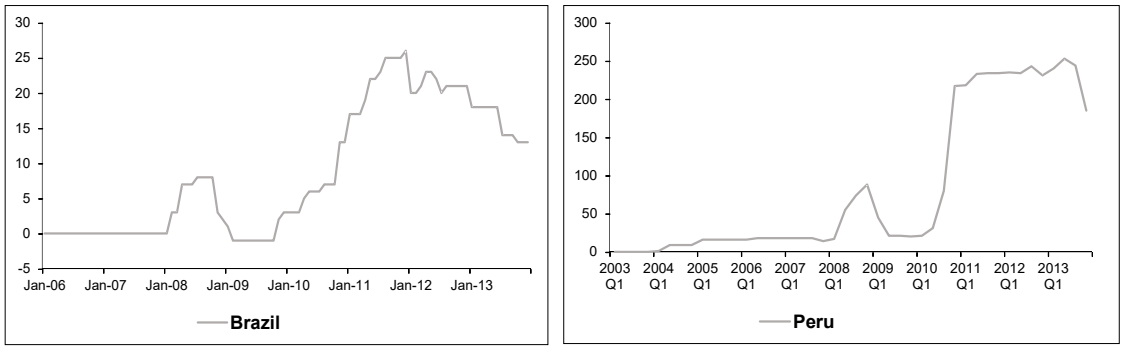
Table 1. Brazil (2006-2013): 7 capital flow regulation indices

		Reg. fixed income (2 indices)	Reg. portfolio (2 indices)	Reg. banks	Direct reg.	Total reg.
Impôsto sôbre Operações Financeiras (IOF) on asset purchases by foreign investors	FDI					
	Portfolio: fixed income					
	Portfolio: equity					
	Depository Receipts					
IOF on FX loans and debt issued out of Brazil						
IOF on future contracts, limits to advance payments by exporters, other						
Indirect regulation on domestic banks						

Table 2. Peru (2003-2013): 6 capital flow regulation indices

	Reg. on access to Central Bank's short-term debt assets (3 indices)	Reg. reserve requirement	Direct reg.	Total reg.
Reserve requirement (RR) on banks' foreign liabilities (PEN and USD)				
Non-resident investors' access to short-term sterilization assets				
Fiscal policy regarding foreign investors' capital rents				
Indirect regulation on domestic commercial banks and pension funds				

Figure 1. Aggregate capital inflow regulation indices in Brazil and Peru*



*Both indices represent, for each moment, how many "net" regulatory events (strengthening=+1; weakening=-1) have taken place since the beginning of the period. Peruvian reserves requirement policy involves many different parameters, and this accounts for the greater number of accumulated events in comparison with Brazil.

Given that many factors might affect the relationship between capital inflows and regulation indices, we considered a set of exogenous variables: 30 for Brazil and 26 for Peru, which we chose taking into account previous empirical works (Ahmed and Zlate, 2013; Baba and Kokenyne, 2012; Benigno et al., 2014; Erten and Ocampo, 2016; Ghosh et al., 2012; International Monetary Fund, 2013, 2011; Koepke, 2015; Nier et al., 2014). These variables can be classified into five categories: (a) interest rate differentials between a recipient economy and the rest of the world; (b) investors' risk aversion; (c) a recipient country's attractiveness for investors; (d) the attractiveness of emerging countries for investors; and (e) a recipient country's attractiveness relative to the rest of emerging countries.

The purpose of selecting such a wide range of control variables was to ensure that most of the candidates likely to explain capital inflows would be considered in the analysis. For example, as far as interest rate variables are concerned, we considered several choices of nominal or real interest rates, and we included corrections related to the cost of exchange rate risk-hedging or exchange rate expectations. Similar arguments informed our decision to consider several alternative proxies for the perception of risk in financial markets, or a country's attractiveness for the investor. A detailed explanation of all the variables used, and the corresponding data sources, is provided in Annex B; the entire dataset considered is available on request.

The regulatory period under analysis is 2008-2013, but we also included some pre-regulation data in the sample, which is why in the case of Brazil the analysis is based on monthly data from 2006:1 to 2013:12. Only quarterly data is available for Peru, so in order to work with a sufficient degree of freedom, the estimation period was increased from 2003:Q1 to 2013:Q4.

4. Estimations

4.1. Methodology

The analysis follows the Box-Jenkins approach to time series modeling (Box et al., 2008) and, in particular, uses a RegARIMA (regression with ARIMA errors) formulation. The RegARIMA model describes the endogenous variable (capital inflows, in our case) as a linear combination of contemporary explanatory variables (including, in our case, a regulation index and other exogenous variables), an independent term, and an ARMA error term which captures any stationary autocorrelation structure, as well as a certain number of unit root factors accounting for any trending component in the time series considered (Box et al., 2008, chaps. 11, 12, 14):

$$y_t = \omega_0 + \sum_{i=1}^{k} \omega_i x_{it} + \frac{\theta_q(B)\Theta_Q(B^S)}{\varphi_p(B)\Phi_P(B^S)\nabla_S^D \nabla^d} a_t \quad ,$$

Where y_t *: endogenous variable*

ω_0 *: independent term*

$\omega_i \ (1 = 1 \ldots k)$ *: coefficients for "k" explanatory variables*

$x_{it} \ (1 = 1 \ldots k)$ *: explanatory variables*

B , B^S *: delay operators (regular and seasonal of period "S")*

∇^d , ∇_S^D *: difference operators ("d" regular differences or "D" seasonal differences of period "S")*

a_t *: white noise component of the error term*

Characteristic polynomial describing the error term:

$\theta_q(B)$ *: moving average regular structure (order "q")*

$\Theta_Q(B^S)$ *: moving average seasonal structure (order "Q")*

$\varphi_p(B)$ *: autoregressive regular structure (order "p")*

$\Phi_P(B^S)$ *: autoregressive seasonal structure (order "P")*

The ARIMA model for errors hypothetically accounts for any systematic behaviour in the data that is not captured by the relationship between the endogenous variable and the regressors. Thus, a key methodological point is to specify an ARIMA model for the error term that yields a non-autocorrelated residual pattern (the estimation corresponding to the error "a_t" in the model).

The ARIMA structure describing the error term includes the regular and seasonal unit roots required to eliminate any trending components that could produce a spurious correlation. Potential endogeneity in the data has also been addressed, using only variables referring to periods prior to that for which capital inflows are measured. Thus, if some causal relationship is inferred, this would be from the regressors to the endogenous variable (not in the opposite sense).

4.2. Model-building strategy

Our main purpose is to answer the question of whether capital account regulation affects capital inflows. To this end, it seems appropriate to adopt a pragmatic approach. As there is no structural model that can be considered canonical, we have run many different models using most of the variables that the specialized literature has suggested can be explanatory factors in capital inflows. Next, we included our regulatory index, in order to confirm whether this last variable improves the explanatory capacity of the models estimated. If the better model (statistically speaking) describing capital inflows includes among

its explanatory variables a capital regulation index, this would provide evidence that the corresponding inflow component is affected by the regulation.

According to this idea, the model-building strategy adopted is structured in three stages. The first consists in fitting as many “basic models” as possible for explaining capital inflows (both in aggregate terms and by main components), testing for the statistical significance of all the explanatory variables initially considered. The final goal of this stage will be to build initial models for each capital inflow component with as many significant explanatory variables as possible. Those models that proved to be more useful among all control variables considered were 30 for Brazil and 26 for Peru.

The second stage consists in adding to the aforementioned basic models the regulation indices, and to test for their individual significance. Global regulation indices are tested against global capital inflow variables, whereas partial indices are tested against the inflow components for which their effects would be presumably more relevant. When the regulation index is found significant at the standard significance level of 10% (or higher), we consider that a “complete model” has been built. In the case of Brazil (Peru), the total number of models estimated is 60 (34), taking into account all the basic and complete models built for the nine (ten) components of the financial account which we considered. Thus, each complete model contains between 2 and 4 explanatory variables in total, including one regulation index.

Finally, in the third stage we compare all the basic and complete models to determine, for each capital inflow component and each regulation index, whether the best model includes the regulation index or not. The comparison is based on three alternative information criteria: (a) Schwarz; (b) Akaike; and (c) Hannan-Quinn; as well as a pure goodness-of-fit criterion, (d) the residual standard deviation. As is well known, the information criteria take into account both the model fit and complexity, while the residual standard deviation emphasizes the ability to provide accurate one-step-ahead forecasts.

Through this process it becomes possible to establish a scale of effectiveness for any specific regulation index. First, there will be no evidence of effectiveness when the regulation index is not significant. Second, the weakest evidence of effectiveness is obtained when there is at least one model where the regulation index is significant, but where none of the criteria considered suggest that this improves the fit achieved by the best basic model. Third, stronger effectiveness evidence is obtained when the model including the regulation index seems better than the best basic model, according to one, two, or three criteria. Lastly, the strongest evidence is obtained when all the criteria suggest that the model including the regulation index is better than the best basic model without the

regulation index.

4.3. Model diagnosis

The Box-Jenkins approach emphasizes the capture of all residual autocorrelation, and none of the models fitted showed evidence of this problem. On the other hand, only 22% of the models estimated for Brazil (13 models) and 53% of the models estimated for Peru (18 models) showed no evidence of non-normality or heteroscedasticity with a p-value of 10% or better (Table 3).

Table 3. Estimated models: statistical properties of the residuals*

	Brazil	Peru
Non-rejection for the null of: - No autocorrelation - Normality - Homoscedasticity	13 (22%)	18 (53%)
Rejection: normality	37 (62%)	10 (29%)
Rejection: homoscedasticity	2 (3%)	2 (6%)
Rejection: normality and homoscedasticity	8 (13%)	4 (12%)
Total number of estimated models	*60 (100%)*	*34 (100%)*

*p-value considered = 10%

These problems do not affect the consistency of the estimates, but they may distort the p-values in hypotheses testing (in general), and when testing for the effectiveness hypothesis (in particular). Nevertheless, these issues do not seem to undermine the conclusions from the econometric analysis developed in the following sections, for several reasons.

First, the large number of rejections of the nulls for normality and homoscedasticity were explained most often by the presence of a few outlying residuals. We checked this by (a) visual inspection of each residual series, and then (b) running a detailed residual check in some randomly chosen cases. This check consisted in zeroing a few outlying residuals (two or three in most cases) and then re-computing the value of the corresponding normality and homoscedasticity test statistics. In all cases we found that the test statistic decreased drastically, very often crossing the non-rejection boundary.

Second, we have borne in mind that large residuals tend to inflate the residual standard deviation and, therefore, to deflate the t-statistics for the significance of the individual parameters. In our case, this means that the presence of outliers in the sample biases the t-test against significance of the regulation

indices. Therefore, we can be confident that no excessive explanatory power has been erroneously attributed to the exogenous variables, because the bias of the analysis, if any, would have been against their significance.

Finally, the general conclusions regarding the effectiveness of capital account regulation do not depend exclusively on hypothesis testing. The approach chosen is far more conservative and robust, based on a comparison of models according their goodness of fit. Moreover, we can rely on the four criteria considered to perform the comparison, given that the parameters of the models have been consistently estimated and the problems of non-normality, as explained, have their origin in the presence of outliers.

5. Main results

5.1. Brazil

We estimated 60 models for Brazil, considering both basic and complete models, using 13 significant control variables (of the 30 initially tested) and 7 regulation indices. The basic estimation period is 2006:1 to 2013:12. However, the variable “embi_b” (the EMBI risk aversion indicator regarding Brazil) was only available from 2006:6, so the 36 models in which this variable is appears are estimated for the period 2006:6 to 2013:12.

In all cases the coefficients have the expected sign for control variables: positive for interest rate differentials and measures of attractiveness to investors; negative for risk and expectations of exchange rate depreciation. In general, the risk variables (particularly “EMBI Brazil”) are the more significant, being present in 52 models. Table 4 shows the results for the 10 models describing Brazilian portfolio inflows; all other individual model results are available on request.

For each model (column) the following information is provided: the ARIMA (p,d,q)x(P,D,Q) model describing the error term; estimation period and number of observations; estimated coefficient and typical deviation for each explanatory variable; rejection of the null hypothesis (the true coefficient being equal to zero), with a level of significance of 10%, 5% or 1%, indicated by “*”, “**”, and “***”, respectively; tested error hypothesis of normality (Chi-square test), non-heteroscedasticity (ARCH effect of order 12, Lagrange multiplier test) and non-autocorrelation (Lagrange multiplier test); Schwarz, Akaike, and Hannan-Quinn criteria; and typical deviation of innovations.[4]

[4] All the models were estimated with *Gretl* software, version 1.9.91 for Mac OS X, between March and July of 2015.

Table 4. Brazil: models for dependent variable "y_por" (gross portfolio inflows)

	Mod Brazil 17	Mod Brazil 18	Mod Brazil 19	Mod Brazil 20	Mod Brazil 21
Error model ARIMA(p,d,q)x(P,D,Q) →	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(5,0,0) x (0,1,1)
exogenous variables ↓	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)
reg_dir			-0,0166826*** (0,00498181)		
reg_tot				-0,0129696*** (0,00307743)	-0,00997146*** (0,00194825)
ird_er	0,0128905*** (0,00292643)		0,0130317*** (0,00277583)		0,0126489*** (0,00237814)
Rird		0,00874438** (0,00443667)			
er_exp		-0,0162536*** (0,00318197)		-0,0132085*** (0,00304779)	
embi_b	-0,000976763*** (0,000358027)	-0,000883093*** (0,000323837)	-0,00133171*** (0,000274450)	-0,00153163*** (0,000256503)	-0,00131366*** (0,000176093)
bovespa3	0,00408538** (0,00159816)		0,00315237** (0,00136272)		0,00450810*** (0,00114996)
Criteria for model comparison					
Schwarz	-21,31597	-20,79266	-27,75493	-30,71828	-30,16521
S.D. of innovations	0,170258	0,175390	0,165850	0,167123	0,158602
Akaike	-37,90210	-35,00934	-44,34107	-44,93497	-49,12079
Hannan-Quinn	-31,25719	-29,31370	-37,69615	-39,23933	-41,52660
Residuals test					
Normality	Rejected (10%)	Rejected (1%)	Rejected (10%)	Rejected (10%)	Rejected (10%)
No heteroscedasticity	Not rejected	Not rejected	Not rejected	Not rejected	Not rejected
No autocorrelation	Not rejected	Not rejected	Not rejected	Not rejected	Not rejected

	Mod Brazil 22	Mod Brazil 23	Mod Brazil 24	Mod Brazil 25	Mod Brazil 26
Error model ARIMA(p,d,q)x(P,D,Q) →	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)	(2,0,0) x (0,1,1)
exogenous variables ↓	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)	79 obs (2007:06-2013:12)
reg_por1	-0,0165115*** (0,00565237)				
reg_por2		-0,0436785*** (0,0128537)			
reg_fi1			-0,0194939*** (0,00632942)	-0,0195991*** (0,00703246)	
reg_fi2					-0,0495732*** (0,0130589)
ird_er	0,0110878*** (0,00288268)	0,0102432*** (0,00286792)		0,0121213*** (0,00278136)	0,0123394*** (0,00275675)
er_exp			-0,0138987*** (0,00309684)		
embi_b	-0,00174189*** (0,000397414)	-0,00185483*** (0,000378844)	-0,00158052*** (0,000300955)	-0,00145837*** (0,000356279)	-0,00152962*** (0,000289592)
bovespa3				0,00274813* (0,00156318)	0,00265700* (0,00137793)
Criteria for model comparison					
Schwarz	-25,36166	-28,85201	-25,89550	-24,43020	-30,58183
S.D. of innovations	0,166783	0,163285	0,172217	0,163910	0,162719
Akaike	-41,94780	-45,43815	-40,11218	-43,38578	-47,16797
Hannan-Quinn	-35,30288	-38,79323	-34,41654	-35,79160	-40,52306
Residuals test					
Normality	Not rejected	Not rejected	Not rejected	Rejected (10%)	Not rejected
No heteroscedasticity	Not rejected	Not rejected	Not rejected	Not rejected	Not rejected
No autocorrelation	Not rejected	Not rejected	Not rejected	Not rejected	Not rejected

Table 5 gathers information obtained from the 60 estimated models. Each column corresponds to one of the 7 regulation indices built, and each row represents one of the 9 capital inflows whose behaviour is analysed. Beside the inflow component name, the number between brackets indicates the number of models, whether basic or complete, built with that inflow component as an endogenous variable.

Table 5. Brazil: effectiveness signs of capital flow regulation (60 models)

	Direct reg.	Total reg.	Portfolio reg. (index 1)	Portfolio reg. (index 2)	Fixed income reg. (index 1)	Fixed income reg. (index 2)	Indirect reg. (banks)
Total inflows (5)	- (0)	- (0)		- (0)		- (0)	
Non-FDI (11)	**- (4)**	**- (4)**	- (2)	**- (4)**	- (3)	**- (4)**	
Portfolio (10)	**- (4)**	**- (4)**	**- (4)**	**- (4)**	**- (4)**	**- (4)**	
Equity (7)	- (0)	- (0)	- (0)	- (0)	- (0)	- (1)	
Fixed income (6)	- (3)			- (3)	- (0)	- (2)	
Long-term (7)	- (2)	- (1)	- (1)	- (2)	- (2)	- (2)	
Short-term (8)	- (3)	- (0)	**- (4)**	**- (4)**	**- (4)**	- (0)	
Other investments (4)	- (0)	- (0)					- (0)
Other investments (short-term) (2)							

In Table 5, each cell shows the effect of one index acting as explanatory variable over one inflow component. Codification is as follows. A grey cell means that the index has not been tested as an explanatory variable. For example, the four indices capturing regulation over portfolio investment (columns 3 to 6) have been tested to explain portfolio investment components only, and not other investment inflows. A white cell means that the index has been tested as an explanatory variable, but that no “complete” model has been found in which that index is significant. For example, one of the indices capturing portfolio inflow regulation (column 3) was never significant when added to the basic models describing “total inflows”, so the index yields no extra explanatory power.

Whenever an index added to a basic model is significant, we first indicate in the cell the sign of the effect and, between brackets, how many criteria (of the 4 considered) suggest that the “complete” model, including the regulation index, is statistically better than the best basic model when describing that capital inflow component. Thus, the higher the number appearing in a cell between brackets, the stronger the statistical evidence that the index corresponding to that column has been influential on the capital inflow component corresponding

to that row.

The first conclusion from Table 5 is that the regulation indices, when significant, always have a negative effect on capital inflows, as would be expected. Moreover, the estimations indicate that the regulation indices clearly add explanatory power to the control variables when describing capital inflow components. In other words, the regulation seems to have been effective, and there are at least four symptoms of this effectiveness.

First, the share of non-FDI inflows over total inflows decreases, because the regulation has a negative and very intense effect on the former but hardly affects the latter. Second, by similar reasoning, the portfolio investment loses weight over total non-FDI inflows. Third, debt portfolio inflows lose relevance over total portfolio inflows. Fourth, there is some evidence that short-term debt portfolio inflows also lose weight as a component of debt portfolio inflows. These four effects are coherent with the goals of the regulators, as the components more affected by the regulation are those usually considered unstable and volatile. On the other hand, there is no evidence that regulation has been effective in achieving one of its main goals: to reduce the volume of total inflows and their contribution to the appreciation of the exchange rate. A last point to mention is that indirect regulation does not seem to be very influential as “direct” and “total” effects are very similar. This is hardly surprising, as the clearest effects on capital inflows, if any, are expected to come from the regulation specifically designed to affect these transactions.

The results seem to be robust. There are no relevant inconsistencies when looking at the effects of different regulation indices over a specific inflow component. The impacts of any specific regulation index over different inflow components are highly consistent as well. Moreover, an additional consistency test has been performed considering as additional control variables the inflows received by the aggregate of emerging countries, excluding Brazil. These new control variables are presumably powerful, given that flows toward all emerging countries tend to be strongly correlated. But the results of the 11 extra models built – with the same methodology explained above – do not diverge substantially from the original models shown in Table 5, which again highlights the robustness of the analysis.

Our results are reasonably consistent with those of previous econometric works measuring the effect of Brazilian regulation on capital inflows between 2006 and 2013. The IMF (2013, pp. 18–22) suggested that Brazilian regulation between March 2008 and June 2012 were effective in curbing portfolio flows and, in aggregate terms, in increasing the relevance of long-term inflows. This idea is also supported by Baumann and Gallagher (2012) for the period 2009-2011.

These authors also conclude that the regulation had no effect on aggregate inflows, again in agreement with the results of the present work, although the evidence presented here seems to be stronger, being the result of analysis of the whole regulatory cycle in Brazil between 2008 and 2013 (only partially covered by the aforementioned works). However, we must be cautious, because at least two methodological issues shed certain doubts on this comparison: (a) the IMF deals with net inflows instead of gross inflows; and (b) Baumann and Gallagher use dummy variables to capture changes in regulation, instead of regulation indices.

Forbes *et al*. (2015) perform a panel-data analysis with Brazil included in their 60-country sample, covering the period 2009-2011. They conclude that the effectiveness of the capital account regulation was, at best, limited, which is also in line with our results. But, again, the comparison is not perfect, because Forbes *et al*. (2015) focus on net inflows during 2009-2011, whereas we consider gross inflows for the period 2006-2013; furthermore, they compute 9 regulatory events on a weekly basis for Brazil, while we consider 72 regulatory changes on a monthly timescale.

Closer to our work is Forbes *et al*. (2016), a case study on the Brazilian experience regulating capital flows between 2006 and 2013. This work is mainly interested in the spillover effects of the Brazilian regulation on other countries. They confirm that, when Brazil tightens capital regulation, international investors respond by curbing the relative weight of Brazilian assets in their portfolios. This is a way to confirm that capital regulations were at least partly effective, as we also suggest. However, while Forbes *et al*. (2016) use portfolio allocation data coming from specific investment funds, we work with balance-of-payments data, which provides the most accurate picture of gross investment entering a country; and, again, while they register only 6 regulatory changes, we consider 72 changes over the same period.

Apart from the econometric literature, most previous descriptive analyses have also confirmed our finding, underlining that Brazilian regulation probably changed the composition of inflows (International Monetary Fund, 2012b, 2011; Organisation for economic co-operation and development, 2011; Pereira da Silva and Harris, 2012; Prates, 2012; Walker, 2010).

Finally, there is debate around the effects of Brazil's capital account regulation on exchange rate appreciation: some authors confirm this effect (Baumann and Gallagher, 2012; Roure et al., 2013), while some others do not (Chamon and Garcia, 2014). Insofar as we did not find effects of regulation measures on inflow volume, our results would be consistent with those who have not found effects over exchange rate behaviour.

5.2. Peru

We built 34 models to analyse the effects of capital account regulation in Peru, considering both basic and complete models. The estimation period is 2003:Q1 to 2013:Q4, except for two models where the period is shorter due to problems with availability of data (2004:Q1 to 2013:Q4). Thirteen control variables (out of the 26 initially tested) were found to be useful as explanatory variables, always presenting the expected sign in their coefficients: positive for interest rate differentials and proxy variables for Peru's appeal to foreign investors; negative for risk, inflation, and the expectation of exchange rate depreciation. The indicators of Peru's attractiveness to foreign investors are the more significant, as they show significance in 23 models. Table 6 shows the results for the 9 models describing Peruvian short-term "other investment" inflows; all other individual model results are available on request.

Table 6. Peru: models for the dependent variable "y_oth_st" (gross short-term "other investment" inflows)

	Mod Peru 20	Mod Peru 21	Mod Peru 22	Mod Peru 23	Mod Peru 24
Error model ARIMA(p,d,q)x(P,D,Q) →	(2,1,0) x (0,0,0)	(1,1,0) x (0,0,0)	(2,1,0) x (0,0,0)	(1,1,0) x (0,0,0)	(2,1,0) x (0,0,0)
exogenous variables ↓	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)
reg_dir		-0,0107467*** (0,00360686)	-0,00528746* (0,00275163)		
reg_tot				-0,0106105*** (0,00356283)	-0,00521939* (0,00272430)
rird_er_pen		0,0352904* (0,0189682)		0,0355163* (0,0189459)	
er_exp	-0,129117*** (0,0346350)		-0,0806204* (0,0415578)		-0,0804959* (0,0415406)
embi_g			-0,00199499** (0,00100720)		-0,00199394** (0,00100745)
Cpi	-0,161601** (0,0638373)				
Cab	0,356864** (0,153251)		0,303690* (0,170508)		0,303483* (0,170613)
Criteria for model comparison					
Schwarz	109,0920	107,4875	111,2780	107,5240	111,3039
S.D. of innovations	0,653184	0,707364	0,643903	0,707637	0,644096
Akaike	98,52475	100,4426	98,94961	100,4792	98,97546
Hannan-Quinn	102,4216	103,0406	103,4959	103,0771	103,5218
Residuals test					
Normality	Rejected (1%)	Rejected (1%)	Rejected (1%)	Rejected (1%)	Rejected (1%)
No heteroscedasticity	Not rejected	Rejected (5%)	Not rejected	Rejected (5%)	Not rejected
No autocorrelation	Not rejected	Not rejected	Not rejected	Not rejected	Not rejected

	Mod Peru 25	Mod Peru 26	Mod Peru 27	Mod Peru 28
Error model ARIMA(p,d,q)x(P,D,Q) →	(1,1,0) x (0,0,0)	(2,1,0) x (0,0,0)	(2,1,0) x (0,0,0)	(2,1,0) x (0,0,0)
exogenous variables ↓	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)	43 obs (2003:2-2013:4)
reg_rr	-0,0108246*** (0,00361317)	-0,00531221** (0,00263314)		
reg_ster1			-0,200954*** (0,0702235)	
reg_ster3				-0,228503* (0,133261)
rird_er_pen	0,0351839* (0,0188002)			
er_exp		-0,0806668** (0,0348257)	-0,0872955*** (0,0311230)	-0,105321*** (0,0326453)
embi_g		-0,00198239** (0,000968312)	-0,00225441** (0,000891294)	-0,00205421** (0,000937123)
Cab		0,305056* (0,172671)	0,269911* (0,159058)	0,318184* (0,166572)
Criteria for model comparison				
Schwarz	107,5241	111,3272	107,2719	112,4132
S.D. of innovations	0,707669	0,644267	0,613433	0,650986
Akaike	100,4793	98,99880	94,94352	100,0848
Hannan-Quinn	103,0772	103,5451	99,48985	104,6312
Residuals test				
Normality	Rejected (1%)	Rejected (1%)	Rejected (1%)	Rejected (5%)
No heteroscedasticity	Rejected (5%)	Not rejected	Not rejected	Not rejected
No autocorrelation	Not rejected	Not rejected	Not rejected	Not rejected

As was done with the case of Brazil, Table 7 gathers information obtained from the 34 estimated models. Where the regulation indices are significant, they most often have a negative sign, as expected. The only exception is Index 2 – "access to Central Bank short-term debt assets" – which displays a counter-intuitive positive coefficient. This is not very worrying, as the best models for Total and Non-FDI inflows exclude the regulation variable.

Table 7. Peru: effectiveness signs of capital flow regulation (34 models)*

	Direct reg.	Total reg.	Reg. Reserve req.	Access to Central Bank's short-term debt assets		
				Index 1	Index 2	index 3
Total inflows (2)					+(0)	
Non-FDI (6)	- (0)	- (0)	- (0)	- (0)	+(0)	
Portfolio (1)						
Other investments (O.I.) (5)	**- (4)**	**- (4)**	**- (4)**	- (2)		
O.I. long-term (3)		+(0)	+(0)			
O.I. long-term private (2)						
O.I. short-term (9)	- (2)	- (2)	- (2)	**- (4)**		- (1)
O.I. short-term (commerc. banks) (1)						
O.I. short-term (Central Bank) (1)						
O.I. short-term (others) (4)	+(0)	+(0)				

* See discussion of Table 5 for interpretation of this table

Based on this evidence, capital account regulation in Peru appears to have changed the composition of inflows, in line with regulators' purposes; short-term "other investment" inflows lost relevance as a component of "other investment" inflows in general. On the other hand, reserve requirement regulation did not affect the short-term inflows received by commercial banks. This is remarkable because the reserve requirement is considered critical by the Peruvian Central Bank. In the same way, the regulation did not significantly affect the short-term inflows received by the Central Bank and, like in Brazil, Peruvian indirect regulation had no significant effects. Lastly, the results suggest that there was a small but positive effect on the rest of short-term "other investment" inflows.

Two points need to be clarified here. On one hand, the regulation affecting the access by foreign investors to short-term debt assets combined two measures: an administrative tax of 4% (quite significant, as the reference interest rate in Peru never exceeded 5% during the period considered), and a complete ban which was periodically activated. In 2008 these two measures were applied for the first time and, logically, completely blocked this component of inflows. The episode had a strong and long-lasting discouraging effect, because even

though these measures were not always activated, their very existence discouraged such inflows permanently, as can be seen in the Peruvian balance of payments. The combination of changing regulation and stable (null) inflow explains the absence of an econometric relationship between these two variables.

On the other hand, most regulation indices have a significant negative effect over the "other investment" component of short-term inflows, even though the effects over their three sub-components were null or positive. The explanation may be that most of our regulation indices capture the main feature of the regulation in Peru: two periods of particularly high intensity (2008-2009, and from 2011 onward). The general picture is that short-term inflows are clearly less relevant in volume during the periods of stricter regulation, because short-term inflows received by the Central Bank were zero. And this is what the econometric models capture.

In the Peruvian case, we applied the same consistency and robustness check performed with the Brazil data, reaching similar conclusions. The results are reasonably consistent when looking at the different regulation indices affecting one specific inflow component. There is some inconsistency regarding the effect of the regulation on non-FDI and other investment flows – almost identical components but, according to the models, very differently affected by regulation. Nevertheless, the effect on these items is not very relevant for the effectiveness analysis because the Peruvian authorities never wanted to affect the volume of non-FDI inflows, but rather the composition of the "other investment" component. Finally, when capital inflows received by emerging countries (excluding Peru) are considered as additional control variables, 20 extra models yield results similar to those initially obtained.

As noted, we found no prior detailed analysis of the effectiveness of capital account regulation in Peru, so we cannot compare our results with other estimates. The present work is, to our knowledge, the first systematic attempt to address this issue by means of econometric methods.

6. Concluding remarks

This work summarizes an intensive econometric assessment of the effectiveness of capital account regulation in Brazil and Peru aimed at modulating the volume and composition of gross capital inflows. Having discussed the econometric results for each case separately, the comparison of both experiences now compels additional remarks.

The first is that the intensity of regulation really matters. In short: more intense

regulation offers a greater probability of affecting capital inflows. Moreover, the link between intensity and effectiveness appears to be far from trivial: there seems to be a minimum intensity threshold for the regulation to prove effective. For example, the Peruvian reserve requirement policy probably did not meet this minimum, being too tepid to significantly affect the short-term inflows received by commercial banks. On the other hand, Brazilian IOF rates were probably high enough to affect the behaviour of investors. The effect of Peru's regulation of short-term inflows received by the Central Bank is even clearer, given that it employed a combination of administrative and price measures – practically equivalent to a ban – which produced drastic effects on the inflow component on which it focused.

In any case, it would be a mistake to conclude that regulation should respond to the principle of "the stronger, the better", because regulation can also generate costs that decision-makers need to consider. These costs might arise from counter-productive distortions, or because the regulation discourages some potentially useful funding for the country. Therefore, our second remark is that regulators should carefully balance benefits and costs, considering preventive capital account regulation as just one alternative of public policy among others.

Comparison of the benefits and costs of capital regulation measures might help to explain the measures applied in each case. Peru probably chose very strong regulation in order to cut inflows received by the Central Bank, because such investment entailed severe problems (distortions of monetary policy, exchange rate instability) and almost no benefits, as it had never before been a sustained source of funding for the country.

On the other hand, both Brazil and Peru resorted to subtler measures (IOF and the reserve requirement, respectively) when they wanted to affect inflows that were simultaneously challenging and valuable. In each case, the space available for strengthening regulation without assuming unaffordable costs was narrower. Brazil succeeded in mitigating short-term flows but did not manage to curb total inflows, or the associated pressures of exchange rate appreciation. To achieve this second goal, Brazil probably should have affected the foreign direct investment channel. But since direct investment is the most welcome component of capital inflows, it is understandable why Brazil chose not to go further in this direction: to do so would have discouraged foreign direct investment.

In the case of Peru, there seems to have been an intense dependency on external funding received by banks to finance domestic non-mining activity, given the weakness of the domestic equity assets market, as well as the tradition of local companies to turn to domestic banks for funding. These facts

probably explain the timidity of the Peruvian reserve requirement.

While an empirical work is never incontestable, it may yet shed some light on links between the reality under analysis and the frameworks developed to interpret and understand it. In this line, we have analysed preventive capital account regulation in Brazil in Peru. No general conclusions can be derived from just two cases, illustrative though they may be. Still, our results, based on deep econometric analysis, can be seen as neither more nor less than potentially useful insights to inform further analyses.

ANNEX A: Capital account regulation measures applied by Brazil and Peru

Box 1. Capital account regulation in Brazil (2006-2013)

Direct regulation		
Finance Ministry	Foreign Direct Investment (IOF on foreign investor)	0% (JAN06); 0,38% (JAN08)
	Portfolio investment (IOF on foreign investor)	- Fixed income securities: 0% (JAN06); 1,5% (MAR08); 0% (OCT08); 2% (OCT09); 6% (OCT10); 0% if debt linked to long-term investment (DEC11); 0% in any case (JUN13) - Shares in investment funds: 0% (JAN06); 1,5% (MAR08); 0% (OCT08); 2% (OCT09); 6% (OCT10); 2% (JAN11); 0% (DEC11) - Equity securities: 0% (JAN06); 2% (OCT09); 0% (DEC11) - Investment redirection from FDI to portfolio investment in equity securities: 0% (JAN06); 2% (JAN11); 0% (DEC11) - ADR cancellation for buying the underlying asset: 0% (JAN06); 2% (JAN11); 0% (DEC11) - Transfer of assets in order to issue ADR out of Brazil: 0% (JAN06); 1,5% (NOV09); 0% (DEC13)
	FX credit inflows received and debt issued out of Brazil (IOF on domestic agents)	5% loans <= 90 days (JAN06); 5,38% loans <= 90 days (JAN08); 6% loans <= 1 year (MAR11); 6% loans <= 2 years (APR11); 6% loans <= 3 years (JAN12); 6% loans <= 5 years (MAR12); 6% loans <= 2 years (JUN12); 6% loans <= 1 year (DEC12)
	Futures markets (IOF on contracts)	- Guarantee margins: 0% (JAN06); 0,38% (MAR08); 6% for foreign investors (OCT10); 0% (JUN13) - Notional value: 0% (JAN06); 1% (JUL11); 0% for hedge derivatives (MAR12); 0% in any case (JUN13)
Central Bank	Advanced payments to exporters (restrictions on domestic agents)	- No restrictions (JAN06); advance for more than 1 year forbidden (MAR12); advance for more than 5 years forbidden (DEC12)
National Monetary Council	Complementary administrative measures on financial markets	- The investor must exit and enter (virtually) in order to change the destination of previous investments (OCT10) - No domestic agent is allowed to cede, rent, or lend securities to foreign investors in order to meet guarantee requirements on futures markets (OCT10)
Indirect regulation		
Finance Ministry	Credit operations (IOF on domestic banks)	- 0,0041%* (JAN06); 0,0082%* (JAN08); 0,0041%* (DEC08) (*per day, limited to a maximum charge over 365 days)
	Short FX open positions in spot markets (unremunerated reserve requirement on domestic banks)	- 0% (JAN06); 60% if the short position exceeds the minor between 3000 million BRL o the bank capital (ABR11); 60% if the short position exceeds the minor between 1000 million BRL o the bank capital (JUL11); 60% if the short position exceeds 3000 million BRL (DEC12); 0% (JUL13)
Central Bank	Credit to households (capital requirements on domestic banks)	- Maximum weight on credit risk assessment rises to 75% for some credits (JUL08); Maximum weight 150% (JUL11); Maximum weight 300% (NOV11)
	Short-term liabilities (deposits) (reserve requirement on domestic banks)	- Sight deposits: ordinary 45%, marginal 8% (JAN06); marg 5% (OCT08); ord 42% (NOV08); marg 8% (MAR10); ord 43% (JUL10); marg 12% (DEC10); ord 44% (JUL12) - Term deposits: ord 15%, marg 8% (JAN06); marg 5% (OCT08); marg 4% (JAN09); ord 13,5% (OCT09); marg 8% (MAR10); ord 15% (ABR10); ord 20%, marg 12% (DEC12)

Source: Secretaria da Receita Federal (n.d.); Banco Central do Brazil e Conselho Monetário Nacional (Banco Central do Brasil, n.d.). The data indicate when the measure becomes effective.

Box 2. Capital account regulation in Peru (2003-2013)

Direct regulation		
Central Bank	Reserve requirement on commercial banks' foreign liabilities (different requirement for PEN and USD liabilities): (44 Central Bank Rules between DEC02 and SEP13)	
	Access to short-term sterilization assets, non-resident investors	- Administrative tax on sterilization assets purchased in secondary market: raised from its ordinary level (0.1%) to 4% between MAR08 – NOV08 and after JUL10 - Sterilization assets unavailable for non-resident investors in some periods (FEB08-AUG08; JUL10-DEC10; JUN11-FEB12; JUN12-FEB13)
Finance Ministry	Fiscal taxes on foreign investors' capital rents	- Tax level for capital rents (domestic and foreign investors) raised in JAN10 and JAN13 - Capital rents obtained by foreign investors derived from derivatives contracts: new tax after JAN10 (to equalize the treatment with domestic agents)
Indirect regulation		
SBS	FX market (limits to domestic agents' operations)	- Limit to long FX global (spot and forward) position for banks (% equity capital): FEB10 (from 100% to 75%), NOV10 (from 75% to 60%), DEC 12 (from 60% to 50%) - Limit to short FX global (spot and forward) position for banks (% equity capital): FEB10 (from 10% to 15%), DEC12 (from 15% to 10%) - Limit to open FX forward position for banks: becomes stricter in JAN11, OCT11 and DEC11 - Limit to the volume of daily and weekly operations in FX markets (spot and forward) for Pension Funds (% assets): becomes stricter in JUN10 and JAN13
	Domestic credit	- Capital requirements for credit risk for banks: raised in NOV12 and JAN13 - Pro-cyclical provision for credit risk: active between OCT08 and SEP09, and again from OCT10

Source: Central Bank Rules (Banco Central de Reserva del Perú, n.d.); SBS (Superintendencia de Bancos, Seguros y Asociaciones de Fondos Privados de Pensiones del Perú, n.d.); Central Bank Inflation Report (Banco Central de Reserva del Perú, n.d.); (Choy and Chang, 2014, pp. 9, 12, 16, 17, 21); (International Monetary Fund, 2011, p. 38); interviews with employees of SUNAT (Superintendencia Nacional de Aduanas y de Administración Tributaria) and the Central Bank.

ANNEX B: Variables and data sources

1. Brazil

Monthly data (Jan 2006 to Dec 2013), except "embi_b" and derived variables (Jun 2006 to Dec 2013). When daily data is available, the first data of the quarter is assigned to this period.

Table A.1. Brazil: variables and data sources

Gross capital inflows	
Monthly external liability variations in USD (balance-of-payments statistics) divided by nominal annual GDP in USD. Nine different variables: y (total inflow), y_non_fdi (inflow distinct from foreign direct investment), y_por (portfolio inflow), y_por_eq (portfolio equity inflow), y_por_fi (portfolio fixed income inflow), y_por_fi_lt (portfolio long-term fixed income inflow), y_por_fi_st (portfolio short-term fixed income inflow), y_oth ("other investment" inflow), y_oth_st (short-term "other investment" inflow). Data: Banco Central do Brasil (n.d.)	
Capital account regulation indices	
reg_fi1	Addition of IOF rates applied on the acquisition by foreign investors of fixed income securities
reg_fi2	Computation of regulation events (strengthening=+1, lightening=-1): IOF rates applied on the acquisition by foreign investors of fixed income securities
reg_por1	Addition of IOF rates applied on the acquisition by foreign investors of fixed income securities, investment funds shares, equity securities, and redirection from FDI to portfolio investment in equity securities
reg_por2	Computation of regulation events (strengthening=+1, lightening=-1): the same transactions detailed for "reg_por1"
reg_banc	Computation of regulation events (strengthening=+1, lightening=-1) affecting domestic banks: IOF due to FX credit inflows received and debt issued out of Brazil, IOF due to credit operations, reserve requirement due to short FX open positions in spot market, capital requirements due to household credit, reserve requirement due to sight and term deposits
reg_dir	Computation of regulation events (strengthening=+1, lightening=-1) considered "direct regulation": those included for building "reg_por2", IOF on foreign direct investment, IOF on the cancellation of Depository Receipts for buying the underlying asset, IOF on the Cession of assets in order to issue Depository Receipts out of Brazil, IOF on domestic agents due to FX credit inflows received and debt issued out of Brazil, IOF on the contracts in FX forward markets, administrative measures to restrict advanced payments received by exporters and other complementary measures affecting domestic financial markets
reg_tot	Computation of regulation events (strengthening=+1, lightening=-1) considered as "total regulation": those included for building "reg_dir" and "reg_banc"
Source: Secretaria da Receita Federal (n.d.); Banco Central do Brazil e Conselho Monetário Nacional (Banco Central do Brasil, n.d.)	
Interest rate differentials	
er_exp	"er_exp" at month "m" = variation of the spot BRL/USD exchange rate over month "m-1" (%)
ird	Nominal interest rate differential Brazil (treasury bills) - rest of the world (3 months nominal USD LIBOR) (%)
ird_fw	"ird" minus BRL/USD 1 month forward premium ((F-e)/e with F=BRL/USD 1 month forward exchange rate; e=BRL/USD spot exchange rate) (%)
ird_er	"ird" minus "er_exp"
rird	Real interest rate differential Brazil (BRL treasury bills interest rates minus BRL past annual inflation) - rest of the world (3 months nominal USD LIBOR minus 4* past quarterly USD inflation) (%)
rird_fw	"rird" minus BRL/USD 1 month forward premium (%) (see the description of "ird_fw")
rird_er	"rird" minus "er_exp"
Sources: own calculations with data from *Ecowin* (Thomson Reuters, n.d.) (BRL/USD spot exchange rate and BRL/USD 1 month forward exchange rate (daily data)), Banco Central de Reserva del Perú (n.d.) (3 months nominal USD LIBOR interest rate (% annualized, daily data)), *International Financial Statistics* (International Monetary Fund, n.d.) (BRL treasury bills nominal interest rate (% annual, monthly data)), Bureau of Labor Statistics (n.d.) (US *Consumer Price Index* (index value, monthly data)), Banco Central do Brasil (n.d.) (*Índice geral de preços do mercado* (IGP-M) of Brazil (% monthly variation, monthly data))	
Risk	
embi_b	*Emerging Markets Bonds Index* Brazil (basis points), built by JP Morgan
embi_la	*Emerging Markets Bonds Index* Latin America (basis points), built by JP Morgan
embi_g	*Emerging Markets Bonds Index* Global (basis points), built by JP Morgan
vix	*Chicago Board Options Exchange Market Volatility Index*

Sources: Banco Central de Reserva del Perú (n.d.) (EMBI Brazil (basis points, monthly data)), Banco Central de Chile (n.d.) (EMBI Latin America, EMBI Chile, EMBI Asia, EMBI Europe and EMBI Global (basis points, monthly data)), *Chicago Board Options Exchange* (n.d.) (VIX (points, daily data))

Appeal for investors		
gdp_r	Real GDP annual growth rate in Brazil (%)	Own calculations with data from Banco Central do Brasil (n.d.)
cab	Current account balance (% of annual GDP)	
igp	*Índice geral de preços do mercado* (IGP-M) (% annual variation)	
bovespa0	Bovespa stock exchange index about Sao Paulo stock market (points)	
bovespa1/2/3/4/5	Bovespa stock exchange index about Sao Paulo stock market (% relative growth in 1, 2, 3, 4 and 5 months)	
FTSE	FTSE *(Financial Times Stock Exchange) Emerging Latin America Index* (% monthly growth). Own calculations with data from *Datastream* (Thomson Reuters, n.d.)	
gdp_eme	Real GDP annual growth rate in emerging and developing countries (%)	*World Economic Outlook Database* (International Monetary Fund, n.d.)
gdp_br_eme	Real GDP annual growth rate in Brazil minus Real GDP annual growth rate in emerging and developing countries (%)	
cpi_br_eme	Annual variation of the Consumer Price Index for Brazil minus Annual variation of the CPI in emerging and developing countries (%)	
bov_FTSE	"bovespa1" minus "FTSE"	
embi_b_g	"embi_b" minus "embi_g") (% of EMBI Global)*	See risk variables for details about data sources
embi_b_chi	"embi_b" minus EMBI Chile (% of EMBI Chile)*	
embi_b_la	"embi_b" minus "embi_la" (% of EMBI Latin America)*	
embi_b_as	"embi_b" minus EMBI Asia (% of EMBI Asia)*	
embi_b_eu	"embi_b" minus EMBI Europe (% of EMBI Europe)*	
y_por_eme1	Gross portfolio inflows received by emerging countries excluding Brazil (% of annual GDP of emerging countries)	Countries considered: Chile, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russian Federation, South Africa, Thailand, and Turkey. Own calculations with data from *Balance of Payments and International Investment Position Statistics* (International Monetary Fund, n.d.) and *World Development Indicators Database* (World Bank, n.d.). Quarterly data available: the value for the quarter is assigned to its three months
y_oth_eme1	"Other investment" inflows received by emerging countries excluding Brazil (% of annual GDP of emerging countries)**	
y_non_FDI_eme1	Inflows distinct from Foreign Direct Investment received by emerging countries excluding Brazil (% of annual GDP of emerging countries)**	

2. Peru

Quarterly data (2003:Q1 to 2013:Q4), except: "ird_fw_pen" and "rird_fw_pen" (2003:Q3 to 2013:Q4); and "y_por_eme2", "y_oth_eme2", and "y_non_FDI_eme2" (2005:Q1 to 2013:Q4). When daily or monthly data is available, the first data of the quarter is assigned to that period.

Table A.2. Peru: variables and data sources

Gross capital inflows	
Quarterly external liability variations in USD (balance-of-payments statistics) divided by nominal annual GDP in USD. Ten different variables: y (total inflow), y_non_fdi (inflow distinct from foreign direct investment), y_por (portfolio inflow), y_oth ("other investment" inflow), y_oth_lt (long-term "other investment" inflow), y_oth_lt_pr (private long-term "other investment" inflow), y_oth_st (short-term "other investment" inflow), y_oth_st_banc (short-term "other investment" inflows received by commercial banks), y_oth_st_cb (short-term "other investment" inflow received by the Central Bank), and y_oth_st_rest (short-term "other investment" inflow received by agents other than the Central Bank or commercial banks). Data: Banco Central de Reserva del Perú (n.d.)	
Capital account regulation indices	
reg_ster1	Administrative tax applied by the Central Bank on sterilisation assets purchased in secondary market
reg_ster2	Dummy variable capturing administrative obstacles to the access of foreign investors to sterilisation assets issued by the Central Bank: takes value 1 if foreign investors cannot purchase these assets, and 0 otherwise
reg_ster3	Computation of regulation events (strengthening=+1, lightening=-1) affecting the access of foreign investors to sterilisation assets issued by the Central Bank: administrative tax and administrative obstacles
reg_rr	Computation of regulation events (strengthening=+1, lightening=-1) regarding reserve requirement on commercial banks' foreign liabilities (PEN and USD)
reg_dir	Computation of regulation events (strengthening=+1, lightening=-1) considered "direct regulation": those included for building "reg_rr" and "reg_ster3", and fiscal policy affecting the capital rents of foreign investors
reg_tot	Computation of regulation events (strengthening=+1, lightening=-1) considered "total regulation": those included for building "reg_dir" and other indirect measures that limit FX spot and forward operations of domestic agents and discourage domestic banks credit operations applying capital requirements or provisions for risk credit
Source: Central Bank Rules (Banco Central de Reserva del Perú, n.d.); SBS (Superintendencia de Bancos, Seguros y Asociaciones de Fondos Privados de Pensiones del Perú, n.d.); Central Bank Inflation Report (Banco Central de Reserva del Perú, n.d.); (Choy and Chang, 2014, p. 9,12,16,17,21); IMF (2011, p. 38); interviews with employees of SUNAT (Superintendencia Nacional de Aduanas y de Administración Tributaria) and the Central Bank	
Interest rate differentials	
er_exp	"er_exp" at quarter "q" = variation of the spot PEN/USD exchange rate over quarter "q-1" (%)
ird_pen	Nominal interest rate differential Peru (PEN interbank interest rate) - rest of the world (3 months nominal USD LIBOR) (%)
ird_fw_pen	"ird_pen" minus PEN/USD 1 month forward premium ((F-e)/e with F=PEN/USD 1 month forward exchange rate; e=PEN/USD spot exchange rate) (%)
ird_er_pen	"ird_pen" minus "er_exp"
rird_pen	Real interest rate differential Peru (PEN interbank real interest rate minus PEN past annual inflation) - rest of the world (3 months nominal USD LIBOR minus 4*past quarterly USD inflation) (%)
rird_fw_pen	"rird_pen" minus PEN/USD 1 month forward premium (%) (see the description of "ird_fw_pen")
rird_er_pen	"rird_pen" minus "er_exp"
ird_usd	Nominal interest rate differential Peru (USD interbank interest rate) - rest of the world (3 months nominal USD LIBOR) (%)
Sources: own calculations with data from Banco Central de Reserva del Perú (n.d.) (PEN/USD interbank spot exchange rate (PEN/USD, daily data) for "er_exp", 3 months nominal USD LIBOR interest rate (% annualized, daily data), Peru interbank interest rates in PEN and USD (% annual, daily data, *Indice de Precios del Consumidor de Lima* (% annual variation, monthly data)), Ecowin (Thomson Reuters, n.d.) (PEN/USD spot exchange rate, PEN/USD 1 month forward exchange rate for forward premium calculations (daily data)), Bureau of Labor Statistics (n.d.) (US *Consumer Price Index* (index value, monthly data))	
Risk	
embi_p	*Emerging Markets Bonds Index* Peru (basis points), built by JP Morgan
embi_la	*Emerging Markets Bonds Index* Latin America (basis points), built by JP Morgan
embi_g	*Emerging Markets Bonds Index* Global (basis points), built by JP Morgan
Vix	*Chicago Board Options Exchange Market Volatility Index*
Sources: EMBI Peru (basis points, daily data) from Banco Central de Reserva del Perú (n.d.); EMBI Latin America, EMBI Chile, EMBI	

Asia, EMBI Europe and EMBI Global (basis points, monthly data) from Banco Central de Chile (n.d.); VIX (points, daily data) from *Chicago Board Options Exchange* (n.d.)		
Appeal for investors		
gdp_r	Real GDP annual growth rate in Peru (%)	Own calculations with data from Banco Central de Reserva del Peru (Banco Central de Reserva del Perú, n.d.)
cab	Current account balance (% of annual GDP)	
cpi	*Índice de Precios del Consumidor de Lima* (% annual variation, monthly data)	
copper_0	Copper price in the international market (USD/TM, daily data available)	Own calculations with data from Datastream (Thomson Reuters, n.d.)
copper_1	Copper price in the international market (% variation during the last quarter)	
FTSE	FTSE *(Financial Times Stock Exchange) Emerging Latin America Index* (% quarterly growth)	
gdp_eme	Real GDP annual growth rate in emerging and developing countries (%).	*World Economic Outlook Database* (International Monetary Fund, n.d.)
gdp_per_eme	Real GDP annual growth rate in Peru minus Real GDP annual growth rate in emerging and developing countries (%)	
cpi_per_eme	Annual variation of the Consumer Price Index in Peru minus Annual variation of the CPI in emerging and developing countries (%)	
embi_p_g	"embi_p" minus "embi_g" (% of EMBI Global)	See risk variables for details about data sources
embi_p_chi	"embi_p" minus EMBI Chile (% of EMBI Chile)	
embi_p_la	"embi_p" minus "embi_la" (% of EMBI Latin America)	
embi_p_as	"embi_p" minus EMBI Asia (% of EMBI Asia)	
embi_p_eu	"embi_p" minus EMBI Europe (% of EMBI Europe)	
y_por_eme2	Gross portfolio inflows received by emerging countries excluding Peru (% of annual GDP of emerging countries).	Countries considered: Brazil, Chile, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russian Federation, South Africa, Thailand, and Turkey. Own calculations with data from *Balance of Payments and International Investment Position Statistics* (International Monetary Fund, n.d.) and *World Development Indicators Database* (World Bank, n.d.)
y_oth_eme2	"Other investment" inflows received by emerging countries excluding Peru (% of annual GDP of emerging countries)	
y_non_FDI_eme2	Inflows distinct from Foreign Direct Investment received by emerging countries excluding Peru (% of annual GDP of emerging countries)	

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References

Ahmed, S., Zlate, A., 2013. Capital Flows to Emerging Market Economies: A Brave New World? (No. 1081), International finance discussion papers. Board of Governors of the Federal Reserve System.

Ariyoshi, A., Habermeier, K., Laurens, B., Otker-Robe, I., Canales-Kriljenko, J.I., Kirilenko, A., 2000. Capital controls: country experiences with their use and liberalization (No. 190), Occasional Paper. International Monetary Fund, Washington, D.C.

Baba, C., Kokenyne, A., 2012. Effectiveness of Capital Controls in Selected Emerging Markets in the 2000s (No. WP/11/281), IMF Working Paper. International Monetary Fund, Washington, D.C.

Banco Central de Chile, n.d. Estadísticas.

Banco Central de Reserva del Perú, n.d. Circulares (varios años).

Banco Central de Reserva del Perú, n.d. Reporte de inflación (varios años).

Banco Central de Reserva del Perú, n.d. Estadísticas.

Banco Central do Brasil, n.d. Legislação e normas.

Banco Central do Brasil, n.d. Statistics: time series management system 2.1. Public module.

Baumann, B.A., Gallagher, K.P., 2012. Navigating Capital Flows in Brazil and Chile. Initiative for Policy Dialogue working paper.

Benigno, G., Converse, N., Fornaro, L., 2014. Large capital inflows, sectorial allocation and economic performance.

Box, G.E.P., Jenkins, G.M., Reinsel, G.C., 2008. Time series analysis: forecasting and control, 4th ed. John Wiley & Sons.

Bruno, V., Shim, I., Shin, H.S., 2015. Comparative assessment of macroprudential policies (No. 502), BIS Working Paper. Bank for International Settlements.

Bureau of Labor Statistics, n.d. Consumer Price Index - All Urban Consumers.

Cardarelli, R., Elekdag, S., Kose, M.A., 2010. Capital inflows: Macroeconomic implications and policy responses (No. WP/09/40), IMF Working Paper. International Monetary Fund, Washington, D.C.

Cardoso, E., Goldfajn, I., 1998. Capital flows to Brazil: the endogeneity of capital controls. Staff Papers-International Monetary Fund 161–202.

Chamon, M., Garcia, M.G.P., 2014. Capital controls in Brazil: effective? Presented at the 15th Jacques Polack annual Research Conference, Washington, D.C.

Chicago Board Options Exchange, n.d. VIX Options and Futures Historical Data.

Choy, M., Chang, G., 2014. Medidas macroprudenciales aplicadas en el Perú (No. N° 2014-007), Documentos de Trabajo. Banco Central de la

Reserva de Perú.

Concha, A., Galindo, A.J., Vasquez, D., 2011. An assessment of another decade of capital controls in Colombia: 1998–2008. The Quarterly Review of Economics and Finance 51, 319–338.

De Gregorio, J., Edwards, S., Valdés, R.O., 2000. Controls on capital inflows: do they work? Journal of Development Economics 63, 59–83. https://doi.org/10.1016/S0304-3878(00)00100-0

Edison, H.J., Warnock, F.E., 2003. A simple measure of the intensity of capital controls. Journal of Empirical Finance 10, 81–103.

Edwards, S., 1999. How effective are capital controls? The Journal of Economic Perspectives 13, 65–84.

Edwards, S., Rigobon, R., 2009. Capital controls on inflows, exchange rate volatility and external vulnerability. Journal of International Economics 78, 256–267. https://doi.org/10.1016/j.jinteco.2009.04.005

Eichengreen, B.J., 2003. Capital flows and crises. MIT press.

Erten, B., Ocampo, J.A., 2016. Macroeconomic Effects of Capital Account Regulations. IMF Economic Review 1–48. https://doi.org/10.1057/s41308-016-0013-1

Fernández, A., Klein, M.W., Rebucci, A., Schindler, M., Uribe, M., 2015. Capital control measures: a new dataset.

Fischer, S., 1997. Capital Account Liberalization and the Role of the IMF. Presented at the Conference on development of securities markets in emerging markets, Inter-American Development Bank. Washington DC.

Forbes, K., Fratzscher, M., Kostka, T., Straub, R., 2016. Bubble thy neighbour: Portfolio effects and externalities from capital controls. Journal of International Economics 99, 85–104.

Forbes, K., Fratzscher, M., Straub, R., 2015. Capital-flow management measures: What are they good for? Journal of International Economics 96, S76–S97.

Forbes, K.J., 2007. One cost of the Chilean capital controls: increased financial constraints for smaller traded firms. Journal of International Economics 71, 294–323.

Forbes, K.J., Warnock, F.E., 2012. Capital flow waves: Surges, stops, flight, and retrenchment. Journal of International Economics 88, 235–251. https://doi.org/10.1016/j.jinteco.2012.03.006

Gallagher, K.P., Griffith-Jones, S., Ocampo, J.A. (Eds.), 2012. Regulating Global Capital Flows for Long-Run Development, Pardee Center Task Force Report. The Frederick S. Pardee Center for the Study of the Longer-Range Future. Boston University, Boston.

Ghosh, A.R., Kim, J., Qureshi, M.S., Zalduendo, J., 2012. Surges (No. WP/11/22), IMF Working Paper. International Monetary Fund, Washington, D.C.

Habermeier, K., Kokenyne, A., Baba, C., 2011. The Effectiveness of Capital Controls and Prudential Policies in Managing Large Inflows (No. SDN/11/14), Staff Discussion Note. International Monetary Fund, Washington, D.C.

International Monetary Fund, 2014. Peru: Selected Issues Paper (No. 14/22), IMF Country Report. International Monetary Fund, Washington, D.C.

International Monetary Fund, 2013. Brazil: Technical Note on Macroprudential Policy Framework (No. 13/148), IMF Country Report. International Monetary Fund, Washington, D.C.

International Monetary Fund, 2012a. The liberalization and management of capital flows: an institutional view. International Monetary Fund, Washington, D.C.

International Monetary Fund, 2012b. Brazil: 2012 Article IV Consultation—Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Brazil (No. 12/191), IMF Country Report. International Monetary Fund, Washington, D.C.

International Monetary Fund, 2011. Recent Experiences in Managing Capital Inflows—Cross-Cutting Themes and Possible Policy Framework. International Monetary Fund, Washington, D.C.

International Monetary Fund, n.d. International Financial Statistics.

International Monetary Fund, n.d. World Economic Outlook Database.

International Monetary Fund, n.d. Balance of Payments and International Investment Position Statistics.

Kaplan, E., Rodrik, D., 2002. Did the Malaysian capital controls work?, in: Edwards, S., Frankel, J.A. (Eds.), Preventing Currency Crises in Emerging Markets. University of Chicago Press, pp. 393–440.

Klein, M.W., 2012. Capital Controls: Gates versus Walls (No. 18526), NBER Working Paper Series. National Bureau of Economic Research, Cambridge. Massachusetts.

Koepke, R., 2015. What drives capital flows to emerging markets? A survey of the empirical literature (No. 62770), MPRA paper. Munich Personal RePEc Archive.

Magud, N., Reinhart, C.M., 2006. Capital controls: an evaluation. National Bureau of Economic Research.

Mantega, G., 2009. Dólar cai e Mantega não descarta medidas adicionais sobre câmbio [WWW Document]. BBC Brasil. URL http://www.bbc.co.uk/portuguese/noticias/2009/10/091021_mantega_cambio_dt.shtml (accessed 2.11.14).

Nier, E., Sedik, T.S., Mondino, T., 2014. Gross Private Capital Flows to Emerging Markets: Can the Global Financial Cycle Be Tamed? (No. WP/14/196), IMF Working Paper. International Monetary Fund, Washington, D.C.

Ocampo, J.A., 2015. Capital account liberalization and management (No. 2015/048), WIDER Working Paper. United Nations University - World Institute for Development Economic Research.

Ocampo, J.A., 2002. Capital-account and counter-cyclical prudential regulations in developing countries (No. 2002/82), WIDER Discussion Papers. World Institute for Development Economics (UNU-WIDER).

Organisation for economic co-operation and development, 2011. OECD Economic Surveys: Brazil 2011. Organisation for economic co-operation and development. OECD Publishing, Washington, D.C.

Ostry, J.D., Ghosh, A.R., Chamon, M., Qureshi, M.S., 2012. Tools for Managing Financial-Stability Risks from Capital Inflows. Journal of International Economics 88, 407–421.

Pasricha, G., Falagiarda, M., Bijsterbosch, M., Aizenman, J., 2015. Domestic and multilateral effects of capital controls in emerging markets (No. 1844), Working Paper Series. European Central Bank.

Pereira da Silva, L.A., Harris, R.E., 2012. Sailing through the Global Financial Storm: Brazil's recent experience with monetary and macroprudential policies to lean against the financial cycle and deal with systemic risks

(No. 290), Workin Paper series.

Prates, D.M., 2012. How to evaluate financial regulation of Brazil.

Quinn, D., Schindler, M., Toyoda, A.M., 2011. Assessing measures of financial openness and integration. IMF Economic Review 59, 488–522.

Rojas-Suárez, L., 2002. Comment to Kaplan, Ethan y Dani Rodrik (2002). “Did the Malaysian control capitals work?,” in: Edwards, S., Frankel, J.A. (Eds.), Preventing Currency Crises in Emerging Markets. University of Chicago Press, pp. 393–440.

Rossini, R., Quispe, Z., Rodríguez, D., 2011. Capital Flows, Monetary Policy and Forex Intervention in Peru (No. 2011– 008), Documentos de Trabajo. Banco Central de la Reserva de Perú.

Rossini, R., Quispe, Z., Serrano, E., 2013. Foreign exchange intervention in Peru, in: Market Volatility and Foreign Exchange Intervention in EMEs: What Has Changed?, BIS Papers. Bank for International Settlements.

Roure, C. de, Furniagiev, S., Reitz, S., 2013. The microstructure of exchange rate management: FX intervention and capital controls in Brazil. Kiel Working Paper.

Secretaria da Receita Federal. Ministério de Fazenda de Brazil, n.d. IOF (Imposto sobre operações de crédito, câmbio e seguro, ou relativo a títulos mobiliários).

Stiglitz, J.E., 2002. Globalization and its Discontents. New York Norton.

Stiglitz, J.E., Ocampo, J.A., Spiegel, S., Ffrench-Davis, R., Nayyar, D., 2006. Stability with Growth: Macroeconomics, Liberalization and Development: Macroeconomics, Liberalization and Development. OUP Oxford.

Superintendencia de Bancos, Seguros y Asociaciones de Fondos Privados de Pensiones del Perú, n.d. Resoluciones (varios años).

Tamirisa, N.T., 2001. Capital controls in response to the Asian crisis. Kanitta Meesook and others, Malaysia: From Crisis to Recovery, Occasional Paper.

Terrier, G., Valdés, R., Tovar, C., Chan-Lau, J., Fernández-Valdovinos, C., García-Escribano, M., Medeiros, C.I., Tang, M.K., Vera-Martin, M., Walker, W.C., 2011. Policy instruments to lean against the wind in Latin America. IMF Working Papers WP/11/159 1–113.

Thomson Reuters, n.d. Ecowin.

Thomson Reuters, n.d. Datastream.

Walker, C., 2010. Brazil’s Tax on Capital Inflows, 2009–10, in: Global Financial Stability Report: Sovereigns, Funding, and Systemic Liquidity. pp. 33–34.

World Bank, n.d. World Development Indicators Database.