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

Hernán Rincón

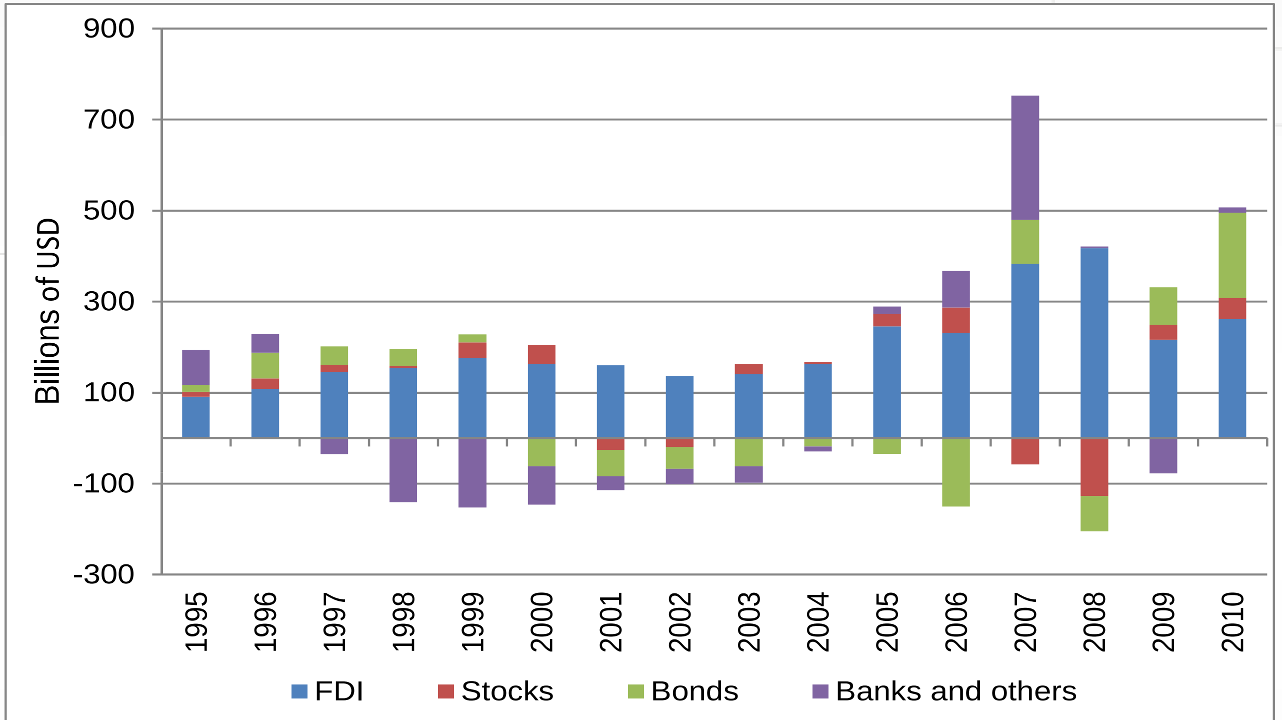
Banco de la República de Colombia

XI Emerging Markets Workshop
Madrid, 4-5 November, 2013

Motivation

- The financial crisis of 2007-09 caused rapid changes in capital flows (amount and composition) toward/from EMs.
- Authorities implemented different policies to limit the destabilizing effects of both their levels and volatility.
- Polices went from macroprudential to capital controls.
- The intense oscillations of capital flows became again a subject of study by the literature.
- This paper is part of this new literature.

Capital flows initiated an upward trend to EMs just after the USA's "dot.com" event in 2002…

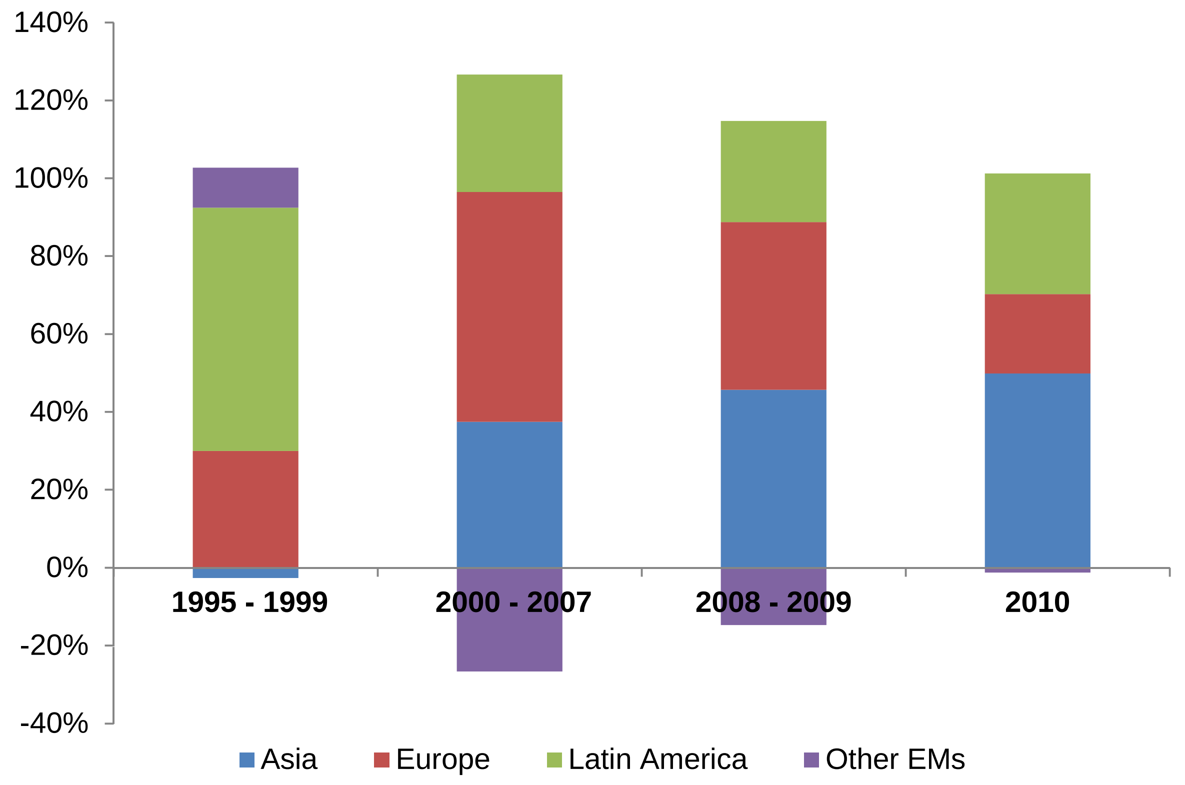


Source: IMF Balance of Payments Statistics. Authors' own calculations.

- FDI suffered to a lesser extent the impact of the crisis, while equity flows and debt bonds deteriorated sharply.

- In 2010, bonds flows increased and exceeded the levels observed before 2008.

The European emerging countries were the most affected by the crisis…



Source: IMF Balance of Payments Statistics. Authors' own calculations.

- After the crisis capital flows to Asia and Latin America increased.

Content

I. Objective

II. Literature review

III. Regression model, data, and econometric approach.

IV. Model specifications and results

V. Main conclusions

I. Objective

- To estimate a reduced form model of capital flows for a sample of EMs and assess their fundamental drivers.

- This research responds two questions:

1) Do the different types of capital flows respond to the same fundamentals and in the same degree?

2) Did the international financial crisis affect their response to fundamentals?

II. Literature Review

¿What explains capital flows to emerging economies?

- **Push or external factors…**
  - Monetary stance, economic cycle, risk appetite of international investors, etc. (Calvo et al., 1993, 1997; Izquierdo et al., 2008; Reinhart y Reinhart, 2008).
- **Pull or domestic factors…**
  - Economic, political and financial stability, economic growth, institutional framework, openness of the economy to trade and capital flows (Papaioannou, 2009).

II. Literature Review (cont.)

- **Both push and pull factors…**
  - During the crisis, the external factors seemed to govern the behavior of capital flows.
  - However, since 2009 the pull factors have explained capital flows in emerging Asia and Latin America (Felices y Orskaug, 2008; Fratzscher, 2011).

III. Regression model, data, and econometric approach

Regression model

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

[illegible]

[illegible]

[illegible]

❖ c is the unobserved component containing everything that is not explicitly controlled.

Data

- Period: 1996 to 2010
- Frequency: Yearly
- Individuals: 49 EMs

  => 15 years and 49 individuals for an initial sample size of 735 observations.

- Sources: FMI, central banks, departments of statistics, others.

Econometric approach

- The dynamic data-panel method introduced by Arellano and Bond (1991).

  - Allows to control for dynamic panel endogeneity and bias problems.

- The estimators are GMM.

  - There are two problems that need to be detected and properly corrected: over-identification and first order autocorrelation.

III. Model specifications and results

Three types…

1st. Regression model incorporates variables identified in equation (1).

2nd. Regression model + qualitative variable ("Crisis") that controls for the international financial crisis.

3rd. Regression model + "Crisis" + interactions between "Crisis" and explanatory variables.

Results (1st type)

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***	0.688***	-0.042***	-0.049
	(0.000)	(0.000)	(0.005)	(0.367)
Trade openness	0.029*	0.041***	-0.026**	-0.024***
	(0.064)	(0.000)	(0.019)	(0.001)
Reserve adequacy	0.041***	0.004	0.001	0.007***
	(0.000)	(0.314)	(0.581)	(0.000)
Domestic GDP growth	0.504***	0.128***	-0.093***	0.270***
	(0.000)	(0.000)	(0.000)	(0.000)
Foreign GDP growth	-0.168***	-0.149***	-0.034	-0.078***
	(0.000)	(0.000)	(0.103)	(0.002)
Institutional stability	0.230***	0.060	0.050	0.032
	(0.009)	(0.214)	(0.177)	(0.581)
Foreign long-term interest rate	-0.282**	0.023	-0.344***	0.056
	(0.017)	(0.880)	(0.000)	(0.615)
Appreciation expectations	2.064***	2.092***	-0.045	-0.049
	(0.005)	(0.008)	(0.926)	(0.939)
VIX variation	0.770*	-0.996***	-0.924***	0.766***
	(0.057)	(0.001)	(0.000)	(0.002)
Financial openness	1.217***	1.224***	0.330*	0.369***
	(0.000)	(0.000)	(0.054)	(0.001)
Public debt	-0.069***	-0.018*	-0.045***	-0.048***
	(0.000)	(0.052)	(0.000)	(0.004)
Foreign stock price returns	2.731***	1.406**	4.067***	0.226
	(0.000)	(0.023)	(0.000)	(0.543)

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

Results (3rd type)

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***	0.625***	-0.092**	0.077
	(0.000)	(0.000)	(0.014)	(0.275)
Trade openness	0.066**	0.047***	-0.028	-0.017
	(0.035)	(0.000)	(0.166)	(0.126)
Reserve adequacy	0.046***	0.015***	-0.001	0.013***
	(0.000)	(0.000)	(0.683)	(0.000)
Domestic GDP growth	-0.227**	-0.320***	0.080	0.182***
	(0.047)	(0.000)	(0.207)	(0.000)
Foreign GDP growth	-0.119**	0.009	-0.039*	-0.047*
	(0.010)	(0.729)	(0.098)	(0.092)
Institutional stability	0.386**	0.144***	-0.099	-0.010
	(0.031)	(0.007)	(0.224)	(0.872)
Foreign long-term interest rate	-0.454	0.539***	-0.603***	0.202*
	(0.134)	(0.000)	(0.000)	(0.095)
Appreciation expectations	-3.477**	-0.442	1.340	-0.579
	(0.019)	(0.575)	(0.106)	(0.362)
VIX variation	1.987***	-0.340	-0.274	0.796***
	(0.001)	(0.224)	(0.576)	(0.004)
Financial openness	1.934***	1.248***	0.243	0.587***
	(0.000)	(0.000)	(0.358)	(0.001)
Public debt	-0.136***	-0.020**	-0.041***	-0.010
	(0.000)	(0.019)	(0.000)	(0.360)
Foreign stock price returns	3.597**	0.905	2.747***	0.150
	(0.021)	(0.135)	(0.000)	(0.773)
Crisis	66.613**	0.183	-11.518***	2.276*
	(0.041)	(0.621)	(0.001)	(0.056)

Results (3rd type)

Interaction VIX variation*Crisis	-8.137***			
	(0.000)			
Interaction domestic GDP growth*Crisis	1.187***	0.392***	0.534*	-0.183
	(0.000)	(0.000)	(0.074)	(0.289)
Interaction trade openness*Crisis	0.065***	-0.020***	0.011	0.018*
	(0.000)	(0.000)	(0.640)	(0.073)
Interaction reserve adequacy*Crisis	-0.023*	-0.021***	0.037**	-0.016
	(0.098)	(0.000)	(0.024)	(0.256)
Interaction foreign GDP growth*Crisis	-0.740**			
	(0.022)			
Interaction appreciation expectations*Crisis	-8.010	-5.035	-5.723	19.590***
	(0.246)	(0.153)	(0.610)	(0.001)
Interaction financial openness*Crisis	-0.039	-0.193	-1.047*	-0.614**
	(0.941)	(0.230)	(0.079)	(0.038)
Interaction public debt*Crisis	-0.076		0.210***	-0.083**
	(0.101)		(0.000)	(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

Results (3rd type with interactions)

Exogenous Variables	Total Flows		FDI		Debt		Other flows	
	coefficients		Coefficients		Coefficients		coefficients	
	Without interactions	With interactions	Without interactions	With interactions	Without interactions	With interactions	Without interactions	With interactions
Lag of the endogenous variable	0.31***	-----	0.62***	-----	-0.09**	-----	0.07	-----
Trade openness	0.06**	0.13	0.04***	0.02	-0.02	-0.01	-0.01	0.01
Reserve adequacy	0.04***	0.02	0.01***	-0.01	-0.00	0.03	0.01***	0.01
Domestic GDP growth	-0.22**	0.96	-0.32***	0.07	0.08	0.53	0.18***	0.18
Foreign GDP growth	-0.11**	-0.85	0.01	0.01	-0.03*	-0.03	-0.04*	-0.04
Institutional stability	0.38**	-----	0.14***	-----	-0.09	-----	-0.01	-----
Foreign long-term interest rate	-0.45	-----	0.53***	-----	-0.60***	-----	0.20*	-----
Appreciation expectations	-3,47**	-3.47	-0.44	-0.44	1.34	1.34	-0.57	19,01
VIX variation	1.98***	-6.15	-0.34	-0.34	-0.27	-0.27	0.79***	0.79
Financial openness	1.93***	1.93	1.24***	1.24	0.24	-1.04	0.58***	-0.02
Public debt	-0.13***	-0.13	-0.02**	-0.02	-0.04***	0.16	-0.01	-0.08
Foreign stock price returns	3.59**	-----	0.90	-----	2.74***	-----	0.15	-----
Crisis	66.61**	-----	0.18	-----	-11.51***	-----	2.27*	-----

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

IV. Main Conclusions

- Both pull and push factors do play a role in the determination of capital flows.
- However, their relative importance changes depending of the type of flow (a call for common aggregation problems in the literature).
- The financial crisis did affect the relationship between flows and their main drivers.

IV. Main Conclusions (cont.)

- The fundamentals that were significant for most types of flows were: Openness, GDP growth in local economies, VIX, financial globalization, and public debt.
- Remaining fundamentals: Their importance changes in terms of sign, size and statistical significance, depending of the type of flow.
- Additionally, all types of flows, except for other net flows, show a certain degree of inertia.

Thanks!

Appendix

Econometric method

- The reduced form of equation (1) is estimated using the dynamic panel method suggested by Arellano and Bond (1991).

- The model proposed to carry out this estimation is:

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

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 (ε ~ i.i.d.).

Econometric method (cont.)

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

As a result, the unobserved component is eliminated. By making a last transformation, the estimable equation is obtained:[18]

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

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

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

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.

Econometric method (cont.)

- This method has two main problems that need to be detected and properly corrected: over-identification of the estimation via invalid instruments, and the first order autocorrelation implicit in the model defined in equation (A.3.1).
  - Sargan (1958) and Hansen (1982) tests are used to evaluate whether the set of instruments adopted is valid or not.
  - Arellano and Bond (1991) test for the presence of first-order autocorrelation in model (A.3.1) from the evaluation of the second-order autocorrelation in the first differences equation.

Results (2nd type)

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***	0.624***	-0.019	-0.204***
	(0.000)	(0.000)	(0.219)	(0.000)
Trade openness	0.020	0.073***	-0.026**	-0.032***
	(0.204)	(0.000)	(0.026)	(0.000)
Reserve adequacy	0.034***	0.011***	0.001	0.003*
	(0.000)	(0.000)	(0.634)	(0.066)
Domestic GDP growth	0.481***	-0.024	0.048**	0.411***
	(0.000)	(0.295)	(0.020)	(0.000)
Foreign GDP growth	-0.160***	-0.070***	-0.013	-0.104***
	(0.000)	(0.000)	(0.385)	(0.000)
Institutional stability	0.247**	0.090**	-0.001	-0.061
	(0.023)	(0.024)	(0.966)	(0.179)
Foreign long-term interest rate	-0.698***	0.212*	-0.243***	-0.098
	(0.000)	(0.080)	(0.000)	(0.357)
Appreciation expectations	1.591**	0.493	-1.024***	1.175***
	(0.018)	(0.315)	(0.008)	(0.006)
VIX variation	1.433***	-0.167	-0.527**	0.644**
	(0.000)	(0.555)	(0.010)	(0.018)
Financial openness	1.202***	1.137***	0.094	0.261***
	(0.000)	(0.000)	(0.461)	(0.006)
Public debt	-0.090***	-0.016**	-0.026***	-0.069***
	(0.000)	(0.028)	(0.001)	(0.001)
Foreign stock price returns	3.333***	0.972***		-1.060**
	(0.000)	(0.001)		(0.027)
Crisis	-0.898**	-0.583***	-1.835***	0.375
	(0.013)	(0.005)	(0.000)	(0.139)

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