

Effectiveness of Capital Controls to Reduce Short Term Flows

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We explore the conditions under which capital controls can be effective to reduce short term flows. In a recent study, Magud, Reinhart and Rogoff, 2018, present a model in which this effectiveness is dependent on the elasticity of short-term capital on total capital flows. We verify the model propositions empirically by computing these elasticities and monitoring of the variation of short-term flows for countries experienced with control. The application of this elasticity approach to the emergents countries of South Asia and Latin America allow confirming the model propositions, and these elasticities are determinants for effective restrictions policies.

Key words: *Capital controls, Short-term, Elasticity.*

Introduction

Reduce the volume of capital flows; change the composition of capital flows to long-term capital flows; act on the real exchange rate, and have a more independent monetary policy, are often the goals targeted by effective capital controls (Magud, Reinhart and Rogoff, 2018).

The capital control literature has presented several problems that have made it difficult to make clear recommendations as to whether or not these controls achieve these objectives (or at least one of these objectives), the results are diverse and numerous. (Korinek, 2011, Benigno et al., 2013, Bianchi and Mendoza, 2011, and Jeanne and Korinek, 2010).

First, there is a lack of a single theoretical framework that clearly defines the macroeconomic consequences of these restrictions (Currie 1985, Axelrod 1980, Blackburn and Currie 1984). Secondly, there is a strong heterogeneity between the countries applying controls; they differ in several aspects (wealth, institutional quality, etc.) (Chanda, 2005, Magud, Reinhart and

Rogoff, 2007). Similarly, the dates of use of these controls differ from one country to another and often constitute a response to a financial crisis (Kaminsky and Schmukler, 2001). Thirdly, it seems difficult to isolate the direct effects of these controls to know if they succeed to limit the capital outflows, and especially that the objectives are multiple as noted previously. (Fernandez et al. 2015, Fratzscher, 2017, Forbes et al. 2015, Aizenman and Pasricha, 2013).

The measures used as a proxy for a capital controls policy are multiple and diverse. The methodology for using these measures differs from one study to another (Edison and Warnock 2003, Reinhart and Montiel 1999). The two successful examples of capital controls are Malaysia and Chile, they are often studied in the empirical literature, but other countries have failed with these restrictive policies (Kaplan and Rodrik, 2001; Athukorala, 2008).

Studies on the effectiveness of capital controls are still current, despite the previously mentioned shortcomings (Tamirisa, 2004). Identifying the precise effects of controls on the quads objectives presented seems difficult. It would be appropriate to study only one objective to have more definite results. In this study, we aim to test the effectiveness of capital controls to reduce short-term capital fluctuations. In several studies on financial crises, these types of flows are the primary source of financial instability in emerging countries (Cordella 1998, Griffith, Montes and Nasution 2001).

The paper presents new analysis of the effectiveness of capital controls to reduce short term flows. To our knowledge, no prior studies have examined the conditions of success of capital controls through calculable methods. We do this by computing the elasticities of short term flows. The study also contributes to the empirical literature on the effectiveness of capital controls by analyzing recent countries experiences with controls (Argentina (2019), Cyprus (2013), Greece (2015), etc.).

We use the model presented by Magud, Reinhart and Rogoff, 2018, to test the effectiveness of capital controls to reduce short-term flows. The main proposals in this model suggest that short-run capital elasticity relative to capital-controlled total capital flows can provide information on the change in short-term flows (decrease, increase and unchanged).

Through computing the elasticity of short-term flow on total capital flows, we aim to validate the model's propositions. We apply this to the cases of separate countries experienced in capital controls and for the region of South Asia and Latin America. Depending on the type of elasticity found (elastic/inelastic / unit), the majority of country/year cases of capital controls confirm the model's propositions.

The paper proceeds as follows. The second section presents why restrictive policies succeed with some countries and fail with others. Through a review of the empirical literature and by analyzing recent experiences of countries with controls, we determine the difficulty of finding a clear conclusion on the effectiveness of these controls. Section four shows an empirical validation of the model suggested for studying. The elasticity of demand for short-term flows is determinant for the variation of these types of flows. The last section discusses the implication of our findings and the policies required for successful capital controls to reduce short-term capital flows.

Do Capital Controls Reduce Short Term Flows?

The question of the effectiveness of capital controls is increasingly debated (Magud, Reinhart and Rogoff, 2018), with many countries currently using them, even though their effectiveness still does not seem to be clearly established and they create distortions if they are indefinite.

Regarding the processes envisaged to achieve the effective regulation of international capital flows, it is difficult to establish "best practices" in this area because the problems and the way markets respond to them differ significantly depending on the legal and market context concerned (Tarullo, 2002).

The study of the effectiveness of capital controls generally takes two aspects: their actions on capital flows and achieving macroeconomic objectives (autonomy of monetary policy, reduction of exchange rate pressures, etc.). This paper focuses on the first aspect, in particular, the impact of controls on short-term flows. The volatility of these short-term flows can destabilize underdeveloped financial markets (Rodrik, 1998). Capital controls on short-term capital flows are often used to reduce these financial instabilities.

After the financial crisis of 2008, more than 1 in 2 economies have used restrictions on short-term capital inflows, and more than 1 in 3 economies have added more restrictions (Fernandez et al., 2015).

In this section, we present the empirical literature on the effectiveness of controls. Then we proceed to a brief review of experienced countries with capital controls and the management of short-term capital flows. This survey includes older experiences such as Brazil, Thailand, Malaysia and Colombia and recent experiences such as Iceland, Ukraine, Cyprus, Argentina, Greece and Russia.

Literature Review

Econometric and statistical studies of the effectiveness of capital controls have several methodological shortcomings. In particular, there are some criticisms for the indices used to

reflect the intensity of capital controls, and many studies simply use dummy variables that take the value of 1 for the presence of controls and 0 for none. It is often difficult to separate the effects caused by controls from effects caused by other macroeconomics policies (e.g., the effectiveness of prudential supervision). In the majority of these studies, controls have been successful, but unfortunately, the degree of success is not equal for all countries.

A meta-analysis is carried out by Magud, Reinhart and Rogoff (2018) and regroups many studies on the effectiveness of controls. The authors analyze 40 empirical studies on the four main objectives of capital controls (reduce the volume of capital flows; change the composition of capital flows in favour of long-term capital flows; affect the real exchange rate, and enable a more independent monetary policy).

These studies show that, in general, capital controls were successful in reducing short capital flows. Among the papers, the authors cited were Cardoso and Goldfajn (1998); Reinhart and Smith (1998); De Gregorio, Edwards and Valdes (2000); Gallego, Hernandez and Schmidt-Hebbel (2002); Le Fort and Budnevich (1998); Baba and Kokenyne (2011) and Montiel and Reinhart (1999). Table 1 summarizes the results of these studies.

Table 1: Summary of studies' results

Study	Did controls reduce the volume of short capital flows
Control on Inflows	
Brazil	Unclear
Chile	Unclear
Colombia	Unclear
Malaysia (1989)	Yes
Malaysia (1994)	Yes
Thailand	Yes
Control on Outflows	
Malaysia (1998)	Unclear
Spain	Unclear
Thailand	Yes
Multi-countries studies	Yes

Note: Yes stands for yes, it works; No, for no, it did not work; Unclear for mixed results.

Depending on the time scale of controls (short time or a long time) the effectiveness of these controls also differs. Cardoso and Goldfajn (1998) show that capital controls were endogenous. When the inflow of short-term capital is massive, the government reacts quickly by instituting controls. The controls are released later when there is a decrease. The authors

show that these controls can be effective in the short term by reducing short-term flows, but they are inefficient in the long run.

The same conclusion is found by Laurens and Cardoso (1998) for the Chilean experience during the 1990s. It was evident that controls were able to affect the level of capital flows only in the short term. In addition, Klein and Shambaugh (2015) find that capital controls have only limited effectiveness, and if this occurs, it is for a short time. The results of these papers are interesting and demonstrate that the controls work better in the short term. We take inspiration from these papers when we try to validate the model's proposition by the use of the variation (to reflect the short time scale) of short-term flows. Ostry et al. (2010) analyze 21 country and cross-country studies (cases of Brazil, Chile, Colombia, Croatia, Malaysia, Thailand). Ten cases found some effects in reducing the volume (but mostly short-term); 19 cases found some effects in altering the composition (7 short-term effects). Moreover, Ostry et al. (2011) studied the effects of capital controls and prudential policies in 41 countries in 1995 - 2008. Capital controls are measured based on IMF AREAER and internal surveys; they find that the composition of capital flows is affected by a smaller share of debt liabilities.

Saborowski et al. (2014) studied 37 countries that introduced outflow restrictions from 1995-2010. The authors find evidence that capital outflow restrictions reduce gross capital outflows, however, under certain conditions: strong macroeconomic fundamentals (growth rate, inflation, fiscal and current account balances); good institutions (World Bank Governance Effectiveness Index); and existing restrictions (intensity of capital controls or comprehensiveness). When none of the three conditions is met, controls will fail to reduce net outflows. Furthermore, some studies suggest that controls are more effective in advanced countries than in developing ones, perhaps because of the better quality of institutions and regulations (Binici, Hutchison and Schindler, 2010).

Some Countries' Experiences

The effectiveness of controls differs across countries. It is difficult to say whether or not a country has succeeded in reducing short-term flows by applying capital controls. With the previous analysis, e.g., of one country, the effectiveness of controls can be admitted for a precise period or year, but it does not confirm other periods. For these reasons, we cannot separate the successful country cases from the failed cases.

The case-setting of countries with capital controls can be carried out on the basis of recent or older experience with the control of capital. At first, we present "old" experiences with controls (Chile, Thailand, Malaysia, etc.), and then we discuss "recent" cases, such as whose

occurs as a consequence of the financial crisis of 2008 and even occurrences in recent years (Greece, Cyprus, Argentina, etc.). Table 2 presents a summary of these countries experiences.

Table 2: Cases Experiences with Controls on Short-term Flows

Country	controls on short term flow
Old cases	
Chile (1990)	Some forms of capital controls have changed the composition of inflows to long-term instruments and limited outflows and subsequent capital outflows. This was the case in Chile in the 1990s. The URR (Unremunerated Reserve Requirements) used in Chile is an indirect tax for short-term capital inflows. The URR limits excessive capital inflows and consequently, the risks to which the institutions provide these transactions are exposed. There is some evidence that the URR has changed the composition of capital inflows (De Gregorio, Edwards and Valdes, 2000).
Brazil (2009)	Brazil has been the main "poster boy" for the use of capital controls since the crisis (Jeanne, 2016). Controls on foreign capital inflows were put in place between October 2009 and May 2013. The government has aimed to improve the quality of capital inflows and to increase the maturity of authorized investments. Results of controls to reduce short-term flows are clear, and between March 2011 and April 2011 (just for one month), short-term foreign borrowing rose from 6.5 billion US dollars to only 26 million US dollars, following the short-term borrowing tax.
Colombia (1991)	In the early 1990s, Colombia experienced massive private capital inflows. To cope with persistent pressures, Colombia adopted a policy to discourage capital inflows, especially in the short term. To limit these short-term flows, the URR was only applied to loans with maturities of up to 18 months. The URR is influenced by the volume of short-term inflows (higher rates are applied to short-term flow). It was difficult to evaluate the effectiveness of the URR to alter the composition of flows; its imposition coincided with the introduction of the exchange rate range, which could have also helped to reduce short-term flows.
Malaysia (1994)	With persistent inflows of capital flows, the Malaysian authorities introduced a number of capital controls in early 1994. The controls covered capital inflows in many forms of foreign loans. Thus, in the same year, the country renounced these controls, believing that the objectives had been achieved, especially to reduce short-term capital inflows. Controls seem to be effective in reducing volume and changing the composition of capital inflows. The country saw the capital account surplus shrink sharply, reflecting a sharp contraction in short-term inflows, while long-term investment flows were relatively less affected.

<p>Thailand (1995)</p>	<p>In Thailand, in 1995, controls to reduce capital flows were introduced. With the strength of massive inflows of short-term flows, the authorities introduced a second set of controls in 1996 in the form of a reserve requirement. These measures appear to have reduced net inflows into Thailand, reduced the share of short-term net inflows in 1995-1996, and increased the share of long-term loans for the same period. Thailand has experienced a significant change in the structure of capital flows with a decline in economic activity. Capital controls have made it possible to change the flow patterns in Thailand, but given their economic consequences, capital controls were not effective compared to other macroeconomics policies.</p>
<p>Recent Cases</p>	
<p>Iceland (2008)</p>	<p>Iceland appears to have effectively adopted capital controls. These controls were imposed in November 2008, following the collapse of the three largest banks. These capital controls were imposed to prevent large and disruptive reversals in capital flows and allowed Iceland to limit capital outflows and stabilize the currency exchange rate of the Icelandic krona. The authorities chose to remove controls on capital outflows in early 2017.</p>
<p>Argentina (2011)</p>	<p>For Argentina, not only did the previous round of controls from 2011 to 2015 fail to stem the bleeding in foreign exchange reserves, but they ultimately led to a balance of payments and a currency crisis. This sowed the seeds for a huge devaluation in December 2015.</p> <p>The recent financial crisis in Argentina led the government in 2019, to institute monetary controls to stabilize the financial market. Among the actions taken were limiting the purchases of currencies following a sharp decline in the value of the peso. Firms have to seek central bank permission to sell pesos to buy foreign currency and to make transfers abroad. Argentina's case can be qualified as a temporary measure. There is no doubt that capital controls work. Mainly, they buy time, but they have a cost, which tends to rise the longer they are in place. There will be people trying to find ways around the controls, looking for legal loopholes. These leakages rise over time and typically lead to even more draconian controls.</p>
<p>Greece (2015)</p>	<p>The main purpose of the Greek capital controls was to guarantee the liquidity of the banks. These controls determine the amounts that people can withdraw from their accounts and their transfers to the outside. In August 2019, Greece ended capital controls, signalling a return to stability as the country seeks to woo back investors and ease the conditions of its debt repayments</p>

<p>Cyprus (2013)</p>	<p>In 2013, Cyprus showed that capital controls are useful in crisis prevention and recovery. Cyprus gained recent experience with capital controls in the wake of its banking crisis, which broke out and pushed the island country's financial institutions to the verge of insolvency. The controls stayed in place for quite a long time and were only gradually withdrawn over a two-year period. The last of them were lifted in April 2015.</p>
<p>China (2015)</p>	<p>In 2015, capital controls in China played a very large role in limiting outflows during that round of yuan depreciation. Among the recent measures to ease controls, in 2017, the Chinese central bank no longer required banks to set aside a 20 per cent deposit on forward sales of foreign currencies, a rule imposed in 2015 to limit the colossal capital flight out of China, a ban on domestic cryptocurrency exchanges, increased disclosure requirements for individuals buying foreign currencies, and tightened restrictions on corporate investments overseas.</p>
<p>India (2013)</p>	<p>For India, the US Federal Reserve announced its intention to halt quantitative easing in 2013. In response, the Reserve Bank of India instituted some new controls on several capital flow aspects, including restrictions on foreign holdings of Indian government bonds, restrictions on foreign currency borrowings, limits on interest rates that banks can pay on foreign currency deposits, etc. These measures are also motivated by the massive capital inflows in 2014 (in the order of 40 billion US dollars). The government warns of the risk of the reversal of flows. Despite the country's experience with capital controls, India has increasingly become more financially integrated with the rest of the world. The pattern of capital flows it receives mirrors those in other emerging economies, pointing to the importance of common factors in driving capital flows to India.</p>
<p>Russia (2010)</p>	<p>Russia was also heavily controlled. The liberalization of the capital account only dates back to 2006, and many years were devoted to restoring the financial system following the chaos that followed the fall of the Soviet Union in the 1990s. The controls on capital movements for this country have significantly reduced the flow of escape. They contributed to the spectacular economic rebound that characterized the country in 1999 and 2000.</p>
<p>Ukraine (2014)</p>	<p>In Ukraine, in 2014, substantial external imbalances, capital flight risks and panic in the foreign exchange market prompted the National Bank of Ukraine to adopt tight capital controls, a number of which remain in effect. In July 2018, Ukraine finally adopted the long-awaited "On Currency and Currency Transactions" law (the "Currency Law") which is intended to replace the archaic currency control legislation. The Currency Law is one</p>

	of the major milestones in opening the Ukrainian economy to foreign investors and providing access to foreign markets for Ukrainian businesses. The tight capital controls introduced previously were loosened by the Ukrainian central bank.
Korea (2009)	The Korean economy has also been a victim of the boom and bust of short-term flows. The authorities in South Korea put in place a number of regulatory measures starting in 2010. Among the measures taken to halt capital flows related to short-term foreign debt is the reinstatement of a withholding tax on interest earned by foreign investors on government bonds. The measures have reduced external vulnerability in particular, containing the banks' short-term external debt.
Brazil (2009)	Brazil has been the main "poster boy" for the use of capital controls since the crisis (Jeanne, 2016). Controls on foreign capital inflows were put in place between October 2009 and May 2013. The government has aimed to improve the quality of capital inflows and to increase the maturity of authorized investments. Results of controls to reduce short-term flows are clear, and between March 2011 and April 2011 (just for one month), short-term foreign borrowing rose from 6.5 billion US dollars to only 26 million US dollars, following the short-term borrowing tax.

Greece and Cyprus had a different destiny for the success of controls in curbing capital outflows. Greece also imposed capital controls in 2015, similar to Cyprus. However, the situations in the two countries are different. Cyprus has recovered from these economic pains, but Greece took longer to recover. In 2017, the Greek government decided to relax capital controls, and a measure was introduced in 2015 to avoid a bank panic in the country, which was already affected by the crisis.

India and China are two countries known for very controlled systems. Capital controls are lengthening over longer periods, and capital controls in both countries have reduced short-term flows. They limit access to foreign financing for creditworthy national institutions only (Ariyoshi, Kirilenko, Otker, Laurens, Kriljenko and Habermeier, 2000). This does not preclude the two countries from reconfirming the controls applied to capital flows.

For Iceland, China, Greece and Cyprus, the common denominator is that the macroeconomic policies were generally supportive in re-balancing the economy; thus, the capital controls were capable of being phased out, or there was no incentive to test them.

In this section, both empirical studies and the experiences of countries with controls do not accurately define the conditions for the success of controls. The results were different enough and did not allow for a general conclusion. There is, however, a consensus that

macroeconomic conditions can help the success of controls. Similarly, some studies show that controls are most effective when they are introduced for a short time.

This raises the question of how to make capital controls effective to reduce short-term flows. Moreover, under which conditions will controls be effective? We try to answer to these inquiries in the next section through a model for a small open economy, in which the effectiveness of controls is conditioned by the elasticity of demand for short-term flows.

Elasticity Approach to Reduce Short Term Flows

Model Description

The model presented in the appendix is the most closely related to Magud, Reinhart and Rogoff, 2018. The authors presented a model under a portfolio balance approach of capital controls. They give many propositions related to many objectives of capital controls. We try to explore their model but only for the objective of reducing short-term flows.

The portfolio balance approach arises from asset models of the spot exchange rate (Levich, 2001). This approach considers two financial assets (money and bonds) and two countries (home and foreign). The exchange rate establishes the equilibrium in investor portfolios comprised of domestic money and domestic and foreign bonds. The menu of assets is expanded to include domestic and foreign bonds (B and F), which are assumed to display imperfect substitutability.

In the model of Magud, Reinhart and Rogoff (2018), the conditions of using this approach are not met. There is an absence of the spot exchange rate. Also, instead of the domestic and foreign bonds, the authors uses the random real rate of returns on short-term and long-term capital flows. In this study, we name this approach "Elasticity approach to reduce short-term flows" in line with both propositions at the end of the model.

The presented model shows that the effectiveness of capital controls for total flows and short-term flows will depend on the elasticity of short-term flows on total flows. Both proposals show that the introduction of control of capital flows does not necessarily lead to an instantaneous reduction in the volume of these flows or a change in their maturity. This confirms the diversity and sometimes the contradictory results found by the empirical literature.

In the next section, we aim for empirical validation of these propositions.

Empirical Analysis

We set the dates of the capital controls (on inflows and / or outflows) based on a follow-up of the empirical literature and a follow-up of the controls applied by the countries in our analysis. We calculated the elasticity coefficients of short-term flows in relation to total flows. Similarly, we calculated the annual variations of these flows in the short term. Due to the lack of available data on short-term flows, we used short-term net flows on external debt.

The summary of the results of this analysis is presented in Table 3. The last column displays the results of these calculations, yes or no, refer to whether or not, the previously described model proposals have been validated.

Table 3: Empirical verification of the model proposition

	Year	Coef. of Elasticity	Type of Demand	Δ of ST Flows	Result
Indonesia	1991 (I)	0.054	Inelastic	0.006	yes
	2010 (I)	16.707	Elastic	1.526	no
Philippines	1994 (I)	87.785	Elastic	-4.081	yes
	2010 (I)	2.764	Elastic	-3.170	yes
Russia	2010 (I)	0.376	Inelastic	-1.360	no
	2015 (O)	1.387	Elastic	-0.121	yes
South Africa	2010 (I)	0.226	Inelastic	-1.106	no
Thailand	1990 (I)	1.143	Elastic	- 0.658	yes
	1995 (I)	1.150	Elastic	1.279	no
	1996 (I)	2.901	Elastic	-0.757	yes
	2010 (I)	0.574	Inelastic	0.355	yes
	1997 (O)	1.785	Elastic	-3.728	yes
	1998 (O)	0.132	Inelastic	-0.172	no
Turkey	2010 (I)	0.447	Inelastic	-8.992	no
India	2013 (I)	28.247	Elastic	-1.042	yes
Brazil	1994 (I)	1.723	Elastic	0.844	no
	2006 (I)	0.425	Inelastic	1.880	yes
	2008 (I)	7.282	Elastic	-1.137	yes
	2009 (I)	161.967	Elastic	-2.207	yes
	2010 (I)	1.757	Elastic	7.181	no
	2011 (I)	79.834	Elastic	-1.908	yes
	2012 (I)	5.261	Elastic	-0.590	yes
1999 (O)	1.052	Elastic	-1.141	yes	

Colombia	1991 (I)	7.780	Elastic	-2.576	yes
	1992 (I)	0.278	Inelastic	1.513	yes
	1993 (I)	0.267	Inelastic	0.357	yes
	1994 (I)	0.650	Inelastic	-0.231	no
	2004 (I)	23.223	Elastic	-16.180	yes
	2007 (I)	3.132	Elastic	-1.455	yes
	2008 (I)	0.534	Inelastic	0.186	yes
Mexico	1992 (I)	0.565	Inelastic	-0.536	no
Peru	2009 (I)	9.034	Elastic	-8.576	yes
	2010 (I)	10.581	Elastic	-3.615	yes
Cyprus	2013 (O)	0.841	Inelastic	-0.455	no
	2014 (O)	0.598	Inelastic	0.016	yes
	2015 (O)	1.857	Elastic	0.148	no
Nigeria	2015 (O)	12.539	Elastic	-0.988	yes
Venezuela	2010 (O)	1.382	Elastic	4.751	no
	2013 (O)	3.489	Elastic	-0.485	yes
	2014 (O)	5.438	Elastic	-0.595	yes
	2015 (O)	47.207	Elastic	-1.502	yes
Ukraine	2014 (O)	0.639	Inelastic	-10.386	no
	2015 (O)	1.00	Unit elastic	-0.772	no
South Asia	1997	6.948	Elastic	-2.752	yes
	1998	0.311	Inelastic	-0.355	no
	1998	1.575	Elastic	-1.087	yes
	2000	1.867	Elastic	-9.037	yes
	2001	0.057	Inelastic	-0.154	no
	2002	2.553	Elastic	-3.475	yes
	2003	0.010	Inelastic	-0.020	no
	2004	0.561	Inelastic	-0.544	no
	2007	1.435	Elastic	-0.245	yes
	2008	0.737	Inelastic	-0.285	no
	2009	7.339	Elastic	-0.575	yes
	2010	2.480	Elastic	2.234	no
	2011	5.430	Elastic	0.666	no
	2012	0.772	Inelastic	-0.113	no
	2013	10.161	Elastic	-0.880	yes
	2014	35.003	Elastic	-3.391	yes
	2015	4.592	Elastic	-0.956	yes
2016	0.725	Inelastic	-18.321	no	
2017	0.519	Inelastic	3.542	yes	

Latin America	1994	0.960	Inelastic	-0.348	no
	1995	2.207	Elastic	-0.872	yes
	1996	39.560	Elastic	-1.852	yes
	1997	8.244	Elastic	-4.882	yes
	1998	55.460	Elastic	-2.305	yes
	2008	4.254	Elastic	-1.102	yes
	2009	3.292	Elastic	-0.363	yes
	2010	2.052	Elastic	-25.901	yes
	2011	7.525	Elastic	-1.191	yes
	2012	24.259	Elastic	-2.991	yes
	2013	1.366	Elastic	-0.120	yes
	2014	8.972	Elastic	0.548	yes
	2015	132.842	Elastic	-2.021	yes
	2016	1.542	Elastic	-0.569	yes
2017	0.870	Inelastic	-0.571	no	

Source: Author's calculation (data from World Bank, International Debt Statistics).

I : Inflow O: Outflow

Note: Yes stands for yes, proposition 1 is confirmed; No, for no, it did not confirm.

First observation: The most interesting periods are post-crisis (after 1997 and 2008). These two periods correspond, for the majority of the countries, to the dates of controls. The Latin American region seems to verify the model proposition, with almost complete validation. For this region, the elasticity of demand for short-term flows on total capital flows is mostly elastic and curbs short-term flows.

Second observation: For the countries of South Asia, in the post-crisis period (and until 2017), when the elasticity of demand for short-term flows is inelastic (i.e., <1), there is a decrease in short-term capital flows. Additionally, when the elasticity is elastic, there will also be a curb in these flows. The finding is interesting for this region. Aside from the years 2011, 2012 and 2017, whether elastic or inelastic demand, capital controls will reduce short-term flows.

Third observation: By analyzing countries, case by case, there is a large confirmation of the model proposition (more "yes" than "no"). Philippines, India, Colombia (except in 1994), Peru, Nigeria show a downward variation in short-term flows when demand is elastic and vice versa when demand is inelastic.

Some other countries, such as South Africa, Turkey, Mexico and Ukraine, contradict the model's proposition. However, these countries have no significant experience with capital

controls; the impact of controls is analyzed only for one year (except Peru for two years). Thailand, Brazil, Colombia and Venezuela have several years of experience with controls. For these countries, elastic demand reduces short-term flows, and inelastic demand increases them.

We present in appendix graphs analysis for South Asian and Latin American regions, and for a single case of Thailand, Brazil, Ukraine, China, Malaysia, and Colombia. These graphs allow also confirming the model's propositions.

Conclusion

The effectiveness of capital controls to reduce short-term flows is the focus of our analysis. It was necessary to know under which conditions these controls operate well. The model developed helps us to set some of these conditions. It indicates that a curb in short-term flows, following capital controls, is dependent on the elasticity of short-term capital flows relative to total flows. The values of this elasticity determine the variation way of short-term flows.

We empirically confirm this finding by computing the elasticity coefficients for each country and each year of instituting controls. When we compare the values of these coefficients with the variation of short-term capital flows, results are satisfactory and validate the model's proposition.

The implication of this study highlights the importance of following the evolution of this elasticity. The economic policies can act appropriately as a result of this monitoring. This is that Hendren (2013) names 'the policy elasticities'. Achieving an elastic demand for short-term flows (> 1) will reduce these flows. Controls can be introduced when this demand is inelastic (< 1).

This can tell us about the effective dates in which a country can use controls. It is also a preventive measure before the country's economic situation worsens. The shift from elastic demand to an inelastic demand can give signals to a country that short-term flows are likely to increase.

Some previous work has found that short-term flows are dependent on another type of elasticity, the interest rate (Turner, 1991). Short-term capital flows can be highly interest rate elastic. Moreover, as the starting point of our model is the foreign investors, some studies have found that foreign investors are highly sensitive to uncovered interest parity conditions (Goldberg and Krogstrup, 2018). This opens the door to other issues regarding the effectiveness of controls through the computing of the elasticities of short-term flows relative

to the changes in interest rate. Thus, monetary policy has a great role to play, by setting the appropriate instruments, to limit excessive short-term flows. Adequate monetary policy with well-designed capital controls can ensure the success of these controls.

As the first-generation crises models suggested in the early 1980s, the crises are mainly due to a weakness in economic fundamentals. Based on our analysis of countries' experiences, this can be true with capital controls. Healthy macroeconomic conditions can help the effectiveness of capital controls. Each country must first begin by stabilizing its macroeconomic system, even before instituting controls. Unfortunately, in this study, we have reiterated that the majority of controls occur in the periods of two crises (1997 and 2008).

The empirical validation and graphs presented in the appendix are more significant for these periods. There appears a lack of preventive measures before crises, which can reduce the effectiveness of capital controls.

Finally, not only capital controls can curb short-term flows. Monetary policy will have a role in reducing interest rate differentials (case of Malaysia). Adequate flexible exchange rate policy discourages speculative flows (case of Chile and Colombia), support the prudential and preventive regulations (case of Chile, Colombia, and Malaysia) and support the confidence of foreign investors (case of Thailand) (Ariyoshi, Kirilenko, Otker, Laurens, Kriljenko and Habermeier, 2000).

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Appendix

1- The Model (Magud, Reinhart and Rogoff, 2018)

The authors rationalize a model to explain under which conditions capital controls can be effective to curb short-term capital flows. Taking the case of a small open economy. It receive two types of capital flows: a short-term capital flow for period t, (noted S_t) and a long-term capital flow (noted L_t), the total of these flows is K_t . Each type of flow yields a return i and i^* , respectively for long-term and short-term flows. Suppose that $i^* > i$.

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

The short-term flows will represent a portion of the total flows z.

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

z will depend on the choice of foreign investors who want to maximize the return on their investments.

Foreign Investors

Represented by an homogeneous group of foreign investors that will maximize their utility based on their returns for each kind of flows.

Consider a risk-averse, expected-utility maximizing investor with initial wealth v_0 . For one representative investor, he choose the composition of his portfolio of these flows following the model parameters, for example according to his risk aversion. He tries to solve a problem such:

$$\max_z(U) = U(\bar{v}, \rho_v^2) \quad (3)$$

Where " \bar{v} " represents the rate of return for both short-term and long-term flows and (3) defined as:

$$\bar{v} = (1 + i)K_t + (i^* - i)zK_t \quad (4)$$

and the variance as:

$$\rho_i^2 = K_t^2 [(1 - z)^2 \rho_i^2 + z^2 \rho_{i^*}^2 + 2z(1 - z)\rho_{ii^*}] \quad (5)$$

Where ρ_i^2 represents the variance of the return rate i and ρ_{ii^*} represents the covariance between i and i^* .

$$K_t = \frac{\bar{v}}{(1+i)+z(i^*-i)} \quad (6)$$

From The first order condition, we obtain:

$$z = \frac{(i^*-i)+\theta(\rho^2-\rho_{ii^*})}{\theta\rho} \quad (7)$$

Where θ represent the coefficient of relative risk aversion of this investor at wealth v .

Assume that U is twice differentiable. Where $U' > 0$ and $U'' < 0$ (risk aversion).

$$\theta = \frac{-vU''(v)}{U'(v)} \quad (8)$$

$$\text{and } \rho = (\rho^2 + \rho_{i^*}^2 - 2\rho_{ii^*})$$

Where z will increase with the differential of rates and decrease with a low risk θ . Another way to write this by:

$$z = \frac{i^*-i}{\theta\rho^2} + \beta \quad (9)$$

$$\beta \equiv \frac{\rho_i^2 - \rho_{ii^*}}{\rho^2} \quad (10)$$

With β we can determine an optimal share of capital flows that will reduce their variance. β separates the risk of each type of flow.

Instituting Capital Controls

Integrate now the capital control aspect. It is assumed that capital control " \mathfrak{S} " take "0" for the absence of controls and " $\bar{\mathfrak{S}}$ " if controls exist.

$$\mathfrak{S} = \begin{cases} 0 & \text{no controls} \\ \bar{\mathfrak{S}} > 0 & \text{with controls} \end{cases} \quad (11)$$

With $0 < \bar{\mathfrak{S}} < 1$. after capital controls, the return on short-term flows, i'^* , will be reduced as follow:

$$(1 + i^*) = (1 + i'^*)(1 - \mathfrak{S})$$

Composition of Capital Flows

We analyze here the results of instituting capital controls. This economy does not initially have capital controls, and subsequently introduces these controls. This will cause a decrease in i^* .

We can see from the equation 8, that :

$$\frac{dz}{di^*} = \frac{1}{\theta\rho} > 0 \quad (12)$$

And thus, *The share of short-term flows is going down with capital controls.* This mean that the share of long term flows will increase.

Aggregation

This analysis, made for a single representative agent of foreign investors, can be generalized over the economy. We assume for the sake of simplicity that these agents receive the same information but their wealths and risk aversion are different.

This investor j will have a short-term flow demand with a wealth V_j given by $z_j V_j$; as noted previously, z_j is conditioned by the individual risk aversion of the investor.

The overall wealth of the economy is given by:

$$\bar{V} = \sum_j V_j \quad (13)$$

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

$$R^* = \sum_j z_j V_j \quad (14)$$

For each investor j , Multiplying equation (9) by V_j on two sides, we obtain the aggregation:

$$\sum_j z_j V_j = \left(\frac{i^*-i}{\rho^2}\right) \sum_j \frac{V_j}{\theta_j} + \beta \sum_j V_j \quad (15)$$

By integrating the equations 12 and 14 into 15 we obtain the following result:

$$R^* = \left(\frac{i^*-i}{\rho^2}\right) \sum_j \frac{V_j}{\theta_j} + \beta \bar{V} \quad (16)$$

With some manipulation we obtain:

$$i^* - i = \theta \rho^2 \left(\frac{R^*}{\bar{V}} - \beta \right) \quad (17)$$

$\theta = \sum_j \frac{\theta_j}{v_j/\bar{V}}$ represents the aggregation of risk aversion.

In the aggregate also, capital controls reduces the share of short-term flows.

As we have proceed with the first result:

$$\frac{di^*}{d(V^*/\bar{V})} = \theta \rho^2 > 0 \quad (18)$$

The equation 17 presents the result found previously, but here for the aggregate. Capital controls will reduce the share of short-term flows for all the economy.

Conditions

To know under which conditions the previous results can be true, for capital flow controls work well with a high level of capital flows, this can be seen by calculating the partial derivative of Equation 17 and we obtain:

$$\frac{di^*}{d\bar{V}} = - \frac{\theta \rho V^*}{\bar{V}^2} \quad (19)$$

For an investor (or even the aggregate market) to achieve the same expected rate of return in response to the instituting controls, the total flow of capital must increase.

Similarly, proceeding to the total derivation of equation 17. The most important results appears as follows:

$$di^* = \theta \rho^2 \left[\frac{\bar{V} dR^* - R^* d\bar{V}}{\bar{Z}^2} \right] \quad (20)$$

With some manipulation we obtain the following two equations:

$$\frac{di^*}{dR^*} = \theta \rho^2 \left[1 - \frac{1}{\mu} \right] \quad (21)$$

$$\frac{di^*}{d\bar{V}} = \frac{R^* \theta \rho^2}{\bar{V}} [\mu - \bar{V}] \quad (22)$$

With $\mu \equiv \frac{dR^*}{d\bar{V}} \frac{\bar{V}}{R^*}$ represents the elasticity of short-term capital flows to total capital flows.

Based on these expressions (21 and 22), we can formulate two propositions:

Proposition 1 *The effects of the imposition of capital controls on short-term flows depend on the elasticity of short-term flows relative to total capital flows, as follow:*

if $\mu = 1$: $\frac{di^*}{R^*} = 0$, the level of short-term capital flows remains unchanged

if $0 < \mu < 1$, $\frac{di^*}{R^*} < 0$, the level of short-term capital flows tends to increase

if $\mu > 1$, $\frac{di^*}{R^*} > 0$, the level of short-term flows tends to fall

and

Proposition 2 *The effects of the imposition of capital controls on total capital flows also depend on the elasticity of short-term flows relative to total capital flows, as follow:*

if $\mu = \bar{V}$: $\frac{di^*}{\bar{V}} = 0$, the level of capital flows is unchanged

if $0 < \mu < \bar{V}$: $\frac{di^*}{\bar{V}} < 0$, the level of capital flows increase

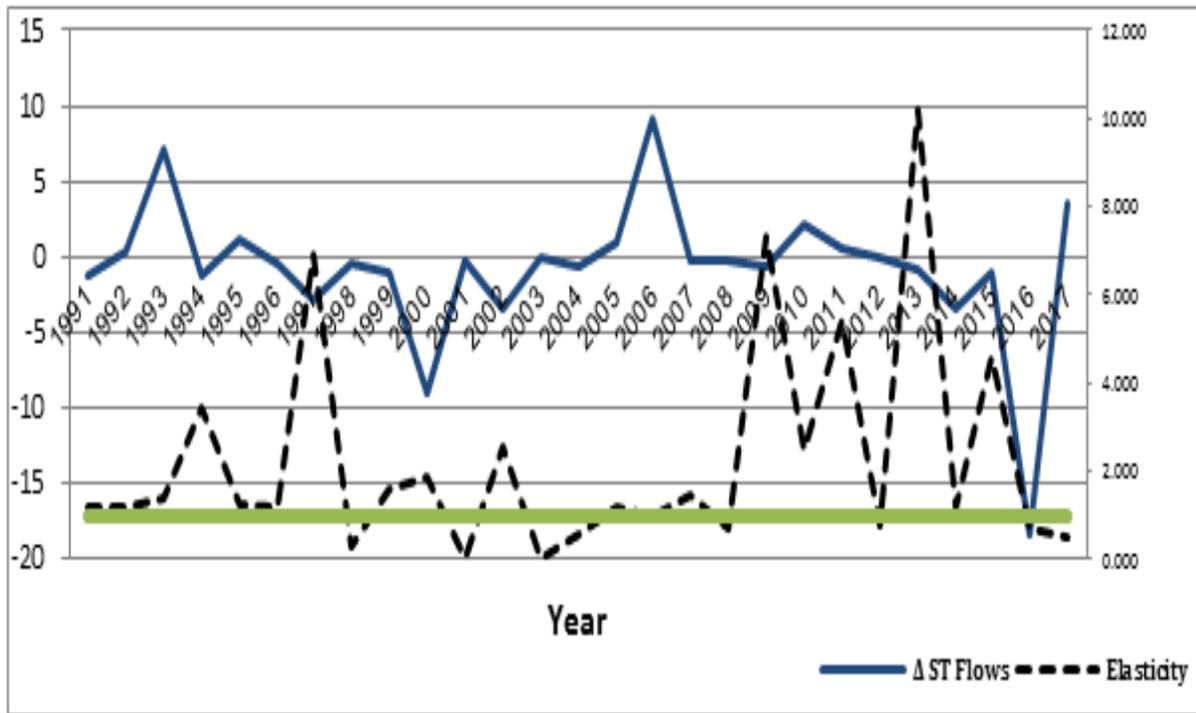
if $\mu > \bar{V}$: $\frac{di^*}{\bar{V}} > 0$, the level of capital flows decrease

2- Graphics validation of the model propositions

We aim to verify the model propositions through graphs for the region of South Asia and Latin America, and also for some case countries. Each graph represents a simultaneous evolution of the calculated elasticity coefficient and the variation of short-term flows. The first axis corresponds to the variation of short-term flows. The second axis corresponds to the elasticity coefficients. The period is larger than what was shown in Table 3 (from 1991 to 2017). The horizontal line corresponds to value '1' of the elasticity. According to the first proposition of the model, above this line, the demand is elastic and it must correspond to a negative variation of the short-term flows. Below, or otherwise between 0 and 1, the demand is inelastic and the variation of the short-term flows must be positive.

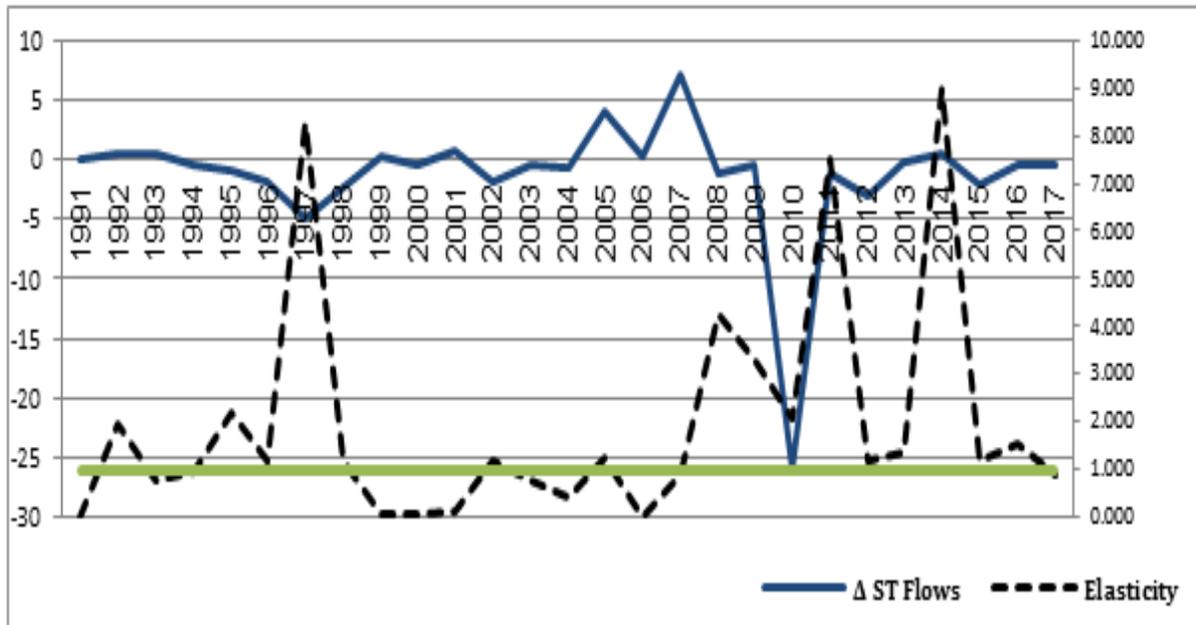
For the South Asia region, there are two clear positive variations in short-run flows, but only before the two financial crises (1992 - 1994 and 2004 -2007). For the rest of the years, we observe a decline in short-term flows. This decline coincides with an elastic demand for short-term flows (coefficient of elasticity > 1), which is in line with the model.

Figure 1. South Asia



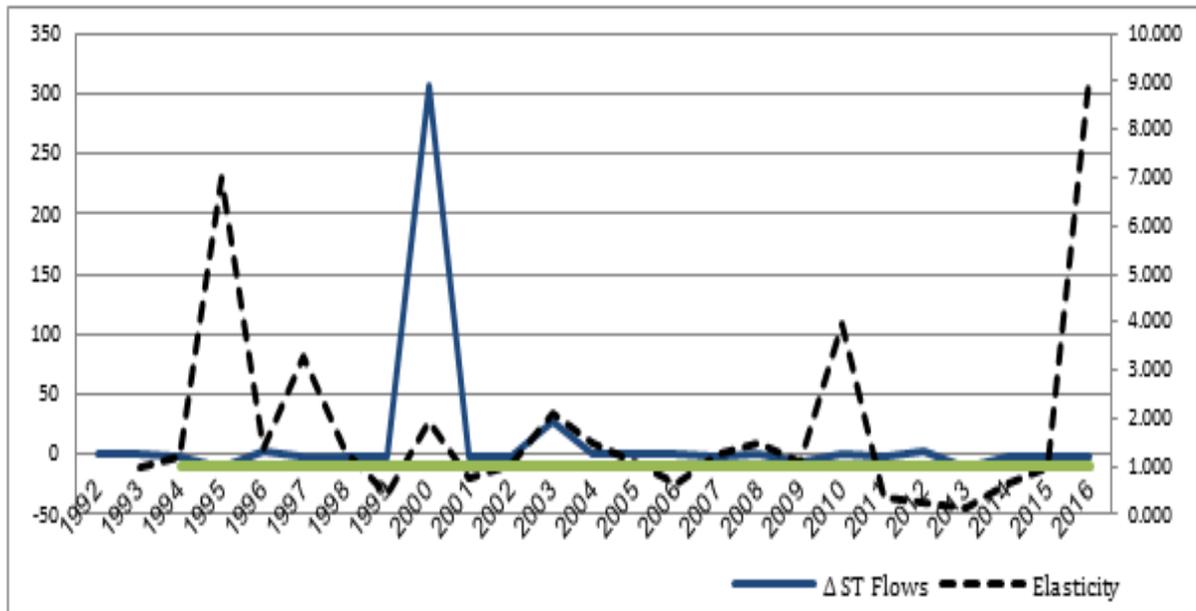
For the Latin American region, the situation is almost similar. The demand is inelastic between the two financial crises (from 1998 to 2007); thus, this period corresponds to a positive variation of short-term flows. Outside this period, elastic demand coincides with negative variation of short-term flows. There is reason to believe that there has been a capital controls relaxation between the two crises that has motivated the return of short-term flows for these regions.

Figure 2. Latin America



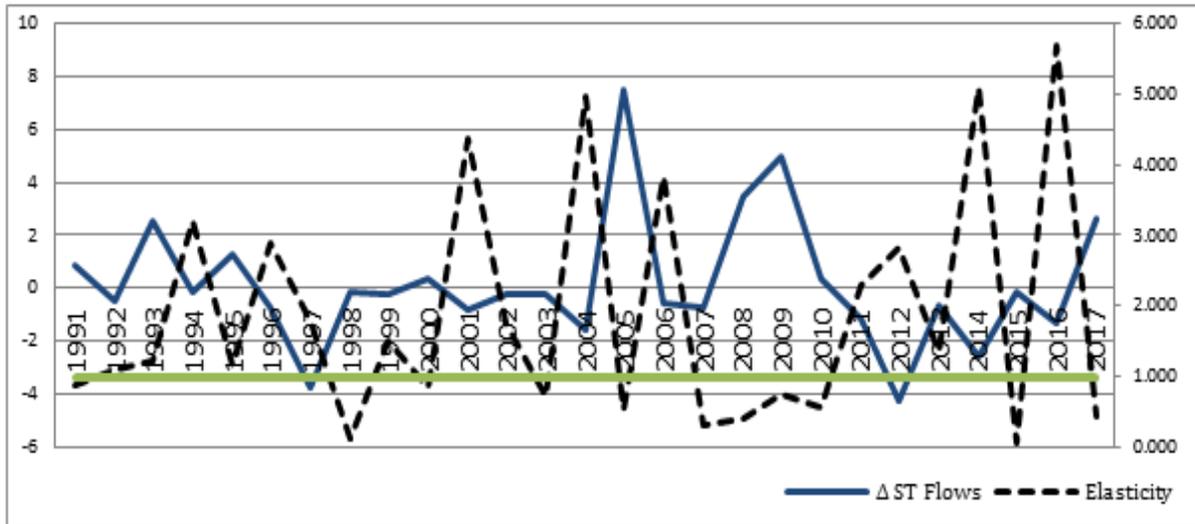
The Ukraine graph shows some failure of capital controls. Despite elastic demand for short-term flows, we did not observe a decline throughout the analysis period. Even if there was a decrease, it was weak.

Figure 3. Ukraine



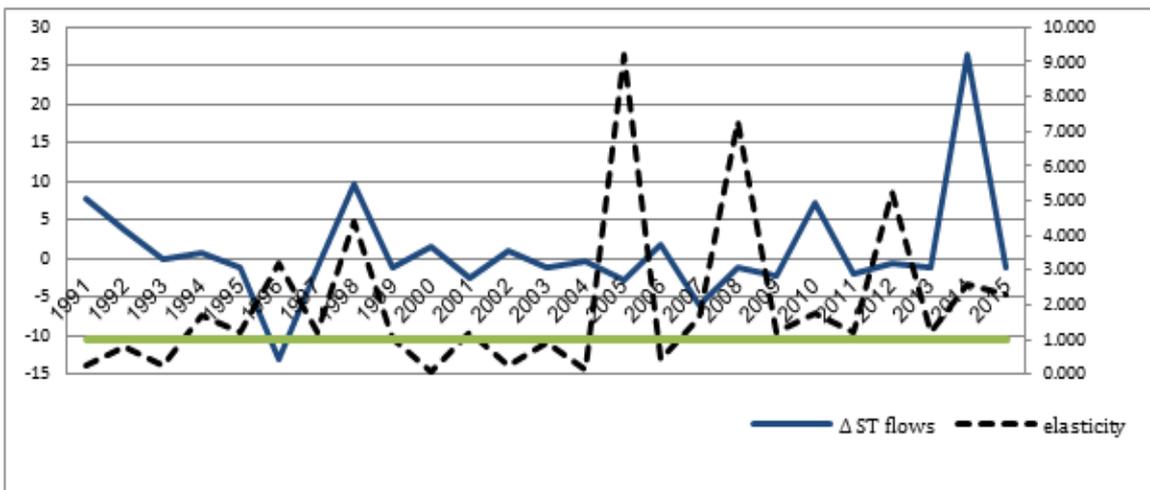
Thailand confirms the propositions of the model, especially between 2007 and 2010. The transition to an inelastic demand in 2007, immediately translated into a positive variation of short-term flows.

Figure 4. Thailand



Brazil, which introduced controls in 2014, saw a negative variation of short-term flows in the years that followed and simultaneously a transition to elastic demand for these flows. The other years of controls (from 2006 to 2012) do not the confirmation of the model's assumptions because the variation in short-term flows was low.

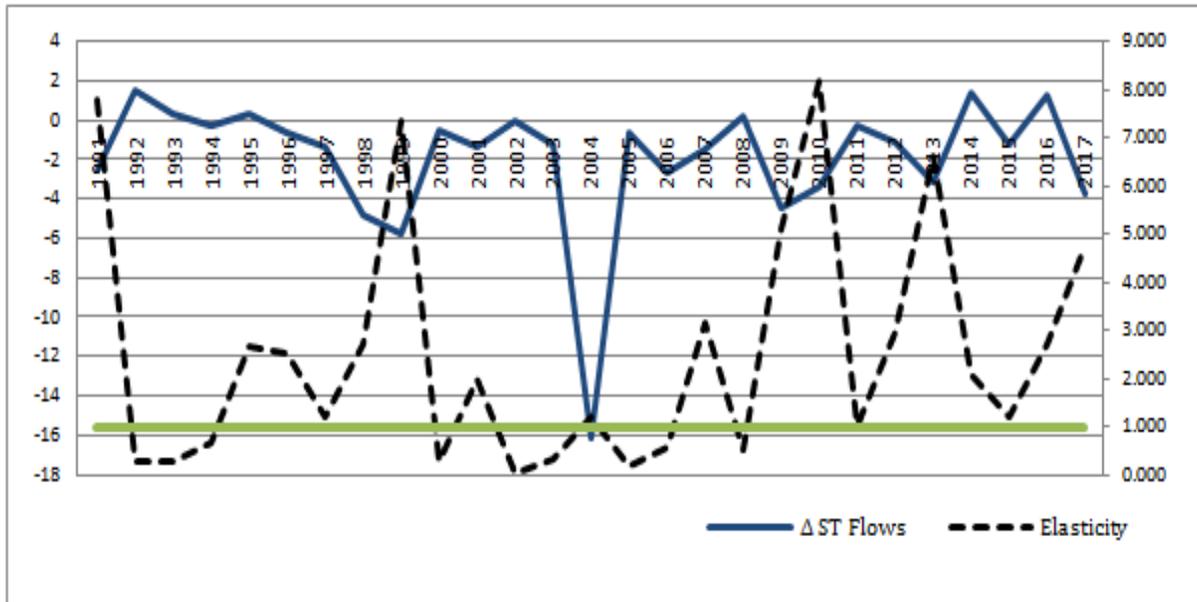
Figure 5. Brazil



Colombia has mastered short-term capital flows. During the analysis period, there is a decrease in the variation of short-term flows. Demand for these flows is largely elastic except

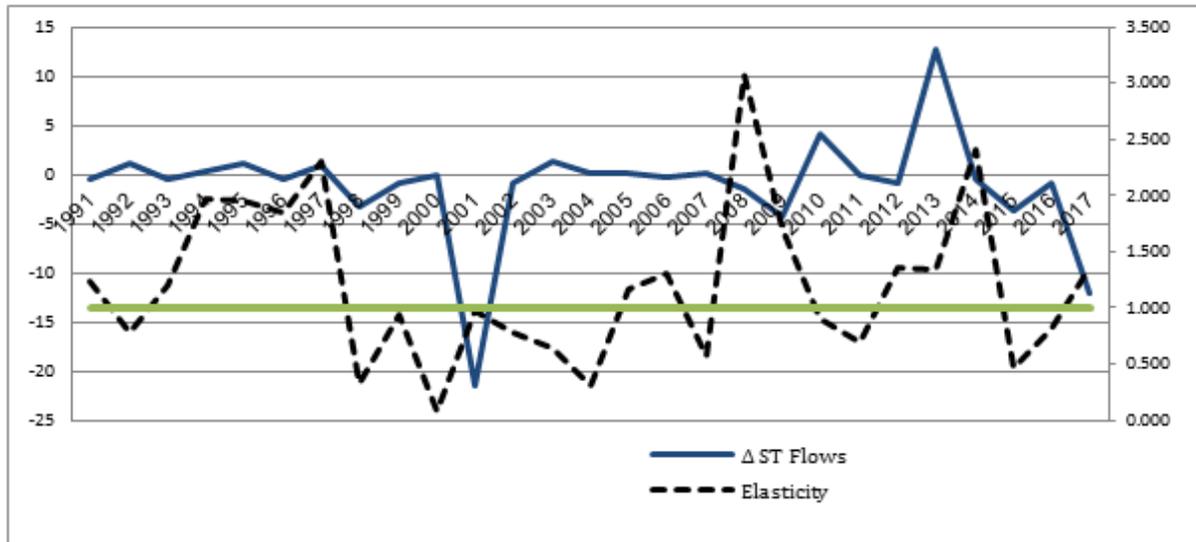
for a few years (from 2001 to 2007). The period of capital controls in this country (1992-1994) is significant; demand coincides with an upward variation of short-term flows, which is in line with the model. The second wave of controls used in 2007 and 2008 also cause a fall in short-term flows.

Figure 6. Colombia



The case of China does not allow an accurate conclusion of the model proposition. First, the capital controls are spread over a long period. Similarly, with the exception of the years 2000 to 2002 (which contradicts the proposition of the model), short-term flow variations are small. They become more volatile after the crisis of 2007, with a negative variation. The period that is closest to the findings in our research is that between 2007 and 2009, the demand is elastic and the variation of short-term flows is negative.

Figure 7. China



For Malaysia, the lack of data only allowed a graphical analysis between 1991 and 2000. There are two interesting periods for this country. In the first, between 1994-1995, the demand is elastic and corresponds to a negative variation of short-term flows. The same pertains to the period 1997-1998. These two periods correspond to the instituting of capital controls in this country and confirm the model's suggestions.

Figure 8. Malaysia

