

Do the different types of capital flows respond to the same fundamentals and in the same degree? Recent evidence for emerging markets

Fernando Arias
fariasro@banrep.gov.co

Daira Garrido
dgarrite@banrep.gov.co

Daniel Parra
dparraam@banrep.gov.co

Hernan Rincon*
hrincoca@banrep.gov.co

May 2013

Abstract

The international crisis by the end of the previous decade brought very important changes in terms of degree, size, and volatility of capital flows to emerging markets. These became a challenge for their economic authorities because the negative effects likely to affect macroeconomic variables of prime importance, such as the foreign exchange rate, macroeconomic and financial stability, and growth. This has led literature and, especially, the authorities to revive their interest in analyzing the behavior of capital flows and their fundamental drivers. The goal of this paper is to estimate a capital flow model for a sample of emerging market economies, assess their determinants and, particularly, analyze whether the different types of capital flows respond to the same fundamentals and to the same degree or not, and if they did respond in the same way throughout the crisis. Results suggest that the traditional attraction and expulsion factors are still playing a key role in capital movements, although their importance depends on the flow type. They also show that the crisis changed their influence on the net flows.

Classification JEL: F21, F32, F36, C5

Key words: capital flows, drivers, emerging markets, crisis, dynamic panel data models

* The first three authors are professionals of the Economic Studies Department of Banco de la República. The last one is Senior Researcher in the Research Unit. Authors express their gratitude for the valuable remarks and recommendations of Francis E. Warnock and two anonymous referees. Authors also thank the comments of the participants of the Fourth BIS CCA Research Conference at the Central Bank of Chile. Lina Pedraza provided excellent research assistance. The views expressed in this document are the sole responsibility of the authors and do not necessarily reflect those of Banco de la República or its Board of Directors.

I. Introduction

International capital flows to emerging-market economies (EMs) have exhibited three clearly differentiated phases since 2000. The first one begins in the early decade and extending through the announcement of the Lehman Brothers bankruptcy on September 15th 2008. This phase was characterized by huge capital inflows to EMs, which created a generalized appreciation of their currencies, credit booms and asset price valuations. In some cases, like in the emerging Europe economies, these positive credit and asset price spirals were added to sharp increases in the balance of payment current-account imbalances that subsequently endangered their macroeconomic and financial stability.

The second phase, immediately after the Lehman financial collapse, was characterized by a significant and fast reversion of capital flows to the EMs – this being particularly evident in those flows destined for portfolio, debt, and bank credits – which, along with the strong liquidity restrictions and the rupture in the credit channel in the Advanced Economies (AEs) generated a considerable reduction in world trade and drastically increased risk aversion affecting several EMs' macroeconomic variables (Milesi-Ferretti and Tille, 2010).

The third phase, from the end of 2009 until year 2011, was distinguished for a capital flow behavior similar to that of the first stage; however, in this occasion, recovery was surprisingly faster and stronger than it was in previous fall episodes. Likewise, another outstanding feature is that their composition varied in a substantial manner, since indebtedness flows had a higher share with respect to those of foreign direct investment (FDI), as shown by Bluedorn et al. (2011).

The intense capital flow oscillations during the above-described phases became a study subject for the literature and a challenge for the EMs' economic authorities, by whom different policies were implemented in order to limit the unstabilizing effects of both the level and volatility of said resources. As a result, it became necessary to review the flows' nature and their fundamental drivers in order to explain both their behavior and persistence or composition, as well as how they affect their economies.

Although policy makers and researchers care about capital flows, few of them realize on the differences between gross and net flows at the time managing or measuring their effects on macroeconomic stability, exchange rates or financial stability. In a recent paper, De Gregorio (2012) called the attention on this distinction. He stated that if the interest is to study the possible pressures on exchange rates or other macroeconomic variables, one should analyze net capital flows, because “[n]et capital inflows are just the counterpart of the current account deficit” and, by definition, “the current account is the change in the international net asset position of an economy.” In contrast, if the concern is to analyze issues related to financial stability, one should concentrate on gross flows, because they can be a source of risk and international financial contagion.¹ In this paper we will concentrate

¹ This argument had been introduced by Borio and Disyatat (2011). They stated that “[b]y construction, current accounts and net capital flows reveal little about financing. They capture changes in net claims on a country arising from trade in real goods and services and hence net resource flows. But they exclude the underlying changes in gross flows and their contributions to existing stocks, including all the transactions

on net capital flows because they constitute a natural current account counterpart around which the debate about external stability focuses on and because we want to evaluate how their net cross-border movements respond to the behavior of external and internal investors and to the macroeconomic conditions of their respective economies. From the econometric point of view, net flows facilitate estimations given the stationary nature of their time series.

The literature has identified two types of determinants of capital flow dynamics. The first one relates to the behavior of external variables (push factors) such as interest rates, economic growth, risk premiums, and the monetary and fiscal policies of the AEs. The second type is associated with the macroeconomic conditions, policies and institutional frameworks of those countries receiving the resources (pull factors). From the behavioral analysis of these determinants, the authorities might be able to predict what it would occur where international and local conditions are changed and, likely, anticipate and prevent as well adverse effects through policy decision making. In this sense, this type of studies will contribute to a better understanding of the behavior of these resources and serve as a fact or judgment element for decisions.

The objective of this document is to estimate a reduced form model of net capital flows for an EMs sample and assessing their fundamental drivers. In order to meet this objective, annual information in a sample of these countries will be used for the 1995-2010 period, as well as a dynamic panel data regression model. In its development, this study will evaluate if the different types of capital flows (FDI, portfolio, and debt) respond to the same fundamentals and to the same degree. Although empirical literature has traditionally studied aggregates flows, the different types are not necessarily deemed to respond to the same fundamentals, just like it has been recently argued by Forbes and Francis (2010), Fratzscher (2011), and Byrne and Fiess (2011).² Also, this research will evaluate whether or not the importance of drivers of capital flows changed in the post-crisis.

This study is intended to be a contribution to the empirical literature that analyzes capital flows in the next directions. Firstly, a sample covering a period before and after the international 2007-2009 financial crisis is used. This helps examine possible structural changes in fundamentals and quantify crisis effects on capital flows to the EMs. Secondly, it includes international investors' growth expectations and risk "appetite" or "tolerance" measures likely to capture faster both capital market perception and reaction as compared with the known push and pull factors. Thirdly, and unlike most literature on this subject, it analyzes separately the different types of capital flows, since the fundamentals serving to explain them, as well as macroeconomic and microeconomic effects they produce may differ in significant ways (Chuhan et al., 1996; Taylor and Sarno, 1997; Kose et al., 2009;

involving only trade in financial assets, which make up the bulk of cross-border financial activity... As such, current accounts tell us little... about the impact of cross-border capital flows on domestic financial conditions."

² In fact, even some of them may respond to factors other than the market itself, like in the case of capital flows directed to public sector financing.

Contessi et al., 2010).³ Therefore, this research will include answers to questions like do the different flow types respond to the same fundamentals and to the same degree?⁴

This document is organized as follows: Section II describes and characterizes the evolution of capital flows to the EMs by differentiating them into bond and portfolio, external debt and FDI flows. Section III reviews the recent literature and identifies the main determinants of capital flows. Section IV presents the regression models, explains data and methodology, and analyzes the results from the dynamic panel data estimation. As illustrated in this section, the traditional panel methods were estimated as fixed and random effects, but none of the estimations met the required standard assumptions. On the other hand, as it will be explained in Appendix 3, the methodology being used allows for the modeling of a likely persistence of some capital flows and controlling – by endogeneity problems emerging between capital flows, economic growth, and public debt. The last section summarized the main study conclusions.

II. International macroeconomic context, and characterization of capital flows to EMs in the past decade

i. International macroeconomic context, and capital flows to EMs

Capital flows to EMs grew fast since the 90's decade, due to the globalization and world integration originating in commercial and financial liberalization, privatizations, and innovation. In this section, some empirical facts are described with respect to the behavior of capital flows and some macroeconomic variables throughout the analyzed period. Emphasis will be made on the way those flows were affected by the international 2007-2009 crisis in terms of composition, variability, and regional directioning.

First of all, the behavior exhibited by capital towards the EMs in the face of the monetary policy stance and growth of the AEs is stressed, and four phases are identified. The first phase took place by the turn of the 90's, when capital flows to EMs grew in a significant manner until an increase in international interest rates came about around 1995. This fact

³ For example, the movements of portfolio investments (bonds and shares) could be explained by internal and external short-term interest differentials and by depreciation expectations, while FDI would be more associated with medium and long-term returns, and growth expectations. As for the effects, probably debt or portfolio flows are more volatile and pro-cyclical as compared with FDI flows (Contessi et al., 2010; Tong and Wei, 2011; Agosin and Huaita, 2011).

⁴ One of the referees brought the authors' attention on the similarities of this document with the Bluedorn et al. (2011) study. Nevertheless, both have important differences and, for this reason, these are submitted as contributions to the literature. Two of the most important of these differences are: i) the objective of the IMF is to identify how the differences in the direct financial exposure of the EMs to the United States alter the effect of its monetary policy on net capital flows to these economies. On the other hand, the purpose of this document is to recognize and assess the main drivers of the different capital flows, among them the monetary stance of the United States, and control for the path of the international financial crisis of 2007-2009. ii) This document uses a dynamic panel enabling the authors to capture the persistence of capital flows particularly those of direct foreign investment, and correct endogeneity problems. Bluedorn et al. (2011) use simple ordinary least squares and they do not capture persistence in the model. Persistence is assessed using ARIMA models separately.

generated a reversion in their dynamics and gave way to a downward trend of capital flows to EMs (Figure 1).



Figure 1. AEs' real interest rates

The second phase was observed between 2000 and 2007. In these years, capital flows to EMs recorded again an important and pronounced increase. During this period, the United States experienced a strong fall in the stock prices of Internet firms and a slowdown in its economy which, in turn, affected other AEs. A significant reduction in their interest rates for a prolonged period was the response of the monetary authorities in these countries (Figure 1).

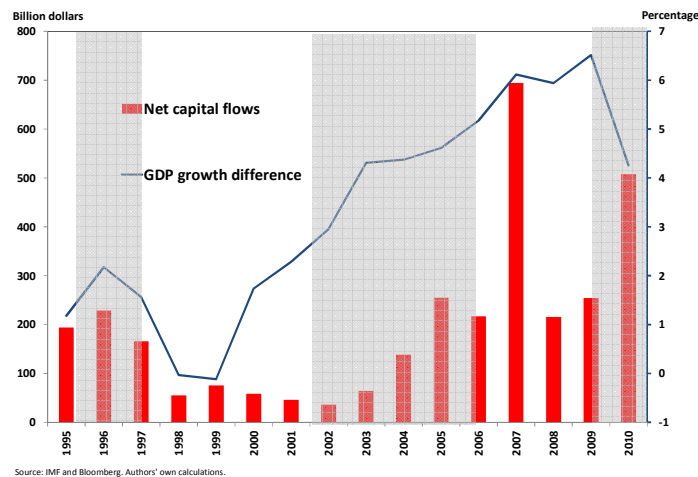


Figure 2. EMs' capital inflows and economic growth

Added to the positive effects of falling interest rate levels in the AEs were relative higher growth rates in the EMs, most certainly explained by economic changes and reforms having

increased their potential growth rates, particularly in the larger EMs like Brazil, China, India, and Russia (Figure 2). As highlighted by the Bank for International Settlements (2009), the best fiscal and macroeconomic indicators in the EMs substantially raised their savings and their investment rates with respect to the 90's and, even in the last years, they exceeded those recorded by the AEs (Figure 2 and Table 1).

Table 1. Macroeconomic indicators in the advanced and emerging economies

	GDP growth		Investment		Gross savings		Current account balance		External debt	Reserve accumulation	
	Percentage		Percentage of GDP								(Bill. Dollars)
	AEs	EMs	AEs	EMs	AEs	EMs	AEs	EMs	AEs	EMs	
1995-99	3.1	4.1	21.9	25.3	22.0	24.0	0.0	(1.2)	36.9	54.4	
2000-07	2.6	6.6	21.1	26.2	20.3	28.8	(0.9)	2.5	32.5	451.8	
2008-09	(1.8)	4.4	19.4	30.2	18.5	32.8	(0.7)	2.6	25.6	621.6	
2010	3.1	7.3	18.6	31.1	18.2	33.0	(0.2)	2.0	25.2	892.2	

Source: IFM, Bloomberg, and Concensus Forecast. Authors' own calculations.

The third phase comprised the crisis period at the time financial panic caused a significant reversion in capital flows from the EMs in the middle of a sharp fall in the AEs interest rates, as a countercyclical response from their authorities.

The last one, which could be named as 2007-2008 post-crisis phase, showed a fast and strong recovery of capital flows to the EMs, probably promoted by interest rates close to zero in the AEs and less growth perspectives as compared with the EMs' prospects (Figure 1).

ii. Characterization of capital flows to EMs

Next, the behavior of capital flows will be described for a sample of 49 emerging market economies as classified into four groups (Appendix 1). It can be seen that, generally, net capital flows have exhibited a significant upward trend since the turn of the 90s. Indeed, net capital inflows grew from an average of 194 billion dollars in 1995 to an average of \$203 billion dollars during the 2004-2006 period (a record figure of \$694 billion dollars was seen during 2007). In 2010 the amounted to \$507 billion dollars (Figure 3).

Although these flows exhibited an upward trend, nonetheless two periods can be seen where some slowdowns or sharp falls occurred. The first one, mainly associated with the Asian crisis and the Tequila effect, was registered around mid 90s. At this time, crises seemed to have been transmitted to the other emerging economies through risk premiums and access to external finance. In fact, it appears that investors did not make a differentiation among countries, which generated serious reversions of capital flows for the overall EMs group. The second shock occurred in the recent international financing crisis between 2007 and 2009, at the time liquidity and credit restrictions affected financial flows like bank, debt and stock flows in the first place, to then be transmitted to the real activity affecting investment levels. Between 2008 and 2009, capital flows fell down to a \$234 billion dollars from its maximum recorded in 2007.

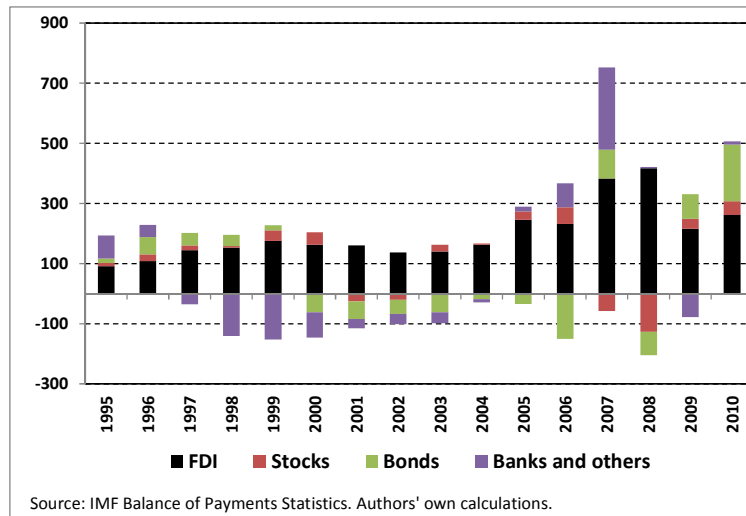


Figure 3. Net capital flows to the EMs by type (Billion dollars)

Despite their abrupt fall caused by the crises, an accelerated return of flows with enhanced intensity to the EMs was observed towards 2010; although they did not attain the levels registered in 2007, they are indeed higher than the last decade average. Particularly, the recovery of external debt bonds and FDI flows is stressed.

Other interesting aspects are associated with the composition of flows and their persistence. Firstly, throughout the study period it can be seen that FDI has been the component of most relative importance in net flows and, given its long-term nature, the one taking longer in being affected by the financial crisis. Secondly, most affected were stocks and bonds flows, since in 2008 they exhibited net outflows of \$204 billion dollars to then recover slightly in 2009 with net inflows of \$113 billion dollars. In the fourth place, and after having shown a remarkable upturn in 2007, bank flows did virtually disappear in 2008 and recorded very large net outflows in 2009 (Figure 4). Finally, the strong 2010 increase in private and public debt bond flows is to be stressed, since they were significantly higher than those registered in the past decade.

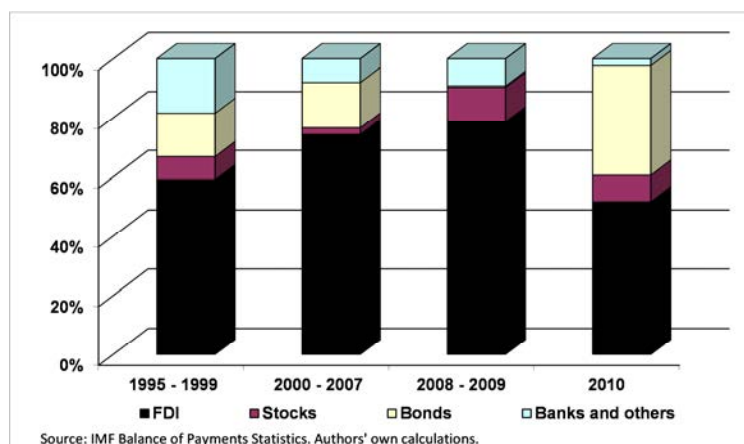


Figure 4. Relative importance of the different type of flows to EMs

By region of destination, the EMs being more affected by the 2008 crisis were the European countries (Figures 5 and 6.b). Between 2000 and 2007, these economies experienced significant capital inflows that seem to have created considerable macroeconomic unbalances as the accumulation of large current-account deficits, greater indebtedness levels and, generally, deterioration in some important macroeconomic indicators, similarly to what occurred in the Asian countries in the second half of the 90's (Bank for International Settlements, *Ibíd.*, *Box C3*; IMF, 2009; IMF, 2009). As for the composition of capital flows in the emerging Europe between 2006 and 2008, it can be seen that resources were concentrated mostly in those of banking origin, which were drastically affected because, since the Lehman Brothers crisis, international liquidity conditions became more demanding and the international credit channel collapsed. Consequently, flows to emerging Europe destined for both FDI and the financing of debt and investments in stock suffered such a notorious decline in 2009 to the point that in 2010 they had not yet recovered completely.

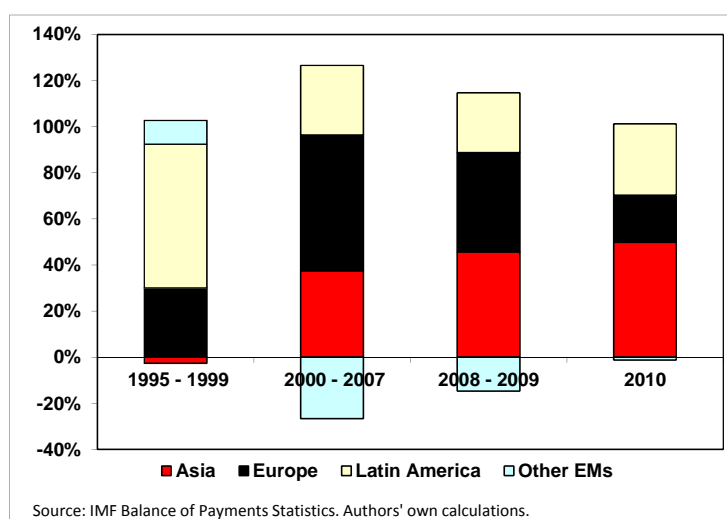


Figure 5. Net capital flows by EMs destination in the study sample (percentage)

In contrast, Ems in Asia and Latin America had a significant recovery and they even attained in 2010 the levels previous to the crisis in such a way that they increased their share within the capital flow total (Figures 5 and 6a-6d). Certainly, the explanation of this fact is a better economic performance, less macroeconomic unbalances, lower exposure of their financial sector to problems associated with the international crisis and, very likely, thanks to the macroprudential measures adopted by their authorities before and during the crisis, since they enabled them to react in a more convenient way to the external shock.

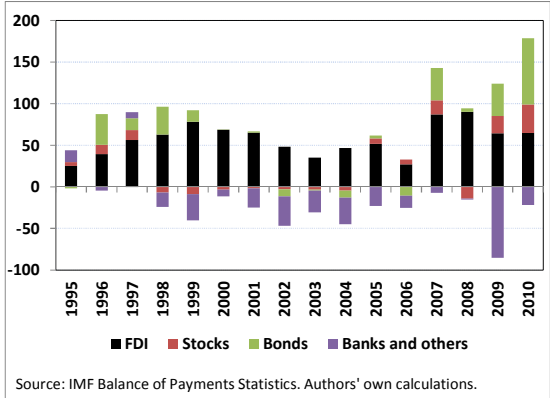


Figure 6a. Net capital flows to Emerging Latin America (Billion dollars)

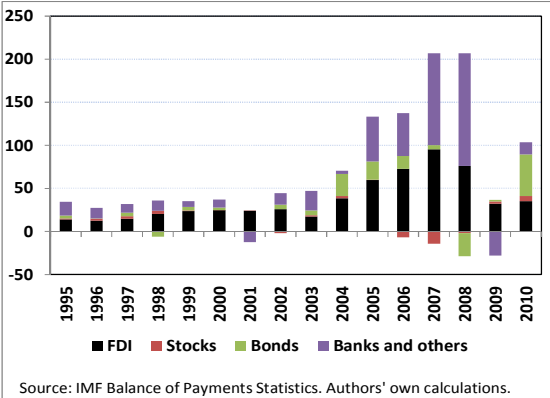


Figure 6b. Net capital flows to Emerging Europe (Billion dollars)

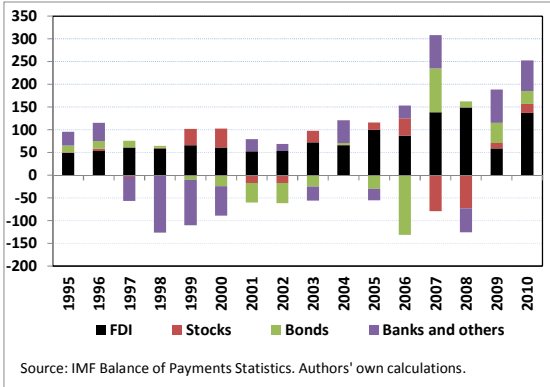


Figure 6c. Net capital flows to Emerging Asia (Billion dollars)

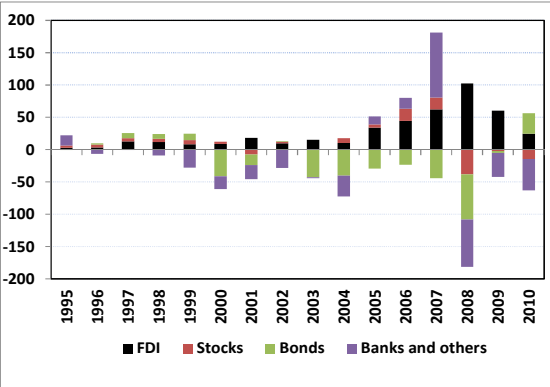
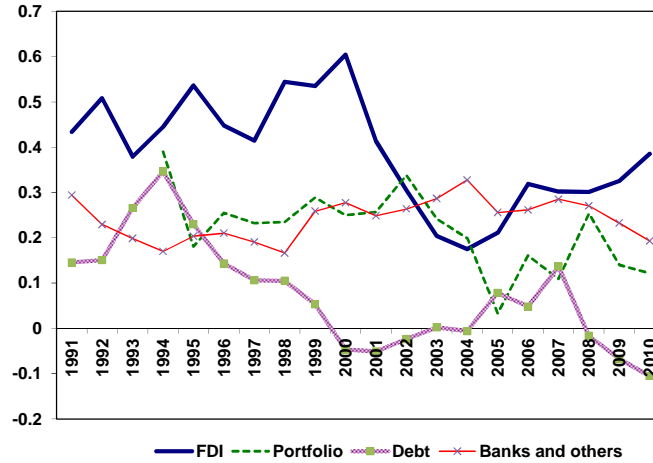


Figure 6d. Net capital flows to Other Emerging Markets (Billion dollars)

Finally, with regard to persistence, it can be seen that it varies according to capital flow nature and maturing process. Particularly FDI flows, which are associated to long-term projects, usually exhibit more persistence while the less persistent ones are those resources destined to investment in debt securities (Figure 7). According to Bluedorn et al. (2011), bank and other private flows are the more volatile ones, and FDI, especially after 2000, is

scarcely more stable than other flow types. As seen in the same study, FDI has registered increased volatility and a reduced persistence in the last decade.⁵



Source: Bluedorn et al. (2011).

Figure 7. Capital flow persistence by type of flow⁶

III. Determinants of capital flows to the emerging markets. What does the literature say?

Literature having analyzed the determinants of capital flows in the past few decades abounds.⁷ The studies have concentrated around the following question: Are the external (push) or domestic (pull) factors what determines a country's capital inflow or outflow? Or, simply, do both play a role that may vary in time and according to the country under analysis? Many authors have argued and found out that capital flows are to a great degree determined by exogenous factors such as international interest rates (international liquidity), international investors' risk aversion (or the opposite, the risk "appetite" or risk "tolerance"),⁸ and growth in advanced economies. Others believe that a country's capital inflows or outflows are mainly explained by internal factors such as local interest rates, economic growth, macroeconomic stability, and the strength of their institutions, the later recently highlighted by Papaioannou (2009).

⁵ In this document, also persistence is analyzed but with a very different approach adopted by Bluedorn et al. (2011), as explained further on.

⁶ Persistence is calculated through the models AR (1) regression coefficients of net private capital flows in percent of GDP.

⁷ The authors are only reporting what they deemed more relevant for the purposes of this document.

⁸ Although the "risk appetite" category is not clearly defined in theoretical terms, literature uses it nowadays in a generalized manner to describe investors' preferences in the face of alternative investments under uncertainty. Dixit and Pindyck's (1994) is taken as a pioneer work in the study of the role of risk in investment decisions.

However, another branch in the literature argues and shows that they depend on not only on the push and pull factors but also on commercial ones. The authors of one of the pioneer documents in Latin America regarding this point of view are Valdes-Prieto and Soto (1998), who analyze the Chilean case. They argue that, in addition to the aforementioned factors, also changes in commercial credits must be taken into account, since these levels are proportional to export and import levels. Recently, Milesi-Ferretti and Tille (2010) stress the importance that commercial flows may have in explaining capital flows.

Among those studies harboring the first hypothesis in the sense that capital flows respond to external factors are Calvo et al. (1993; 1997) and, more recently, Izquierdo et al. (2008) and Reinhart and Reinhart (2008). They conclude that the terms of trade, interest rates and international growth are what actually “pushes” international capitals towards the Latin American economies. For instance, in the face of a reduction in the interest rates of AEs caused by a lax monetary policy, investors would find incentives to seek higher returns in emerging economies in such a way that capital flows to them would increase.

In line with this tradition, some authors have recently assessed the role of AEs investors’ risk aversion in their portfolio decisions, hence its influence on capital flows towards EMs. For example, in the U.S. case, Egly et al. (2010) consider that a negative shock to these investors’ risk aversion make them take refuge in Treasury Bonds as fast as possible against investments in corporate bonds as well as in local shares and abroad. This probably helps explain EMs outflows in times of international financial stress. The most important policy implication resulting from this branch of literature is that the EMs authorities should carry out a careful and timely follow-up on external conditions, because their variations might involve a mass capital outflow likely to jeopardize macroeconomic stability.

Despite the evidence submitted in previous researches, other authors highlight to a greater extent the importance of internal factors as determinants of capital flow behavior. A seminal research in this direction is that carried out by Chuhan et al. (1996), who inquired about the factors having motivated the flows recorded from the United States to an EMs sample in the first half of the 90’s. They found out that although global factors are important, the internal features of each individual economy play a very meaningful role to the extent that internal variables were three or four times more important than external variables were to explain capital flow dynamics, particularly in Asia. Generally, they observed that bond-destined flows are much more sensitive to alterations in the international environment, while those oriented to the purchase of stocks are more sensitive to variations likely to occur in the internal conditions of the recipient economy.

The main argument of Chuhan et al. (Ibid.) indicates that external investors seeking to diversify risk and maximize short-term returns would pay more attention to relative international conditions when investing in securities, like bonds, while they would be much more concerned about the internal conditions of the country where they own shares, since the performance of the firm they own is crucial in the long-term returns of their investment. Given the fast and relatively deep global financial integration in the past decade, this kind of argumentation does not seem likely to be firmly maintained nowadays, since capitals do not longer seem to have residences and they move fast from a country or sector or asset to

another by means of multiple financial figures. In this document, the authors assess if this type of hypotheses can still be maintained today.

Recently, Felices and Orskaug (2008), and Fratzscher (2011) stress the role played by both push and pull factors in the capital flow dynamics. For instance, Fratzscher (2011) states that common external factors were more important in explaining the behavior of flows to the EMs during the 2007-2009 crisis while, since the beginning of 2009, each country's attraction or specific factors are those having explained the return of capital flows to them. This behavior is particularly true in emerging markets of Asia and Latin America having improved institutional quality and macroeconomic fundamentals, and reduced the risk perception prevailing among investors in the 90's.

Another branch of literature apart from that already exposed has identified other factors that over and above may explain capital movements toward and among the EMs like, for example and most importantly, contagion, information asymmetry, and degree of financial integration.

Contagion began to be a subject for analysis since the end of the 90's, when the literature was interested in studying the channels through which the international crisis of Mexico (1994), Asia (1997), and Russia and Brazil (1998) were transmitted. In these crises, contagion was an element that affected the behavior of capital flows to other countries. It has to be remembered that abrupt capital outflows occurred in an environment where investors did not seem to differentiate between nations; therefore, when a shock took place in an emergent market economy, similar countries did also suffer the consequences.

Edwards (2000), for instance, found evidence that the Asian financial crisis was directly associated with the opening of its capital account and non credible foreign exchange systems. Hernandez et al. (2001) have seen evidence of contagion in both FDI and portfolio investment due to direct commerce relationships and macroeconomic similarities among developing economies. Recently, from their study of a sample of both AEs and EMs, Forbes and Warnock (2010) have found that contagion through commerce and geographical (regional) location is relevant in explaining extreme capital movements, while attraction factors play a moderate role in that explanation.

On the other hand, information asymmetry can also affect the behavior of capital flows because foreign investors do usually alter their decisions from two phenomena being highlighted in the literature: the "herd behavior", and the "home bias" that favors domestic investments. For instance, Cont and Bouchaud (2000) have found a positive relationship between the excess of kurtosis observed in the distribution of probability in asset returns and herd behavior, since a more volatile asset market tends to increase the probability of agents imitating each other.

Bikhchandani and Sharma (2001) have also found evidence of information asymmetry occurring where, at a given time, investment strategies follow the same behavior pattern. For example, when buying soaring shares and selling those that are sinking without consulting the actual conditions of the businesses (in a similar sense as already described, and modeled by the *behavioral finance* literature).

Finally, the literature has stressed the influence that the degree of international financial integration can have on capital flows, since they depend to a large extent on mobility facilities and the connection to the international capital markets offered by the recipient country (Milesi-Ferretti and Tille, 2010; Bluedorn et al., 2011). Nevertheless, the authorities in many countries impose capital controls and foreign exchange regulations as temporary or permanent political measures which either limit or in extreme cases prevent capital inflows or outflows, at least in *de jure* terms. This fact creates the need to incorporate variables permitting to capture that reality at the time of assessing the determinants of capital flows.

To conclude, and according to the literature, it seems necessary to consider the different types of pull and push factors in the analysis dealing with the determinants of capital flows. Likewise, the fact that the effects and importance of the different factors might vary depending on the type of capital flow and the analyzed period should be taken into account.

IV. The regression model, data, and methodology

According to the literature reviewed, the strategy to be employed in this document consists of constructing estimable equations for each one of the types of capital flows where the explanatory variables are constituted by pull and push factors. The importance of each one of them is expected to vary according to the type of flow being explained. For instance, financial or short-term risk variables should be more associated with bank or stock flows, while real or medium or long-term financial variables would be more related to the FDI flows. As we stated from the beginning, in this paper capital flows mean net flows.

Therefore, the equations that will be estimated shall be in the form of:

$$(1) \quad \textit{Type of capital flow}_{it} = \textit{Type of capital flow}_{it-1} + \textit{Push factor}_{it} \alpha_i + \textit{Pull factor}_{jt} \beta_j + (c_i + \varepsilon_{it})$$

With

$$\textit{Type of capital flow}_{it} = \left\{ \begin{array}{l} \textit{Total} \\ \textit{FDI} \\ \textit{Debt} \\ \textit{Other flows} \end{array} \right.$$

$$\textit{Pull Factors}_{it} = \left\{ \begin{array}{l} \textit{Domestic GDP growth} \\ \textit{Institutional stability} \\ \textit{Public debt} \\ \textit{Trade openness} \\ \textit{Reserve adequacy} \\ \textit{Financial openness} \\ \textit{Appreciation expectations} \end{array} \right.$$

$$Push\ Factors_{jt} = \begin{cases} Foreign\ long - term\ interest\ rate \\ VIX\ variation \\ Foreign\ stock\ price\ returns \\ Foreign\ GDP\ growth \end{cases}$$

Where each capital flow type (standardized by each country's GDP) will have a subgroup of explanatory variables according to their nature and characteristics. The reduced form of the equation (1) is estimated by means of the dynamic data-panel method introduced by Arellano and Bond (1991).⁹ To solve difficulties associated with endogeneity and bias problems, for example with variables such as the domestic GDP, international reserves or capital controls, we use lagged levels of the variables as instruments for the endogenous differences. The parameters are estimated by GMM.

From the stylized facts and the methodology exposed, three exercises were implemented:¹⁰

- i. The first one incorporates all the variables proposed in the equation (1).
- ii. The second exercise, in addition to the proposed variables, takes into account a qualitative one that controls for the international financial crisis of 2007-2009.¹¹
- iii. The third exercise envisages the interaction between the explanatory variables in the equation (1) with the qualitative crisis variable.¹²

Each exercise includes regressions for the total net capital flows and for the disaggregation being analyzed: FDI, debt (bonds), and other flows (banks, portfolio, and others).¹³ Net stocks were left aside because, likely due to data frequency and the methodology used, no consistent results were found and estimations did not meet the assumptions required. It is to be noted that the traditional fixed and random, in addition to the dynamic panel methodologies, were tried. In addition, tests with quarterly data were carried out but, in the end, no satisfactory results were obtained.

The findings of the first exercise are reported in Table 2. It is necessary to explain that, in all models, 49 countries were used throughout 15 years, which gives an initial sample size

⁹ The procedure is described in Appendix A.3.

¹⁰ In all models, the methodology programmed by David Roodman (2006) for Stata was used. At the same time, the Windmeijer corrections as well as those of small sample were applied. All the codes, written in the Stata language, are available to the reader and can be requested from the authors.

¹¹ At this level, only the crisis variable was incorporated as a factor affecting the conditioned mean of the different capital flows used as endogenous variables.

¹² It is necessary to explain that it was decided to control for the crisis suffered by the economy worldwide at the end of the previous decade because it is in line with the purposes of this document. However, within the study period considered, there were more than one world crisis affecting somehow flows between and among countries. The analysis of all the crises is left as a proposed subject for future research.

¹³ In the practice it is common to include qualitative variables controlling for each one of the time units incorporated into the model, for the purpose of isolating and controlling likely unobserved factors the nature and variation of which are solely due to time. These variables, however, were not statistically significant. In addition, and in order to maintain the degrees of freedom of the estimate, it was decided to exclude them from it.

of 735 observations. Nevertheless, the inclusion of instruments causes the amount of usable data to decrease down to a range of 673 to 649 data, depending of the number of instruments used to estimate each regression.

In the first place, all capital flow types, with the exception of the other flows, exhibit a moderate degree of inertia, the highest of which, as expected, is particularly recorded by FDI (0.7).

In the second place, the only variables found significant for all the flow types taken into account are the domestic trade openness, GDP growth in local economies, the VIX variation, the domestic financial openness, and the public debt. For the remaining variables, their importance changes (sign, size, and statistical significance of the respective coefficients), depending of the type of capital flow being analyzed.

In the case of the pull variables, the national debt happens to be an adverse determinant for capital flows because, if it increases, they are reduced. In the case of appreciation expectations, it is seen that total and FDI flows respond in a positive manner, as predicted by the portfolio models. Nonetheless, it is inexplicable that debt and other flows do not respond to these expectations.

On the other hand, domestic GDP growth happens to be a factor that attracts external capitals for most flows, just as expected. Nevertheless, an exception is found in the debt flow where the coefficient associated with economic growth has a negative sign and is statistically significant. A plausible explanation for this result is the fact that when economy grows automatic fiscal income and expenditure stabilizers allow the public sector to incur less debt. Domestic growth may have had the same consequences on the private sector behavior. As found out as well by the literature, an increase in the reserve adequacy that is a reduction in the external vulnerability attracts more resources that could be debt-flow substitutes.

In the case of push variables, foreign GDP growth, measured by a leading economic activity indicator, was a negative and significant determinant. This means that as long as the AEs conditions are better, outward flows will go from the emerging markets to the advanced economies (the *flight to quality* hypothesis). The foreign long-term interest rate was significant only for the case of total flows and FDI.

Finally, an interesting result was that the foreign stock price returns have a positive and significant effect on capital flows to the EMs. Therefore, this variable being used as a proxy of the profitability of the variable income market in the AEs suggests that, despite an increase in returns at the financial markets of these economies, flows would likewise be displaced to the emerging markets. This apparently contradictory result could somehow be explained under the hypothesis that financial markets show co-movements or are co-integrated to some degree; for this reason, an improvement in the stock market in developed countries may also account for a momentum of the stock markets in emerging

Table 2. Results of the dynamic panel models applied to the total net capital flows, and by components

Exogenous Variables	Total Flows	FDI	Debt	Other flows
	coef/p-value	coef/p-value	coef/p-value	coef/p-value
Lag of the endogenous variable	0.398*** (0.000)	0.688*** (0.000)	-0.042*** (0.005)	-0.049 (0.367)
Trade openness	0.029* (0.064)	0.041*** (0.000)	-0.026** (0.019)	-0.024*** (0.001)
Reserve adequacy	0.041*** (0.000)	0.004 (0.314)	0.001 (0.581)	0.007*** (0.000)
Domestic GDP growth	0.504*** (0.000)	0.128*** (0.000)	-0.093*** (0.000)	0.270*** (0.000)
Foreign GDP growth	-0.168*** (0.000)	-0.149*** (0.000)	-0.034 (0.103)	-0.078*** (0.002)
Institutional stability	0.230*** (0.009)	0.060 (0.214)	0.050 (0.177)	0.032 (0.581)
Foreign long-term interest rate	-0.282** (0.017)	0.023 (0.880)	-0.344*** (0.000)	0.056 (0.615)
Appreciation expectations	2.064*** (0.005)	2.092*** (0.008)	-0.045 (0.926)	-0.049 (0.939)
VIX variation	0.770* (0.057)	-0.996*** (0.001)	-0.924*** (0.000)	0.766*** (0.002)
Financial openness	1.217*** (0.000)	1.224*** (0.000)	0.330* (0.054)	0.369*** (0.001)
Public debt	-0.069*** (0.000)	-0.018* (0.052)	-0.045*** (0.000)	-0.048*** (0.004)
Foreign stock price returns	2.731*** (0.000)	1.406** (0.023)	4.067*** (0.000)	0.226 (0.543)
Arellano-Bond Test for AR(1) in First Differences	0.000	0.000	0.000	0.037
Arellano-Bond Test for AR(2) in First Differences	0.480	0.268	0.203	0.481
Hansen Test	0.272	0.310	0.319	0.648

Note: *** p<0.01, ** p<0.05, * p<0.1.

Regression models do not include interaction variables, nor do they control for the crisis

countries.¹⁴ A similar result was found by Melo and Rincon (2012) when studying the effects of external shocks on asset prices in a sample of Latin American countries.

The results from the second exercise are reported in Table 3. In the first place, the effect of the international crisis was negative and significant for all cases, except for other capital flows. This result is coherent with the empirical facts described in section II, since after the Lehman Brothers bankruptcy capital flows to the EMs were quickly and strongly reduced.

However, it is necessary to stress that, with the inclusion of the variable “Crisis”, some results having been obtained in the preliminary exercise were not maintained. For example, the inertia of the debt flows ceased to be significant while that of other flows became significant (though remaining at low levels). A possible explanation of this result is the recomposition of the agents’ portfolios in favor of shorter-term flows. Likewise, domestic GDP growth ceased to be an important determinant of FDI, but not of other flows for which it continued to be important, probably because external investors did not perceive its “temporary” falls as risks for their medium and long-term investments.

The appreciation expectations exhibit the signs expected in the case of total and other flows, but not for debt flows, while FDI is not affected by these expectations when controlled for the crisis. Financial openness ceased to be significant for debt flow only. Notice that the foreign stock prices return could not be estimated in the case of debt flows because none of the models including them met the goodness of fit criteria associated with dynamic panel data models. The other results such as the public debt effect and the AEs’ measure of economic activity were robust in the face of the crisis effects.

¹⁴ The intention was to assess the effect of the most representative index of the variable income markets in the emerging countries considered, but lack of information and the poor development of those markets in these countries prevented a proper carrying out of the intended analysis.

Table 3. Results of the dynamic panel models applied to the total net capital flows and by components, controlling by the international crisis

Exogenous Variables	Total Flows	FDI	Debt	Other flows
	coef/p-value	coef/p-value	coef/p-value	coef/p-value
Lag of the endogenous variable	0.349*** (0.000)	0.624*** (0.000)	-0.019 (0.219)	-0.204*** (0.000)
Trade openness	0.020 (0.204)	0.073*** (0.000)	-0.026** (0.026)	-0.032*** (0.000)
Reserve adequacy	0.034*** (0.000)	0.011*** (0.000)	0.001 (0.634)	0.003* (0.066)
Domestic GDP growth	0.481*** (0.000)	-0.024 (0.295)	0.048** (0.020)	0.411*** (0.000)
Foreign GDP growth	-0.160*** (0.000)	-0.070*** (0.000)	-0.013 (0.385)	-0.104*** (0.000)
Institutional stability	0.247** (0.023)	0.090** (0.024)	-0.001 (0.966)	-0.061 (0.179)
Foreign long-term interest rate	-0.698*** (0.000)	0.212* (0.080)	-0.243*** (0.000)	-0.098 (0.357)
Appreciation expectations	1.591** (0.018)	0.493 (0.315)	-1.024*** (0.008)	1.175*** (0.006)
VIX variation	1.433*** (0.000)	-0.167 (0.555)	-0.527** (0.010)	0.644** (0.018)
Financial openness	1.202*** (0.000)	1.137*** (0.000)	0.094 (0.461)	0.261*** (0.006)
Public debt	-0.090*** (0.000)	-0.016** (0.028)	-0.026*** (0.001)	-0.069*** (0.001)
Foreign stock price returns	3.333*** (0.000)	0.972*** (0.001)		-1.060** (0.027)
Crisis	-0.898** (0.013)	-0.583*** (0.005)	-1.835*** (0.000)	0.375 (0.139)
Arellano-Bond Test for AR(1) in First Differences	0.000	0.000	0.011	0.031
Arellano-Bond Test for AR (2) in First Differences	0.476	0.333	0.207	0.297
Hansen Test	0.525	0.247	0.400	0.525

Note: *** p<0.01, ** p<0.05, * p<0.1
Regression models do not include interaction variables.

In order to assess whether the crisis did or did not affect the fundamentals role, the last exercise includes interaction variables between the qualitative variables that capture the crisis and the variables that measure the pull and push factors. Qualitative variables are constructed as follows: for total flows, a variable that takes value 1 from 2008 and until the end of the sample, and zero in another case is constructed. For the DFI and the debt flows, a variable that takes value 1 in 2009 and zero in another case is constructed. Finally, for the other flows, the variable takes value 1 in 2008 and zero in another case. This is because the reaction to the crisis is much faster in most flows, with the exception of the FDI's which very likely, at the time of the crisis, was already planned and, therefore, the most significant impact begins to be seen since 2009.¹⁵ The results of this third exercise are shown in Table 4.

As a result, interactions between the crisis and the economic openness, external vulnerability, GDP growth indicators, the AEs economic activity indicator, the VIX variation, the financial globalization index, and the public debt were statistically significant for at least one of the types of capital flows taken into account.¹⁶ This suggests that the international financial crisis did not only affect the capital flow dynamics but also the relationship between them and their drivers, at least in the short term.

In analyzing the net effect between the explanatory variables in themselves and their respective interactions with those that capture the crisis, it is found that, for the case of push factors, the VIX coefficient is negative, which indicates that an increase in the external risk reduces capital flows to the EMs. As for the pull factors, several cases stand out where the sign of the coefficient associated to a specific determinant did finally change its total effect on capital flows.

For example, the coefficient of domestic GDP growth changed from positive to negative in the regression for other flows; the coefficient of appreciation expectations changed from positive to negative in the regression for total flows, and from significant to statistically non-significant in the regression for FDI; the coefficients of financial openness changed from positive to negative in the models for debt and other flows and, in the most surprising case, the coefficient of public debt changed from negative to positive in the model for debt. These results seem to indicate that the magnitude of the crisis was such that it affected both capital flow dynamics and the importance of its fundamentals drivers.¹⁷

¹⁵ It is important to explain that this qualitative variable defining the crisis is no control whatsoever for unobserved factors. The Arellano and Bond (1991) methodology overcomes this problem; for this reason, they are not going to appear in the estimation of this type of inconveniences, and trying to control them would be unnecessary.

¹⁶ There are cases of interaction between the VIX and the leading economic activity indicator of the AEs, where it is only relevant for total flows.

¹⁷ It is worth mentioning that the crisis took place towards the end of the sample, thus some of these results are likely to change if a larger time sample is included. In fact, for most flows with the exception of FDI's, the crisis variable is built as a qualitative momentum variable.

Table 4. Results where interaction variables are included

Exogenous Variables	Total Flows	FDI	Debt	Other flows
	coef/p-value	coef/p-value	coef/p-value	coef/p-value
Lag of the endogenous variable	0.310*** (0.000)	0.625*** (0.000)	-0.092** (0.014)	0.077 (0.275)
Trade openness	0.066** (0.035)	0.047*** (0.000)	-0.028 (0.166)	-0.017 (0.126)
Reserve adequacy	0.046*** (0.000)	0.015*** (0.000)	-0.001 (0.683)	0.013*** (0.000)
Domestic GDP growth	-0.227** (0.047)	-0.320*** (0.000)	0.080 (0.207)	0.182*** (0.000)
Foreign GDP growth	-0.119** (0.010)	0.009 (0.729)	-0.039* (0.098)	-0.047* (0.092)
Institutional stability	0.386** (0.031)	0.144*** (0.007)	-0.099 (0.224)	-0.010 (0.872)
Foreign long-term interest rate	-0.454 (0.134)	0.539*** (0.000)	-0.603*** (0.000)	0.202* (0.095)
Appreciation expectations	-3.477** (0.019)	-0.442 (0.575)	1.340 (0.106)	-0.579 (0.362)
VIX variation	1.987*** (0.001)	-0.340 (0.224)	-0.274 (0.576)	0.796*** (0.004)
Financial openness	1.934*** (0.000)	1.248*** (0.000)	0.243 (0.358)	0.587*** (0.001)
Public debt	-0.136*** (0.000)	-0.020** (0.019)	-0.041*** (0.000)	-0.010 (0.360)
Foreign stock price returns	3.597** (0.021)	0.905 (0.135)	2.747*** (0.000)	0.150 (0.773)
Crisis	66.613** (0.041)	0.183 (0.621)	-11.518*** (0.001)	2.276* (0.056)
Interaction VIX variation*Crisis	-8.137*** (0.000)			
Interaction domestic GDP growth*Crisis	1.187*** (0.000)	0.392*** (0.000)	0.534* (0.074)	-0.183 (0.289)
Interaction trade openness*Crisis	0.065*** (0.000)	-0.020*** (0.000)	0.011 (0.640)	0.018* (0.073)
Interaction reserve adequacy*Crisis	-0.023* (0.098)	-0.021*** (0.000)	0.037** (0.024)	-0.016 (0.256)
Interaction foreign GDP growth*Crisis	-0.740** (0.022)			
Interaction appreciation expectations*Crisis	-8.010 (0.246)	-5.035 (0.153)	-5.723 (0.610)	19.590*** (0.001)
Interaction financial openness*Crisis	-0.039 (0.941)	-0.193 (0.230)	-1.047* (0.079)	-0.614** (0.038)
Interaction public debt*Crisis	-0.076 (0.101)		0.210*** (0.000)	-0.083** (0.014)
Arellano-Bond Test for AR(1) in First Differences	0.000	0.000	0.000	0.014
Arellano-Bond Test for AR(2) in First Differences	0.451	0.348	0.178	0.510
Hansen Test	0.310	0.267	0.640	0.352

Note: *** p<0.01, ** p<0.05, * p<0.1

V. Conclusions

In this document, models for the different types of capital flows for an EMs sample were estimated, and the role of their determinants was quantified and assessed. In addition, the likely effects of the crisis on their dynamics and the relative importance of their fundamentals were analyzed.

The main results show that the pull and push factors identified by the literature continue to play a central role in the determination of capital flows, but their relative importance is different according to the type being analyzed. Therefore, the only fundamental drivers that were significant for all the flow types taken into account were the degree of trade openness, domestic GDP growth, the VIX variation, the financial openness of local economies, and the public debt. For the remaining fundamentals, their coefficients change in terms of sign, size and statistical significance, depending of the type of capital being analyzed. Additionally, it was found that all the types of capital flows, except for other flows; show a certain degree of inertia.

With respect to the effects of the recent international financial crisis, estimations indicate that it did change the importance of net flows drivers. The crisis did cause a change in how investors determine whether they should invest in an emerging market or not (the coefficients were statistically significant in most models envisaged). This is coherent with what was found in the descriptive part of the flows and reported by the latest literature, which shows that, economically speaking, the effect of the crisis on them was significant.

Nevertheless, this results must be seen with some cautiousness to the extent that the crisis is taking place in the last years of the sample; for this reason, in those cases where the ‘crisis’ variable was defined as a qualitative level variable it is not possible to affirm with certainty that there was a structural change in the way the fundamental drivers affect capital flows, but only that during and after the crisis the investors’ perception, as well as flow dynamics do indeed change with respect to non-crisis periods.

From the point of view of economic policy, the document results attract attention on the need for better understanding of the dissimilar nature of the different capital flows and their unequal response in the face of changes in the fundamental drivers.

References

- Arellano, M. and Bond, S. (1991) "Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", *Review of Economic Studies*, Vol. 58, No. 2, pp. 277-297.
- Bikhchandani, S. and S. Sharma (2001) "Herd Behavior in Financial Markets", *IMF Staff Papers*, Vol. 47, No. 3, pp. 279-310.
- Bank for International Settlements (2009) "Capital flows and emerging market economies", *Committee on the Global Financial System Publications*, No 33, January.
- Bluedorn, J.; R. Duttagupta; J. Guajardo; P. Topalova (2011) "International Capital Flows: Reliable or Fickle?", *World Economic Outlook: Tensions from the Two-Speed Recovery*, Chapter 4, International Monetary Fund, April.
- Borio, C.; P. Disyatat (2011), "Global imbalances and the financial crisis: Link or no link?" *BIS Working Papers*, No. 346, May.
- Byrne, J. and N. Fiess (2011) "International Capital Flows to Emerging and Developing Countries: National and Global Determinants", *Working Papers*, No. 2011_01, Business School - Economics, University of Glasgow.
- Calvo, G.; L. Leiderman; C. Reinhart (1993) "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors", *IMF Staff Papers*, Vol. 40, No.1, pp. 108-151.
- Calvo, G.; L. Leiderman; C. Reinhart (1997) "Capital Inflows and Real Exchange Rate Appreciation in Latin America: With a Reference to the Asian Experience", en S. Edwards (ed.), *Capital Controls, Exchange Rates, and Monetary Policy in the World Economy*, Cambridge University Press.
- Chuhan, P.; G. Perez-Quiros; H. Popper (1996) "International Capital Flows: Do Short-Term Investment and Direct Investment Differ?", *Policy Research Working Paper*, No. 1669, World Bank, Washington.
- Cont, R. and J. P. Bouchaud (2000) "Herd Behavior and Aggregate Fluctuation in Financial Market", *Macroeconomics Dynamics*, Vol. 4, Issue 2, pp. 170-196.
- Contessi, S.; P. De Pace; J. Francis (2010) "The Cyclical Properties of Disaggregated Capital Flows", *Working Paper Series*, No. 2008-041C, Federal Reserve Bank of St. Louis.
- De Gregorio, J. (2012), "On Capital Flows: Gross, Net, and Policies," Mimeo, Universidad de Chile, September.
- Dixit, A. and R. Pindyck (1994) *Investment Under Uncertainty*, Princeton University Press, Princeton.

- Edwards, S. (2000), “Contagion”, *World Economy*, Vol. 23, No. 7, pp. 873-900, July.
- Egly, P.; D. Johnk; D. Perez (2010) “Foreign Portfolio Investment Inflows to the United States: The Impact of Investor Risk Aversion and US Stock Market Performance”, *North American Journal of Finance and Banking Research*, Vol. 4. No. 4, pp. 25-41.
- Felices, G. and B.-E. Orskaug (2008) “Estimating the Determinants of Capital Flows to Emerging Market Economies: A Maximum Likelihood Disequilibrium Approach”, *Working Paper*, No. 354, Bank of England, November.
- International Monetary Fund (2009) “Crisis and Recovery”, *World Economic Outlook*, April.
- International Monetary Fund (2009) “Addressing the Crisis”, *Regional Economic Outlook (Europe)*, May.
- Forbes, K. and F. Warnock (2011) “Capital Flow Waves: Surges, Stops, Flight, and Retrenchment”, *NBER Working Paper Series*, No. 17351.
- Fratzscher, M. (2011) “Capital Flows, Push versus Pull Factors and the Global Financial Crisis”, *Working Paper Series*, No. 1364, European Central Bank, July.
- Hansen, L. (1982) “Large Sample Properties of Generalized Method of Moments Estimators”, *Econometrica*, Vol. 50, No. 33, pp. 1029-1054.
- Hernandez, L.; P. Mellado; R. Valdes (2001), “Determinants of Private Capital Flows in the 1970s and 1990s: Is there Evidence of Contagion?”, *IMF Working Paper*, No. WP/01/64, International Monetary Fund.
- Izquierdo, A.; R. Romero; E. Talvi (2008) “Booms and Busts in Latin America: The Role of External Factors”, *Working Paper*, No. 631, Inter-American Development Bank, February.
- Kose M.; E. Prasad; M. Terrones (2009) “Does Openness to International Financial Flows Raise Productivity Growth?”, *Journal of International Money and Finance*, Vol. 28, Issue 4, pp. 554-580.
- Melo, L. F. and H. Rincón (2012) “Choques externos y precios de los activos en Latinoamérica antes y después de la quiebra de Lehman Brothers”, *Borradores de Economía*, No. 704, Banco de la República.
- Milesi-Ferretti, G-M and C. Tille (2011) “The Great Retrenchment: International Capital Flows During the Global Financial Crisis”, *Economic Policy*, April, pp. 289–346.

Montiel, P. and C. Reinhart (1999) “Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital Flows? Evidence from the 1990s”, *Journal of International Money and Finance*, Vol. 18, Issue 4, pp. 619–635.

Papaioannou, Elias (2009) “What Drives International Financial Flows? Politics, Institutions, and Other Determinants”, *Journal of Development Economics*, Vol. 88, No. 2, pp. 269–81.

Reinhart, C. and V. Reinhart (2008) “Capital Flow Bonanzas: An Encompassing View of the Past and Present”, *NBER Working Paper Series*, No. 14321.

Roodman, D. (2006) “How to Do xtabond2: An Introduction to Difference and System GMM in Stata”, *Centre for Global Development Working Paper*, No 103.

Sargan, J. (1958) “The Estimation of Economic Relationships Using Instrumental Variables”, *Econometrica*, Vol. 26, No. 3, pp. 393-415.

Taylor, M. and L. Sarno (1997) “Capital Flows to Developing Countries: Long- and Short-Term Determinants,” *The World Bank Economic Review*, Vol. 11, No. 3, pp. 451–70.

Terrier, G.; R. Valdes; C. Tovar; J. Chan-Lau; C. Fernández-Valdovinos; M. García-Escribano; C. Medeiros; M-K. Tang; M. Vera; Ch. Walker (2011) “Policy Instruments To Lean Against The Wind in Latin America”, IMF Working Paper, No. 159.

Tong, H. and S.-J. Wei (2011) “The Composition Matters: Capital Inflows and Liquidity Crunch During a Global Economic Crisis”, *Review of Financial Studies*, Vo. 24, No. 6, pp. 2023-2052.

Valdes-Prieto, S. and M. Soto (1998), “The Effectiveness of Capital Controls: Theory and Evidence from Chile”, *Empirica*, Vol. 25, Issue 2, pp. 133-164.

Verdier, G. (2008) “What Drives Long-Term Capital Flows? A Theoretical and Empirical Investigation”, *Journal of International Economics*, Vol.74, Issue 1, pp. 120-142, January.

Appendix 1
Emerging markets in the sample, and their classification

Emerging America	Latina	Emerging Asia	Emerging Europe	Other emerging economies
Argentina		China: Mainland	Bulgaria	Azerbaijan
Brazil		India	Croatia	Belarus
Chile		Indonesia	Cyprus	Egypt
Colombia		Malasia	Czech Republic	Israel
Costa Rica		Philippines	Hungary	Jordan
Dominican Republic		Republic of Korea	Latvia	Kazakhstan
Ecuador		Singapore	Lithuania	Kuwait
Mexico		Sri Lanka	Malta	Libya
Peru		Thailand	Poland	Morocco
			Rumania	Russia
			Slovenia	Saudi Arabia
			Turkey	Syrian Arab Republic
			Ukraine	South Africa
				Tunisia

Source: Bluedorn et al. (2011)

Appendix 2

Variables and information sources

This article uses as its main source the annual data compiled in the two publications of the International Monetary Fund (IMF): (i) *International Financial Statistics (IFS)* and (ii) *Balance of Payments Statistics (BOPS)*; World Bank: *World Development Indicators*; Central Banks, and Bloomberg, among others.

Annual and quarterly data about capital flows were compiled from the database of the IMF Balance of Payments Statistics. Particularly, net capital flows pertain to the sum of the net direct foreign investment flows, net share flows, external debt bonds, and other net investment flows. In the later, the other National Central Government and Monetary Authorities' net investment flows are excluded. The total net capital flows, as well as their components, have been considered in nominal dollars of the United States, and were standardized according to the GDP in nominal dollars of the United States.

Variable	Construction	Sources
Trade openness	Sum of goods and services imports and exports as GDP %	<i>International Financial Statistics</i> (IFS) and International Monetary Fund (IMF)
Domestic GDP growth	Real GDP growth (%)	IFS, IMF databases, and the World Bank's World Development Indicators (WDI) databases
Crisis Crisis1 Crisis2 Crisis3	Financial crisis control dummy Dummy=1 since 2008 until 2010. Dummy=1 for year 2008. Dummy=1 for year 2009.	Calculations by the authors
Public debt	Total gross Government (domestic plus external) public debt as GDP %	Source: Carmen M. Reinhart Database (http://www.carmenreinhart.com/data/) and Central Banks
Appreciation expectations	Rationally constructed appreciation expectations ($\Delta\%St = \Delta\%St+1$). S=USD/Local currency.	IFS and IMF databases
Total net capital flows and their components: foreign direct investments, debt (bonds), and other capital flows	United States nominal dollars	International Monetary Fund <i>Balance of Payments Statistics</i> (BOPS) database
Foreign GDP growth	Leading indicator of economic activity in AEs: Economic activity average indices of the Eurozone (OECD Euro Area Index) and the United States (CB US leading Index) as weighted by their respective GDP.	Bloomberg
Financial openness	Financial globalization indicator (<i>de jure</i> measurement of capital controls): an increase in the index means wider openness of the capital account of the balance of payments.	Chinn & Ito (2008)
Institutional stability indicator	Index that rates the type of democracy in the economies within a range between 10 and -10 Where: consolidated democracy = 10, and strongly autocratic = -10. Autocracies -10 to -6; anocracies -5 to 5; democracies 6 to 10	Center for systemic peace, Polity IV. http://systemicpeace.org/polity/polity4.htm
Foreign stock price returns	Annual Standard & Poor's 500 percent variation	Bloomberg
Foreign long-term interest rate	10-year Treasury Bills interest rate	Bloomberg
VIX	Annual Chicago Board Options Exchange Market volatility index	Bloomberg
Reserve adequacy indicator	International reserves divided into the monetary M1 aggregates as GDP %	IFS, IMF databases, and the World Bank's World Development Indicators (WDI) databases

Source: Compilation and authors' own calculations.

Appendix 3 Econometric methodology used

The reduced form of equation (1) is estimated using the dynamic panel method suggested by Arellano and Bond (1991),¹⁸ which makes it possible to assess the relationship between the endogenous variable and the exogenous variables, controlling for dynamic panel endogeneity and bias problems. The model proposed to carry out this estimation is as follows:

$$(A.3.1) \quad y_{i,t} = \alpha y_{i,t-1} + \beta_j x_{i,j} + c_i + \varepsilon_{i,t},$$

Where y corresponds to the vector containing the endogenous variable, x is the exogenous variables matrix, c is the unobserved component containing everything that is not explicitly controlled in the exogenous part of the regression. Sub-indices i and t make reference to the individual and time dimension, respectively. Finally, ε is the estimation error, assumed to be identically and independently distributed ($\varepsilon \sim \text{i.i.d.}$).

Starting from equation (A.3.1), an endogenous variable lag is created, and it is subtracted at both sides of the equation to obtain:

$$(A.3.2) \quad \Delta y_{i,t} = (\alpha - 1)y_{i,t-1} + \beta_j x_{i,j} + c_i + \varepsilon_{i,t}.$$

As a result, the unobserved component is eliminated. By making a last transformation, the estimable equation is obtained:¹⁹

$$(A.3.3) \quad \Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \beta^* \Delta x_{i,t} + \Delta \varepsilon_{i,t}$$

The estimator, using the Generalized Moments Method (GMM), is:

$$(A.3.4) \quad \beta_{GMM} = (x' z A z' x)^{-1} x' z A z' y,$$

where z is the instruments matrix and A is the correction matrix. With this methodology, lags of the instrumented variables can be used as their instruments, assuming that these are not correlated to the error term of the model.

It should be mentioned that two problems arise from the use of this methodology, which should be detected and properly corrected: over-identification of the estimation via invalid

¹⁸ Diverse experiments were carried out using the traditional methods of panel data (fixed and random effects). However, these models did not meet several of the assumptions needed to make inferences about their results.

¹⁹ Resulting from multiplying (A.3.2) by $I \otimes M$, where I is the identity matrix and M is a matrix with minus one at the main diagonal, ones just on top of it, and zeros in the remaining spaces.

instruments, and the first order autocorrelation implicit in the model defined by equation (A.3.1).²⁰

In order to identify the first problem, Sargan (1958) and Hansen (1982) tests are used and assessed under a statistical perspective of whether the set of instruments adopted is valid or not. Under the null hypothesis of proper instruments, the tests take the following functional form:

$$(A.3.5) \quad W = \frac{1}{N} (z' \epsilon)' A_{EGMM} (z' \epsilon),$$

where N is the sample size, ϵ are the empirical errors and $A_{EGMM} = (z' z)^{-1}$. The difference between the Sargan and Hansen tests is that the first assumes certain well-behaved empirical errors, while the second takes them from a robust estimation prior to heteroskedasticity problems.

With respect to the identification of the second problem, Arellano and Bond developed a test to assess the presence of first-order autocorrelation in model (A.3.1) from the evaluation of the second-order autocorrelation in the first differences equation, i.e., in equation (A.3.3) (see Arellano and Bond, 1991, page 282).

²⁰ Where there is autocorrelation in the model, and once the problem has been controlled with the non-observed component, it is possible that some of the lags used as instruments are not the most proper ones to play that role.