Financial Stability Report

SECOND HALF 2008

BANCO CENTRAL
DE CHILE

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*/ This is a translation of a document originally written in Spanish. In case of discrepancy or difference in interpretation the Spanish original prevails. Both versions are available at www.bcentral.cl.

Contents[1/]

[1]/ The statistical closing date of this *Report* was 18 December 2008, except for chapter V and for the section on the Consolidated government (chapter IV).

Preface

As set forth in its Basic Constitutional Act, the Central Bank of Chile (the Bank) must "safeguard the stability of the currency and the normal functioning of internal and external payments." To carry out these tasks, the Bank is vested with diverse legal powers, such as extending emergency credit and determining regulations in matters affecting the financial system and foreign exchange operations.

The Central Bank's focus in the area of financial stability is centered mainly on the proper functioning of the system and the Chilean economy's access to the international financial markets. The Central Bank's tracking of financial stability is complementary to that undertaken by the specialized supervisory entities; it serves as an independent element of analysis with respect to the supervisors' powers and functions in relation to the entities subject to their oversight.

The objective of the *Financial Stability Report* consists in providing information, on a half-yearly basis, on recent macroeconomic and financial events that could affect the financial stability of the Chilean economy, such as the evolution of the indebtedness of the main credit users, the performance of the capital market, and the ability of the financial system and the international financial position to adapt to adverse economic situations. In addition, the *Report* presents the policies and measures that support the normal functioning of the internal and external payments, with the objective of promoting general knowledge and public debate with regard to the Bank's performance in fulfilling this function. The articles that appear in the final pages summarize recent research efforts by the Bank on topics related to financial stability.

The Board

Summary

In September last year, the world financial crisis took a dramatic turn for the worse. The fragility described in the two last *Reports* derived in a crisis of a magnitude with no precedent in several decades, marking the onset of a new phase in the period of turmoil that began in mid-2007.

The period from August 2007 to September 2008 was characterized by the continuous erosion of the portfolios of major financial intermediaries, a weakening of their capital positions and uncertainty about the value of their assets. This uncertainty, compounded with U.S. banks' extraordinary needs for liquidity because of implicit and explicit off-balance-sheet commitments, pushed up interest rates in the U.S. and in Europe. This prompted the main central banks in the world to provide liquidity in an attempt to prevent a spiraling shortage of liquidity that would force banks to rapidly sell off their assets and thus further depress their market value.

The nationalization of Fannie Mae and Freddy Mac, the downfall of Lehman Brothers and the AIG bailout mark the beginning of a second phase of the financial crisis, which features a generalized reduction in the appetite for riskier assets, a significant flight toward liquid assets and exceptionally volatile asset prices. In this period, premiums on interbank liquidity reached historic highs, while at the same time the yields on short-term U.S. Treasury notes approached record lows. This financial panic was allayed only with the series of announcements of bank capitalization and extended guarantees on bank liabilities initiated by the United Kingdom, and with the substantial and coordinated injections of liquidity by the main central banks of the world.

Although what triggered the crisis specifically was the low credit quality of subprime mortgage borrowers in the U.S., the current situation has revealed, for some developed economies, some structural faults that are the outcome of recent financial developments. Worth singling out are deficiencies in the processes of originating and distributing financial assets and in the supply of liquidity by financial agents with no access to public mechanisms of liquidity provision. This has triggered the near paralyzation of several non-bank intermediation mechanisms—such as the issuance of certain securitized assets—, a series of mergers between traditional and investment banks, and the decision of the remaining investment banks in the U.S. to reinvent themselves as commercial banks.

It also explains why the Federal Reserve saw the need to intermediate credits directly.

This loss of trust in several non-bank credit intermediation mechanisms has driven other intermediaries—particularly banks—to increasingly take over the role of credit providers. The banking sector faces this challenge with a deteriorated capital base due to losses originating in their overexposure to risky assets, which has not been counterbalanced by either private or public capital increases. This combines with the increase that has been observed, and which is expected to continue, in delinquent instruments in bank portfolios of several developed economies, especially mortgage loans, and with the financial cost of the liquid asset accumulation that began in October.

The impact of financial turbulence on emerging economies also aggravated considerably in September, with large rises in risk premiums and portfolio capital outflows in several of them. Notwithstanding, there is a clear differentiation in these corrections, with bigger increases in financing costs in those economies that were considered more risky beforehand.

Despite the extremely complex external financial scenario, Chilean banks and firms have managed to obtain new loans or renew existing ones abroad, albeit at higher spreads and shorter duration than used to be the norm. The inflow of foreign direct investment has also been sustained. Furthermore, no portfolio capital has been seen to flow out of the Chilean economy, and nominal interest rates on public securities have dropped in recent months. Meanwhile, institutional investors, as well as firms and households, have brought part of their assets abroad back into the country, contributing to the economy's adjustment to the new external financial conditions. In addition, the information available shows that the direct exposure of Chilean financial institutions to delinquent financial institutions, either through holdings or as counterparties to derivatives' contracts, has been almost nil.

Notwithstanding the relatively favorable behavior of external financing so far, the complex financial environment that is foreseen at least in the short term, leads this *Report* to identify **a more acute contraction of the supply of external funds as the main threat to the Chilean economy's financial stability.** This threat could materialize in a protraction or and aggravation of the current financial weakness in the main economies in the world, or through contagion effects originating in difficulties at systemically important emerging countries.

Within this context of global financial uncertainty, the position of solvency and liquidity of the Chilean economy remains sound, despite a recent increase in short-term debt and a reduction in foreign asset valuation. This, due to the accumulation of foreign assets by both public and private agents. In particular, the stock of international reserves and assets accrued in the economic and social stabilization fund (FEES) have permitted the Central Bank and the General Goverment to take a number of measures intended to provide liquidity in foreign currency to local agents, through a program of currency swaps and dollar deposits in domestic banks.

Due to the deepening of the international financial crisis and its impact on the real economy, prospects for world growth have been revised downward substantially from the latest *Report*. Worth noting are the deteriorated expectations on emerging economies' output growth and the sharp fall in the dollar prices of several commodities. As is thoroughly discussed in the *Monetary Policy Report*, such weakening translates

into less demand for Chilean exportables, and contributes to a drop in expected output for 2009. Accordingly, this *Report* identifies a deepening or a protraction of the world economic slowdown as the second threat to financial stability.

Domestically, money markets experienced some constraint in late September but they have been gradually returning to normal. By the end of that month, and coinciding with the period of heaviest turbulence in world financial markets, a large increase in short-term interest rates in pesos was observed, widening the gap with the expected short-term average interbank rate. At the same time, onshore dollar rates showed a significant increase, drifting farther apart from the short-term Libor. Coinciding with the startup of the Central Bank's dollar swap programs, peso liquidity provision programs and Central Government deposits, said interest rates on peso deposits have declined, but still gaps are somewhat larger than they were in early September. Because of these gaps, the Central Bank decided in December to stretch its swap programs to the whole of 2009, while expanding the mechanisms to provide liquidity in pesos.

Since late September, volatility in exchange rates and stock prices has hit historic highs. The Chilean peso has depreciated more than 34% in nominal terms since the last *Report*. Part of this depreciation responds to the global appreciation of the U.S. dollar that resulted from the portfolio's flight to U.S. Treasury notes, seeking a reduction in risk or an increase in liquidity. It cannot be ruled out, however, that pension funds may have played their part in the exchange rate market stress, through substantial shifts in their foreign exchange hedging positions.

As in previous periods, interest rates on public debt securities have been hit harder by domestic events than by external factors. Nominal rates have moved in tandem with the monetary policy rate, while real rates have tended to rise in line with the reduced inflation expectations of recent months.

In the medium term, the external and internal economic slowdown could increase the materialization of credit risks in the entrepreneurial sector. Exporting companies are expected to face a deceleration of external demand, although its effects will be partly offset by a drop in the costs of key inputs and the depreciation of the peso in real terms. Sectors producing or selling goods that are highly sensitive to the business cycle—such as real estate or durable consumption goods—will see a faster slowdown in sales.

The companies registered in the Superintendency of Securities and Insurance (SVS) showed in their September 2008 statements, strengths to deal with the second phase of the world financial crisis. These companies' low exposure to the exchange rate should be noted, together with the absence of operations in speculative exchange rate derivatives that have been taking place elsewhere in the region. **Another good thing is the increase in corporate bond placements in recent months, which has emerged as an alternative source of funds to foreign funding or local banks.** Banks' commercial loans are slowing down due to more stringent requirements and a reduction in the sector's demand.

Total household debt continues to decelerate, owing to tighter lending conditions and to a reduction in demand for credit. As in the latest Report, banking consumer loans are the main culprit of this deceleration. Meanwhile, non-bank consumer credits continue to grow strongly, although not as fast as in earlier periods. Household borrowing indicators show a slight increase

since the last *Report*. However, the country's household debt to disposable income ratio is lower than in countries that have been hit most severely by the global financial crisis.

Various indicators single out the Chilean banking system as one of the soundest in the region. Such strength has reflected on the favorable trend of the banking sector's market capitalization, as opposed to Europe or the U.S. In Chile a traditional banking model with a commercial orientation has prevailed. Worth noting are the zero direct exposure to U.S. subprime instruments, a relatively small security investment portfolio, no off-balance-sheet vehicles and important retail funding. Moreover, the banking sector maintains its low exchange rate risk exposure. **Notwithstanding, the international conditions have affected the country's borrowing conditions and driven banks to accumulate substantial liquidity in both domestic and foreign currency.** These two factors combined prompted big hikes in deposit and lending interest rates in late September. While at the time of writing this *Report* deposit rates have declined, lending rates remain high, owing partly to higher perceived risks.

The challenge remains for the banking system to maintain and expand its external sources of financing. In the present international financial context, banks must take special care in negotiating their external liquidity positions and take whatever actions are necessary to ensure for themselves a smooth access to foreign markets.

Banks have further increased their provisions, building significant safeguards to confront the expected slowdown in the real sector. On the other hand, the sector's capital adequacy requirement is around 12%. Despite increased provisions, on average banks are showing rates of return on equity similar to historic averages. In a context of reduced economic growth, capitalization decisions become essential to strengthen the capacity of banks to provide financing to the economy, and to help channel external funds. Therefore, the banking sector would be wise to consider some policies along these lines.

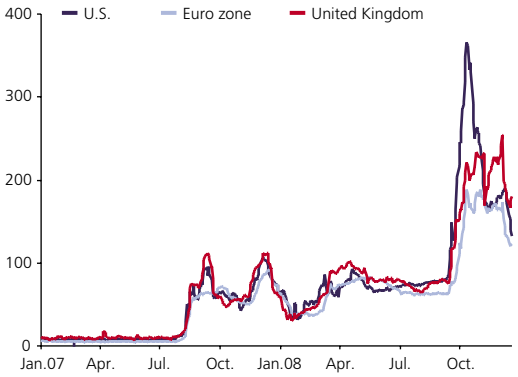
Overall, the current macroeconomic policy strategy, the prudential regulation framework, the banking system's equity situation, plus the levels of solvency and liquidity exhibited by the Chilean economy, should contribute to mitigate the impact of more stringent global financial standards and a severe deceleration of the world economy. In the present international financial scenario, the Central Bank of Chile will hold on to its active policies to support the domestic banks' liquidity in both foreign and domestic currency, in such a way as to ensure that they can continue to play its role as credit provider to firms and households. As was explained in the previous *Report*, the worsened external financial conditions and the world economic slowdown will have a significant negative impact on the Chilean economy. However, the analysis contained in this Report suggests that the Chilean financial system is well suited to sail through this restrictive international scenario without becoming an additional source of risk or volatility.

I. Financial environment and risks

Figure I.1

Three-month liquidity conditions in the interbank market (*)

(basis points)



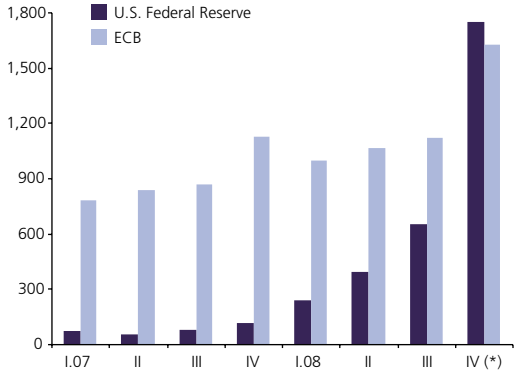
(*) Spreads between the LIBOR and the overnight index swap rate for each area.

Source: Bloomberg.

Figure I.2

Liquidity injections by central banks (*)

(US$billion, € billion)



(*) Data through 12 December 2008. Figures from the Federal Reserve in dollars and from the ECB in euros.

Source: Bloomberg.

This chapter reviews the recent conditions and developments in the international financial market. It also describes and lays the foundation of the Central Bank of Chile's assessment of the main external risk factors for national financial stability.

Evolution of the international financial crisis

The financial systems of the developed economies —in particular, the U.S.— are experiencing a crisis of a magnitude without precedent in several decades. While the crisis was triggered by the deterioration of the credit quality of subprime mortgages in the U.S., the current situation has exposed structural weaknesses in these financial systems. These weaknesses include the systemic importance of highly leveraged financial intermediaries, credit disintermediation (which weakens oversight), and the extensive use of short-term market financing to finance long-term assets (box I.1).

The deterioration of mortgage portfolio default indices —especially for subprime mortgages— began in early 2007 in the U.S. This coincided with the start of a period of falling housing prices, after years of strong growth. Uncertainty about the quality of mortgage assets increased in August of that year, especially with regard to securitized instruments backed by those assets. This increase translated into extraordinary hikes in the interbank rate spread for uncollateralized loans over the expected overnight financing rate (figure I.1). This premium reflected the banks' uncertainty not only regarding the quality of other banks' assets (especially through their exposure to instruments with underlying mortgage assets), but also about their own liquidity needs and the ease with which they would be able to acquire liquidity should they need it (box I.2).

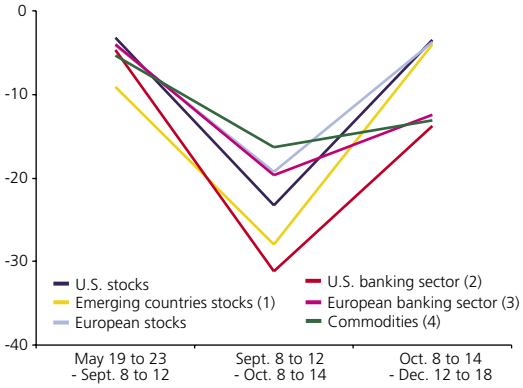
In the face of these events, the central banks increased their liquidity supply. In the case of the U.S., the Federal Reserve also progressively extended the terms of these loans, the accepted collateral, and, finally, eligible agents, through the creation of special programs (figure I.2)[1]/. The agents of access to liquidity to other financial intermediaries is a reflection of their growing systemic importance.

[1]/ In particular, investment banks without a primary dealer rating (see glossary) were incorporated as eligible entities.

Figure I.3

Prices of selected assets

(equivalent monthly change, percent)



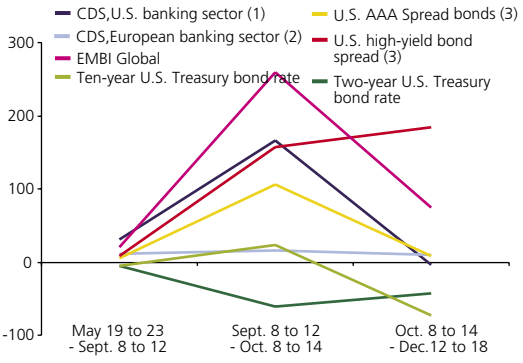
(1) MSCI emerging markets index.
(2) Average stock prices for Citigroup, JPMorgan, Goldman Sachs, Morgan Stanley, Merril Lynch, Wachovia, and Bank of America.
(3) Average stock prices for UBS, HSBC, Deutsche Bank, Santander, BBVA, and ING.
(4) JP Morgan Aggregate commodities index.

Sources: Own elaboration, based on data from Bloomberg and JPMorgan.

Figure I.4

Prices of selected assets

(equivalent monthly change, percent)



1) Average spread on five-year CDSs for Citigroup, JPMorgan, Goldman Sachs, Morgan Stanley, Merril Lynch, Wachovia, and Bank of America.
(2) Average spread on five-year CDSs for UBS, HSBC, Deutsche Bank, Santander, BBVA, and ING.
(3) Spread between ten-year generic corporate bonds and ten-year U.S. Treasury bonds.

Sources: Own elaboration, based on data from Bloomberg and JPMorgan.

Mortgage default continued to increase in the U.S. in the first three quarters of 2008 (see the following section). While traditional banks recognized losses from their exposure to the subprime sector, nonbank intermediation (carried out by investment banks and issuers of securitized assets) faced serious difficulties owing to the loss of confidence in the incentives that this model needs to generate assets in line with the quality of the loans offered. This translated into a steep drop in the issue of securitized assets, producing a credit contraction, and growing difficulties for investment banks to raise market financing. The government-guaranteed mortgage agencies in the U.S. (Fannie Mae and Freddie Mac) partially offset the slower activity of the entities issuing securitized assets, which hurt the quality of their balance sheets. Despite these developments, the impact on the prices of other assets, like stocks and bonds, was relatively light until September 2008 in both developed and emerging economies (figures I.3 and I.4).

That month, several of these pressures came to a head. As a result of the perceived increase in their portfolio credit risk, Fannie Mae and Freddie Mac had difficulty placing their debt. The importance of these intermediaries in the mortgage market led them to be practically nationalized. On another front, the U.S. investment bank Lehman Brothers was unable to find partners that would provide additional capital or to raise market financing through debt. As the company did not receive government support, it had to file for bankruptcy. In contrast, the U.S. government was willing to bail out the AIG insurance company, given its better asset quality relative to Lehman Brothers and the company's systemic importance as a counterparty to numerous credit default swap (CDS) contracts.

The combination of these events, which confirmed the need for a contraction of the balance sheets of nonbank intermediaries, triggered the biggest financial asset price slides in decades, combined with the highest price volatility[2]/. Interbank rates increased substantially, forcing central banks to again expand their internal liquidity supply, and to initiate or expand coordinated actions to inject dollar liquidity through swap programs with the U.S. Federal Reserve. Over the past few months, the commercial banks have held this additional liquidity in central bank deposit accounts (figure I.5).

The drop in financial asset prices continued despite the U.S. Congress's approval of a US$700 billion program to buy risky assets. The freefall eased off only after a series of unprecedented announcements regarding the capitalization of the banking industry and the extension of state insurance on bank liabilities, initiated first by the British government in mid-October and then by other countries (figures I.3, I.4 and table I.1). On 12 November, the U.S. government announced that, like the United Kingdom, it would use the approved funds to capitalize the banking industry, instead of buying risky assets as originally announced.

[2]/ In September, the main investment banks that were still viable sought mergers with commercial banks or obtained a license to operate as such.

Table I.1

Financial sector support programs (1)

(US$ billion)

Country	Announced				Effective (1)	Insurance coverage	
	Loan guarantees	Capital injections	Other purposes	Country total		Other Deposits	liabilities
U.S.		250	450	700	162	x	x
Japan		300		300		x	
United Kingdom	385	77		462	56		
Euro zone							
Germany	513	167		679	18	x	
France		53	410	463	1	x	
Holland	256	60		316	18	x	
Spain	128		64	192	13	x	
Austria	109	19		128	7	x (2)	
Greece	19	6		26		x	x
Portugal	26			26	11	x	x
Belgium		6	3	9	12	x	x
Other countries							
Norway			51	51		x	
Sweden	189			189	3	x	x
Switzerland		5	51	56	8		x
Australia			5	5		x	
Canada			21	21		x	
Total	**1,625**	**943**	**1,055**	**3,622**	**308**		

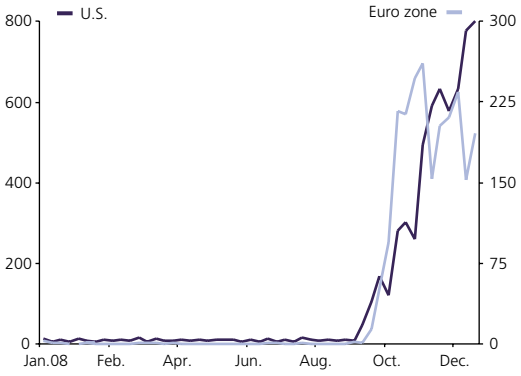
(1) Effective through 18 December 2008.
(2) Only for individuals.

Sources: Federal Reserve Board, Bank of England, UBS, Bloomberg, and press reports.

Figure I.5

Liquidity held by commercial banks (*)

(US$ billion, € billion)



(*) Weekly data, updated through the week of 17 December. Figures for the U.S. in dollars and of for the euro zone in euros.

Sources: Federal Reserve Board and ECB.

These measures succeeded in substantially reining in the reduction rate of the majority of asset prices in the nonfinancial sector (stocks, sovereign bonds, and AAA bonds). Other assets, however, continued to post reductions, although less severe and differentiated by market, reflecting the worsening of growth prospects.

With regard to financial intermediaries, liquidity premiums have remained high, which signals banks' reluctance to lend while there is still uncertainty surrounding the true price of assets and the availability of liquidity in the medium term. The Citigroup episode confirms this trend[3]/. This situation has led the Federal Reserve to take an increasing role in financial intermediation.

The future unfolding of the financial crisis is difficult to predict. Default rates on different types of loans continue to rise in several developed economies, housing prices continue to fall, and the outlook for the real economy is discouraging. There is also the possibility of new changes in the structure of the financial system, such as mergers or new interventions by the authorities to solve the problems of systemically important intermediaries.

[3]/ After Citigroup's stock prices plunged in November 2008, the U.S. Treasury injected capital through a purchase of preferred stocks totaling US$20 billion (in addition to the US$25 billion allotted in October through the Troubled Assets Relief Program, or TARP) and extended a government guarantee of US$306 billion on its risky assets. Part of the agreement is that the bank must assume the first losses and copay additional losses.

Transmission channels

There are several channels through which the international financial crisis could affect the Chilean economy. A first channel is financial and has to do with the ability of local agents to obtain external financing at a reasonable cost. This could become difficult, as a result of both the external intermediaries' tightened lending capacity and changes in the perception of risk in the emerging economies in general and Chile in particular. These factors are relevant for different types of financing (i.e., bank, bonds, or foreign direct investment). A second channel has to do with the negative impact of the crisis on world growth in the coming years and how this could affect the payment capacity of national debtors. This section reviews antecedents related to these channels.

Commercial banking in the U.S. and Europe faces an upward trend in default, which hinders lending growth

Default rates on bank mortgage loans in the U.S. continue to rise, with residential loans hitting record levels not seen since the beginning of the past decade (figure I.6). Residential loans account for 28% of total bank loans. Default rates have also risen in other segments, particularly consumer and business loans, but they remain at a reasonable level relative to previous cycles. Given the outlook for economic activity, the default rate on business loans is expected to rise. Data from some European economies also indicate an increase in default.

Housing prices are an important determinant of the evolution of portfolio quality. Falling prices increase the probability of nonpayment, especially in countries that recently went through periods of steep price increases, where it is more likely that some of the loans were associated with transactions that assumed that these increases would continue. Several developed economies have recently recorded such price drops, which increases the likelihood of a future deterioration in the quality of the banks' portfolios (figure I.7).

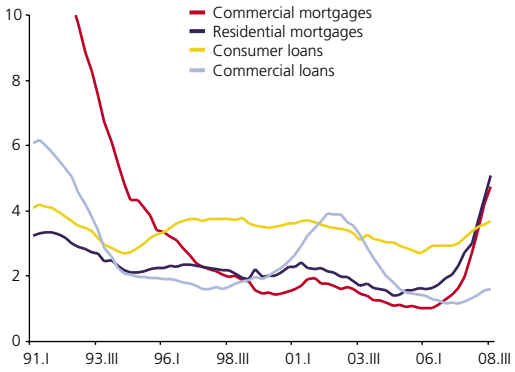
Despite the public and private capitalizations, the capital levels of banking sectors in developed economies are insufficient to avoid a credit crunch

One determinant of the banking sector's lending capacity is its capital position, which has been hurt by the high losses reported in recent periods. Banks have responded by seeking to recapitalize (table I.2). However, in an environment of widespread deterioration of asset quality, the additional amount of capital required for the banking system to send a convincing signal of solvency is higher than the recognized losses.

Figure I.6

Credit default in U.S. commercial banks

(percent of total loans in each category)

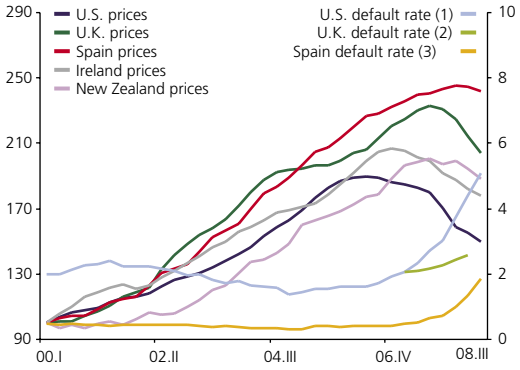


Source: Federal Reserve Board.

Figure I.7

Housing prices and residential mortgage default in selected economies

(index January 2000 = 100, percent of total residential mortgage loans)



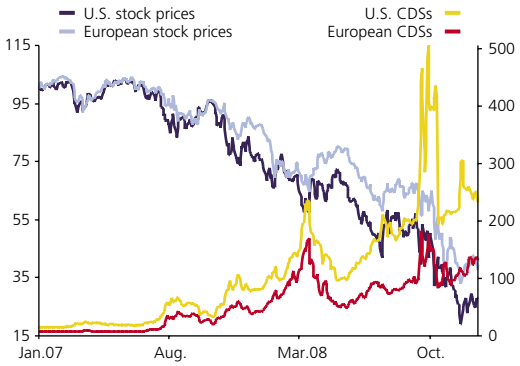
(1) Delinquency of 30 days or more.
(2) No defined period.
(3) Delinquency of 90 days or more.

Sources: Federal Reserve Board, Bank of Spain, Financial Services Authority, and Bloomberg.

Figure I.8

Stock prices and CDSs of European and U.S. banks (1) (2)

(index January 2007 = 100, basis points)



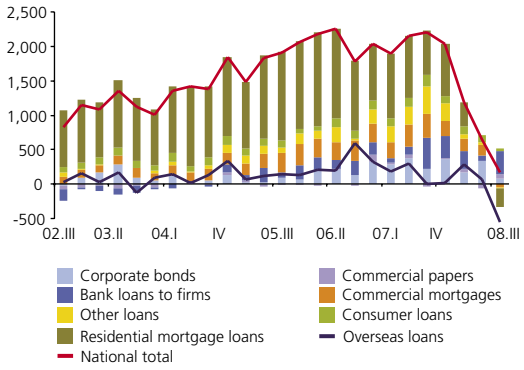
(1) U.S.: Citigroup, JPMorgan, Goldman Sachs, Morgan Stanley, Merrill Lynch, Wachovia, and Bank of America. Europe: UBS, HSBC, Deutsche Bank, Santander, BBVA, and ING.
(2) Measured as the five-year CDS spread.

Source: Bloomberg.

Figure I.9

Total net loans in the U.S.

(seasonally adjusted annualized data, US$ billion)

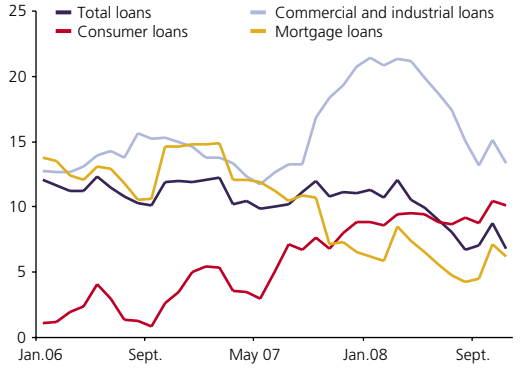


Source: Flow of Funds Accounts, Federal Reserve Board.

Figure I.10

Commercial bank loans in the U.S.

(annualized change, percent)



Source: Federal Reserve Bank of St. Louis.

Table I.2

Losses and capital increases of international banks (*)

(US$ billion)

	Losses due to writedowns and credit quality	Capital increases		Difference
		of governments	Other	
World	746.4	250.4	547.6	51.6
U.S. and Canada	437.8	161.5	268.8	-7.5
Europe	279.3	87.9	225.1	33.7
Asia	29.3	1.0	53.6	25.3
Wachovia Bank	96.5	0	11.0	-85.5
Citigroup	67.2	64.5	49.3	46.6
Merril Lynch	55.9	10.0	19.9	-26.0
UBS	48.6	6.0	27.0	-15.6
Washington Mutual Bank	45.1	0	12.1	-33.0
HSBC	30.3	0	4.9	-25.4
Bank of America	27.4	15.0	40.7	28.3
JPMorgan Chase	19.9	25.0	19.7	24.8
Wells Fargo	14.6	25.0	16.8	27.2
Morgan Stanley	21.5	10.0	14.6	3.1
Royal Bank of Scotland	15.2	5.0	43.8	33.6
Credit Suisse	14.3	0	12.0	-2.3
IKB Deutsche Industrie Bank	14.2	2.3	9.4	-2.5
Deutsche Bank	12.8	0	6.0	-6.8
Credit Agricole	9.5	3.0	9.3	2.8
Fortis	9.1	11.2	11.0	13.1

(*) Values accumulated from the third quarter of 2007 to the statistical closing of this *Report*.

Sources: Bloomberg and Federal Reserve Board.

Government recapitalization through preferred stocks has been important in improving the banking system's solvency position. It is still a long way from being enough to avoid a credit crunch, however. The thin capital cushion is also reflected in the low valuation of bank stocks in the U.S. and Europe, which have fallen more than the aggregate stock indices (figure I.8).

U.S. data confirm a credit crunch in 2008

Up to the third quarter of 2008, the credit flow to both households and businesses in the U.S. declined substantially. In seasonally adjusted terms, the annualized credit flow to households thus far in 2008 represented 9% of the annual average of the 2005–2007 period, and 67% in the case of businesses. Mortgage loans —both residential and commercial— posted the biggest drop. Credit from the U.S. to the rest of the world also fell (figure I.9).

For the most part, these lower flows reflect the balance sheet contraction of non-bank intermediaries, one of the components of the process of "deleveraging" (box I.1).

In the case of bank loans, the data confirm the results of lending standards surveys, which have been reporting a contraction since December 2007 (figure I.10). Currently, lending surveys from both the U.S. and the euro zone show a tightening of lending conditions (figure I.11).

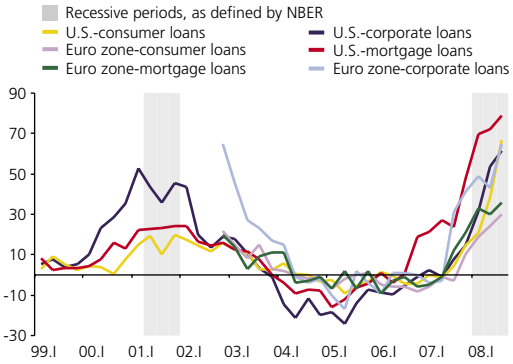
The deepening of the financial crisis since September triggered a sharp correction in asset prices in emerging economies

As of September, the international financial crisis has had a moderate effect on the majority of emerging economies. Commodity prices remained high

Figure I.11

Lending conditions index on loans in the U.S. and euro zone (*)

(percent)



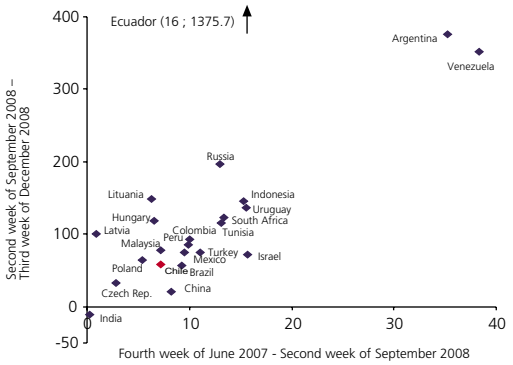
(*) Net tightening index: Number of banks that indicate —in lending condition surveys carried out by the Fed and the ECB— tighter conditions, net of banks that indicate looser conditions, over the total number of banks.

Sources: Federal Reserve Board, ECB and NBER.

Figure I.12

Risk perception of emerging economies

(average monthly change in EMBI spreads, basis points)

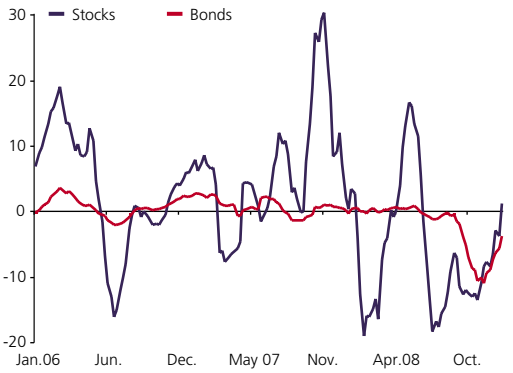


Source: Own elaboration, based on data from Bloomberg.

Figure I.13

Total capital flows to emerging economies (*)

(US$ billion)



(*) Eight-week moving sum.

Source: Own elaboration, based on data from Emerging Portfolio Fund Research.

despite the crisis, which benefited a significant number of these economies, generating current account surpluses and attracting capital to local stock markets. Other economies, however, displayed sizable macroeconomic imbalances, as evidenced by massive current account deficits.

Starting in September, sovereign spreads and exchange rates deteriorated sharply. In the September–December four-month span, the average monthly change in the sovereign spreads of a group of emerging economies was about ten times higher than the average monthly change of the first phase of the crisis (August 2007 to September 2008, figure I.12). The strong positive relation between the changes in the spreads in these two periods indicates that this adjustment includes a continuing differentiation across economies. This is very important in the case of Chile, since some countries in the region have very high sovereign spreads (Argentina, Ecuador, and Venezuela). Data on portfolio flows to emerging economies show an outflow of stock investment, which intensified in October and expanded to bonds; this confirms the change in the demand for these economies' assets (figure I.13). It is worth mentioning that the outflow eased off in the weeks before the statistical closing of this *Report*. Also, the majority of emerging economies registered depreciations in the last quarter, even though their performance had been uneven in the previous year (figure I.14).

Several emerging economies have faced balance-of-payments problems, leading the IMF to establish support programs. In the last quarter of 2008, the Fund provided emergency loans to five emerging economies that presented significant external imbalances and a strong dependence on external financing. The loans were for amounts above US$2.0 billion to Iceland and Latvia, which were also facing a crisis in their banking systems; US$7.6 billion to Pakistan; US$16.4 billion to Ukraine; and US$25.8 billion to Hungary, the latter loan was provided in conjunction with the World Bank and the European Union.

Starting in September, world growth has been revised downward

In the months following the last *Report*, the U.S. and European economies slowed significantly. The world growth outlook for the next two years has weakened, with major downward revisions in almost all regions[4]/. With regard to Chile's main trading partners, China is expected to maintain high but slowing growth, while developed economies' output would fall in the coming year (figure I.15).

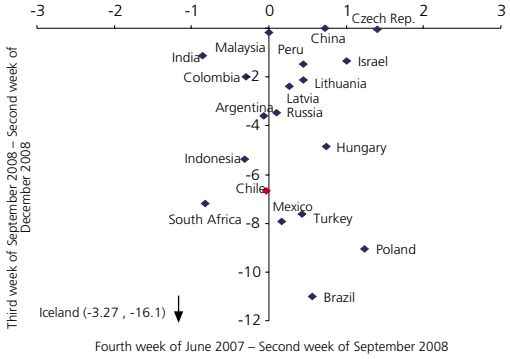
In recent months, both fiscal and monetary stimulus packages have been announced. In the fiscal arena; these stimuli are primarily oriented to supporting financial markets and institutions, with the goal of preventing a drop in lending through guarantees that reduce uncertainty about default risk. In the monetary arena, there have been important reductions in monetary policy rates, some of them coordinated among economies (figure I.16). In the case of the U.S., there is almost no room to continue with traditional monetary stimulus measures. This is not the case in other economic areas, however, where the drop in expected inflation facilitates taking measures in this direction.

[4]/ *Monetary Policy Report*, January 2009.

Figure I.14

Currency value in emerging economies (*)

(average monthly change in exchange rates, percent)



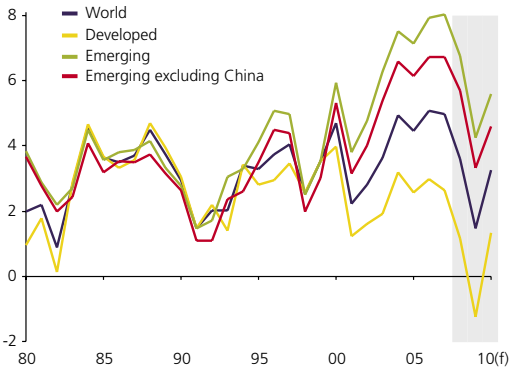
(*) A negative percent change indicates depreciation of the currency against the dollar.

Source: Own elaboration, based on data from Bloomberg.

Figure I.15

World growth at PPP (*)

(annual change, percent)



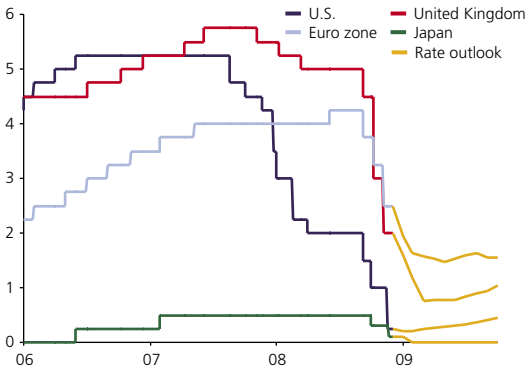
(*) Purchasing power parity. Regional classifications and weights follow IMF definitions.
(f) Projected.

Sources: Central Bank of Chile based on a sample of investment banks, Consensus Forecast, and IMF.

Figure I.16

Monetary policy rate and outlook (*)

(percent)



(*) Elaboration based on interest rate futures contracts. Spot prices at the statistical closing of this *Report*.

Sources: Central Bank of Chile and Bloomberg.

Global imbalances, as seen in high current account deficits in some developed economies, continue to correct, but the possibility of sharper adjustments cannot be discarded

Previous *Reports* identified the sharp adjustment of the current account deficit of some developed economies as a threat to Chile's financial stability. Although in recent years the U.S. has accounted for the main deficit in terms of absolute size, other developed countries such as Iceland, Spain, and Australia have had substantial current account deficits relative to their GDP. These deficits have been financed with surpluses in emerging economies (especially China) and oil-exporting countries (figure 1.17).

The accumulation of reserves and sovereign funds by a large share of emerging economies has played an (indirect) role in these imbalances. On one hand, it has limited one of the surplus adjustment mechanisms by reducing the appreciation of some currencies. On the other, given the strong relative importance of the dollar in international reserve accumulation, it has contributed to keeping interest rates low in the U.S., exacerbating the excess spending in this economy and, therefore, its deficit.

The current account surpluses of many emerging economies have fallen since mid-2008. This adjustment is due to reductions in saving by the public and private sectors in these countries, in response to the drop in commodity prices and the world recession. At the same time, investment has decreased substantially in the developed economies as a result of the financial crisis. Nevertheless, the U.S. still has a significant current account deficit.

The present global situation, therefore, involves a partial correction of these global imbalances. In the near future, the most likely scenario is that current account deficits will increase in the emerging economies, driven by lower export prices and a recession in the developed economies. In some cases, such as China, this could be magnified by an expansionary fiscal policy. For the developed economies, in turn, the current account deficits can be expected to fall, as a result of reductions in private investment and increases in private saving, which should be partially offset by increases in the fiscal deficit.

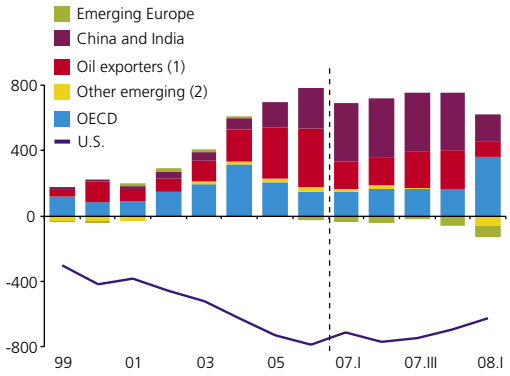
In the above case, there is still the risk of a sudden stop in gross capital inflows to the U.S. This could lead to a scenario characterized by additional economic contraction and a depreciation of the dollar. This effect could be partially mitigated if U.S. investors sell off their foreign assets, thereby reducing the direct impact on the U.S. However, this would have repercussions in the countries that issued those assets, including the emerging economies and Chile, which in turn would repatriate the assets of residents abroad, should they have any. This second scenario carries the potential risk of substantially reducing gross international positions, with consequent losses in terms of risk diversification. For the U.S., this reduction in gross positions would have a negative impact on its current account deficit, owing to the higher return that it permanently receives for its net foreign assets, thus escalating its needs for external financing.

In sum, the risk of a sudden adjustment of the U.S. current account deficit persists, with negative consequences for the Chilean economy in terms of external demand and the supply of foreign capital.

Figure I.17

Current account balances

(US$ billion)



(1) Members of OPEC.
(2) Includes selected countries from Latin America, Central America, Asia, Africa, and Oceania.

Source: Own elaboration, based on data from the IMF.

Main risks to financial stability in Chile

In the past six months —and especially since September— two of the main external risks identified in the last *Report* have materialized: a credit crunch in the international financial markets and a severe global recession. Therefore, and in contrast to previous *Reports*, the Chilean economy faces a very weak external scenario.

In this context, the first threat is that the current crisis situation will translate into a protracted period of tight restrictions on external lending. This could occur if: (i) commercial banks are not being able to improve their balance sheet positions, and financial asset losses again put the banks in a very fragile capital position for reestablishing credit to a significant degree; (ii) the environment of uncertainty persists over time, giving rise to cautious behavior that eschews loans to emerging economies; (iii) external lending policies become more restrictive in merged banks, that have been rescued by governments or public banks; or (iv) there is contagion due to problems in other emerging economies.

The second threat identified in this *Report* is that world growth will be even lower than forecast, producing a harsher effect on the Chilean economy. The outlook for world growth in 2009 is unfavorable, and it has worsened in the last quarter. Moreover, the developed economies are expected to post negative growth. This reduced global economic activity undermines local growth through its direct impact on the export sectors and, through them, on other sectors of the economy. In this environment, the impact on financial stability is reflected in an increase in business and household credit risk. Given the current degree of uncertainty and the risk of protectionist measures being taken, the possibility of lower-than-forecast world growth cannot be ruled out, with a greater impact on the Chilean economy.

Based on the relevant risk factors for the Chilean economy, this *Report* considers two scenarios for the stress tests carried out on different entities.

To facilitate comparison over time, the stress scenarios are the same as in previous *Reports*. They consider two extremely adverse macroeconomic contexts. The first assesses the case of a shock that has a significant, but short-lived impact on real and financial variables. In this case, there is a sharp increase in the short-term rate of 660 basis points in one quarter; the currency suffers a real depreciation and inflation accelerates, while GDP grows 4.6 percentage points less than in the baseline scenario in the first year. All these effects disappear toward the end of the second year.

The second scenario considers a less pronounced, but more long-lasting impact. Short-term interest rates rise around 150 basis points the first year. The impact on the exchange rate and inflation is about a third of the impact in the first scenario, but its effects last for several years, falling gradually. Real output grows 1.8 percentage points less than in the baseline scenario in the first year. Both scenarios assume that monetary policy behaves consistently with the Central Bank's objectives.

Box I.1 **Leveraging and deleveraging**

Financial leveraging refers to the use of debt to finance assets, and it applies to both users and suppliers of credit. The concept is currently being mentioned frequently in relation to the process of deleveraging —the reduction in the use of debt— which both types of agents are undergoing in the U.S. For the former (credit users), this process has a negative impact on aggregate demand. For the latter (credit suppliers), it affects both the economy's aggregate supply and demand. This box reviews the characteristics of deleveraging among credit suppliers in the U.S.

In the U.S., leveraging in the supply of credit took several forms. On one hand, banking institutions created investment vehicles in order to increase their leveraging without exceeding regulatory limits. On the other, financial intermediaries that issue debt with low capital requirements —such as securitized bond issuers and investment banks, which do not take deposits covered by public insurance— took on a greater role in the supply of credit. The growth of these entities increased the leveraging of the system as a whole. These institutions went from representing around 15% of lending in 2000 to 22% in 2008, which largely explains credit growth in the U.S. between 2004 and 2007 (figure I.18).

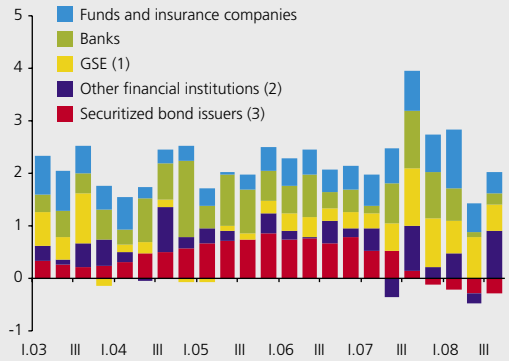
The business model of these financial intermediaries now seems unsustainable, as evidenced in the meager credit issues in this sector. The contraction of these issues is a primary component of the deleveraging process that this financial system must undertake.

In addition to the deleveraging of these financial intermediaries, the commercial banks must also deal with an adjustment. Their leverage level rose following the start of the subprime crisis, as a result of both recorded losses, which reduced the banks' capital (table I.2), and the incorporation into the balance sheet of off-balance-sheet investment vehicles. Some investment banks, which had lower capital levels than the commercial banks, were absorbed by or converted into commercial banks, which forced them to increase their capitalization levels.

Figure I.18

Contribution to lending growth in the U.S.

(percent)



(1) Government sponsored enterprises.
(2) Includes investment banks.
(3) Asset backed securities.

Source: Central Bank of Chile, based on data from the Federal Reserve.

The deleveraging of the banking industry can be achieved through either an increase in capital (via capital infusions from stockholders or the government) or a reduction in assets accompanied by a corresponding reduction in liabilities. The uncertainty surrounding the future financial conditions and the current high cost of financing suggest that, thus far, capital infusions have been insufficient. The asset reduction channel, in turn, is a slow process, in which the entities gradually pay off their liabilities as their assets mature.

The deleveraging process currently taking place in financial institutions can thus be expected to translate into a tightening of lending. Its magnitude will depend on the evolution of the banks' portfolio risk, the premiums on uncertainty, and the size of the financial institutions' recapitalization, among other factors.

Box I.2: **Liquidity: Definitions and links to the LIBOR-OIS spread**

This box describes the liquidity concepts commonly used in the literature and the evidence on the usefulness of the LIBOR-OIS spread as a summary indicator for liquidity conditions in international markets.

The two most commonly used definitions of liquidity are market (or trading) liquidity and funding liquidity[1]/. Market liquidity is defined as an asset's ability to be traded without generating significant movements in the price; that is, the ease with which market agents can liquidate their assets without facing a significant loss in equity. Funding liquidity, in turn, is defined as the ease with which agents can obtain funding.

These concepts are different, but related, and the lack of liquidity in one of these areas could have an impact on the other. For example, asset prices depend on both expected flows and market liquidity. If liquidity is not tight, the price basically depends on expected flows. If the liquidity for trading that asset deteriorates, however, then the price of the asset must take into account the corresponding premium, causing a loss in value. This could force the sellers to devote additional resources to adjust their debt ratios. Funding liquidity could thus be affected through this channel.

Measuring these liquidity concepts is complex. However, for the analysis of the current financial turbulence, the LIBOR-OIS spread has been a common summary indicator for analyzing liquidity conditions in the financial markets[2]/. The rest of this box therefore describes the spread in more detail and presents background data on its different components.

The LIBOR reflects the rate at which banks are willing to loan to each other without requiring the use of collateral. The overnight indexed swap (OIS), in turn, is a contract that pays, on maturity, the difference between a fixed interest rate and the daily compound interest on a floating reference rate. In the case of the U.S., the floating rate corresponds to the effective Federal funds rate[3]/. The LIBOR-OIS spread thus compares the banks' alternatives of uncollateralized financing (LIBOR) versus financing at close to the expected monetary policy rate without actually carrying out an effective resource transaction.

Following Michaud and Upper (2008), the LIBOR-OIS spread can be decomposed into five elements:

$$s = pt + rc + lf + lm + mm \qquad (1)$$

where s denotes the spread, pt is the premium on the uncertainty of the expected path of rates, rc is the credit risk premium, lf is the funding liquidity risk premium, lm is the market liquidity premium, and mm represents aspects of the microstructure of the markets.

The evidence on the relative importance of these factors is mixed. Michaud and Upper (2008) show that if high-frequency panel data are used, funding liquidity requirements (lf) play an important role in explaining the LIBOR-OIS spread. Their data do not indicate a link between credit risk (rc) and the daily or weekly dynamics of the LIBOR-OIS spread[4]/.

[1]/ Other definitions associated with the liquidity concept are the liquidity of financial instruments—which is closely related to market liquidity—and monetary liquidity, among others. For additional information, see Bank of France (2008).

[2]/ For example, Sengupta and Man (2008), based on a descriptive analysis, suggest that "In short, the LIBOR-OIS spread has been the summary indicator showing the 'illiquidity waves' that severely impaired money markets in 2007 and 2008."

[3]/ For example, if the one-month OIS is 1.0% and the compound interest of the floating rate is 0.5%, the swap buyer will receive from the counterparty a flow of $5,000 for a contract that involves a notional principal of $1,000,000 at the end of the month [(1.0%–0.5%) x $1,000,000 = $5,000].

[4]/ This finding holds for both the economic and statistical significance of the estimated parameters.

However, Michaud and Upper's results suggest that there is a long-term link between credit risk factors and the spread (that is, they could be cointegrated), with the spread incorporating changes in credit risk factors with a significant lag. This is consistent with Taylor and Williams (2008), who conclude, based on aggregate variables, that the LIBOR-OIS spread largely depends on the evolution of credit risk factors.

In a more conceptual analysis, Allen and Carletti (2008) argue that the observed increase in the LIBOR-OIS spread could reflect a greater reluctance on the part of banks to provide liquidity to other banks—that is, tight funding liquidity. This apparent reluctance to supply liquidity (liquidity hoarding) could be explained by two factors. The first involves the banks' desire to protect themselves in the face of higher-than-expected potential liquidity needs, given possible disruptions in the mortgage, syndicated loan, and commercial paper markets. The second factor corresponds to uncertainty about counterparties' exposure to the real state market and other markets under stress.

Finally, Giavazzi (2008) analyzes the increase in the spread as a response either to greater credit risk or to a potential shortage of banking capital[5]/. This author considers that credit risk should not be too significant, since the default probabilities implicit in the spread are not plausible. With regard to a possible shortage of capital, Giavazzi's (2008) estimates imply that the capital restrictions required to explain an important share of the spread would be improbable. The hypothesis favored by Giavazzi entails strategic predatory behavior on the part of capitalized banks[6]/. While this hypothesis is indirectly tied to a diagnosis of tight funding liquidity, it involves different motivations than an explanation based on a liquidity tightening stemming from uncertainty with regard to funding sources, for example.

In sum, the reported evidence on the determinants of the LIBOR-OIS spread is mixed, and researchers assign a different role to liquidity and credit risk depending on the horizon considered. High-frequency panel estimates suggest that the dynamics of the spread could be associated, to a large extent, with trends in funding liquidity. Studies at the aggregate level place greater emphasis on credit risk factors in the evolution of the spread. These results must be interpreted with caution, however, given that the current financial turbulence is still unfolding, which adds another layer of uncertainty.

[5]/ Giavazzi (2008) terms these possible explanations the European view and the American view, respectively.

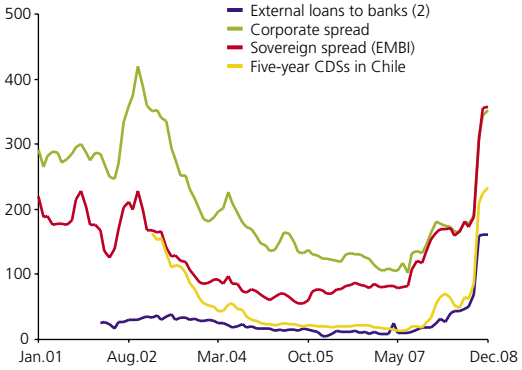
[6]/ Giavazzi (2008) attributes this hypothesis to Ricardo Caballero.

II. External financing

Figure II.1

Chilean debt spread (1)

(basis points)



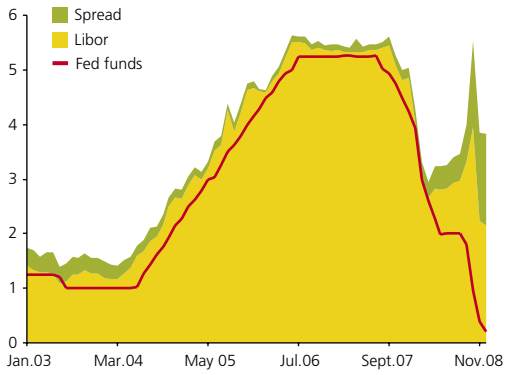
(1) Data for December through the statistical closing of this *Report*.
(2) Spread over Libor on short-term variable-rate loans to resident banks.

Sources: Bloomberg and Central Bank of Chile.

Figure II. 2

Cost of variable-rate short-term external bank financing for resident banks (1) (2)

(percent, basis points)



1) This form of financing represented 76% of loans between the fourth quarter of 2007 and the third quarter of 2008.
(2) Data for December through the statistical closing of this *Report*.

Sources: Bloomberg and Central Bank of Chile.

This chapter examines recent trends in and the outlook for the Chilean economy's external financing and international liquidity, in the context of the threats described in chapter I.

Conditions for access to external financing

Sovereign, corporate and bank risk premiums have increased since the last Report, especially since September

Since the last *Report* and, in particular, since late September, the spreads on Chilean external debt have undergone substantial hikes relative to the reference rates in the international markets. The country risk premium, measured by the EMBI return, and the cost of default insurance on Chilean debt (CDSs at 5 years) have matched the highest levels on record (1998 and 2003, respectively). The spreads at which corporate bonds are traded show considerable increases, although not as far as the levels recorded between 2002 and 2003, or earlier in 1998 (figure II.1). The spread on the banks' external financing rate over LIBOR has also increased significantly, to between 170 and 200 basis points at the close of this *Report* (figure II.2).

Part of the increase in the spreads has been offset by reductions in the external reference rates. In the past few months, the U.S. Treasury bond rate, which is used as a reference for the Chilean bond spread, has declined considerably. Despite fluctuations, the LIBOR is more than 200 basis points lower than in the first half of 2007, following cuts in the U.S. monetary policy rate.

Given the current international financial environment, it is important not only to analyze the evolution of the cost of credit, but also to assess whether the patterns of capital inflows and outflows have changed materially. In particular, it is important to determine whether access to external financing has become more difficult and whether there have been any abnormal capital outflows.

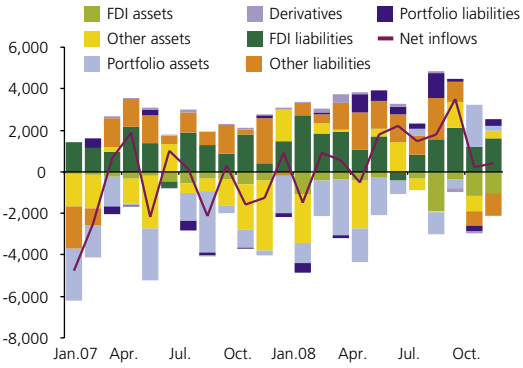
Nonresident portfolio flows are not substantially different from previous periods

Financial account flows feature a reduction in the entry "other liabilities" beginning in October. This is mainly due to the drop in trade loans, which in turn is related to lower imports (figure II.3). As in the majority of emerging economies, Chile witnessed an outflow of nonresident portfolio investment (portfolio liabilities) in October. This phenomenon, however, was short-

Figure II.3

Selected financial account flows (*)

(US$ million)



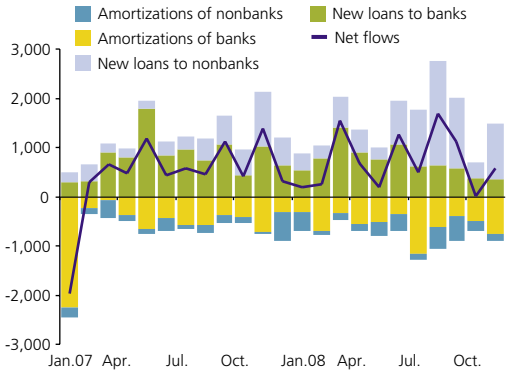
(*) Excludes reserve assets.

Source: Central Bank of Chile.

Figure II.4

Flows of external loans to residents

(US$ million)

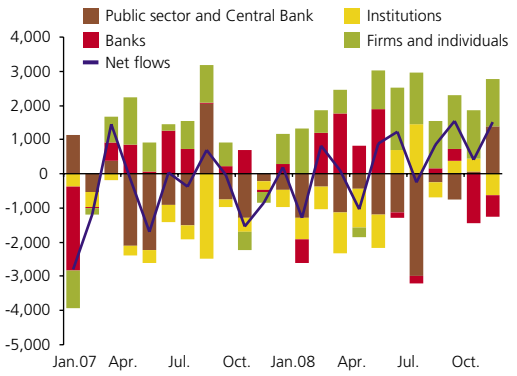


Source: Central Bank of Chile.

Figure II.5

Financial account flows by institutional sector (*)

(US$ million)



(*) Total net flows.

Source: Central Bank of Chile.

lived and was reversed in November. Resident flows registered an inflow in November. Finally, foreign direct investment (FDI) has been little affected by the deepening of the international financial crisis.

Despite the extreme financial turbulence since the last Report, banks and firms have been able to roll over debt or issue new debt abroad

Previous *Reports* have mentioned that some of the Chilean economy's foreign creditor banks posted important losses stemming from the current financial situation. This could represent a threat, given the banks' reduced lending capacity, which would impose the challenge of seeking out alternative creditor banks. The evidence to date indicates that the banks that have been affected by the crisis continue to lend to local entities. This signals the creditors' interest in maintaining a lending relationship, even with tight capital. Moreover, new banks have emerged in the creditor matrix, which reflects the existence of an additional supply of financing for local debtors in the international banking industry.

Thus in the period since the last *Report*, existing loans have been rolled over and new loans contracted by the domestic banking system and local firms, despite the deterioration in lending conditions especially since September (figure II.4). These trends indicate that, as of November, the Chilean economy as a whole maintains its access to external lending.

Institutional and private investors have repatriated overseas assets, which has helped the adjustment to the external financial turbulence

In the analysis of the financial account by institutional sector, the performance of the public sector and the Central Bank has shown an important change: after recording net outflows for the last two years, they posted a net inflow in November (figure II.5). Firms and individuals continued to register net inflows of portfolio assets and deposits for nearly US$940 million a month between April and November. The net flows of the pension funds have, in general, been positive since June —because the funds have sold assets abroad and repatriated resources to Chile— although there was a reversal in November. Between January and May 2008, the outflow from these funds averaged roughly US$900 million a month, whereas they have recorded inflows of US$270 million, on average, since June.

Finally, local banks recorded capital outflows in October and November, which is related to a reduction in liabilities combined with an increase in offshore deposits of US$1.1 billion.

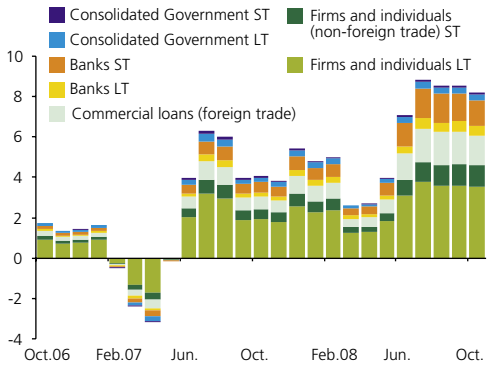
External liquidity and solvency

Since the last Report, external solvency indicators for the Chilean economy have remained robust, despite deteriorations at the margin

Between March and September, the growth rate of the external debt stock accelerated relative to past years (table II.1). This expansion is mainly explained by increases in long-term lending to firms, trade loans, and short-term bank debt (figure II.6). As a result of this growth, gross external debt ratios (external debt to GDP and external debt to exports) had weakened as of September (table II.2).

Figure II.6

Contribution to the quarterly growth of external debt (*)
(percent)



(*) Moving quarters ending each month. Short-term debt (ST) is the one coming due within one year, while long-term debt (LT) is coming due in more than one year.

Source: Central Bank of Chile.

Table II.1

External debt of the Chilean economy
(millions of dollars)

	2005	2006	2007	2008			
	Dec.	Dec.	Dec.	Mar.	Jun.	Sept.	Oct.
Total external debt	46,211	49,234	55,822	57,995	62,940	68,459	67,324
Short-term external debt (1)	7,095	9,318	11,175	12,175	16,701	18,821	17,534
Banks	1,162	1,873	974	1,606	3,122	3,187	2,530
Firms and individuals	5,912	7,428	10,185	10,557	13,570	15,628	14,995
Commercial loans	5,088	6,508	8,455	8,740	11,530	12,341	11,672
Consolidated Government	16	17	16	12	9	6	9
Long-term external debt (1)	39,116	39,916	44,647	45,820	46,613	49,638	49,790
Banks	6,222	5,761	9,512	10,741	11,404	11,089	11,233
Firms and individuals	27,740	29,830	31,335	31,970	32,276	35,646	35,675
Consolidated Government	4,241	4,325	3,800	3,109	2,933	2,903	2,882
Residual short-term external debt (RSTED) (2)	16,182	17,478	22,556	23,542	30,331	32,490	31,078
Banks	5,502	5,300	7,001	8,690	10,784	10,602	9,760
Firms and individuals	10,562	11,467	14,653	14,576	19,003	21,367	20,797
Commercial loans	5,256	6,685	8,456	8,740	11,530	12,341	11,672
Consolidated Government	118	710	902	276	544	521	521

(1) Contractual maturity.
(2) RSTED: Residual short-term external debt. Total external debt maturing in the next twelve months.

Source: Central Bank of Chile.

Table II.2

External liquidity and solvency indicators
(percent)

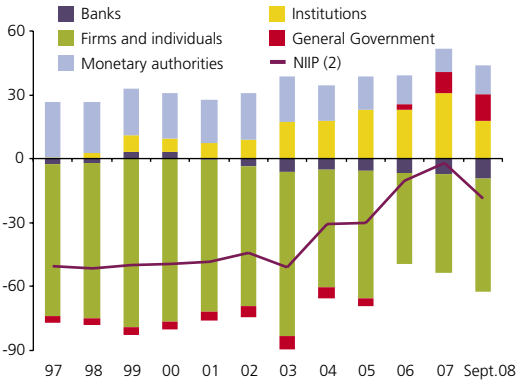
	2004	2005	2006	2007	2008	
	Dec.	Dec.	Dec.	Dec.	Sept.	Oct.
Solvency						
External debt/GDP (1)	45	38	33	34	37	
Current account balance/GDP (1)	1.7	1.1	4.7	4.4	-0.9	
External debt /Exports	110	90	70	83	97	96
Net international position/GDP (1)	-32	-28	-10	-2	-19	
Liquidity						
RSTED / External debt (2)	32	33	34	40	47	46
RSTED/Official international reserves	88	89	85	133	134	135
RSTED/ Unrestricted NIR (3)	119	153	127	146	146	144
Current external financial RSTED / Unrestricted NIR	81	110	83	91	90	90
RSTED/(Unrestricted NIR + External accounts receivable)	83	92	78	87	96	
Other						
Long-term external debt/External debt	82	82	78	80	73	
Current fixed-rate external debt (net of swaps)/ External debt	61	56	58	59	62	
Memo:						
RSTED/(NIR + FEES) (4)				73	75	
RSTED/(Unrestricted NIR + FEES)				77	80	

(1) Four-quarter moving GDP.
(2) RSTED: Residual short-term external debt. Total external debt maturing in the next twelve months.
(3) Unrestricted NIR: official reserves minus short-term commitments in foreign currency (maturing BCX, BCD, swaps), General Treasury deposits in the Central Bank, and so on.
(4) FEES: Social and Economic Stabilization Fund.

Source: Central Bank of Chile.

Figure II.7

Net international investment position
(percent of GDP) (1)

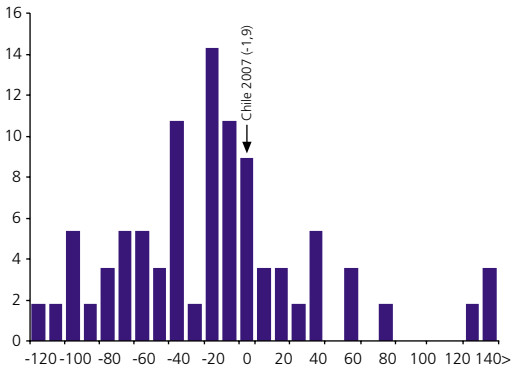


(1) GDP at a real constant exchange rate (base index: September 2008 = 100).
(2) Net international investment position.

Source: Central Bank of Chile.

Figure II.8

Distribution of the net international investment position (*)
(percent of GDP)



(*) Histogram constructed based on data from 2007 for a sample of 56 countries.

Sources: International Financial Statistics (IMF), World Economic Outlook database, and Central Bank of Chile.

Also as of September, the Chilean economy's net international investment position (NIIP) —which takes into account both external assets and liabilities— registered more negative values, comparable to the levels seen in 2005. This greater liability position is due to the growth in external debt mentioned above, together with a shrinking in the net asset position of institutional investors. This was primarily caused by the fall in the international stock markets, which significantly reduced the valuation of Chilean assets abroad (figure II.7). Aggregate solvency indicators have thus deteriorated at the margin, although they are not very different from their values recorded in the recent past.

The NIIP provides a simple summary of an economy's international solvency position, since it subtracts external assets from external liabilities. A comparison of Chile's NIIP (as a percentage of GDP) with that of a sample of emerging and developed economies in 2007 reveals that Chile is above the median of the full distribution and in the highest decile of the emerging economies (figure II.8). A simple test of macroeconomic consistency shows that in the event that the baseline scenario of the last *Monetary Policy Report* (IPoM) were to materialize, the NIIP would reach 18.9% by late 2009[1]/. While this represents a deterioration relative to 2008 and 2007, an increase in net liabilities is the appropriate reaction of an economy facing a temporary drop in the demand for its exports.

Despite the increase in short-term foreign debt, liquidity indicators remain stable

To analyze the economy's international liquidity needs, a first approximation is to look at the maturities on external debt. As of October 2008, the Chilean economy's total external debt maturing in the next twelve months (that is, the current external debt) was US$31.078 billion, which represents 46% of total foreign debt and about 17% of GDP (table II.1 and figure II.9). In relation to the economy's liquid assets, the total current external debt was 144% of unrestricted reserves. However, an important share of this current debt is tied to foreign trade (38%) and corresponds to the direct financing of foreign export firms and domestic importers. Current external financial debt (62%) reached 90% of reserves (12% of GDP) in October.

Due to the Central Bank's reserve accumulation policy carried out between April and September 2008, liquidity indicators have remained constant, despite increased current external debt. In addition, even after taking into account the fiscal stimulus program announced on 5 January, the foreign assets of the Central Government should reach approximately 10% of GDP, thus becoming a potential source of liquidity, as was the case in October 2008 (chapter III).

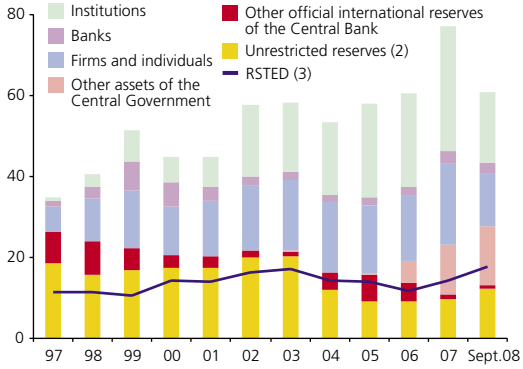
A complementary exercise for evaluating the economy's liquidity position consists in adding up the foreign debt refinancing needs, the liquidity needed to cover the current account deficit projected in the January 2009 *Monetary Policy Report*. Assuming that the public sector deficit will be financed through the sale of foreign assets held by the Central Government, the private sector's

[1]/ The estimates are based on the assumptions for the 2009 current account deficit and inflation published in the January 2009 *Monetary Policy Report*. They further assume that 64% of international liabilities are denominated in UF, which correspond to FDI.

Figure II.9

Availability of external financial liquidity

(percent of GDP) (1)



(1) GDP at a real constant exchange rate (base index: September 2008 = 100). External liquidity includes short-term loans, cash, and deposits, and portfolio investment. It does not include derivative positions.
(2) Official reserves less short-term commitments in foreign currency.
(3) RSTED: Residual short-term external debt. Total external debt maturing in the next twelve months.

Source: Central Bank of Chile.

financing needs should reach 1.9% of GDP, which translates into a total potential demand for liquidity of 15% of GDP. This demand is equivalent to 101% of net international reserves and 60% of net international reserves plus Central Government assets, net of the deficit payment. However, this exercise was constructed using the IPoM baseline scenario, and it thus considers the current account deficit that would occur with an open financial account.

Finally, portfolio liabilities represent a small share of Chilean economy's total foreign liabilities (11.4% as of September 2008)[2]/. This reduces the risks for external liquidity from portfolio capital outflows that might occur in response to new global portfolio changes beyond those seen in recent months.

Liquidity provision policy

Given the environment of tighter external financing and greater uncertainty described in this chapter, the Central Bank of Chile has taken a series of measures designed to provide foreign currency liquidity to domestic agents (chapter III). The ultimate objective of these measures is to mitigate the effects of external turmoil on the local economy, thereby safeguarding the stability of the financial system and the normal functioning of internal and external payments.

The policy guiding the design of these measures is based on two criteria. First, they must have a clear framework that is announced in advance and a specific duration, so as to reduce private agents' uncertainty about their access to liquidity in the future. The Central Bank does not consider that the partial sale of the auctioned funds is indicative of a complete normalization of external financial conditions nor, therefore, that this instrument is redundant (chapter III). As discussed in chapter I, the international financial outlook continues to be extremely uncertain.

The second criterion on which the design of the Central Bank's program for foreign currency liquidity relies on is that public instruments must be secondary to private external financing sources. This is achieved by introducing higher costs and/or limited quantities. The goal is to ensure that the private sector maintains an active policy of seeking funds and instruments abroad —as it has been doing in recent months— and to generate the appropriate price incentives so that resident and nonresident investors increase their supply of capital to the Chilean economy. To safeguard this priority structure, the Central Bank will continue monitoring the use of the dollar liquidity programs, the volumes and prices of external debt flows, and the foreign investment decisions of local financial agents, so as to adjust the financial cofinancial conditions of the liquidity policies if necessary.

[2]/ This figure compares with an average of 24% in December 2007, for a sample of 54 countries (figure II.8).

III. Local financial markets

This chapter analyzes the principal local financial markets, taking into account recent developments in output, returns, and volatility.

The local money markets went through an unusually turbulent period between September and October, which was gradually normalizing toward the end of the year

As deep uncertainty characterized capital markets in developed countries in the third quarter, the local financial market witnessed an increase in financial agents' demand for short-term financing, in both dollars and pesos. The loss of confidence in access to traditional sources of foreign financing —as a result of the complex financial situation affecting many of the main international banks in the U.S. and Europe— heightened the perception of financial risk in the banking industry, while increasing the liquidity demands of corporate clients. This, in turn, led to increases in the precautionary demand for liquidity, driving up deposit rates. The situation worsened between late September and early October, after Lehman Brothers (the U.S. investment bank) filed for bankruptcy, causing interest rates to rise in the main money markets in Chile.

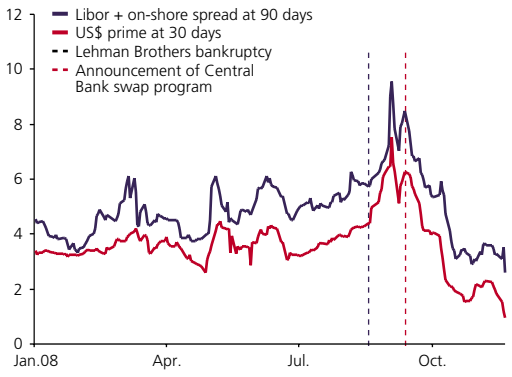
In the case of the dollar money markets, the above was evidenced in the behavior of the 90-day on-shore rate, which reached a historical high of 9.56% in early October, and the prime rate on 30-day foreign currency deposits, which peaked at 7.52% on the same day (figure III.1)[1]/.

In this context, the Central Bank decided to end its reserve accumulation program on 29 September, as a way to mitigate the potential effects of the turbulence in the world money markets on the Chilean economy. The program involved daily purchases of US$50 million, for a total of US$8.0 billion, and its objective was to improve Chile's liquidity position. On the date of the announcement, the Bank had increased its reserves by US$5.75 billion. The bank also reinitiated 28-day dollar swap auctions for the next four weeks, with transactions of US$500 million per week (a total of US$2 billion), which were sterilized with repos at the same maturity. The length and terms of the swap program have gradually been expanded. On 10 October, the Central Bank of Chile extended the program from one to six months and, at the same time, lengthened the terms of the transactions to 60 and 90 days. Later, in early December, the Central Bank increased the maximum maturity of the swaps to 180 days and extended the program through all of 2009. At the close of this *Report*, the Central Bank had sold

Figure III.1

Dollar rates in the local market

(percent)



Sources: Bloomberg and Central Bank of Chile.

[1]/ For more information on how the dynamics of the onshore rate spread are determined and interpreted, see "The dynamics of the on-shore spread in Chile," in this *Report*.

somewhat more than US$1.5 billion through peso-dollar swap auctions, with an average use ratio of 0.3 times and an average spread of 160 basis points over LIBOR, although the spread has hovered around 110 basis points starting with third auction (table III.1).

Table III.1

Dollar swaps operations (*)

(US$ million)

Date	Maturity (days)	Amount offered (US$ million)	Amount purchased (US$ million)	Weighted spread premium (percent)
30 Sept.08	28	500	388	3.49
07 Oct.08	28	500	30	3.06
14 Oct.08	91	500	200	1.07
21 Oct.08	63	500	150	1.04
28 Oct.08	91	500	67	1.10
04 Nov.08	63	500	227	1.09
11 Nov.08	91	500	15	1.06
18 Nov.08	63	500	100	1.06
25 Nov.08	91	500	200	1.20
02 Dec.08	182	500	160	1.06
09 Dec.08	182	500	0	-
16 Dec.08	182	500	0	-

(*) Central Bank of Chile press release, 10 October 2008.

Source: Central Bank of Chile.

Along the same lines, on 9 October, the Central Bank temporarily modified (for six months) the regulations pertaining banks and savings & loan associations foreign currency reserves holdings, authorizing the use of local currency, euros, and yen.

The Ministry of Finance also contributed to alleviating tensions on short-term dollar financing. First, the Ministry transferred US$1.05 billion to bank time deposits in early October, using some of the dollar deposits built up in the Reserve Funds held abroad (chapter IV, Consolidated Government). Second, on 12 and 19 November the Central Bank of Chile, acting as the Ministry's fiscal agent, auctioned close to US$700 million in dollar deposits at an average rate of 3.39% (an average spread of 117 basis points over LIBOR), using funds from the seasonal surpluses in the Treasury Banking Account (table III.2).

Table III.2

Dollar deposit auctions by the General Treasury

Date	Maturity (days)	Amount auctioned (US$ million)	Amount sold (US$ million)	Sale interest rate (*) (percent)
12 Nov.08	91	350	332	3.27
19 Nov.08	119	368	368	3.50

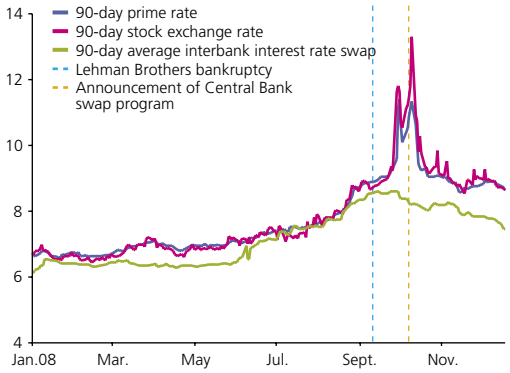
(*) Weighted interest rate of sales (LIBOR + spread).

Source: Central Bank of Chile.

Figure III.2

Peso market rates

(weekly averages, percent)



Source: Central Bank of Chile.

The peso money markets also showed signs of stress, which was reflected in an interest rate hike in the prime deposit markets and deposits traded in secondary markets, over the one-day rate expectations contained in the average interbank interest rate swap operations. On 10 October, 90-day negotiable deposit and prime rates peaked (at annual rates of 13.3% and 11.3%, respectively), while the interest rate on interbank rate swaps hovered at around 8.2% for the same maturity (figure III.2). The 180- and 360-day prime rates are not significantly different from the 90-day rate. However, the spreads relative to interbank swap operations have fallen at a slower pace, as a result of the steeper drop in the average interbank rates at these maturities, in line with the expected cuts to the MPR.

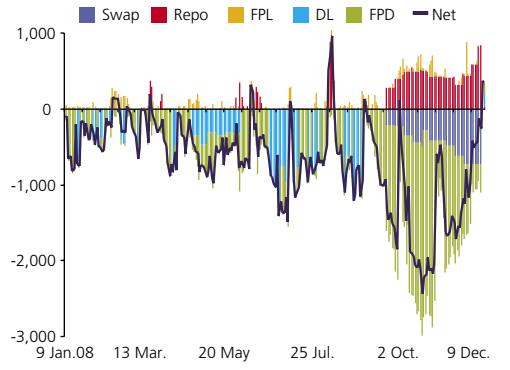
The increases in interest rates in the last week of September had a negative effect on pricing of mutual funds with maturities of 90 days or less (type 1 funds). As a result, a considerable number of participants liquidated their shares, which put even more upward pressure on the rates on deposits traded at the stock exchange, the main investment instrument of type 1 funds. The equity of these funds hit bottom in the first week of October, then gradually increased to June 2008 levels as of mid-December.

To ease the management of peso liquidity, on 10 October the Central Bank proceeded to temporarily accept bank deposits as collateral for seven-day repo operations, to be in effect for a period of six months. Since that date, 43% of repo operations have been guaranteed with bank deposits. This measure contributed to reducing money market interest rates. On 10 December the Central Bank of Chile made two additional announcements: (i) the use of bank deposits as collateral was extended through the end of 2009, while the eligible transactions were expanded to up to 28 days; and (ii) a complementary mechanism was introduced to provide longer-term liquidity (over 28 days), based on a line of credit that accepts General Treasury bonds, among others, as effective collateral.

Figure III.3

Central Bank monetary operations

(stock in Ch$ billion)



Source: Central Bank of Chile.

Table III.3

Repurchase agreements (1)

(Ch$ million)

Month	Amount purchased at 28 days	Amount purchased at 7 days	Percent with bank collateral (2)
Sept.08	278,352	0	0.0
Oct.08	428,835	198,898	31.7
Nov.08	241,125	256,492	51.5
Dec.08	615,358	502,692	45.0

(1) Central Bank of Chile press release, 10 October 2008.
(2) Seven-day repos use bank time deposits as collateral.

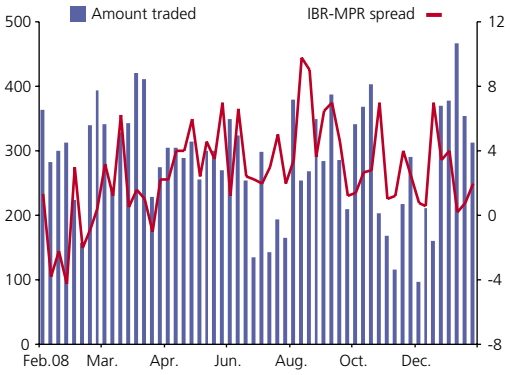
Source: Central Bank of Chile.

The episode of money market rate hikes that was set off in late September continued through the second week of October. During this period, the majority of banks increased their level of liquid assets. Consequently, the funds held in the Central Bank's standing depository facilities grew in October

Figure III.4

Interbank operations and the IBR-MPR spread

(weekly average, Ch$ billion and basis points)

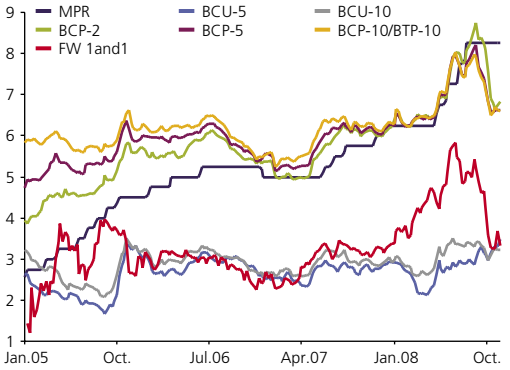


Source: Central Bank of Chile.

Figure III.5

Interest rates on Central Bank instruments

(percent)

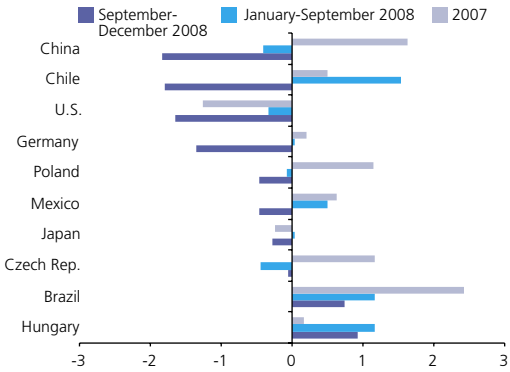


Source: Central Bank of Chile.

Figure III.6

Nominal sovereign interest rates at 5 years (*)

(percent change)



(*) Corresponds to Bloomberg's generic indices in currency of origin, except for Chile, which uses the BCP-5.

Sources: Bloomberg and Central Bank of Chile.

well above the averages seen in 2008 (figure III.3)[2]/. This period also saw a reduction in the volume of activity in the overnight interbank loan market, to $96 billion the last week of October (versus an average of $280 billion in 2008), without a significant increase in the spread between the interbank rate (IBR) and the monetary policy rate (MPR) (figure III.4). This is consistent with an increase in the precautionary demand for liquid funds in the face of the uncertainty caused by the external turbulence.

With the startup of the Central Bank's dollar and peso liquidity provision programs, both short-term bank deposit rates in pesos and on-shore deposit rates in dollars have fallen, which suggests that the pressure in the local money markets eased off toward the end of November. The results of the last foreign currency swap auctions —which were not completely auctioned or were voided— is consistent with this abatement. Despite the reductions, both the foreign currency rate spreads and the money market peso rates are at somewhat higher levels than they were before the liquidity meltdown episode.

The primary market for commercial papers was one of the markets in which the tight funding liquidity was most evident (box III.1). In late September, the secondary market for these instruments already had a higher premium for liquidity risk. Issues in this market hit the ground in October, but they began to recover in November with new issues of commercial papers by businesses in the real sector.

The evolution of market activity and rates for long-term Government and Central Bank instruments has been affected by the change in inflation expectations and the path of the MPR

Between June and early September 2008, interest rates on five- and ten-year Central Bank nominal securities increased approximately 120 and 90 basis points, respectively, dovetailing the upward trend in the MPR, which rose 200 basis points in the same period (figure III.5). In the past few months, however, medium-term inflation expectations have recorded a downward trend (*Monetary Policy Report*, January 2009). This has fueled expectations for a drop in the MPR in the medium term, which has led to a reduction in medium- and long-term nominal rates of around 200 basis points since early September.

An international comparison of the rates on five-year Government nominal securities in local currency for each country reveals that this rate in Chile has performed in line with the evolution of rates in the U.S., Germany, and China, which have already cut down their monetary policy rates (figure III.6).

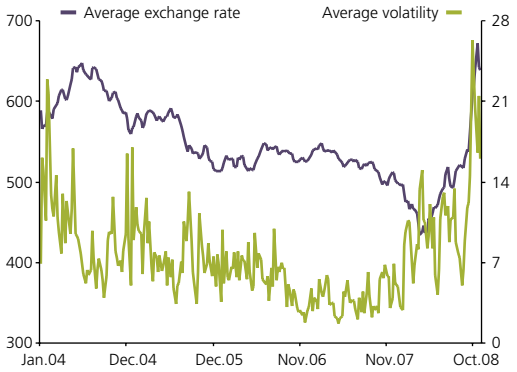
The recent drop in inflation expectations has driven up real interest rates, especially at the shortest maturities. For example, the five-year UF-denominated Central Bank bond (BCU) rose 60 basis points relative to late August, to about 3.5% at the close of this *Report*.

[2]/ For more detail on these tools, see *Financial Stability Report*, first half 2008, box II.2.

Figure III.7

Exchange rate level and volatility (*)

(weekly average, pesos to the dollar and points)



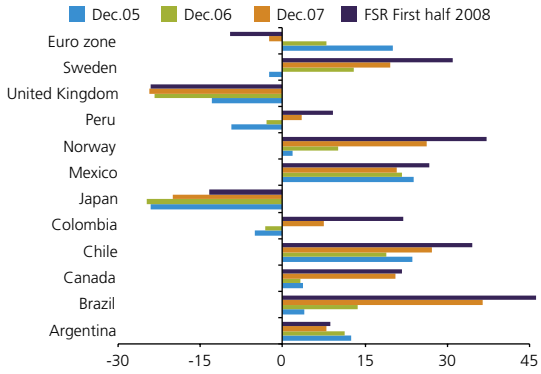
(*) Volatility calculated using the methodology described in Alfaro and Silva (2008).

Source: Central Bank of Chile.

Figure III.8

Exchange rate variation (*)

(percent)



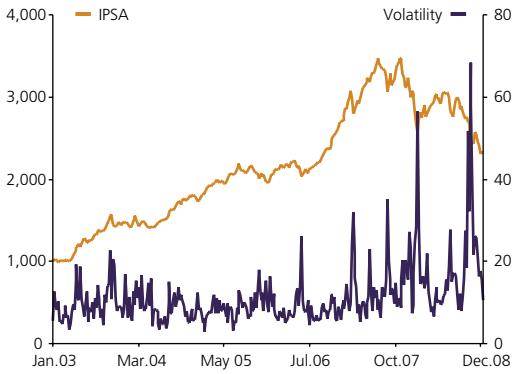
(*) On 18 December, relative to the indicated date. An increase indicates depreciation against the dollar.

Source: Bloomberg.

Figure III.9

IPSA level and volatility (*)

(weekly average, points and percent)



(*) Volatility calculated using the methodology described in Alfaro and Silva (2008).

Source: Own elaboration based on data from the Santiago Stock Exchange.

Volatility in the foreign currency and stock markets reached record highs in the second quarter. However, the Chilean stock exchange was less affected in terms of pricing and appears to be more loosely correlated than the main regional stock exchanges

The peso-dollar exchange rate rose more than 27% in 2008 as of the close of this *Report*, and more than 34% since the last *Report*. In the second week of October, its volatility peaked at an annualized 26%, which is more than triple the historical mean (7.5%) and higher than any other observation in the period 2004–2008 (figure III.7). The recent depreciation of the peso is in line with trends in the currencies of several other countries, and it appears to reflect a global revaluation of the dollar (figure III.8).

The local stock exchange posted negative returns in the year. As a result of the worldwide adjustment in the price of risky assets, the Selective Stocks Price Index (IPSA) has fallen by around 22% in local currency since the close of the last *Report*. This drop is smaller than that observed in other economies in the same period. In particular, the Chilean index fell less than the markets in Mexico, the U.S., and Brazil (measured in local currency), where the stock markets were down roughly 28%, 36%, and 45%, respectively. The volatility of the IPSA, in turn, reached record highs in the period of analysis (68%) (figure III.9).

In terms of correlations, a notable trend is the reduction in the observed correlation between IPSA returns and other regional stock market indices, measured in domestic currency. This was not the case with the U.S. and Japanese indices, where the correlation of returns rose significantly following the start of the subprime crisis, relative to the average for the period 2000–2007 (table III.4).

Table III.4

Stock market correlations in local currency (*)

	IPSA	Bovespa	CPI	S&P500	DAX	Nikkei	China
IPSA	–						
Bovespa	0.93 0.61	–					
CPI	0.97 0.80	0.96 0.92	–				
S&P500	0.52 0.90	0.73 0.75	0.58 0.90	–			
DAX	0.80 0.83	0.94 0.86	0.85 0.94	0.90 0.96	–		
Nikkei	0.58 0.90	0.78 0.76	0.64 0.91	0.92 0.97	0.90 0.95	–	
China	0.52 0.74	0.62 0.46	0.59 0.62	0.54 0.85	0.67 0.79	0.45 0.83	–

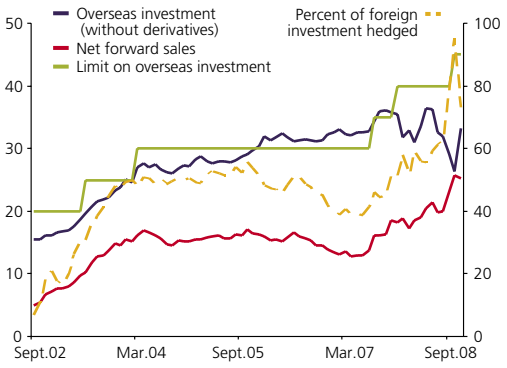
(*) January 2000 to July 2007 and August 2007 to December 2008.

Source: Bloomberg.

Figure III.10

Investment abroad and hedging of the pension funds

(US$ billion, percent)

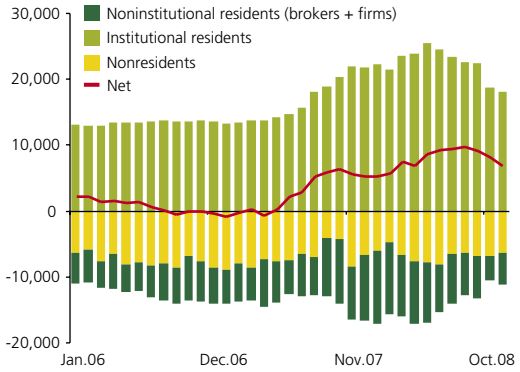


Source: SP.

Figure III.11

Change in the forward position of the main agents (*)

(US$ million)



(*) Excludes interbank operations.

Source: Central Bank of Chile.

The plunge in the international stock markets last October eroded the value of the pension funds' external assets. In line with this drop pension funds cut back their currency hedging

The value of the pension funds' overseas assets fell US$25 billion between June and October 2008, which is equivalent to a 6% drop in the value of the fund (figure III.10). This decline is mainly explained by the negative impact on asset value of the plunge in the main stock indices of developed and emerging countries[3]/. The rest of the reduction is explained by the net sale of external assets, which reached nearly US$2.4 billion in the same period; the money from the sales was reinvested in government papers and bank time deposits in the local market. The pension funds gradually returned to foreign markets in November, with somewhat higher investment in variable-rate than fixed-rate instruments.

Starting in June, the pension funds underwent a steady reduction in their foreign exchange futures contracts. The drop in their forward dollar sales position reached US$6.5 billion between June and October 2008 (figure III.11). Although estimates of the impact of this change in position using historical parameters indicate that these operations had a moderate effect on the exchange rate, the possibility that they contributed to putting pressure on the foreign exchange market cannot be disregarded in the current context of international financial turbulence.

While it is possible that the change in the pension funds' hedging position reflects an endogenous adjustment toward an optimal currency hedging level, it is also possible that the direction and speed of the adjustment is related to compliance with the limits on currency hedging established in DL 3500, given that the value of external assets fell in September and October[4]/. This issue was addressed by the Superintendency of Pension Funds when it authorized a temporary increase in the time required to reverse these positions in the derivatives market.

[3]/ For a description of the regulatory changes in the pension funds' investment limits, see chapter VI.

[4]/ The Pension Fund Investment Regulations establish that excess investment in forward contracts must be eliminated within ten working days of its origination, through the sale or settlement of the positions.

Box III.1: **The commercial paper market and the factoring industry in Chile**

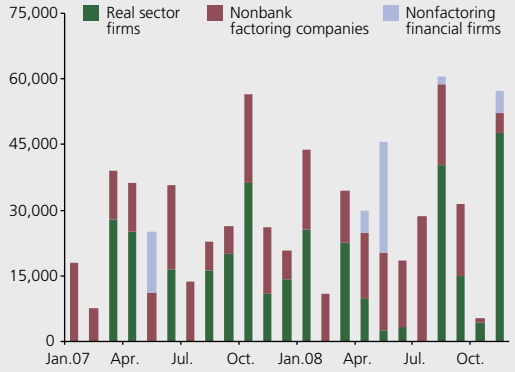
One of the local financial markets that were most affected by the international financial turbulence last October was the money market. Financing terms deteriorated sharply for short-term operations in both dollars and pesos (figures III.1 and III.2).

The commercial paper market used by some firms in the real sector and by nonbank factoring companies is a relatively small short-term financing market (equivalent to 4% of the stock of corporate bonds as of October 2008), in which the participants use money market rates as a benchmark for pricing new issues (figure III.12)[1]/. It therefore comes as no surprise that refinancing conditions also deteriorated in this market in the period indicated.

Figure III.12

Commercial paper loans

(Ch$ million of October 2008)



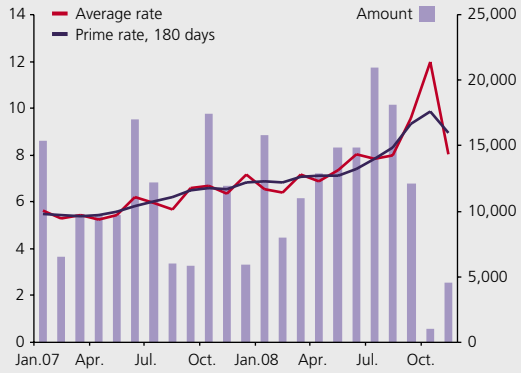
Source: SVS.

As shown in figure III.12, commercial paper loans in October were barely 18% of the average amounts loaned between January 2007 and September 2008[2]/. In particular, new commercial paper issues by nonbank factoring companies in October had a spread of more than 200 basis points over the 180-day prime rate and represented barely 7% of the average registered issues between January 2007 and September 2008 (figure III.13)[3]/. All told, the low spreads in this market could also have been exceptional, attributable to the loose liquidity conditions in the money market.

Figure III.13

Commercial paper loans: Nonbank factoring companies

(percent, Ch$ million)



Source: SVS.

The virtual shutdown of financing through commercial papers in October was a significant event for nonbank factoring companies, since commercial papers accounted for 50% of their callable liabilities at that date. In contrast, bank-affiliated factoring firms are largely financed with funds from the related/parent bank or from other commercial banks; this group actually reported an increase in the volume traded in the second quarter of 2008. This situation could create a financing risk for nonbank factoring companies. This risk should be fully processed and assessed by the companies' usual creditors, although the average maturity of the firms' assets is estimated to be shorter than 180 days.

[1]/ The nonbank factoring companies considered in this box are members of the Chilean Factoring Association (Achef); as issuers of commercial papers, they are also registered with the Superintendency of Securities and Insurance (SVS) and have available data on their financial situation. This institution also includes factoring companies that are bank affiliates.

[2]/ Loans from nonfactoring financial firms include securities agencies and other financial service providers.

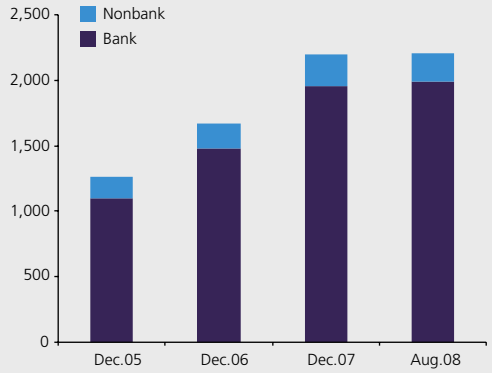
[3]/ Traditionally, almost 100% of commercial paper issues have been bought by mutual funds. Registered commercial paper issues have an average maturity of 179 days.

In terms of the overall business of the factoring industry, which had creditors totaling $2.2 trillion (US$4 billion) in August 2008, the impact of the events in the commercial paper market could be limited, given that nonbank factoring companies represent barely 10% of the total business (figure III.14).

Figure III.14

Factoring debtors

(Ch$ billion)



Sources: SVS and SBIF.

Despite the relatively low share of nonbank factoring companies in total factoring loans, the situation could still have a serious effect on the financing options of small and medium-sized enterprises (SMEs), which are the industry's main market. For these firms, nonbank factoring companies can represent an alternative source of funds when bank lending dries up in the face of increased systemic risk.

In response to the complex international circumstances and the tightening of the local money markets, in October 2008 the ministries of Finance and Economic Affairs announced a set of measures to support access to financing for smaller firms. One of these measures consisted in channeling Corfo funds through new lines of financing for both bank and nonbank factoring companies (US$100 million), aimed at smaller firms. In addition, Corfo's reduced requirements to institutions applying for these funds, although without compromising the program's risk control systems. In mid-December, Corfo reported that thus far nearly US$80 million of the available resources had been allocated to three nonbank factoring firms and two bank-related factoring companies.

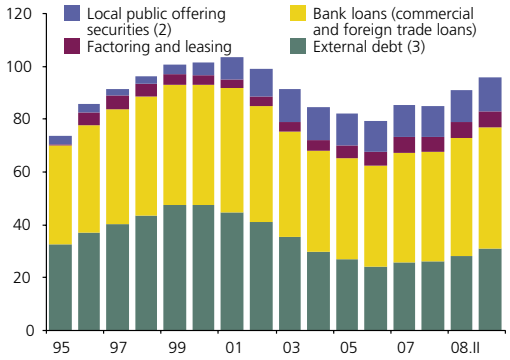
In early 2009, the government expanded this line of financing by US$50 million.

IV. Credit users

Figure IV.1

Total debt

(percent of GDP) (1)



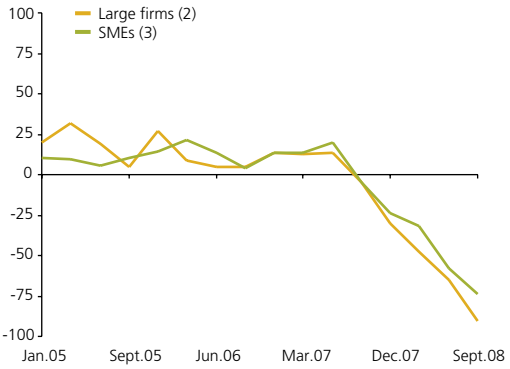
(1) 2008 GDP corresponds to the moving year ending in each quarter.
(2) Corporate bonds (except Codelco), nonbank asset-backed securitized bonds and commercial papers.
(3) Includes loans associated with FDI. Converted to pesos using the average exchange rate for the period March 2002-September 2008.

Source: Central Bank calculations, based on data from SVS, SBIF, ACHEF, and Central Bank of Chile.

Figure IV.2

Change in credit supply index (1)

(net percent of responses)



(1) Central Bank of Chile's Bank Lending Survey. Negative values indicate tighter conditions.
(2) Firms with annual sales over UF 100,000.
(3) Small and medium-sized enterprises (*Pymes*).

Source: Central Bank of Chile.

This chapter examines the financial situation of credit users and evaluates the credit risk trend in the Chilean economy and its sensitivity to the risks described in chapter I.

Firms

Prior to the worsening of international financial conditions in September and October, debt financing continued to grow

As of the third quarter of 2008, the total debt of firms posted a real annual growth rate of 13.1%, with notable increases in bank debt (11.8%) and external debt (17.9%). The total debt of firms thus grew as a percentage of output (figure IV.1).

Despite stricter lending standards than in the last *Report*, bank debt has continued to grow. The Central Bank's Bank Lending Survey for the third quarter of 2008 reflects these tighter conditions (figure IV.2). Interest rates on commercial loans have risen, especially since early October (chapter V).

With regard to external financing, data for September 2008 indicate that external bank debt coming due within a year represented 2.7% of GDP. While the cost of financing has increased, especially on short-term adjustable-rate loans (chapter II), the sector has maintained its access to external financing. Nevertheless, there is still a risk that lending conditions will be further constrained, which would force the indebted firms to seek alternative sources of financing.

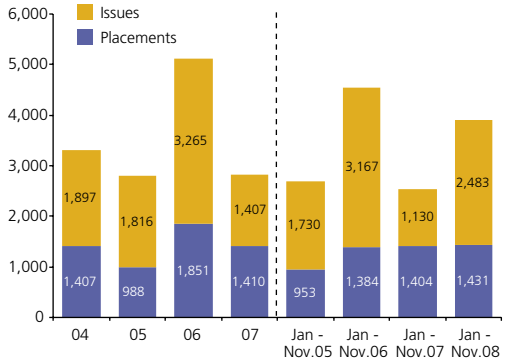
Local corporate bond placements recorded a real increase of 1.9% as of November 2008, relative to the same period in 2007; this was accompanied by a higher cost of financing (figure IV.3). Annualized lending rates rose between 80 and 150 basis points (figure IV.4), which compares favorably with the evolution of the cost of external credit (chapter II). Thus, for example, the issue rate on a ten-year bond in local currency from an AA– firm increased 150 basis points between 2007 and 2008, whereas the interest rate on a potential issue abroad would have risen twice that amount in the last few months. Similarly, bonds listed on the local market increased significantly, especially in August and October. In addition, three firms —two in the electric sector and one associated with the construction sector— placed large bond issues in December for nearly $331 billion.

Financing through public offerings of other types of securities represented a much lower share than bonds: around 1.0% of the total stock of debt in the

Figure IV.3

Corporate bond issues (*)

(Ch$ billion of November 2008)



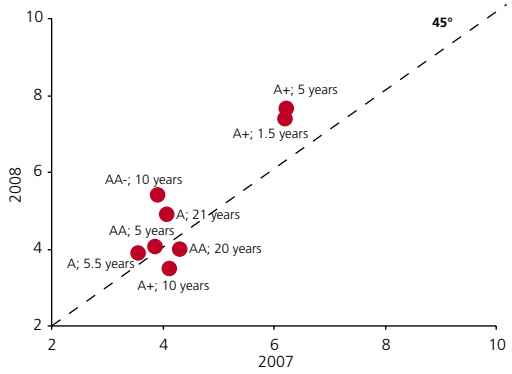
(*) Includes financial firms listed in the SVS.

Source: SVS.

Figure IV.4

Rates on local corporate bonds (*)

(average interest rate on placement, percent)



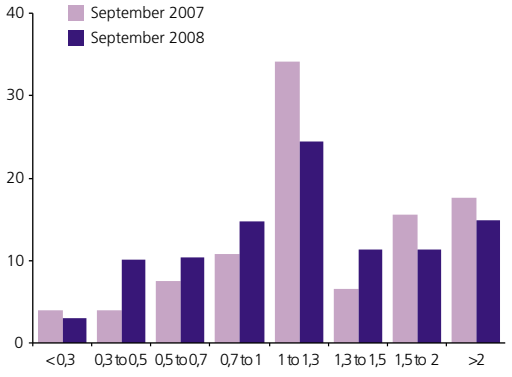
(*) Compares placement rates of a single firm at similar maturities, using the most conservative current risk rating and 2008 placement maturities.

Source: Central Bank calculations, based on data from the SVS.

Figure IV.5

Total debt by liquidity ratios (*)

(percent, times)



(*) Percent of financial debt in firms by ranges of liquidity ratios (acid test).

Source: Central Bank calculations, based on data from the SVS.

case of securitized bonds, and about 0.5% in the case of commercial papers. Both instruments showed less movement than in previous years.

Firms took advantage of the favorable environment of previous years to strengthen their financial position, which contributed to their capacity to face the current weakening of the economic environment

As of September 2008, when the international financial crisis began to worsen, firms registered with the Superintendence of Securities and Insurance (SVS) had healthy financial indicators. Operating margins were 10.1%, on average, versus 11.6%[1]/ in the same quarter of the previous year. The consumer, construction, and food sectors had the sharpest relative deterioration in their profitability and solvency ratios. Liquidity, in turn, fell in most sectors. The share of debt held by firms with a liquidity indicator of less than one rose from 26% to 38% in one year (figure IV.5).

Investment started to slow in the third quarter of the year (with a 4% drop in investment flows between September 2007 and September 2008, excluding mining), primarily in the forestry, electric, telecommunications, and infrastructure concessions sectors. Operating cash flows were the main sources of investment financing, and some of these funds were also allocated to reducing the debt.

As of September, SVS-registered firms posted a slight decline in their debt ratios and debt repayment capacity. These firms maintained an interest coverage of five times, on average, and indebtedness of 0.65 times equity and 3.2 times EBITDA (figure IV.6). Looking just at the most fragile firms, the debt of the group of firms with the highest debt levels increased relative to March 2008, although their repayment capacity remains healthy[2]/.

The corporate sector's foreign exchange exposure is low compared with previous crises

The high volatility of the exchange rate in the last months of 2008 highlighted the financial risks associated with holding foreign currency debt. However, as of the third quarter of 2008, the total net mismatch was 0.23% of total assets, which is lower than in previous years (figure IV.7). Moreover, this figure is far lower than the levels seen before the Asian crisis: 12.2% in December 1996 and 15.6% at year-end 1997. Individually, the majority of the firms with balance sheet mismatches have natural hedging, given that some of their operating flows are in foreign currency.

With regard to the use of currency derivatives, at the end of the third quarter featured the considerable losses suffered by companies in Brazil, Mexico, and South Korea made news as a result of the use of currency options. The available evidence indicates that this is not a problem for domestic

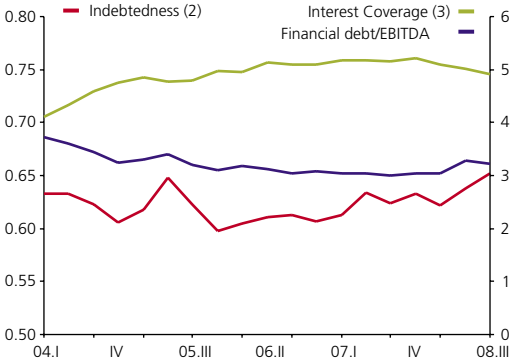
[1]/ Excluding the mining sector.

[2]/ Fragility at the individual level tries to identify firms with a potential default risk, and it is measured through the financial debt ratio (more than 1.5 times) and the interest coverage ratio (less then two times). For these firms to represent a systemic threat, they cannot have mechanisms for mitigating default risk.

Figure IV.6

Debt and payment capacity of SVS-listed firms (1)

(times)



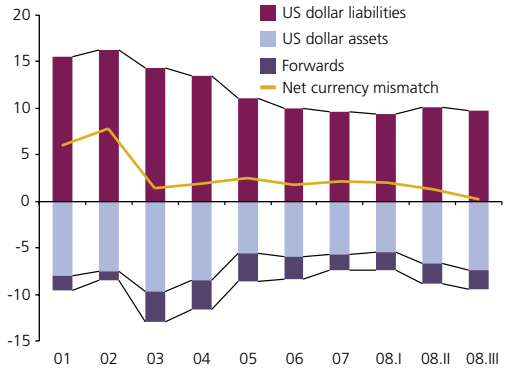
(1) Consolidated financial statements. Excludes mining.
(2) Financial debt/(Equity+minority interest).
(3) Interest coverage, moving year.

Source: Central Bank calculations, based on data from the SVS.

Figure IV.7

Currency mismatches breakdown (*)

(percent of total assets)



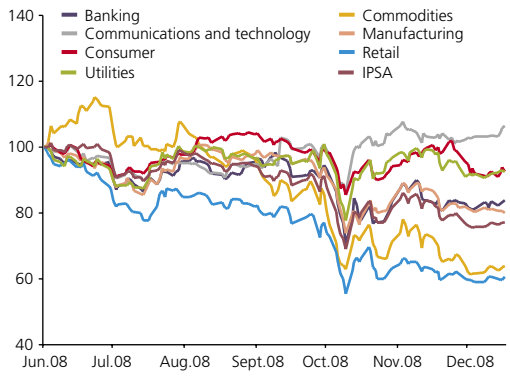
(*) Calculated over the weighted average.

Source: Central Bank calculations, based on data from the SVS.

Figure IV.8

Sectoral stock indices

(base index: 2 June 2008 = 100)



Sources: Santiago Stock Exchange and Bloomberg.

firms—first, because the local use of options is very scarce, and second, because in Chile currency derivatives are basically used for hedging and not speculation, as was the case in the countries cited above.

The complex economic environment is already being reflected in the real sector, leading to forecasts of a worsening of firms' credit risk

The recent change in economic conditions was reflected in a 23% drop in the IPSA as of the close of this *Report*, relative to the close of 2007. However, performance by sector was uneven (figure IV.8). Retail trade and construction posted the steepest drops. The commodities sectors recorded a considerable hike in mid-year, but fell drastically with the declines in copper, crude oil, and wood pulp prices. The communications and technology sector led in gains, driven by mobile telephony, internet use, and cable television.

The complex economic environment is also reflected in the data for the real sector. The demand conditions for export products have deteriorated significantly. This sector has been evolving toward a greater diversification of products and destination markets, which should put it in a better position to weather a world recession. However, small and medium-sized firms face a higher risk, as their export supply is less diversified and their destinations are primarily countries in the region. On the other hand, the real depreciation of the peso and reductions in the cost of inputs imply important cost savings in dollars for these firms.

The retail trade sector is highly sensitive to the financial situation of households, so high inflation, economic recession and unemployment affect their sales and portfolio quality. As of September 2008, retail sales per square meter fell, on average, 7% in real annual terms (total real sales held steady), and their provisions for uncollectibles increased[3]/. While this sector represents a moderate risk for the banking system, some local banks have an important share of their lending in this sector.

Real estate is another sector that is highly sensitive to the economic cycle. Housing demand has fallen as a result of the economic slowdown and, to a lesser extent, inflation, as has the financial institutions' willingness to grant mortgage loans. Consequently, sales have slowed considerably. In the case of apartments, for example, the number of months to sell out stock has doubled since March 2008, exceeding 30 months nationwide[4]/. As of September, housing sales had fallen nearly 20% in annual terms both in Santiago and nationally. Additionally, the Bank Survey carried out by the Central Bank of Chile in the third quarter of 2008 reveals tightened lending standards for real estate and construction firms in 71% of the institutions surveyed, in response to the worsening economic environment and the increased credit risk of these clients. In November, the government announced an economic plan that commits more than US$800 million, with the goal of stimulating housing demand and financing for housing sales, by expanding the benefits' coverage currently associated with the housing subsidy. In a complementary

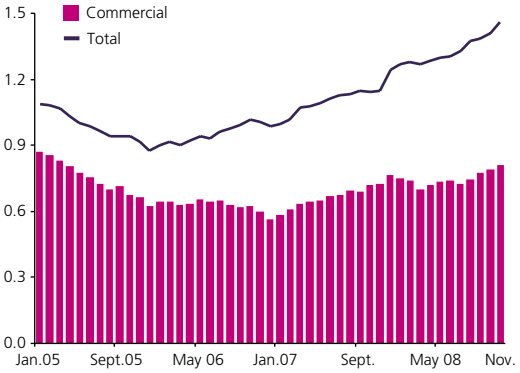
[3]/ These figures are based on data from Cencosud, D&S, Falabella, Ripley, and La Polar, taken from their press releases.

[4]/ Data for September 2008. Source: Chilean Chamber of Builders (*Cámara Chilena de la Construcción*).

Figure IV.9

Loan-loss provisions (*)

(percent of each portfolio)



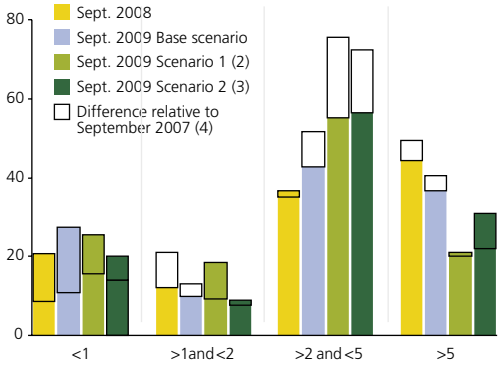
(*) Moving year ending in each month.

Source: Own calculation based on data from SBIF.

Figure IV.10

Local bank debt and payment capacity under alternative scenarios (1)

(percent, times)



(1) Percent of the sample's local bank debt, by range of interest coverage ratio.
(2) Significant drop in financial valuation of risky assets.
(3) Significant global slowdown.
(4) Shaded areas represent data as of September 2008.

Sources: Central Bank calculations, based on data from the SVS, SBIF, and Central Bank of Chile.

measure, the General Treasury would capitalize the state-owned bank *Banco Estado* in 2009, so as to be able to channel the available funds to families that want to buy a home as well as to small businesses.

Thus far, the default rate on commercial bank loans has increased only slightly

In the past few months, loan-loss provisions as a percentage of the banks' commercial portfolio has been increasing at the margin, reaching 0.81% in November 2008. These levels, however, are lower than in 2005 (figure IV.9).

In the area of corporate bonds, the rating agencies have raised their risk assessment. The average rating on these securities fell at the margin, to nearly AA–. This was due to the continued downgrading of the debt of some firms in the electric sector and infrastructure concessions[5]/. In addition, the outlook for some of the firms in the retail sector was changed to "negative."

Under the most adverse scenario in the stress tests, interest coverage remains above two times for most of the firms of the sample, but shows smaller cushions than in 2007

Based on data for September 2008 to run the stress tests, the results show that, under the scenarios described in chapter I, most SVS-listed nonfinancial firms with local bank debt maintain a healthy interest coverage ratio (figure IV.10)[6]/. Nevertheless, compared with the same exercise last year, there is now a larger share of firms with an interest coverage of less than two times.

Based on the analysis above, the corporate sector was in a strong position for facing the downturn of the international financial environment in September and October 2008. The outlook for the sector is that non financial firms will continue to operate in a complex economic environment and the sector's credit risk may worsen.

Households

Homeowner's credit risk is expected to increase due to the complex economic environment

The evolution of household debt takes on special relevance in the current economic context, because it affects multiple financial intermediaries both directly and indirectly. Until the last *Report*, high inflation rates were the main factor affecting family finances. This variable works through several channels: it reduces the value of the nominal items owned by the household (assets and debts), shrinks income flows and financial costs denominated in pesos, and

[5]/ The infrastructure concessions were affected by the lower risk rating of the companies that insure their bonds.

[6]/ The methodology used for these stress tests is described in Rodríguez and Winkler (2007). The scenarios used are constructed as deviations from the baseline scenario, which corresponds to the projection scenario presented in the most recent *Monetary Policy Report*. Details are provided in Jara, Luna, and Oda (2008).

increases the prices of inflation-indexed items (such as mortgage payments contracted in UFs). Although inflation has had a net negative impact in the past few months, mainly as a result of falling real wages (around 1% in real annual terms between September 2007 and September 2008), the most recent data suggest that this risk factor is dissipating. Thus, the main threat regarding household credit risk is a reduction in labor income, especially as a result of unemployment.

Table IV.1

Household debt

(real annual change, percent)

	2007				2008				
	I	II	III	IV	I	II	III	October	November
Mortgage	**15.1**	**15.5**	**14.9**	**15.5**	**15.5**	**14.5**	**13.3**		
Bank	14.9	15.8	14.7	15.3	15.3	14.1	13.3	12.1	12.7
Nonbank (1)	16.5	14.1	16.2	16.2	17.0	17.1	13.6		
Consumer	**18.1**	**17.0**	**14.0**	**11.4**	**10.0**	**7.5**	**5.8**		
Bank	18.0	15.1	10.3	7.0	5.2	3.3	1.1	-0.6	-0.7
Nonbank (2)	18.1	19.5	19.3	17.2	16.3	12.8	11.9		
Total	**16.5**	**16.2**	**14.5**	**13.5**	**12.8**	**11.1**	**9.8**		
	(Amount of total debt in Ch$ billion of September 2008)								
Total	**29.4**	**30.2**	**30.9**	**32.2**	**33.2**	**33.5**	**33.9**		

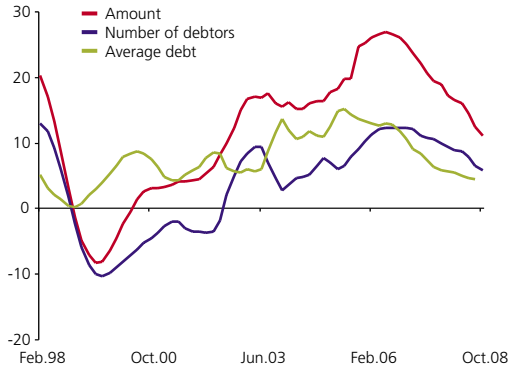
(1) Includes securitized mortgage debt.
(2) Includes retailers, CCAF, cooperatives, car financing, insurance companies, and securitized debt. In the third quarter, data on the cooperatives is projected.

Sources: SBIF, SVS, SuSeSo, and Central Bank of Chile.

Figure IV.11

Consumer bank debt (*)

(annual change, percent)



(*) Moving half-year. Amount and average debt in nominal terms.

Sources: SBIF and Central Bank of Chile.

While household debt continues to grow, it has slowed significantly

In the third quarter of 2008, aggregate debt grew 9.8% in real annual terms, versus an average of 15% in 2007 (table IV.1). This is mainly explained by the slowdown in consumer bank debt, which reflects lower growth in both the number of borrowers and the average debt per borrower (figure IV.11). Meanwhile, nonbank consumer loans began to show signs of slowing in the last quarter of 2007, but they still have a higher growth rate than bank loans.

This pattern suggests a more stringent lending environment, which was carried over to loan maturities, as the upward trend in maturities ended in recent months (figure IV.12). Additionally, household loans have become considerably more expensive (chapter V). This confirms that supply factors have also contributed to the slowdown in consumer bank debt.

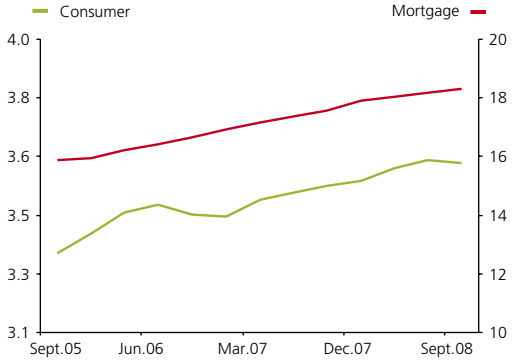
The Bank Survey carried out by Central Bank of Chile in the third quarter of 2008 reveals that the banks are seeing a lower demand for consumer loans (figure IV.13). A large share of households identifies themselves as being in a difficult economic situation, and they are less confident in the economy, which affects their borrowing decisions (figure IV.14). These demand factors compound the tighter supply conditions described above.

The slowdown in nonbank consumer debt is led by slower growth in retail loans. Retailers represent the second largest source of consumer loans for households (table IV.2). The growth rate of retail loans fell from an average real annual rate of 22.4% in 2007 to 11.1% (annualized) in the third quarter

Figure IV.12

Maturities on bank debt (*)

(years)



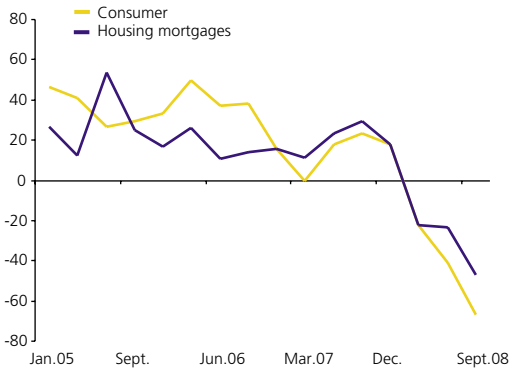
(*) Weighted by amount of debt.

Sources: SBIF and Central Bank of Chile.

Figure IV.13

Perception of the demand for loans (*)

(net percent of responses)



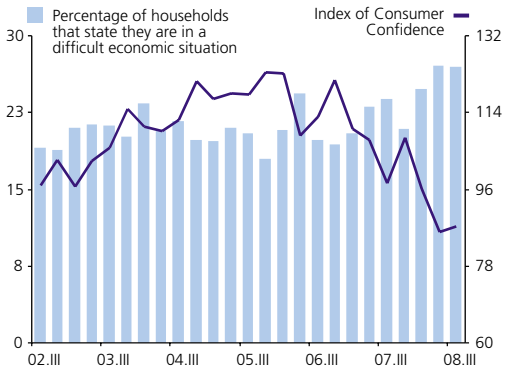
(*) Central Bank calculations, based on data from the Bank Lending Survey. Negative values indicate tighter conditions.

Source: Central Bank of Chile.

Gráfico IV.14

Household perceptions on debt

(percent, index)



Source: Perception survey carried out by the University of Chile.

of 2008. One of the reasons for this drop is the substantial reduction in sales in general (see the section on firms, above) and durable goods in particular. Durable goods consumption has contracted significantly, and is expected to finish the fourth quarter of 2008 below 5%, versus an average of 12.6% in the three previous quarters (IPoM, January 2009). Other sources of nonbank consumer credit also recorded slower growth in recent months, with the exception of the private compensation funds, which maintained a growth rate of around 18%.

Table IV.2

Household debt

(percent share in the total)

	2004	2005	2006	2007	2008 I	2008 II	2008 III
Mortgage debt	**54.6**	**53.2**	**51.8**	**52.8**	**53.1**	**54.0**	**54.7**
Bank	45.7	45.6	44.4	45.2	45.4	46.1	46.9
Nonbank (1)	8.9	7.6	7.4	7.6	7.7	7.9	7.9
Consumer debt	**45.4**	**46.8**	**48.2**	**47.2**	**46.9**	**46.0**	**45.3**
Bank	26.1	27.0	27.9	26.4	26.0	25.4	24.8
Retailers, less than 1 year (1)	6.0	6.2	5.6	5.8	5.5	5.5	5.3
Retailers, more than 1 year	0.9	1.1	1.5	1.8	1.9	1.9	2.0
Private compensation funds	3.9	3.5	4.3	4.3	4.4	4.3	4.3
Cooperatives (2)	2.1	2.4	2.5	2.7	2.7	2.6	2.6
Nonbank car loans	2.0	2.3	2.4	2.6	2.7	2.7	2.7
University	4.5	4.1	3.7	3.3	3.4	3.3	3.2
Insurance companies	0.1	0.1	0.2	0.3	0.4	0.4	0.4

(1) Includes securitized debt.
(2) Figure for the third quarter is projected.

Sources: SBIF, SVS, SuSeSo, and Central Bank of Chile.

Like consumer loans, mortgage loans saw a drop in their growth rate, as a result of both supply and demand factors (table IV.1). Interest rates on mortgages rose, especially starting in the second quarter of 2008 (figure IV.15 and chapter V). At the same time, banks reported a drop in the demand for mortgages in the Bank Survey for the third quarter of 2008 (figure IV.13). Inflation was an important factor in this trend in 2008, since it increased the cost of UF-denominated mortgage payments; this was compounded by the worsening economic outlook for households (figure IV.14). Nonbank mortgage debt also registered slower growth. Securitized mortgage debt, in particular, posted a quarterly drop of 1.8%, on average, for the first three quarters of 2008.

As of September 2008, household debt indicators had increased slightly

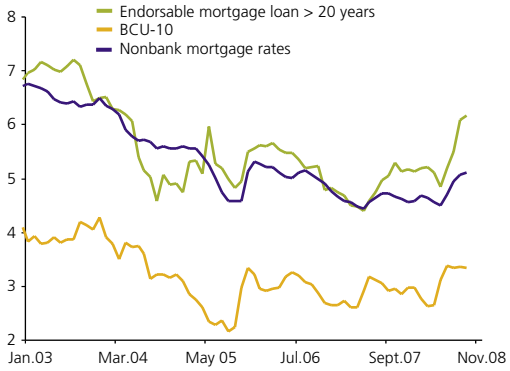
The long-term debt-to-income ratio (DIR) has risen slightly, from 58% to 60% between March and September 2008 (figure IV.16). The higher DIR is associated with the growth in total debt and the drop in real disposable income. The latter is primarily due to the decrease in real wages as a result of inflation. Nevertheless, the DIR is lower in Chile than in developed countries (figure IV.17).

The long-term debt-service coverage ratio (DSR) was 11.7% in September 2008 (figure IV.16). The level of this indicator was stable because the drop in disposable income was offset by a lower debt service. The reduction in debt service is mainly associated with the effect of inflation on the payment

Figure IV.15

Mortgage market interest rates

(percent)

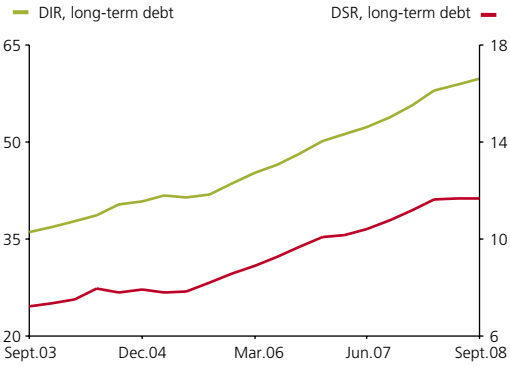


Sources: SBIF and Central Bank of Chile.

Figure IV.16

Long-term indebtedness (DIR) and debt-service coverage ratio (DSR)

(percent of disposable income)

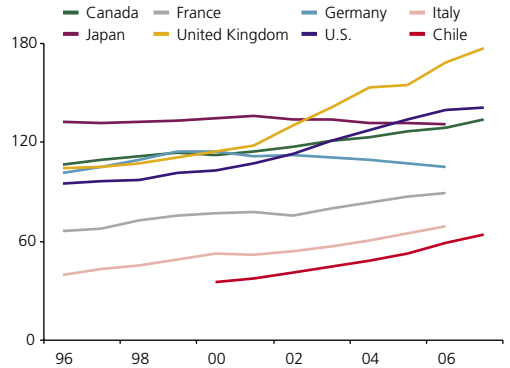


Sources: SBIF, SVS, SuSeSo, and Central Bank of Chile.

Figure IV.17

Indebtedness in selected countries

(percent of disposable income)



Sources: OECD, Bloomberg, and Central Bank of Chile.

of amortization and interest on consumer loans with maturities over one year, which are almost entirely denominated in pesos.

Household credit risk indicators have deteriorated, in line with the complex economic environment

Loan-loss provisions on bank consumer loans have followed an upward trend, reaching 8.5% of bank consumer loans in November 2008 (figure IV.18). This signals that the banks anticipate an increase in default risk for households. Loan-loss provisions on bank mortgage loans, however, have been stable. Nonbank credit agencies show a similar pattern.

The 2007 Chilean Survey of Household Finances indicates that 9.5% of households could face difficulties meeting their debt obligations, because their expenses exceed their income by 20% and their debt service is at least 75% of their income. The debt held by these households represents 16.1% of total debt, and it is proportionately more concentrated in consumer debt. Given the serious threat of a significant increase in unemployment, stress tests were carried out at the microeconomic level with regard to the percentage of households with debt at risk (box IV.1).

Borrowing and lending decisions must be carefully evaluated, especially in the current economic context

The primary threats addressed in the previous *Report* —namely, a significant tightening of international credit and a world recession— have materialized, and there is a continued risk that they will grow worse. It is therefore critical that the financial institutions continue to closely evaluate their lending practices, and that they constitute adequate reserves to face this risk. Households, in turn, must carefully analyze their ability to comfortably cover their debt service when considering taking out new loans, taking into account the current context of economic recession.

Consolidated government

In 2008, the government continued to accumulate substantial savings, which are largely available for facing the changed international scenario

The fiscal revenue authority reports that the Central Government will end 2008 with a total balance of approximately 7% of GDP[7]/. As of late September, the government held peso assets valued at $5.62 trillion, which are mainly used to finance the current budget, and foreign currency assets of US$27.38 billion. That is, nearly three-quarters of total assets are in foreign currency, including US$19.268 billion in the Social and Economic Stabilization Fund (FEES) and US$2.39 billion in the Pension Reserve Fund (FRP)[8]/.

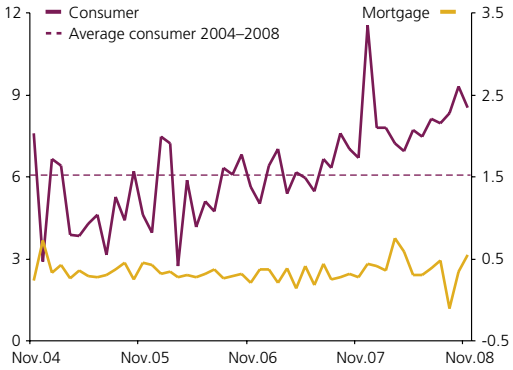
[7]/ For additional details, see Budget Division (2008).

[8]/ This information is available in the *Public Debt Statistics Report* published by the Ministry of Finance (web page), December 2008. However, the individual reports for these funds include updated statistics indicating that as of November 2008, FEES assets totaled US$19.164 billion and FRP assets US$2.331 billion.

Figure IV.18

Loan-loss provisions on bank loans

(percent of respective loans)

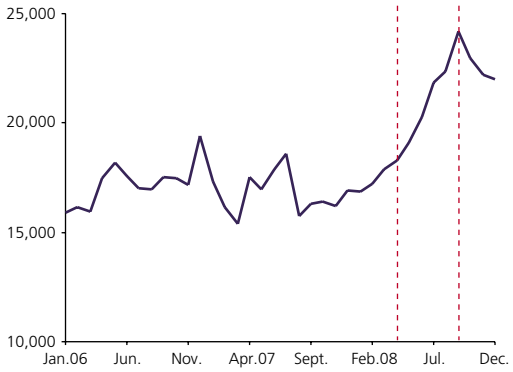


Sources: SBIF and Central Bank of Chile.

Figure IV.19

Net international reserves (*)

(US$ million)



(*) Dotted lines demarcate the Central Bank's reserve accumulation program.

Source: Central Bank of Chile.

In accordance with the Fiscal Responsibility Law, FRP funds can only be used to complement the financing of fiscal liabilities deriving from the state minimum pension guarantee on old age, disability, and survivor's pensions. In contrast, the use of accumulated FEES resources and most other financial assets is under the authority of the President of the Republic.

The Central Bank's balance sheet showed a surplus in 2008, as a result of the increase in the exchange rate. However, when the cash flow statement was calculated in accordance with the IMF methodology, which excludes capital gains, it reported a deficit of around 0.9% of GDP.

The gross debt of the Central Government grew from 4.1% of GDP at year-end 2007 to 4.4% of GDP in September 2008. Taking into account the 2008 auction calendar for General Treasury bonds, the balance of outstanding bonds issued in national currency is around US$4.20 billion at the close of the year (around 2.7% of GDP), 87% of which are denominated in UFs and the rest in pesos. External debt, in turn, reached US$2.86 billion (1.8% of GDP) in September 2008.

The estimated fiscal deficit for 2009 should be transitory and easily financed with accumulated assets, as envisaged by the fiscal rule

Considering the impact of the external crisis and the measures announced in the first days of January, the revenue authority estimates an effective fiscal deficit of 2.9% of GDP in 2009 and a structural deficit of 0% of GDP. Given the transitory nature of this change in the structural surplus rule of 0.5% of GDP, public sector financing for 2009 is ensured through the reduction of accumulated FEES assets and other Public Treasury assets, as envisaged in the rule. Moreover, the 2009 Budget contemplates the authorization of a new debt issue of up to US$3.00 billion, in domestic and foreign currency[9]/.

The consolidated Central Bank and Central Government has nearly US$47 billion available to sustain the external liquidity of the country

Reserve program

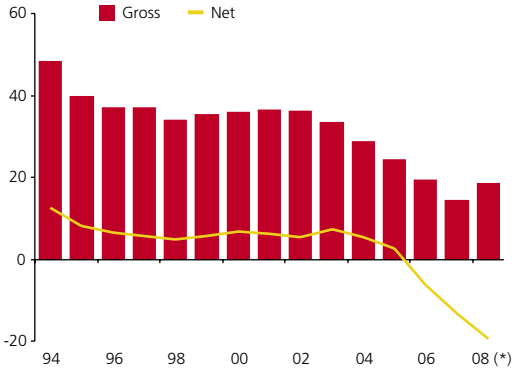
In December 2007, the Central Bank's international reserves totaled US$16.91 billion. As the probability of an international liquidity crunch increased, the Central Bank initiated a reserve accumulation program for US$8.00 billion. After US$5.75 billion had been accumulated, the materialization of the international financial crisis —which tightened dollar liquidity on the local market— led the Bank to suspend this program toward the end of September (chapter III). At the close of this *Report*, the balance of the Central Bank's international reserves was around US$22 billion (nearly 15% of GDP) (figure IV.19).

[9]/ On 8 January 2009, the Ministry of Finance announced that it would issue debt for roughly US$1 billion in the domestic market; it is not yet known whether the remaining US$2 billion authorized by the Budget Law will eventually be issued.

Figure IV.20

Total debt of the Consolidated Government

(percent of GDP)



(*) As of September 2008.

Source: Budget Division.

Sovereign funds

The sovereign funds (FEES and FRP) are currently administered by the Central Bank in its role as fiscal agent, as established in Supreme Decree 1383 of December 2006, issued by the Ministry of Finance. Investment guidelines for these funds are contained in Supreme Decree 1382 of December 2006, issued by the same ministry, and in complementary instructions.

As mentioned, all of the FEES and FRP assets are in foreign currency, of which approximately 50% is in U.S. dollars, 40% in euros, and the remaining 10% in yens.

To give some relief to the tight foreign currency liquidity conditions caused by the turbulence in the international markets, the Central Government deposited some of its resources held overseas in local commercial banks (chapter III).

The gross debt of the Central Government is very small as a share of GDP (4.4%), and it is mostly long term

Public finances continue to be very solid. The Central Government has generated a fiscal surplus in 17 of the last 22 years. Moreover, the estimated deficit for 2009 will be easily financed with resources saved by the General Treasury. The purpose of saving when the copper price and output are above their long-term levels is precisely to have resources available to be used in periods of lower prices and a slower economy, thereby stabilizing aggregate spending.

The Central Government's debt as a share of GDP is very low both in historical terms and in comparison with other Latin American countries (figure IV.20). Finally, a large share of the Central Government's debt is long term, especially debt issued in the local market.

Box IV.1: **Households' financial vulnerability**

The growth in credit to Chilean households has been a focal point in recent years. While different debt indicators show significant increases at the aggregate level in the last decade, there are few sources that support the assessment of the real vulnerability of this sector from the perspective of financial stability. One of the tools that allows us to shed light on the financial fragility of households is running stress tests using microeconomic data.

This box presents the results of stress tests that can be used for evaluating the financial vulnerability of households in the face of shocks to the unemployment rate. The Chilean Survey of Household Finances, carried out by the Central Bank of Chile for the first time in 2007, constitutes the first statistical source with financial information at the microeconomic level, which makes it possible to perform these estimates.

Although households face a variety of financial risks stemming from a range of sources, the loss of employment is, empirically, a crucial determinant of credit risk. At the same time, the vulnerability of a household to an aggregate shock that generates increases in unemployment will depend on the specific characteristics of that household[1]/. This implies that, in order to assess the credit risk of a given debt, we need to know the characteristics of the debt holder.

Using data from the 2002 and 2004 Social Protection Surveys, it is possible to estimate job loss probabilities at individual level, as a function of particular household characteristics such as gender, age, education, and type of job contract. This is feasible because the Social Protection Survey contains retrospective data on individual employment histories going back to 1994. Once job loss probability is estimated, it is imputed to the households surveyed in the Chilean Survey of Household Finances according to their characteristics. Monte Carlo simulations can then be used to measure the households' "debt at risk" under different unemployment scenarios.

This exercise uses two variables to define debt at risk. The first is a negative financial margin, defined as the case in which a household's total expenses exceed its income by 20%. The second is high debt service as a share of income, defined as more than or equal to 75%.

These measures provide a way to identify households that could run into problems servicing their debt. However, the measure does not take into account mitigating factors that could prevent the detected stress from ending in higher default. These factors include the following:

- The existence of formal or informal unemployment insurance (support networks).
- The sale of assets.
- The possibility of returning to work (that is, the exercise does not consider the duration of unemployment).

According to the Chilean Survey of Household Finances, at the end of 2007, 61% of households had some kind of debt[2]/, and the unemployment rate in the sample was 6%. It follows that 9.5% of households have debt at risk, which represents 16.1% of total household debt (table IV.3). In addition, the percentage of nonmortgage debt at risk is larger than the share of mortgage debt at risk. This indicates that mortgage debtors are less vulnerable to unemployment shocks, which suggests that approval standards are stricter for this type of loan.

[1]/ Estimates for job loss probability indicate that men are less likely to lose their jobs than women, while households whose members have a higher level of education have a lower risk of unemployment than households with fewer years of schooling. Finally, young workers with less experience are more likely to lose their jobs than more experienced workers.

[2]/ See box III.1 of the *Financial Stability Report*, first half 2008.

[3]/ According to data published by the INE, the national unemployment rate reached 11.9% in the June-August quarter of 1999.

Table IV. 3

Households with debt at risk
(percent of the sample)

Sample unemployment rate	Households with debt at risk			Mortgage debt at risk			Nonmortgage debt at risk			Total debt at risk		
6		9.5			14.5			18.8			16.1	
Unemployment rate used to calculate debt at risk	**Min.**	**Ave.**	**Max.**	**Min.**	**Ave.**	**Max.**	**Min.**	**Ave.**	**Max.**	**Min.**	**Ave.**	**Max.**
11	15.9	17.4	18.8	19.2	22.7	26.2	26.2	29.8	33.3	22.3	25.2	28.1
16	20.1	21.7	23.3	22.8	26.5	30.2	30.9	34.9	38.8	25.9	29.3	32.6
							(Difference relative to the initial 6%, percentage points)					
5	6.4	7.9	9.3	4.7	8.2	11.7	7.4	11.0	14.5	6.2	9.1	12.0
10	10.6	12.2	13.8	8.3	12.0	15.7	12.1	16.1	20.0	9.8	13.2	16.5

Source: Fuenzalida and Ruiz-Tagle (2008).

When we increase unemployment and simulate a scenario similar to the Asian crisis (in which unemployment bordered on 11%[3]), debt at risk increases relative to the initial situation, to between 22% and 28% of total household debt. The rise in nonmortgage debt at risk ranges between 7 and 15 percentage points relative to the starting point, while the increase is lower in the case of mortgage debt, between 5 and 12 percentage points.

The results show that the impact of rising unemployment is not linear for either, the percentage of households with debt at risk or the percentage of debt at risk. In the case of debt at risk, a change in the unemployment rate from 6% to 11% produces an average increase in the total debt at risk of 9.1 percentage points (from 16.1% to 25.2%). An additional increase in the unemployment rate of the same magnitude increases the percentage of debt at risk by 4.1 percentage points.

Stress testing allows us to measure the financial vulnerability of households in the face of unemployment shocks. It is important to note, however, that the percentage increase in debt at risk does not necessarily imply an equal increase in household default. The utility of this measure will increase as the number of observations grows, to the extent that it contributes to better identifying the relationship between debt at risk and default.

V. Banking system

This chapter analyzes the financial strength of the local banking system, which is directly related to its degree of exposure to credit, market, and liquidity risk and its capacity to absorb adverse shocks.

Several indicators show that the Chilean banking system is one of the strongest in the region

The current global financial crisis originated in developed economies, with financial entities that were strongly exposed to complex financial assets. These institutions have had to recognize huge losses stemming from the adjustment of these asset prices.

In Chile, the financial investment portfolio represents a relatively small percentage of the banking system's total assets (10%, versus 23% for the commercial banking industry in the U.S. in November 2008), and it is concentrated in highly liquid instruments, such as Central Bank papers (47%)[1]/. Additionally, current regulation to date has not allowed Chilean banks to issue credit derivatives, and if they write interest rate or foreign exchange options, they must report the valuation method used to the supervisory organization.

Another characteristic of the current global financial crisis has been the exposure of the international banking industry to off-balance-sheet investment vehicles, which are strongly dependent on wholesale financing and whose losses affected the banking system through the existence of explicit or de facto contingent commitments. In Chile, however, the banking industry to date has predominantly followed a traditional banking model, characterized by a basically commercial business orientation, a broad base of retail deposits (32% of total liabilities), and assets made up primarily of loans (70%), which are originated and administered on the balance sheet. In the specific case of housing financing, certain elements of the Chilean regulations have limited the emergence of a subprime sector like the American one (box V.1).

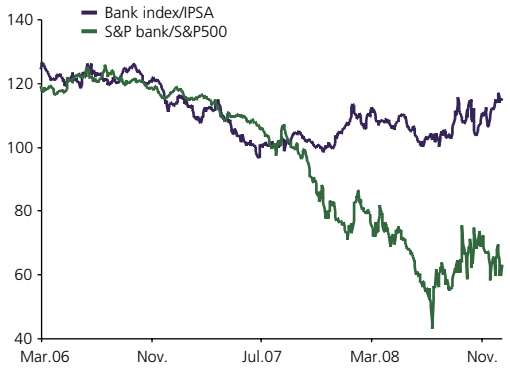
With regard to liquidity management policies, in mid-2007 the Chilean banking industry began to increase the relative share of more liquid assets on the balance sheet and to diversify the sources of internal and external financing. The banks were thus anticipating a possible change in financing

[1]/ The figure for the U.S. is calculated based on the assets and liabilities of the commercial banking industry, obtained from statistics published by the Federal Reserve.

Figure V.1

Compound bank indices

(base: August 2007 = 100)



Source: Bloomberg.

Table V.1

Risk rating of long-term deposits

Rating	December 2007		November 2008	
	N° of banks	% assets	N° of banks	% assets
AAA	7	56	7	56
AA+	5	8	4	7
AA	2	15	2	16
AA-	5	20	5	20
A+	0	0	0	0
A	3	1	3	1
A-	2	1	2	1
BBB+	1	0	1	0
BBB	0	0	0	0
BBB-	0	0	0	0
BB+	0	0	0	0
BB	1	0	1	0
Average	AA+		AA+	

Sources: Fitch Ratings and Feller-Rate.

conditions, in view of the increase in the foreign investment limits of the pension funds. This has put the local banking system in a better position to face both the emergence of the crisis and its ongoing effects.

In terms of the supervision of the Chilean banking system, the assessment carried out in 2004 by the IMF and the World Bank —within the framework of the Financial Sector Assessment Program (FSAP)— found a level of compliance with the basic principles of effective banking supervision of over 80%, compared with 50%, on average, for the economies in the region and 90% for developed economies[2]/.

The strengths of the Chilean banking system are reflected in the trend in local banks' stock prices, which is very different from the stock indices of the European and U.S. banking systems and is closely aligned with the IPSA (figure V.1). At the same time, the average rating of the system's long-term deposits in local currency is still AA+ (table V.1), while recent evaluations by international organizations highlight the Chilean banking system as one of the soundest in the region (table V.2).

Table V.2

Financial strength indicators

	Capital adequacy ratio (1)	Capital/ Assets (1)	Financial sophistication (2)	Bank health (3)
Chile	12	7	26	18
Brazil	18	10	21	24
Colombia	13	11	69	77
Mexico	16	14	56	55
Canada	12	5	6	1
Spain	11	7	23	20
U.S.	13	10	3	40
New Zealand	n.a.	n.a.	29	8

n.a.: Not available.
(1) Values in the first quarter of 2008, according to the *Global Financial Stability Report* of October 2008.
(2) Relative position in a ranking of 134 economies, based on a survey that measures the level of financial market sophistication in comparison with international standards. This survey was developed by the World Economic Forum between 2007 and 2008.
(3) Relative position in a ranking of 134 economies, based on a survey that measures the level of solvency of the banking system in each country. This survey was developed by the World Economic Forum between 2007 and 2008.

Sources: IMF (2008) and World Economic Forum (2008).

Nevertheless, the turbulence in the international markets has affected the terms of access to external financing…

In recent months, the national banking system has faced higher overseas financing costs (figure V.2). Some market participants have signaled that the

[2]/ *FSAP August 2004, IMF Country Report 04/269; "Implementación de Basilea II en Chile: Visión del Supervisor," presentation by the Superintendency of Banks and Financial Institutions (SBIF), 15 April 15th 2008; "Unlocking Credit," Inter-American Development Bank, 2005 Report, page 89. The comparisons were made against assessments carried out before 2005, because in 2006 the Basel Committee updated the Core Principles and Chile has not been subjected to new assessments within the FSAP framework after that date.*

larger spreads have favored the entry of a larger number of international creditor banks, lending for relatively smaller amounts and shorter maturities. As of September, the banking system's main foreign creditor accounted for no more than 15% of the sector's total external debt.

While Chilean banks have been able to roll over their liabilities with foreign creditors, there is considerable uncertainty associated with the availability of resources in entities that have traditionally provided foreign exchange liquidity and that currently face complex mergers, restructuring, and takeovers by their respective governments.

….although external debt represents a relatively small source of financing for the Chilean banking industry

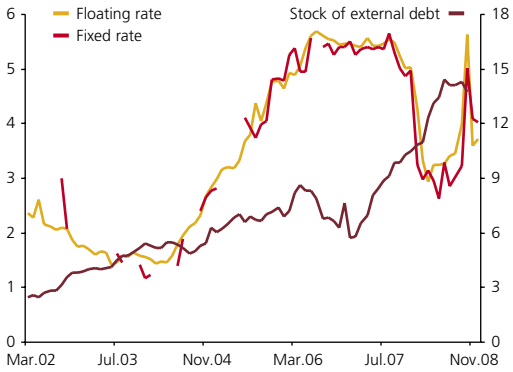
The banks' external liabilities increased steadily in the first half of 2008, and then tended to level off beginning in July (figure V.2). Despite this growth, foreign liabilities represent less than 10% of total liabilities for the majority of the banks in Chile.

These funds were mainly used to finance foreign trade operations. The foreign trade sector represents 11% of total system loans and has grown strongly in the past year (26% in real terms) as a result of growth in imports (a real annual rate of 34% in November)[3]/. The financing needs of firms in this sector could fall as a result of slower economic growth, which would reduce the pressure on the local banking system to obtain new loans abroad.

Figure V.2

External debt of banks

(percent, US$ billion)

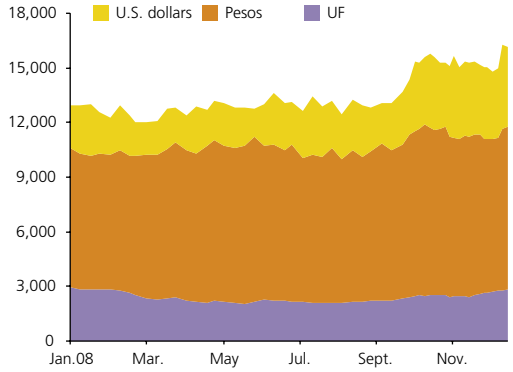


Source: Central Bank of Chile.

Figure V.3

Liquid assets of the banking system (*)

(Ch$ billion)



(*) Includes cash and financial investment flows up to 30 days.

Source: Central Bank of Chile.

The banking system has built up considerable liquidity in both domestic and foreign currency

The increase in international volatility in September generated uncertainty regarding the capacity of the local banking industry to roll over their external lines of credit, which prompted a significant build-up of liquid assets in local and foreign currency (figure V.3 and chapter II). In particular, deposits with the Central Bank increased in October and the first half of November (figure III.3), despite the fact that, on average, the short-term portion (90 days) of the external credit lines represent under 40% of the inflows from credit allocated to financing foreign trade operations.

On the liabilities side, foreign currency time deposits in the local system grew more than US$4.4 billion between December 2007 and November 2008, of which US$1.05 billion correspond to deposits made by the Finance Ministry in October and US$700 million to deposits auctioned by the Central Bank in November, in its capacity as fiscal agent.

The banking system maintains a low net exposure to foreign currency risk…

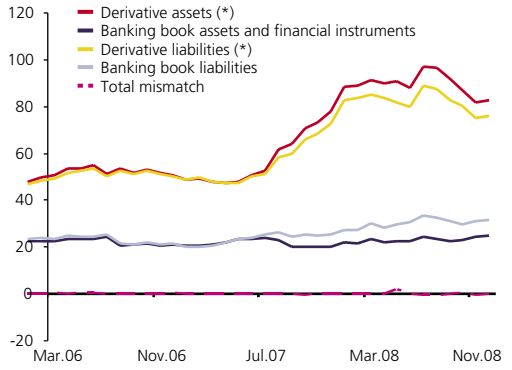
The pension funds' increased demand for currency hedging, which was behind the increased activity in the currency derivatives market beginning

[3]/ Corresponds to the change in flows accumulated between January and November of each year.

Figure V.4

Foreign exchange balance of the banking system

(US$ billion)



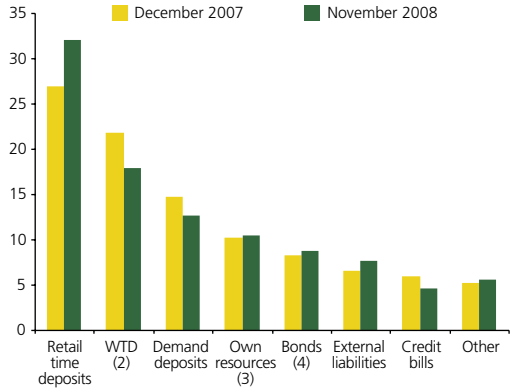
(*) Includes notional value of foreign exchange forwards and swaps.

Source: Own elaboration based on SBIF data.

Figure V.5

Sources of bank funding

(percent of total liabilities) (1)



(1) Total liabilities, net of contingent liabilities and fair value of derivatives instruments.
(2) Wholesale time deposits. Includes mutual and pension funds.
(3) Includes base capital, provisions, net fair value of derivatives instruments, and earnings.
(4) Includes senior and subordinate bonds.

Source: Own elaboration based on SBIF data.

in the second half of 2007, has contracted in the past few months. The banking system's net asset position in currency derivatives, resulting from this demand, tends to be offset with a net liability position on the rest of the balance sheet, so that the system limits its exposure to currency risk, on the order of US$200 million or 1.4% of equity (figure V.4).

This has allowed the banks to lessen the impact of the exchange rate hike (by offsetting losses in foreign exchange earnings with gains in currency hedging transactions), especially in banks oriented toward the lending business.

During the most stressful weeks of September and October, there was a greater perceived risk of nonrenewal of derivatives contracts with a foreign counterparty, which would have led to an increase in currency mismatches. Despite the slower activity in the derivatives markets, this risk has not materialized, but rather has tended to diminish, thanks to the plans to rescue troubled financial institutions implemented by the authorities in the main economies affected by this global crisis. Moreover, the banks in the Chilean system exhibit relatively low exposure (in derivatives contracts and assets) to those counterparties with the most severe financial problems.

…and diversified sources of financing

As of November 2008, the Chilean banking system has a diversified financing structure (figure V.5), in which retail deposits make up the main source (32% of total liabilities). Next are wholesale time deposits (18% of total liabilities), including pension funds (10%) and mutual funds (8%). The latter exposure has become relevant in the current, highly volatile scenario.

Even so, local financing has also been affected by the volatility in external markets

The turbulence in the external market triggered an increase in local money market rates toward the end of September, including short-term bank deposit rates (chapter III). A parallel increase was seen in short-term lending rates. While the former have fallen, the latter remain high, thus increasing bank spreads.

Internal estimates suggest that, in order to offset the cost to the banking system of stockpiling liquid assets, it would be necessary to increase lending rates by around 15 basis points[4]/, which is almost a third of the largest increase observed in the short-term loan segment (up to 30 days).

[4]/ In monthly terms.

Figure V.6

Real growth of loans

(12-month percent change)

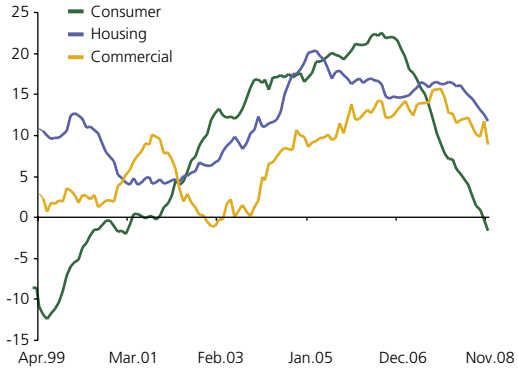
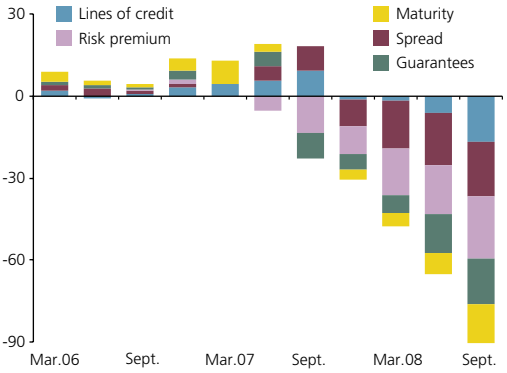


Figure V.7

Index of change in lending conditions to large firms (1) (2)

(percent)



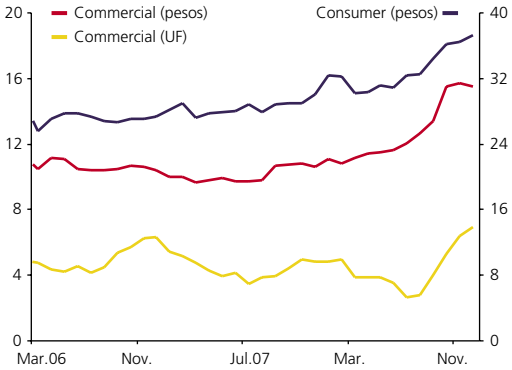
(1) Firms with annual sales over UF100,000.
(2) Constructed from the Central Bank of Chile's Bank Lending Survey. Negative values indicate tighter conditions.

Source: Central Bank of Chile.

Figure V.8

Interest rates on bank loans

(annual percent)



Source: Central Bank of Chile.

Given the uncertain economic environment, business financing has slowed

Loans to the mega-business segment underpinned the strong performance of commercial loans until late 2007, with real annual growth rates above 15%. Despite strong growth of commercial loans in October 2008 (2.5% in real terms in the month), over the course of the year they have slowed (figure V.6)[5]/.

This slowdown is explained by both stricter lending conditions and a drop in the sector's demand. The findings of the Central Bank's Bank Lending Survey for the third quarter of 2008 show that over 91% of banking institutions tightened their lending conditions, as a result of the deterioration in the economic environment and the world economic outlook, together with a less favorable perception of their clients' credit risk. In the same period, the number of banks that reduced the amounts and maturities of loans to large firms increased (figure V.7). Macroeconomic projections for the coming quarters indicate that this credit slowdown could intensify.

Between June and December 2008, the average interest rates on commercial loans in pesos rose by 380 basis points, while UF rates increased by 330 basis points (figure V.8). The difference could be explained by the large number of banking institutions that have increased risk premiums on loans to this sector (figure V.7).

Consumer credit, which is highly sensitive to the economic cycle, continued to decelerate

In November 2008, consumer loans posted a real annual contraction of 1.6%, while nominal growth fell an average annual 14% in the first half of 2008, to almost 8% (figure V.6). Depending on the evolution of employment and output in the coming months, there may be further contractions in this segment.

The sensitivity of this type of credit to the economic cycle has had a strong impact on banks oriented to this segment. At the system level, consumer loans represent around 11% of the total loan portfolio, but in these institutions the share exceeds 65%. Following a highly expansionary period in previous years, the credit portfolio of the consumer banking industry slowed sharply, from a near zero growth rate in late 2007 to a real annual contraction of 9% in November 2008.

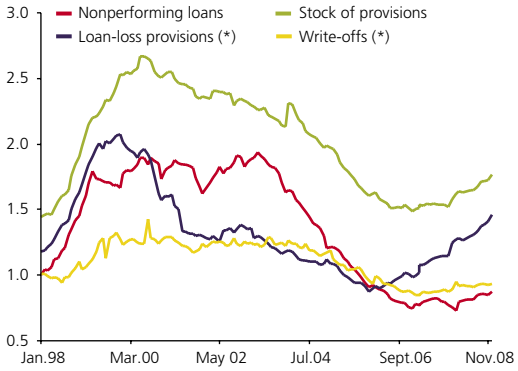
Consumer lending rates have steadily been adjusting upward since the first quarter of 2008, which is consistent with higher inflation and the increase in the perceived risk of the sector within the current economic scenario (figure V.8).

[5]/ The growth in October could be explained, in part, by the increased use of bank lines of credit by some firms to build up liquidity for precautionary purposes. For more detail on the construction of this series, see box IV.2 of the *Financial Stability Report*, first half 2008.

Figure V.9

Indicators of credit risk

(percent of loans)



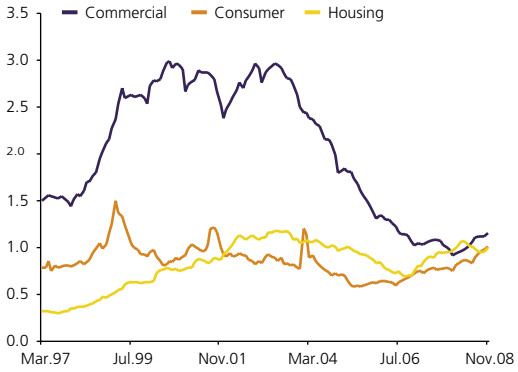
(*) Moving years ending each month.

Source: Own elaboration based on SBIF data.

Figure V.10

Nonperforming loans indices

(percent)



Source: Own elaboration based on SBIF data.

Figure V.11

ROE distribution

(percent of capital and reserves by group of banks)

Source: Own elaboration based on SBIF data.

Loan-loss provisions continue to grow, despite the fact that the portfolio's default level remains low by historic standards

Increased provisions constitute an important safeguard for facing a real recession, in which the probability of the quality of the credit portfolio deteriorating rises (figure V.9). This would be reflected in an increase in nonperforming loans, which grew slightly in the consumer and commercial segments over the course of 2008 and through the close of this *Report* (figure V.10).

An important share of the growth in consumer loans in recent years owed to the entry of debtors characterized by lower income and greater relative risk. The banking system has therefore constituted a rising level of loan-loss provisions: in November, they stood at 5.7% of total system loans, 6.3% in consumer banks and 9.6% in the average consumer divisions[6]/.

The exposure of the commercial loan portfolio to sectors that are sensitive to the economic cycle, such as retail and construction, represents approximately 30% of total loans to the corporate sector. There is also a direct exposure of around 20% to nonbank financial companies, such as factoring and leasing companies, among others. In a scenario characterized by slow employment growth and a sluggish economy, these sectors could contribute to an increase in default on commercial loans[7]/.

The local banking system maintains a capital adequacy ratio around 12%, and its profitability is near the average of the past 15 years

Despite the increase in loan-loss provisions in 2008, the system's return on capital remains around 16% in annual terms, with the larger banks posting the highest profit levels (figure V.11).

The higher level of loan-loss provisions in banks concentrated in the retail segment, combined with the contraction of consumer loans, sharply reduced the return on equity of this group of institutions, from 12.9% to 5.6%, on average, in the past year. However, the capital adequacy ratio (CAR) of these banks (17%) exceeded the system's average (11.7% in October), which has been aided in the past year by the contraction of loans in these banks and by the issue of subordinate bonds.

In October a greater number of institutions registered a smaller capital gap, that is, with a CAR in the range of 10% to 11% (figure V.12). This is explained by the increase in risk-weighted assets, as a result of the nearly 20% depreciation of the peso and the greater commercial loans in the month.[8]/

[6]/ The figure for consumer divisions is for October 2008. Consumer division loans represent 20% of total consumer loans in the system.

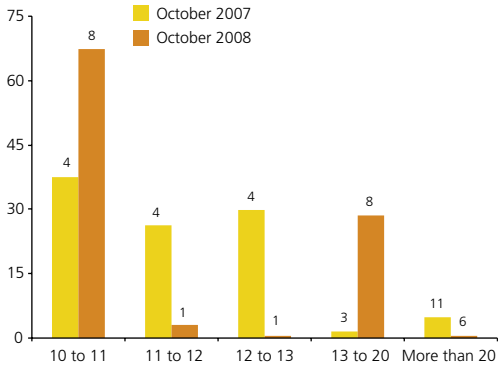
[7]/ A new concept of portfolio quality comes into effect in 2009, which will generate new data on the banking system's exposure to credit risk (box V.2).

[8]/ See note 5.

Figure V.12

CAR distribution (*)

(percent of risk-weighted assets, by CAR range)



(*) The values over each bar indicate the number of banks in each range.

Source: Own elaboration based on SBIF data.

Some of these banks do not have sufficient margin to issue subordinate bonds. However, several of them have already begun the process of issuing new shares to widen their capital base.

In an environment of slower economic growth, capitalization decisions become particularly important for strengthening the banking system's capacity to provide financing to the economy and to contribute to facilitating access to external credit. These policies are prudent in the current context.

Stress tests

Stress tests are an analytical tool that contributes to identifying weaknesses and sizing up financial strengths in a given moment of time. Given their static and partial nature, they do not necessarily uncover all the effects of specific risk scenarios.

The tests carried out in September 2008 suggest that the banking system maintains the capacity to absorb the materialization of the external risk scenarios, associated with the threats presented in chapter I[9]/.

Exposure to credit risk has increased relative to the last quarter of 2007, while exposure to market risk remains flat

The stress tests show that credit risk is the most important risk for the local banking system. In the two risk scenarios considered in this *Report* (chapter I), loan-loss provisions as a percentage of loans, which is an indicator of portfolio quality, increased from 1.4% (September) to 1.7% and 2.1% of loans, respectively, with consumer loans showing the strongest impact. These levels are similar to those observed in 1998–2001 (figure V.9)[10]/. The system's losses associated with credit risk represent 1% of capital in the baseline scenario and nearly 8% in the most severe risk scenario.

The risk of losses from financial instrument pricing in the face of changes in the structure of interest rates is on the order of 2% of the system's capital. Risk stemming from the repricing of assets and liabilities remains below 1% of capital, even in the most severe scenario.

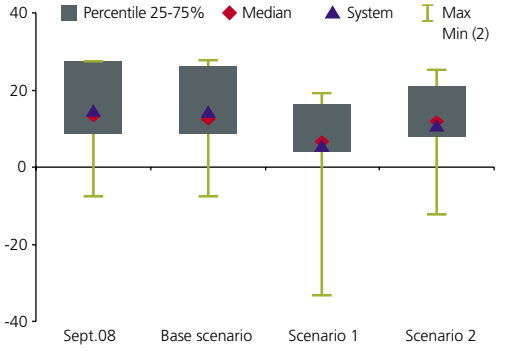
Exposure to currency risk remains low, because the majority of the institutions maintain a relatively matched foreign exchange position. However, the depreciation of the peso could have an impact on the system's CAR, since it increases the value of risk-weighted assets denominated in foreign currency. The tests carried out to measure this effect, under different assumptions for depreciation, show limited changes to the CAR at both the individual and system levels. This is essentially explained by the small share of foreign currency assets on the local banking industry's balance sheet.

[9]/ The risk scenarios evaluated in this exercise are as follows: (1) a sharp fall in the pricing of financial assets with real effects and (2) a global recession. These are constructed as deviations from the baseline scenario, which corresponds to the projection scenario presented in the most recent *Monetary Policy Report*. For details, see Jara, Luna, and Oda (2008).

[10]/ For details on the methodology used to calculate credit risk, see Alfaro, Calvo, and Oda (2008).

Figure V.13

Impact of different risk scenarios on the profitability of capital (1)

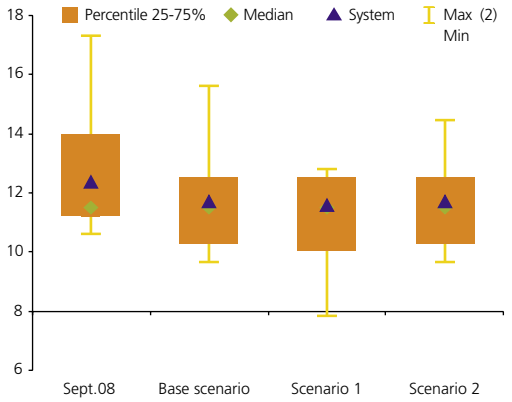


(1) Figures are weighted by the base capital of each institution in September 2008.
(2) Minimums correspond to the first percentile.

Source: Own elaboration based on SBIF data.

Figure V.14

Impact of different risk scenarios on the CAR (1)



(1) Figures are weighted by the base capital of each institution in September 2008.
(2) Maximums correspond to the 90th percentile.

Source: Own elaboration based on SBIF data.

As of September 2008, the system's profitability was 14.6%, but some banks, which together add up to 16% of the system's capital, reported losses. Based on this situation, the impact of losses from credit and market risk reduces the system's profitability to 5.6% of capital in the most severe scenario. In this scenario, banks with losses represent 20% of the system's capital (figure V.13). However, without taking into account possible capitalizations or changes in the amount granted, the system's CAR remains around 11.5% in the risk scenarios (figure V.14).

Box V.1: **Aspects of mortgage market regulations in Chile**

The national mortgage market continues to be quite dynamic (with annual growth over 13%), showing low default rates (a nonperforming loan index below 1%), and collaterals appropriately valued over time.

This strong performance of the local market is explained not by the existence of especially stringent regulatory provisions that inhibit the development of private business, but rather by a set of complementary factors that act in conjunction, including the regulatory infrastructure, effective oversight, and the degree of market development.

Origination of mortgage loans

In Chile, three main instruments are used to finance mortgages: mortgage credit bills, endorsable mortgage loans , and nonendorsable mortgage loans. All three operations are subject to general standards and prudential regulations, issued by the Superintendency of Banks and Financial Institutions (SBIF). In addition, mortgage credit bills and endorsable mortgage loans are subject to specific regulations, in consideration of their placement on the securities market (table V.3).

Table V.3

Regulation of mortgage instruments

Regulation/Instrument	Bills	MHE	MH
Regulator	BCCh/SBIF	SBIF	No specific regulation
Loan to value ratio	75%	80%	No restriction
Maturity	More than 1 year	1–30 years	No restriction
Dividend	25% of borrower's income	No restriction	
Securitization	Unsecuritizable	No restriction	
Insurance	Fire and Mortgage life		No restriction

Sources: SBIF and Central Bank of Chile.

Mortgage bills are regulated by the Central Bank's financial guidelines and specific, complementary, SBIF regulations. Basically, they allow banks to finance mortgage loans with third-party resources, but the banks have to keep the original loans on their balance sheets and assume the default risk before the investors. They are subject to a number of regulatory provisions, including a maximum loan-to-value (LTV) ratio of 75% and a limit on payments to 25% of the borrower's income for loans under UF3,000.

Endorsable mortgage loans, as their name indicates, are loan securities that can be endorsed. They are subject to specific regulations issued by the SBIF, such as the requirement to maintain a maximum LTV ratio of 80%.

The available regulatory safeguards display a degree of convergence with developed countries; for example, in terms of the applicable LTV ratios[1]/. However, in the case of the U.S., not only were lending standards relaxed in recent years, but LTV ratios rose, from historical averages of around 80% to near 100%. In fact, it is estimated that 18% of loans originated in 2006 and 2007 reached LTV ratios above 100%[2]/.

Domestically, the combination of growing competition in recent years, increased availability of capital in the banking entities, and remarkably low interest rates drove the supply of financing toward nonendorsable mortgage loans. This type of loan allowed banks to offer their clients more flexible conditions, such as combinations of fixed and floating rates, payment conditions allowing the borrower to defer one or more payments a year over the life of the loan, and better LTV ratios than mortgage bills and endorsable

[1]/ Catte, Girouard, Price, and André (2004).

[2]/ Ellis (2008).

mortgage loans. Consequently, the share of nonendorsable mortgage loans in the stock of bank mortgage loans grew dramatically from 12% in the early 2000s to over 70% in 2008 (table V.4).

Tabla V.4
Composition of the housing mortgage financing market in Chile

Period	MH	MHE	Bills	Market total
		(percent)		(US$ million)
Dec.00	12.0	20.1	67.8	7,928
Dec.05	51.3	10.5	38.2	17,598
Sept.08	73.4	7.4	19.2	26,760

(*) Using the exchange rate at the end of each period.
Source: Own elaboration based on SBIF data.

Despite the prevalence of nonendorsable mortgage loans, which are not subject to specific regulations, loan origination standards have remained within appropriate parameters. For example, the supply of mortgage loans based on these instruments maintains LTV ratios below 100%.

Another sign that loan origination is correctly channeled is that this trend has not interfered with the market prices of financial goods, which remain correlated with variables such as economic growth, income, and the availability of land. Between 2001 and 2007, the prices of houses and apartments rose by roughly 32% and 14%, respectively[3]/. This local market performance contrasts with market behavior in developed countries, where housing prices doubled or tripled in the same period[4]/.

All of the above is related to good practices by local banks, together with the supervision processes applied by the SBIF to assess the banking entities, in terms of their capacity to manage their credit and financial risks. This evaluation system is formulated into the guidelines issued by the Superintendency, in accordance with the principles outlined in the General Banking Law[5]/.

This oversight process covers over 85% of the total supply of mortgage loans in the country, which is the share generated by the banking industry. The remaining share of mortgage credits is originated by insurance companies (overseen by the SVS) and mortgage brokers (*sociedades administradoras de mutuos hipotecarios*).

The debate on the advisability of the reach of financial oversight has become particularly relevant in the context of the international financial crisis. In particular, a recent report by the U.S. Department of the Treasury establishes that over 50% of the loans classified as subprime were originated by loan entities and brokers that were not subject to federal oversight[6]/.

Structured financing

Chile has sufficient legal and regulatory base to ensure that the mortgage financing entities (banks, insurance companies, and brokerages) transfer some of their endorsable and nonendorsable mortgage loans to a securitization vehicle, which in turn can issue a securitized bond similar to the mortgage-backed securities (MBS) used in the U.S.

Despite the existence of this legal framework, structured financing mechanisms have developed slowly in the country, and they have not reached significant volumes from a systemic perspective. The total current stock of mortgage-backed securitized bonds was about US$350 million in October 2008, which is a little more than 1% of the total stock of housing mortgage loans issued by the banking sector[7]/.

The above is associated with the business preferences of market agents and the banks' capital cushion, among other factors. Another factor involves the cyclical difficulties that have arisen in past years, stemming from increases in the demand to refinance the underlying loans of these instruments when market interest rates fell to record lows.

Additionally, the market participants follow good practices in terms of managing these instruments. For example, while there are no specific prohibitions on securitizing nonendorsable mortgage loans, in practice the securitized bonds that are issued are backed by endorsable mortgage loans originated under tighter conditions, as mentioned above.

[3]/ The real transaction price index for Santiago (IPVT), estimated internally on the basis of data provided by ACOP.

[4]/ Borio and Guire (2004).

[5]/ Chapters 1–13, "Clasificación de Gestión y Solvencia," in the SBIF's *Recopilación Actualizada de Normas*.

[6]/ Paulson, Keel, and Nason (2008).

[7]/ Data for October 2008 available at www.svs.cl.

Another of the country's strengths is the existence of a single securities registry maintained by the SVS. This registry contains detailed information on the issue dates, the securitization vehicle, and characteristics of the underlying assets.

All of the above contrasts with the widespread use of structured financing practices in developed markets. Particularly in the U.S., the mortgage financing market is based on the originate-to-distribute model, through which the majority of mortgage loans generated by commercial banks and other financial entities have been moved off the balance sheet. There is no single agency (equivalent to the SVS in Chile) that centralizes information on these instruments and the risk profile of the mortgages that back them up. The creation of an agency that serves this function is one of the objectives of the proposals to reform the U.S. regulatory system that have been presented to date.

Credit derivatives

The associated transactions of financing vehicles like MBS and credit derivatives have presented additional complexities, mainly in terms of adequate risk management. For example, credit default swaps (CDSs) provide insurance against default risk and have been widely used in the last decade, in relation to the development of the mortgage market in the U.S. and other developed countries. However, CDSs have also proven to have adverse effects by making it more difficult for investors to appropriately assess their exposures.

In Chile, the regulatory provisions on financial matters issued by the Central Bank, in accordance with the provisions in the General Banking Law, regulate operations with derivative instruments. These regulations allow the use of a wide range of derivative instruments, and some, such as forwards and swaps, have been developed extensively in the local market. The use of credit derivatives, however, has not been authorized to date.

Future financial developments in the regulatory infrastructure and local markets should draw on observation of the international experience, extracting lessons so as not to make the same mistakes.

Box V.2: **Changes in the accounting valuation principles of the national banking system**

Beginning in January 2009, changes will be introduced in the valuation principles of certain bank assets and liabilities, which will require banks to make adjustments in their capital accounts. Some of these changes complement the process of adopting the International Financial Reporting Standards (IFRS), initiated by the Superintendency of Banks and Financial Institutions (SBIF) in 2001[1]/.

These changes will affect the level of some entries on the balance sheets and income statements of banks operating in Chile and, therefore, the evolution of a series of indicators that are traditionally used in the analysis and oversight of the sector.

Main changes

(i) Loan valuation. Loans will be valued based on amortized cost, that is, the amount that was initially recognized less principal payments, plus or minus accrued indexation allowances and interests at the effective interest rate. The latter is determined based on the future cash flows of the instrument and the net amount of the initial loan; that is, it corresponds to the internal rate of return (IRR).

The application of this principle will affect both the book value of the loans and the net interest margin of these operations, because some of the necessary costs of loan origination will be included in the asset corresponding to the loan. Loans are currently valued at cost, but the associated origination costs are recorded in other asset accounts.

(ii) Provisions for contingent credit losses. Banks must constitute loan-loss provisions for contingent credit, which currently is not considered. This includes the amounts approved for open lines of credit, which represented more than 60% of total contingent credit in October 2008[2]/. To measure the contingent credit exposure, the new standards establish conversion factors both for constituting provisions and for capital requirements.

(iii) Revaluation of fixed assets. Although the banking sector's fixed physical assets only represent around 1% of total assets, the adjustment that banks will have to make in January 2009 could have an impact on equity in some cases, because the goods will now be priced at their appraised value.

(iv) Deferred expenses. Starting in 2009, banks will no longer be able to defer the recognition of certain expenses in earnings (such as organization and start-up costs or expenses incurred in the sale of products). Consequently, any balances that are still being accounted on the assets side must be deleted from the opening balance sheet in January 2009, with effects on equity.

(v) Impaired portfolio. The banks will have to use a new credit category: the impaired portfolio. This portfolio comprises all credit to debtors for whom there is evidence that they will default on some of their obligations, even if they are currently up to date on their commitments. Evidence of possible default includes, for example, financial difficulties on the part of the debtor, imminent bankruptcy, forced restructuring, and exceeding the predefined limits on credit lines or overdrafts.

(vi) Monetary correction. Starting in January 2009, monetary correction will be eliminated. Banks will no longer be able to record either the revaluation of paid-in capital or the charge to earnings for this item. Since paid-in capital and bank reserves will no longer increase automatically through this revaluation, the maintenance of capital will require decisions on the part of these entities with regard to dividend payout and the constitution of reserves.

[1]/ See the box, "International financial reporting standards in the local banking sector," *Financial Stability Report*, second half 2007.

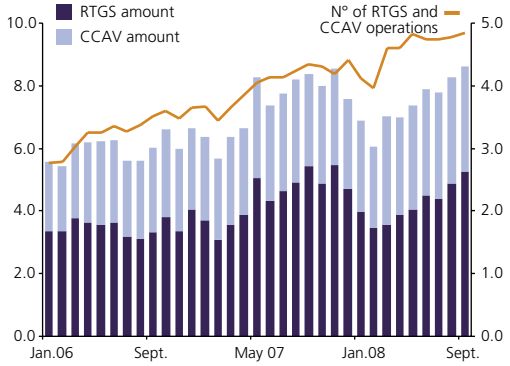
[2]/ To date, only the amount used on credit lines is subject to loan-loss provisions.

VI. Financial regulations and infrastructure

Figure VI.1

Payments settled in the large-value payment systems (*)

(trillions of pesos, number of transactions in thousands)



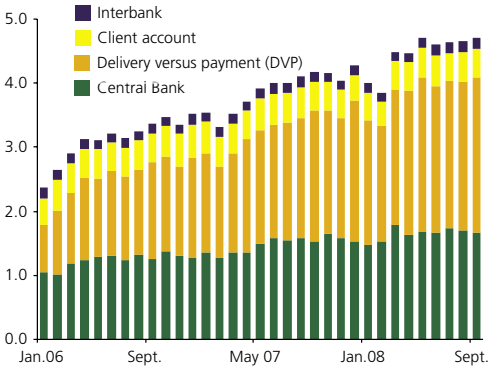
(*) Monthly daily average.

Sources: Combanc and Central Bank of Chile.

Figure VI.2

Types of payments settled in the large-value payment systems (*)

(number of operations in thousands)



(*) Monthly daily average.

Sources: Combanc and Central Bank of Chile.

This chapter reviews the functioning and development of the payment systems and the infrastructure that supports the operation of the local financial markets, as well as recent initiatives in the area of the financial regulatory framework and prudential regulation, both in Chile and abroad.

Payment systems and financial infrastructure

Large-value payment systems

The large-value payment systems are made up of the real-time gross settlements (RTGS) system and the Large-Value Payment Clearing House (CCAV). Both systems process interbank, client account, and delivery versus payment (DVP) operations.

The number of operations settled in the large-value payment systems in the third quarter of 2008 averaged 4,788 payments per day, which is 13% more than the average for the same period of 2007. The total value of the operations settled, however, grew slightly more than 1% in the same period, reaching $8.6 trillion per day (figure VI.1).

This uneven behavior of the aggregate figures for the value and number of transactions in the period under analysis is explained by the more dynamic performance of transactions channeled through the CCAV, relative to those processed through the RTGS system.

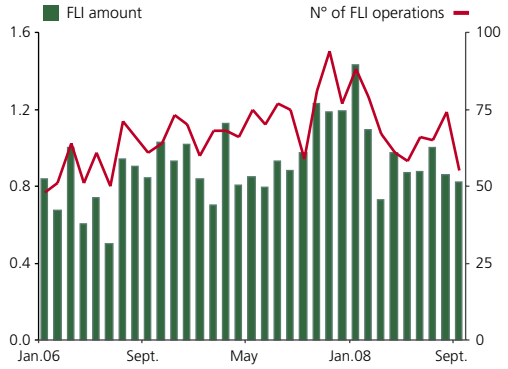
Transactions processed through the CCAV grew 17% in number and almost 8% in value. This expansion was driven mainly by the larger volume of client account operations, which increased almost 30% in number and 22% in value, reaching a daily average of 2,094 operations for a total of approximately $1.8 trillion (figure VI.2). The CCAV processes around 80% of the system's total client account operations, so its dynamic performance is directly reflected in the behavior of the aggregate data.

The more sluggish trend of operations through the RTGS system essentially stems from a drop in the volume of Central Bank transactions, which reached a daily average of $1.8 trillion in the third quarter of 2008, almost 13% lower than in the same quarter of 2007. While this type of transaction accounts for a small percentage of the total number of operations in the system (3.5%), they represent over 30% of the total in terms of value, which explains their importance in the period under analysis.

Figure VI.3

Use of the Overnight Liquidity Facility (FLI) (*)

(Ch$ trillion, number of operations)



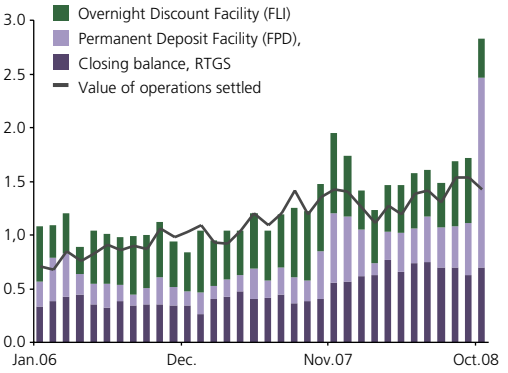
(*) Monthly daily average.

Source: Central Bank of Chile.

Figure VI.4

Liquidity in the RTGS system (*)

(Ch$ trillion)



(*) Monthly daily average.

Source: Central Bank of Chile.

Table VI.1

Primary means of retail payment

	2007	2008 (*)
	(Ch$ trillion)	
Checks	371.8	386.4
Automatic teller machines (ATM)	10.3	11.5
Nonbank credit cards	3.8	4.2
Bank credit cards	2.6	3.2
Debit cards	1.2	1.8
Internet operations	n.a.	n.a.
	(millions of transactions)	
Checks	259.0	251.6
Automatic teller machines (ATM)	264.3	285.2
Nonbank credit cards	159.9	172.9
Bank credit cards	68.2	79.0
Debit cards	70.1	97.3
Internet transfers	117.3	123.3

n.a.: Not available.
(*) Last available data, annualized.

Source: Own elaboration based on SBIF data.

Central Bank operations are mainly associated with providing liquidity to the banking system. The banks can go to the Overnight Liquidity Facility (FLI) and the Permanent Deposit Facility (FPD), which the Central Bank offers through its Open Market Operations System (SOMA). The FLI was used less in the third quarter of 2008 than in the same period of 2007, declining to levels similar to 2006's (figure VI.3).

Use of the FLI continued to fall after the close of the third quarter, while use of the FPD expanded substantially (figure VI.4). This reflects the fact that the financial entities had a greater relative availability of funds, held in demand deposits with the Central Bank.

The increase in available resources corresponds to a precautionary strategy adopted by some entities, in response to the heightened uncertainty about the availability of external financing. The situation peaked in October, then diminished in subsequent weeks as the capitalization and/or rescue plans announced by foreign authorities contributed to normalizing the functioning of the international financial markets.

Low value payment systems

The total value of payments made with checks (more than $386 trillion per year) represents more than 90% of the total value processed through the retail payment systems (table VI.1). However, the total number of checks cashed continues following a downward trend, with a systematic reduction of around 3% a year (figure VI.5). Thus, in terms of the number of operations, the share of this means of payment has fallen to 38% of the total. This can be explained because the alternative means of payment, such as Internet transfers, generally limit the maximum amount per transaction, which impedes their use in the larger-value payment segment of the retail payment system.

In contrast to the number of checks cashed, all other forms of retail payment showed sustained growth. Debit cards were particularly dynamic in the last period, with an annual growth of 40% in number and 50% in value.

Bank credit card transactions grew nearly 16% relative to the previous year, which was more than double the growth rate of nonbank credit cards in the same period. Credit cards issued by the banking sector thus recovered some of the ground lost in previous periods. The total combined value of bank and nonbank credit card transactions amounted to $7.4 trillion, with bank cards increasing their share from 41% in 2007 to 44% in 2008.

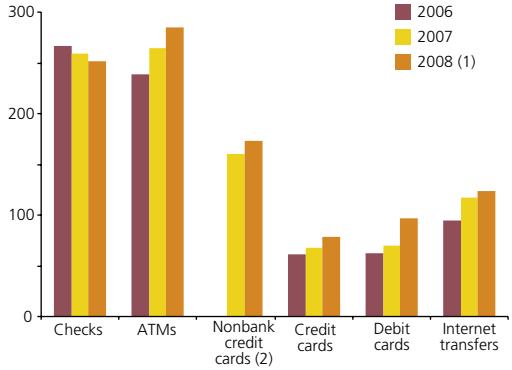
Finally, the growth in electronic bank transfers made over the Internet has tended to slow relative to previous years. Even so, these transfers exceeded 123 million transactions per year. Thus, in terms of the number of transactions, this form of payment is the fourth most commonly used retail payment system.

The elimination of the tax on transactions made with checks, debit cards, ATM withdrawals, and transfers, including electronic transactions, came into effect in October 2008. This could affect the behavior of some of the retail

Figure VI.5

Means of retail payment

(millions of transactions)



(1) Last available data, annualized.
(2) Available since 2007.

Source: Own elaboration based on SBIF data.

payment means. In particular, the volume of small value payments made via debit cards is expected to increase.

Financial framework and prudential regulation

Regulatory framework issued by the Central Bank of Chile

Temporary modification of the regulations on the constitution of reserves (October 2008, www.bcentral.cl)

The Central Bank temporarily authorized banking firms and savings & loan associations to constitute reserves in foreign currency, with no distinction between U.S. dollars, euros, or Japanese yen. The objective of this change is to facilitate the management of foreign currency liquidity given the global financial scenario facing the Chilean economy.

These regulations are in effect from 9 October 2008 to 8 April 2009.

Extension of the instruments eligible for carrying out repurchase agreement transactions (October 2008, www.bcentral.cl)

The Central Bank authorized the inclusion of bank-issued fixed-maturity certificates of deposit or promissory notes, in pesos and payable to the beneficiary, in the set of bank-issued fixed-income securities that can be used for repurchase agreement operations (repos). This authorization is part of a set of measures adopted by the Central Bank to facilitate the management of liquidity by local banking institutions in the face of the new international financial environment.

These regulations are in effect as of 10 October 2008.

Foreign currency swap program (October 2008, www.bcentral.cl)

Starting on 2 October 2008, the Central Bank announced a program of foreign currency swap auctions. On 10 October the program was extended from one to six months, and an announcement specified that the swaps would be offered at 60 and 90 days, alternating each week, for a value of US$500 million in each auction. This implies offering a total maximum value of US$5 billion. The auction program is one of the measures oriented toward smoothing liquidity management for the institutions that make up the local financial system, given the events in the international financial markets.

Modification of the pension funds' investment limits and related matters (September 2008, www.bcentral.cl)

On 8 September 2008, the Central Bank modified the regulations governing the investment limits on the pension funds and related matters, in accordance with the new legal framework introduced by the Pension System Reform passed in March 2008 (Law 20,255).

The main changes involve the increase in overseas investments, both at the aggregate level and by fund, which will gradually be raised between 1 October 2008 and 3 August 2009. On the latter date, the aggregate limit

on overseas investment will reach 60%, while the limits on the different types of fund will be as follows: 80% for Type A fund; 70% for Ttype B fund; 60% for Type C fund; 30% for Type D fund; and 25% for Type E fund. As on previous occasions, the Central Bank's objective with this increase is to uphold the legislator's decision to give the AFPs more room for maneuver in their investments.

Foreign currency investment without currency hedging will reach its maximum level on 1 April 2009. The new limits by fund will be 50% for Type A, 40% for Type B, 35% for Type C, 25% for Type D, and 15% for Type E.

Additionally, and within the framework of Law 20,255, the Central Bank decided to gradually increase the limits on the AFPs' foreign currency investment without currency hedging. As of 1 April 2009, Type A fund can have up to 50% of its investment in foreign currency investment without currency hedging, Type B fund 40%, Type C fund 35%, Type D fund 25%, and Type E fund 15%.

Finally, as of 1 October 2008, the limits on overseas investment in relatively riskier instruments are 20% for Type A fund, 17% for Type B fund, 14% for Type C fund, and 10% for Type D fund.

In making this decision, the Central Bank considered that the gradual and preannounced expansion of the overseas investment limits would affect neither the normal functioning of internal and external payments nor the implementation of monetary policy.

This regulation took effect on 1 October 2008.

Extension of the recognition of Framework Agreements on Derivatives Contracts (August 2008, www.bcentral.cl)

The current bankruptcy laws (modified in 2007 by Law 20,190, MKII) allow the reciprocal compensation of liabilities stemming from derivatives contracts in the event that one of the counterparties declares bankruptcy, whenever these contracts are originated under a framework agreement on derivatives contracts recognized by the Central Bank of Chile and include a compensation agreement in the case of bankruptcy or forced liquidation. In the exercise of these powers, in January 2008 the Central Bank recognized the "1992 ISDA Master Agreement" and "2002 ISDA Master Agreement" for operations between nonbank counterparties.

On 7 August 2008, the Central Bank decided to extend its recognition to framework agreements on derivatives contracts in which one of the counterparties is a banking firm domiciled in Chile. Thus, the reciprocal compensation of liabilities stemming from these contracts is allowed —subject to compliance with certain general terms and conditions— in the case of a forced liquidation of a bank counterparty, in accordance with the stipulations of the General Banking Law.

Regulations issued by other supervisory organizations in the country

SVS establishes regulations on qualified investors and public offerings of securities in Chile (June 2008, www.svs.cl)

The Superintendency of securities and Insurance (SVS) implemented a set of regulatory changes with the goal of facilitating and promoting the public offering of foreign securities in Chile, within a framework that includes conditions and requirements to safeguard against the risks associated with these operations. To this end, the SVS authorized intermediaries and securities exchanges to sponsor the listing of foreign securities in Chile and established new requirements and conditions for acquiring qualified investor status.

The SVS also defined the requirements for making a public offering of foreign securities in Chile, establishing that any type of investor can acquire securities listed on markets recognized by the SVS. For securities listed on markets that are not recognized by the SVS, but are recognized by the International Organization of Securities Commissions (Iosco), access is granted only to qualified investors.

Superintendency of Pensions issues a Pension Fund Investment Regime (September 2008, www.spensiones.cl)

The Pension System Reform (Law 20,255) incorporated a series of amendments to the laws governing pension systems, including the expansion of investment possibilities in Chile and abroad. To this end, an "Investment Regime" was created, conceived as a more flexible regulatory instrument that acts as a complement to the structural regulatory principles established in the law. The Regime must be drawn up by the Superintendency (SP) and then receive a favorable report from the Technical Investment Counsel and the approval of the Ministry of Finance.

In accordance with these new legal provisions, the SP issued the Resolution containing the first Pension Fund Investment Regime on 9 September 2008.

Documents of interest published by national and international organizations

"Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience: Follow up on Implementation" (FSF, October 2008, www.fsforum.org)

This document reports on the follow-up to the recommendations to enhance the resilience of financial markets, presented by the Financial Stability Forum (FSF) in April 2008. While the report recognizes that the authorities' efforts in recent months have focused on emergency measures geared toward shorter-term effects, it also highlights significant advances, particularly in terms of strengthening supervision and improving accounting and disclosure standards.

The FSF considers it necessary to make additional coordinated efforts among its members, authorities, and other international agencies, in order to monitor the emergency measures and responses adopted in the face of the international crisis. It also expects to adopt additional measures to mitigate the sources of procyclicality in the financial system (for example, improving practices for estimating capital requirements and reserve constitution), extend the reach of financial regulation (with particular emphasis on institutions, instruments, and markets that are currently unregulated), and achieve better integration between the tracking of macroeconomic variables and prudential supervision.

Finally, taking into account the most recent events affecting the financial markets, the document emphasizes the need to accelerate the implementation of some of the recommendations for refining the functioning of the over-the-counter (OTC) derivatives market, accounting standards, and the quality of credit ratings and increasing the efforts by private associations to improve practices in their respective industries.

"Principles for Sound Liquidity Risk Management and Supervision" (BIS, September 2008, www.bis.org)

With the goal of incorporating the lessons learned since the start of the international financial crisis, the Basel Committee on Banking Supervision (BCBS) conducted a full review of its guidelines on "Sound Practices for Managing Liquidity in Banking Organizations", published in 2000. The review establishes 17 principles for strengthening the institutions' management of liquidity.

The first (and fundamental) principle defines the bank as responsible for the sound management of liquidity risk, assigning to the supervisor the functions of assessing the quality of the bank's liquidity risk management framework and its liquidity position and taking prompt action if a bank is deficient in either area in order to protect depositors. Principles 2 to 4 establish the role of the banks' corporate governance, which includes defining the level of liquidity risk tolerance and, from this perspective, formulating strategies and developing new products. Principles 5 to 12 cover the establishment of a sound process for measuring and managing liquidity risk, especially the risk involved in managing OTC derivatives and collateralized instruments. These principles emphasize the importance of updating the scenarios and assumptions of the stress tests, developing contingency plan, and maintaining a reserve of liquid assets that can be used in critical scenarios. Principle 13 establishes criteria on the public disclosure of information that allows market participants to accurately judge the soundness of a bank's liquidity position. Finally, principles 14 to 17 review the role of the supervisors in terms of their regular assessment and monitoring activities, their capacity to intervene in critical situations, and the development of mechanisms for communicating with other supervisors and authorities.

"Proposed Revisions to the Basel II Market Risk Framework" (BCBS-Iosco, July 2008, www.bis.org)

Given the significant losses experienced by banking entities in the past year, mainly stemming from exposure in their trading book, the Basel Committee presents a proposal for improving Basel II, especially in terms of expanding

the scope of the capital charge for incremental risk (which is addressed in detail in a separate consultative document, reviewed below), refining internal value-at-risk (VaR) models, and updating the sections on prudential valuation for positions subject to market risk.

With regard to internal VaR models, banks will be required to justify the exclusion of any variables that are normally used in pricing financial instruments, to carry out backtesting validation, and to periodically update market data. In the area of prudential valuation for positions subject to market risk, the Committee proposes to use a language more consistent with current accounting guidelines, and it establishes that regulators must have the capacity to require adjustments to current value, even beyond the standards for financial reporting.

"Guidelines for Computing Capital for Incremental Risk in the Trading Book" (BCBS-Iosco, July 2008, www.bis.org)

This publication provides an update to the guidelines on estimating an incremental capital charge (established by BCBS/Iosco, 2005), assigned to specific risks that originate in exposure in the banks' trading books and that are not appropriately reflected in VaR. These models for determining the incremental risk charge (IRC) are solely directed to institutions that estimate their market risks using their own models, developed in accordance with the guidelines in "Market Risk Amendment" (BIS, 1996).

The IRC, according to the extended definition presented in this document, should capture a broader spectrum of risks that are not already captured in default risk, such as those originating in changes in risk ratings, spreads, and prices of financial instruments. Supervisors should focus on the definition of standards for acceptable confidence intervals, capitalization and liquidity horizons, the inclusion of nonlinear impacts implicit in options positions, and possible adjustments for double counting (VaR/IRC). Finally, the document includes recommendations on validation, disclosure, and feedback.

"Containing Systemic Risk: The Road to Reform" (Counterparty Risk Management Policy Group, August 2008, www.crmpolicygroup.org)

This document focuses on the steps that must be taken by the private sector to reduce the frequency and/or severity of future financial shocks. It outlines initiatives focused on the future development and rehabilitation of the international financial system, which are organized into four areas of interest. First, the document discusses a reconsideration of the standards for accounting consolidation under U.S. generally accepted accounting principles (GAAP), in particular incorporating off-balance-sheet transactions onto the balance sheet. Second, it proposes measures for better understanding and managing complex financial instruments, with particular emphasis on their distribution and how the more sensitive risks are disclosed. Third, it analyzes the functions of risk monitoring and management, focusing on the role of sound practices of corporate governance and balancing liquidity, debt, and capital adequacy. Finally, it includes measures for increasing the resilience of credit markets in particular and financial markets in general, especially OTC derivatives market.

"Principles of Conduct and Best Practice Recommendations" (Institute of International Finance, September 2008)

Principles of conduct, best practice recommendations, and suggestions for authorities are presented as alternative practices for overcoming the current weaknesses of financial markets and reestablishing confidence among participants.

These recommendations are directed at strengthening market and liquidity risk management, designing compensation policies that incorporate risk as a performance variable, and improving valuation mechanisms. Finally, minimum conditions are outlined for developing originate-to-distribute processes, establishing, for example, the importance of applying the same standards for due diligence in credit assessment, independently of whether the assets are held on the books or distributed.

"Comprehensive Strategy to Address the Lessons of the Banking Crisis Announced by the Basel Committee" (BIS, November 2008)

In this document, the Basel Committee announced the development of a broad strategy for identifying the weaknesses in regulation, supervision, and risk management, which came to light in the international financial crisis and which are especially relevant for internationally active banks.

The fundamental objective is to strengthen Basel II, primarily along the following key dimensions: risks present in the trading book, base capital (including building up reserves to absorb financial shocks), risk-based measures, supervisory capacity for assessing cross-border liquidity requirements, corporate governance, counterparty risk, and risk management and disclosure. It also promotes globally coordinated supervisory follow-up exercises to ensure the implementation of best practices.

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Glossary

AAA bonds: Corporate bonds with the best possible risk rating (in the Standard & Poor's rating system), which means they have a low probability of default.

ABS: Asset-backed security. A long-term bond backed by a set of assets, usually made up of consumer loans (credit cards and car loans), student loans, home equity loans, or commercial loans. ABSs that are backed by mortgage assets are called mortgage-backed securities (MBSs).

Acid liquidity: The acid-test ratio, or the ratio between current assets net of inventory and current liabilities.

Average interbank interest rate swap (*promedio cámara*): Derivatives contract between two parties, who carry out an exchange of flows at future dates, between a fixed rate established when the contract is written and a variable rate (fixed-for-floating swap). The variable rate corresponds to the average interest rate in the interbank clearing house (*cámara*), which in turn is derived from the average clearing house index.

Backtesting: Statistical processing of historical data on the performance of a financial institution's investments. It is used to assess, for example, business strategies and risk valuation tools. In the context of international guidelines financial regulation policy issues, it refers to the periodic comparison of a financial entity's daily VaR, with regard to income and losses generated through financial instrument transactions.

Basel II: The second accord issued by the Basel Committee on Banking Supervision (BCBS), with the goal of creating an international standard for the banking industry's operation and risk control. Basel II is based on three pillars, which seek to foster greater stability of the financial system: (1) minimum capital requirements aimed at making resource allocation more sensitive to credit and market risks; (2) procedures for improved supervision; and (3) greater market discipline.

Basis point: Unit of measure of the volatility of a bond that is traded in financial markets, equal to one one-hundredth of one percentage point (0.01%).

Base capital: Paid-in capital plus bank reserves.

CAR: Capital adequacy ratio. A measure of a bank's financial soundness, measured as the ratio of capital to credit-risk-weighted assets.

CCAV: Large-Value Payment Clearing House (*Cámara de Compensación de Pagos de Alto Valor*). Electronic system of interbank payments that operates as a netting engine, with procedures to ensure the final clearing of the net results of each settlement cycle in the RTGS system.

CDS: Credit default swap. A derivative instrument that provides insurance against the credit risk of the issuer of a given underlying sovereign or corporate bond. The institution that grants the CDS commits to covering the loss associated with a previously established credit event occurring before the bond's maturity date.

Central Government: Institutions associated with the three branches of the state (executive, legislative, and judicial), as well as Law 13196, the interest earned from recognition bonds, and the oil price stabilization fund.

Consolidated Government: Total Central Government and the Central Bank of Chile.

Consumer banks: Banks whose main business is consumer lending.

Credit risk: The possibility that a bank debtor or counterparty will fail to meet its contractual obligation, whether in interest or capital.

Currency mismatch: The difference between foreign currency liabilities and foreign currency assets, less the net position in derivatives (the difference between buy and sell positions in derivatives contracts).

Currency risk: Exposure to losses caused by adverse changes in the value of the foreign currencies in which the instruments, contracts, and other transactions recorded on the balance sheet are denominated.

Currency swap: A contract between two parties establishing a commitment to exchange the specified notional principal and fixed interest in one currency for the specified notional principal and fixed interest in another currency, at a future date and at a pre-established price. In this type of contract, the notional principal must be specified in both currencies.

Current external debt: External debt coming due within 12 months of a given date (that is, short-term external debt plus the current portion of long-term external debt).

Default: The nonpayment of the interest or principal on a legally contracted debt.

DIR: Debt-to-income ratio. Measures the debt held by households with different financial and nonfinancial entities as a percentage of their available income.

DVP: Delivery versus payment. A clearing mechanism that links a securities transfer system with a funds transfer system, guaranteeing that the delivery of the securities occurs simultaneously with the payment thereof.

EBITDA: Earnings before interest, taxes, depreciation, and amortization. Used as an approximation of operating cash flow.

EMBI Global Premium: Measure of the difference between the return on emerging economies' sovereign debt in dollars issued in international markets and U.S. Treasury bonds.

EMBI Premium: Measure of an economy's risk. The difference between the return on a country's sovereign debt in dollars issued in international markets and U.S. Treasury bonds.

External debt: Includes bank debt, bonds, and other overseas loans, as well as loans associated with foreign direct investment.

Factoring: A financing option oriented toward small and medium-sized enterprises, which allows such firms to obtain liquidity by selling or assigning their accounts receivable. The receivables are usually made up of invoices, checks, and drafts. The firm receives a cash advance in exchange for transferring the right to collect payment on the accounts to the factor, which could be either a bank or a specialized firm called a factoring company.

FEES: Economic and Social Stabilization Fund (*Fondo de Estabilización Económica y Social*). Created in 2007 by Decree with Force of Law DFL N° 1, of 2006 issued by the Finance Ministry. The Fund's objective is to accumulate the surplus flows that are generated by the application of the structural balance rule, and it will serve as a source of financing in future deficit periods.

Financial debt: Debt that pays interest, measured as bank debt, plus public liabilities (bonds and commercial papers).

Financial indebtedness: Ratio of financial indebtedness, measured as financial debt/(Equity plus minority interest).

FIR: Debt-service coverage ratio. Measures the payments that households must make to fulfill their consumer and mortgage loan commitments, as a percentage of their available income.

Fiscal agent: Legal representative of the General Treasury that manages and invests public resources on behalf of and at the risk of the State, among other functions.

FLI: Overnight Liquidity Facility (*Facilidad de Liquidez Intradía*). Financing granted by the Central Bank of Chile to banking entities through the RTGS system. This facility operates daily through the purchase of financial instruments with a repurchase agreement. The terms and conditions of these operations are contained in the Central Bank's financial regulations.

Foreign trade banks: Banks that are oriented toward foreign trade loans and that also invest in derivative and nonderivative financial instruments.

Forward: A contract between two parties, establishing a commitment to exchange a certain quantity of an asset on a future date, at a predetermined price.

FPD: Permanent Deposit Facility or Liquidity Deposit Facility (*Facilidad Permanente de Depósito o Depósito de Liquidez*). Operations through which the Central Bank contributes to banks' liquidity management by accepting deposits. The deposits collect interest on the agreed maturity date, as established in the Central Bank's financial regulations.

FPL: Permanent Liquidity Facility (*Facilidad Permanente de Liquidez*). Financing instrument loaned by the Central Bank of Chile to banks via the purchase of securities with a repurchase agreement. This facility is contracted at an interest rate and maturity established in the Central Bank's financial regulations.

FRP: Pension Fund Reserve (*Fondo de Reserva de Pensiones*). A fund created by the Fiscal Responsibility Law, whose objective is to complement the financing of fiscal liabilities deriving from the state minimum pension guarantee on old age, disability, and survivor's pensions and welfare benefits. It is managed by the Central Bank of Chile in its capacity as fiscal agent, under investment guidelines defined by the Finance Ministry's Decree 1382 and complementary instructions.

GSE: Government Sponsored Enterprises. Private firms with public policy objectives, created by the U.S. Congress to reduce the cost of capital to certain sectors of the economy and to increase the transparency and efficiency of capital market in those segments. The sectors in question are students, mortgage debtors, and farmers.

High-yield bonds: Corporate bonds that have a risk rating below investment grade (CCC to BB, in the Standard & Poor's rating system), which means they have a high default risk.

IFRS: International Financial Reporting Standards. A set of standards issued by the International Accounting Standards Board (IASB), whose goal is the comparable and transparent revelation of financial statement information, for all participants in the world capital markets.

Interbank rate (IBR): The daily weighted average rate on uncollateralized loans of bank reserves between banks.

Interest coverage: A measure of payment capacity, defined as the ratio of EBITDA to financial expense.

Interest rate risk: Exposure to losses caused by adverse changes in interest rates, which affect the value of the instruments, contracts, and other transactions recorded on the balance sheet.

Liquidity risk: The risk that a counterparty (or participant in the payments system) will not be able to meet its obligations when they come due, although it may be able to do so in the future. Liquidity risk does not necessarily imply that the counterparty is insolvent.

LVPS: Large-value payment systems. Comprises the RTGS and CCAV systems.

Operating margin: A firm's profitability, independent of how it is financed. Measured as the ratio of operating income to sales income.

Market risk: The potential loss in value of the net positions held by a financial entity, as the result of adverse changes in market prices.

MBS: Mortgage-backed security. An ABS backed by mortgages.

Medium-sized banks: Banks with a smaller market share and less diversification than multibanks.

MHE: Endorsable mortgage loans (*mutuos hipotecarios endosables*). Money loans that are recorded in a registered deed and collateralized by real estate, given to individuals or legal entities to finance the purchase, construction, extension, or repair of any type of real estate. They are called endorsable mortgage loans because once the seller is paid, the loan can be assigned (endorsed) to other institutions authorized by law.

MSCI Emerging Markets Index: An index created by Morgan Stanley Capital International to measure the stock market performance of emerging markets worldwide.

Multibanks: Banks with a large market share and a high degree of diversification in their operations (loans and derivative and nonderivative financial instruments).

Negotiable deposit rate: The interest rate at which bank deposits are traded in the secondary market of the Santiago Stock Exchange.

NIIP: Net international investment position. The difference between the economy's external assets and liabilities.

Onshore dollar rate: Estimate of the external rate relevant to the national foreign exchange market, which is, in general terms, derived from the covered interest rate parity.

Onshore dollar spread: The difference between the onshore rate and the LIBOR. It is therefore a proxy for the cost of financing in dollars in the national market vis-à-vis the international market.

Originate-to-distribute: A widely used mechanism in developed financial markets, through which a financial entity can increase its lending capacity (originate), for an established capital level and/or regulatory limit, by transferring these operations off the balance sheet through a range of ABSs (distribute).

Overnight rate: The rate at which the banks grant immediate financing to other banks.

Over-the-counter: A term used to describe the trading of financial instruments directly between two parties, without going through the organized securities exchanges.

Primary dealers: Financial institutions authorized to participate directly in the U.S. Federal Reserve's open market operations and U.S. Treasury bond auctions.

Prime deposit rate: Interest rate that financial institutions offer their best clients on short- and medium-term deposits.

Public offering instruments: Instruments issued by firms and traded in the capital market.

Repos: Repurchase (reverse repurchase) agreements. A sale (purchase) collateralized with an agreement or commitment to repurchase (sell back) the security.

Repricing: A component of interest rate risk, corresponding to the exposure to losses caused by rolling over of assets and liabilities with different maturities under different financial conditions.

Risk-weighted assets: Bank assets weighted on the basis of five risk categories, set forth in Article 67 of the General Banking Law. The ratio of capital to risk-weighted assets is to an index of capital adequacy (known as the Basel index), internationally accepted as a measure of bank solvency.

ROE: Return on equity. Measured as the ratio of earnings after taxes, amortizations, and extraordinary items to shareholders' equity plus minority interest. It is the shareholders' return.

RTGS: Real-time gross settlements system. Electronic interbank payment system managed by the Central Bank of Chile, in which the processing and clearing of transactions is carried out continously, individually, and in real time.

Senior bonds: Ordinary long-term bond issued by banks.

Short-term residual external debt: Includes the original short-term debt and the long-term debt falling due within the next 12 months.

Sovereign bonds: Debt instruments issued by the government of a country in local or foreign currency. In the case of a foreign-currency-denominated sovereign bond, the selected currency generally corresponds to a more stable economy.

Subordinate bonds: Long-term bonds issued by banks, with an average maturity of not less than five years and with no prepayment clauses. Because subordinate bonds are repaid after the claims of other creditors are settled in the case of bank liquidation, a share of these bonds is computed as capital.

Subprime: A loan segment of the U.S. financial market. They are loans (usually mortgages) granted to debtors whose characteristics and payment history are below the average standards of the banking industry, such that they present a greater default risk than the average for other loans. The loans granted to debtors that satisfy the average standards of the banking industry are called prime.

Swap: Derivatives contract between two parties, who carry out an exchange of flows at future dates. One of the most common swap contracts is the interest rate swap, in which the parties exchange predetermined flows at a fixed rate, set when the contract is written, for predetermined flows at a variable rate.

Swap rate: The fixed rate in an interest rate swap, which is exchanged with the observed average interbank interest rate, based on a given amount of capital and a specified period in the future.

Total debt: Current liabilities. These include all of a firm's liabilities with third parties other than its shareholders.

Treasury banks: Banks that are dedicated to investment in derivative and nonderivative financial instruments and that do not have loans.

Treasury Bank Account: Current account of the State Public Services, which is held with the State Bank (*Banco Estado*). All Public Sector income is deposited in the Treasury Bank Account, with the exception of funds expressly identified by law. This account is subdivided into the main account, held by the General Treasury of the Republic, and subsidiary accounts, allocated to different public sector bodies.

U.S. GAAP: Generally accepted accounting principles in the United States.

Unrestricted reserves: Official reserves less short-term commitments in foreign currency (maturing BCX, BCD, and swaps), Fiscal deposits with the Central Bank, and others.

VaR: Value at risk. A tool designed to quantify, to a set level of significance or uncertainty, the amount or percentage of loss that an investment portfolio will face over a given period of time.

Abbreviations

ACHEF: Asociación Chilena de Empresas de Factoring (Association of Chilean Factoring Firms).
ACOP: Asociación de Corredores de Propiedades (Association of Real Estate Agents).
AFP: Administradoras de Fondos de Pensiones (Pension Fund Administrators).
BCD: Central Bank bonds expressed in dollars.
BCP: Central Bank bonds expressed in pesos.
BCU: Indexed Central Bank bonds, expressed in UF.
BCX: Central Bank dollar bonds.
BIS: Bank for International Settlements.
BTP: Treasury bonds expressed in pesos.
CCAF: Cajas de Compensación de Asignación Familiar (Family Allowance Compensation Fund).
Corfo: Corporación de Fomento de la Producción (Chilean Development Agency).
ECB: European Central Bank.
EMBI: Emerging Market Bond Index.
GDP: Gross domestic product.
IBR: Interbank rate.
IMF: International Monetary Fund.
INE: Instituto Nacional de Estadísticas (National Statistics Bureau).
IPSA: Índice de Precios Selectivo de Acciones (Selective Stock Price Index).
IRR: Internal rate of return.
Libor: London inter-bank offered rate.
MPR: Monetary policy rate.
MSCI: Morgan Stanley Capital International.
NBER: National Bureau of Economic Research.
NIR: Net international reserves.
OECD: Organization for Economic Cooperation and Development.
OPEC: Organization of Petroleum Exporting Countries.
SBIF: Superintendencia de Bancos e Instituciones Financieras (Superintendency of Banks and Financial Institutions).
SMEs: Small and medium-sized enterprises.
SP: Superintendencia de Pensiones (Superintendency of Pensions).
SuSeSo: Superintendencia de Seguridad Social (Superintendency of Social Security).
SVS: Superintendencia de Valores and Seguros (Superintendency of Securities and Insurance).
U.S.: United States of America.
UF: Unidad de Fomento (an inflation-indexed unit of account).

Settlements and contract prices in the Chilean currency derivatives market*

Authors: Carlos Echeverría**, Claudio Pardo**, and Jorge Selaive**

I. Introduction

The currency derivatives market has grown substantially in Chile in recent years. The increase in currency derivatives activity started with the elimination of the exchange rate band in September 1999 and the lifting of exchange controls in 2001, which generated greater participation by agents in the real sector and a significant increase in cross-border transactions. Thus, for example, total derivatives contracts grew from US$163 billion to US$660 billion between 2001 and 2007. Similarly, the last triennial survey of foreign exchange market activity carried out by the Bank for International Settlements (BIS) reports that transactions in Chile rose from a daily average of US$0.97 billion in 2004 to US$2.3 billion in 2007[1]/.

In Chile, currency derivatives are traded in the over-the-counter (OTC) market, which is made up of networks of dealers operating outside an organized exchange. Consequently, the transaction information can only be found in the reports sent by the broker-dealers to the Central Bank of Chile, in accordance with the reporting requirements in the *Compendium of Foreign Exchange Regulations* (CFER). On the other hand, one characteristic of OTC markets is the non-public nature of a market maker's bid-ask quotes to end users. Contract prices can therefore vary in an off-exchange market, depending on the contract agent (Nystedt, 2004).

In addition, almost all currency forward contracts in the Chilean currency derivatives market are non-deliverable forwards (NDFs), which are essentially a settlement involving the cash payment of the difference between the contract price and the spot price on the settlement date[2]/. This type of contract allows market participants to deal in amounts that are several times greater than their available capital. Similarly, it extends the set of participants who can engage in transactions, to include players with limited capital[3]/.

As part of the Central Bank of Chile's task of monitoring financial stability, it is important to closely examine developments in the depth, liquidity, and efficient functioning of the foreign exchange market. Disruptions in this market could have adverse effects on other important segments of the financial sector, such as the pension funds and national banks. These processes have been explored in articles included in earlier versions of this *Report* (Alarcón *et al.*, 2007).

This article aims to contribute to the discussion and understanding of the functioning of the Chilean foreign exchange market. We use a unique database covering the period from January 2007 to July 2008, which identifies various characteristics of currency forward contracts in Chile. First, we describe developments in the settlements associated with forward contracts, with a breakdown by counterparty and maturity. Here we examine the money transfers associated with the settlement of the difference between the contract price and the exchange rate on the contract termination date, differentiating between domestic and foreign players. Second, we compare the contract bid and ask prices for different market participants, highlighting any potential price discrimination on the part of the market makers. Finally, we examine the local and external net interest margins and their evolution in the period of analysis[4]/.

* The opinions expressed herein are the exclusive responsibility of the authors and do not necessarily represent the views of the Central Bank of Chile or its Board. We thank Patricio Jaramillo and Luis Opazo for comments. Any remaining errors are our own.

** Central Bank of Chile.

1/ The latest survey covered a sample of 52 countries. The reporting countries turn in figures on the average daily transactions in the month of April in the year of the survey, so they may not coincide with the annual statistics reported by Chile for the same period.

2/ The spot price is usually the exchange rate observed on the previous day.

3/ In a non-deliverable forward, the parties are not required to pay the total value of the contract's underlying asset, but rather are only responsible for the difference to be settled, which reduces capital requirements.

4/ Market makers are the broker-dealers that provide the buy and sell quotes; they are mainly domestic and foreign banks.

Our analysis of this database indicates that the transfers generated by the foreign exchange contracts were positive for the Pension Fund Administrators (AFPs) and negative for the real sector between October 2007 and April 2008[5]/. The largest settlements have been generated since January 2008, which are in line with the increased variability in the exchange rate. On the other hand, while the differences in contract prices while high (often representing around 3% of the comparable interbank contract price), they are not persistent and thus do not suggest price discrimination. Finally, the net interest margins corresponding to the difference between the buy and sell prices are, on average, around 10 basis points (bp) for both domestic and foreign banks. As a whole, they have increased substantially with the greater exchange rate volatility.

The next section explains the basic characteristics of the derivatives market. The third section describes developments in foreign exchange settlements both in the aggregate and broken down by agent. The fourth section discusses differences in contract prices by agent. The final section concludes.

II. Characteristics and functioning of the derivatives market

The functioning and infrastructure of the derivatives market in Chile are not significantly different from other derivatives markets around the world. Local market makers, primarily banks, perform derivatives transactions for most local market participants, including pension funds and other institutional investors, real sector firms, insurance companies, and so on. External market makers provide the same brokerage service for all interested parties that are authorized to trade in currency derivatives with them, as long as they submit to the New York regulations. A significant difference between derivatives contracts written by local and foreign banks is that the latter are usually subject to margin calls[6]/.

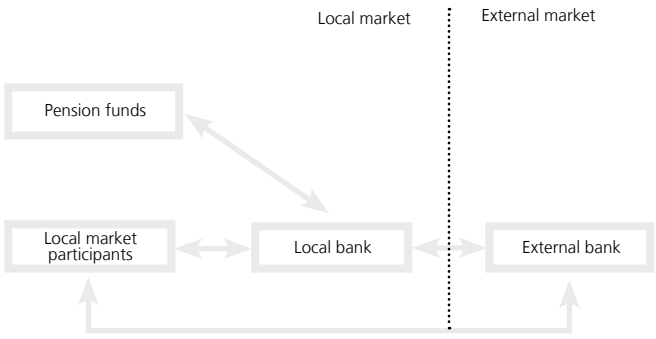
The main instrument used in the local market is the peso-dollar forward. These contracts establish the future exchange of the two currencies at a date and exchange rate agreed on when the contract is fixed. Other instruments, such as foreign exchange swaps and currency swaps, are also used in the Chilean market, but much less than forwards. They are estimated to represent less than 10% of total transactions[7]/. Foreign exchange swaps involve the exchange of two currencies, usually a spot exchange with a reverse forward exchange of the same two currencies at a different exchange rate, with the objective of obtaining a certain interest rate. In currency swaps, or cross-currency swaps, two parties commit to exchanging interest rate flows on loans in different currencies for an agreed period and then exchanging the principal in different currencies at a fixed exchange rate at the contract termination date. Currency swaps are mostly associated with long-term hedging.

The diagram presents a very simplified overview of the contract flows carried out in the Chilean currency derivatives market. Local banks carry out operations with local market participants and with external banks. Local non-bank agents, with the exception of the pension funds, also write contracts with external agents. The pension funds have only recently been authorized to use foreign banks as counterparties, pending the accreditation of the authorized banks.

The foreign exchange data collected by the Central Bank, as authorized in the CFER, can be used to monitor operations involving banks or external entities. The data do not cover operations involving dealers such as investment groups, stock brokers, or securities brokers, but these account for a small share of the total traded (less than 10% of the total traded in the derivatives market), according to Alarcón, Selaive, and Villena (2004).

Diagram

Flow of contracts in the Chilean currency derivatives market



Source: Own elaboration.

The foreign exchange trade is primarily conducted in decentralized markets, which can be characterized by asymmetric information, counterparty risk, and a lagged price discovery process. Derivative transactions can be carried out in either an organized exchange or an over-the-counter market. Exchange-traded contracts, which account for a small share of derivatives contracts in Chile and the rest of the world, are characterized by a high degree of standardization, publicly disclosed transactions, and the use of clearing houses. OTC contracts, in Chile as in other markets, are generally traded

[5]/ The real sector comprises resident nonfinancial agents, basically resident firms.

[6]/ Margin calls are the practice of requiring (depositing) increases in capital equal to the losses (gains) deriving from the marked-to-market accounting value of the contract.

[7]/ Currency options, while approved for issue by local banks, are rarely used by local market participants.

by telephone or through on-line trading systems, which impedes the fixing of a single transaction price for all market participants.

Earlier studies of the Chilean currency derivatives market include Fernández (2003), who reviews the regulatory framework and its impact on market development, with a focus on the regulatory changes in the Capital Market Law. She also considers the impact on the forward market of the changes in the Central Bank of Chile's foreign exchange policy in the late 1990s, and she compares the evolution of other Latin American countries with a more highly developed derivatives market. The study's central hypothesis is that financial regulation put a brake on the development of the derivatives market, particularly through restrictions on the pension funds' participation. The paper finds that regulation did, in fact, contain the development of the local derivatives market and that foreign exchange policy did not have a significant impact on that market.

Alarcón *et al.* (2007) and Ahumada and Selaive (2007) analyze the determinants of the development of the Chilean derivatives market using BIS transaction statistics. Their evidence indicates that the level of activity on the Chilean spot market is not too much different from the average of advanced economies. The increased activity in the derivatives market in recent years positions Chile slightly above other emerging economies, but still far from the advanced economies, even considering that the pension funds have contributed substantially to the growth of the market, through their prudential regulation with regard to currency risk. Finally, panel estimates for the sample of economies analyzed suggest that foreign exchange derivatives activity is converging toward the levels that the Chilean economy should have, based on its fundamentals.

III. Recent developments in currency derivative settlements

The database analyzed in this section covers all the peso-dollar currency forwards settled between 1 January 2007 and 31 July 2008, identifying the contract price or the agreed upon forward exchange rate, the maturity in days, the contracted notional value in dollars, and the counterparties involved[8]/. Any transactions that are terminated early are removed from the database[9]/, which leaves approximately 152,000 forward operations settled in the period under analysis.

The contract price corresponds to an effective closing date. Thus, a contract between a market participant and a local bank, with a maturity of k days, specifies the peso-dollar exchange rate at which the operation will be settled on the ending date of the contract. The database does not identify the time of day when the contract was written, which could affect the price differences constructed in the next section. However, this is the most detailed database available for the derivatives market in Chile. Similar international studies also use daily data (Misra and Behera, 2006; Peng *et al.*, 2007)

We examine developments in settlements from the perspective of the main market participants, namely, the real sector, the pension funds (or AFPs), financial institutions, and the public sector. In particular, we separate out the AFPs, given that they account for a large share of the total traded in this market. As a whole, all these participants carry out transactions with local banks and, sometimes, foreign banks (henceforth, market makers). The real sector includes both firms and individuals; the AFPs encompass all the pension funds; and financial institutions group together insurance companies, mutual funds, and securities brokers. Finally, the public sector includes the Chilean Copper Corporation (Codelco), the National Petroleum Corporation (ENAP), the National Mining Corporation (Enami), and Railroad Transport (FF.EE.).

III.1 Aggregate settlements

Table 1 presents the total settlements for the period under analysis. For each operation, the settlement is calculated as the difference between the contracted exchange rate and the exchange rate observed on the day the contract ends, multiplied by the notional amount in dollars. The resulting amount in pesos is divided by the same observed exchange rate, to thus end up expressed in U.S. dollars. This is the procedure by which currency forwards are, in fact, settled in the Chilean OTC market.

Table 1

Notional amount of contracts and their corresponding settlements, by market participant (*)

(US$ million)

Market participant	Local banks		External market		Total	
	Amount of contract	Settlement	Amount of contract	Settlement	Amount of contract	Settlement
Local banks	181,515	0	410,978	504	592,494	504
Real sector	151,785	-423	55,521	-32	207,307	-456
AFPs	122,744	1,151			122,744	1,151
Financial institutions	25,037	-94			25,037	-94
Public sector	8,025	3			8,025	3
Total	489,109	636	466,500	472	955,609	1,108

(*) For the period January 2007 – July 2008.

Source: Central Bank of Chile.

[8]/ The database includes operations settled between January 2007 and July 2008, but contracted before January 2007.

[9]/ Early settlements account for not more than 0.1% of total contracts.

Total settlements were US$1.108 billion, of which 66% were local market operations and 34% external market operations. In terms of market participants, the AFPs recorded a positive settlement; that is, they received positive transfers for their currency forwards in the period of the study. The real sector, in turn, carried out transfers primarily with local banks, for a total of US$456 million[10]/.

A time-trend analysis of settlements by type of market participant (figure 1, panel A) reveals that a large share of the settlements and transfers occurred in the first months of 2008. This essentially reflects exchange rate variations, which generated significant net transfers among participants. The AFPs received positive transfers of around US$500 million in March 2008, while the real sector and the financial institutions, as a whole, registered negative transfers of approximately US$280 million. These transfers did not exceed 1% of the amounts contracted.

Panel B of figure 1 shows that the trend for settlements or transfers by type of participant has been in line with the evolution of net contracts for each group. The AFPs exhibit a net short position that has increased significantly since March 2008. The banks, in turn, show net long positions over almost the entire period, with the exception of October and November 2007.

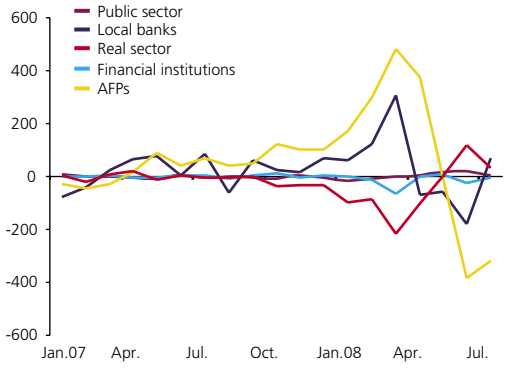
Figure 1

Settlements and net contracts by market participant

(US$ million)

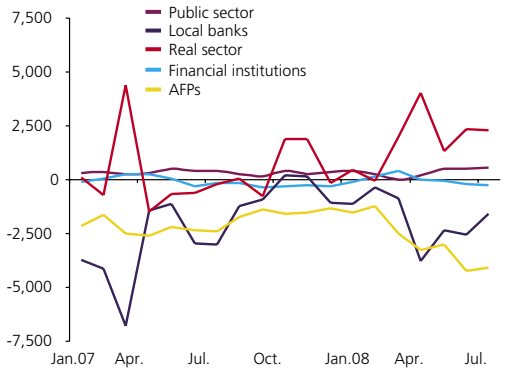
Panel A

Settlements by market participant



Panel B

Net contracts (purchases less sales) by market participant



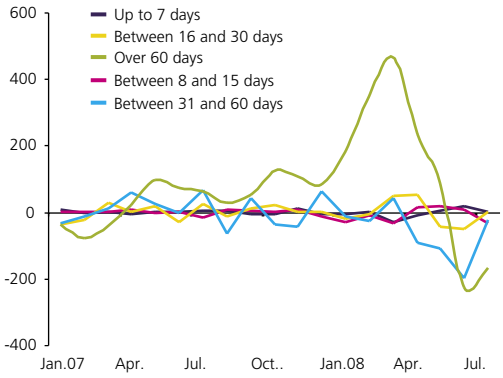
Source: Central Bank of Chile.

Some players in the currency derivatives market have a general preference for a given maturity, which can be explained, in part, by the nature of the underlying assets being hedged. The maturities associated with the largest settlements are over 60 days. These maturities are most often seen with the AFPs, which use currency hedging on overseas investments (figure 2).

Figure 2

Total settlements by maturity

(US$ million)



Source: Central Bank of Chile.

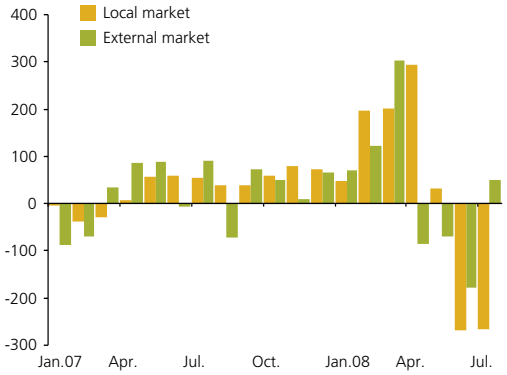
Figure 3 provides a different perspective on settlements, based on residency. Beyond the global dynamics, it is interesting to note the large settlements starting in February 2008. In particular, in April 2008, the local market recorded positive currency forward settlements, while external agents presented a negative position of the same magnitude. The currency forward positions taken by external and local agents in previous periods, combined with the observed currency depreciation, resulted in the generation of positive transfers to local participants over external agents that month.

[10]/ While it is possible to observe foreign exchange settlements for forward operations at the individual bank level, interbank settlements are zero sum.

Figure 3

Settlements in the local and external markets (*)

(US$ million)



(*) Local market includes AFPs, financial institutions, real sector, and public sector
Source: Central Bank of Chile.

IV. Differences in foreign currency forward contract prices

This section explores possible differences in prices among participants in the Chilean currency derivatives market, together with net interest margins.

Given that this is an OTC market, prices are not public when the transactions are carried out. OTC markets can produce differences in contract prices among agents, given the use of customized contracts that are tailored to the needs of the end users (Nystedt, 2004). It is therefore useful to examine the forward contract prices of different market participants from the perspective of the efficient functioning of the currency derivatives markets. In particular, are there differences in the sales price of one agent versus another? If so, are these differences persistent? This study does not attempt to unveil the economic reasons for possible differences, but rather to identify elements for later analysis. In addition, the market makers assume margin costs on buying and selling derivatives contracts. We therefore need to examine the magnitude and recent trends of these margins.

Table 2 presents the monthly differences in contract prices for the AFPs and for other agents at 30-day maturities, normalized by the comparable interbank forward price each day. To this end, we only use transactions that were written and, obviously, cleared in the period under study. Specifically, the price difference indicator for AFP forward sales is given by the following equation[11]/:

$$\textit{AFP sales price difference} = \frac{\textit{Price(AFPs/Banks)} - \textit{Price(Other agents/Banks)}}{\textit{Interbank price}}$$

where:

Price*(AFPs/Banks)* corresponds to the forward sale price from AFPs to local banks,

Price*(Other agents/Banks)* corresponds to the forward sale price from non-AFP agents (namely, financial institutions, external agents, or the real sector) to local banks. The interbank price corresponds to the forward price of currency forward operations with the same maturity in the same period[12]/.

Table 2

Difference in the prices of 30-day forward contracts of the AFPs

(percent over interbank forward price)

Period	Forward sales by AFPs to banks, less sales by:			
	External agents to banks	Financial institutions to banks	Real sector to banks	Real sector to external agents
Jan.07	-0.52	-0.41	-0.70	-0.83
Feb.07	-0.81	-0.14	0.06	-0.11
Mar.07	-0.11	-0.02	0.04	-
Apr.07	0.21	0.18	0.07	-0.52
May 07	0.10	-0.32	0.17	-
Jun.07	0.23	0.52	0.44	-
Jul.07	0.38	0.36	0.30	-
Aug.07	-0.52	-0.30	-0.40	-
Sept.07	-0.32	0.42	0.46	-0.95
Oct.07	-1.12	-0.02	-0.73	-1.82
Nov.07	0.10	0.11	0.13	-
Dec.07	-0.06	-0.27	-0.14	-
Jan.08	1.19	-0.03	1.65	4.32
Feb.08	0.42	0.56	1.22	-
Mar.08	-1.30	-0.83	-1.60	-
Apr.08	0.78	1.27	-1.16	-1.05
May 08	0.44	0.80	0.08	-
Jun.08	-0.80	-3.19	-1.25	0.02
Jul.08	-2.75	-1.52	-0.27	-

Period	Forward purchases by AFPs from banks, less purchases by:			
	External agents from banks	Financial institutions from banks	Real sector from banks	Real sector from external agents
Jan.07	-0.51	-0.66	-0.46	-0.39
Feb.07	-0.96	-0.97	-0.97	-1.20
Mar.07	0.34	0.31	0.23	0.10
Apr.07	0.09	-0.27	-0.07	0.55
May 07	-0.28	0.28	0.19	0.38
Jun.07	0.33	0.27	0.30	0.03
Jul.07	0.82	0.76	0.75	-0.43
Aug.07	-0.19	-0.43	-0.48	-0.81
Sept.07	-0.39	0.22	-0.25	-0.66
Oct.07	0.54	0.49	0.93	-0.41
Nov.07	0.08	0.30	0.39	-
Dec.07	0.15	0.06	-0.22	0.48
Jan.08	-0.19	-0.15	0.72	-0.72
Feb.08	0.47	-0.04	0.43	0.34
Mar.08	0.63	-0.56	0.27	-1.15
Apr.08	1.81	-0.97	-0.30	-
May 08	-0.85	-1.31	-0.52	0.32
Jun.08	1.79	-1.57	0.60	-
Jul.08	-	-2.03	-0.26	

Source: Central Bank of Chile.

[11]/ This indicator does not control for differences associated with the size of the contracts. Despite this disadvantage, it is important to note that in organized exchange markets, currency futures are traded at identical prices, without differentiating with respect to the size of the contracts.

[12]/ For example, if an AFP makes a 30-day forward sale at a price of Ch$500/US$ to a local bank at time t and, at the same time t, a real sector firm makes a forward sale with the local bank a Ch$510/US$, then the indicator would show a difference of Ch$10/US$, which would be normalized to the price of an interbank contract with the same characteristics to determine the percentage difference over that price. This indicator is calculated for all contracts with the same maturity written at the same point in time.

On inspection, the differences are not found to be persistently positive or negative, in either purchases or sales. The average difference is around 0.1% of the interbank price. However, isolated differences are, in some cases, as much as 3% of the comparable closing interbank forward price.

Table 3

Difference in the prices of 30-day forward contracts of the financial institutions

(percent over interbank forward price)

Period	Forward sales by financial institutions to banks, less sales by:		
	Real sector to banks	Real sector to external agents	External agents to banks
Jan.07	-0.29	-0.42	-0.11
Feb.07	0.20	0.03	-0.67
Mar.07	0.06	-	-0.09
Apr.07	-0.11	-0.70	0.03
May 07	0.49	-	0.42
Jun.07	-0.08	-	-0.29
Jul.07	-0.06	-	0.01
Aug.07	-0.10	-	-0.21
Sept.07	0.04	-1.37	-0.74
Oct.07	-0.71	-1.80	-1.10
Nov.07	0.02	-	-0.02
Dec.07	0.13	-	0.20
Jan.08	1.67	4.34	1.22
Feb.08	0.66	-	-0.14
Mar.08	-0.77	-	-0.47
Apr.08	-2.43	-2.32	-0.49
May 08	-0.72	-	-0.36
Jun.08	1.93	3.21	2.39
Jul.08	1.25	-	-1.23

Period	Forward purchases by financial institutions from banks, less purchases by:		
	Real sector from banks	Real sector from external agents	External agents from banks
Jan.07	0.20	0.27	0.15
Feb.07	-0.01	-0.23	0.01
Mar.07	-0.08	-0.21	0.02
Apr.07	0.20	0.82	0.36
May 07	-0.09	0.10	-0.56
Jun.07	0.03	-0.24	0.06
Jul.07	-0.01	-1.20	0.06
Aug.07	-0.04	-0.38	0.24
Sept.07	-0.47	-0.88	-0.60
Oct.07	0.44	-0.90	0.05
Nov.07	0.09	-	-0.22
Dec.07	-0.28	0.43	0.10
Jan.08	0.87	-0.57	-0.04
Feb.08	0.47	0.38	0.51
Mar.08	0.84	-0.59	1.20
Apr.08	0.68	-	2.78
May 08	0.79	1.63	0.46
Jun.08	2.17	-	3.35
Jul.08	1.77	-	-

Source: Central Bank of Chile.

Table 3 presents the same exercise for the financial institutions. In this case, the average difference is similar, and again there is no evidence of persistent price differences on the part of market makers toward the real sector.

Finally, table 4 presents the above exercise using the real sector, and again there is no evidence of price differentiation. It is important to bear in mind that the real sector firms that participate in this market are large enterprises[13]/. Alarcón, Selaive, and Villena (2004) present a breakdown of real sector firms that use derivatives contacts and find a significant bias toward large companies. This is important because counterparty risks are reduced when dealing with a relatively homogeneous group of agents[14]/.

Table 4

Difference in the prices of 30-day forward contracts of the real sector

(percent over interbank forward price)

Period	Forward sales by real sector to banks, less sales by:		Forward purchases by real sector from banks, less purchases by:	
	Real sector to external agents	External agents to banks	Real sector from external agents	External agents from banks
Jan.07	-0.13	0.17	0.06	-0.06
Feb.07	-0.17	-0.87	-0.22	0.01
Mar.07	-	-0.15	-0.13	0.11
Apr.07	-0.59	0.15	0.62	0.16
May 07	-	-0.07	0.19	-0.47
Jun.07	-	-0.21	-0.27	0.03
Jul.07	-	0.08	-1.19	0.07
Aug.07	-	-0.12	-0.33	0.28
Sept.07	-1.41	-0.78	-0.41	-0.13
Oct.07	-1.09	-0.40	-1.34	-0.39
Nov.07	-	-0.03	-	-0.31
Dec.07	-	0.08	0.71	0.38
Jan.08	2.67	-0.45	-1.44	-0.91
Feb.08	-	-0.80	-0.09	0.04
Mar.08	-	0.30	-1.43	0.36
Apr.08	0.12	1.95	-	2.11
May 08	-	0.36	0.83	-0.34
Jun.08	1.28	0.46	-	1.18
Jul.08	-	-2.48	-	-

Source: Central Bank of Chile.

Since contract prices vary significantly in a given month, we compared daily contracts. Again we found no systematic pattern and confirmed the strong variations in price differences, similar to those presented in the above tables. We also performed the exercises for other contract maturities, as in the first section, and found no evidence of price differentiation. Finally, we compared the prices of contracts with the same notional amounts and again found no differences in the contract prices for any of the agents examined[15]/.

With regard to net interest margins, local and external banks broker currency operations by taking sale and purchase forward positions. To examine the margins or the differences between the sale and purchase prices, we considered all operations with a 30-day maturity in the period under analysis. Table 5 presents

[13]/ Tables 2, 3, and 4 present all the possible combinations, given the sectoral definitions used in the study and the functioning of the currency derivatives markets. Operations between AFPs and external agents are not included, because these operations are not carried out.

[14]/ Firms of all sizes participate in the spot currency market, which would probably contribute to a greater dispersion in the cleared prices. This factor is not addressed in this study, however.

[15]/ These exercises are not presented here, but they are available on request.

the average monthly change in these margins. Two observations stand out. First, there are differences in the margins of the local market versus the external market, which could be attributed to noise stemming from the use of daily data for the comparisons without taking into account exchange rate volatility during the day. Beyond this difference, the average margin in both markets is very similar, at around 10 basis points. Second, there has been a relative increase in margins since April 2008, in line with the greater volatility in the exchange rate.

As a reference, these margins are, on average, very close to the margins found in other emerging economies (Misra and Behera, 2006). In South Korea, the spreads are around 10 basis points, on average, while in India they are around 9 basis points.

Table 5

Net interest margins: local and external markets

(basis points)

Period	Margin in the local market	Margin in the external market
Jan.07	10.2	4.4
Feb.07	8.5	8.8
Mar.07	6.5	12.0
Apr.07	4.0	5.1
May 07	10.0	3.7
Jun.07	5.1	2.7
Jul.07	7.1	6.8
Aug.07	7.3	8.9
Sept.07	1.8	2.9
Oct.07	8.7	2.7
Nov.07	7.9	14.8
Dec.07	14.9	9.9
2007average	7.6	7.5
Jan.08	3.2	3.6
Feb.08	6.1	15.8
Mar.08	8.9	10.5
Apr.08	12.0	20.7
May 08	25.4	10.1
Jun.08	14.5	17.1
Jul.08	19.5	22.5
2008 average	14.7	21.0
Period average	10.3	12.8

Source: Central Bank of Chile.

V. Conclusions

This study examines developments in settlements associated with peso-dollar forward contracts in the Chilean foreign exchange market. We also look for differences in the prices of exchange rate forward contracts between the main market participants.

We find that the clearing of currency contracts was positive for the AFPs and negative for the real sector between October 2007 and April 2008. The largest settlements have been generated since January 2008.

We find differences of up to 3% in exchange rate forward contract prices, relative to the comparable interbank exchange rate forward. The differences are not persistent, however, and they are not concentrated in a particular type of agent, which suggests scarce price differentiation on the part of the market makers. The available data do not allow intraday comparisons, which could affect the above conclusion. Caution is thus advised in interpreting results in which this factor could be relevant, especially on days with significant exchange rate volatility.

In terms of net interest margins, we find an average of 10 basis points, which has been increasing in line with the greater exchange rate volatility since April 2008. However, in absolute terms, the low magnitude of this indicator suggests that the markets are relatively efficient.

Interesting avenues for future research include analyzing the ability of the currency derivatives market to anticipate fluctuations in the spot exchange rate, as well as possible information asymmetries among the different agents, following the literature on market microstructure (Lyons, 2001; Evan and Lyons, 2002; among others).

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The dynamics of the onshore spread in Chile*

Authors: Luis Opazo ** and Bárbara Ulloa ***

I. Introduction

The onshore rate is the estimate of the external rate that is relevant to the national currency market, which, in general terms, is derived from the covered interest rate parity. Thus, the onshore spread corresponds to the difference between the onshore rate and the Libor, providing a proxy of the cost of financing in dollars in the national market vis-à-vis the international market.

In the absence of margin costs and risk, liquidity, and other premia, the onshore spread should converge to zero as a basic condition of market arbitrage. However, this spread has undergone important fluctuations in the last couple of years (figure 1). In particular, the 1, 3, and 12 months spreads increased 261, 150, and 44 basis points (bp), respectively, between the first week of June 2007 and the last two weeks of May 2008. Increases of this magnitude have not been seen since the second half of 2003.

The different hypotheses on these fluctuations range from market observation (for example, the role of institutional investors) to more structural elements (for example, the result of the financial market integration). To identify the role of such elements, we use Alarcón *et al*. (2008) as a conceptual benchmark and complement their work with a statistical analysis of the onshore spread. We also conduct econometric estimates to characterize the changes observed since mid-2007.

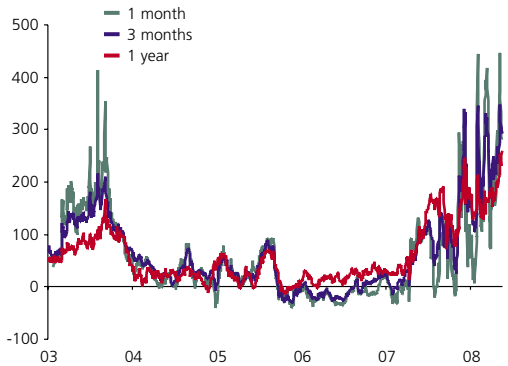
Sizing up the prevalence and role of the above mentioned factors is especially important for monitoring and evaluating the dynamics of the currency market. For example, if it is established that the onshore spread quickly adjusts to deviations from its external reference value, this would suggest the existence of a financially integrated market. If this is not the case, however, the evolution of this variable could be tied to local supply and demand in this market, and systematic deviations from its reference value could indicate, for example, tight foreign currency liquidity in the local market.

The rest of the paper is organized into four sections. The next section outlines the conceptual framework, while section 3 presents some stylized facts. The paper then econometrically estimates a nonlinear arbitrage model, as well as a vector autoregression. Section 5 concludes.

Figure 1

Onshore spread *(*)*

(basis points)



(*) Period from 2 May 2003 to 15 September 2008.

Source: Central Bank of Chile, Financial Operations Division.

*/ The opinions expressed herein are the exclusive responsibility of the authors and do not necessarily represent the views of the Central Bank of Chile or its Board. We thank Kevin Cowan, Pablo García, Beltrán de Ramón, and an anonymous referee for comments, as well as participants in an in-house seminar held by the Financial Policy Division of the Central Bank of Chile.

**/ Central Bank of Chile, Financial Policy Division.

***/ Central Bank of Chile, Research Division.

II. Conceptual framework[1]/

The onshore rate seeks to reflect the covered interest rate parity. In general terms, this implies that investors cannot arbitrage differences between the local and external interest rates once they have hedged the currency risk associated with the operation. Specifically, this condition can be achieved through the sale of dollars in the spot market with the objective of making a deposit in the local market, eliminating the currency risk through either a forward hedge or an offsetting operation[2]/.

Therefore, the onshore rate is calculated using the prime deposit rate[3]/, the average of the currency sell and buy positions in the forward market, and the sell position in the spot market:

$$i_t^* = \frac{S_t}{F_t}\ (1 + i_t) - 1 \qquad (1)$$

where i_t is the prime rate in local currency, S_t is the peso-dollar sell point in the spot market at time t, and F_t is the average of the peso-dollar buy and sell position associated with a forward contract with the same maturity as the prime rate.

In the absence of transaction costs and other types of frictions, the onshore rate must be arbitraged with an equivalent rate in the international market. However, both the presence of transaction costs and the credit risk inherent in our economy impose a natural limit on arbitrage operations. Specifically, if the arbitrage is achieved by taking on debt at Libor (i.e., contracting debt directly in dollars), then the cost of the transaction will be given by:

$$\bar{i}_t = l_t + \theta^1_t + \rho_t \qquad (2)$$

where l_t is the Libor, θ^1_t transaction costs and taxes on external debt operations, and ρ_t the country credit risk premium[4]/.

If the banks conduct the arbitrage through deposits at Libor in the external market, then the return will be given by:

$$\underline{i}_t = l_t - \theta^2_t \qquad (3)$$

where θ^2_t reflects the transaction costs and taxes associated with overseas deposits.

Based on equations (1) to (3) and assuming positive values for θ^1_t, θ^2_t, and ρ_t, it is infered that $i_t \leq i^*_t \leq \bar{i}_t$. If the onshore rate is within the range $[\underline{i}_t, \bar{i}_t]$, it will not be arbitraged in the external market, because the return on deposits in the external market is lower than the synthetic return of the onshore operation, $-\ \underline{i}_t < i^*_t -$, and the cost of contracting debt overseas to deposit in the local market is higher, $- i^* < \bar{i}_t\ -$.

In sum, when the onshore rate is in the no-arbitrage range, its dynamics will be influenced by the local amplitude in the foreign exchange market and by the determinants of the local interest rate. When the onshore rate equals the opportunity cost associated with operating overseas, its dynamics will be governed by the arbitrage with that market.

III. Stylized facts[5]/

This section provides background information on the increases in the onshore rate in 2003 and 2007, together with a description of the potential relationship with the currency derivatives market and external financing conditions (Libor and country risk). The study uses data through 15 September 2008. We explicitly exclude the recent financial turbulence for two reasons. First, the recent turbulence may have caused a real or potential tightening in the sources of dollar financing[6]/. In practical terms, this reduces the applicability of the arbitrage benchmark proposed in section 2. Second, given that the current turmoil is still unfolding, it is extremely complex to accurately estimate its potential implications for the dynamics of the onshore spread.

Onshore rate: 2003 and 2007

With regard to the increases in the onshore rate in 2003 and 2007, it is necessary to consider the following factors:

[1]/ This section follows Alarcón *et al.* (2008).

[2]/ That is, buying dollars in the spot market with the objective of depositing them overseas at a given rate in dollars, and hedging the currency risk through a forward sale that coincides with the maturity of the deposit.

[3]/ Corresponds to the rate offered by banks to institutional investors.

[4]/ This limit could also be influenced by the idiosyncratic risk of each particular bank and by liquidity premiums, among other things.

[5]/ In what follows, the analysis centers on the one-year onshore rate because country risk premiums are only available at one year (one-year CDS). However, the analysis and conclusions based on the one-year rate can be extended to other maturities, since the correlation between the different maturities is fairly high.

[6]/ For example, the financial problems at Wachovia could have been a source of uncertainty in this area, since this bank accounted for approximately 10% of the external credit lines that local banks held with external banks.

(a) Position within the band. In 2003 the onshore rate was within the arbitrage band, and in August 2007, it began moving toward the upper bound of the band (figure 2).

(b) International market conditions. The Libor was relatively constant in 2003, whereas it fell sharply in mid-2007 (figure 3).

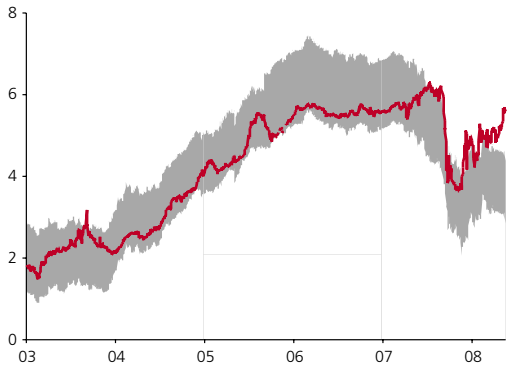
(c) Currency derivatives: nonresidents and AFPs[7]/. Both 2003 and 2007 showed an increase in the derivative positions of the AFPs[8]/, while the quantity of derivatives contracted by nonresidents was relatively constant (figure 4).

These factors suggest that relatively greater forward positions of the AFPs could have driven the increase in the onshore spread in 2003. In contrast, the increase in 2007 may have been influenced by the steep drop in the Libor and the greater currency hedging by the AFPs. More specifically, the AFPs began increasing their hedging in early 2007, which translated into a moderate increase in the onshore rate at mid-year, with no significant change in the Libor. However, the sharp reduction in the Libor in the middle of last year brought the onshore rate to the band ceiling. Since then, it has continued to be arbitraged and has been relatively constant (figure 5).

Figure 2

One-year onshore rate and arbitrage limits (*)

(percent)



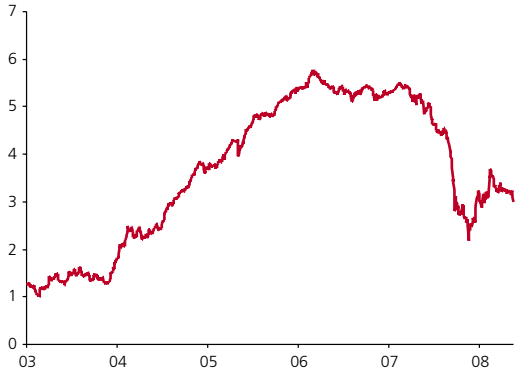
(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Own elaboration, based on data from Central Bank of Chile, Financial Operations Division.

Figure 3

London Interbank Offer Rate (Libor) (*)

(percent)



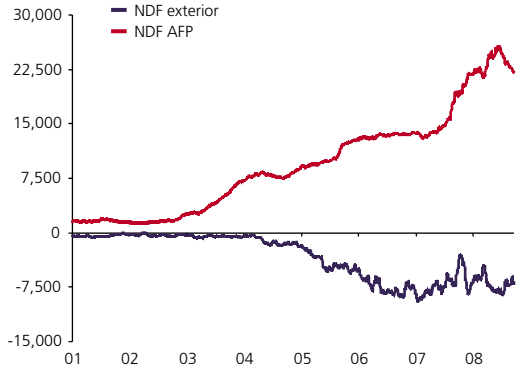
(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Bloomberg.

Figure 4

NDF-Exterior and NDF-AFP (*)

(US$ million)



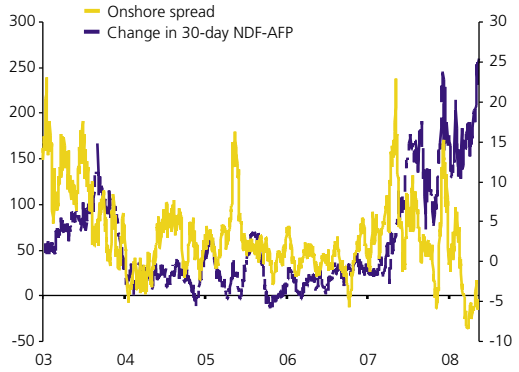
(*) Sample period: 1 January 2001 to 15 September 2008.

Source: Central Bank of Chile.

Figure 5

Evolution of the NDF-Exterior and the onshore spread (*)

(basis points)



(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Central Bank of Chile.

[7]/ The most commonly traded derivatives in the Chilean market are non-deliverable forwards (NDFs). The AFP forward position corresponds to the NDF position of the AFPs, mutual funds, and insurance companies, but the AFPs account for almost all of this aggregate position.

[8]/ Both episodes coincide with an extension of the foreign investment limit. In March and June 2003, the foreign investment limit was raised from 16 to 20% and from 20 to 25%, respectively. In August 2007, the limit was raised from 30 to 35%.

Forward position

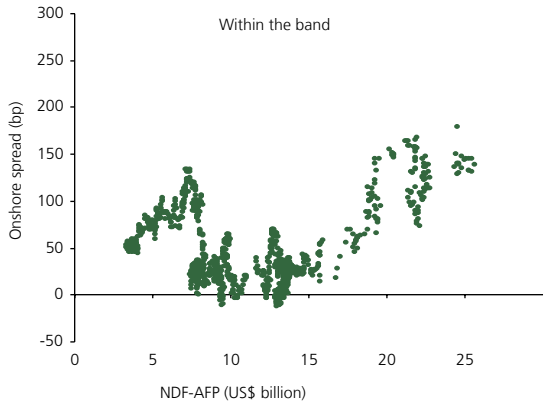
Currency derivative positions were classified as Exterior and AFP. In what follows, external positions, termed NDF-Exterior, correspond to the demand for peso-dollar hedging by nonresident investors, while the forward position of the AFPs, termed NDF-AFP, is associated with the supply of hedging in the local market.

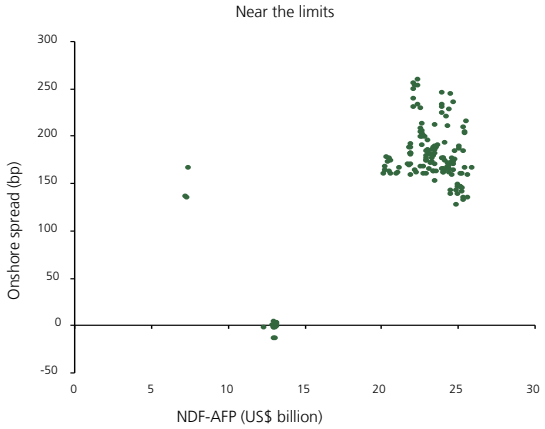
Figure 6 presents the relationship between the NDF-AFP and the onshore rate, controlling for the distance from the arbitrage limits. This was achieved by adjusting the upper and lower limits of the band by 10 basis points, that is, the upper limit by –10 basis points and the lower limit by +10 basis points. According to the conceptual framework described in section 2, the onshore rate should be positively related to the relative supply of NDFs within the limits of the arbitrage band, since in this case the greater supply should translate into a reduction of the forward exchange rate. This relationship should weaken when the onshore rate lies near the arbitrage band limits, in which case the onshore rate should essentially be determined by the arbitrage conditions.

The evidence reported in figure 6 is consistent with this model. Specifically, we find a positive relationship between the onshore rate and the NDF-AFP for periods within the band, and this relationship weakens when the rate lies near the band limits[9]/. The NDF-Exterior, however, does not display a clear relationship with the onshore spread (figure 7)[10]/.

Figure 6

Onshore spread versus NDF-AFP (*)



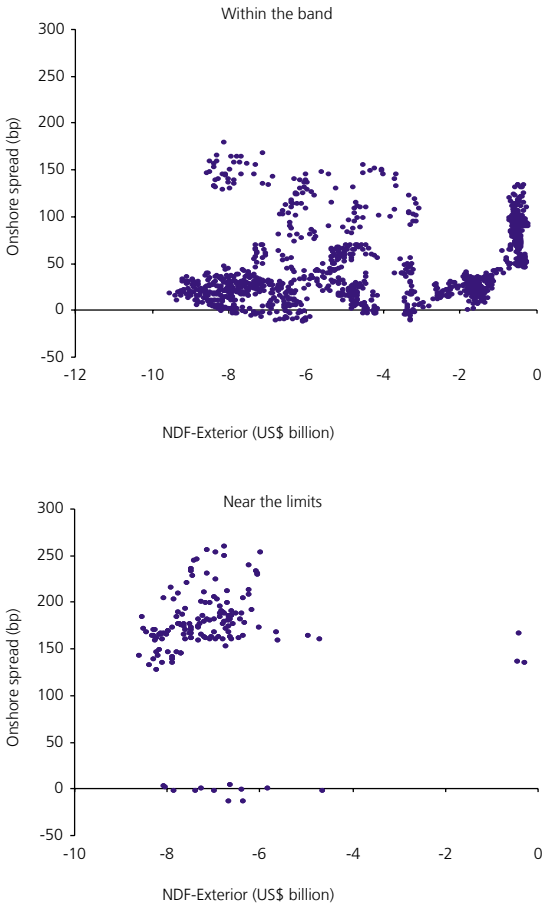


(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Own elaboration, based on data from Central Bank of Chile.

Figure 7

Onshore spread versus NDF-Exterior (*)



(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Own elaboration, based on data from Central Bank of Chile.

[9]/ This observation is sensitive to adjustments in the bands, but the results are robust to sensitivity tests of 25 basis points.

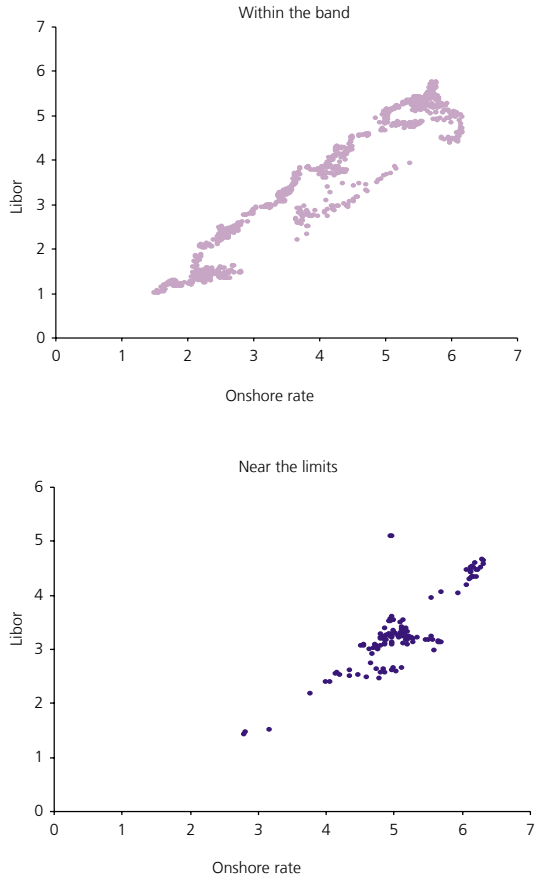
[10]/ The causes of this dichotomy between the NDF-Exterior and the NDF-AFP are not evident. We suspect, however, that the substantially higher volatility of the NDF-Exterior relative to the NDF-AFP could provide a potential explanation (the ratio between the standard deviation and the mean of the NDF-Exterior is six times larger than the NDF-AFP), in the sense that changes in the NDF-Exterior are less informative for the market than the relative forward-spot price.

External conditions

Figure 8 illustrates the relationship between the Libor plus country risk and the onshore rate. As expected, this relationship is positive, independently of whether we control for distance from the band. However, the relationship fluctuates over time, with no systematic pattern (figure 9). Specifically, the moving correlation between the Libor and the onshore rate fluctuates strongly. The correlation is broken as the onshore rate nears the limits of the band, and it tends to increase when it reaches the limits, with the exception of the most recent period. This is consistent with the model presented in section 2, since the onshore rate can become disconnected from the Libor when it is in the center of the band, but it becomes correlated again when it approaches the limits. As suggested earlier, this could be what happened in mid-2007 when the Libor fell, bringing the onshore rate to the upper limit of the band.

Figure 8

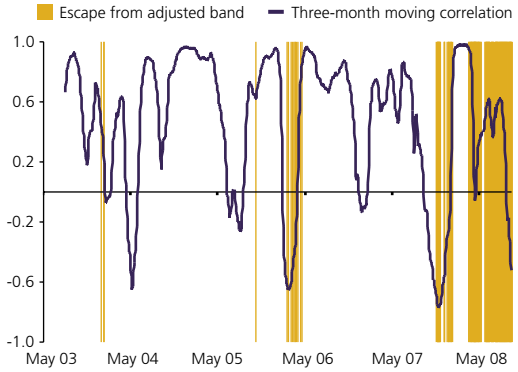
Onshore rate and Libor at one year
(percent)



Source: Central Bank of Chile.

Figure 9

Moving correlation of the onshore rate and the Libor at one year (1)



(1) Sample period: 2 May 2003 to 15 September 2008.
(2) The areas indicate when the onshore rate is in the limits of the band. The correlation was calculated based on a three-month moving window.

Sources: Central Bank of Chile and Bloomberg.

IV. Econometric analysis

This section estimates an arbitrage model for the onshore rate, together with a VAR that analyzes the interrelation of the onshore rate, activity in the foreign exchange market, and the external interest rate. These approaches have advantages and disadvantages. The arbitrage model captures the nonlinearity associated with the dynamics of the onshore rate (section 2), but it does not incorporate the possible endogeneity of the variables. The VAR does control for potential endogeneity, but given its linear nature, it cannot pick up the existence of different states for the dynamics of the onshore rate.

IV.I Arbitrage model[11]/

As described above, the dynamics of the onshore rate depend, first, on whether the rate is within the so-called no-arbitrage range and, second, on the available liquidity for arbitraging the rate differential when the onshore rate is near the band limits. These elements are incorporated in the following model:

[11]/ The estimation methodology closely follows Kambhu (2006), with adjustments to incorporate the specifics of the Chilean onshore market.

$$\Delta i_t^* = \varpi_t \cdot f(\Delta NDF^{AFP}, \Delta NDF^{Ext}) + (1-\varpi_t) \cdot \left[\begin{array}{l} \lambda^{l} \cdot z \cdot (E(\hat{i}_t) - i_{t-1}^*) \\ + \lambda^{nl} \cdot (1-z) \cdot (E(\hat{i}_t) - i_{t-1}^*) \end{array} \right] + \mu_t \qquad (4)$$

where:

i_t^*= the onshore rate in period *t*;

$\hat{i}_t$= the equilibrium onshore rate in period *t*;

ϖ_t=1 if the onshore rate is in the no-arbitrage range and 0 otherwise;

z_t=1 if the market is liquid and 0 otherwise;

ΔNDF^{AFP} = the daily change in the NDF-AFP;

ΔNDF^{Ext}= the daily change in the NDF-Exterior; and

μ_t= a stochastic residual.

Equation (4) establishes that in periods in which the onshore rate cannot be arbitraged (ϖ_t=1), its variation will depend on the relative supply of NDFs, where $f(\ )$ is a linear function. When the onshore rate can be arbitraged (ϖ_t=0), if there are no restrictions on arbitrage based on the liquidity of the market participants (z = 1), the onshore rate will converge to its equilibrium value at a rate given by λ^l, while the rate of convergence in the presence of liquidity restrictions (z = 0) will be given by λ^{nl}. Note that $\lambda^{l,nl}$=1 implies that the onshore rate will converge instantly to its equilibrium value, whereas in the presence of restrictions on arbitrage, the convergence will be gradual ($\lambda^{l,nl}$<1).

In estimating equation (4), we use the following assumptions:

(a) Arbitrage limits. The values of $\underline{i}$ and $\bar{i}$ are estimated as follows:

$$\underline{i}_t = l_t - 12.5\,bp + \varepsilon \qquad (5)$$

$$\bar{i}_t = l_t + rp_t + te_t - \varepsilon \qquad (6)$$

where *l* = the Libor, *rp* = country risk, *te* = stamp duties, and ε = the arbitrage margin of 25 basis points (bp) around the limits[12]/.

(b) Liquidity of market participants. Based on Kambhu (2006), the hypothesis on the speed of adjustment (λ^l ,$\lambda^{l,nl}$) is that if the agents face losses (gains), the arbitrage capacity will be constrained (will increase), that is, $\lambda^l > \lambda^{nl}$ [13]/. To this end, the gains or losses from arbitrage are inferred through the similarity or difference between the real and expected change in the onshore rate. Specifically, participants make decisions based on the expected change in the onshore rate, $\left(E(\hat{i}_t) - i_{t-1}^*\right)$, and the investors register losses or gains depending on whether the onshore rate changed in that direction[14]/. This can be summed up in the following variable:

$$\pi_t = \underbrace{\Delta i_t^*}_{a} \cdot \underbrace{\frac{\left|E(\hat{i}_t) - i_{t-1}^*\right|}{E(\hat{i}_t) - i_{t-1}^*}}_{b}$$

where (a) determines the real change in the onshore rate and (b) the sign of the arbitrage activity. In this sense, agents are assumed to register gains if $\pi_t > 0$ and losses if $\pi_t < 0$

The estimation of equation (4) covers the period from 2 May 2003 to 15 September 2008, with daily data. The results are reported in table 1. First, the table reveals a high goodness of fit (R^2=16%). Second, while the coefficient associated with the NDFs of the AFPs is statistically significant, it is less important in economic terms. In the case of the NDFs held by nonresidents (NDF-Exterior), we cannot reject the hypothesis that they are not statistically different from zero and, in addition, the value of the estimated coefficient is quite low. Finally, the estimates point to a relatively fast arbitrage in the neighborhood of the arbitrage band limits; in cases characterized as liquid, approximately 20% of the gap in rates is closed in one day. In contrast, in the illiquid scenario (that is, when market participants post losses), the adjustment is more toward a divergence arbitrage, with a negative sign. Kambhu (2006) associates this type of arbitrage with situations in which the participants offload positions when facing losses[15]/, which causes the spread to change in the opposite direction from what happens with a convergence spread.

[12]/ The results are robust to sensitivity tests of the parameter ε for values ranging from 100 and 25 basis points. This exercise was carried out in order to partially capture some of the uncertainty associated with the calculation of the band.

[13]/ Reasons for this type of behavior range from the simple reduction in the capital available to leverage arbitrage positions, to an increase in the investors' risk aversion (Kambhu, 2006).

[14]/ $E(\hat{i}_t)$ is the expected value of the equilibrium onshore rate in period *t* based on information in *t* – 1. That is, it corresponds to the projection of the band limit for the next period. This was estimated through a first-order autoregressive process, using the standard information criteria.

[15]/ The presence of divergence arbitrage could originate in a situation where investors need to liquidate their assets to address losses (for example, margin calls) and/or because their risk aversion increases in the presence of such losses, among other possible mechanisms.

Figure 10 presents the evolution of the residuals from January 2007 to September 2008, revealing an increase in volatility in 2008. In general, however, the residuals have been relatively small, despite considerable fluctuations in the onshore rate at the end of the sample. When the residuals did increase beyond the respective confidence band, these fluctuations were transitory.

Finally, we used the model to conduct an out-of-sample simulation from 15 September to the first week of October, in order to assess the dynamics of the onshore rate during the recent financial turbulence. Figure 11 presents the explained and unexplained components of the change in the onshore rate. The figure suggests that, even in a period of significant financial turbulence, the model explains the dynamics of the onshore rate fairly well, with the exception of 30 September. In that case, the residual explains 91% of the change observed on that date.

Table 1

Determinants of changes in the onshore rate (*)

Independent variable	Dependent variable: Coefficient	p-value
$E(i_t) - i^*_{t-1}$ with liquidity	0.1939	0.0000
$E(i_t) - i^*_{t-1}$ w/o liquidity	-0.1290	0.0000
ΔNDF^{AFP}_{t-1}	0.0045	0.0761
ΔNDF^{AFP}_{t-2}	0.0061	0.0247
ΔNDF^{EXT}_{t-1}	0.0001	0.4828
ΔNDF^{EXT}_{t-2}	0.0001	0.7416
Adjusted R2 = 0.16		

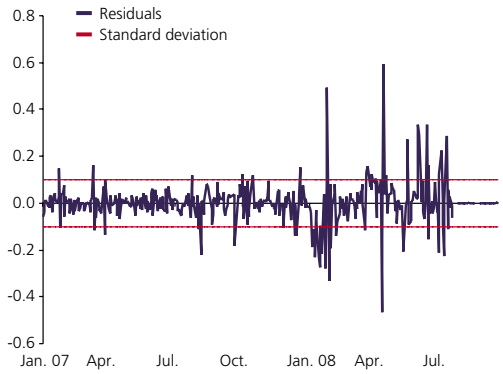
(*) Sample period: 2 May 2003 to 15 September 2008.

Source: Own estimates, based on data from Central Bank of Chile.

Figure 10

Residuals of the estimation (*)

(percent)



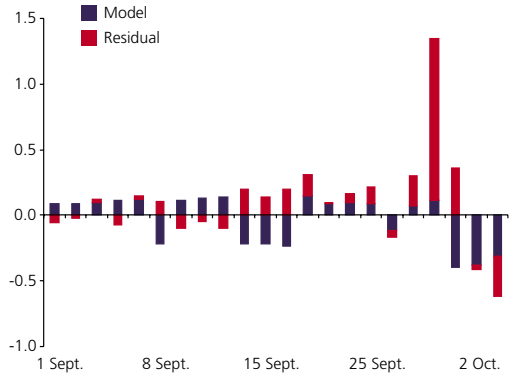
(*) Sample period: 1 January 2003 to 15 September 2008.

Source: Own elaboration.

Figure 11

Change in the onshore rate (*)

(percent)



(*) Sample period: 1 September to 4 October 2008.

Source: Own elaboration.

IV.II Vector autoregression (VAR)

The reduced-form VAR is as follows:

$$\begin{bmatrix} \Delta(libor_t - i^{cl}) \\ \Delta NDF^{Ext\,t} \\ \Delta NDF^{AFP}_t \\ \Delta s^*_t \\ \Delta tc_t \end{bmatrix} = \Gamma(L) \begin{bmatrix} \varepsilon^{i}_t \\ \varepsilon^{Ext}_t \\ \varepsilon^{AFP}_t \\ \varepsilon^{s^*} \\ \varepsilon^{tc}_t \end{bmatrix} \qquad (7)$$

where:

$libor_t$ = the one-year Libor in period t;

i^{cl}_t = the interest rate in Chile in local currency (the average one-year interbank swap rate);

ΔNDF^{Ext} = the change in NDF-Exterior;

ΔNDF^{AFP}_t = the change in NDF-AFP;

s^* = the onshore spread at one-year maturity;

Δtc_t = change in the peso-dollar parity; and

ε^j = the stochastic shock to variable j.

The interest rate differential is assumed to be exogenous to the system, that is, it only depends on its own lags. We chose one lag, based on the traditional information criteria. The estimation is performed with daily data for the period October 2003 to September 2008[16]/.

[16]/ The results are robust to the inclusion of parities and country risk premiums for Chile and Brazil. These sensitivity tests seek to control for potential NDF-Exterior contracts oriented toward the carry trade between Chile and Brazil.

The appendix presents the impulse responses of the onshore spread and the exchange rate to a shock in the interest rate differential, the NDF-Exterior, the NDF-AFP, and the onshore spread. The main results are as follows:

(a) Interest rate differential. An eight-basis-point increase in the differential between the Libor and the local currency rate triggers an immediate drop in the spread of approximately 13 basis points, which is reversed in the next few days. This, in turn, generates a depreciation of the exchange rate, but we cannot reject the hypothesis that the impulse is not statistically different from zero.

(b) Nonresident currency derivatives. The response of the onshore spread to an NDF-Exterior shock is not statistically different from zero. With regard to the response of the exchange rate, we find maximum depreciation of approximately 0.15% in response to a one-standard-deviation increase in the NDF-Exterior (that is, a 4% shock). The low magnitude of these effects is consistent with the results reported by Cowan, Rappaport, and Selaive (2007) and Jadresic and Selaive (2005).

(c) AFP currency derivatives. The onshore spread increases approximately 0.5 basis points in response to a 0.7% increase in the NDF-AFP, which converges to zero in a period of less than five days. The exchange rate appreciates slightly and as in the previous result, converges in a period of less than five days.

(d) Onshore spread. A seven-basis-point shock in the onshore spread causes an initial appreciation of the currency, which is reversed in approximately three days. The total accumulated change is thus close to zero (specifically, a 0.05% depreciation). In other words, assuming perfect linearity, if the onshore spread were to increase 100 basis points, the exchange rate would only depreciate 0.71%.

V. Conclusions

The increase in the onshore spread observed since mid-2007 is consistent with the conceptual framework analyzed in this paper. The reduction in the Libor in mid-2007 would have brought the onshore rate to the upper limit of the band and, since then, it has remained at levels consistent with rate arbitrage at the international level. In other words, the dynamics of the onshore rate since mid-2007 would be compatible with a financial integration model, without significant deviations from this framework.

Nevertheless, this does not imply that the AFPs have not played some role. The systematic increase in the NDF-AFP since early 2007 could explain part of the increase in the onshore rate observed in the first half of 2007. Our estimates suggest, however, that the spread is not very sensitive to NDFs, and it is therefore probable that the NDF-AFP explains a relatively small share of the increase.

Finally, the results and interpretation of the recent increase are subject to a degree of uncertainty inherent in estimations that cover a short time period and that include the recent financial turbulences, which are an ongoing process.. In practice, this imposes a greater degree of uncertainty on the identification of the factors behind this type of fluctuations.

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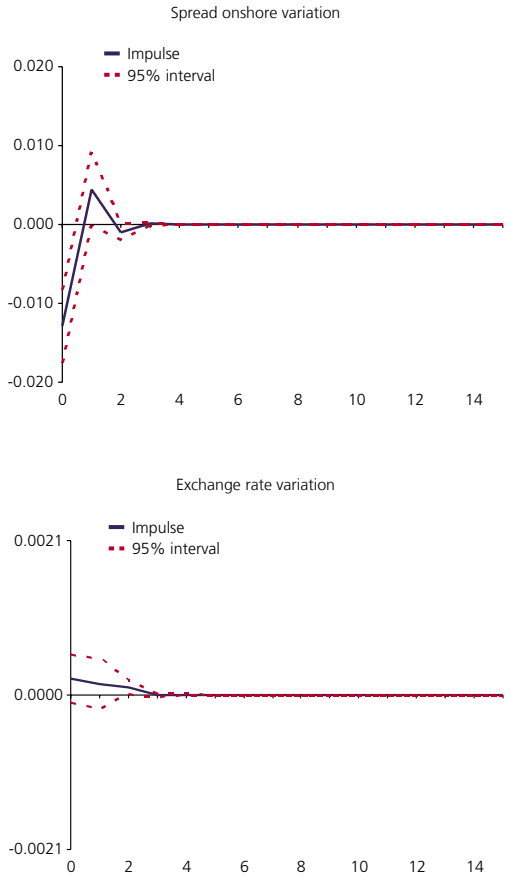
Appendix

VAR impulse-response exercises

Figure 1

Response to a one-standard-deviation shock in the rate differential

Impulse $\Delta(libor_t - i_t^d) = 0.08$

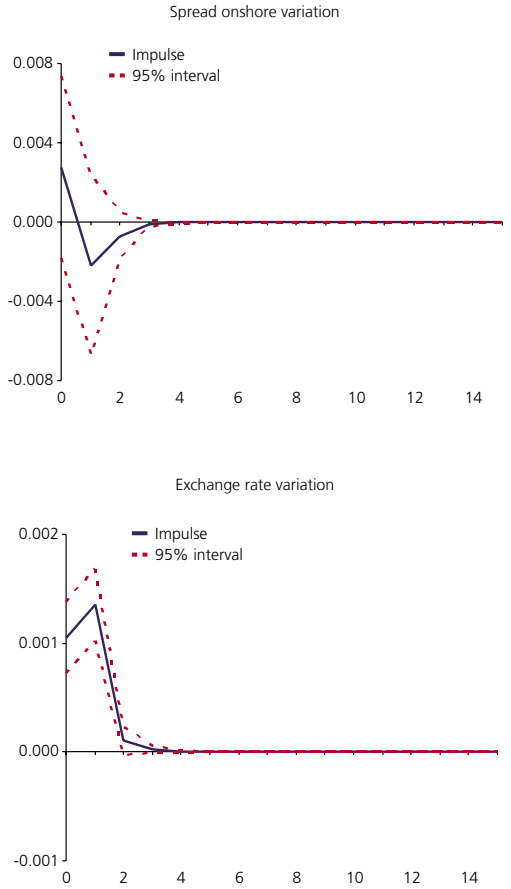


Source: Own elaboration.

Figure 2

Response to a one-standard-deviation shock in the NDF-Exterior

Impulse $\Delta NDF^{Ext} = 4\%$

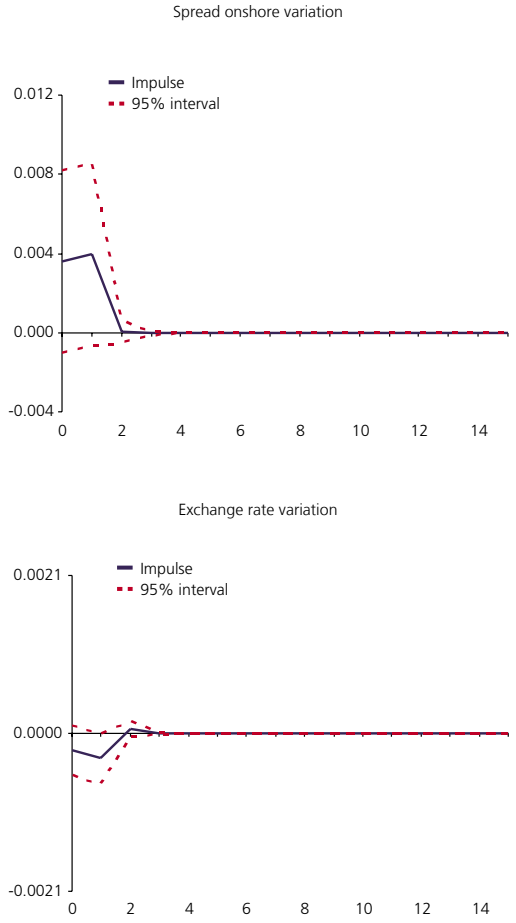


Source: Own elaboration.

Figure 3

Response to a one-standard-deviation shock in the NDF-AFP

Impulse ΔNDF^{AFP} = 0.7%

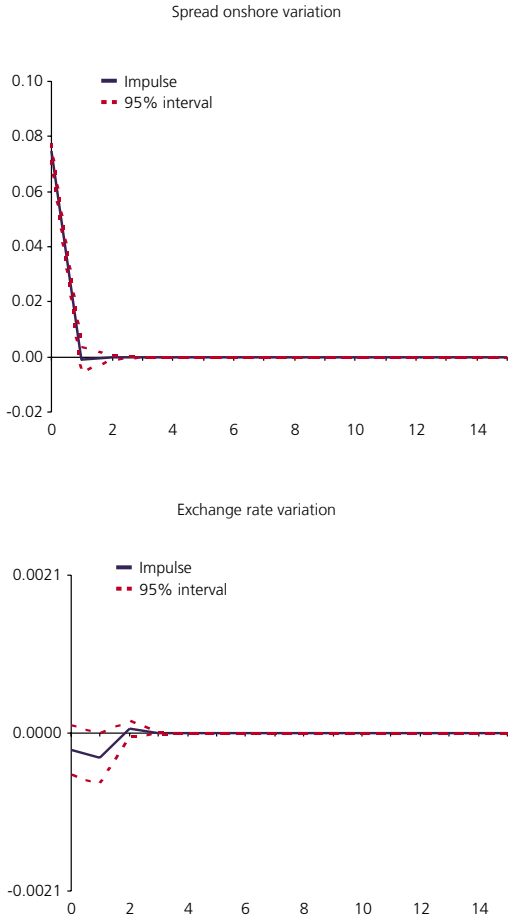


Source: Own elaboration.

Figure 4

Response to a one-standard-deviation shock in the onshore spread

Impulse Δs_t^* = 7 bp



Source: Own elaboration.

Index of tables and figures

Tables

Figures

Tables in the articles

Gráficos de los artículos

Diagram in the articles

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