Long-term rates and the term premium: evidence from Chile[1]

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Abstract

Chile is no exception to the high co-movement of sovereign long-term rates observed between EMEs and the United States. In particular, we show that the high co-movement is mainly driven by synchronisation of the term premium. The aggressive monetary policy in developed economies since the financial crisis, and the changing pattern in the profile of investors holding bonds issued abroad, have not only compressed term premia but have also increased their volatility. In this paper, we document these patterns for Chile, showing that in the last few years a larger share of Chilean bonds are being held by investors who are outside the oversight of the US Securities and Exchange Commission, such investors arguably being those who might adjust their portfolios abruptly. This poses a challenge regarding the impact on longer-term rates of monetary policy normalisation in the United States, and the capacity of Chile's monetary policy to stabilise long-term rates in response to large swings in term premia.

Keywords: term structure of interest rates, monetary policy, international finance

JEL classification: E43, E52, F30

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1. Introduction

With few exceptions, emerging market long-term rates have been highly correlated with US long-term rates. If anything, this correlation has increased since 2005 (Turner (2014), Miyajima et al (2012)), arguably as a result of integration in global financial markets. A decomposition of long-term rates into the expected path of monetary policy rates and term premia shows that it is the term premium which is highly correlated across countries, which is consistent with the evidence of independent management of short-term interest rates in some emerging markets in recent decades (Claro and Opazo (2014)). Moreover, the US term premium has compressed significantly in the last few years in a context of highly aggressive monetary policy, albeit with high volatility of that premium.

Two debates have ensued, based on these developments. The first focuses on the extent to which central banks are restricted in their ability to affect monetary conditions if their control on long-term rates is limited by international factors. Eventually, the inability of central banks to materially affect long-term rates could have serious monetary and financial stability considerations (Rey (2013), Obstfeld (2014)).

The second debate is related to the source of compression and volatility in the term premium. One hypothesis is that the decrease in the term premium is the result of an abundance of liquidity in the main financial markets and the search for yield (Hanson and Stein (forthcoming)).[4] According to Hanson and Stein, "easing of monetary policy – even via conventional policy tools in normal times – tends to reduce both the term premiums on long-term Treasury securities and the credit spreads on corporate bonds." Alternatively, Bernanke (2013) argues that a lower volatility of Treasury yields and an increasingly negative correlation between bond prices and stock prices have made bonds more attractive as a hedging asset, which has increased demand for them and compressed their spreads. A drop in inflation volatility in the last decades may also have helped to lower the cost of holding longer-term securities.

Also, the increasing role that investment and hedge funds play in sovereign and corporate bond markets – relative to banks or other long-term investors with buy-and-hold strategies – suggests that some structural changes have occurred. The increasing costs that some regulation – such as the Dodd-Frank Act – have imposed on banks' positions in sovereign and corporate bonds have increased the role of players that, because of their nature, might introduce more volatility in asset prices (Turner (2014), Shin (2013)). Indeed, the relevance of the term premium in determining long-term rates – which arguably are very relevant to determining monetary and financial policies– makes it necessary for central banks to incorporate these considerations into their short-term monetary policy stance.

In this paper we show evidence for Chile on: (i) the high co-movement in long-term rates with those in the United States, (ii) the role played by the co-movement in the term premium in this relationship, and (iii) the role that investment managers play as holders of Chilean corporate and government debt instruments issued in

[4] See also Krishnamurthy and Vissing-Jorgensen (2011), Gagnon et al (2011), D'Amico et al (2012), and Shin (2013). For similar evidence in the United Kingdom, see Joyce et al (2011).

foreign markets. The rest of the paper is structured as follows. In the next section, we present some evidence on correlation between long-term rates in the United States and developing countries, with a special focus on Chile. In Section 3, we show from the decomposition of longer-term rates between the path of short-term rates and the term premium for the United Sates and Chile that it is the term premium component with explains the correlation across rates. In Section 4, we show evidence that investment funds have increased their holdings of Chilean foreign debt in recent years. Finally, Section 5 concludes.

2. Co-movement of longer-term rates

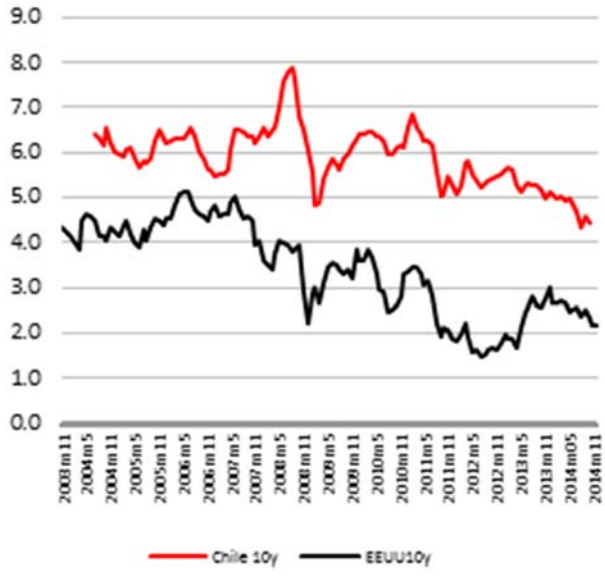
Long-term interest rates tend to be highly correlated across developed countries (Obstfeld (2014) and others.) Taking the 10-year US Treasury bond as benchmark, a 0.6 correlation coefficient is observed on average with other government bond yields for the period 1990–2014.

The importance of external factors such as US Treasury bond yields, global risk aversion measures, and other macroeconomic variables have been widely documented as explaining emerging market yields – and credit spreads – on bonds issued in international markets (see eg Longstaff et al (2011), Central Bank of Chile (2014)). There is less evidence for the influence of external factors on domestically issued government bonds. Turner (2011) and more recently Miyajima et al (2012) are some exceptions, showing that, for a sample of emerging economies, domestic government bond yields between 2000 and 2011 were not significantly related to Treasury bond yields and the Vix index. However, after 2008 the impact of the Treasury bond becomes statistically and economically significant.

Ten-year government bond rates: 2003–14 Graph 1

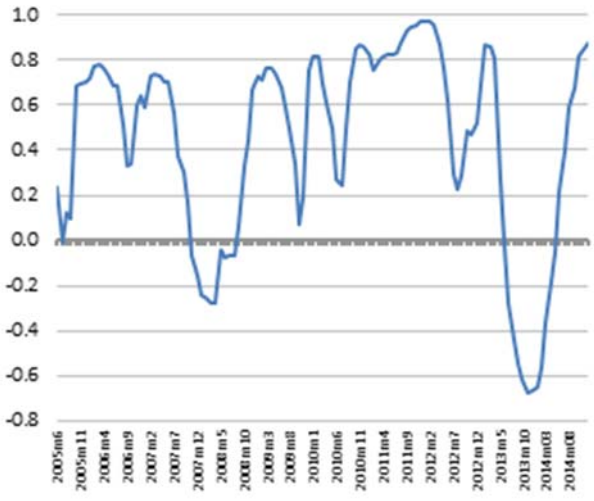
Panel A: US Treasury 10-year and BCP 10-year

(percent)



Panel B: Correlation coefficient

(12-month moving average)



Sources: Central Bank of Chile; Bloomberg.

Panel A in Graph 1 shows the 10-year government bond rates in Chile and the United States since January 2005, and panel B in the same graph shows the 12-month correlation coefficient of both series. As is the case for other developing economies, we observe a high co-movement of long-term rates in Chile and the United States. The sample average of the correlation is 0.4. The high correlation does not seem to depend critically on the share that non-residents represent in the Chilean domestic debt market. The share of foreign investors in the Chilean market is small (estimates range from 2% to 4%), and still the correlation between the yield on the Chilean long-term Central Bank bond (BCP10) and that of the US Treasury bond yield is relatively high: 0.4, on average during the period 2005–14. In contrast, the correlation in Peru is as high as 0.6, where the share of foreigners in domestic government bond market is close to 60% (IMF (2014)).

As is evident from Graph 1, correlation varies over time, as there are a few episodes in which long-term rate movements – at least for short frequencies – differ from those in the United States. One way of addressing this issue is to use the decomposition of long-term rates between the expected path of short-term rates and the term premium, which is the premium required for investing in longer-term securities.

3. Decomposition of longer-term rates

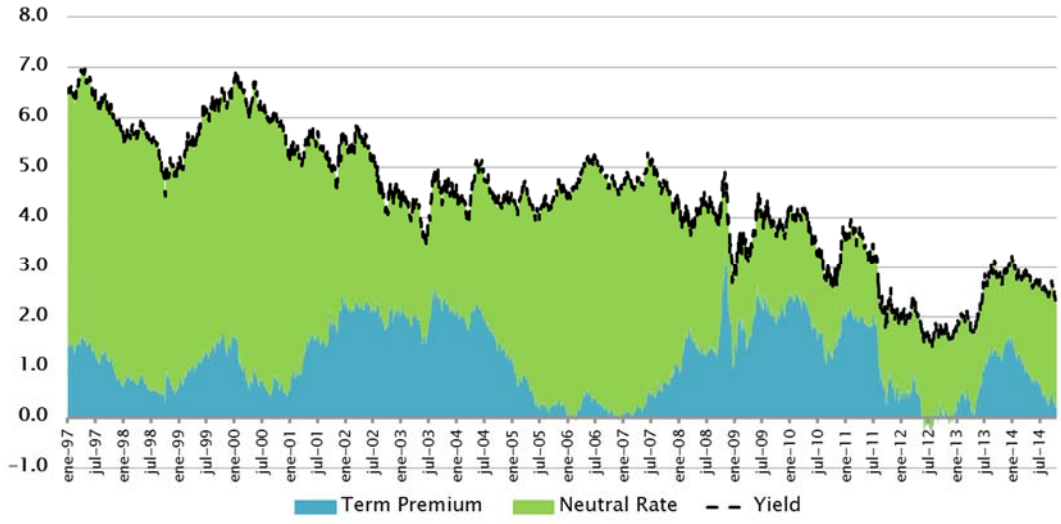
The distinction between the expected path of short-term rates and the term premium is important in several dimensions. First, it is relevant to distinguishing whether the historically low long-term interest rates currently in place reflect an expectation for prolonged low short-term rates – consistent with a secular stagnation hypothesis – or whether they reflect a low term premium. Second, the decomposition is useful for understanding the sources of fluctuations in long rates and for better understanding how the co-movement of long-term rates is compatible with monetary policy rate independence and exchange rate flexibility.

The term premium and the expected path of short-term rates are not observed but rather estimated, and there are different techniques for doing so. In this paper, we use the decomposition of the US Treasury bond calculated at the NY Fed, using the Adrian et al (2013) methodology.[5] Essentially, this methodology proposes a structure for determining the level of neutral short-term interest rates – which reflects the full path of short-term rates implicit in the yield curve – at any point in time as a function of macroeconomic fundamentals. The decomposition of long-term rates for the United States, as done by Adrian et al (2013), shows that in the last few years the most convincing explanation for the decrease in long-term interest rates is the Fed's highly expansionary monetary policy and the expectation that short-term rates will remain low for a long period of time. The fall of the term premium has also played an important part, especially in explaining the volatility of rates (Graph 2).

[5] The term premium is a model-based construct based on market readings of expectations about future variables. When markets are illiquid or very volatile (eg around the Lehman failure), there is a lot of noise in these readings (Turner (2014)).

US Treasuries 10-year interest rate decomposition: 1997–2014

(Percent) Graph 2



Source: Federal Reserve Bank of New York based on Adrian et al (2013).

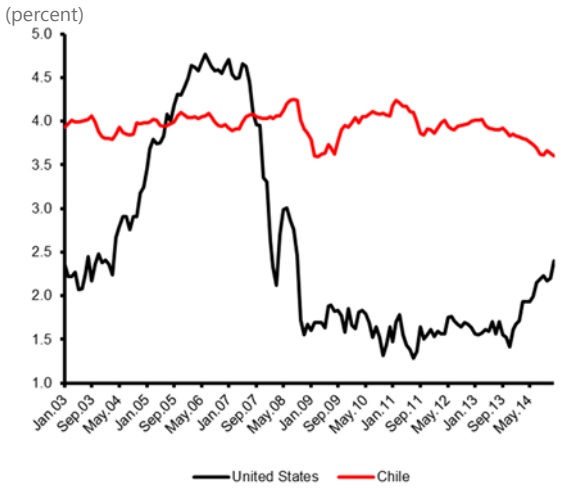
Using a similar methodology, the term premium component of the Chilean domestic long-term bond is estimated and also shows a declining trend.[6] The results show that historically low long-term rates reflect mainly a low term premium, while the path of short-term rates impacts the level of rates through fluctuations in the monetary policy rate. The evidence for Chile, however, shows that short rates quickly incorporate the convergence of short-term rates towards long-term neutral levels. Blake et al (2015) study the term decomposition for Chile and other inflation targeting countries, and show that in the case of Chile the expected path of short-term rates rapidly moves to approximately 5%, regardless of the spot level of monetary policy rates.

Graph 3 compares the two components of long-term rates in Chile and the United States using the Adrian et al (2013) methodology. Panel A shows the evolution of the neutral rate, while panel B plots the trajectory of the term premium. Several conclusions can be drawn. First, it is straightforward to see that the expected path of policy rates in Chile is quite stable, even in a context where short-term rates have fluctuated between 8.25% in mid-2008 to 0.5% in mid-2009. This probably reflects that, during this period, markets incorporated in their expectations that the Central Bank had only a limited ability and willingness to deviate persistently from its long-term neutral stance. This may also reflect the fact that, in this period, the economy had not been subjected to large shocks that would have justified a long deviation, as the figures for the United States suggest. Second, it is also clear that fluctuations in the term premium are much more prevalent, and that overall they are closely linked to those in the United States, with the exception of the 2013–14 episode of large volatility in global bond markets.

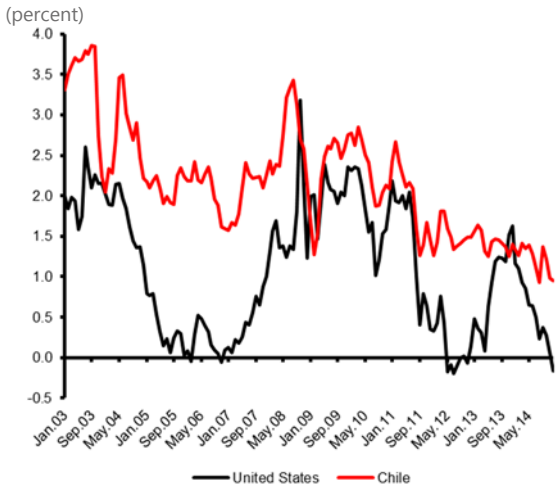
[6] We are grateful to Ceballos et al (2015) for sharing the data set with a decomposition of long-term rates in Chile.

Chilean and US 10-year government bond decomposition Graph 3

Panel A: Expected path of policy rates



Panel B: Term premium



Source: Federal Reserve Bank of New York, based on Adrian et al (2013) and Ceballos et al (2015), for Chile.

A final conclusion, which is implicit in these figures, is that the strong co-movement in long-term rates reflects mainly the high correlation of the term premium, which is statistically and economically significant in the last 10 years. Table 1 reports the simple correlation between long rates for the period January 2003–December 2014 and also the cross-correlation between components. Noticeably, the correlation is low for the neutral rate component, which is consistent with the evidence of monetary independence in Chile in the last 15 years in a context of exchange rate flexibility.[7] In other words, short-term rates could be independent, but the terminal rate may not. Wright (2011) has also documented a high correlation of the term premium across developed economies.

Chile-US 10-year rate correlation, Jan 2003–Dec 2014

(correlation coefficient) Table 1

		10-year US Treasury bond		
		Yield	Term premium	Neutral rate
BCP 10y	Yield	0.623	0.578	0.153
		(0.000)	*(0.000)*	*(0.068)*
	Term premium	0.631	0.629	0.122
		(0.000)	*(0.000)*	*(0.144)*
	Neutral rate	0.262	0.031	0.220
		(0.002)	*(0.712)*	*(0.008)*

Source: Federal Reserve Bank of New York, based on Adrian et al (2013), and Ceballos et al (2015).

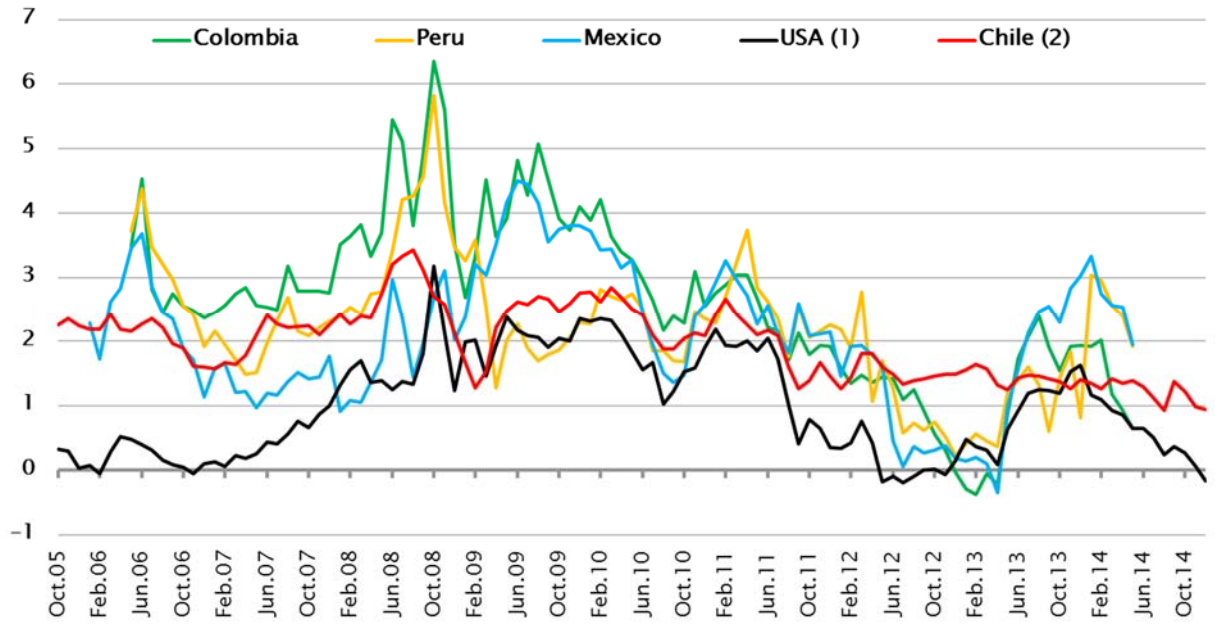
Note: p-values are shown in parenthesis

[7] See Claro and Opazo (2014). See also Claro and Soto (2013) for an account of exchange rate policies in Chile since 2000.

It is important to notice that these correlations vary over time: neither the correlation of long-term rates nor the high co-movement of term premia is stable over time. Two considerations arise. First, the speed and degree to which non-arbitrage considerations generate fluctuations in asset prices across countries depends on market conditions, which vary over time. For example, this might explain why the significant and short-lived jump in the term premium in the United States in mid-2013, associated with the initial tapering discussion, did not have a material impact on Chile's rates. It has been documented that long-term rates in other countries did rise in May 2013 as a result of increases in the term premium.[8] In the case of Chile, both the evolution of short-term rates in a context of domestic deceleration and the lack of response of the term premium contributed to the muted response of long rates. It is possible that the modest presence of non-residents in domestic debt markets delays to some extent or even isolates asset prices from short-lived fluctuations abroad.

Term premium on 10-year rates: United States versus a selection of Latin American countries

(percent) Graph 4



(1) Federal Reserve Bank of New York, based on Adrian et al. (2013); (2) Ceballos et al. (2015).
Source: Blake et al. (2015). Source: Blake et al (2015).

This issue brings us to a second relevant discussion, which is meant to clarify the nature of fluctuations in the term premium, and the role that market participants play in asset price adjustments (IMF (2014)). The sharp response of the term premium in the United States around mid-2013 has raised the question of how volatile asset prices have become, and how sensitive they are to market news in the context of a highly expansionary monetary policy. Some explanations are related to

[8] See "The transmission of unconventional monetary policy to the emerging markets", *BIS Papers*, no 78, 2014.

the changes that market participants have experienced since the financial crisis. According to Turner (2014), when term premia stay continuously low, savers are more willing to invest in short-dated paper, and borrowers are more willing to finance their investments with long-term debt.

One way to approach this discussion proceeds from Graph 4, which plots the term premium of long-term bonds in several Latin American countries since 2006, as computed by Blake et al (2015). Overall, as mentioned above, we observe a high co-movement in the term premium with that of the United States. However, in the 2013–14 period, both Peru and Mexico saw significant fluctuations in the term premium while Chile did not. Because the presence of foreigners in domestic bond markets is significantly higher in Peru and Mexico than in Chile, this might reveal that short-run fluctuations in the domestic term premium might depend on how large the presence of foreigners in domestic bond markets is, as they are the key players that are arbitraging between markets.

When term premia are low, banks are less willing to conduct maturity transformation. So who steps up to the plate? Turner (2014) recognises that it is not fully known who is doing maturity transformation. He explains that there is no simple metric to measure how much a particular bank or insurance company is doing, nor it is not known either how much maturity transformation is done within a country, or how much is done abroad. But anecdotal evidence, surveys and also a combination of debt securities databases, as well as data on primary dealers' stocks, point to an increasing participation by mutual funds and hedge funds. This is the issue we discuss in the next section.

4. The increasing role of international asset managers in debt markets

The 2013–14 episode provides evidence for the role that asset managers are playing in bond markets. Since the 2008–09 financial crisis, non-leveraged institutions have greatly increased their presence in fixed income markets (IMF (2014)). Consistent with this, we can see in Graph 5 the growing role that mutual funds and exchange traded funds (ETFs) have played since 2008 in the US corporate bond market, as brokers and dealers reduce their inventories.[9]

A strong reallocation of portfolios across different groups of asset managers has caused sharp corrections in asset prices, especially in fixed income securities. Although countries with a larger share of non-residents in domestic markets have seen more dramatic changes in financial conditions, there is evidence that throughout the emerging world large fluctuations in the term premium have taken place.

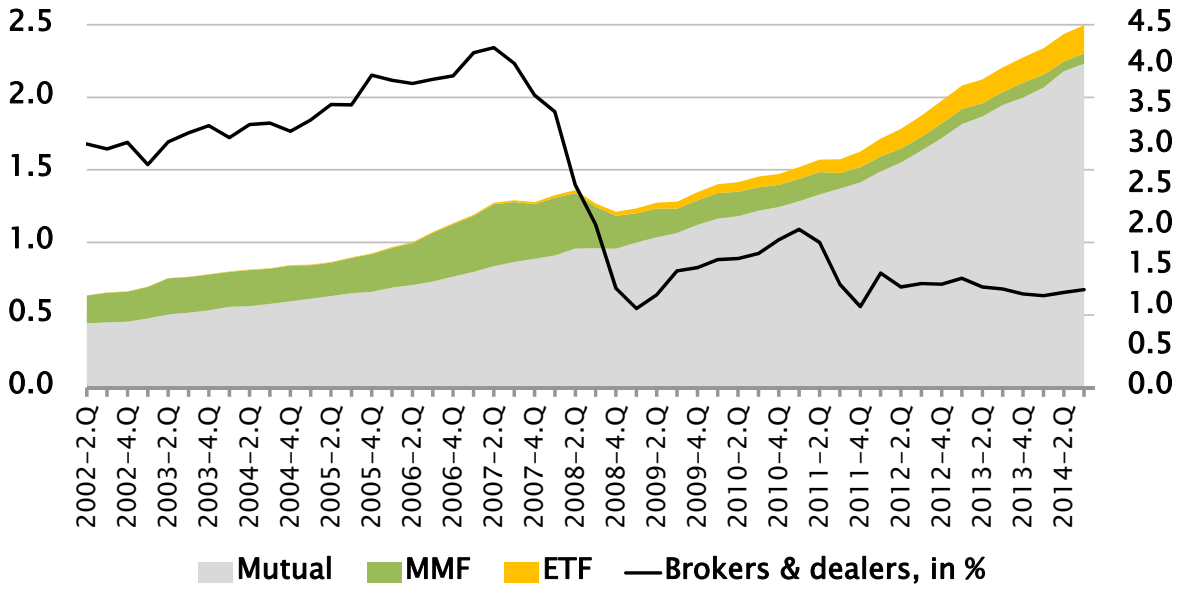
The highly synchronised nature of financial conditions across borders, measured by the high co-movement in risk premia (or alternatively, as many authors have emphasised, by financial flows) is very noticeable. In the pre-crisis period (2003–08), global liquidity was transmitted across leveraged banking

[9] See also Cetorelli (2014).

positions, while after 2010 been bond markets have been the main transmission channel. According to Shin (2013), "The transmission of financial conditions across borders has taken the form of 'reaching for yield', the decline of risk premiums for debt securities and the explosion in issuance of international debt securities that has ensued in order to satisfy the demand." Insurance companies and pension funds have also increased their positions in higher-yielding asset classes, including emerging market debt and equity (BIS (2011)).

ETFs and mutual fund shares in US corporate bond market

(US dollars trillions and percent (right axis)) Graph 5



Source: BIS (2015).

This reallocation of portfolios coincides with a disproportionate growth of fixed income markets since 2008, compared to other asset markets (Feroli et al (2014)). Emerging markets in particular increased the pace and size of their international issuance, while achieving historically low coupon rates, and several countries accessed foreign markets for the first time. "Risk compression" across the yield curve and across high-grade and high-yield bonds was the term most used to refer to this phenomenon.[10]

The increasing participation in securities markets of non-banking institutions might be an undesirable consequence of new regulations. The Volcker rule prohibits banks from engaging in short-term proprietary trading in securities, and commodity futures and options for their own account. It also debars banks from owning, sponsoring or to maintaining certain types of relationship with hedge funds or private equity funds, referred to as "covered funds". One of the unintended

[10] The reduced appetite of US primary dealers for using their own balance sheets for market-making is another possible explanation for the large price swings observed in periods of higher volatility (GFSR (2014)).

consequences of this rule has been a shift in this business to usually less regulated and more opaque financial institutions.

Liquidity in secondary bond markets has declined – another unintended consequence – because primary dealers have cut their inventories and reduced the amount of capital that is allocated to market-making. Portfolio rebalancing will depend on, among other factors, the depth and liquidity of debt markets (Eichengreen and Gupta (2013)). This might be especially relevant in markets for EMEs' debt (Miyajima et al (2012)).

The role of investors, such as mutual funds and ETFs, that are exposed to redemption risk by the ultimate investors could lead asset managers to display a more procyclical behaviour (Shin (2013), IMF (2014)). Also, their behaviour is, in part, motivated by their relative performance ranking (Feroli et al (2014), Raddatz and Schmukler (2012)). Therefore, they seek momentum and investment opportunities so that they can outperform other investors. In fact, they are eager to anticipate the moves of large asset managers so as to act first.[11] They also trade smaller amounts (compared to primary dealers), which does not help market depth and market-making. A direct consequence is that the risk of fire-sales and abrupt changes in asset prices is higher, resulting in increased volatility. Other regulatory changes and accounting conventions could also enhance procyclical behaviour by market participants, contributing to reinforce some shocks and destabilise market prices (BIS (2011), Turner (2011)).

5. The case of Chile

Overall, the patterns of debt issuance in Chile have followed those of other emerging economies. As shown in Graph 6, since 2010 there has been a significant increase in debt issuance by Chilean financial and non-financial firms, in both domestic and foreign markets. The share of foreign issuance has increased significantly, thanks to the improved access for emerging economies in the international debt markets in an environment of low interest rates and the ensuing "search for yield".

Detailed information on the profile of investors holding Chile's foreign bonds is difficult to find. However, we take advantage of a novel Bloomberg database constructed from public information on the investor profile of holders of Chilean fixed income instruments issued in foreign currencies. The sample consists of 102 bonds outstanding as of the third quarter of 2014, with a minimum size of $100 million. Of this total, 60% was issued by the non-financial corporate sector, mostly with a maturity of 10 years or longer.[12] These bonds are roughly representative of the universe of foreign debt issued by Chilean firms and banks, as well as by Chile's government.

Graph 7 shows the composition of the bonds in the sample by year of issuance, type of issuer and credit rating of the issuer. As can be observed, most were issued

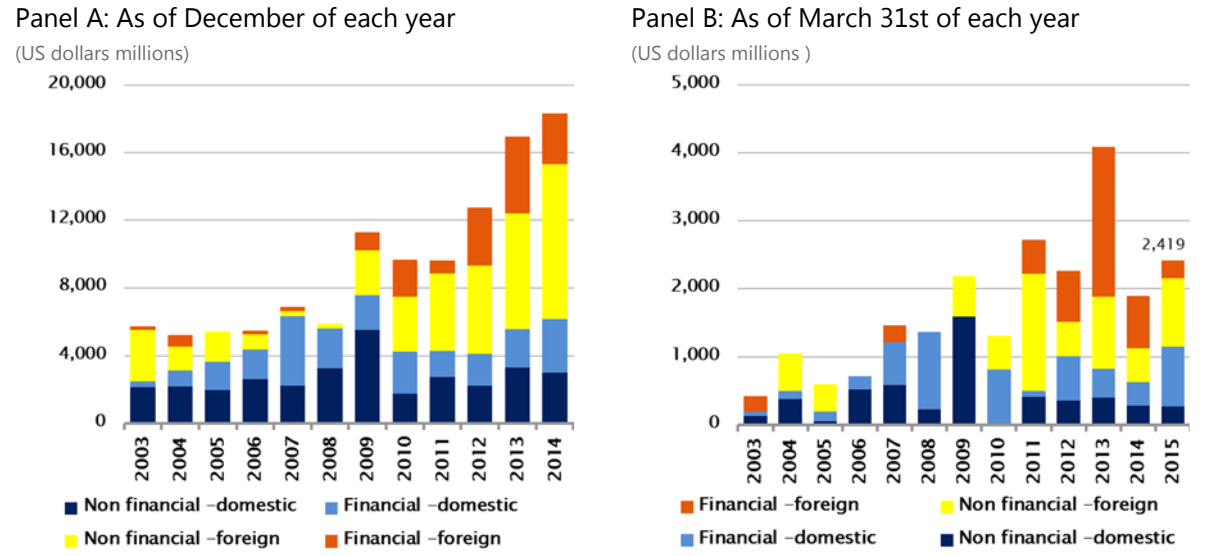
[11] Large asset managers are launching a "dark pool" for equity trading (called Luminex) in an attempt to prevent high-frequency firms from disrupting their trades and raising costs.

[12] Shorter-term bonds are usually issued by the financial sector (banks).

in the last two years, and 28 in 2014 alone. This is not an artefact of the sample – bonds outstanding – as the years 2013 and 2014 were reportedly record years in terms of gross issuance (as seen in Graph 6 and reported in Central Bank of Chile´s Financial Stability Report in 2014). It is worth noting the increased proportion of lower-rated issuers, a trend which is also seen in other markets, as noted above.

Domestic and foreign issuance of Chilean financial and non-financial firms since 2003

Graph 6



Source: Santiago Stock Exchange and Bloomberg

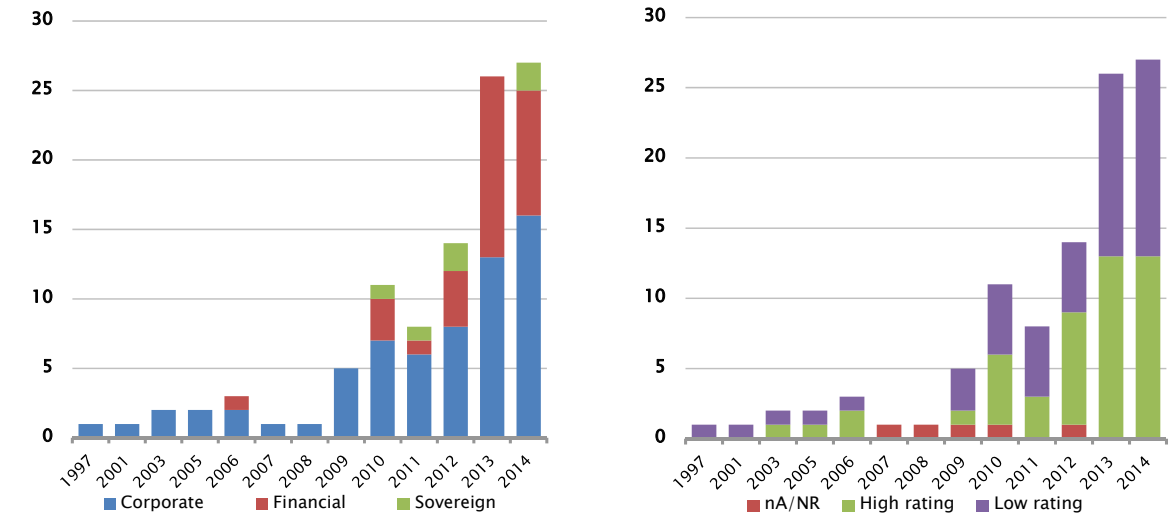
The identity of the holders of these bonds is known for all institutional investors that have filing obligations with the US Securities and Exchange Commission (SEC), and therefore have to regularly disclose their portfolios. This means that the holder's identity is verifiable for only a portion of the total issuance, representing about 30% for corporate and financial bonds and 16% for sovereign bonds. The remaining portions are either in the hands of sovereign funds, whose investment strategy is more linked to the sponsoring country's fiscal policy, or in the hands of more opaque investors such as hedge or investment funds that do not have the obligation to disclose their portfolios.[13] The majority of Chilean bonds are registered with the SEC so that they can be sold to qualified investors. Of these, insurance companies and financial advisors hold the largest share of the issuance.[14] A portion equivalent to about 5% of Chilean bonds issued abroad is held by Chilean residents.

[13] In terms of the characteristics of the investment decisions of the different types of funds, see IMF (2014), Chapter 2.

[14] On a related work, Ulloa et al (2015) analyse the investor base of the variable income portion of portfolio inflows using a proprietary database of the Central Bank of Chile. Mutual funds, indexed funds and sovereign funds have gained share. Interestingly, indexed funds' flows are significantly determined by long-term rate differentials, while mutual funds are not.

Outstanding number of bonds, by year of issuance, type of issuer and credit rating*

(number) Graph 7



* Includes 102 outstanding bond issues as of Q3 2014, issued since 1997 in amounts of $100 million or more.

Source: Bloomberg.

With this information we are able to draw some preliminary conclusions regarding the composition of US holders of currently outstanding Chilean bonds. We are also able to analyse the change in the composition of holders since the bonds were issued. The first interesting feature that stands out is that a greater proportion of holders can be identified for bonds issued in the early and mid-2000s (holders for approximately 40% of the amount issued can be identified), whereas post-crisis that proportion falls to just under 30% for the 2011–12 cohort, and 20% for bonds issued in 2014 (Graph 8, panels A and B). We argue that this could be preliminary evidence for a shrinkage in demand on the part of regulated investors in the last few years, while the participation of hedge funds (with no obligation to disclose their portfolios) may have increased in secondary markets.

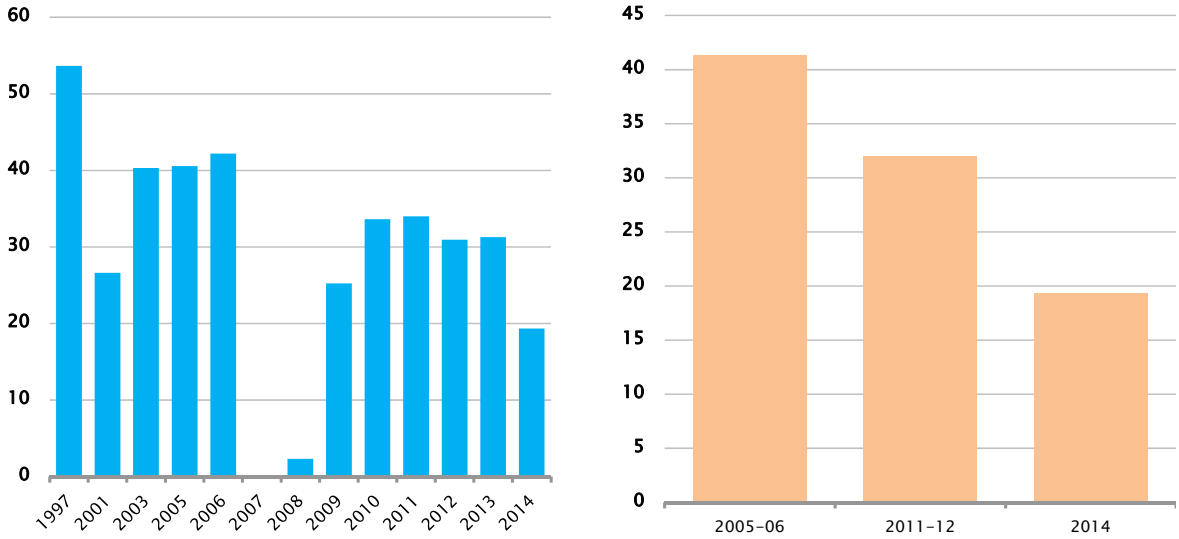
A second observation follows from analysing the time pattern of holdings since the outstanding bonds were issued. There is a clear and significant fall in the share of bonds held by regulated investors – from almost 45% in mid-2008 to about 35% thereafter. The yellow line in Graph 9 shows the share of bonds held by this type of investor at each point in time, while the other lines show the same path for bonds issued at different dates. As noted above, on average, the proportion of bonds held by identifiable investors has tended to fall. At the same time, bonds issued in the last few years have a much lower proportion of identifiable holders. The share represented by bonds issued in 2014, which accounts for 26% of the outstanding stock, makes it clear that the last issues have been acquired mainly by investors outside the purview of the SEC.

Finally, there is an important difference in the historical pattern once we divide the sample into high credit quality and low credit quality issuers, according to the Standard and Poor's credit rating scale. Bonds issued by BBB+ or higher-rated firms have experienced a much sharper and more uniform decrease in holdings by identifiable investors, while a flat pattern is observed for high yielders. In fact, as of the third quarter of 2014, both types of security (high- and low-rated) have an

observed proportion of identifiable investors of almost 35%, which is the same as for low-rated issuers before the crisis, as opposed to almost 50% in the case of highly rated issuers. This might reflect a stronger demand for high credit quality bonds by unregulated investors (Graph 10).

Share of outstanding debt (Q3 2014) held by SEC reporters, by date of issuance*

(Percentage) Graph 8

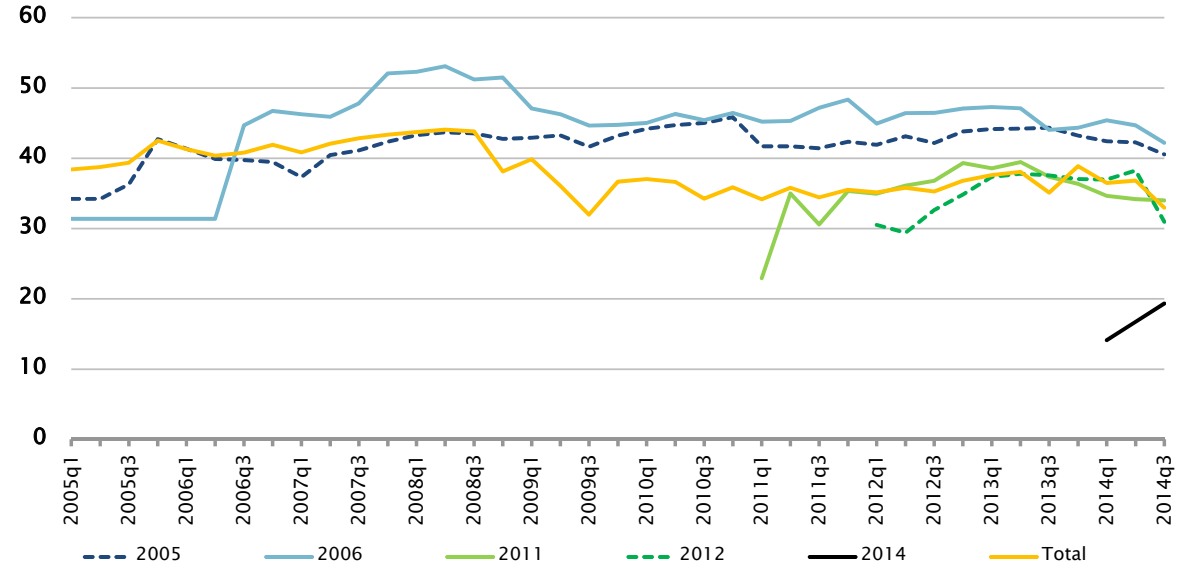


* Includes 102 outstanding bonds as of Q3 2014, issued since 1997 in the amount of $100 million or more.

Source: Bloomberg.

Share of outstanding bonds held by SEC reporters, by cohort*

(percent) Graph 9



* Historic share of issuance held by identifiable investors for a subsample of 55 bonds, with terms of 10 years or longer.

Source: Bloomberg.

Share of outstanding bonds held by SEC reporters, by S&P rating*

(percent) Graph 10

* Historic share of issuance held by identifiable investors for a subsample of 55 bonds, with terms of 10 years or longer.

Source: Bloomberg.

6. Final remarks and policy implications

The term premium component of long-term rates plays an important role in explaining the high co-movement of yields across countries and also the high volatility in yields. The question of what determines the high (and increasing) volatility in term premia is critical to understanding how financial markets work, the power of monetary policy, and its links to financial stability. In this paper, we show some evidence for Chile and other Latin American countries that, first, the high co-movement in longer-term rates arises mainly from the high correlation of term premia. Although this correlation is high over the long term, it varies significantly over time. Part of this fluctuation might be related to the part that foreign investors play in domestic bond markets. Some evidence suggests that a very high presence of foreigners might generate a much stronger linkage in term premia over short periods.

A second conclusion is that a shift seems to have taken place in the profile of holders of bonds issued abroad by Chilean financial and non-financial firms. In particular, we observe that hedge funds and more opaque investment funds have increased their presence in these markets, relative to SEC-reporting investment funds and banks. This phenomenon has been documented as a general trend in the last few years, and has arguably affected the volatility of term premia. The investment strategies of these more lightly regulated players might translate into a much higher co-movement in flows into and out of bond markets, and hence a more volatile term premium. The evidence suggests that Chile is no exception to

this tendency, as we observe a similar shift in the profile of bond holders in foreign markets, although there is still a large share in the hands of insurance companies, which are usually buy-and-hold investors. A potential challenge might arise from the impact on longer-term rates US monetary policy normalisation, and in the medium run regarding the volatility of the yield curve.

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