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# **Bilateral Data on Capital Flows: Role in Financial Stability Monitoring**

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# **Bilateral Data on Capital Flows: Role in Financial Stability Monitoring<sup>1</sup>**

A NOTE PREPARED FOR THE 1<sup>ST</sup> IMF STATISTICS FORUM

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## **1. Introduction**

There is substantial evidence that the demand by non-residents for the assets of Emerging Market Economies (EME) is volatile, and depends on “push” factors that are unrelated to the marginal productivity of the host economy. The concern is that rising demand could push up the prices of EMEs assets and increase the issuance of these assets. This increased issuance in turn can coincide with a current account (CA) deficit, since assets finance increased consumption, investment and government spending.

A large fall in non-resident demand have significant costs for EMEs. Downward adjustment in previously inflated asset prices can generate financial distress if accompanied by leverage. In turn, if this fall follows a period of high current account deficit is can lead to costly macro adjustments (as in Calvo et al (2004) and the long literature on the costs of current account adjustments (see Edwards 2004)

Understanding the determinants of “surges” and “stops” in different types of capital flows, and then to be able to monitor their evolution, are therefore both important components of financial stability analysis in financially integrated EMEs.

In this context, the purpose of this note is to evaluate the extent to which global bilateral databases are useful for financial stability analysis. We also aim to assess directions of new data initiatives to improve this analysis. Throughout the note we mostly focus on portfolio and debt inflows, given the relative stability of FDI flows (For a discussion on the stability of FDI see Levchenko and Mauro 2006 and Milesi-Ferretti and Tille 2011).

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We will proceed as follows. First, we very briefly some stylized facts on gross capital flows. Then we move to pinpoint issues related to cross border bank lending as well as portfolio flows. We close with concluding remarks.

## **2. Some stylized facts on capital flows**

Figure 1 shows gross capital flows, for the average EME and for Chile over the last 20 years. The figure shows the drop of gross capital inflows to EMEs after the tequila crisis, the impact of the LTCM and Russian crisis on gross flows, and finally the contraction and rapid recovery following the subprime crisis.

The figure also shows the changing relative importance of the types of non FDI gross capital flows. Bank lending surged prior to the subprime crisis. Post crisis, non FDI flows have been dominated by portfolio flows.

Chile has followed a similar overall pattern to the average EME, with some notable exceptions. First, Chile did not experience a large reversal of gross inflows in 1998 – but rather an acceleration of outflows. Second, Chile has a somewhat higher share of FDI in total inflows than the average EME.

A notable recent development has been the growth of gross outflows out of EME. This started in Chile in 1998 – coinciding with the liberalization of investment restrictions on pension funds (see García-Silva and Carriere-Swallow 2013). In more recent years portfolio outflows has been replaced by FDI as the dominant source of capital outflows from Chile. Other EMEs have followed suit more recently: in 2012 the average EME in the sample invested 10% of its GDP abroad.

The buildup and drop in cross border bank lending to EMEs is also evident in BIS banking data. After 2009 the volume of lending recovered but has remained stable. Interestingly, the upward trend in lending continued for Chile, with important shifts in composition by country. After 2008 the share of loans from European Banks fell significantly.

## **3. Determinants of Cross Border Bank Lending: Summary of Existing Evidence**

There is a fairly large literature on the determinants of cross border bank lending. The earlier literature was in the broader context of capital flows to EMEs, and looked at push pull factors for different types of capital, including cross border debt. These studies used Balance of Payments data and summary measures of global financing and macroeconomic conditions. (see for example Fernandez-Arias, 1996; Hernández et al, 2001).

Later literature explored bilateral bank credit flows using the BIS bank data. This allowed for more granular information on home country macro conditions, or to include variables that captured the average situation of banks in the home country. The key assumption in this literature is imperfect substitution between banks. If substitution is imperfect then and host economy will not be able to easily substitute to banks from a 3rd country if its “usual” lender reduces supply.

Does this disaggregated information add to traditional balance of payment and stock flows? The evidence is a clear yes.

For instance, the World Bank (2008) using BIS data on foreign bank claims for 124 emerging economies finds that deterioration in home country interbank liquidity reduces lending to emerging markets. Cetorelli and Goldberg (2011) find a similar result using BIS data during the 2008/9 crisis and a measure of exposure to dollar funding liquidity risk. McGuire and Tarashev (2008) also find a relationship between the dynamics of cross border banking claims, and funding conditions. In addition they find that average measures of bank solvency in the home countries impacts lending. Muller and Uhde (2013) confirm this result, and find that in addition bank solvency, home market concentration and regulatory environment, are significant drivers of cross border bank flows. Finally, recent work by Herrmann and Mihaljek (2010) show that substitution across banks is also limited by geography ---as distance is a relevant determinant of cross border bank lending. Note that most of these papers include controls for macro-economic conditions in home host countries (see also Buck et al 2010).

The BIS bank data has also allowed to estimate contagion via bank lending. (Van Rijckeghem and Weder 2000 and 2001; Martinez et al 2005, Opazo Silva 2007). For example, Opazo and Silva (2007) find that greater exposure to countries in South East Asia implied reductions in cross border lending to other countries at the time of the Asian Crisis.

Because of data availability on cross border lending, most of these papers include country level averages of bank level data: bank solvency, loan provisions and common exposures. One exception (De Haas and Van Horen (2012)) confirms the importance of bank specific variables. In the paper they use micro-data on syndicated loans from 75 banks to 59 countries, and find that bank-specific shocks ended up being transmitted across borders. Banks that were particularly shocked in the crisis restricted their lending, especially to smaller borrowers.

#### **4. Cross Border Bank Lending: Some Evidence from Chilean Bank Loans**

Our empirical approach is based on McGuire et al 2008, who find that funding conditions in home market affect cross border lending of banks. Specifically we analyze the extent to which bank level funding conditions affect the terms at which they lend to

Chilean banks. The data also allows some preliminary insights into the capacity of Chilean banks to substitute suppliers.

The database is composed of bank pair transactions. For instance, a specific loan operation between Banco Estado and Citibank New York. Our sample is of approximately 3000 such transactions. The key fields included are: the interest rate on the loan (expressed in spreads over LIBOR), the size of the loan in USD, the currency denomination of the loan, term, and whether it is trade related.

The dependent variable is the spread over libor on bank to bank cross border loans. The RHS variables are Chilean average country risk (measured by Chilean sovereign CDS), overall financial risk in the home market of the lending bank (proxied by home country CDS), specific bank funding conditions (proxied by home bank CDS).

Figure 3 shows the volume of bank to bank cross border loans in the broader context of cross border lending from the Balance of Payment Statistics. Our operation x operation sample covers new bank to bank loans for the period 2009 to 2013. These are the loans behind the blue area in the figure. Note that in 2013 the net flows of bank to bank loans have been negative, as amortizations have outpaced new loans and Chilean banks have moved towards market sources of USD funding.

Of note is that there are significant heterogeneity in the rate of the loans over time and within periods, in particular periods in which overall global risk aversion rose (marked in grey in figure 4). This pattern is robust to using a hedonic pricing model that includes bank level fixed effects, and controls for the term, size and currency of the loans. Figure 5 shows that there is also significant variation across countries. In particular in times of global financial distress – which provides further support for the importance of bilateral data such as that provided by the BIS. Figure 6 also shows that there is heterogeneity within economies (EU vs US for instance). There also appears to be a strong relation in between countries and within countries dispersion of spreads (Figure 7).

Table 1 presents a simple empirical exercise using the transaction level data described previously. The columns report results for the full sample, and crisis vs non crisis periods. The crisis periods are those in which the Chilean CDS where above 100bp, which coincide with the subprime crisis and the Eurozone problems in 2011 and 12. All specifications include lender and borrower bank fixed effects.

The estimated coefficients suggest that funding conditions impact the terms at which banks lend in cross border operations. Interestingly, in periods of higher stress only the country CDS is significant whereas in “tranquil” times bank CDS is significant. We take this to mean that individual bank funding conditions matter – but that in crisis periods their movements are dominated by country level factors. Note also that the term premium and trade-related credit variables are less important in tranquil times, which is consistent with a higher term premium in crisis episodes and higher concerns regarding counterparty risk.

These results are preliminary. Extension should include a richer data set on lending bank funding conditions, lending bank solvency controls and controls for borrowing bank solvency.

If some global banks are lending at worse terms...then why do Chilean banks not shift lender? The operation level data hints at a significant degree of persistence across bank pairs (see table 2). This indicates that the shift to cheaper sources of funding may not be easy to implement quickly.

## **5. Cross Border Bank Lending: Implications for Monitoring Financial Stability Risks**

The previous results –and the existing literature on cross border bank lending-- have important implications for financial stability monitoring: i) there is a need to monitor host country (and “home” bank) diversification, ii) it is important to monitor funding conditions in relevant host countries, iii) if possible it is important to monitor lender bank “health” and funding conditions, including common exposures, ideally at bank level.

Figures 8 through 10 provide a simple example based on Chilean data. Since the financial crisis of 2008, there has been a falling share in lending from Eurozone banks, with a rising share of lending from Japanese and UK based banks. Despite changes in the rank, concentration by country is high with just 4 source countries making up 80% of lending to Chilean banks (figure 9). A similar pattern emerges at the bank level. Concentration is relatively high, but some of largest lenders changed after 2009 (figure 9).

Figure 10 presents a further dimension: concentration of lenders across Chilean recipient banks is high, independent of size. That is, all Chilean banks, irrespective of their size, face a limited number of foreign providers of cross border bank lending. Finally, Figure 11 shows a specific tool of bank-level data for monitoring the overall cost of funding for the sector in Chile.

*Some takeaways from the last three sections*

1. Existing empirical evidence suggest that the availability of more detailed bank-level data, that allows to gauge in a more granular way the cross-border bank relationships, can go a long way towards improving our assessment of financial fragilities in periods of stress.
2. This, because of imperfect substitution across banks that provide cross border funding, and the role of bank conditions in determining lending supply (especially in time of financial stress).
3. Although countries can draw on their own data for monitoring fragilities, cross country data is critical for carrying out the empirical analysis needed to refine quantifications of these fragilities.

## 5. Cross Border Portfolio Flows

Is bilateral data on portfolio flows useful for financial stability analysis?

There is some empirical analysis that looks at home – host determinants of portfolio flows – mostly for individual host countries. Moreover, existing cross country data suffers from a relevant limitation. As a large share of data comes through (or goes to) international financial centers, the immediate (registered) destination (or origin) of flows is often different from the final investment destination.

A quick look at Chilean data on pension fund holdings illustrates the relevance of this point. Note that because of regulatory requirements (such as adequate hedging of currency exposure), the Superintendency of Pensions in Chile is able to distinguish between the registered location of foreign assets held by pension funds and their actual ultimate destination.

Figure 12 presents the starkly different picture that emerges. Whereas the immediate destination is dominated by Luxemburg, Ireland, and Chile (likely due to competitive advantage in the relationship between fund administrators and pension funds), the ultimate destination is significantly different, and reflects a broad diversification.

An investor based approach to collecting data on portfolio flows may be more relevant than bilateral data. Recent work by the IMF (GFSR 2011) emphasizes the relevance of looking at the type of investor behind portfolio flows as each type of investor has potentially different investment criteria (and balance sheet limitations). Existing data shows that the type of investor holding EME assets is varied – and includes different forms institutional investors, and increasingly foreign exchange reserves and sovereign wealth funds. Figure 13 shows a similar exercise for Chile, in which inflow data was categorized by agent.

A large (and growing) literature has looked at portfolio decisions of institutional investors. Most of this research focuses on mutual fund investments because of data availability (see survey in Gelos 2011).

Some of the more recent papers focus on “push and pull” factors to explain portfolio allocations. In this line, Fratzscher (2012) exploits a 50 economy weekly panel, and finds that changes in global liquidity and risk conditions have played an important role on global capital flows. In a similar line, Puy (2013) splits portfolio flows into equity and bonds flows, and finds that unobservable global and regional factors explain most of the variation of flows, for advanced and emerging economies.

Another stream of research focuses on portfolio allocation mechanisms. Kaminsky et al (2004) study the existence of contagion and momentum strategy during normal and crisis times. Griffin et al (2004) use a model with home bias and response of foreign investors

to unexpected high returns, and find that equity flows toward a country increase with the return of that country's stock markets, which also suggests momentum trading.

Broner et al (2006) develop a model in which equity fund managers shift their allocation towards the average portfolio, providing evidence of a portfolio rebalancing channel of contagion. Raddatz and Schmuckler (2012) also find evidence of a portfolio channel. Using mutual fund portfolios, they find asset allocation is driven both by investors and managers, and that mutual funds helped to spread "crisis" across countries.

Hence, existing evidence suggest that mutual funds investors are volatile, and potentially a source of contagion, even beyond EME. Along these lines Hau and Luai (2013) and Manconi, Massa and Yasuda (2012) have highlighted the role of equity and bond funds in propagating the great financial crisis.

There is some evidence that other sources of portfolio investment is more stable (See GFSR 2011). A comparison of the data from Emerging Portfolio Fund Research (EPFR) and Balance of Payments data is consistent with this evidence. EPFR captures investment by mutual funds and ETFs in EMEs, whereas Balance of Payment Statistics captures the full span of investors. Figures 14 and 15 show the relative volatility of both sources of data. EPFR data is systematically more volatile, suggesting that other source of investment flows may be more stable than mutual funds. Of course there are other explanations for this result – including small samples in the EPFR – but the results are suggestive.

*Some takeaways from this section:*

1. Expanding available data on cross country portfolio flows may not be the most profitable avenue, whereas investor type seems very relevant.
2. We can think of two potential approaches to do so. One, to expand BoP statistics at the national level. The other, replicate BIS approach: IOPS and IASIC. Ideally we would like to have common investor data to capture interconnections (Gelos 2011)
3. More research is needed on portfolio decisions of investors (in particular sovereign and hedge fund investors), and how they interact with each other is of course needed.

If an effort is made to increase granularity on balance of payments data, there are a couple of additional avenues that may merit exploration. Available BoP is resident based, and thus does not account for the place or currency of issuance of the instrument. This distinction is particularly relevant for debt flows: as local currency local issuance vs foreign currency foreign issuance have significantly different effects on balance sheets of issuers.

In the case of Chile, the distinction is extremely relevant. Figure 16 shows that most debt inflows are cross border issuance, while most equity inflows are flows into local markets

(not purchases of ADRs). This is consistent with existing data on non-resident holdings of Chilean local currency debt.

## **6. Conclusions**

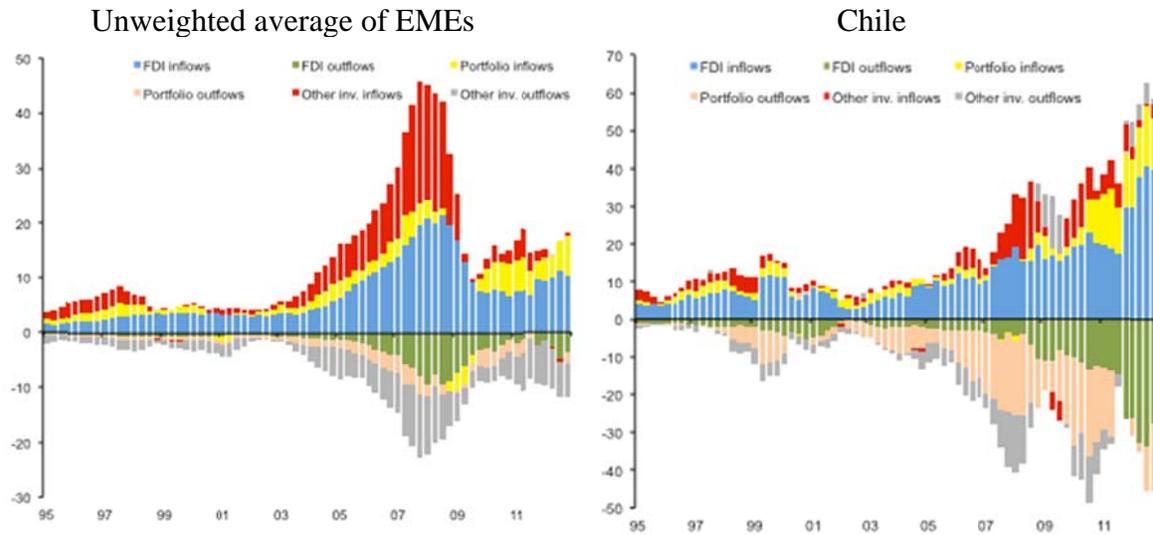
Although BIS data is an extremely useful tool for monitoring the risk of reversal in cross border bank credit, there is value in obtaining bank level data on cross border lending – at least for the largest global banks. Recent disclosure of data by the BEA in its stress tests is a valuable example. These datasets would allow research and monitoring (in particular of cross exposures).

The use of existing surveys on portfolio investments for financial stability analysis may be limited by the “veil” introduced by International Financial Centers, due to the role that they play in intermediating global portfolio flows.

Disaggregating portfolio flows by type of investors is an important avenue to explore, as suggested by data from Chile and recent research. Knowing which type of investor is driving the flows is at least as important as knowing their nationality. Expanding (and systematizing) data on place of issuance is another relevant dimension for risk monitoring.

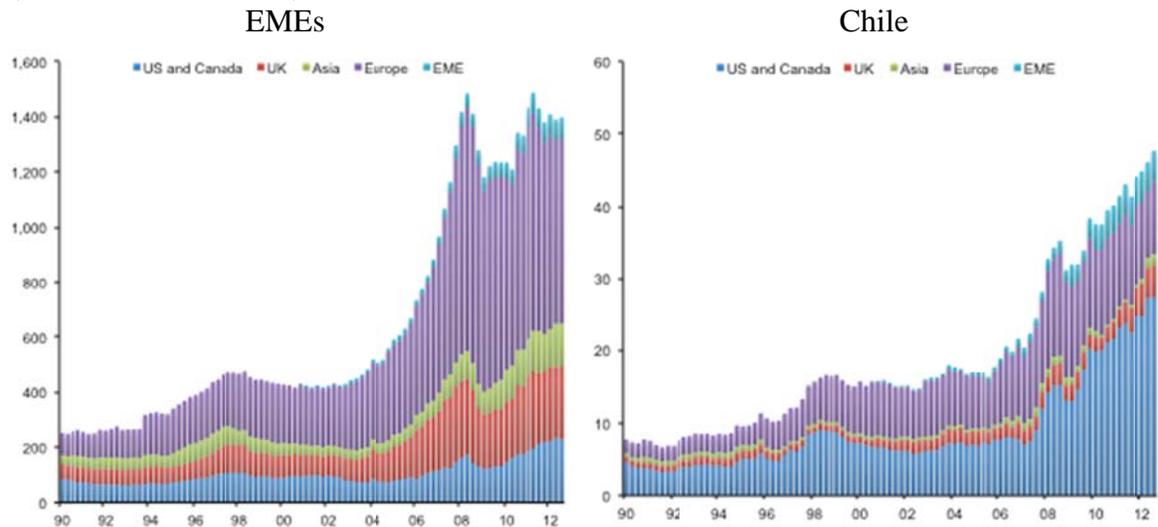
Finally – the overall importance of granular data on cross border flows and positions makes global initiatives like the LEI, that allow to collect this data in a consistent manner, a priority.

**Figure 1**  
Gross capital inflows and outflows  
(percent of 2000 GDP)



Source: IMF data.

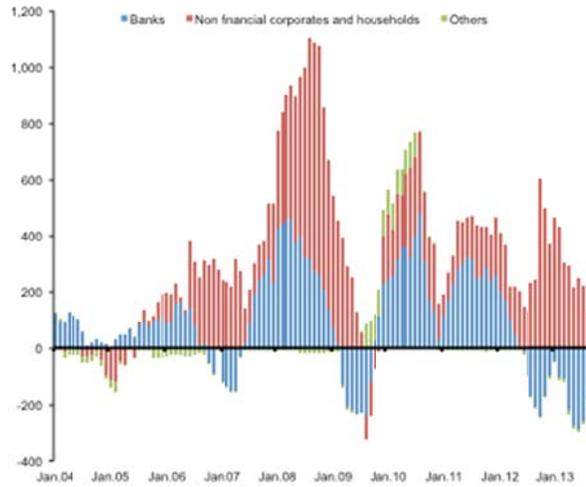
**Figure 2**  
Foreign claims by reporting areas  
(billions of US dollars)



Source: BIS locational.

**Figure 3**

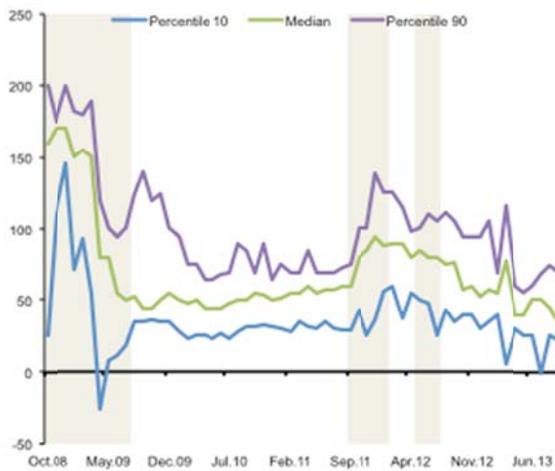
Financial Account Liabilities in Chile: Other investments  
(12m moving average, millions of US dollars)



Source: Central Bank of Chile

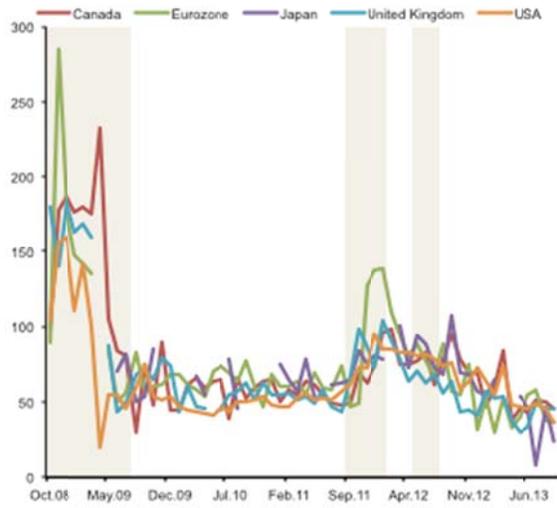
**Figure 4**

Cross-border Chilean banks spreads  
(basis points)



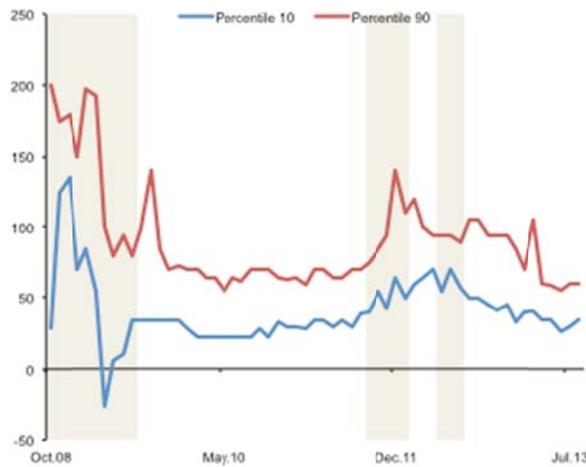
Source: Central Bank of Chile

**Figure 5**  
 Cross-border Chilean banks spreads, by zone  
 (basis points)

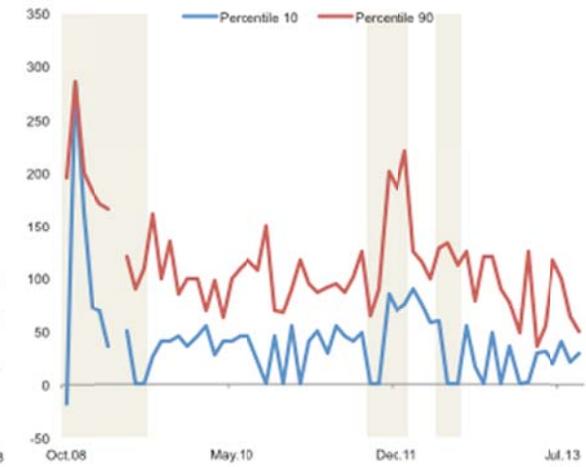


Source: Central Bank of Chile.

**Figure 6**  
 Cross-border Chilean banks spreads, by zone  
 (basis points)  
 US

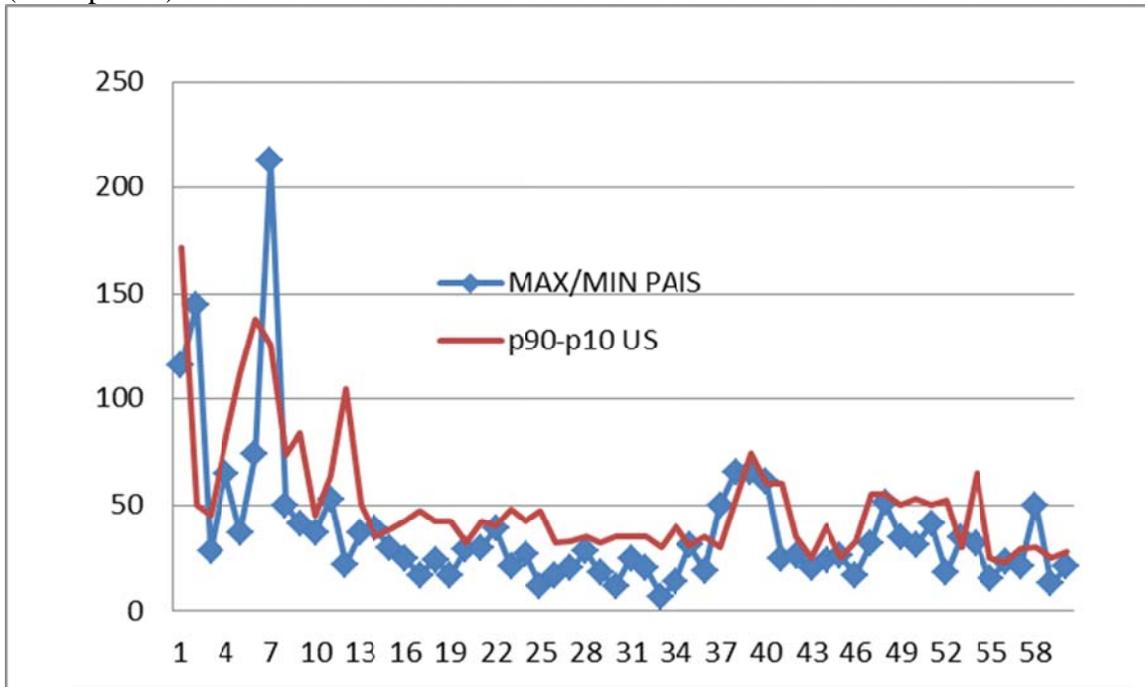


Eurozone



Source: Central Bank of Chile.

**Figure 7**  
Co-movement in cross-border bank spreads  
(basis points)



Source: Central Bank of Chile

**Table 1**  
Cross-border bank spread regressions

	Full Sample		Crisis		Non Crisis	
In term	17.6	***	21.9	***	16.6	***
log(trade)	-12.4	***	-16.5	***	-11.0	***
log(fix rate)	5.2	***	14.0	***	1.5	***
cds chile	0.5	***	0.6	***	0.2	***
cds country	0.1	***	0.2	***	0.0	
cds bank	0.0		0.0		0.1	***
R <sup>2</sup>	0.55		0.67		0.42	
N	2692		635		2057	
Dummies Chilean Bank	Yes		Yes		Yes	
Dummies Lender Bank	Yes		Yes		Yes	

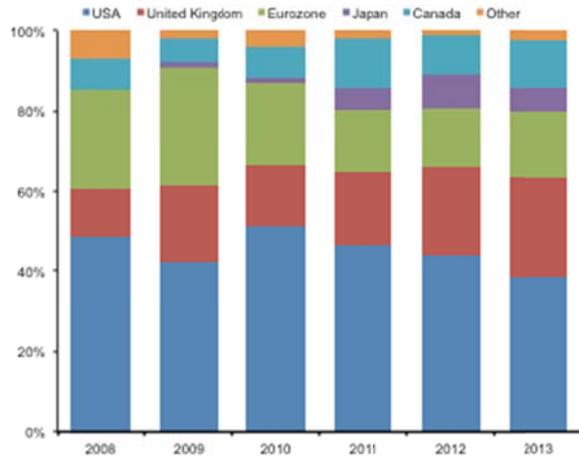
Source: Central Bank of Chile

**Table 2**

Cross-border bank spread regressions: Persistence

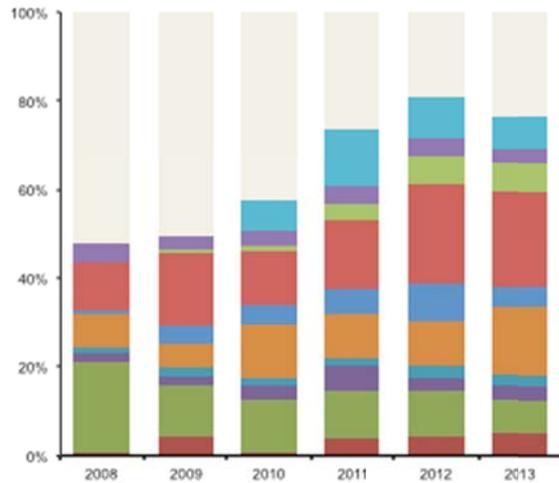
		Full		Full		Crisis		Non crisis	
Lags									
	1	0.26	***	0.26	***	0.22	***	0.26	***
	2	0.16	***	0.16	***	0.12	***	0.17	***
	3	0.1	***	0.1	***	0.17	***	0.09	***
	4	0.05	***	0.05	***	0.17	***	0.03	***
	5	0.04	***	0.06	***	0.00	***	0.06	***
cds chile		yes		no		no		no	
cds country		yes		no		no		no	
cds bank		yes		no		no		no	

Source: Central Bank of Chile

**Figure 8**Cross-border bank loans to Chilean banks  
(% of stock)

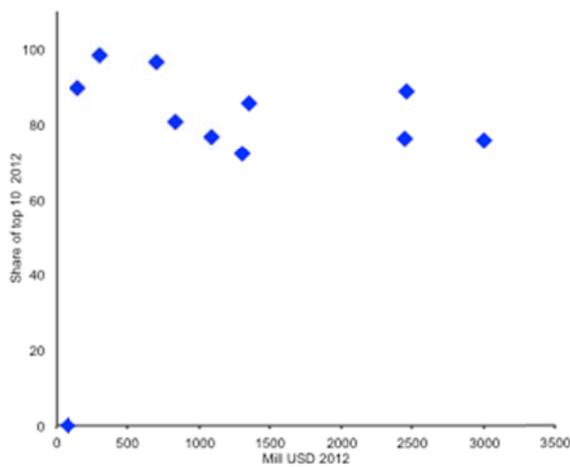
Source: Central Bank of Chile

**Figure 9**  
 10 largest lender banks of 2012 – Share of total lending  
 (percent)



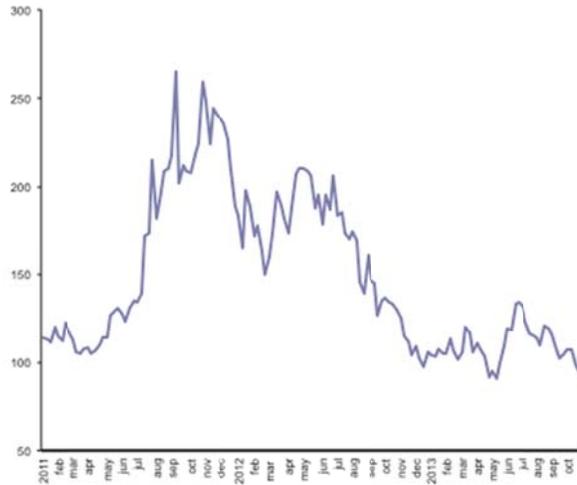
Source: Central Bank of Chile

**Figure 10**  
 Concentration of top 10 foreign creditor banks by each Chilean bank 2012  
 (percent)



Source: Central Bank of Chile. X axis total loans by bank 2012. Y axis share of loans from largest foreign lender banks.

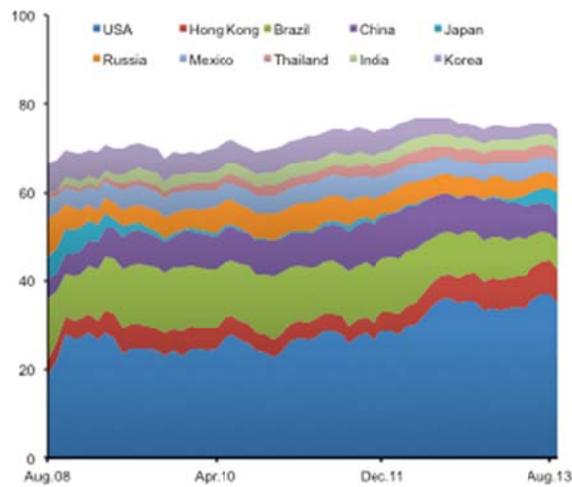
**Figure 11**  
Average CDS of Bank Lending to Chilean Banks  
(basis points)



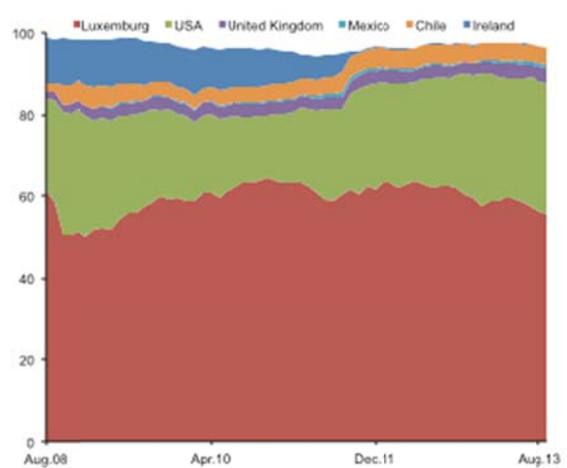
Source: Central Bank of Chile

**Figure 12**  
Chilean Pension Fund Investments  
(percent of investment abroad)

Ultimate destination – Top 10



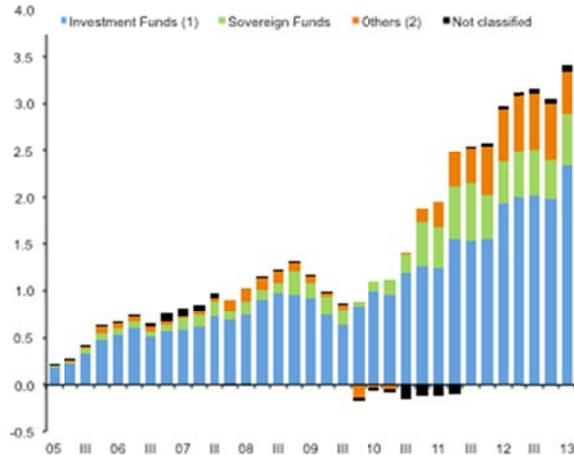
Immediate destination – Top 6



Source: Chilean Pensions Supervisor.

**Figure 13**

Net gross equity inflows, by investor  
(percent of GDP)



(1) Includes Institutional, Indexed and non-Indexed funds. The latter are Mutual Funds, Hedge Funds, etc.

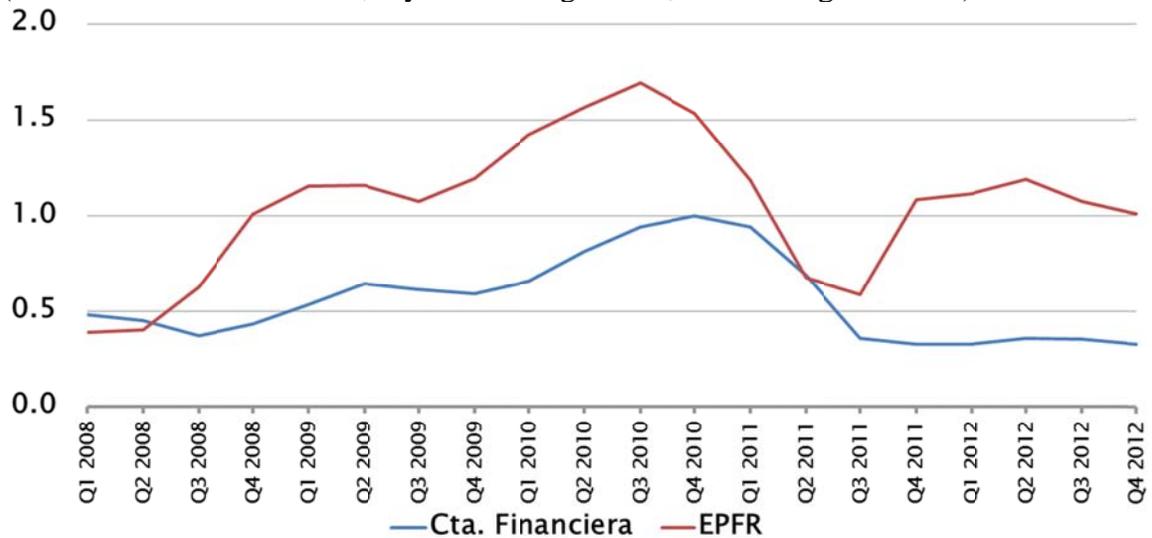
(2) Includes Custody and Investment Banks.

Source: Central Bank of Chile

**Figure 14**

Volatility of Portfolio flows toward Latam (\*)

(Var. Coeff. of annual flows; 2-years moving st dev., over average 2006-13)

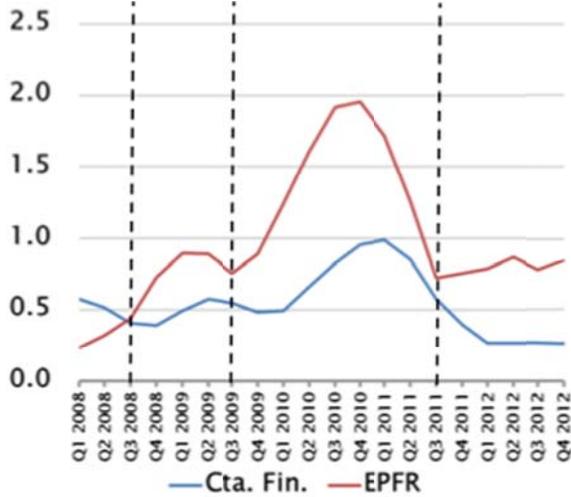


**Figure 15**

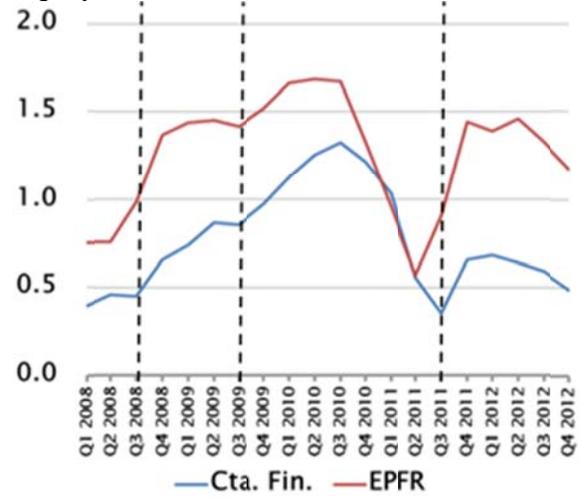
Volatility of Portfolio flows toward Latam (\*)

(Var. Coeff. of annual flows; 2-years moving st dev., over average 2006-13)

Fixed Income



Equity



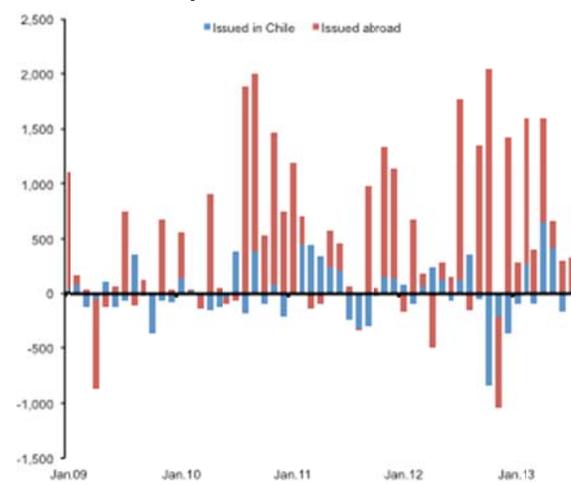
(\*) EPFR-Latam includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Rep., Ecuador, El Salvador, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela. Financial account data includes only Argentina, Brazil, Chile, Colombia, Mexico and Venezuela, however, these economies account for the 99% of the total flows in the overall EPFR. Source: EPFR and IFS.

**Figure 16**

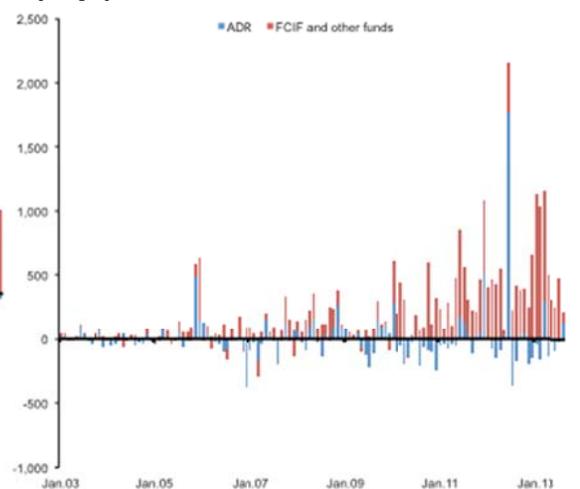
Portfolio inflows in Chile

(millions of US dollars)

Fixed income portfolio liabilities



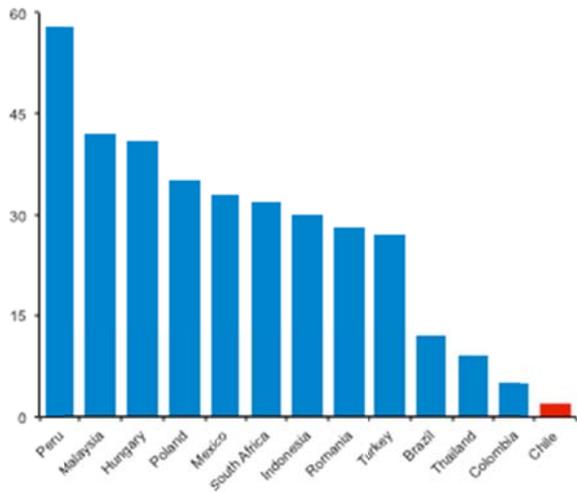
Equity portfolio liabilities



Source: Central Bank of Chile.

**Figure 17**

Share of non resident investors in local currency sovereign bond markets  
(percent, Q3 2012)



Source: IMF and JP Morgan

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