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The Case of Chile**

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Financial Turmoil, Illiquidity and the Policy Response The Case of Chile[†]

Pablo García S.[‡]

March 13th, 2009

Introduction

The policy response to the extraordinary events of the last year and a half occurred in different stages, which correspond broadly with the progressive deterioration of international financial conditions. From the perspective of the Chilean economy, from August 2007 to December 2007, financial turbulences seemed well contained within specific institutions. Between January and April 2008, tensions in financial markets spread, some institutions failed, commodity prices and exchange rates worldwide were subject to high degrees of volatility but global trade and growth seemed to be relatively isolated from the turmoil. Between April and August 2008 commodity prices, particularly oil, reached historical peaks, and inflation perspectives deteriorated markedly. Between September and December 2008, financial markets worldwide seized up and there was a collapse in interbank operations. Even after a significant step up of official financial, monetary and fiscal policies announcements, the financial situation remain largely under stress, and the true extent of the damage to the global real economy and trade in the past quarter has become apparent. Monetary policy has therefore shifted rapidly to a clear easing stance.¹

The first section of this note will present a description of how the Chilean economy fared facing these unusual developments, and what policies were adopted by the authorities. As will be evident, the deterioration of the conjunctural situation and the future outlook required a significant step-up of measures over 2008 to deal with the tensions in exchange rate markets, dollar and peso money markets, and liquidity conditions in general. The second section presents some of the risks going forward and some of the challenges that are faced when designing and implementing policies to counteract the deteriorating financial situation.

[†] Prepared for *The Global Financial Crisis - Central Bank Responses in the Western Hemisphere* conference, co-organized by Banco de la Reserva del Perú and the International Monetary Fund and held in Lima, Perú, on March 16th, 2009. The views in this paper do not necessarily represent those of the Central Bank of Chile or its Board.

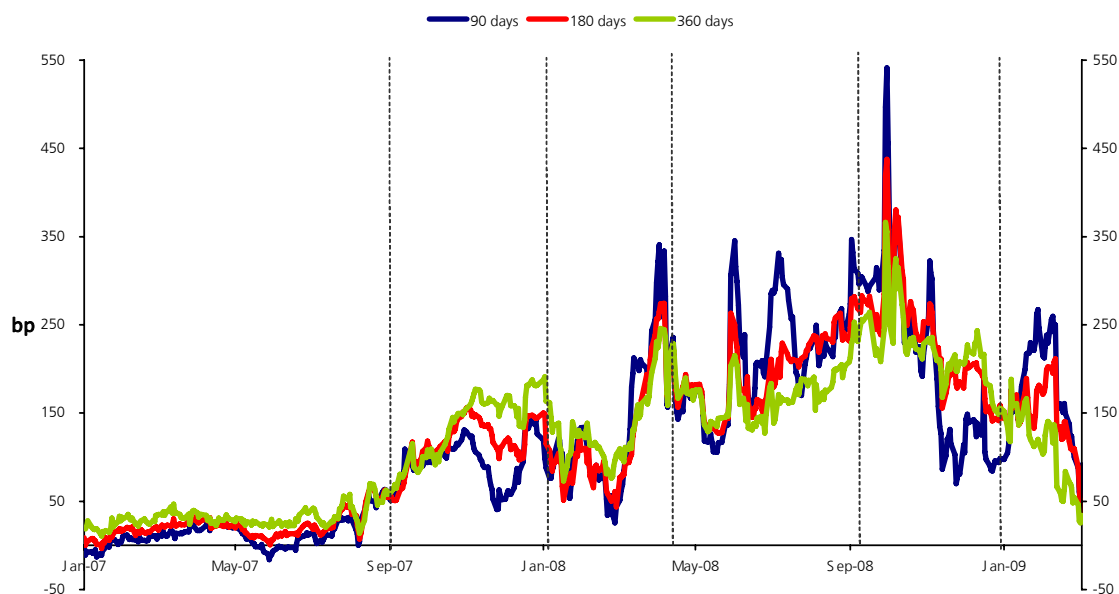
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¹ These periods are highlighted with dotted lines in the enclosed figures.

Financial turmoil, liquidity tensions and the policy response so far

The start of the turmoil in global financial markets being transmitted to the local scene can be traced back to mid August 2007, when the immediate manifestation of strains in dollar liquidity across global interbank lending showed up as an increase in the spread of onshore U.S. dollar (USD) rates² over LIBOR. As Figure 1 shows, starting in August 2007 this spread shifted from 0-50bp over the last quarter of 2007 to between 100 and 200bp.³ Parities remained quite unperturbed by this phenomenon, and the exchange rate over the last quarter of 2007 actually appreciated 4% on average when compared with the earlier part of the year. The assessment over this initial period was that the increase in this onshore spread did not have a material impact by itself on other segments of the financial systems. Indeed, the significant losses in equities and other high-risk assets across the globe provided a disincentive to local institutional investors to increase their exposure abroad, even though they had regulatory leeway for such a portfolio shift.

Figure 1
Spread between onshore USD rates and Libor
(basis points)



Source: Banco Central de Chile.

For calculation of onshore rates see text.

Dotted line marks the highlighted periods in the text.

² Measured as the implicit USD dollar interest rate on OTC forward contracts in the local banking system.

³ Even in normal times, onshore-offshore arbitrage of USD liquidity conditions is not perfect, due to the existence of taxes and other wedges. The main agents in this market are pension funds, which have had by regulation the requirement to use as counterparties local banks for hedging spot forex positions, non-resident participants that operate with USD/CLP NDF contracts, and local banks themselves.

Some implications on the shifting global risk situation became apparent in the credit spreads faced by banks abroad, and the subsequent hike in the spreads for short term (30-90 days) loans in Chile. However, the magnitudes were fairly bounded, and no major macroeconomic impact was observed (unlike what transpired a year later with the collapse of Lehmann Brothers). The Chilean economy was undergoing by the end of 2007 an unwinding of the previous credit cycle, the main drivers of growth and demand seemed not to be linked to short term credit conditions, and monetary policy remained focused on facing the inflationary challenge of skyrocketing commodity and energy prices.

In the first quarter of 2008, tensions intensified markedly in developed financial centers, culminating with the collapse and intervention of Bear Sterns. Over this period, the extraordinary monetary and liquidity measures undertaken by the Federal Reserve were occurring in the backdrop of a global environment where observers still expected a sustained decoupling of emerging economies, as evidenced by the strong growth in many of the larger ones and the resilience of commodity prices to the US slowdown. This environment was conducive to dollar weakness, and the currencies of emerging economies, as well as those of several developed ones, showed a sharp appreciation vis-à-vis the USD. The Chilean peso (CLP) was no exception, and it actually appreciated against the USD by 11 points between the end of December 2007 and the end of March 2008 (Figure 2). In the same period, forward interest rate differentials were strongly driven by the reduction in the expected Federal Funds rate, and in a more subdued way by the expectations of monetary policy hikes locally to counter the inflation threats. However, the magnitudes involved helped account for only a fraction, between 20% and 40%, of the movement in the nominal exchange rate.⁴ Expected long run fundamentals did not shift in the direction of suggesting a stronger currency in real terms either as, for instance, the spike in commodity prices that was beginning to occur was pushing up both the copper and oil prices, having therefore an ambiguous impact particularly on the private sector's terms of trade.

Box – Accounting for Nominal Exchange Rate Fluctuations⁵

The usual methodology to assess high frequency nominal exchange rate movements is the uncovered interest rate parity (UIP), under which the following must hold:

$$(1) \quad 1 + i_0 = (1 + i_0^*) \times \frac{E_1^{e,t} - E_0}{E_0},$$

where E is the nominal exchange rate (measured as CLPs per USD), the superscript $e,0$ indicates the expectation at period 0 of the variable in question, and the subscript is the moment of valuation of the assets. Taking logs and using the usual approximation $\ln(1+x) \approx x$ when x is close to zero, then (1) becomes:

$$i_0 = i_0^* + \ln E_1^{e,0} - \ln E_0$$

⁴ See Box: Accounting for Nominal Exchange Rate Movements.
⁵ Based on Broer and Dominichetti (2003).

Using it as a determination for the spot rate:

$$\ln E_0 = i_0^* - i_0 + \ln E_1^{e,0}.$$

Iterating forward one finds that:

$$\ln E_0 = \sum_{s=0}^T (i_s^* - i_s)^{e,0} + \ln E_T^{e,0}.$$

Taking into account that the long run nominal exchange rate is equivalent to the long run real exchange rate adjusted by the difference in local and external accumulated inflation, then:

$$\ln E_0 = \sum_{s=0}^T (i_s^* - i_s)^{e,0} + \sum_{s=0}^T (\pi_s - \pi_s^*)^{e,0} + \ln RER_T^{e,o}$$

If the real exchange rate at period T that is expected in period 0 is assumed to depend on a vector of fundamental variables \mathbf{F} , then one can replace the expected real exchange rate by the expected fundamentals at time T multiplied by a vector of loadings $\boldsymbol{\beta}$.⁶ This expanded UIP condition can reflect exactly nominal exchange rate levels if it is expanded by an error term:

$$\ln E_0 = \sum_{s=0}^T (i_s^* - i_s)^{e,0} + \sum_{s=0}^T (\pi_s - \pi_s^*)^{e,0} + \boldsymbol{\beta} \mathbf{F}_T^{e,o} + \varepsilon_0.$$

Finally, taking differences this expression allows for nominal exchange rate movements between a period 0 and a period 1.

$$\begin{aligned} \ln E_1 - \ln E_0 = & \\ & \underbrace{\sum_{s=1}^T (i_s^* - i_s)^{e,1} - \sum_{s=0}^T (i_s^* - i_s)^{e,0}}_{\Delta i} + \underbrace{\sum_{s=1}^T (\pi_s - \pi_s^*)^{e,1} - \sum_{s=0}^T (\pi_s - \pi_s^*)^{e,0}}_{\Delta \pi} + \underbrace{\boldsymbol{\beta} \mathbf{F}_T^{e,1} - \boldsymbol{\beta} \mathbf{F}_T^{e,o}}_{\Delta \mathbf{F}} + \underbrace{\varepsilon_1 - \varepsilon_0}_{\Delta \varepsilon} \end{aligned}$$

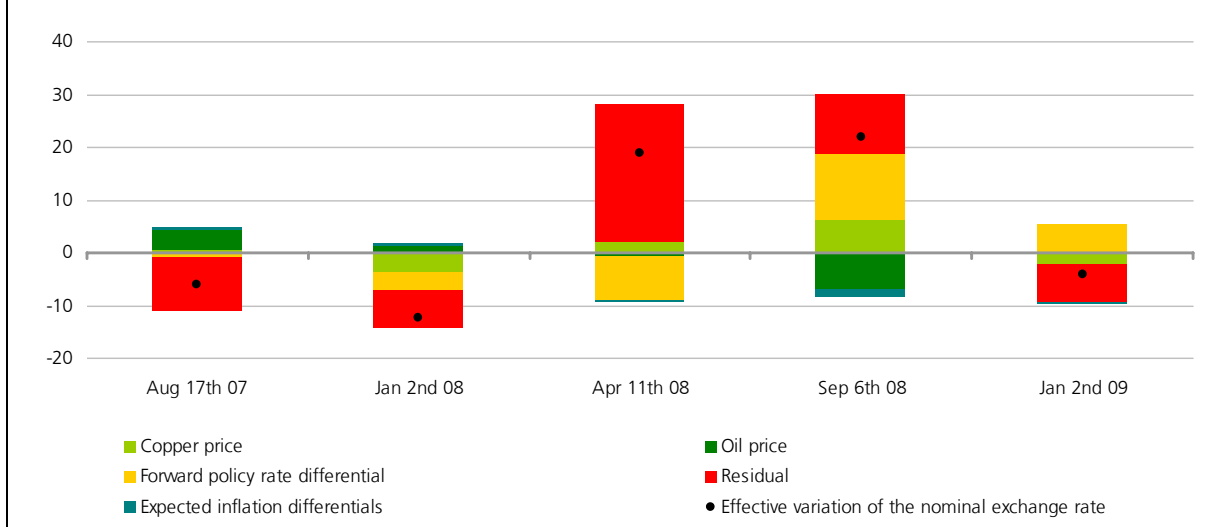
This implies that movements in the nominal exchange rate between moment 0 and moment 1 can be decomposed into changes in forward interest rate differentials, changes in expected inflation differentials, changes in forward Fundamentals, and a residual term:

$$(2) \quad \ln E_1 - \ln E_0 = \Delta i + \Delta \pi + \Delta \mathbf{F} + \Delta \varepsilon.$$

The following figure shows the decomposition of nominal exchange rate variations over the time periods highlighted in the text, starting with the dates indicated below the colored

⁶ See Cowan *et al.* (2007) for high frequency exchange rate models, and Caputo *et al.* (2008) for quarterly frequency models of the real exchange rate.

bards and ending in the dates of the following bar to the right. As can be seen, an important part of nominal exchange rate fluctuations cannot be attributed to the observed variables mentioned above, both in terms of the appreciation up to April 10th and the subsequent depreciation. Forward interest rate differentials do contribute to the fluctuations in exchange rates, particularly over the last quarter of 2008.



Given the perception of significant risks to global financial markets and the increased likelihood of a major future deterioration in global financial conditions, and also considering that the level of the real exchange rate was deemed to be below levels consistent with its fundamentals over the long run, the Central Bank decided in April 2008 to intervene in the foreign exchange market. This was the third time since the adoption of the floating exchange rate regime that intervention under “exceptional circumstances” was undertaken.⁷

⁷ De Gregorio *et al.* (2005) describe the 2001 and 2002 intervention episodes.

Figure 2
Nominal exchange rate
(index, 02.01.07=100)



Source: Banco Central de Chile.
Dotted line marks the highlighted periods in the text.

The flexible exchange regime that underpins the full-fledged inflation targeting framework operating in Chile was put in place in the second half of 1999. It acknowledges that although letting the exchange rate bear the brunt of the adjustment to changing conditions, there is scope for intervention under exceptional circumstances if the exchange rate, without major changes in fundamentals, shows large movements in either direction within a relatively short period of time. This excessive appreciation or depreciation may weaken economic agents' confidence (by affecting inflation and thereby requiring monetary policy action), make financial markets more volatile, or deliver the wrong signals about prices, affecting the efficient allocation of resources. The intervention decision can take the form of foreign exchange operations and/or the provision of foreign exchange hedging instruments. Concretely, in April 2008 the Central Bank announced a program of reserve accumulation to bolster the external liquidity of the Chilean economy, through daily spot purchases of USD50 million. This program complied with the exceptionality of the intervention, shielding the floating exchange rate regime through avoiding discretionary dollar purchases. Moreover, given that some tensions in USD liquidity were still present, the Central Bank also announced that it would undertake USD short-term repo⁸ operations to forestall any additional stress in USD markets due to the intervention. Changing portfolio decisions by institutional investors,⁹ however, prevented these added tensions to materialize, and the USD onshore–LIBOR spread actually narrowed significantly following

⁸ Locally, these operations have been termed “swap operations”.

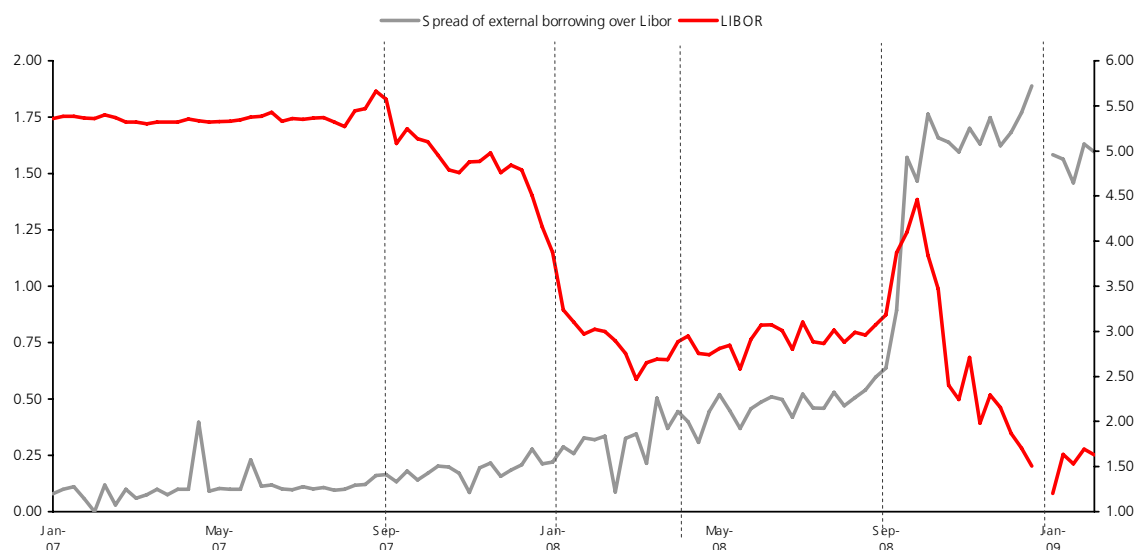
⁹ For a more detailed description of the role and incidence of institutional investors (pension funds) in USD markets, see Cowan *et al.*(2007) and Desormeaux *et al.*(2008)

the intervention decision (Figure 1). The Central Bank thus stopped USD repo offers for the time being.

The period that followed (April to August 2008) was characterized by a sharp increase in current and expected inflation. While the price data for the first four months of 2008 had shown some abatement of inflationary surprises, particularly when contrasted with the second half of 2007, the inflation figures for June to August showed a torrid reappearance of inflationary pressures. Headline inflation inched upwards, peaking over 9% y-o-y in the second half of the year, and several measures of inflation expectations pointed toward a persistence of the process that would keep inflation over the target well into 2010. In these circumstances, and in the context of a growing economy, the Central Bank raised interest rates by a cumulative 200 basis points in four months, and stated in its September 5th Monetary Policy Report to Congress that it would keep on raising rates to ensure a softening of aggregate demand so as to generate the necessary slack for disinflation towards the 3% target in 2010.

In the middle of September, a few days after the presentation to Congress, there was a sudden jump in the cost of foreign borrowing by banks after the Lehman Brothers' collapse, and emerging economies' financial markets recoupled rapidly to the deteriorated scenario, especially in terms of equity prices and exchange rates. Dollar illiquidity became extremely acute in international interbank lending, affecting the cost and access conditions for local banks' borrowing possibilities abroad. The spread over LIBOR of the cost of external financing faced by local banks shifted from an average of 67bp during August to 162bp during September. USD LIBOR was also shooting up, from around 300bp at the beginning of August to 450bp by mid September (Figure 3). Moreover, although external credit lines remained open, the swiftness of the changes in the external conditions and the natural reticence by local agents to engage in credit operations at such a turbulent period also reduced volumes. The average inflows originated through local bank borrowing from abroad declined by half in October and November, from a weekly average of over USD100 million in the first nine months of 2008.

Figure 3
External borrowing cost for local banks
 (pct)



Source: Banco Central de Chile.
 Dotted line marks the highlighted periods in the text.

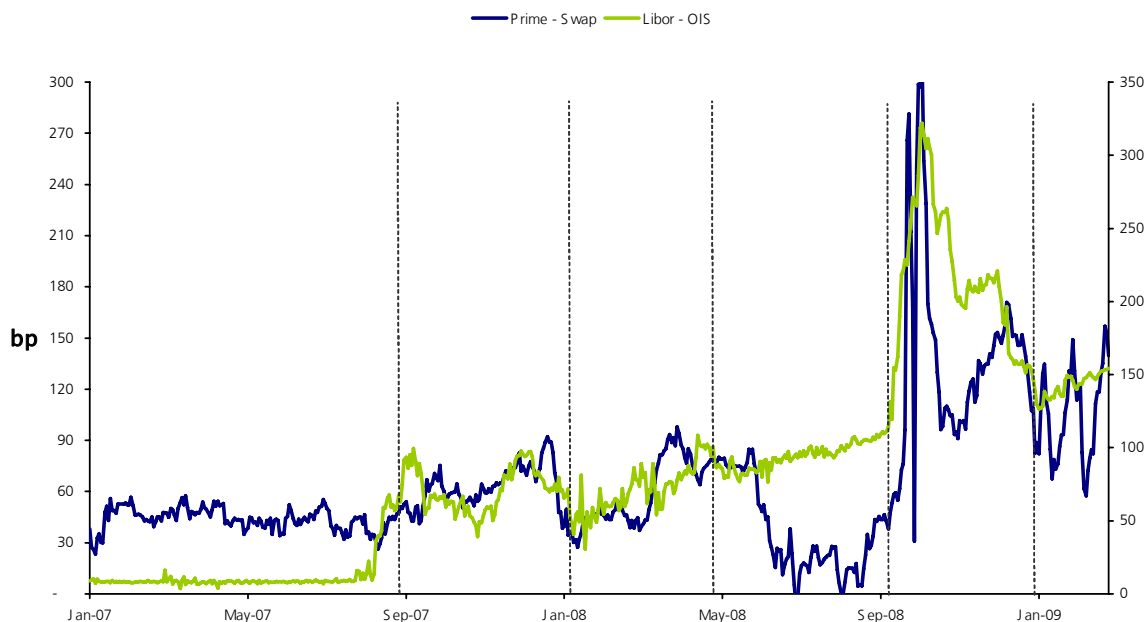
The global financial stress was of such magnitude that excess nervousness percolated to other local financial segments, most notably, liquidity conditions in money markets (both peso and USD). Onshore USD spreads also spiked well above LIBOR, reaching over 500bp during the last days of September and early days of October (Figure 1). Meanwhile, for the first time since the beginning of global financial turmoil, local peso money markets were subjected to significant pressures. The spread between prime deposit rates and implicit interbank term rates in swap contracts, that had hovered around 50bp before June 2008 and actually compressed to zero in the period immediately before the Lehman Brothers debacle, shot up to close to 300bp also in late October (Figure 4). This increase in deposit rates occurred fairly coincidentally with significant portfolio shifts, away from money market mutual funds and into direct deposit taking by investors. Thus, although these tensions were the likely result of higher risk perceptions and uncertainty with a shift away from mutual funds and into banks, the total deposit base actually grew over this time.

The rapid normalization of local money market conditions, over a period of weeks and not months, can be linked to extraordinary measures taken by the Central Bank. In the first place, the Central Bank decided on September 29th to terminate its intervention process and to offer USD liquidity through USD repurchase arrangements.¹⁰ Specifically, this facility consisted of a weekly auction on which up to USD500 million were sold in the spot market, with a repurchase agreement at 28 days, with a maximum bid by individual banks of USD100 million and a minimum bid USD rate of LIBOR + 300bp. Initially, this facility

¹⁰ This repo operation, locally termed “swap”, is qualitatively similar to the backstop USD liquidity operation that was first offered and then suspended right after the intervention decision in April 2008. See footnote 7.

was implemented for a few weeks, but later the minimum bid USD rate was reduced to LIBOR.¹¹

Figure 4
Libor-OIS spread and the spread between prime deposit rates and peso swap contracts
 (basis points, 180 days)



Source: Bloomberg, Banco Central de Chile

As local money market tensions persisted in the few days after these measures were taken, the Board adopted on October 9th and 10th a number of additional measures to further ensure the normal provision of liquidity and the orderly functioning of the financial system as a whole. These measures consisted in allowing the constitution of reserve requirements on USD deposits in local currency or non-USD foreign currency (thus freeing several hundred million dollars in USD liquidity), the extension of USD repo operations (“swaps”) for the period up to April 2009 (and for 60 and 90 days tenors), the extension of peso repo operations for the same period, and the implementation of a special 7-day rolling repo operation that would accept bank CDs as collateral, with a 35% haircut.

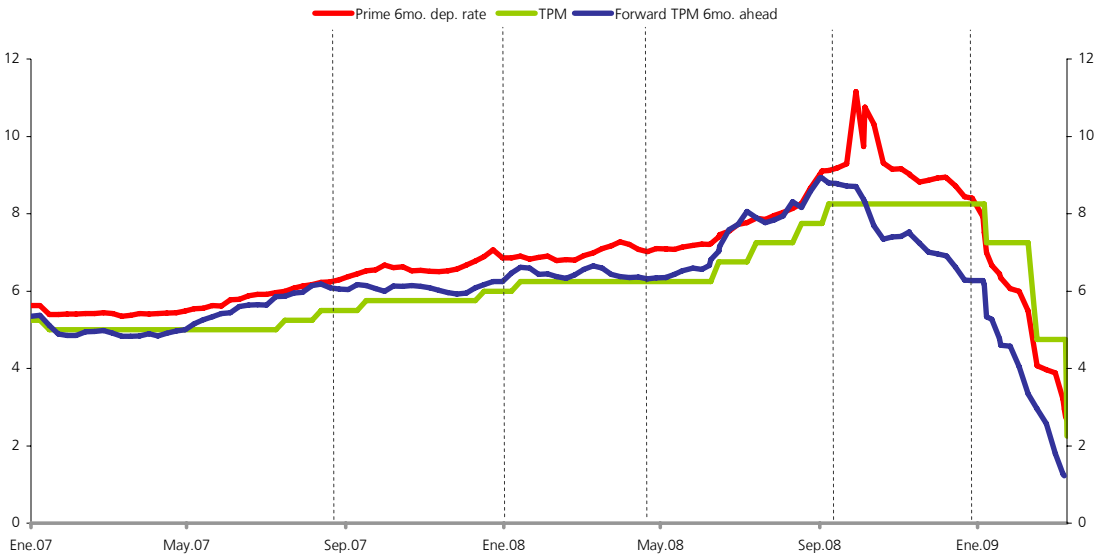
As noted, these measures allowed a fairly quick easing of the tensions in the short end of the curve, as can be seen in figures 1 and 4. However, the reduction in spreads over longer terms was not as strong, and the tight global conditions remained. Given these circumstances, on December 10th a further extension of the liquidity program was announced. The special repo operation with CDs as collateral was extended to 28 days, the haircut for the 7-day repo operation was reduced to 10%, and the Board announced that these, along with the USD “swap” facility (extended up to 180 days tenor), would be in

¹¹ The Ministry of Finance also repatriated about USD1 billion in deposits to the local banking system.

place for the whole of 2009. Finally, the Board announced that in the near term a liquidity facility accepting a broader range of collaterals (including government bonds) and over longer terms (28 days up to a year) would be implemented. This new facility came in line in January. With these different initiatives conditions returned to normal, in the sense that they reflected clearly the monetary policy stance, and USD liquidity tensions abated significantly. In particular, although the weekly auction that implements the provision of USD liquidity through “swaps” has been in place, only once since the period of highest turmoil has there been any marked interest in it.

From September to December, the monetary policy rate was held constant, but a significant shift in agents’ perceptions occurred. Forward monetary policy rates implicit in yield curves showed first a sharp flattening and then an easing path for monetary policy in the short run. This was recognized by the Central Bank as the likely path going forward in an updated outlook published in November and by the inclusion of explicit biases in the communiqués issued in the monetary policy meetings of December 2008. As over the first months of 2009 the actual magnitude of the decline in global activity, trade and demand in the last quarter of 2008 became evident, the Central Bank validated the policy statements from previous months and reduced the monetary policy rate by 100pb in January, 250bp in February, and 250bp in March, thus bringing it to 2.25%, and with a further but diminished easing bias. The preannounced path of monetary policy easing, along with the actual large reduction in the monetary policy rate, has helped drive down credit spreads, particularly at shorter terms, that had increased significantly over October and November, closely mirroring the increased uncertainty and perceptions of credit risk across the globe.

Figure 5
Monetary Policy Rate and expectations of policy stance
 (pct)



Source: Banco Central de Chile

The shift to a countercyclical policy stance was also taken forcefully on fiscal policy. In January, the government announced a sizable fiscal stimulus package, amounting to US\$4 billion for this year. Of this amount, US\$3 billion have direct macroeconomic¹² impact, through a temporary reduction in the stamp tax (with an annual revenue impact of USD600 million and corresponding to a reduction of 120 basis points on a one year credit), USD1.6 billion of higher spending in infrastructure, subsidies to job creation and focalized transfers to low income households, and USD800 billion in tax credit. The financing of this stimulus package has also contributed to assimilate the impact of the deterioration of the global scenario, thanks to a planned drawdown of USD3 billion from the sovereign wealth fund, implemented through daily sales of 50 million dollars operationalized by the Central Bank. The issuance of internal debt, both by the Central Bank and the fiscal authorities, has been marked down with respect to previous years. Hence, the financing needs of the current account are likely to be fulfilled mostly through the use of resources held abroad.

Risks and policy challenges going forward

The depth and scope of the global recession and financial crisis have gone beyond what even the most pessimistic observers were estimating at the outset of the subprime events in early 2007. In this very uncertain environment, it is not only extremely difficult to forecast the most likely path for financial indicators and the global economy, but also to assign probabilities of occurrence to different scenarios. The difficulties arise not only from the wide dispersions of possible outcomes over a linear description of their impact (from, say, “bad” to “worse”), but also from the inadequacy of framing the risks in a one-dimensional spectrum.

For instance, the events over 2008 showed how the actual performance of the global economy did not follow a simple linear deterioration, but rather suffered non-monotonic shifts in the conditions in different markets and asset prices. For instance, although it is clear that perceptions of credit risk globally have been on the rise practically without pause since 2007, they coincided with an initial period of significant weakness in the dollar and high commodity prices in early 2008 as the monetary policy in the US and elsewhere moved strongly in an expansionary mode while the emerging economies “decoupled.” This was then followed by a sharp appreciation of the dollar as investors scrambled for dollar liquidity in the aftermath of the Lehman Brothers collapse, a quick recoupling of exchange rates and equity prices in emerging economies with the deteriorated global situation, and a sharp appreciation of the Yen. Finally, as liquidity tensions across the globe abated, the USD again weakened somewhat. Currently, we are witnessing again an increased demand for dollars due to the heightened financial uncertainty, but against a backdrop of higher yields on long-date government bonds due to the deteriorating fiscal situation in some economies.

These changes in correlations are likely to occur again in the future. For example, the question will remain for some time as to how relative prices, particularly the main exchange rates, will shift to accommodate the significant deterioration of output and trade

¹² The USD1 billion remainder being earmarked for the capitalization of the state-owned copper company CODELCO.

that we are witnessing across the globe. It is far from clear how this adjustment will proceed and how medium term movements in real exchange rates can be accommodated and reconciled with short term disturbances due to global liquidity preference, portfolio effects or the impact of official policies. Countries with large sovereign wealth funds or significant stocks of international reserves, such as the Asian economies, will be faced with the difficult tradeoffs of selecting the optimal financing needs of fiscal packages through foreign resources or domestic debt issuance. Given the fiscal efforts involved, the financing decisions are likely to have effects on conditions faced by local firms. Moreover, the challenge this poses for large systemic economies is even more important as it requires a global coordinated approach to this issue.

The possible resurgence of liquidity tensions also poses challenges in conducting adequate domestic liquidity policies. Although on a first take one can think of liquidity provision in foreign currency as being conceptually independent of local currency liquidity provision thanks to flexible exchange rates, in practice we have seen how this is not so, and how quickly tensions in global USD liquidity can be transmitted to local currency money markets. On the one hand, uncertainty about future ease of access to foreign exchange liquidity coupled with doubts over how the Central Bank could react to such a scenario, for instance by tightening (and not easing) policy to force macroeconomic adjustment or showing some reluctance to use scarce foreign reserves through reserves, can generate a scramble for both local currency and foreign currency liquidity. On the other hand, a rapid depreciation of the currency can also be a symptom of a rapid perception of augmented local credit risk and thus increase demand for local currency liquidity by financial and non-financial firms. Other possible channels for this phenomenon include the hoarding by financial institutions of cheaper local currency liquidity to comply in part with overall liquidity policies in a sudden tightening of external conditions, or the shift away from rolling-over expensive external liabilities and into local financing by corporates.

The adequate implementation of domestic liquidity policies needs furthermore to be carefully tailored to fit within the overall macroeconomic policy stance. This has several implications for the design and implementation of these liquidity policies. First, the anchor for the liquidity stance in a well functioning financial system is the expected path for the overnight monetary policy rate. In times of stress, the pricing of assets becomes distorted through the emergence of liquidity and other premia, which have to be attacked with changes in liquidity policy so as to achieve the alignment of these asset prices with an expected path for monetary policy that is consistent with what the Central Bank aims to achieve. An implementation of liquidity measures that implicitly signals a path for monetary policy that is materially distinct from the one communicated by the Central Bank can generate at best confusion and at worst further uncertainty and turbulence. Second, to the usual requirement of monetary and fiscal policy coordination, in times of financial stress the financing of fiscal policy needs also to be taken into account. In some economies, the issuance of quasi-fiscal bonds is an important part of liquidity operations (such as in Chile), so coordination on this front is easy. However, more often than not, the financing of fiscal policy is the main source of local currency bonds. This poses an obvious challenge of coordination between liquidity policies and official debt policy. Third, and as mentioned above, in emerging economies the recourse to foreign exchange intervention cannot be

discarded. This also has obvious implications for liquidity conditions, even more so in the case of fiscal authorities with accumulated sovereign wealth funds.

To conclude, the risks besetting the global economy are significant. The materialization of negative scenarios can have significantly more damaging effects on financial markets if an uncoordinated policy response is implemented. Failure of coordination can occur not only between major economic zones, but also within each economy through an inadequate mix of fiscal vs monetary policy, or an incoherent set of exchange rate, debt and/or liquidity measures.

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