Financial Stability Report

SECOND HALF 2006

BANCO CENTRAL
DE CHILE

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*/ In case of any discrepancy, the Spanish original prevails.

Contents[1]/

[1]/ The statistical close of the *Report* was 20 December 2006, except for the section on the Consolidated Government, which was 2 January 2007.

Foreword

As established in its Basic Constitutional Act, the Central Bank of Chile must "provide for the stability of the currency and the normal functioning of the internal and external payment systems." To carry out these tasks, the Central Bank of Chile is vested with diverse legal powers, such as extending emergency credit and determining regulations in matters affecting the financial system and international trade 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 markets, and the ability of the financial system and the international financial position to adapt sufficiently to adverse economic situations. In addition, the *Report* presents the policies and measures that support the normal functioning of the internal and external payments system, with the object of promoting general knowledge and public debate with regard to the Bank's performance in fulfilling this function. The papers that appear in the final pages summarize recent research efforts by the Bank on topics related to financial stability.

The Board

Summary

External conditions that favor the financial stability of the Chilean economy prevail. Interest rates and risk premiums continue to be low in developed financial markets, after turbulences of last May and June. This has reflected on high market capitalization in the Chilean stock exchanges and has contributed to keeping long-term interest rates low, a phenomenon that is also present in various emerging economies. Strong world economic growth and good prices of commodities and other exports —still high despite a recent downward correction for copper— have strengthened the results and financial situation of Chilean companies and government.

Although unlikely to materialize, some uncertainties persist, in particular that low risk premiums revert up and that new episodes of high volatility occur in international financial markets. In the present circumstances, there is uncertainty around fundamental factors that have shaped the current scenario of low risk valuation. The volatility seen in world financial markets in May-June 2006 raises doubts regarding the sustainability of the current levels of risk valuation.

While some benign hypotheses claim that the current levels of risk premiums are a consequence of the development of risk transfer instruments, less optimistic visions cannot be disregarded. These phenomena might be originating in the competition between financial intermediaries that leads them to take higher risks to improve their returns within a context of reduced world interest rates. Information is scarce regarding actual credit and counterparty risk exposure of hedge funds in developed financial markets. Operating problems in settling operations with credit risk transfer instruments detected by supervisors at developed markets have been resolved, but some concern prevails because as yet said instruments have not been tested over long periods of corporate default. In summary, doubts persist around the way financial markets might accommodate a significant adjustment of risk valuation.

The maturing of the global economic cycle introduces additional incertitude with respect to the persistence of the current favorable financial conditions. So far, corrections in the real estate market and economic deceleration in the US have been assimilated with no material financial turbulence. Nonetheless, should American households' payment capacity deteriorate because of a larger correction, or the good scenario for inflationary pressures around the world revert up, developed financial markets might be pressured and put the main economic zones' monetary policies in a dilemma. Other risk factors come from the posture of OPEC to restrict the global supply of crude oil, geopolitical uncertainties and the possibility of an abrupt correction of global current account imbalances

between the US, Asia and oil-exporting countries, which might have a major impact on the price of the US dollar.

Credit users in Chile are generally well prepared to absorb a deterioration of the macrofinancial conditions, without jeopardizing domestic financial stability. In particular, the operation of the structural fiscal surplus rule has allowed continuing rapidly and steadily reducing the net consolidated debt of the Central Bank and the Central Government, thus helping maintain long-term interest rates at low levels. The Fiscal Accountability Act, especially with regards to the capitalization of the Central Bank, favors the latter's capacity to weather disturbances. On the other hand, companies reporting their financial statements to the Superintendency of Securities and Insurance continue to post improvements —at the margin— of their financial figures, and no significant financial risk scenarios are detected that might affect them. Among non-financial companies, it is worth highlighting a strong increase of funding available and a more leading role of corporate indebtedness among companies related to sectors that are more sensitive to the cycle.

Although beginning to slow down, household credit continues to grow within a heavily competitive scenario. Such competition has improved conditions for debtors, among which the most notable is longer terms. Improved conditions have also passed through to some older debtors through refinancing operations and debt consolidations, very substantial in 2005 and 2006. The above partially offsets the increase in the financial burden inherent to credit growth. However, household perception with respect to their own indebtedness has deteriorated marginally, and some indicators of credit quality show a change of trend after a prolonged period of good numbers.

The capital adequacy ratios of banking institutions look robust, despite strong expansion of credit in every segment. The flexibilization of certain commercial practices, such as the extension of loan maturities —especially consumer and housing mortgage loans— together with increased access of banks to attractive funding conditions, have provided support to the large increase in loans, partly offsetting the effects of interest rate normalization of recent years. While credit expansion has been across the board, banks have shown faster growth in those economic sectors and segments with a track record of being more sensitive to the business cycle. Still, financial institutions continue to show strength through their high profitability rates and good capitalization indices.

As the period where household credits are growing becomes enlarged, opportunities to grow with constant risk conditions become exhausted. This posses a challenge to credit issuers and their clients, who must conduct a cautious and prudent risk assessment for new loans, especially being in a cyclical stage that is closer to long-term conditions than in previous years.

In institutional investors' portfolios a tendency to international diversification remains. Insurance companies and mutual funds have continued to increase their holdings of foreign instruments, reducing the net share of securities issued by the State and the Central Bank. To the extent in which the returns on said investments are not highly correlated with the profitability of domestic assets, such trend contributes positively to the economy's financial stability, as it diversifies risks and reduces the

probability of a change in those portfolios generating more price volatility in the local financial market.

In any case, portfolios of pension funds and mutual funds register significant increases in time deposits and bank bonds. This is due partly to certain market conditions, such as wide availability of liquid funds from the corporate sector, and partly to existing regulations that restrain the composition of investment portfolios. Recent announcements of legal initiatives aimed at making investment options more flexible for institutional investors support a greater diversification of risks. The effects of these and other changes of the structure and sources of bank financing should be properly considered by financial institutions in their risk analyses.

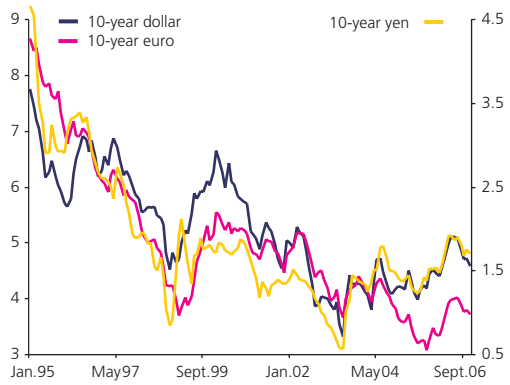
The economy has continued to strengthen its external financial position. Upgrades in sovereign risk rating and in the country ceiling have recognized the soundness of the economy, a perception that runs parallel to transitory factors such as the high copper price. The external debt shows a moderate increase, and most of it is non-financial, including credits associated with foreign trade and foreign direct investment. Various structural phenomena are eating up the gross international reserves of the Central Bank, but this must not be construed as an erosion of the entity's international liquidity, which is in an adequate level. On the other hand, the Consolidated Government's international liquidity has grown significantly, thanks to the functioning of the fiscal rule, high copper prices and the Executive's decision of keeping the extra resources invested abroad. These facts permit to foresee a reduction in the sensitivity of the economy's external financing to a potential deterioration of the conditions of world financial markets or of the terms of trade.

I. Financial risk environment and scenarios

Figure I.1

Long-term interest rates

(percent)

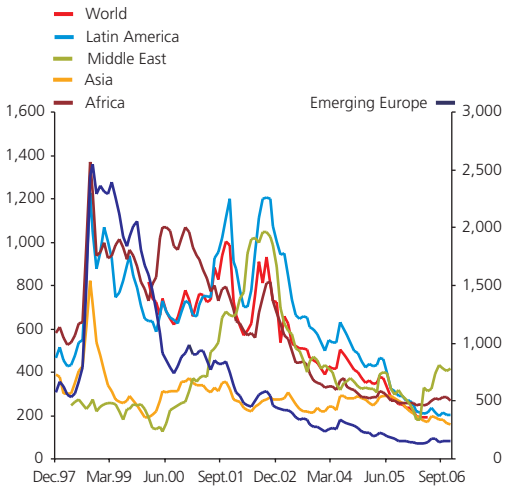


Source: Bloomberg.

Figure I.2

Risk premiums on emerging market sovereign bonds

(basis points)



Source: Bloomberg.

This chapter reviews the recent conditions and developments in the international and domestic financial markets. It also describes and lays the foundations of the Central Bank of Chile's assessment of the main threats to financial stability that could come from those markets.[1]/

International environment

Access conditions for external financing continue to be very favorable

The international context is favorable for financial stability. Long-term interest rates remain at historically low levels (figure I.1), as do the risk premiums on sovereign bonds in the different emerging regions (figure I.2). The latter have even contracted in economies with weak economic fundamentals.

These low interest rates could be explained both by the market's confidence in the central banks' ability to control inflation and by the abundant liquidity generated through high current account surpluses and reserve accumulation in some emerging economies (especially the Asian economies and the oil exporters).

The world economy continues to be dynamic, but it shows signs of slowing

The world economy has experienced sustained growth over the last three years. This expansion is notable not only for its high growth rates, but also for its duration. The last quarter, however, has brought signs of a slowdown in the US, together with a slight reduction of the high US current account deficit. This has been accompanied by an increased expansion in the euro area, Japan, and the emerging economies.

Local financial markets

Long-term interest rates revive a downward trend

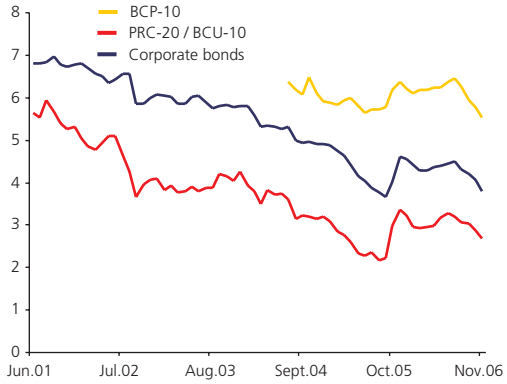
Between June and September 2006, market expectations for the monetary policy rate one year out register a drop of 75 basis points (bp). Long-term interest rates record falls of around 50 bp between June and November, in

[1]/ For a description of the methodology used for risk monitoring, see box I.1 in this *Report*.

Figure I.3

Long-term bond rates

(percent)

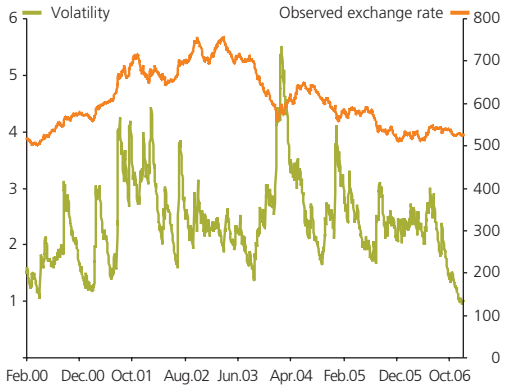


Sources: LVA indices, and Central Bank of Chile.

Figure I.4

Monthly exchange rate volatility

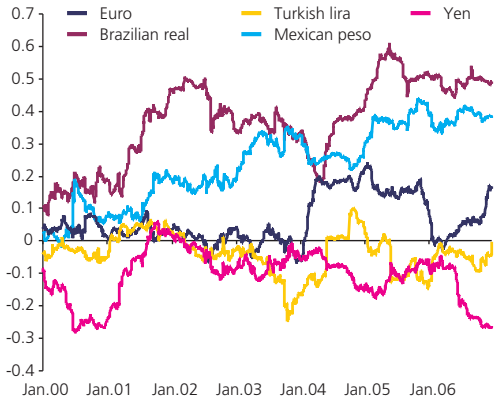
(percent and peso/ dollar)



Source: Central Bank of Chile.

Figure I.5

Correlation between the Chilean peso and other currencies (*)



(*) Correlation of the daily variation, moving year.

Source: Authors' calculations, based on data from Bloomberg.

line with the expected lower short-term rates and with similar movements in long-term interest rates in the US and the euro area (figure I.3).

The local stock exchange, like those of other emerging economies, posted a vigorous recovery after the drop of the second quarter of 2006 (May–June), surpassing its level before the drop. This growth strongly parallels the US exchange. Furthermore, the correlation between the daily variation of the *IPSA* and the S&P500 at twelve months increased from values near 0.15 to 0.50 in the period April–October 2006.

In the last quarter, the exchange rate registered volatility levels close to the lows observed over the last few years (figure I.4). The daily variation of the nominal exchange rate maintained its high correlation with the Brazilian real and the Mexican peso (figure I.5).

Financial risks

The main external threat to financial stability that we identify in this *Report* is a sharp correction in risk premiums in the international financial markets.

Risk ratings in the international financial markets are at historically low levels

The low risk premiums for debt instruments and their low dispersion across countries and regions with very different macroeconomic fundamentals (figure I.6) suggest that the financial markets may be undervaluing financial and geopolitical risks. Measures of risk perception in other financial markets, like the North American stock market, are also near their historical lows (figure I.7).

The classifications of the risk rating agencies display a similar trend. The weighted average of risk ratings for a selected group of emerging economies has improved continuously since 1998 (figure I.8). While the improvement of their macroeconomic fundamentals validates this trend, there may be evidence that the risk ratings have increased beyond what is justified by the fundamentals.

Several factors could explain the low risk ratings

Some analysts attribute this scenario of low risk ratings to the combination of low interest rates, the absence of economic and financial crises, and the solid macroeconomic fundamentals in a broad group of emerging economies. This could have led investors to take positions in instruments traditionally associated with higher risks ("search for yield"). Other analysts attribute the low risk premiums to an incorrect evaluation of the true financial risks.

A more benign perspective relates the current state of risk premiums with the development of financial risk transfer instruments and markets. It is worth noting, however, that these instruments have not been proven in situations of real financial stress. Moreover, there is a lack of regulation in these markets, and the relevant agents—namely, the hedge funds—are subject to minimal information requirements. Finally, some of these hedge funds registered significant losses in the last year (box I.2).

Figure I.6

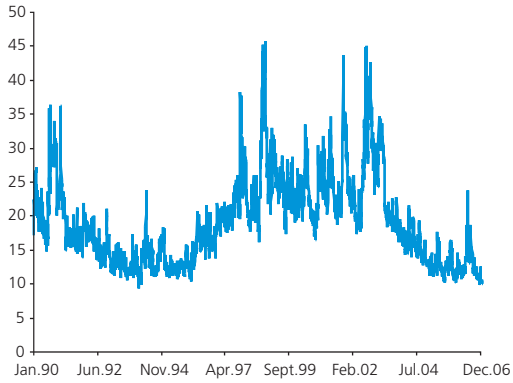
Risk premium compression
(variation coefficient) (1)

(1) Calculated as the coefficient between the standard deviation and the average risk premium in each period, for the following group of economies: Brazil, Chile, Malaysia, Mexico, Indonesia, Russia, Thailand, and Turkey.
(2) Sovereign bond credit default swaps.
(3) Emerging Markets Bond Index.

Source: Authors' calculations, based on data from Bloomberg.

Figure I.7

Stock price volatility (*)
(index)



(*) Measured by the VIX of the Chicago Board Option Exchange (CBOE). Expected short-term stock market volatility (30 days), implicit in the price of S&P500 options.

Source: Bloomberg.

A sharp and unexpected correction in risk ratings would affect the main financial variables

A correction could be triggered by a major credit event in the hedging markets, the default of a large financial intermediary or group of intermediaries in the international markets, an economic or financial crisis in a systemically important emerging economy, or a severe contraction of international liquidity. The latter could be produced by a substantial increase in interest rates as a result of greater inflationary pressures, a greater slowdown than expected in the US, a marked correction in the main currency parities, or the sharp correction of the global current account imbalances. These threats are analyzed in greater detail below.

A sharp hike in risk ratings could translate into a strong increase in the cost of external financing. Both the intensity and the macroeconomic and financial consequences of such a correction will depend on the causal factor. If the reversal stems from a contraction of global liquidity, then it would be plausible to expect a relatively homogeneous and generalized impact across markets, economies, and regions. If, on the other hand, the correction is the result of bad asset valuation, the magnitude and severity of the adjustment would be more uncertain, although the most strongly affected economies would be those with the weakest fundamentals.

Such a correction could stem from a major credit event or the default of systemically important financial intermediaries

There is evidence that at the international level, credit derivatives market risks could be highly concentrated in the banking system. At the end of 2005, the Credit Default Swap (CDS) markets showed that only around 10% of credit risks had been transferred out of the banking system.[2]/ At the same time, the 15 main banks and securities brokers accounted for approximately 83% of gross positions in credit derivatives in 2005.[3]/ Finally, some systemically important banks operate as "funds of hedge funds," which exposes them to counterparty risk in the face of defaults by these brokers.[4]/

Vulnerabilities in emerging economies also expose the financial system to a significant correction in the case of a crisis

In general, emerging economies' fundamentals have continued to improve, with considerable reductions in external debt, a large accumulation of international reserves, and current account surpluses, especially in the oil-exporting countries. These economies, however, are still susceptible to changes in the market's perception of risk, as evidenced by the massive sale of relatively riskier financial assets last May and June.

Among the emerging economies, Hungary is perhaps currently the most vulnerable to a reversal of capital flows, owing to the magnitude and

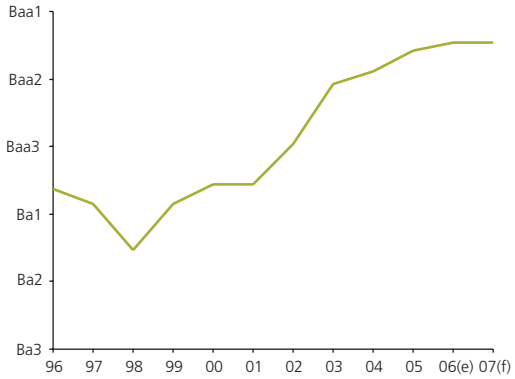
[2]/ BIS (2006).

[3]/ Fitch Ratings (2006). Gross positions capture the replacement cost of contracts.

[4]/ The "funds of hedge funds" are investment institutions that buy several hedge fund portfolios as a risk diversifications strategy.

Figure I.8

Emerging economies' country risk index (*)
(rating category)

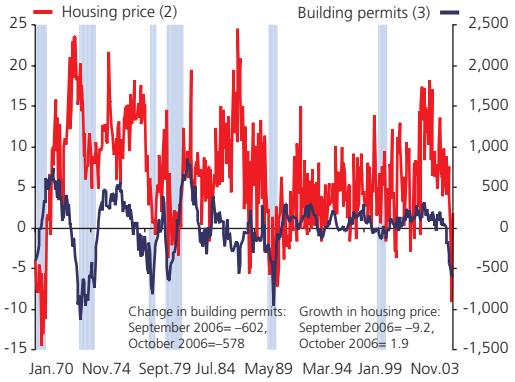


(*) Moody's country risk rating, weighted by the relative GDP of the group of countries evaluated each year. The projections assume that the countries maintain their rating through November 2006. Countries in the sample: Argentina, Brazil, Chile, Mexico, Thailand, South Korea, Malaysia, Turkey, India, Russia, and China.
(e) Estimate.
(f) Projection.

Source: Authors' calculations, based on data from Bloomberg and IMF.

Figure I.9

Real estate sector indicators in the US (1)
(percent, thousands of houses)



(1) The shaded areas represent recessions, according to NBER.
(2) Annual growth.
(3) Absolute annual change.

Sources: US Department of Commerce: Census Bureau; Bloomberg; NBER.

persistence of its fiscal deficit and the rapid growth of its current account deficit, which has reached 9.1% of gross domestic product (GDP).

Turkey and South Africa maintain high current account deficits at around 6% of GDP, so a sharp depreciation of their currencies continues to be a risk. In China and India, some international organizations have expressed concern for the stability of the banking system, based on the deficiencies of the regulatory framework. In China, the risks associated with the exposure and quality of the banks' portfolios are particularly worrisome in the face of the rapid expansion of domestic credit and investment. Finally, Mexico and Brazil are exposed to greater fiscal imbalances.

At the world level, geopolitical risks have increased in the last six months with the tensions in North Korea and the Middle East.

Alternatively, the correction in risk ratings could be triggered by a substantial increase in interest rates or in a sharp slowdown in the US

Increases in international interest rates could be brought on by the accumulation of inflationary pressures or by new oil price hikes, among other factors. The most probable scenario for the oil price is that it will hold steady at its recent high levels, both because of a higher world demand—with China and India playing key roles in this growth—and because of a low capacity for supply growth in the short term. However, threats of a geopolitical character introduce an element of additional uncertainty with regard to possible hikes.

In the case of a slowdown in the US, the recent evolution of several indicators suggests that the probability of a recession has increased relative to the last *Report*.[5]/ This assessment is based on the combination of a rapid fall in the sale of durable goods, the reversal of the slope of the yield curve, and the recent contraction of the real estate sector (figure I.9), which is reflected in a sharp drop in prices and units sold.

The possibility of a sharp and disorderly correction of global imbalances also persists

A sharp and disorderly correction of the global current account imbalances (figure I.10) and a fast adjustment in the main currency parities could cause significant disturbances in the international financial markets. The evolution of these imbalances depends crucially on savings (private and public) in the US, Asia, and the oil-exporting countries, and on capital inflows to the North American economy. The majority of the analyses[6]/ indicate that the current account deficit in the US is not sustainable at its current levels, generating strong international pressure both for China to revalue its currency and for the US to adjust its expenditure level.[7]/ The recent fall of the dollar seems to

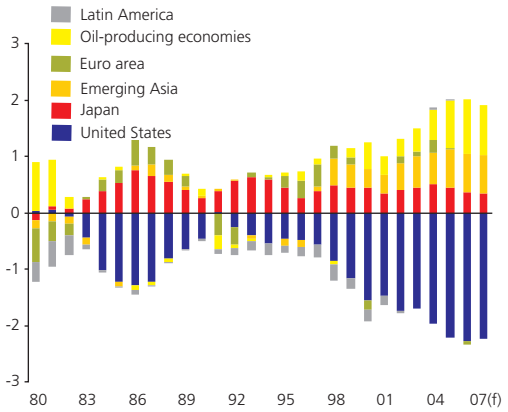
[5]/ Estimations by the Federal Reserve Bank of Philadelphia indicate that the probability of a recession in the next three quarters rose from close to 12% at the beginning of 2005 to over 19% in the third quarter of 2006.

[6]/ Obstfeld and Rogoff (2006); Rajan (2005); Buiter (2006); Roubini (2005); IMF (2006a); and Whitehouse (2006).

[7]/ According to figures from the Bureau of Economic Analysis, US external debt payments have surpassed the return on US foreign investments since the third quarter of 2005. In the second quarter of 2006, the gap was US$2.5 billion, which is the largest difference since 1960. These results have revived the discussion on the need for an adjustment in US expenditures.

Figure I.10

Current account balance in main economic areas
(percent of world GDP)



(f) Projection.

Source: IMF.

be in line with these pressures. The large exchange rate flexibility in China and the growing possibility of a significant reduction of aggregate demand in the US point to a scenario of gradual, orderly adjustment of the global current account imbalances.

The possibility of contagion in the case of a more systemic adjustment cannot be ruled out, although the economy is stronger to face this type of shock

Evidence on the behavior of the stock market indices, exchange parities, and sovereign bond risk premiums shows that Chile could be exposed to some degree of contagion from other economies in the region—primarily Mexico and Brazil—and from economies with a similar risk rating—Hungary and Poland. This is particularly the case with stock prices,[8]/ as seen in the massive sale of May and June (box I.3). Nevertheless, the current exchange rate, fiscal and monetary policy scheme makes the economy very resilient and should facilitate the adjustment to this type of shock.

Based on the primary threats identified above, this Report considers two risk scenarios for the stress tests

The most adverse scenario is considered to be the sharp hike in risk premiums in the international financial markets. In this case, we assume a hike in Chile's country risk premium and in international interest rates, which together total 300 bp. This increase would be transmitted to domestic short- and long-term interest rates, while the reduction in external financing would lead to a real depreciation of the exchange rate. This scenario also considers a fall in the price of copper, which, together with the previous effects, would generate an adverse economic cycle in Chile, with a slowdown of economic activity in the short term.

The second scenario considers a contraction in world economic activity accompanied by tight global liquidity, which could be triggered, for example, by a higher oil price, a sharp adjustment of global imbalances, and/or a severe deterioration in the credit quality of credit users in the US The short-term interest rate hike in Chile is similar to that of the first scenario, but the effect on long-term rates and the real exchange rate is more limited. In this case, we assume that the cyclical downturn in Chile is longer but less intense in the short term than in the first scenario.

[8]/ Although the correlation between Chile's sovereign risk premium and exchange parities and those of these economies is currently modest (less than 0.5), it has been very high in the past, such that a degree of codependency in the future cannot be ruled out. The correlation between stock prices increased considerably in the months following the massive asset sale in May and June, recording historical highs (around 0.6 in October 2006).

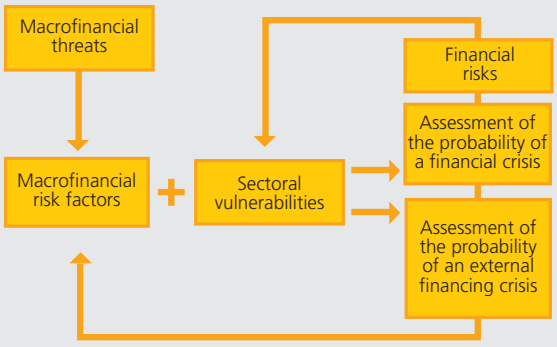
Box I.1: **Methodology for monitoring systemic risks**

Monitoring the risks to financial stability requires a methodology that allows the analysts to identify the sequence of events that might affect the normal functioning of the local financial system and/or access to the international financial markets. This box describes general aspects of the methodology used in the Central Bank of Chile to monitor risks to financial stability.

The methodology combines the analysis of threats from the national and international macroeconomic and financial environment with the assessment of the financial vulnerability of the agents that participate in the local financial system. This combination allows a qualitative evaluation of changes in the probability of internal and external crisis and its possible feedback into markets and users of the financial system (figure I.11). A central element of this methodology is the concept of financial risk, which is the expected magnitude of the damage or loss that could stem from agents' financial activities, affecting key dimensions of their financial functioning such as, for example, their earnings, cash flow, or equity. Depending on the agents' exposure, financial risk can be classified into credit risk, market risk, and liquidity risk.

Figure I.11

Risk monitoring scheme



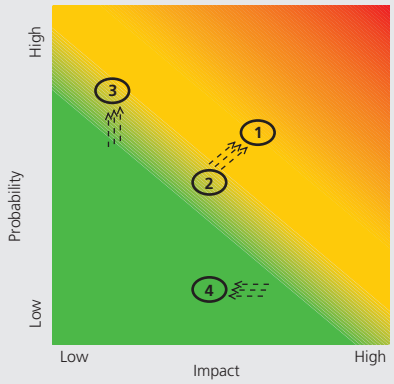
Source: Central Bank of Chile.

The methodology used by the Central Bank can be summarized in three steps:

Step 1: Evaluation of macrofinancial threats. This step identifies the real and financial threats from the national and international economy that could significantly affect the financial stability of the Chilean economy. These are classified and ranked based on a qualitative evaluation of their **probability of occurrence** and their possible **impact** on the financial system, according to their degree of potential stress. This estimation is illustrated graphically in a probability-impact matrix (figure I.12), with levels ranging from low (green) to high (red). The threats are evaluated in terms of their effect on risk factors, or macrofinancial variables that are key for the stability of our financial system, including interest rates, the country risk premium, and the real exchange rate, among others. For example, this *Report* identifies as a principle threat a sharp correction of risk premiums in the international financial markets (threat 1 in figure I.12). The effects on the risk factors associated with this threat are a strong hike in interest rates and in corporate and country risk premiums, as well as a contraction of capital inflows both into emerging economies in general and into our economy in particular, which could generate a significant depreciation of the peso.

Figure I.12

Probability-impact matrix



(1) Sharp correction of risk premiums in the international financial markets.
(2) Substantial increase in international interest rates.
(3) Recession in the US.
(4) Correction of global imbalances.

Source: Central Bank of Chile.

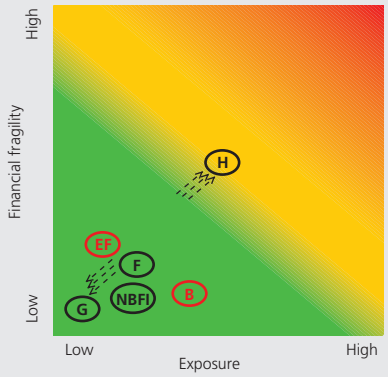
Step 2: Evaluation of sectoral vulnerability.
The agents and sectors (financial system users and institutions) are classified according to their **financial fragility** and the magnitude of their **exposure** to different risk factors. Each sector receives a ranking based on our evaluation of the potential degree of vulnerability of a set of indicators. This estimation is illustrated graphically in a fragility-exposure matrix (figure I.13), with levels ranging from low (green) to high (red).

For a set of indicators, the financial fragility of agents and sectors is evaluated in terms of the proximity of the levels of these indicators to the breakpoint of acceptable risk (based on standards found in the literature or on the historical levels of the national financial system). Next, their exposure is measured as the sensitivity of these indicators to changes in the environment, triggered by the risk factors identified in the first step.[9]/ The combination of these two dimensions (fragility and exposure) determines the assessment of the sector's degree of financial vulnerability.

In this *Report*, for example, the household sector is very vulnerable, given the high and sustained growth rate of household debt, mainly in consumer loans (credit users H in figure I.13).

Figure I.13

Sectoral financial fragility–exposure matrix (*)



(*) Credit users and nonfinancial intermediaries: households (H), firms (F), nonbank financial institutions (NBFI), government (G).
Systemic risks: banks (B), external financing (EF).

Source: Central Bank of Chile.

Step 3: Evaluation of systemic financial risks.
Financial risk stems from the interaction between the risk factors and the vulnerability of agents or sectors that are subject to monitoring. This step includes the study of the transfer of financial risk among systemically important institutional agents and sectors, its implications for the most important national financial markets, its possible feedback into the macroeconomic scenario, and the evolution of changes in the probability of occurrence and in the potential magnitude of an internal or external financial crisis.[10]/

For example, this *Report* considers that sectoral vulnerability to the different detected threats is moderate to low, and that the transfer of risk to both the local financial system and external financing is limited. The *Report* therefore concludes that the probability of a systemic crisis continues to be low.

The three steps of this risk-monitoring methodology are reflected in the structure of the *Report*. The first step, the identification and assessment of threats to financial stability, is carried out in chapter I. The second step, the evaluation of sectoral vulnerabilities, is represented in the analysis of credit users in chapter II and in part of the analysis of the financial system, covered in chapter III. Finally, the third step is also developed in chapter III, which evaluates systemic risks in two areas that are crucial for financial stability in our economy: the financial system and the access conditions for external financing.

[9]/ Individual- and sectoral-level stress tests are carried out in this step.

[10]/ Systemic stress tests are carried out in this step (that is, on the banking system and external financing).

Box I.2: **Hedge funds**

The recent losses of Amaranth and other hedge funds (September 2006) of over US$7 billion has raised new doubts regarding the implications of hedge fund operations for the rest of the financial system. Although it has been argued that these collapses did not represent a real systemic risk, unlike the 1998 episode involving Long-Term Capital Management (LTCM),[11]/ this interpretation only highlights the uncertainty surrounding the effects of hedge fund activity on the stability of the international financial system. In Chile these intermediaries do not operate directly, but they could still affect the domestic financial market if they trigger events of a systemic nature.

This uncertainty combines with numerous questions on issues such as their degree of market presence, level of indebtedness, and performance. These questions are due, in part, to the fact that hedge funds are not required to report their operations or the nature and type of investors that work with such funds.

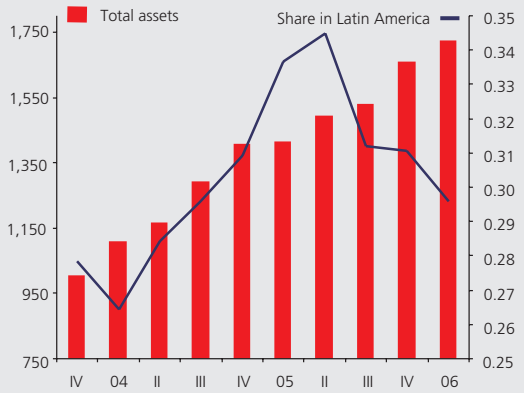
This box provides some background on these aspects of hedge funds.

Growth and presence in Latin America. Hedge funds have registered strong growth at the world level in recent years. Assets administrated by hedge funds rose to US$1,786 billion (figure I.14) in the third quarter of 2006, which equals around 5% of the total assets managed by international investment funds. With regard to hedge fund activities in Latin America, the region still represents a low percentage of hedge fund operations. In fact, although this share has tended to grow over time, a reversal was seen between the second quarter of 2005 and the third quarter of 2006, from 0.34 to 0.30% of total assets.

Figure I.14

Hedge funds in Latin America

(US$ billion, percent)



Source: HedgeFund.Net (2006).

Level of indebtedness. Hedge funds as a group are associated with high levels of indebtedness. However, Schneeweis *et al*. (2006) estimate that the median indebtedness by type of investment strategy varies between one and three times their capital, which is far below the standard for financial institutions. Nyberg (2006) presents similar results for Sweden, where the median indebtedness is 0.8 times and the most indebted fund has an index of 3.2 times.

Performance. One of the main attractions of hedge funds is their ability to generate higher earnings than other investors. However, Yale International Center for Finance (IMF, 2006b) estimates that the hedge funds' real returns would reach 9% annually after being adjusted for the fact that results are only reported by funds in operation and those that effectively

[11]/ LTCM's losses were over 2% of the sector's assets, while Amaranth's losses reached only 0.5%. Similarly, the direct exposure of the international banking system to LTCM's losses was over 50%, whereas exposure to Amaranth did not exceed 28%. Finally, Amaranth's operations were concentrated in a specific market (gas), while LTCM was more diversified.

demonstrate positive results.[12]/ That is, real returns would be slightly more than half the figure reported by the more traditional performance indices. Along similar lines, Kat and Palaro (2006) conclude that the majority of the hedge funds has not generated better returns than the S&P 500, T-bonds, and Eurodollar futures.

Financial stability. The implications for financial stability are fairly uncertain, and little quantitative evidence is available. With regard to the risk of contagion, Boyson et al. (2006) find no evidence of contagion to hedge funds from the stock, fixed-income, and exchange markets. Chan et al. (2005) estimate that the systemic risk associated with hedge funds has grown steadily over time, with small banking institutions being particularly exposed; the larger banks, in contrast, are more exposed through structured products and counterparty risk, among others.

[12]/ Hedge funds are not required to report, so it is possible that only funds with positive returns report their earnings. This bias is known as backfill bias.

Box I.3: **Differentiation of emerging economies in recent episodes of volatility**

In May and June 2006, the international financial markets —primarily stock and debt markets— experienced a strong increase in price volatility, a situation that affected emerging economies, in particular. This episode demonstrated that these economies are still relatively vulnerable to sharp, unexpected changes in international financial conditions and, furthermore, that the most vulnerable economies are those with weak fundamentals. In the case of Chile, the financial repercussions were fairly minor compared with other emerging economies.

There is no consensus on what this episode demonstrates with regard to the degree of strength exhibited by the international financial system. A degree of consensus has emerged, however, with regard to the existing potential for an even greater price correction.

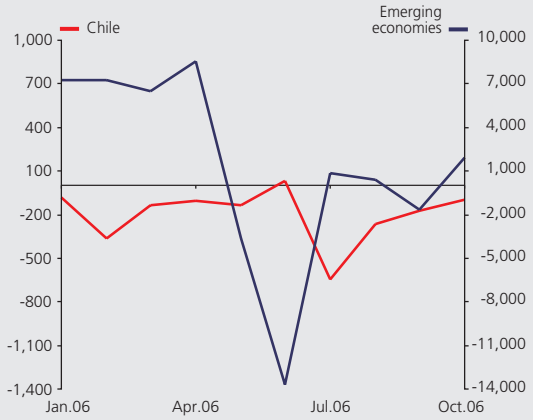
The rest of this box documents the effects of the episode of May–June 2006 on some of the risk factors for financial stability.

Investment fund flows. After the end of April, stock and debt flows to emerging markets became negative for eight consecutive weeks (figures I.15 and I.16). These outflows represented, on average, 8% of the flows accumulated in 2006.[13]/ While these flows have become positive again, they have not yet recovered their previous levels.

In Chile, stock flows behaved practically identically to the flows to emerging economies as a whole, although with a lag. In contrast, debt flows to Chile did not register a similar pattern to that seen for emerging economies.

Figure I.15

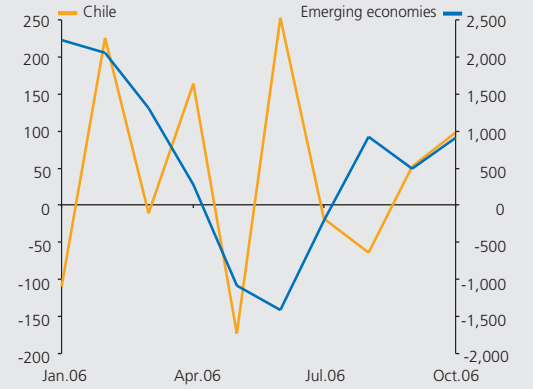
Monthly stock flows
(US$ million)



Sources: Emerging Portfolio Fund Research; and Central Bank of Chile.

Figure I.16

Monthly bond flows
(US$ million)



Sources: Emerging Portfolio Fund Research; and Central Bank of Chile.

[13]/ Emerging Portfolio Fund Research.

Sovereign debt. Emerging economies' country risk premiums were corrected upward, with the largest corrections occurring in the economies with the greatest sovereign risk—namely, Argentina, Brazil, and Turkey. Since July, country risk premiums have returned to their previous levels, except in the case of Turkey. In Chile, the change in country risk premium was very slight.

Credit Default Swaps (CDS). The CDS term spread can be employed as a measure of the financial markets' perception of the financial stability of economies at different time horizons.[14]/ A fall in this measure is associated with an increased perception of the probability that a credit event will occur in the short term.[15]/ This measure fell for the majority of the economies, and, with the exception of Argentina, the largest drops were seen in countries with an initially higher term spread (Brazil, Colombia, Turkey, and Mexico). Again, the term spread virtually did not change in the case of Chile.

Stock markets. The evolution of stock prices also suggests that investors have differentiated their behavior in different emerging economies. For example, the Turkish and Hungarian stock exchanges fell 24% and 18% in nominal terms, respectively, in May and June 2006, while Chile recorded a much smaller drop (5%).

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[14]/ One advantage of using this indicator instead of CDS levels is that the use of different CDS premiums with different maturities reduces the potential influence of variables that are not necessarily associated with the countries' credit risk factors (such as changes in market liquidity).

[15]/ In normal times, a CDS premium is positively correlated with its maturity, since the possibility of a credit event is greater the longer is the term covered by the CDS. The opposite occurs in periods of economic and financial turbulence, however, because the premium is larger for a CDS with a shorter maturity. This reflects the investors' perception of a greater probability of default in the short term.

II. Credit users

The possibility of default on credit commitments is one of the main risks on the balance sheets of the national financial intermediaries, as well as for the external balance of the economy. In Chile, the banking system is exposed through its loans to households and nonfinancial firms and, to a lesser extent, through its investments in public debt securities. Consequently, the Consolidated Government and the corporate sector have a significant effect on the economy's external position. This chapter examines the financial position of credit users and evaluates the credit risk trend in the Chilean economy and its sensitivity to the risks described in chapter I.

In the last six months, credit users have maintained a favorable position for absorbing deteriorations in the macrofinancial environment, without jeopardizing the financial stability of the Chilean economy. The application of the structural surplus rule has allowed the authorities to continue to quickly and consistently reduce the net debt of the Consolidated Government.[1]/ Firms[2]/ have continued strengthening their equity position, and no significant areas of financial risk have been detected that might affect them. Finally, although household indebtedness maintains a strong growth rate, it shows some signs of slowing. Confirmation of these trends can be found in the fact that Chilean sovereign bond risk ratings have improved, and corporate bond risk ratings have held steady with no major changes. The portfolio quality of the banking institutions has not registered significant variations.

Firms

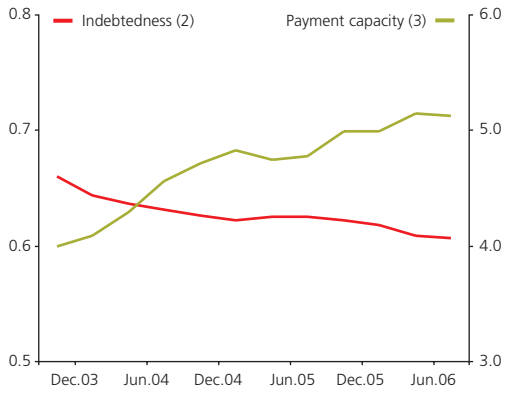
Loans to domestic nonfinancial firms are the main asset on banks' balance sheets (47%). Their greatest exposure is in nontradables sectors, and the majority of these loans corresponds to large firms. The external debt of nonfinancial firms represents around 75% of the economy's external debt, and their capital and debt securities account for around 25% of the assets of domestic institutional investors.

Data on nonfinancial firms registered with the Superintendency of Securities and Insurance (SVS) show that the favorable macroeconomic conditions of the last year have generally allowed the firms to continue strengthening their financial position. Some of the main export products continue to register historically high prices, and domestic consumption has continued to expand dynamically, although economic activity grew less than in 2005. In specific sectors, these conditions have been partially offset by a lower exchange rate and energy price hikes, which have reduced the margins and earnings

Figure II.1

Payment capacity and indebtedness (1)

(times)



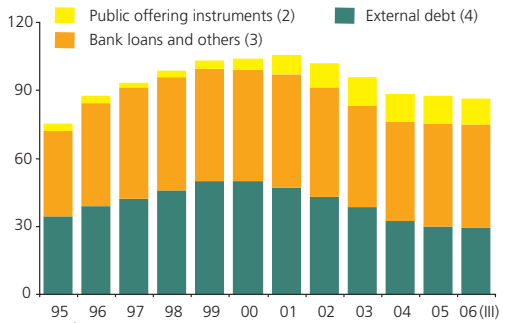
(1) Consolidated financial statements, excluding the mining sector.
(2) Financial debt/ (equity+minority interest).
(3) Interest coverage, moving year. Coverage calculated (EBITDA/ financial expense), where EBITDA = Operating income+depreciation.

Source: Authors' calculations, based on data from the SVS.

[1]/ Central Bank and Central Government.

[2]/ On the basis of data provided by the Superintendency of Securirties and Insurance (SVS).

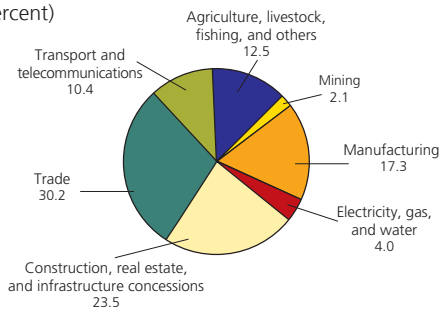
Figure II.2
Total debt
(percent of GDP) (1)



(1) GDP of the Q.III 2006 corresponds to the moving year ending in the given quarter.
(2) Corporate bonds (except *Codelco*), securitized bonds with nonbank underlying assets, and commercial papers.
(3) Business loans, foreign trade, leasing, and factoring.
(4) Converted to pesos using the average exchange rate for the period 2002 to September 2006.

Source: Authors' calculations, based on data from the SVS, SBIF, and ACHEF.

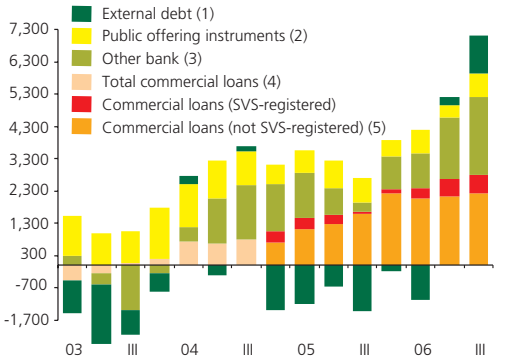
Figure II.3
Bank loans by economic activity (*)
(percent)



(*) As of August 2006. Total commercial loans excluding community and personal services, and financial institutions.

Source: SBIF.

Figure II.4
Sources of financing
(net annual flows, billions of September 2006 pesos)



(1) Converted to pesos using the average exchange rate for the period 2002 to September 2006
(2) Corporate bonds (except *Codelco*), securitized bonds with nonbank underlying assets, and commercial papers.
(3) Foreign trade, leasing, and factoring.
(4) Commercial loans, foreign trade, leasing, and factoring.
(5) Disaggregation at the *FECU* level only available starting in December 2003.

Source: Authors' calculations, based on data published by the SVS, SBIF, and ACHEF.

of some firms. However, this has not affected the debt ratios or payment capacity of the sector as a whole (figure II.1). Interest rates, in turn, remain at historical lows, and the firms' funding costs did not vary strongly during the year, although they did post a moderate increase relative to 2005.

While the sector's total debt continues to grow faster than economic activity —led by bank loans—the low interest rates and sufficient operating cash flow has kept the debt ratios of SVS-registered firms stable. The evolution of their main financial indicators suggests that the risk of debt default has fallen at the margin. This trend is corroborated by the risk rating agencies, which practically did not change the risk perception of rated firms in the last half. For the moment, the lower growth of activity in 2006 relative to 2005 has not affected the credit quality of these firms.

The banking system continues to drive the growth of corporate loans

As of September 2006, the total debt of the corporate sector reached $62.431 trillion, or 86.6% of gross domestic product (GDP)[3]/ (figure II.2), with a real annual growth rate of 11.1%. The local banking system continues to be the sector's primary source of financing, with nearly 53% of the total, and it is also the source with the highest growth rates in the last three quarters. In September, the real growth of loans and other bank debt (commercial loans, foreign trade loans, leasing, and bank factoring) reached 15.1%. According to the most recent data available, the loan portfolio of the local banking system is concentrated in trade (30.2%), construction, real estate, and infrastructure concessions (23.5%), and manufacturing industry (17.3%) (figure II.3). In the last year, the exposure of the banking system to the construction, real estate, and infrastructure concessions sector increased 320 percentage points, to the detriment of the share of the trade and industrial sectors.

The corporate sector's liabilities from bonds and other public offering debt instruments grew at a real annual rate of between 5% and 10%, which is lower than in previous years.[4]/ External debt registered positive growth rates, after posting drops for the better part of the period analyzed (figure II.4). As of September, public offering instruments and external debt experienced annual rises in real terms of 9.3% and 6%, respectively.

In the case of nonfinancial firms registered with the SVS, new financing (gross flows) in recent quarters has included external bank loans and, to a lesser extent, public liabilities (bonds). Stock placements, in contrast, have been used less as a source of financing since late 2005. In the period January–November 2006, stock placements recorded a real fall of 63.5% relative to the same period of the previous year.

The growth of bank credit seems to extend to the different segments of the corporate sector

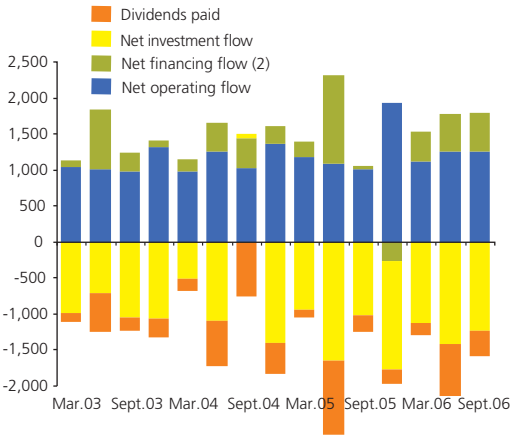
The growth of bank credit to SVS-registered firms has also been dynamic, although more moderate than aggregate growth. In September 2006, the

[3]/ 45% relative to GDP, measured as the constant real exchange rate in December 1995.

[4]/ In any case, bond placements recovered some of their momentum in the fourth quarter of the year. Note that this analysis excludes financial firms (banks and other finance corporations) and *Codelco*.

Figure II.5

Sources and uses of funds, nonmining firms (1)
(annual flows, billions of September 2006 pesos)



(1) Consolidated financial statements.
(2) Excluding dividends paid.

Source: Authors' calculations, based on data from the SVS.

Table II.1

Financial indicators (*)

Indicator	Dec.03	Dec.04	Dec.05	Sept.05	Sept.06
Operating margin (percent)					
MIning	26.3	40.6	42.2	39.7	53.5
Rest	12.1	12.6	11.8	11.8	11.6
Return on assets (ROA, percent)					
MIning	8.1	21.9	28.4	24.5	45.6
Rest	2.9	3.9	3.1	3.4	3.8
Interest coverage (times)					
MIning	9.2	21.1	28.4	27.8	41.6
Rest	4.0	4.7	5.0	4.8	5.1
Financial debt / EBITDA (times)					
MIning	1.8	0.8	0.6	0.7	0.4
Rest	3.4	3.1	2.9	3.1	2.7
Total debt / Equity (times)					
MIning	1.09	0.99	0.80	0.84	0.89
Rest	0.92	0.93	0.96	0.98	0.99
Financial debt / Equity (times)					
MIning	0.69	0.52	0.43	0.45	0.45
Rest	0.63	0.61	0.60	0.62	0.61

(*) Consolidated financial statements.

Source: Authors' calculations, based on data from the SVS.

real annual growth of business loans from the banking system to the sector as a whole was 12.9%, whereas loans to SVS-registered firms grew 13.8%. In June, these figures were 12.4% and 11.9%, respectively, and in December 2005 they were 11.4% and 3.1%. Although the available series is fairly short, the magnitude of the observed increases suggests that the sector as a whole has been using bank credit intensively.

Nonfinancial firms continue to put in a healthy performance

The favorable macroeconomic conditions of the last year have generally allowed nonfinancial firms to continue strengthening their financial position. In the case of nonmining firms registered with the SVS, the expansion of credit is associated with increased investment—led by the forestry sector—and has been accompanied by a moderate rise in operating cash flow and earnings retention (figure II.5).

The above has allowed the firms to maintain their debt ratios with no major changes, except in a few specific cases that are not systemically relevant. As of September, the financial debt ratio—measured as financial debt (local and external bank debt and bonds) to equity—reached 0.61 times. Payment capacity—measured by financial expense coverage[5]/—held steady at a healthy level (5.1 times), with very little variation since mid-2004 (table II.1). The latter reflects not only a good operating performance, but also the historically low financing costs. The average cost-of-funds rate of these firms (6.7% annual) remained stable relative to the previous quarter, although it increased slightly between January and September 2006, by 20 basis points.

While the most important indicators for evaluating the sector's credit risk are currently at satisfactory levels, some sectors have posted a poorer performance in recent quarters, as measured by their margins and profitability. These include the industrial-forestry sector and the land and maritime transport sector. The construction sector, in turn, continues to present sufficient performance indicators. The analysis of sectoral- and individual-level vulnerability is summarized at the end of this section.

The mining sector exhibits a notable improvement in earnings

In contrast with other sectors, the mining sector displays significant growth in operating flows, which is primarily explained by the price of minerals, especially the record price of copper. In this sector in particular, the increased operating cash flow has largely been designated to the payment of dividends (figure II.6), so debt levels and financial debt ratios have been relatively stable (table II.1).

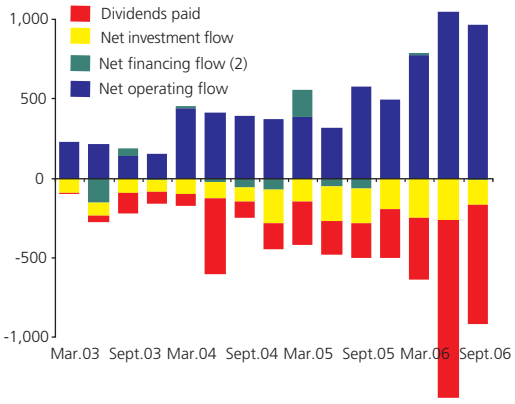
The analysis of sectoral- and individual-level vulnerability does not reveal cases that represent systemic threats

The financial debt of SVS-registered nonfinancial firms is concentrated among a few companies, the majority of which present healthy financial indicators. The 20 firms in the sample with the largest assets account for

[5]/ Also called interest coverage. In this *Report*, the two terms are used interchangeably.

Figure II.6

Sources and uses of funds, mining sector (1)
(annual flows, billions of September 2006 pesos)



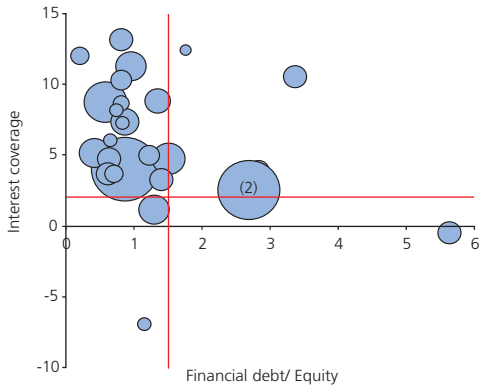
(1) Consolidated financial statements.
(2) Excluding dividends paid.

Source: Authors' calculations, based on data from the SVS.

Figure II.7

Concentration of financial debt by interest coverage and indebtedness (1)

(times)



(1) As of September 2006. The size of the circle represents the share of financing debt in the total debt of the sample.
(2) Includes the entire infrastructure concessions sector.

Source: Authors' calculations, based on data from the SVS.

63% of financial debt, and their interest coverage ratios are over three times, with the exception of one public land transport firm. At the same time, the majority post a financial debt ratio of under one time.

To uncover possible vulnerabilities at the individual level, the highest potential risk group was defined as firms with a financial debt ratio of over 1.5 times (representing 20.4% of the debt in the sample) and an interest coverage ratio of less than two times (16% of the debt in the sample).[6]/ The majority of firms (70% of total financial debt) fall outside these ranges (figure II.7).

The main conclusion of the analysis of this group of firms with less robust financial indicators and/or a worse relative performance is that they do not represent an important risk to the financial health of their creditors. This conclusion is based on the existence of debt guarantees and considerations specific to their business, such as their competitive position, the natural variation of their income, and the stage of project maturity, among other factors.[7]/ In the case of infrastructure concessions, another factor considered was that the majority of the concession contracts include mechanisms for mitigating demand risk.[8]/

In the case of public firms, the implicit or explicit guarantees represent a transfer of credit risk to the Central Government. Given the amounts involved and the Government's current financial position, this does not represent a risk for financial stability.

Stress tests suggest that the sector is capable of enduring scenarios of greater financial stress

The current financial situation of the corporate sector constitutes an important safeguard in the face of a possible deterioration in existing macrofinancial conditions. The materialization of any of the risk scenarios described in chapter I would have an impact on economic activity and the evolution of interest rates and the exchange rate, and it would thus have adverse effects on the payment capacity and solvency of nonfinancial firms.

We estimated the impact of two risk scenarios on the interest coverage ratio of nonfinancial firms: a sharp rise in risk premiums in the international financial markets; and a contraction in global activity combined with a tightening of liquidity. The former scenario is considered the more adverse of the two. Calculations indicate that under the first scenario, firms would register an important deterioration in their main financial indicators, but the majority would remain within ranges considered healthy from a financial perspective.

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[6]/ The analysis also takes into account, among other factors, the specific characteristics of the business and the sector: the firm's competitive position; its management and ownership structure; its possibilities for accessing different financing sources; and its debt structure (maturity profile versus cash flow).

[7]/ This last is particularly relevant in the case of infrastructure concessions.

[8]/ These include a guaranteed minimum income (GMI) and an income distribution mechanism (IDM). The GMI constitutes a state guarantee that is activated if the concessionaire's operating income does not meet a predetermined amount. The IDM is a form of traffic insurance that guarantees a certain total income over the life of the concession.

Disaggregating the shock's impact into the different risk factors reveals that an increase in the exchange rate would trigger the largest fall in the interest coverage ratio in most of the sectors. The rest of the shocks —namely, a fall in output or in the copper price and an increase in interest rates— would have a lesser effect on this indicator.

In the most extreme scenario, at-risk loans —measured as the share of local bank debt concentrated in firms with an interest coverage ratio of less than one time— would rise from 9.3% to 13.5% of the total after one year (September 2007). Additionally, an important share of the sample would move from ranges with coverage of over five times to the range of two to five times (figure II.8).

The main sectors contributing to the 9.3% at-risk bank debt as of September 2006 are infrastructure concessions and land transport. After the shock, the increase in debt in this coverage range is due mainly to the land transport sector and, in particular, one public firm whose debt has state guarantees.

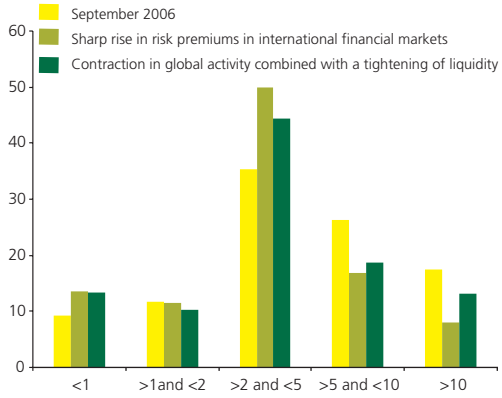
If only the concentration of bond liabilities is measured, the share of corporate debt with a coverage ratio of less than unity would rise from 8.8% to 18.3%. Finally, if measured as external debt, the share in firms with interest coverage ratios of less than one time would increase to 7.9% in the most adverse scenario, from 2.9% at the starting point.

In sum, while the effects of the shocks weaken the sector's payment capacity, it remains at reasonable levels in aggregate terms; at-risk debt does not rise substantially, and at least some of the most affected firms hold debt guarantees or other mitigation mechanisms.

Figure II.8

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

(percent, times)



(*) Percentage of local bank debt in the sample, according to the range of the interest coverage indicator.

Source: Authors' calculations, based on data from the, SBIF, and Central Bank of Chile.

Households

Loans to households represent around 25% of bank assets. Around 60% of the total corresponds to home mortgage loans and the rest to consumer loans and other credits tied to the use of credit cards and checking account overdrafts.

Household loans continue to grow strongly

Total household debt grew 17% in real annual terms in the third quarter of 2006. As of September, total hold debt was estimated at $23.200 trillion, and its real annual growth fluctuated between 15% and 18% in the last three years. The growth of debt continues to be led by consumer loans from banks, with a real annual increase of 23% in the third quarter of and 22% in November. Mortgage loans issued by the banking system grew 16% in real annual terms in the third quarter of 2006 and 15% in November. Another notable trend is the drop in the growth rate of nonbank consumer loans, which was 15% in the third quarter of 2006 after having grown 24% in the last quarter of 2005 and 20% in the first half of 2006 (table II.2).

The competition inside the financial system has translated into more flexible conditions being granted for household loans in 2006, which is reflected in the results of the bank loan survey carried out by the Central Bank of Chile. While the market maintains its perception that the risk exposure of this segment continues to rise, loan supply conditions continue to be favorable thanks to the strong competition among banks and nonbank institutions.

Table II.2

Household debt

(real annual change, percent)

	2005				2006			
	I	II	III	IV	I	II	III	Nov.
Mortgage	**15**	**14**	**13**	**14**	**15**	**16**	**16**	
Bank	20	18	17	16	17	17	16	15
Nonbank (1)	-9	-5	-5	0	6	10	14	
Consumer (2)	**19**	**17**	**21**	**21**	**21**	**20**	**20**	
Bank	19	20	19	20	21	22	23	22
Nonbank (3)	20	13	24	23	21	18	15	
Total	**17**	**15**	**17**	**17**	**18**	**18**	**17**	

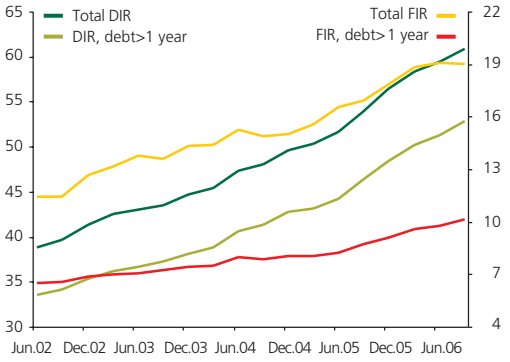
(1) Includes securitized mortgage debt.
(2) Includes university debt and nonbank automobile debt.
(3) Includes retailers, private compensation funds, cooperatives, and insurance companies.

Sources: SBIF; SVS; SuSeSo; Central Bank of Chile.

Figure II.9

Indebtedness (DIR) and financial burden (FIR)

(percent of disposable income)

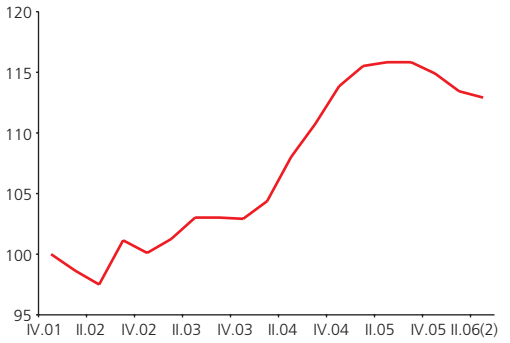


Source: Authors' calculations, based on data from the SBIF, SVS, SuSeSo, and Central Bank of Chile.

Figure II.10

Housing price index (1)

(December 2001=100)



(1) Index measured as the median price in UF of housing transactions.
(2) Second quarter 2006 includes transactions carried out through May.

Source: Authors' calculations, based on data from the *Asociación de Corredores de Propiedades de Chile* (ACOP).

In the case of mortgage loans, supply conditions remain moderately flexible given the lower perception of credit risk reflected in the last survey.

The recent increase in debt and the financial burden is led by consumer loans from banks

The sustained increase in debt over and above the growth of disposable income has translated into an increase in the debt-to-income ratio (DIR) with a maturity of over a year throughout the period of analysis, reaching 52.9%[9]/ in September 2006 (figure II.9). The high growth rates of the last few years confirm that consumer debt maturing in over a year is the most dynamic component of household indebtedness. However, the share of this debt continues to represent less than 35% of total debt maturing in over than a year.

The estimated service on debt with a maturity of over a year as a percentage of disposable income rose to 10.1% in September 2006, from 9.8% in the previous quarter. This increase in the service-to-income ratio at more than one year is mainly explained by increases in the financial burden corresponding to consumer debt. This is a scenario in which interest rates on loans to individuals have been stable or have risen at the margin, and the residual terms of consumer and mortgage loans have lengthened by six or nine months, respectively, in the last half.

Housing price dynamics continued to slow in the second quarter of 2006, partially containing the growth of mortgage loans and contributing to holding the latter below the average growth registered in 2005. Thus, housing prices, measured by the median housing transaction recorded in the most representative neighborhoods of the Santiago Metropolitan Region, have displayed a downward trend for the first time in four years. Specifically, housing prices registered a fall of 2% in real terms in the second quarter of 2006 relative to the same quarter of the previous year[10]/ (figure II.10).

Despite the concentration of debt, no major gaps are seen between household debt, assets, and income

Disaggregating consumer bank debt by debt bracket reveals that 8.6% of debtors— who have consumer loans of more than 400 UF —account for 45.7% of debt. Debtors with more than 400 UF in loans have increased their indebtedness at average annual rates of over 30% in real terms in the period 2005–06, and they explain more than 50% of the recent growth in consumer debt. These debtors have an average consumer debt of $14.3 million as of October 2006, five times more than the average of all debtors.

The disaggregated data collected in the 2004–05 Social Protection Survey (*Encuesta de Protección Social*, or *EPS*) show that these debtors (with more than 400 UF in bank loans) have twice the earnings of the rest of the indebted households, triple the asset holdings, greater human capital, and

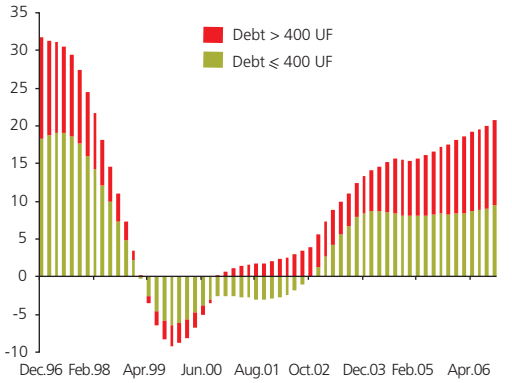
[9]/ The historical calculation of the debt-to-income ratio (DIR) and the debt-service-to-income ratio was revised based on the continual updating of the national accounts data, which include measures of disposable income.

[10]/ For more information on this indicator, see Cox and Parrado (2005).

Figure II.11

Contribution to the growth of consumer bank debt, by debt bracket (*)

(moving year real change, percent)



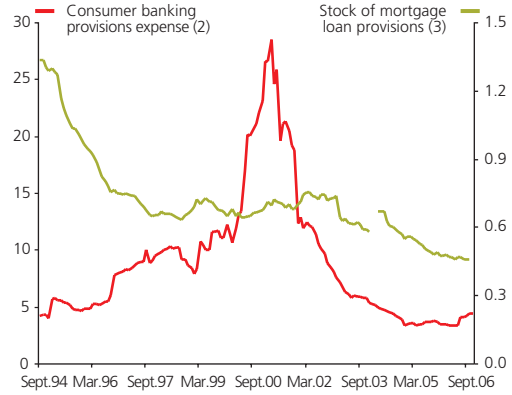
(*) Starting in February 2004, consumer debt includes the used portion on lines of credit.

Sources: SBIF; Central Bank of Chile.

Figure II.12

Household credit risk (1)

(percent)



(1) Measured via banking system risk indicators.
(2) As a percent of total consumer banking loans.
(3) As a percent of the system's total mortgage loans.

Source: SBIF

better guarantees.[11]/ This information suggests that, in contrast with the previous credit cycle, a sharp drop in the rate of indebtedness in the face of a change in macrofinancial conditions is less probable. The fall in the growth rate of consumer loans in the period 1999–2000 was caused by a deeper and more persistent reduction in consumer loans of less than 400 UF[12]/ (figure II.11). Nevertheless, it is important for the banking institutions to uphold the prudent management of their portfolios, given the recent increase in credit exposure.

Although the labor market slack is being reduced, the growth rate of household debt will probably hold steady around the rates recorded in the past few quarters. The normalization of the monetary stimulus, the less dynamic economic activity in 2006, and the economy's gradual movement toward full employment should contain the growth rate of debt, which could, in turn, leave the credit risk indicators unchanged or raise them slightly.

Both the exposure and financial fragility of households remain at healthy levels at the aggregate level

Credit risk indicators, measured by bank provisions, suggest that both credit providers and households at the aggregate level are appropriately administering their debt levels. Home mortgage risk remains very low, while loan loss provisions on consumer loans have barely risen (figure II.12).

This evaluation of the household sector points to the conclusion that the sector's exposure and financial fragility have risen in the last year (box I.1), mainly through increased indebtedness. However, the risk of a significant deterioration of the households' ability to service their debt is limited. This is conditional on the macroeconomic environment remaining mild and on the financial institutions continuing to carefully evaluate their standards for granting loans. If this is not the case, the financial stress of the most indebted households would be expected to increase in the face of deterioration in the environment.

Consolidated Government[13]/

The public sector's degree of financial soundness affects the asset quality of financial intermediaries, the confidence of national and foreign investors, and the availability and cost of financing for other agents in the economy. In the case of Chile, the exposure of national and international investors to public debt, which includes the Central Government and the Central Bank, is low. The external debt of the Central Government equals 8.7% of the country's external debt, while banks' investments in public debt securities represent 7.4% of their assets. Beginning in 2006, the Consolidated Government became a net creditor.

[11]/ For more detail on the distribution of household risk and indebtedness in Chile, see "Financial situation and vulnerability of Chilean households" at the end of this *Report*.

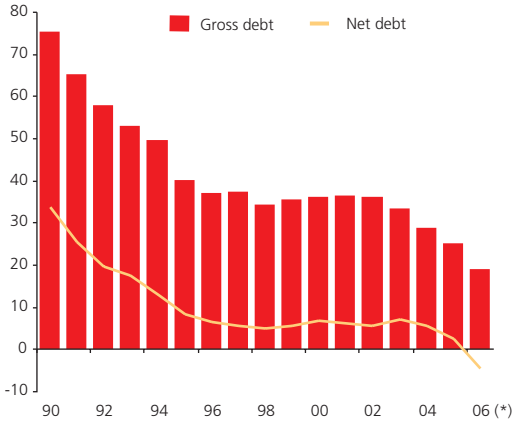
[12]/ This conclusion should be taken with caution, since the growth of consumer debt in the highest brackets could be associated with business financing, mortgages, car loans, and debt consolidation.

[13]/ The consolidated figures for the Central Government and the Central Bank eliminate entries that represent liabilities (assets) for the Central Government and assets (liabilities) for the Central Bank. These entries are fiscal promissory notes with the Central Bank, fiscal deposits in the Central Bank, and Central Bank securities held by the Central Government.

Figure II.13

Consolidated public debt

(percent of GDP)



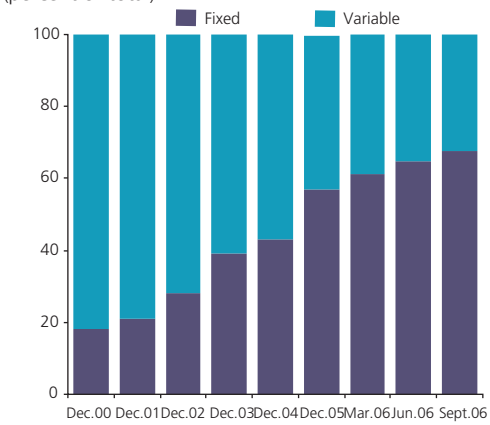
(*) As of September 2006.

Source: Finance Ministry.

Figure II.14

Central Government's debt, by type of interest rate contracted

(percent of total)

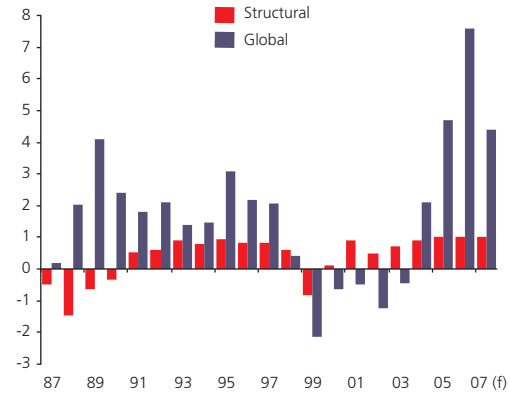


Source: Finance Ministry.

Figure II.15

Total balance of the Central Government

(percent of GDP)



(f) Projection.

Source: Finance Ministry.

In the framework of the existing fiscal rule, the size of Chile's gross and net public debt has continued to be reduced as a result of the extraordinary earnings from copper, which have been used to prepay debt and accumulate foreign assets. In fact, the Consolidated Government became a net creditor in the third quarter of 2006. Thus, the Consolidated Government's gross and net debt the fell from 25.1% and 2.6% of GDP in December 2005 to 19.1% and –4.6% in September 2006, respectively (figure II.13). The application of the Budget Law, whose drafting is based on compliance with the fiscal rule, should translate into new increases in the net creditor position in the last quarter of 2006 and in 2007, since the copper price continues to sit above its long-term level in this period.

The Central Government reduced its exposure to liquidity and interest rate risk

Most of the Central Government's existing debt is contracted at medium and long terms, thus keeping the exposure to liquidity risk low. Moreover, as of September 2006, only 32% of its debt was at variable rate, which translates into lower interest rate risk (figure II.14). The latter is a result of the significant prepayment of its debt with the Central Bank, which reached US$1.500 billion in 2006.

Apart from the short-term instruments issued by the Central Bank for liquidity management, the Consolidated Government's liabilities with a maturity of less than a year are easy to finance since they represent approximately 13% of total other liabilities as of September 2006. As of the same date, the Consolidated Government's short-term liabilities in foreign currency were slightly more than US$4.800 billion, or 21% of the Central Bank's total international reserves and of the Public Treasury's assets held abroad.[14]/

At year-end 2006, the Republic of Chile's long-term financial liabilities hold an A+ rating or better in local currency and an A (or the equivalent) in foreign currency, according to the three international risk rating agencies.

In the near future, the Central Government should continue strengthening its net creditor position

According to the most probable projections, the Central Government will continue to increase its net creditor position on generating considerable surpluses in the two-year period 2007–08, because the copper price is expected to remain above its long-term level, in a context of GDP growth near trend rates (figure II.15).

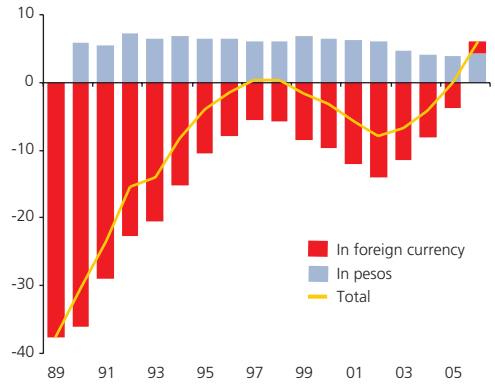
The Central Bank, in turn, has gradually been reducing its cash flow deficit as a result of the policy on reducing it assets and liabilities; the fall in the country risk premium; and the favorable conjuncture for interest rates in recent years, which has reduced the differential between debt costs and asset earnings. The Central Bank has thus also continued to reduce its debt as a share of output, in both gross and net terms.

[14]/ Foreign currency deposits in the domestic financial system are not considered.

Figure II.16

Net positions of the Central Government

(percent of GDP)



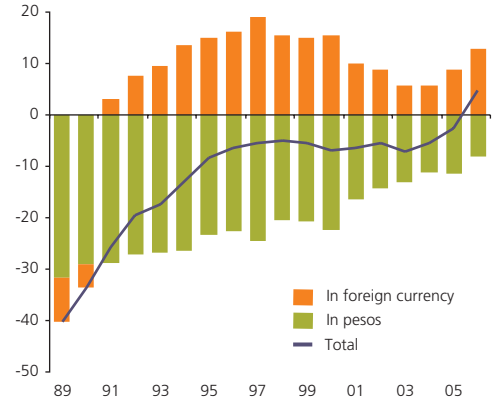
(*) As of September 2006. A positive number implies a net asset position, while a negative number represents a net liability position.

Source: Central Bank of Chile, based on data from the Finance Ministry

Figure II.17

Net positions of the Consolidated Government (*)

(percent of GDP)



(*) As of September 2006. A positive number implies a net asset position, while a negative number represents a net liability position.

Source: Central Bank of Chile, based on data from the Finance Ministry.

In addition, the recently approved Law on Fiscal Responsibility authorizes the Central Bank's capitalization for five years, starting in 2006, up to 0.5% of the previous year's GDP each time. This contribution was US$605.9 million in 2006, and estimates indicate it will reach US$700 million in 2007. Since the capitalization is in dollars, the Central Bank's net position in foreign currency and international reserves will grow, ceteris paribus.[15]/

The accumulation of assets abroad on the part of the Consolidated Government makes the net creditor position sensitive to exchange rate fluctuations. As of September 2006, both the Central Bank and the Central Government register a net creditor position in foreign currency of 9.5% and 1.7% of GDP, respectively (figures II.16 y II.17).[16]/

Finally, the capitalization of the Central Bank is important because it strengthens the Bank's credibility and autonomy, increases its capacity to absorb internal and external shocks, improves the transparency of the fiscal accounts, and contributes to the development of the country's institutional framework by establishing the correct incentives to discourage inconsistent fiscal policies.

[15]/ The final outcome for reserves depends on movements in the Central Bank's liabilities with the Central Government and the private sector.

[16]/ This is the first time the Consolidated Government has achieved a net creditor position since data became available in the Finance Ministry's Public Debt Report (1990 on). A similar pattern is seen for the Central Government, which became a net creditor in December 2005.

Box II.1: **Household indebtedness: international comparisons**

One of the most notable recent developments in the financial system has been the growth of household loans, which rose from 18.5% of gross domestic product (GDP) in 2000 to 22% in 2006. This is good news for households, since it broadens their opportunities to access welfare-enhancing services by, for example, allowing them to handle transitory reductions in income or unexpected increases in expenditures and thus to maintain a consumer profile more in line with their permanent income. At the same time, it represents a change in the risk scenario of banks and other agents that issue household loans. This latter issue implies challenges for the industry, households, and regulators to make possible that this be an orderly process in that the risks remain contained.

One of the criteria used by both the industry and some regulators to rate these developments is international comparison. While such comparisons can provide useful references, any conclusions reached from them should be taken with caution. In particular, they should limit the objective attributes being compared. For example, a common mistake is to argue that a certain level of indebtedness is appropriate—in the sense of not posing risks—simply because it is similar to that of other countries with a similar income level, without taking into account data on the loan portfolio quality of the countries of reference; their regulation and supervision; the quality of the banking system's risk management; and so forth.

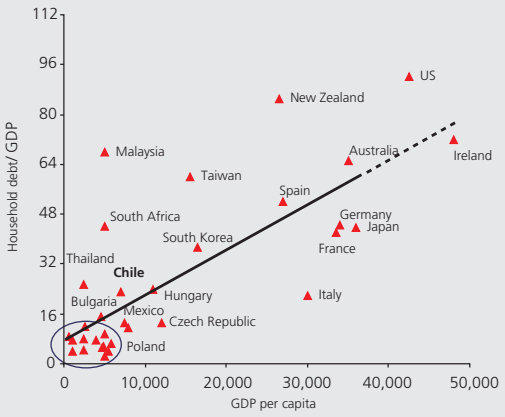
In this box we compare household credit levels and financial burden in different countries, controlling for income level..

While the international evidence reveals a positive relation between the ratio of household credit to GDP and per capita GDP (figure II.18), the variability of this relation is huge. In countries with a similar income level to Chile, the ratio of household credit to GDP ranges from 3% to 64%, while that of developed economies falls between 22% and 92%. This evidence suggests that there is no precise relation between these two variables beyond the fact that it is positive.

Nevertheless, not all the components of household credit display the same degree of dispersion or the same relation with per capita GDP (figure II.19). As income level rises, the component with the strongest growth is mortgage loans. The share of consumer loans in GDP, in turn, presents a lower growth trend and differs only slightly among economies with medium and high per capita income. Its variability is also less than among the latter. On comparing our banking system with that of higher-income countries, we find that the difference is much greater in mortgage loans (14% of GDP in Chile versus 43% of GDP for the average of developed countries in the sample) than in consumer loans (8% versus 13%, respectively).

Figure II.18

Household indebtedness versus level of development (*)
(percent of GDP, dollars)

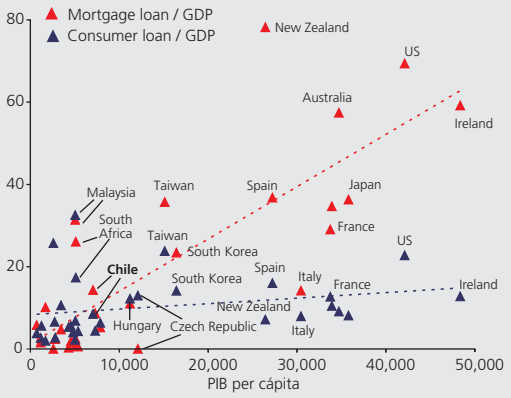


(*) Emerging and mature economies. Level of development measured via GDP per capita. Countries within the circle: Venezuela, the Philippines, Russia, Colombia, Indonesia, Peru, Brazil, Rumania, Argentina, India, China, and Turkey.

Source: IMF (2006c).

Figure II.19

Mortgage loans and consumer loans versus level of development (*)
(percent of GDP, dollars)

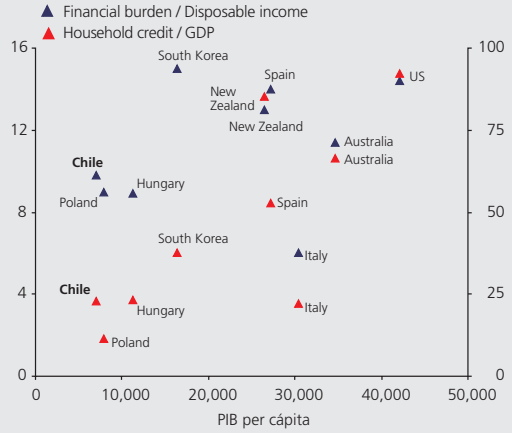


(*) Emerging and mature economies. Level of development measured via GDP per capita.

Source: IMF (2006c).

Figure II.20

Financial burden and household loans versus level of development (*)
(percent, dollars)



(*) Emerging and mature economies. Level of development measured via GDP per capita.

Source: IMF (2006c).

The relevant evidence on this issue in the case of Chile is that in the medium term, mortgages can be expected to register stronger growth than consumer loans, while the growth of the latter would tend to converge with GDP growth. In terms of risk, mortgage loans are les risky for banks because of the existence of collateral.

Another cross-country comparison of interest is the financial burden. This one indicator allows the comparison of loan amounts and conditions, in terms of maturity and rates charged. This measure brings us closer to a risk perspective, by revealing the fraction of income that households must commit to servicing debt. Comparing financial burdens thus provides more information than comparing loan amounts.

The financial burden indicator for Chile is lower than that of higher-income countries, but not to the degree that one might expect given the level of debt in those countries (figure II.20). This slight difference in the financial burden is explained by the fact that households in more developed countries enjoy more advantageous loan conditions, in particular longer maturities.

The evidence shows a pattern in that as household credit rises, loan conditions become more flexible, such that the burden of these loans on households increases at a lower rate. A priori, the lengthening of terms has an ambiguous effect on risk. On one hand, it implies a lesser financial burden for the same level of credit, which increases the probability that the households will meet their obligations and thus lowers risk. On the other, the length of the credit issuers' exposure to a source of risk increases, which increases risk. This reinforces the message that the growth of household credit implies changes in the risks to which the industry is exposed, which must be correctly administered.

Box II.2: **The importance of credit information systems**

The economic literature emphasizes the crucial role played by information asymmetries in the development of the credit market and how these can cause adverse selection and moral risk problems, which together generate an above-optimal credit rationing.[17]/ One way to reduce these asymmetries is by analyzing debtors' payment performance, found in the credit information systems or registries.[18]/

In general, a credit information system includes the existing legal infrastructure, the use of mass credit assessment systems (credit scoring), the countries' perspective on the protection of private information, and the use of reputation as collateral, among others.

Credit information systems incorporate both public and private registries. The main objective of public registries is to improve banking supervision; the goal of private registries, in contrast, is to help financial institutions and other firms make better loan decisions (i.e., to avoid financing higher-risk clients, who exhibit bad payment performance or who are in arrears or in bankruptcy) based on knowledge of the debtors' payment history.

It has been shown empirically that the adequate development of credit information registry systems generates several benefits. These include reducing information asymmetries between creditors and debtors; stimulating financial development by giving a larger segment of the population access to credit; and reducing interest rates, which contributes to reducing the risk of excessive indebtedness.[19]/

In Chile, the main public credit registry is the debtor database administered by the Superintendency of Banks and Financial Institutions (SBIF). This contains detailed information—both positive and negative—on all debtors in the banking system. The positive information includes, for example, the total amount of individual debt and the payment pattern for debts paid on time, while the negative information includes the number and amount of individual past-due, in default, and contested loans, among other variables. Additionally, several private entities (*Dicom*, *Equifax*, Databusiness, *Siisa*, and *Sinacofi*) collect credit information from different sources,[20]/ which banks and other credit-issuing entities can access.

While the Dicom registries have more limited historical information than in the past and the registry of positive payment performance of nonbank debt is limited or nonexistent,[21]/[22]/ the credit information registry system in Chile compares positively with other economies in terms of the coverage of the public registry and the quality and reach of the credit information (figures II.21 y II.22).

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[17]/ See Jaffee and Russell (1976) and Stiglitz and Weiss (1981).

[18]/ See Diamond (1991), Petersen and Rajan (1994), Berger and Udell (1995), and Peek and Rosengren (1995).

[19]/ Countries with credit registries have, on average, a more developed financial system (IDB, 2005) and fewer financial restrictions for firms (Jappelli and Pagano, 1993; Galindo and Millar, 2001; Barron and Staten, 2003; Love and Mylenko, 2003).

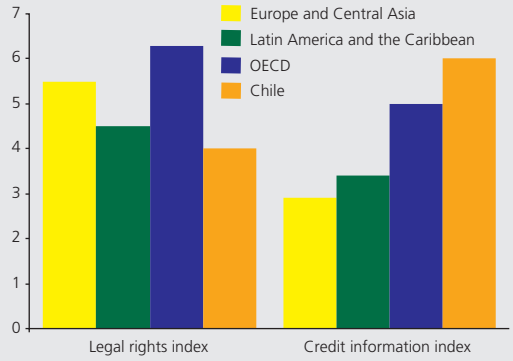
[20]/ Chambers of Commerce (e.g., *Boletín Comercial*), notaries, retailers, the Real Estate Registry, the Labor Board, the Internal Tax Service, the Electoral Registry, the General Treasury of the Republic, the Civil Registry and Identification Service, the Ministry of Labor, and the National Customs Service, among others.

[21]/ Law 19,812 of 2002 reduced the available data by eliminating records on default debtors whose debts had been paid and by dropping to five years the maximum time that debtors with unpaid liabilities can remain in the registries. It also reduced the minimum amount of debts that must be reported and prohibited reporting on debts contracted with public or private firms that provide electricity, water, telephone, and gas services.

[22]/ The new regulatory framework on issuing and operating credit cards that came into force in 2006 centers on improving the supervision of nonbank credit cards, but it does not require issuers of such cards to include this information in the consolidated debtor registry.

Figure II.21

Measures of credit information (*)



(*) The legal rights index measures the degree to which guarantees and bankruptcy laws protect the rights of lenders and borrowers. This index ranges from 0 to 10, where a higher score indicates that the laws are adequately designed to facilitate access to credit. The credit information index measures the reach, access, and quality of credit information. This index ranges from 0 to 6, where a higher value indicates a greater availability of credit information, from both public and private registries.

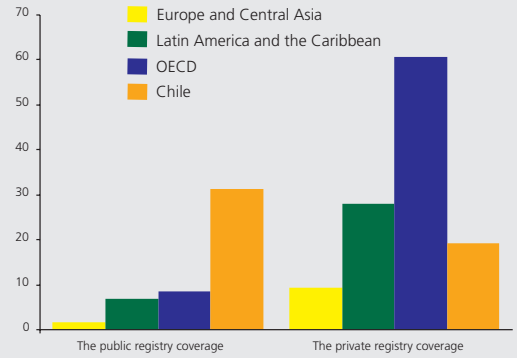
Source: Djankov, McLiesh, and Shleifer (2006).

As the degree of financial depth rises in an economy, it becomes increasingly advisable to have sufficient historical data registries that contribute to improving the credit risk assessment systems. This deepening process could be facilitated by continued progress in the design of comprehensive loan performance registry systems, in both the banking and nonbank sectors.

Figure II.22

Coverage of credit registries (*)

(% of the adult population)



(*) The public (private) registry coverage indicator reports the number of people and firms listed in the public (private) credit registry that currently have information on their payment history, unpaid debts, or level of outstanding debt.

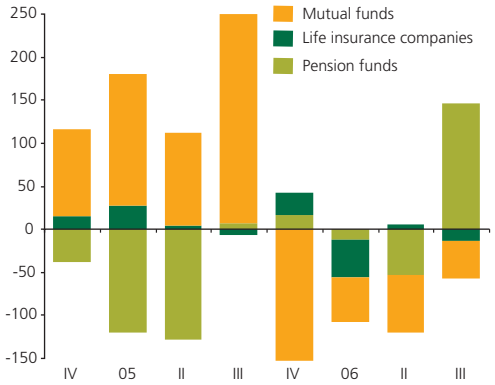
Source: Djankov, McLiesh, and Shleifer (2006).

III. Assessment of systemic risks

Figure III.1

Net investment in national stocks by nonbank financial institutions (*)

(quarterly flow in billions of September 2006 pesos)



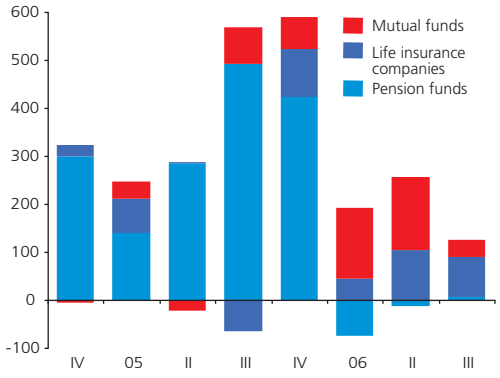
(*) Excludes variations attributable to price changes.

Sources: SAFP and SVS.

Figure III.2

Net investment abroad by nonbank financial institutions (*)

(quarterly flow in billions of September 2006 pesos)



(*) Excludes variations attributable to price changes.

Sources: SAFP and SVS.

This chapter assesses systemic risks to the financial system and international financial integration, in light of the national and international macrofinancial threats and sectoral vulnerabilities described in the previous chapters.

Nonbank financial sector

This section analyzes the investment decisions of nonbank financial institutions and their potential impact on the financial markets, as well as the financing conditions of credit users and banks.

The high volatility that characterized domestic and foreign stock markets in mid-2006 did not significantly change the composition of the institutional investors' aggregate portfolio. While the share of variable-income instruments fell in the period of high volatility, today it has recovered the percentages displayed in early 2006. This reassignment has driven a greater holding of bank instruments and an increase in foreign investment by the mutual funds and life insurance companies. As of September 2006, the assets managed by the nonbank financial institutions surpassed US$120.000 billion, approximately 90% of gross domestic product (GDP).

The aggregate portfolio remains stable despite changes among institutional investors

The share of investment in local stocks in the aggregate portfolio of the nonbank financial institutions stayed at around 12% of assets in 2006. In the second quarter, the share of stocks fell as a result of the drop in prices on the exchange and net stock sales, but purchases by the pension funds partially reversed this effect in the second half of the year (figure III.1).

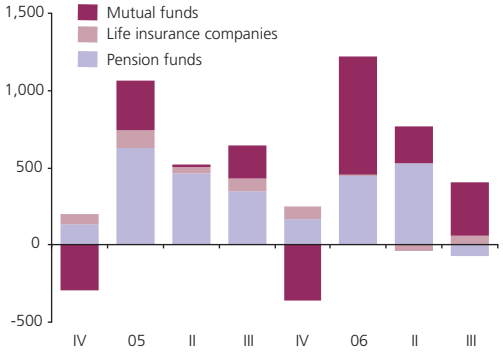
Investment abroad maintained its share in the aggregate portfolio of the nonbank financial institutions at around 23%, even considering the environment of high volatility displayed by the emerging stock markets in the months of May and June. While the mutual funds and life insurance companies have continued to invest strongly abroad, the pension funds have held their investment above the allowed limit, reducing the net flows of these instruments (figure III.2).

This foreign exposure poses risks stemming from the increased volatility expected in the international markets (chapter I). However, the exchange risk associated with this investment is contained by the hedging policies applied

Figure III.3

Net investment in bank bonds and deposits by nonbank financial institutions (*)

(quarterly flow in billions of September 2006 pesos)



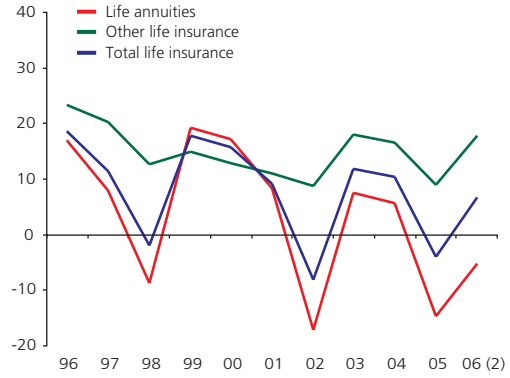
(*) Excludes variations attributable to price changes.

Sources: SAFP and SVS.

Figure III.4

Growth of insurance premiums, by type (1)

(percent)



(1) Annual growth.
(2) Annualized figures as of September.

Source: SVS.

by pension funds and life insurance companies, which are traditionally higher than the regulatory requirements.

The composition of fixed-income investment has changed

The stock of government securities and mortgage bills in the institutional investors' portfolio has continued to fall in the last six months. Both the reduced financing needs of the Central Government and the high rate of prepayment on mortgage bills have contributed to this phenomenon.[1]/

In contrast, bank bonds and deposits have risen sharply. As of September 2006, the relative share of time deposits was 23% of total investments. This strong growth in the volume of deposits is mainly explained by the expansion of short-term fixed-income mutual funds and medium- and long-term deposits held by the pension funds (figure III.3).

Corporate bonds, in turn, have kept their relative share at around 13% of the total assets of the nonbank financial institutions. In particular, the life insurance companies' portfolios have maintained a high share of corporate bonds since the end of 2005 (35% of their assets).

Solvency of life insurance companies

Life insurance companies have diversified their income sources in the face of a drop in life annuity premiums

Income from premiums and the profitability of the life insurance industry remain stable thanks to the continued diversification of income sources, even considering the low long-term interest rates and the drop in sales volume.

As of September 2006, life annuity premiums again posted a negative annual change (figure III.4), explained by the low long-term interest rates and by the greater relative attraction of programmed withdrawal in this context.[2]/ However, mortgage insurance and other types of life insurance have grown at real annual rates of 10%; this trend is driven by the buoyancy of household loans, which are relatively more sensitive to the economic cycle, and by the natural increase in the market share of life insurance associated with economic growth.

The financial strength of the life insurance companies was maintained in the last quarter

Despite the volatility of return on investment, the life insurance companies' return on average equity remained around 16% in 2006. The evolution of

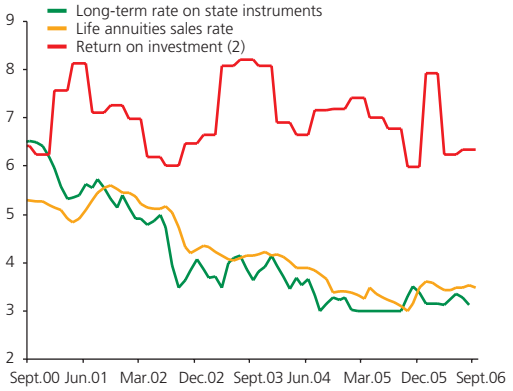
[1]/ Low long-term interest rates have extended the prepayment period for mortgage bills, although this has been more moderate than in the 2004–05 period. Basically, at the beginning of 2005, monthly prepayments reached levels around 3% of the stock of bills issued, whereas that figure bordered on 1% in October 2006.

[2]/ The formula for calculating programmed withdrawal rates causes them to react with a lag to changes in market rates. Moreover, the programmed withdrawal option provides the possibility of postponing the purchase of a life annuity until interest rates are more favorable.

Figure III.5

Long-term margin and return on investment of life insurance companies (1)

(percent)



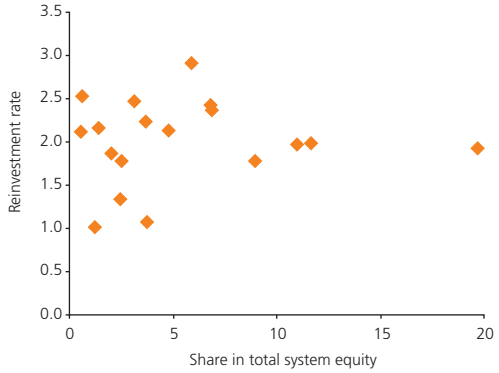
(1) Long-term reference margin: difference between the long-term rate on state instruments and the life annuities sales rate.
(2) Accounting returns of total stock of investment.

Source: SVS.

Figure III.6

Asset sufficiency tests (*)

(percent)



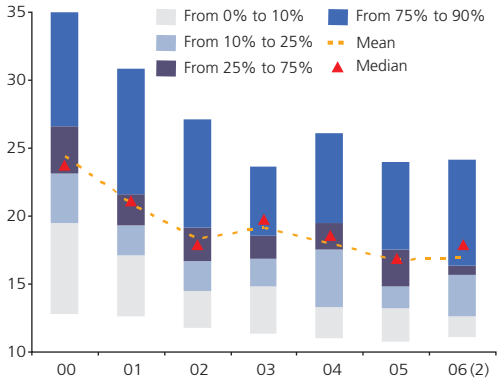
(*) Figures as of June 2006.

Source: SVS.

Figure III.7

Solvency of life insurance companies (1)

(equity / credit-risk-weighted asset)



(1) The percentile indicates equity of life insurance companies accumulated.
(2) Figures as of June.

Source: Figueroa and Parrado (2005).

rates offered on life annuities has followed a similar path to market rates for long-term papers, while the life insurance companies' return on investment surpassed 6% in real terms (figure III.5).

Asset adequacy tests suggest that the industry's reinvestment risk is contained, because in all companies the resulting reinvestment rate is lower than the rates for long-term instruments seen in the market (figure III.6). The asset adequacy test reveals the minimum earnings rate at which a company should reinvest its assets with the goal of adequately fulfilling its liabilities.

The life insurance companies maintained a stable ratio of equity to credit-risk-weighted assets in the first half of 2006, owing to the fact that the different categories of investment instruments maintained their share in total assets, while the industry's capital level did not register significant changes (figure III.7). The industry's credit risk rating has not changed since the last *Report* in March 2006, confirming an adequate solvency level.

Some relevant factors for the future evolution of industry risks that are being implemented include the authorization to sell variable life annuities and the updating of the mortality tables, this time in reference to the life annuity holder's beneficiaries. Additionally, the Superintendency of Securities and Insurance (SVS) is evaluating the implementation of a risk-based supervision model with implications for the method of supervision, the minimum capital and solvency requirements, the investment regime, and accountability, among other aspects (chapter IV).

Banking sector

Banks are the main actors in the financial system and in the payments system, so that the analysis of their risks and vulnerabilities represents a central element in the assessment of the stability of the financial system. To this end, this section 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 to its capacity to absorb shocks.

Bank financing conditions continue to be attractive, and they sustain the strong growth in lending

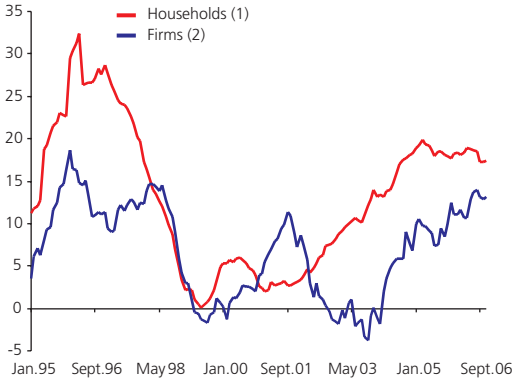
The banking system has enjoyed a favorable environment for raising resources in recent times, combined with heightened competition among credit providers. Consequently, the financing conditions granted by banks (rates, terms, and amounts) continue to be attractive in all loan segments. Business and household loans have thus continued to grow strongly, despite the lower growth of economic activity in 2006. The demand for bank financing from the nontradables sector, which is a major client of the banking system, has remained high, favored by the strong growth of imports in 2006.

Business loans averaged a real annual growth rate of 12% in 2006, despite the slower economic expansion. In the case of households, the current growth rates continue to be high, but their pace is lower than it has been in other strongly expansionary periods (figure III.8).

Figure III.8

Bank loans

(real annual growth, percent)



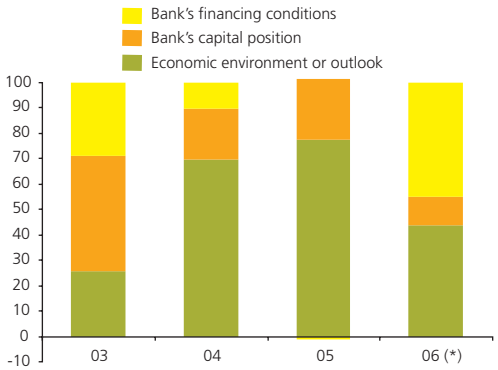
(1) Consumer and household loans.
(2) Commercial and foreign trade loans.

Source: SBIF.

Figure III.9

Origin of the increased flexibility of bank financing conditions

(percent of total answers)



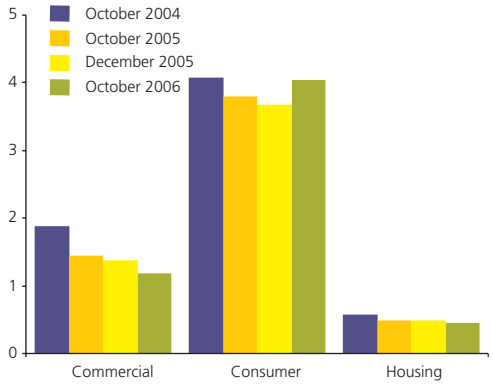
(*) Average of the first three quarters of the year.

Source: Authors' calculations, based on the results of the quarterly survey of bank credit conditions, carried out by the Central Bank of Chile.

Figure III.10

Provisions for credit risk

(percent of loans)



Source: SBIF.

According to the banks themselves, their ability to raise resources on favorable terms explains a large share of the growth in bank loans, over and above the industry's appraisal of the macroeconomic environment (figure III.9). Bond issues and the growth in institutional deposits have supported the extension of the average maturity of bank financing sources, thereby reducing the pressure to transfer increases in the monetary policy rate onto bank lending rates.

Exposure to economic sectors that are more sensitive to the cycle has increased

The vitality of business loans is strongly reflected in the evolution of loans to sectors that are more sensitive to the economic cycle, such as the real estate sector, infrastructure concessions, and construction. While an important share of this financing features real guarantees or is relatively less risky, the increase in bank exposure to this sector (more than 13% of the business loan portfolio) means that banks have become more sensitive to a potential deterioration in economic conditions (table III.1).

Table III.1

Loans, by economic sector

(percent of total loans to firms)

Sector	2000 Nov.	2001 Nov.	2002 Nov.	2003 Nov.	2004 Nov.	2005 Nov.	2006 Aug.
Tradables	25.2	24.3	21.9	20.6	20.0	19.0	18.7
Agriculture	8.2	8.1	7.8	7.2	7.4	7.1	7.4
Mining	1.2	1.5	1.5	1.2	1.4	1.4	1.1
Manufacturing	15.8	14.6	12.6	12.2	11.1	10.5	10.2
Nontradables	74.8	75.7	78.1	79.4	80.0	81.0	81.3
Electricity	1.6	1.5	2.1	2.7	2.0	2.1	2.4
Real estate, concessions, and construction	7.4	7.0	8.3	10.5	11.1	12.4	13.8
Trade	17.1	19.9	20.6	19.9	19.4	18.0	17.8
Transport, storage, and communications	3.5	3.7	3.8	3.9	4.2	5.7	6.1
Financial services firms	27.6	24.7	22.3	22.1	22.0	23.3	22.8
Community and social services	17.6	18.9	21.0	20.3	21.4	19.6	18.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SBIF.

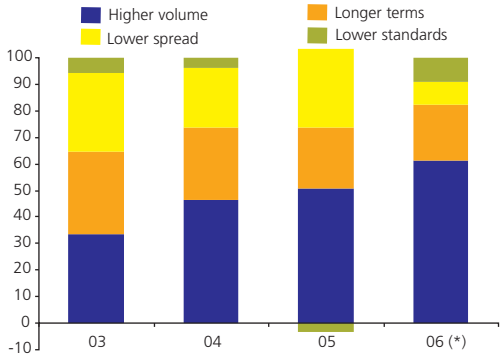
Household risk perception has risen

Consumer portfolio provisions have begun to reverse their decreasing trend of previous years (figure III.10), although the remaining default indicators (past-due portfolio and overdrafts) still stand at historical lows. Although the increase in provisions in 2006 is small, the industry appears to be registering a change in trend in relation to the credit risk of consumer loans.

The higher degree of competition may explain the trend, given that pressure to maintain or increase market share in the consumer segment has traditionally been associated with reductions in standards for granting credit. However, as shown in figure III.11, the increased flexibility of conditions for extending credit in this segment in 2006 is mainly related to an increase in volumes and terms of the loans granted and, to a lesser extent, to lower standards on extending credit. Also, credit has been granted to new debtors. The number of consumer bank debtors today is 2.5 million, compared with 2.2 million in mid-2005, which surpasses the levels registered since 1998.

Figure III.11

Impact of the increased flexibility on consumer loans
(percent of total answers)

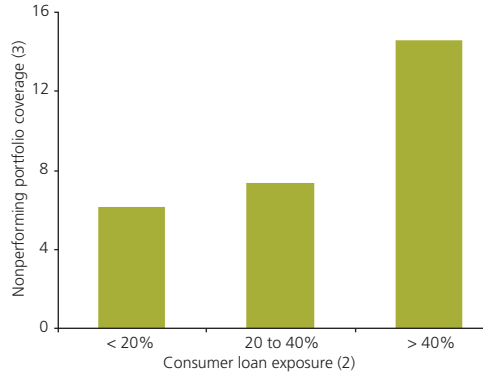


(*) Average of the first three quarters of the year.

Source: Authors' calculations, based on the results of the quarterly survey of bank credit conditions, carried out by the Central Bank of Chile.

Figure III.12

Nonperforming consumer portfolio coverage (1)
(times)

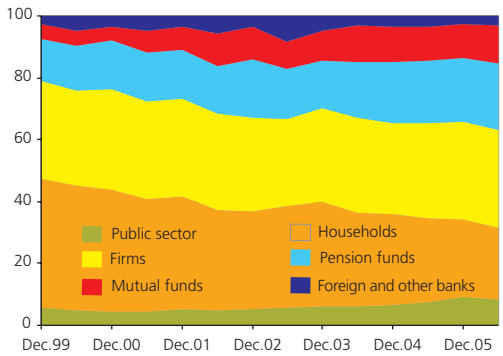


(1) As of October 2006.
(2) Consumer loans over total loans.
(3) Stock consumer provisions over nonperforming consumer portfolio.

Source: Authors' calculations, based on data from the SBIF.

Figure III.13

Composition of bank deposits, by type of institution
(percent)



Source: Authors' calculations, based on data from the SBIF.

According to the banks themselves, the increased flexibility of bank financing conditions for consumer loans has mostly been reflected in the volume and terms of loans granted, which has allowed households to consolidate and refinance their debt under more favorable conditions. As of last November, the banking system's exposure to the consumer and housing loan segments was 13% and 21% of total lending, respectively.

Provisions for consumer portfolio credit risk could increase in the future, given that the increased indebtedness of households increases their vulnerability to changes in the economic cycle. Banks with a significant exposure to the consumer segment have a credit risk coverage (stock of provisions to past-due portfolio) up to three times higher than the system average. Thus, should the trend toward increased exposure in this segment persist, the provisions level is expected to increase, even in the absence of changes in macroeconomic conditions (figure III.12).

In contrast to the 1995–97 period, when consumer loans grew 30%, on average, in real annual terms, the current growth of consumer loans occurs in a context in which the industry has improved its credit risk management through the use of more sophisticated models. Moreover, the institutions that currently display the highest growth in this segment also maintain a greater degree of diversification, and their equity backing and profitability are higher than those recorded in the previous cycle.

The sectoral recomposition of deposits and loans continues

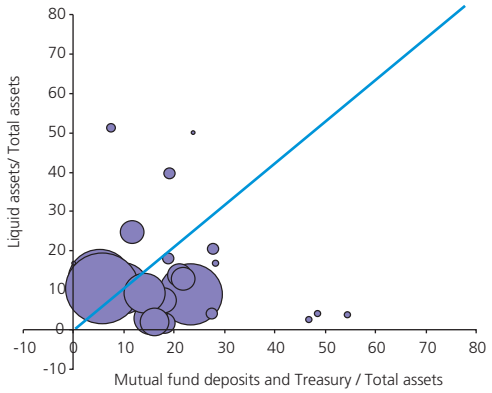
The increasing share of wholesale sources in bank financing constitutes a risk factor for liquidity management. This is particularly relevant given the growing share of mutual fund deposits in total bank deposits (figure III.13). The strong growth of institutional investment in bank deposits reflects, in part, the trend of short-term fixed-income mutual funds (or type I mutual funds), whose share of bank deposits reaches 95% of the portfolio. Between January and September 2006 alone, these funds grew 42% in real annual terms, on average, generating a deposit flow of almost US$1.600 billion in this period—equivalent to over half the new deposit flows in the banking system. Moreover, because the type I mutual funds are short term, they raise the volatility of bank deposits. Mutual funds represent 18% of total bank deposits in the aggregate, but this figure may surpass 50% in the case of some smaller banks.

Liquid assets represent a natural safeguard against potential withdrawals or the unforeseen nonrenewal of bank deposits, especially those that are more sensitive to market conditions. As of last September, more liquid assets accounted for nearly 11% of total assets, or 80% of the deposits held by the mutual funds and the General Treasury (figure III.14).

The recent changes in the sectoral composition of deposits and loans intensified over the course of 2006. In particular, the household sector has deepened its net debtor position in the banking system, as a result of its higher level of absolute indebtedness and lower share of total deposits, including both demand and time deposits (figure III.15). This fall in the direct deposits of households partly explains the strong growth in mutual

Figure III.14

Volatile financing and liquid assets (*)
(percent of total assets)

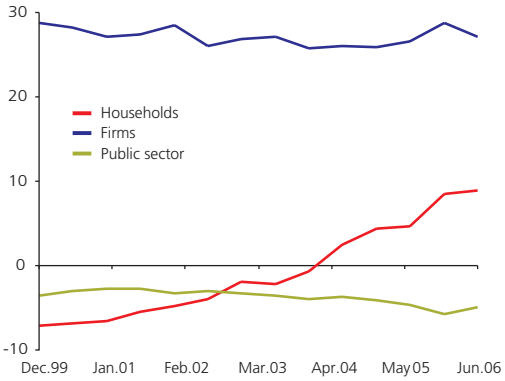


(*) Figures as of September 2006. The size of the circle represents market share by asset amount.

Source: Authors' calculations, based on data from the SBIF and SVS.

Figure III.15

Gap between loans and deposits, by type of institution (*)
(percent)



(*) Difference between loans and deposits over total assets.

Source: Authors' calculations, based on data from the SBIF.

fund deposits mentioned earlier.

The intermediation margin remains stable, despite the flattening of the yield curve

In theory, asset terms are longer than liability terms, so a flattening of the yield curve tends to be tied to a fall in the intermediation margin. When the macroeconomic scenario is favorable, however, banks can adjust the structure of their balance sheets to reduce the impact of the relative increase in short-term rates.

This process appears to be developing in the local banking system, where the intermediation margin has been relatively stable over the last few years at around 3% of total assets, while the liability margin has grown relative to the asset margin (figure III.16). The stability of medium- and long-term indexed rates has motivated the issuing of bonds and time deposits with a maturity of over a year, allowing banks to ease the impact of the evolution of the monetary policy rate on the cost of funds.[3]/

In sum, the current macroeconomic scenario has meant that the growth of loans to sectors with higher margins could be accompanied by a gradual increase in loan loss provisions, thereby keeping the return on capital at around 19%. The relative importance of the liability intermediation margin has risen because the higher cost of funds in pesos (stemming from the hike in short-term interest rates) has been offset by a more moderate increase in the cost of funds in indexed currency (figure III.17).

Stress tests

As described in chapter I, the Chilean economy is facing at lest two hypothetical stress scenarios: (1) a sharp hike in risk premiums in the international financial markets, and (2) a contraction in world economic activity accompanied by tight global liquidity. The materialization of these risk scenarios would have an impact on economic activity and the evolution of interest rates and the exchange rate, and it would therefore have direct effects on the credit and market risks facing the banking institutions.

In particular, scenarios that combine lower economic growth, higher interest rates, and higher unemployment would reduce the payment capacity of bank clients. The result would be an increase in real losses from bad loans (write-offs). Figure III.18 shows the loss distribution as a percentage of loans that arise from the combination of exposure to different types of credit (business, mortgage, and consumer) and the estimated loan loss provisions and write-offs under each risk scenario. According to these estimations, average losses from nonpayment represent only 5% of loans under the worst scenario, but the dispersion is high as of a result of the large losses suffered by institutions that are highly exposed to consumer loans (figure III.18).

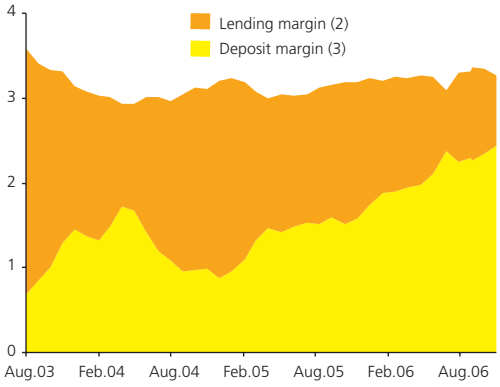
Both risk scenarios generate losses from market risk, which in the case of the

[3]/ As of September, the banking system has issued bonds for US$1.600 billion.

Figure III.16

Composition of the intermediation margin (1)

(percent)



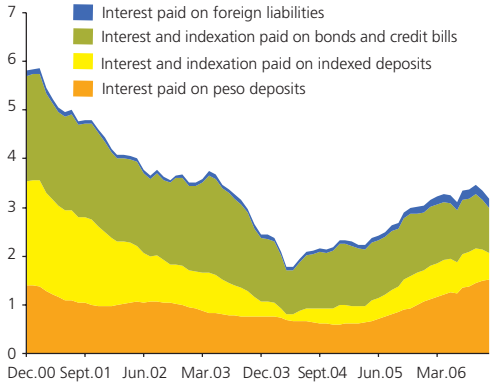
(1) Annual income from net indexation and interest as a percent of total assets. Indexation does not include indexed-peso operations tied to the exchange rate.
(2) Difference between interest and indexation earned as a percent of total assets and the twelve-month moving average of the BCP-2 rate.
(3) Difference between the twelve-month moving average of the BCP-2 rate and interest and indexation paid as a percent of total assets.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Figure III.17

Composition of the cost of funds (*)

(percent)



(*) Results are built based on the moving year of the monthly flow.

Source: Authors' calculations, based on data from the SBIF.

local banking system is reflected in losses from interest rate risk and foreign currency risk. The direct losses associated with exchange rate fluctuations are limited, given the banking system's low direct exposure to this risk,[4]/ while the indirect losses are implicit in the higher credit risk described above. An interest rate hike would causes losses stemming from the reduced value of the business portfolio and the valuation of assets and liabilities.

Assessing the impact of the different risk scenarios on the equity solvency of each banking institution requires taking into account their exposure to the different risk factors and their capacity to face such shocks. The high earnings level currently displayed by the banking system (19% of basic capital), combined with its adequate level of capitalization, represents the banks' main safeguard against the materialization of adverse scenarios. Under the worst scenario, average earnings would become negative, but the capital adequacy index would not register marked changes.

Given that this loss distribution and the capital and earnings levels are similar to the last *Report*, the consequences of these scenarios for the capital adequacy index are also similar to what was presented six months ago (figure III.19). Under the worst scenario, institutions that together represent around 7% of the system's assets could reduce their capital adequacy level to less than 8%. These banks either have a strong interest rate exposure or are niche banks specialized in the consumer segment.

External financing

The international financial markets are an important source of financing for domestic firms and, to a lesser extent, for banks and the government. A sharp and significant deterioration in market access conditions could generate financial and/or balance-of-payments stress. This section examines the recent evolution and perspectives of the Chilean economy's external financing, as well as the risks that could affect its continuity.

The economy continues to strengthen its external financial position in the favorable international macrofinancial environment. In recognition of the economy's soundness, the country risk rating was upgraded and the country ceiling raised in 2006. While external debt continues to increase moderately, a large share of this growth corresponds to nonfinancial debt (accounts payable associated with foreign trade). Moreover, a large share of external debt continues to be long term; to have a fixed interest rate; and to pertain to Chilean affiliates of foreign corporations. All of this contributes to a lower sensitivity of the economy's external financing to conditions in the international financial markets.

Although they have increased, corporate and sovereign financing costs continue to be favorable

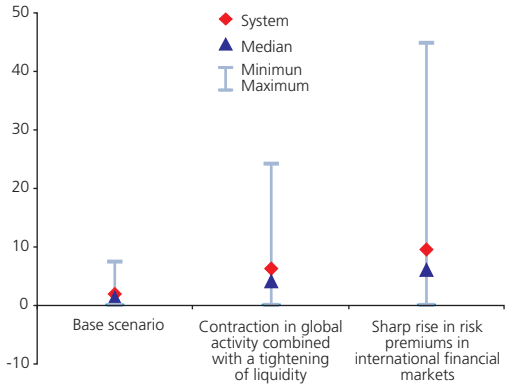
Long-term interest rates (at ten years) have fallen slightly in the last half, by around 40 basis points (bp). Short-term rates stand almost 20 bp higher than last April, despite having fallen last quarter. Corporate and

[4]/ See "Currency mismatch in the Chilean banking system" in this *Report*.

Figure III.18

Impact of the different risk scenarios on loan loss provisions and write-offs

(percent of loans)

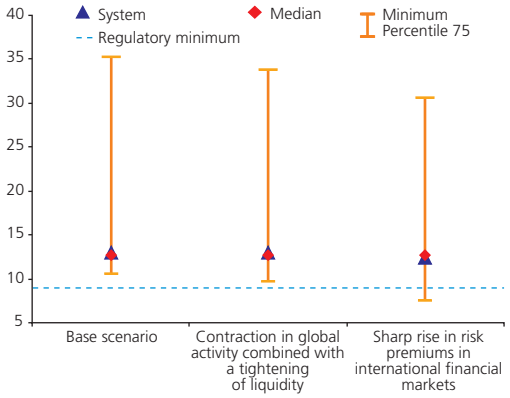


Source: Authors' calculations, based on data from the SBIF.

Figure III.19

Impact of the different risk scenarios on the capital adequacy index

(percent)

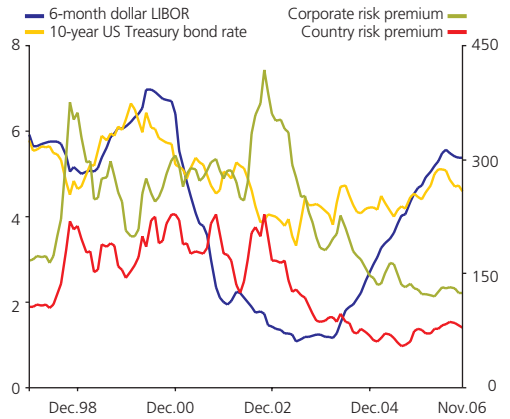


Source: Authors' calculations, based on data from the SBIF.

Figure III.20

Cost of external financing

(percent, basis points)



Sources: Bloomberg and Central Bank of Chile.

sovereign risk premiums, in turn, have increased less than 5 bp since April (figure III.20).

In addition, the country risk rating has seen new improvements. In July, Moody's upgraded Chile's country risk rating from Baa1 (adequate payment capacity) to A2 (robust payment capacity), bringing it in line with the other two main international risk rating agencies. Both Moody's and Fitch raised the country ceiling for the foreign currency debt rating, from strong payment capacity to high quality (Aa3 and Aa2,[5]/ respectively). Finally, in December, Standard & Poor's gave a positive assessment of the country risk rating of Chile's foreign currency debt Chile.

Copper earnings dominate the significant net capital inflows to the economy

As of October 2006, the economy had received historically high external liability flows (US$10.300 billion), equivalent to around 7% of gross domestic product (GDP). These flows are dominated by foreign direct investment (FDI, around US$7.100 billion), mainly the reinvestment of earnings from mining surpluses. In the mining companies, the reinvestment of income has been reflected in an increase of both short-term assets (trade credit, tax provisions, and deposits) and fixed assets.

This significant reinvestment of income has placed Chile among the top ten destinations for FDI at the world level.[6]/ The economy's external indebtedness has also increased (US$3.200 billion). However, almost two-thirds of this new debt corresponds to nonfinancial flows associated with trade credit extended to Chilean firms by their suppliers.

External asset flows in 2006 have also been significant, primarily for the public and corporate sectors (US$14.500 billion). This increase in external assets has been led by the Central Government, which to date has destined a large share of the copper surpluses to financial investments abroad (US$6.300 billion). Private sector firms have closely followed (US$4.850 billion), mainly through trade credits associated with increased exports and FDI abroad. Finally, during the year the mutual funds and life insurance companies also increased their portfolio investment abroad (US$1.600 billion). The economy has thus continued strengthening its external financial position, and its net liability position relative to the rest of the world has continued to fall (figure III.21).

External liquidity and solvency indicators remain stable at the aggregate level

The ratios of external debt to GDP and external debt to exports continue to fall. In September, they represented 70 and 50% of their average values for the last five years, respectively (table III.2). This primarily reflects strong export and output growth. International liquidity indicators, measured as the ratio of liabilities maturing within one year to international reserves

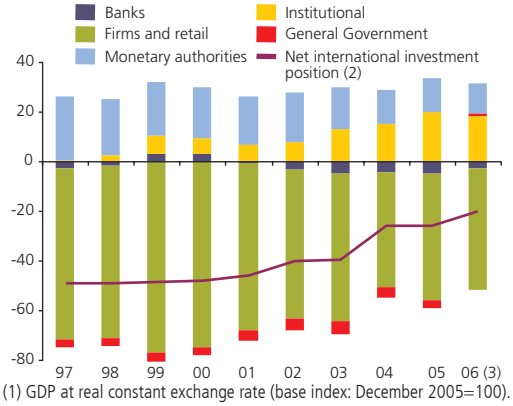
[5]/ In Moody's equivalent scale.

[6]/ World Bank (2006).

Figure III.21

Net international investment position

(percent of GDP) (1)



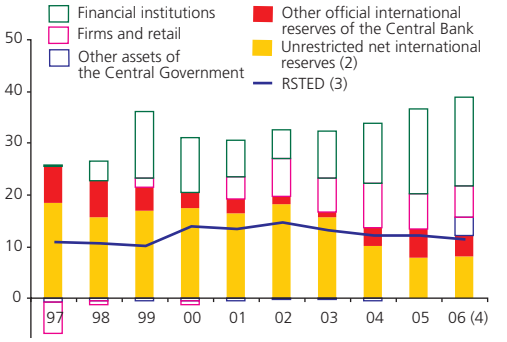
(1) GDP at real constant exchange rate (base index: December 2005=100).
(2) PIIN: Net international investment position.
(3) Values as of September 2006, estimated on the basis of financial account flows.

Source: Central Bank of Chile.

Figure III.22

Availability of net external financial liquidity

(percent of GDP) (1)



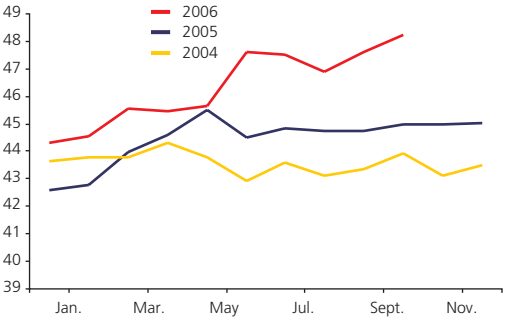
(1) GDP at real constant exchange rate (base index: December 2005=100).
(2) Official reserves minus short-term liabilities in foreign currency (maturing BCX, BCD, swaps), deposits by the General Treasury in the Central Bank, and others.
(3) Residual short-term external debt.
(4) Values as of September 2006, estimated on the basis of financial account flows.

Source: Central Bank of Chile.

Figure III.23

Total external debt

(US$ billion)



Source: Central Bank of Chile.

(official and freely available), have weakened somewhat but remain in comfortable ranges. At the same time, the availability of global liquidity in foreign currency of the economy continues to increase, given the greater accumulation of external assets by the Central Government and institutional investors (figure III.22).

External debt continues to grow moderately

The increase in external debt has been moderate (7% annually in US dollars, as of October 2006), although higher than in previous years (figure III.23). It has been concentrated in short-term debt, due to the higher volumes of trade credit tied to imports. Compared with other economies with a similar risk rating, Chile's external debt represents a smaller percentage of GDP (figure III.24). Furthermore, nearly 80% of the total corresponds to the private sector, and this share has been fairly stable over the last ten years.

Firms account for 78% of the economy's external debt, with the majority being financial debt (figure III.25). However, the sector's external debt as a percentage of its total indebtedness is close to a third; this share has been falling over time. The external debt of the banking sector is low, and it is hedged against currency risk. Together with the interest rate and term structure, this suggests that the risks of a reversal in the access conditions for external financing remain limited.

The structure and composition of external debt contribute to strengthening the external sector. More than 80% of the stock of external debt is contracted in the long term, and this figure has been stable over time. Around 57% of external debt is at a fixed rate, net of rate swap transactions (table III.2). Around half of the external debt of firms corresponds to affiliates of international corporations, a share that has been relatively stable across time (figure III.26). Nonfinancial debt associated with trade credit and loans with related firms represent 49% of short-term maturities and 24% of total external debt. All these characteristics contribute to the external financial stability of the Chilean economy.

Table III.2

External liquidity and solvency indicators

(percent)

	Aver. 01-05	2004 Dec.	2005 Dec.	2006 Apr.	2006 Sept.
Solvency					
External debt / GDP	52	46	39	39	34
Current account balance / GDP	-0.3	1.7	0.6	-	3.7
External debt / exports	176	135	111	112	87
External debt service (3) / exports	32	31	22	26	19
Liquidity					
RSTED / external debt (1)	30	32	32	34	34
RSTED / official international reserves	80	87	85	89	93
RSTED / unrestricted net international reserves (2)	99	116	146	144	141
Coverage					
Long-term external debt / external debt	84	82	84	84	81
Current fixed-rate external debt (net of swaps) / external debt	58	61	56	55	57

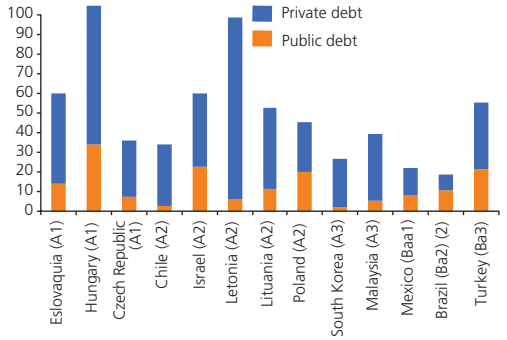
(1) RSTED: residual short-term external debt.
(2) Unrestricted net international reserves: official reserves minus short-term liabilities in foreign currency (maturing BCX, BCD, swaps), deposits by the General Treasury in the Central Bank, and others.
(3) Value as of September 2006 is estimated.

Source: Central Bank of Chile.

Figure III.24

International comparison of external debt (1)

(percent of GDP)



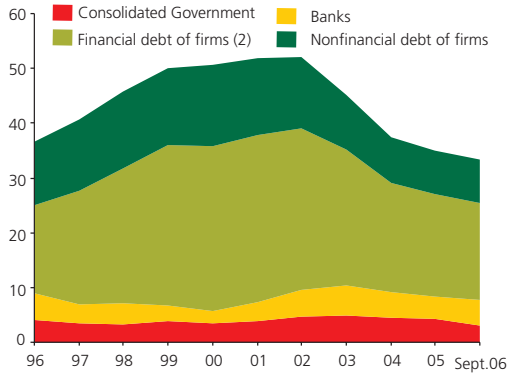
(1) External debt as of June 2006, estimated GDP for 2006, and Moody's risk rating.
(2) In 2005 Brazil initiated a program of announced debt prepayments.

Sources: World Bank; Moody's and IMF.

Figure III.25

Gross external debt, by institutional sector (1)

(percent of GDP)



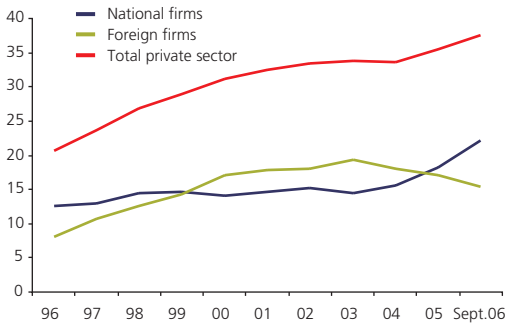
(1) GDP at real constant exchange rate (December 2005=100).
(2) Financial debt excludes trade credits and loans tied to FDI.

Source: Central Bank of Chile.

Figure III.26

External debt of the private sector, by nationality of creditor

(US$ billion)



Source: Central Bank of Chile.

The use of financial hedging of currency risk continues to rise

In September 2006, 70% of the firms that operate in the currency derivatives market held net asset positions, and almost all of these firms are in the nontradables sector (figure III.27). These positions equal almost two-thirds of the external debt of firms with net asset positions, a little more than 25% of the total external debt of the sector, and almost 80% of residual short-term debt (RSTED).

The economy continues to maintain adequate external liquidity

The level of international reserves is being affected by various changes of a structural nature. First, the prospective approval of the proposed Law on Capital Market Reform (MKII) will reduce the financial system's technical reserve needs. Until now, a considerable share has been constituted with foreign currency swap transactions, so its reduction will have as a counterpart the reduction of international reserves. Second, the Executive's intention to manage the General Treasury's external assets through the fiscal agency will lead in the short term to the drawdown—at maturity—of the fiscal deposits that are currently held in the Central Bank. In the future, however, fiscal deposits and withdrawals in the fiscal agency's accounts will not affect the Central Bank's balance sheet. The implementation of this process will produce a substantial reduction in the international reserves accounted on the Central Bank's balance sheet.[7]/

These movements should not be interpreted as a reduction in the Central Bank's international liquidity. The decision by the Board to hold the funds from the Bank's recent capitalization in foreign currency, together with the plan to not roll over dollar-denominated promissory notes (BCD), reveal that the Central Bank's current international liquidity level is adequate. At the level of the Consolidated Government, international liquidity levels should continue to increase considerably, thanks to the application of the fiscal rule, the unusually high copper prices, and the Executive's decision to hold these resources abroad.

The economy's exposure to changes in external financing costs continues to be moderate

The stress tests conducted estimate that for each 100 bp increase in interest rates or risk premiums, the interest service on external debt would rise by around US$300 million after one year. This figure, although contained, is 20% higher than the figure reported in the July 2006 *Report*, mainly as a result of the increase in short-term debt.

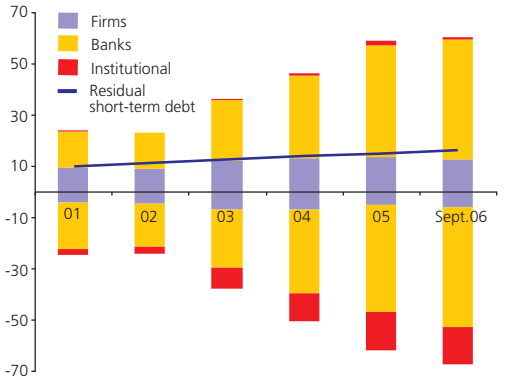
Under the most adverse risk scenario, the capital outflows associated with the higher external debt service would represent less than 1% of GDP after the first year and nearly 2% of GDP after the second and third years. The external solvency of the economy would not undergo major adjustments,

[7]/ In addition, the usual capitalization by the banking system of earnings from the 2006 period has increased the base that is exempt from the technical reserve requirement for the first quarter of 2007.

Figure III.27

Gross positions in currency derivatives (*)

(US$ billion)



(*) Includes local and foreign counterparties of open positions at notional value. Asset positions are illustrated on the positive axis and liability positions on the negative axis.

Source: Central Bank of Chile.

since the ratio of external debt to GDP would be stable at around 38%. This exercise assumes that the growth of the stock of external debt, as well as its rate and term composition, is held constant at the average values recorded in the 2001–05 period.

The Chilean economy is in a robust position for absorbing this type of shock

Although these scenarios would increase the volatility of the domestic financial markets (as was seen in May and June 2006), the economy's external solvency, the composition and structure of its external financing, the strength of its fundamentals, and its macroeconomic policy framework combine to put the economy in a robust position for absorbing this type of shock.

Box III.1: **The growth of bank credit: a look at the last 15 years**

The last several years have seen a sustained recovery of bank credit, after registering minimal growth rates in 1999, and even negative rates in the consumer sector. This recovery has unfolded with varying degrees of intensity across all the banking system's lending. The highest growth was in consumer credit, which displayed a real annual growth rate above 22% in November 2006.

There is ample evidence that rapid loan growth can be an indicator of a possible rise in credit risk in the banking system. This box compares the evolution of bank credit in 2000–06 with an equivalent period prior to the Asian crisis (1992–98), which set off a sharp adjustment of the credit cycle and led to an important restructuring of the banking industry in the 2000–06 period. The box emphasizes the evolution of consumer credit, as that sector is the most sensitive to a deterioration in domestic macrofinancial conditions.

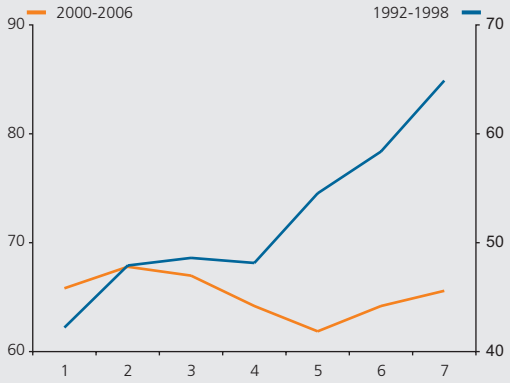
Several factors suggest that the recent developments are less worrisome from the perspective of financial stability than the events of 1992–98. First, the real increase in bank credit starting in 2000 was significantly smaller than that of 1992–98, when credit grew more than 50% faster than GDP[8]/ (figure III.28). For example, the growth of trade credit reached 23% in 1993, while in the later period it was only 13% (annualized) in 2006. Consumer loans grew over 30% in two consecutive years (1992 and 1993), whereas the highest average of the 2000–06 period was seen last year (17%).

Second, the 2000–06 period was characterized by a higher concentration of total loans in the multibanks, which in turn displayed a lower growth rate than in the 1992–98 period. Banks dedicated mainly to consumer loans have raised their growth rate significantly, but they still represent a small share of the banking sector (figure III.29).

Figure III.28

Evolution of bank credit

(percent of GDP)

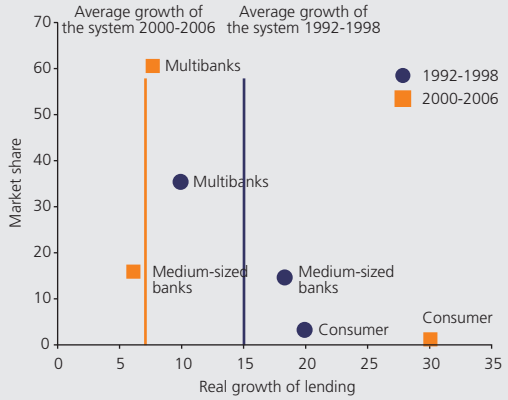


Source: Central Bank of Chile.

Figure III.29

Lending: growth and share, by type of bank

(percent)



Source: Authors' calculations, based on data from SBIF.

[8]/ If the mining sector is excluded from the output measure, credit as a percentage GDP recovers at the end of the 2000–2006 period, similar to what was seen at the end of the first period. However, it is not clear that the exclusion of a particular economic sector is the best method of evaluating the credit cycle.

The consumer loan sector has featured the gradual absorption or disappearance of finance corporations and the consolidation of the consumer divisions of the multibanks. These changes modified the structure of the market in the second period. Moreover, the fine-tuning of provisions regulations and the introduction of capital adequacy framework have improved credit risk management and increased the solvency of the system in general.

Finally, looking at this sector in the periods under analysis—and specifically at those institutions that display high annualized growth rates in consumer loans—reveals a recomposition of the market structure (table III.3). The institutions that lead in growth in this segment currently have a larger equity base with which to face a possible increase in credit risk. The percentage of this type of credit in the total assets of each bank is lower, on average, in the brackets considered in the analysis. This confirms that the banks that are most dynamic in this sector have a more diversified line of business. Furthermore, the number of banks that display high growth rates is lower in the 2000–06 period, especially for the segment of real growth rates above 30%.

Table III.3

Consumer loans: solvency, profitability, share, and number of banks
(percent and number)

	Period 1992-1998		Period 2000-2006	
	10%< x < 30%	x > 30%	10%< x < 30%	x > 30%(*)
	(percent)			
CAI	14.5	15.8	16.1	18.4
Assets	16.9	11.5	9.8	10.8
N° of banks	9	11	8	2

(*) X represents the annualized growth of consumer loans. CAI represents the average capital adequacy index by period and bracket. Assets represents the percent of consumer loans over average assets by period and bracket.

Source: Authors' calculations, based on data from the SBIF.

IV. Financial regulations and infrastructure

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

Financial framework and prudential regulation

Regulatory framework dictated by the Central Bank of Chile

Initiative on the revision of the regulatory framework on deposits, financial intermediation, and other operations (October 2006)

In October 2006, in the context of the program aimed at modernizing the financial regulatory framework, the Central Bank of Chile released for feedback on a proposal to modify the standards on deposits, financial intermediation, and other transactions covered in chapter III.B.1 of the *Compendium of Financial Regulations* of the issuing institution. The review of the regulations covered in that chapter took into account the advances made by the economy and the local financial system in recent years, as well as the best international practices and recommendations in this matter. The proposed regulatory framework incorporates new deposit instruments and promotes the adoption of international best practices, recommendations, and standards.

The main changes consist in modernizing the regulations on interest rates and currencies in which time deposits can be contracted; increasing the flexibility of regulations on the advance payment of deposits and short-term intermediation; incorporating structured notes (box IV.1) as time deposit instruments; ratifying the minimum terms for transacting sales with resale agreement; and replacing the regulations on "short sales" with standards oriented to regulating security loan operations (box IV.2).

Authorization for foreign issuers to issue and transact fixed-income public offer instruments in Chile (July 2006)

In July, the Central Bank of Chile authorized people domiciled or residing abroad to issue and place peso bonds in Chile. These issuers, and the papers they issue, must be registered in the Securities Registry established by the Law on the Securities Market.

Regulations issued by other supervisory organizations in the country

Backtesting for internal risk-monitoring models: statistical determination of the ex post multiplier table (SBIF, September 2006)

The Central Bank of Chile's regulations on market risk allow banks with a solvency rating of A and with the prior authorization of the Superintendency of Banks and Financial Institutions (SBIF) to use their own "internal" value-at-risk (VaR) models to monitor and control their exposure to market risk. These banks must also periodically carry out backtests on their models, to assess the degree of statistical precision of the results generated by the model.

In September, the SBIF published the document "Backtesting *para modelos internos de medición de riesgos: determinación estadística de la Tabla de Permanencia*" (Backtesting for internal risk-monitoring models: statistical determination of the ex post multiplier table). This document is intended to serve as a methodological reference for constructing the ex post multiplier table, a tool used to correct the VaR model results by increasing the calculated value in function of the statistical confidence of the model.

Financial risk hedging operations, investment in financial derivative products, and stock loan operations (SVS, August 2006)

The Superintendency of Securities and Insurance (SVS) modified the regulatory framework for operations with derivative products by insurance companies, allowing these institutions to invest in derivative products and to carry out financial risk hedging operations. These new investments will be subject to limits and restrictions so as to contain the risks involved. At the same time, the new provisions promote the application of international accounting standards and principles, especially the application of "fair value" in the accounting of these instruments. The new regulations also allow these institutions to loan stocks in their portfolio in short-sale transactions.

Format of the report on stress tests applied to market risk exposure (SBIF, April 2006)

Stress tests constitute a valuable tool for assessing the risks faced by banks and other financial institutions, because they allow the quantification of the impact of extreme, but plausible shocks on profitability and solvency.

According to the Central Bank of Chile's regulations on market risk, financial institutions must carry out stress tests on all positions that carry market risk, using the scenarios considered to be the most relevant given the structure of their balance sheet and the scale and complexity of their operations. These tests must be performed in conformance with instructions from the SBIF.

In April 2006, the SBIF issued new instructions on the format banks must use when filing their report on the stress tests. The objective is to systematize the information contained in the reports.

Document on the new model for monitoring solvency, based on risks for the Chilean insurance industry (SVS, December 2006)

In December 2006, the SVS published a document entitled "*Nuevo modelo de supervisión de solvencia basada en riesgos para la industria aseguradora chilena*" (The new model on solvency supervision, based on risks for the Chilean insurance industry), which describes the basic tenets of the authority's new approach to the supervision of insurance companies. The objectives of this new supervision model are to strengthen the insurers' risk management systems, to carry out preventative monitoring, to make the regulations more flexible, to bring the supervisory system in line with international recommendations, and to adequately target the supervisory resources.

The proposed model draws on the supervisory levels or pillars approach developed by the International Association of Insurance Supervisors (IAIS) and by the Basel Committee on Banking Supervision (Bank for International Settlements, BIS). It establishes two levels of supervision: a basic regulatory level with minimum solvency requirements (level 1) and a complementary supervisory level aimed at establishing a process of company risk assessment, with a qualitative emphasis, carried out on the basis of good management practices and principles (level 2). The European Union is developing a similar approach for supervising insurance companies in its member countries, known as Solvency II.

Expansion of limits on foreign investment (Legislative initiative to reform the pension funds, December 2006)

The proposed law on pension reform announced by the Government in December would expand the limits on foreign investment currently applied to the Pension Fund Administrators. The proposed law considers gradually raising the overall foreign investment limit from the current 30% to 80%. To avoid a situation in which a single type of fund uses the higher allotted share for total foreign investment (as a result of individual choices made by the affiliates with regard to the type of fund in which they want to hold their pension assets), limits would be created by fund. The initial proposed ranges for investing abroad as a percentage of the total portfolio, by type of fund, are as follows: fund type A, 45% to 100%; fund type B, 40% to 90%, fund type C, 30% to 75%; fund type D, 20% to 45%, and fund type E, 15% to 35%. Finally, the Central Bank of Chile would retain its current function of determining the maximum limit within the ranges defined by the Law.

Documents of interest published by international organizations

"High-level principles for business continuity" (Joint Forum, BIS, August 2006)

This document presents a series of principles and recommendations on business continuity, aimed at contributing to the resilience of the financial system. These recommendations are directed toward participants of the financial industry (banks, insurance companies, and others), service

providers (securities exchanges and payment and settlement system operators), and regulatory and supervisory authorities.

The paper incorporates lessons learned from recent serious events (terrorist acts and natural disasters), which have made manifest the fact that their materialization constitutes a risk for financial stability.

The principles presented in the paper promote the following: the responsibility of the board and upper management in establishing the policies and procedures for managing business continuity; the designation of responsible parties and communication mechanisms to operate during significant disruptions of business; the testing of the business continuity plans; and the specification of the role of the supervisory authorities in these plans (box IV.3).

"Supervisory guidance on the use of the fair value option for financial instruments by banks" (Committee on Banking Supervision, BIS, June 2006)

This document provides a series of recommendations for banking supervisors with regard to the way in which banks should apply the concept of fair value. These recommendations are structured around seven principles, divided into two large categories: (i) The supervisor's expectations for banks using the fair value option (fulfillment of the IAS 39 criteria; adequate risk management systems; exclusion of instruments whose fair value cannot be precisely estimated; and the provision of complementary information by the banks), and (ii) the supervisor's assessment of the financial institutions' risk management, controls, and capital adequacy.

"The management of liquidity risk in financial groups" (Joint Forum, BIS, May 2006)

This document presents the results of the Joint Forum's review on the liquidity risk management practices of the largest financial service entities (banks, securities brokers, and insurance companies) in the world.

The work analyzes five basic areas: (i) how the large financial groups manage liquidity risks among jurisdictions, sectors, and affiliates, especially in moments of financial stress; (ii) the impact of regulation and supervision on liquidity risk management practices and structures; (iii) the nature of the products and activities that need significant liquidity; (iv) the assumptions used by the entities with regard to the availability of liquidity sources; and (v) the magnitude of the liquidity disturbances that the entities are willing to face.

The payments system and financial infrastructure

The payments system is an essential component of financial infrastructure. Its safe and efficient functioning is fundamental for the good performance of the economy, the effectiveness of monetary policy, and financial stability.

Monitoring the payments systems contributes to the resilience of the financial system. The considerable increase in transactions processed through these systems and the greater international concern for and interest in financial stability have highlighted the importance of the monitoring function and have contributed to better specifying this concept.

The Central Bank of Chile has the responsibility of overseeing the normal functioning of the payments systems. It therefore has the authority to regulate and supervise different aspects of the systems. It also acts as a broker and user of these services and as a proponent of the reform and modernization of the financial infrastructure.

Large-value payments systems

The large-value payments systems are made up of the Real-Time Gross Settlements (RTGS) System, managed by the Central Bank, and the Large-Value Payments Clearing House (*Cámara de Compensación de Pagos de Alto Valor*, or *CCAV*), managed and operated by *Combanc S.A.* Both systems process interbank operations associated with the transfer of funds between financial institutions, or by client accounts, and delivery versus payment (DVP) operations. The latter procedure allows the synchronization of securities transfers in the Central Securities Deposit, with payments settled in the Central Bank of Chile or the *CCAV*.

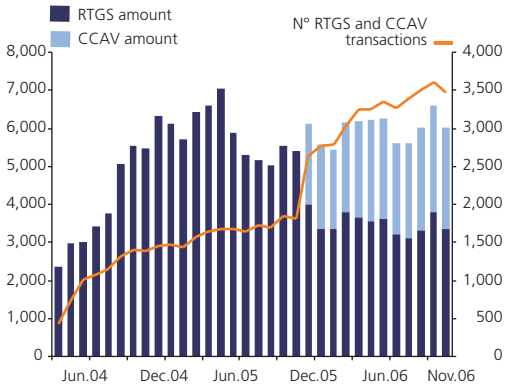
The number of operations settled in the large-value payments systems increased steadily throughout 2006, reaching 3,474 daily transactions, on average, in November. Of these transactions, more than 70% were processed in the *CCAV*. The increased use of this system is explained, in part, by the lower liquidity requirements for the functioning of this type of system. With regard to the amount of operations settled, this tended to stabilize in 2006 at around $6,000 billion a day (equal to about $1.727 million per payment). Of this amount, $3,300 billion were processed in the RTGS, while $2,700 billion were processed in the *CCAV* (figure IV.1).

Between January and November 2006, 53% of the operations processed in the large-value payments systems corresponded to interbank operations, followed in importance by DVP operations, with 13% of the total. The average number of daily payments associated with the latter type of operations was around 450 (which represents an average of $980 million per payment).

With regard to the distribution of money transfer instructions processed during the day, a high percentage of the daily operations in the RTS System—both in number of operations and in value—are concentrated in the opening hour (9:00 a.m.). These payments correspond to transfers carried out by the financial institutions to constitute the necessary guarantees for the *CCAV's* start of operations. Interbank and client account operations are distributed more homogeneously over the course of the day, although they also display a higher concentration in the morning. Most of the activity in the afternoon business hours (from 4:00 p.m. to 5:00 p.m.) involves derivatives payments at the settlements close of the *CCAV* and at the close of interbank payment settlements and receipts (figure IV.2).

Figure IV.1

Payments settled in large-value payment systems (*)
(billions of pesos, number of transactions)

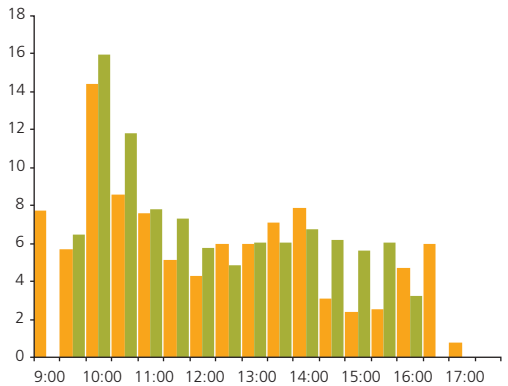


(*) Monthly daily average.

Sources: Combanc; Central Bank of Chile.

Figure IV.2

Distribution of the number of payments settled in large-value payment systems
(percent, time)



Sources: Combanc; Central Bank of Chile.

Figure IV.3

Use of retail payment methods

(years, percent share in the total number of transactions)

Source: Authors' calculations, based on data from the SBIF.

Retail payments systems

The low-value or retail payments systems—used by individuals and/or firms to make payments and money transfers—process a large number of transactions with a lower unit value, normally tied to the buying and selling of goods and services.

The most commonly used retail payment means in Chile is the check, which accounts for nearly 38% of total operations. However, its relative importance has fallen systematically in recent years, owing to the growing use of credit cards, debit cards, and electronic Internet transactions (figure IV.3). The number of Internet transactions rose 44% over the previous year, reaching a share of 12% in June 2006. This phenomenon reflects increased access to this type of technology, as well as efforts by the banks themselves to increase its use, given the lower processing costs of the operations.

With regard to transaction values, debit cards registered the strongest growth in the last year (24% nominal) and the second largest increase in number of transactions (19%), accounting for 9% of total operations as of June 2006. In second place are credit cards, which recorded a nominal increase in total transaction value of 7% relative to last year (table IV.1).

The number of transactions carried out using automatic teller machines fell, which reverses the trend of the last several years. This could be associated with the increased use of debit cards.

Table IV.1

Evolution of main retail payment methods

	2000	2001	2002	2003	2004	2005	2006 (1)
	(value in billions of pesos for each year)						
Checks	518,574	545,627	568,040	512,007	503,038	462,985	339,126
ATMs	4,969	5,795	6,710	7,058	7,673	8,633	8,210
Credit cards	920	1,010	1,072	1,269	1,495	1,996	2,141
Debit cards	31	175	319	597	804	942	1,172
Internet transactions	n.a	n.a	n.a	n.a	n.a	n.a	n.a
	(number of transactions, in thousands)						
Checks	305,122	293,173	285,108	291,932	284,286	276,589	262,960
ATMs	161,576	184,980	210,930	221,464	233,617	246,115	222,612
Credit cards	39,832	41,974	42,427	46,121	50,799	63,780	61,572
Debit cards	1,972	11,490	20,459	34,058	42,645	52,157	62,282
Internet transactions (2)	5,969	12,244	23,184	34,065	46,556	56,991	82,089

(1) Annualized figures as of June.
(2) Figures are annualized on the basis of transactions realized in June and December.
n.a: Not available.

Source: SBIF.

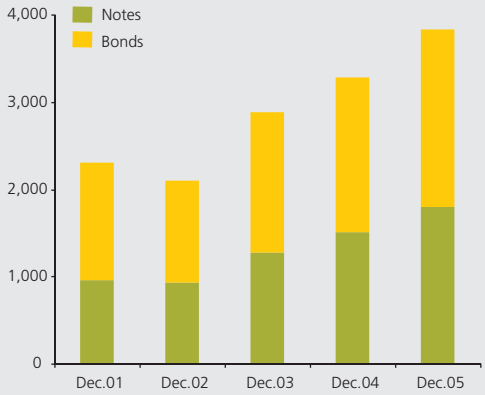
Box IV.1: **Structured notes**

The main characteristics of structured notes

Structured financial products can be defined as hybrid assets, which combine a fixed-income instrument with a series of derivative products. The majority also contain embedded options, so the product's return is subject to the earnings of the underlying asset (over which the note is structured), which could be one or more market indices or asset categories (rates, currencies, stocks, or commodities). In the last few years, the gross issue of this type of instrument at the world level has practically equaled that of bonds (figure IV.4).

Figure IV.4

Gross issue of bonds and structured notes
(US$ billion)



Source: BIS.

The most common structures of these products provide, for example, floating coupons tied to the evolution of the underlying asset; fixed coupons plus the revaluation of a designated index; and shortening and extending the amortization of a bond, among others. Structured notes are generally created according to the needs of the investor, which gives them unique characteristics. They are therefore less liquid in secondary markets and require an appropriate risk assessment.

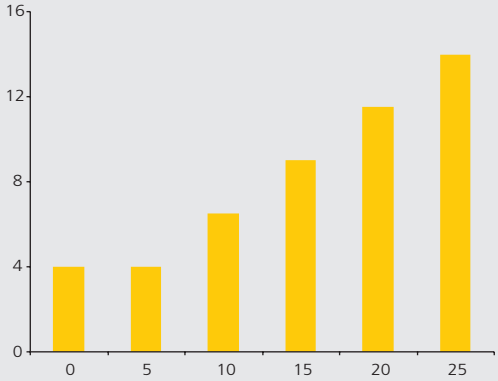
In the case of institutional investors, investment in structured notes is aimed at achieving three main objectives: gaining access or exposure to specific assets; improving portfolio composition; and eliminating or reducing exposure to certain risks. For retail investors, which use structured notes as alternatives to deposits or other debt instruments, they can offer higher returns by allowing the investors to obtain a variable-income exposure. Both types of investors can receive tax benefits, depending on the legislation of the country of origin.

Types of structured notes

The main characteristics of structured notes can be distinguished by whether or not the investor puts the principal at risk. In structured notes with a guaranteed principal, the investor has financially protected the nominal amount of the investment and only risks future earnings. The basic structure incorporates the purchase of options, which implies limiting the assumed risk. A simple example is a bond tied to a variable-income index (a fixed-income security with an added option tied to the behavior of a designated index) that provides an annual fixed coupon and, at the bond's maturity date, as a minimum pays its nominal value plus 50% of the appreciation of the index over a determined value, such as 10% (figure IV.5).

Figure IV.5

Internal rate of return of a bond tied to a variable-income index (1) (2)
(percent of index appreciation)



1) Note with a one-year maturity, a 4% annual coupon, and a payment on maturity of the principal plus 50% of the index appreciation over 10%.
(2) This instrument can be replicated with a deposit and the purchase of a call option.

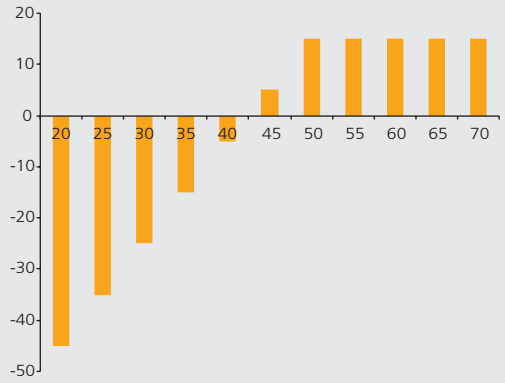
Source: Authors' calculations.

In the case of structured notes without a full principal guarantee or with a partial guarantee, the investor risks the nominal amount of the investment, so these instruments can offer higher returns. Reverse convertible notes are the best-known example: the investor receives a fixed rate over market, in exchange for assuming the risk of receiving the principal as an underlying asset—for example, stocks—at a price set when the note is underwritten. The basic underlying structure is the sale of options, which implies assuming greater risk, including the possibility of losing the total capital invested (figure IV.6).

Figure IV.6

Internal rate of return of a reverse convertible (1) (2)

(percent, stock price at maturity)



1) Note with a one-year maturity, a 15% annual coupon, and an initial stock price of US$50. If the value of the stock at maturity is equal to or greater than the initial value, it pays the principal plus the coupon; if less than the initial value, it pays the coupon plus the number of stocks that results from dividing the principal by the initial stock price.
(2) This instrument can be replicated with a deposit and a put option sale.

Source: Authors' calculations.

Regulatory aspects[1]/

In the case of institutional investors and issuers, the recommendations from the international organizations focus on promoting risk management policies and procedures. They also propose improvements in the returns analysis and appraisal of structured notes and suggest that these investments be oriented to qualified investors.[2]/

In the case of retail investors, the emphasis has been on promoting information transparency and highlighting the importance of understanding the products, the associated risks, and the possible returns under different scenarios prior to making the investment.[3]/

[1]/ The Central Bank of Chile is in the process of reviewing the regulatory framework on bank deposits and financial intermediation, contained in Chapter III.B.1 of the *Compendium of Financial Regulations* (see the section on financial framework and prudential regulation in this chapter). The new provisions will incorporate structured notes as time deposit instruments.

[2]/ Advisory Letter AL-94-2, 1995, Office of the Comptroller of the Currency (OCC). Letter SR 94-45, 1995, Federal Reserve. *Thrift Bulletin* 65, 1995, Office of Thrift Supervision (OTS).

[3]/ This is the case of Spain, Mexico, and the European Union, among others.

Box IV.2: **Security loans**

Main characteristics of security loans

Security loans are operations in which the lender or assignor transfers specified financial instruments to a third party, the buyer, who is obligated to return the same or similar securities during or at the end of the term stipulated in the contract. These operations can be classified into two broad groups based on the main objective of the operations: securities-driven operations are undertaken to obtain a security that is not the portfolio, while cash-driven operations provide collateralized financing.

This type of operations contributes significantly to the proper functioning of the currency and securities markets, by facilitating settlement processes and improving market depth and liquidity. Their promotion is therefore recommended by central banks, supervisory entities, and international financial organizations.[4]/

Types of operations

Security loans: An agreement in which the holder of the securities transfers them to a third party, the borrower, subject to the stipulation that the buyer will return the same (or similar) securities on a specified date or on demand. Full and unrestricted ownership is transferred to the borrower, but the original owner continues to assume the risks and benefits of the property. These operations fall into two categories, based on the type of collateral (cash or securities) given to the lender.

Table IV.2

Comparison of operations

Characteristic	Security loan		Repurchase agreement		Sell-buybacks
	Cash collateral	Securities / noncash collateral	Specific security	General collateral	
Formal exchange method	Sale with commitment to buy back at an equivalent value.	Sale with commitment to buy back at an equivalent value.	Sale and repurchase based on the master agreement.	Sale and repurchase based on the master agreement.	Sale and repurchase.
Form of exchange	Securities vs cash.	Security vs collateral (often free of payment, but sometimes delivery against delivery).	Security vs cash (generally delivery against payment).	Cash vs security (generally delivery against payment).	Cash vs security (generally delivery against payment).
Type of collateral	Cash.	Securities (stocks and bonds), mortgage bills, CDs.	Cash.	General collateral (bonds) or an acceptable security specified by the buyer.	Generally bonds
Motivation	Primarily to obtain a specific security.	Specific security.	Specific security.	Financing.	Primarily to obtain financing.
Returns paid as	Rebate interest (returns paid in cash at a below-market rate).	Standard charge, for example, in basis points.	Repo rate: interest rate on the cash part of the transaction.	Repo rate: interest rate on the cash part of the transaction.	Repo rate: paid via the difference between the sale and the repurchase price.
Initial margin / Change of margin	Yes / Yes.	Yes / Yes.	Yes / Yes.	Yes / Yes.	Possible / No.
Collateral substitution	Yes (determined by the borrower).	Yes (determined by the borrower).	No.	Yes (determined by the original seller).	No.
Coupons and dividends	For the lender.	For the lender.	Paid to the original seller.	Paid to the original seller.	There is no formal return obligation. Included in the repurchase price.
Maturity	Open or at a fixed term.	Open or at a fixed term.	Open or at a fixed term.	Open or at a fixed term.	Only at a fixed term.
Typical assets	Stocks and bonds.	Stocks and bonds.	Mainly bonds, possibly stocks.	Mainly bonds, possibly stocks.	Almost always bonds.

Source: Faulkner (2004).

[4]/ CPSS – IOSCO (2001); Faulkner (2004).

Repurchase agreements (repos): The sale of securities for cash, with the commit to buy back the same or similar instruments at a fixed price either on a specified future date or with an open maturity. Repos grant full, unrestricted ownership of the securities to the buyer, who is authorized to resell them to a third party. The original seller retains some property rights, such as the right to receive coupons, but relinquishes the right to sell.

Sell-buybacks: Transactions that have the same economic effect as a repo but that involve two simultaneous transactions—an immediate purchase and a future sale. The sales price is generally calculated and negotiated using the market repo rate as a reference. The buyer of the security has absolute ownership and thus receives any coupon payments during the life of the operation.

Risk management

In general, risk management practices aim to reduce counterparty risk. It is therefore advisable to carefully assess the credit risks involved in these transactions, including establishing limits and requesting collateral.

Regulators and the industry have also promoted the use of master agreements as a tool that contributes to the mitigation of (credit and legal) risks. The most commonly used master agreements at the world level are the Global Master Agreement published by the International Securities Market Association and the Bond Market Association, the European Master Agreement from the European Banking Federation, and US Master Repurchase Agreement published by the Bond Market Association.[5]/

[5]/ The Central Bank of Chile is in the process of reviewing the regulatory framework on bank deposits and financial intermediation, contained in Chapter III.B.1 of the *Compendium of Financial Regulations* (see the section on financial framework and prudential regulation in this chapter). In the new chapter, the regulations on "short sales" will be replaced with provisions oriented toward regulating security loan operatios. The provisions stipulate that the documentation of security loan operatios in which a financial institution participates must make reference to, or be based on, a master agreement that has been edited and updated in accordance with the international best practices and recommendations on the issue.

Box IV.3: **Best practices on business continuity**

A broad international consensus has been established in the last few years on the need to strengthen the payment and securities settlement systems (PSSS) by promoting best practices and principles of system design and functioning. In August 2006, the BIS Joint Forum published the document "High level principles for business continuity,"[6]/ whose objective is to help financial authorities and organizations improve the resilience of the PSSS by providing a broad framework for good practices.

Similarly, as part of its PSSS monitoring function, the Central Bank of Chile periodically meets with industry representatives,[7]/ with the goal of tracking the systems' operation; assessing incidents that could affect the normal functioning of the systems; and developing and perfecting coordination mechanisms that strengthen business continuity.

This box describes these principles, with a special focus on what are called business continuity procedures.

High-level principles for business continuity

This document defines Business Continuity Management (BCM) as a whole-of-business approach that includes policies, standards, and procedures that ensure the timely recovery and maintenance of specific operations and procedures in the event of a disruption. Its goal is to reduce to a minimum the operating, financial, and legal risks and other possible consequences associated with the materialization of such an event.

The principles, which are described below, take into account the lessons learned from recent acts of terrorism, catastrophes, and natural disasters, which have highlighted the risk to financial stability that the materialization of an operational event represents.

Principle 1: Board and senior management responsibility. The board of directors and senior management are responsible for BCM. Industry participants and financial authorities should have a comprehensive and effective BCM.

Principle 2: Major operational disruptions. Industry participants and financial authorities should incorporate the risk of a major operational disruption into their BCM policies and procedures.

Principle 3: Recovery objectives. Industry participants should define recovery objectives that reflect the risk they represent to the operation of the financial system. Industry participants that provide critical services or pose a significant risk to the operation of the financial system should incorporate higher standards in their BCM.

Principle 4: Communication. Industry participants and financial authorities should include in their BCM plans procedures for communicating both within their organizations and with relevant external parties in the event of a significant business disruption.

The document highlights the importance of being able to communicate effectively during the management of an event that could affect business continuity. It further emphasizes that communication is particularly important in the early stage in order to make appropriate and timely decisions; that clear, regular communication maintains public confidence; and that that the BCM should incorporate clear and comprehensive communication protocols.

Principle 5: Cross-border communications. The communication procedures of industry participants and financial authorities should address protocols for communicating with other jurisdictions in the event of continuity events with cross-border implications.

Principle 6: Testing. Industry participants and financial authorities should test their business continuity plans, evaluate their effectiveness, and continually update their BCM.

Principle 7: Business continuity management reviews by financial authorities. Financial authorities should incorporate BCM reviews into their periodic evaluation of industry participants.

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[6]/ The Joint Forum of the Bank for International Settlements (2006).

[7]/ Representatives of the Santiago Stock Exchange, Combanc, the Central Securities Depository, and the Association of Banks and Financial Institutions.

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Macroeconomic fluctuations and bank performance in Chile*

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I. Introduction

The purpose of this study is to characterize the cycles of a broad set of credit aggregates and other assets, liabilities, and risk, solvency, and portfolio quality indicators for Chilean banks. To detect patterns in bank performance between 1989 and 2006, we compare each variable's cycle to the corresponding broader cycle of economic activity.

This exercise can shed light on what stage of the credit cycle the economy is currently experiencing. Our conclusions are also relevant for monitoring financial stability. We further analyze the results taking credit theory into account: if loans are used to smooth consumption and production, their behavior should be countercyclical, or at least acyclical, whereas if loans behave in accordance with the credit channel and financial accelerator theory, they should fluctuate procyclically. Credit channel theorists essentially argue that financing fluctuates along with agents' net wealth, which is used as a guarantee. Thus, while lending grows in a period of expansion, during recessions banks hold liquid assets, and access to financing becomes stricter for individuals and small businesses, since they have less equity (Bernanke and Blinder, 1988; Bernanke and Gertler, 1989).[1]/

To meet this article's objective, we use techniques commonly seen in the real business cycle literature to establish empirical patterns. We calculate cross-correlations between the gross domestic product (GDP) cycle and the cyclical component of variables affecting banks' balance sheets (assets and liabilities), and variables and indicators built from the income statement.[2]/ We also calculate volatility relative to GDP and to the size of the fluctuations or percentage deviations from trend.[3]/ These correlations do not imply causality, but rather comovements.

Finally, we not only consider the aggregate variables of the entire banking system, but also disaggregate the variables by bank type. This makes it possible to determine whether there are groups of banks that perform differently along the cycle.

The following section provides a detailed summary of the main cyclical patterns found in the banking industry. The third section contains a conclusion and some lessons about the current cycle.

II. Cyclical patterns in the banking industry

In this section, we calculate cross-correlations between the GDP cycle and a broad set of variables taken from banks' financial statements, using quarterly information from the Superintendency of Banks and Financial Institutions (SBIF) for the period 1989–2006. The sample is divided into two subperiods to determine whether there was a significant change when the flexible exchange rate regime began in 1999.[4]/[5]/

In addition to using the aggregate of all banks, we broke down the variables by bank type: private banks; large versus small banks; local versus foreign banks; and traditional, corporate,

* The opinions expressed in this article are the exclusive responsibility of the authors and do not necessarily represent the opinions of the Central Bank of Chile, its Board, or the International Monetary Fund. We thank Kevin Cowan, Pablo García, Alejandro Jara, Luis Opazo, participants in the Central Bank of Chile's in-house Financial Policy Division seminar, and an anonymous referee for comments.

** International Monetary Fund.

*** Central Bank of Chile.

1/ Similarly, this perspective confirms that the availability of credit can accentuate cycles, and that financing can be a better key indicator of economic activity than money, because the demand for lending is more stable than the demand for money. See Alfaro et al. (2004) for a study of the bank credit channel in Chile.

2/ Cross-correlation is defined and exemplified in the second section.

3/ We also calculate the cross-correlations between bank interest rates and the monetary policy rate.

4/ The first subperiod begins in the first quarter of 1989 and ends in the second quarter of 1998. The second subperiod runs from the third quarter of 1999 to the third quarter of 2006.

5/ We excluded the quarters from the third quarter of 1998 to the second quarter of 1999 because this was an atypical moment of extreme turbulence. We included these quarters, however, when considering the sample as a whole.

investment, and retail banks.[6]/ This breakdown provides information about the relative importance of different bank categories between 1989 and 2006 (table 1). The share of local and corporate banks in the system has fallen relative to their share in 1989. In contrast, the share of large and traditional banks has increased.

Table 1

Characterization of the banking system

	Number of banks			Assets			Loans		
Classification	**Jan-89**	**Sept-99**	**Sept-06**	**Jan-89**	**Sept-99**	**Sept-06**	**Jan-89**	**Sept-99**	**Sept-06**
	(percent share in the aggregate)								
System	39	32	30	100.0	100.0	100.0	100.0	100.0	100.0
Private	38	31	29	80.0	85.7	84.8	82.7	87.4	86.5
Large	3	5	4	35.8	52.7	57.7	33.6	55.3	60.7
Small and medium	35	26	25	44.2	33.0	27.0	49.1	32.1	25.8
Local	17	14	15	64.4	59.2	44.5	68.6	63.4	48.1
Foreign	21	17	14	15.5	26.5	40.3	14.1	24.0	38.5
Traditional	12	12	12	63.0	75.6	76.5	64.9	78.6	80.7
Firms	20	13	10	14.1	6.2	5.1	15.0	5.6	4.1
Investment	2	2	3	1.3	1.2	1.8	1.1	0.1	0.1
Retail	4	4	4	1.5	2.8	1.3	1.8	3.1	1.6

Source: Authors' calculations, based on data from the SBIF.

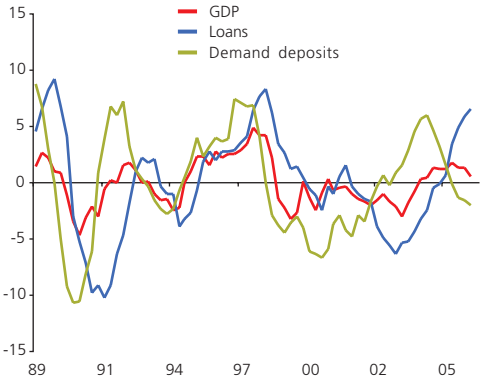
As a prior step to undertaking this exercise, all series are deflated and seasonally adjusted, and all, including GDP, are detrended using a Hodrick-Prescott filter, as is common in this type of literature.[7]/

The above procedure identified four periods of GDP growth (above trend): 1989–1990, 1993–1994, 1996–1998, and 2004–2006. It also identified four periods of recession (below trend) in 1988, 1990–1991, 1994–1995, and 1999–2004 (figure 1).[8]/ The GDP cycle lasts around 4.6 years, and the maximum deviations from trend are 5%, both negative and positive.

Figure 1

Output cycle, loans, and demand deposits, 1989–2005

(percent, deviation from trend)



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Below we describe the main patterns found for the different indicators and balance sheet variables.

Comparing the cyclical components of GDP, credit, and demand deposits reveals that while loans (credit) lag output cycles, demand deposits lead it. Moreover, the latter two series have bigger fluctuations than GDP (figure 1).

The cross-correlation in i is between the variable in question in period t+i and GDP in t, where the value of i ranges from –8 to 8. Thus, if the highest correlation of the variable with GDP occurs in t+2, then the variable is said to lag the output cycle by two periods. If the highest correlation is in t–2, then the variable leads. When we consider the full sample, a correlation with GDP higher than 0.12 (one standard deviation) is considered significant.[9]/ The lead or lag relative to GDP is significant if the difference between the correlation in t+i and the correlation in t (i=0) is statistically different from zero, with the same level of confidence (equal to or higher than 0.12). The dotted lines in the figures correspond to the confidence interval constructed with a standard deviation for the distinct subperiods.

II.1 Asset variables

This subsection covers the asset components of the banks' balance sheets.

II.1.1 Total loans

The banking system's total loans are highly correlated with GDP, and they significantly lag two quarters in the cycle (figure 2 and table 2).

[6]/ Private banks exclude BancoEstado. The remaining categories are subdivisions of private banks. Large banks are those whose total assets are greater than 6% of the system for more than one year. Retail banks allocate more than 50% of their loans to consumer credit. Foreign banks are at least 50% owned by nonresidents. Corporate banks have a high share of commercial and foreign trade loans. Investment banks hold assets that are principally composed of financial investments and derivative instruments. The category of traditional banks basically includes whatever is leftover, namely, banks that focus on the more traditional banking business: multibusiness lines and a diversified portfolio.

[7]/ We also tested the robustness of our results to the use of other filters. Two other filters were used to make the calculations: Christiano-Fitzgerald (2003) and a three-year centered moving average, which behaves much like other filters found in the literature. The Hodrick-Prescott filter generates a smooth trend and a volatile cycle, while the Christiano-Fitzgerald filter provides a very smooth cycle. The long moving average generates trends and cycles that are very similar to those obtained with other filters (band-pass), like the one in Baxter and King (1999). The use of alternative filters does not change the phase of the variables' cycle relative to the GDP cycle.

[8]/ An analysis of the Chilean economy's empirical patterns can be found in Restrepo and Soto (2006).

[9]/ Given that the sample is relatively small, we use a one-standard-deviation confidence interval to determine the statistical significance of the correlations, as is common in the literature. This value is 0.12 for the full period, 0.16 for the 1989–1998 period, and 0.19 for the 1999–2006 period.

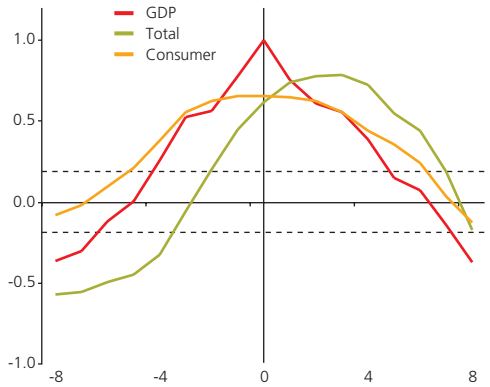
Figure 2

Correlation between system loans and output, 1989–1998

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Figure 3

Correlation between system loans and output, 1999–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Total loan cycles last approximately 4.3 years, on average, and the size of positive and negative deviations is very similar, at 2.1 and 2.2 years, respectively. The deviations from trend in percentage terms were calculated as a measure of the size of the cycle. The maximum positive deviation found was 9%, while the maximum negative deviation was –10%. In other words, total loans can fluctuate nearly 20% in the space of one cycle (table 2).

Table 2

Cyclical description of total and consumer loans

	Period	Max. correlation n	Max. correlation Value	Relative volume	Cycle length	Max. positive deviation	Max. negative deviation
					(years)	(percent)	
Total system loans	89-06	2*	0.81 *	2.4	4.3	9.2	10.2
Total system loans	89-98	2*	0.88 *	2.3			
Total system loans	99-06	3	0.79 *	2.4			
System's consumer loans	89-06	1	0.82 *	5.2	5.9	20.4	22.0
System's consumer loans	89-98	1	0.87 *	5.4			
System's consumer loans	99-06	0	0.66 *	5.2			

n: Indicates lead or lag when the maximum correlation is produced.
*: Indicates that this value is significant.
Note: Cross-correlations are calculated relative to the cyclical component of GDP.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Its standard deviation (volatility) is 2.3 times that of GDP for the whole sample, and it does not change significantly between periods (table 2).[10]/ This means that the movement of total loans is very stable during the whole sample.

This behavior is common to several types of banks. One notable exception is foreign banks, which behave acyclically.[11]/

II.1.2 Consumer loans

Consumer loans have a number of characteristics that should be highlighted.

First, consumer loans tend to coincide with the output cycle. This is evident in the second period. In the first period, however, they lag by one quarter, but it is not statistically significant (figures 2 and 3). This means that consumer loans lead total loans.

Second, consumer loans fluctuate widely. Their maximum positive deviation is 20%, and the negative is 22%; in other words, they could fluctuate as much as 40% during the cycle.[12]/ This is also reflected in the calculation of the standard deviation, which is 5.2 times that of GDP.[13]/

II.1.3 Commercial loans

The behavior of commercial loans across the cycle is very similar to the behavior of total loans, in terms of duration and the lag with the GDP cycle. Also, there are no significant differences in commercial loans between the 1989–1998 and 1999–2006 periods. Nevertheless, the size of the cycle is greater

[10]/ The volatility of credit is consistent with the credit channel approach, which holds that imperfections in financial markets affect bank lending, causing banks to restrict loans and thus to contribute to amplifying the cycles of the economy (changes in supply). Credit volatility could also be the result of changes in indebtedness requirements due to the cycle—that is, changes in demand—although the latter is generally considered to be more stable than the demand for money.

[11]/ An analysis of the behavior of this type of bank should examine both its sources of capital and loanable funds and the sectors to which it offers loans. This analysis is beyond the objectives of this article, however.

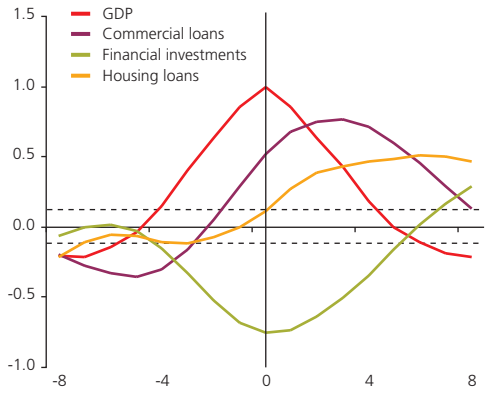
[12]/ These loans are almost three times more volatile than the system's consumer loans.

[13]/ The relative volatility of these loans was 5.4 in the first period and then dropped to 5.2 in the second. However, this variation is not significant.

than that of total loans. The maximum deviation, both positive and negative, is 14%, and its volatility is 2.8 times that of GDP (figure 4 and table 3).

Figure 4

Correlation between selected asset accounts and output, 1989–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Table 3

Cyclical description of selected asset accounts

	Period	Max. correlation n	Max. correlation Value	Relative volume	Cycle length	Max. positive deviation	Max. negative deviation
System's commercial loans	89-06	3 *	0.76 *	2.8	4.4	13.9	13.7
System's mortgage loans	89-06	6 *	0.51 *	2.6	7.8	11.0	13.9
System's mortgage loans	89-98	7 *	0.60 *	2.6			
System's mortgage loans	99-06	1	0.58 *	3.2			
- Local banks	89-06	2 *	0.74 *	5.3	7.6	31.7	17.7
Financial investment of the system	89-06	3 *	-0.57 *	3.5	5.4	12.5	19.5
- Large banks	89-06	1 *	-0.49 *	5.7	5.2	26.1	22.7

n: Indicates the advance or lag where the maximum correlation is obtained.
*: Indicates that this value is significant.
Note: Cross-correlations are calculated relative to GDP.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

II.1.4 Mortgage loans

When we consider the whole 1989–2006 period, cross-correlations of mortgage loans with GDP do not display a markedly cyclical behavior. This is because the mortgage loan cycle is the longest of all types of loans, lasting approximately 7.7 years. The maximum value of positive percentage deviations is 11%, while negative deviations reach 14%.

The banking system's total mortgage loans do display cyclical behavior in the 1999–2006 period, which coincides with the GDP cycle. Moreover, disaggregating mortgage loans by type of bank reveals that local banks behave cyclically, with a correlation to GDP of 0.74 and a significant lag of two quarters. In contrast, mortgage loans given by foreign banks are fairly acyclical.

II.1.5 Financial investments

Financial investments of banks move in the opposite direction of the cycle, with a significant lag of three quarters. In the more recent period, their counter-cyclical behavior was accentuated, while the negative correlation of this series with GDP went from –0.52 to –0.67 and the lag was reduced. This behavior is consistent with the credit channel in the sense that when risk increases, banks restrict lending and maintain their financial investments.

The maximum percentage deviations with respect to trend are 13% and –20%, which show a certain degree of asymmetry. The standard deviation with respect to GDP, the other indicator of volatility, calculated for the full sample, is 3.5, although in the last period it rose to 5.1 (table 3).[14]/

Large banks lead the system with a maximum correlation of only a one-quarter lag, although their correlation is slightly lower (0.49 versus 0.57).

II.2 Liability variables

Within the group of variables analyzed from the liability accounts, we focus here on demand deposits, time deposits, and subordinated bonds.

II.2.1 Demand deposits

Demand deposits, whose evolution is heavily associated with the demand for money (including checking accounts, savings accounts, and cashier's checks), have a statistically significant lead of two quarters relative to GDP (table 4 and figure 5). The lead is even greater for the system as a whole in the second period (1999–2006) (table 4).

Table 4

Cyclical description of selected liability accounts

	Period	Max. correlation n	Max. correlation Value	Relative volume	Cycle length	Max. positive deviation	Max. negative deviation
System's demand deposits	89-06	-2 *	0.64 *	3.3	4.1	23.6	14.0
System's demand deposits	89-98	-2	0.69 *	3.3			
System's demand deposits	99-06	-6 *	0.56 *	3.7			
System's time deposits	89-06	3 *	0.50 *	2.3	6.0	8.0	11.8
- Local banks	89-06	2 *	0.85 *	3.9			
System's subordinate bonds	89-06	5 *	0.52 *	7.3	4.1	29.0	37.6
- Local banks	89-06	5 *	0.61 *	9.3	4.0	51.4	31.9

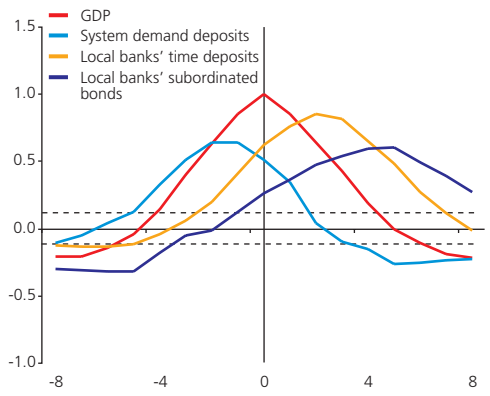
n: Indicates the advance or lag where the maximum correlation is obtained.
*: Indicates that this value is significant.
Note: Cross-correlations are calculated relative to GDP.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

[14]/ The cycle of banks' liquid assets is similar to that of financial investments, but it is even more variable.

Figure 5

Correlation between selected liability accounts and output, 1989–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

The demand deposit cycle is as long as the GDP cycle, but it is more volatile. Its maximum positive percentage deviation from trend is 24%, and the negative is 14%. This asymmetry could have to do with the existence of a nonlinear relation between money (demand deposits) and interest rates.[15]/ As expected, this variable behaves very similarly to checking accounts, but its correlation with GDP is slightly more advanced. The behavior of demand deposits is very similar in all types of banks.

II.2.2 Time deposits

The system's time deposits have a lag of three quarters. Local bank deposits are highly correlated with GDP. The point of greatest correlation between time deposits in local banks and GDP occurs with a lag of two quarters and reaches 0.85 when using the full sample. This correlation is higher than for traditional banks (0.53) and the system as a whole (0.50). The volatility of the system's time deposits is 2.3 times GDP (table 4), while the volatility of local banks' deposits is 3.9 times higher.

Time deposits in corporate and foreign banks behave relatively acyclically, which is quite different from the behavior in the system as a whole.

II.2.3 Subordinated bonds

Subordinated bonds are highly correlated with GDP, especially in the case of local banks although they have a five-quarter lag. The lag has to do partly with the fact that capital requirements are associated with loans and loans lag GDP. It could also be that issuing this type of instrument takes time and only large issues are justified, which is consistent with its high degree of volatility.

II.3 Solvency, risk, and performance indicators

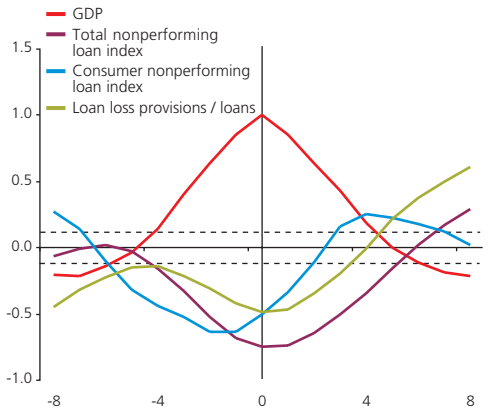
This section includes some indicators frequently used to analyze the strength and performance of a financial institution.

II.3.1 Total nonperforming loan (NPL) index

One of the indicators of portfolio risk or quality is the total nonperforming loan index (NPL). The total NPL ratio is countercyclical and coincides with the GDP cycle, as do loan loss provisions, but it is more significant than the latter (figure 6).[16]/

Figure 6

Correlation between portfolio quality indicators and output, 1989–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

The volatility of the NPL index is 7.5 times greater than that of GDP and three times greater than loan volatility. The maximum positive deviation from trend reached 30.2% during the recession, while the negative deviation reached –29.7% during economic growth (table 5).

II.3.2 Consumer nonperforming loan (NPL) index

The consumer NPL index is also countercyclical, but it tends to lead the GDP cycle. This is particularly the case with local and retail banks' consumer NPL ratio. These indicators lead GDP by four quarters, which means they could be good indicators

[15]/ Restrepo (2002) shows that as interest rates drop, the elasticity of demand for money rises, which could fully offset the decreases associated with a slowdown in economic growth. The opposite effect happens with interest rate hikes, which reduce elasticity.

[16]/ Retail banks' loan loss provisions (not shown) have a low correlation with GDP.

of the quality of the system's portfolio and economic activity (table 5).

Table 5

Cyclical description of solvency, risk, and performance indicators

	Period	Max. correlation n	Max. correlation Value	Relative volume	Cycle length	Max. positive deviation	Max. negative deviation
System's past-due portfolio index	89-06	0	-0.75 *	7.5	6.0	30.2	29.7
- Retail banks	89-06	-4 *	-0.38 *	14.1	3.4	147.4	58.4
System's consumer nonperforming loan index	89-06	-1	-0.64 *	5.5	2.8	34.2	17.1
- Local banks	89-06	-4 *	-0.53 *	6.1	2.8	50.6	20.8
- Retail banks	89-06	-4 *	-0.43 *	18.1	4.5	146.8	71.0
Loan loss provisions / system loans	89-06	0	-0.68 *	7.4	9.8	24.4	26.7
Capital adequacy index	89-06	1	-0.67 *	2.3	4.1	9.7	8.0
Gross operating results / assets	89-06	0	-0.58 *	2.3	3.3	10.7	13.5
- Private banks	89-06	-1	-0.50 *	2.5	2.6	12.3	15.6
Financial operating results / assets	89-06	-3 *	-0.33 *	4.0	3.2	18.0	30.2
Financial operating results / assets	89-98	-1	-0.50 *	2.5			
Financial operating results / assets	99-06	-4 *	-0.66 *	8.2			
Operating expenses / assets	89-06	2	-0.30 *	1.3	3.3	6.5	7.2
Demand deposits / liquid assets	89-06	1	0.51 *	6.5	6.4	55.9	29.5

n: Indicates the advance or lag where the maximum correlation is obtained.
*: Indicates that this value is significant.
Note: Cross-correlations are calculated relative to GDP.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

NPL ratio deviations from trend are asymmetrical. They rise 34% in recession and drop 17% in periods of economic growth. This is interesting from a financial stability viewpoint because in recessions, losses could surpass estimates based on the simple historical average or a recent growth period (table 5).

The general rule is that when total, consumer, housing, and commercial nonperforming loan indices start to grow, it indicates that GDP is starting to slow down (figure 6).

II.3.3 Capital adequacy ratio (Basel index)

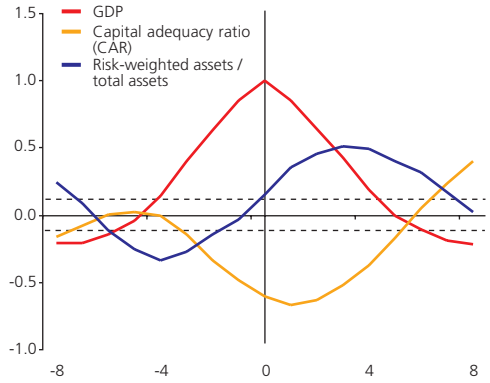
The main measure of solvency is the capital adequacy ratio (CAR), or Basel index, which consists of regulatory capital divided by risk-weighted assets.

This indicator displays a significantly countercyclical behavior (figure 7).[17]/ This behavior mainly responds to the denominator's cyclical movements. In fact, risk-weighted assets grow a good deal during GDP's growth phase. The correlation of this ratio with GDP is similar in almost all types of banks, with the exception of foreign banks, whose ratio once again has an acyclical behavior (table 5).[18]/

Risk-weighted assets over total assets are positively correlated and lag the cycle. This happens because the numerator rises after the cycle, when the banks' appetite for risk increases. In other words, the portfolio composition moves toward riskier assets (figure 7).

Figure 7

Correlation between solvency and risk indicators and output, 1989–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

II.3.4 Ratio of financial operating results and of gross operating income to total assets

The ratio of financial operating results (FOR) to assets and the ratio of gross operating income (GOI) to assets are widely used indicators of profitability, and both behave countercyclically. When considering the whole sample, FOR to assets is three quarters ahead of the cycle, while GOI to assets coincides with the GDP cycle. Comparing FOR to assets in the two subperiods shows that the lead increases from one quarter in the 1989–98 period to four quarters in the 1999–2006 period (figure 8). These movements are practically the same for all types of banks.[19]/

The cycle's length for both variables is approximately 3.3 years, which is shorter than the loan and GDP cycles. Also, financial income is twice as volatile as gross operating income. In fact, the maximum positive and negative deviations of FOR to assets are 8% and –30%, respectively, while in the case of GOI to assets, the deviations are 11% and 14%. This means that nonfinancial income seems to contribute to cushioning the fluctuations of financial income (figure 8).

It is worth noting that highly used indicators like return on assets (ROA) and return on equity (ROE) have a relatively low and lagged correlation with GDP, almost acyclical.

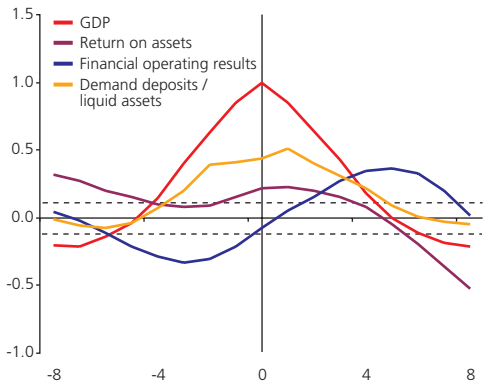
[17]/ It behaves the same way as the capital-to-total-assets ratio.

[18]/ Although a one-quarter lag can be seen in this figure, it is not significant.

[19]/ A Granger test with four lags demonstrates causality in both directions for financial operating results, gross operating income, and operating expenses. In contrast, causality is not seen in either direction for demand deposits with four lags, but it is seen in both directions with eight lags.

Figure 8

Correlation between earnings and performance indicators and output, 1989–2006



Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

II.3.5 Ratio of operating expenses to assets

Operating expenses are used to analyze bank efficiency. This expense is procyclical and lags the GDP cycle. However, when observing operating expenses as a proportion of assets, it turns out these are countercyclical. This happens because loans increase much more with economic expansion. These expenses, although more volatile than GDP (1.4 times more), are less volatile than most of the variables considered in this article (table 5).

II.3.6 Ratio of demand deposits to liquid assets

This liquidity indicator shows that the proportion of demand deposits (volatile liabilities) to liquid assets increases in an economic expansion. Contrary to what we saw when analyzing demand deposits, this indicator does not lead the cycle, but rather is statistically coincident.

II.4 Interest rates

Interest rates are procyclical, and different rates behave very similarly along the cycle. Interest rates lag the GDP cycle by three to four quarters, but they coincide with the real monetary policy rate (MPR) (table 6). In general, the correlation with the MPR is quite high, which is particularly true for the real 90- to 360-day loan rate (table 6).

Another consideration is that the interest rates analyzed here are much more volatile than GDP, but less so than the real monetary policy rate. For example, the maximum positive and negative percentage deviations from the BCU5 trend are 35% and 26%, respectively, and its volatility is half that of the MPR.[20]/ One exception is the real 90- to 360-day deposit interest rate, whose volatility is 50% greater than that of the MPR (table 6).

Table 6

Cyclical description of interest rates

	Period	Max. correlation n	Max. correlation Value	Relative volume	Cycle length	Max. positive deviation	Max. negative deviation
Real loan rate, 90–360 days	89-06	0	0.91 *	0.7	3.5	57.0	48.7
Real deposit rate, 90–360 days	89-06	0	0.77 *	1.5	5.5	94.4	183.3
Loans up to 500UF	89-06	0	0.68 *	0.5	6.5	16.6	44.3
Loans over 5.000UF	89-06	0	0.73 *	0.9	7.0	48.1	48.1
BCU 5	89-06	0	0.77 *	0.5	5.6	34.9	26.1

n: Indicates the advance or lag where the maximum correlation is obtained.
*: Indicates that this value is significant.
Note: Cross-correlations are calculated relative to the real monetary policy rate cycle.

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

III. Final comments and conclusions

This section outlines the most important conclusions of this analysis.

Our examination of banks' total portfolio shows that it is markedly procyclical and has a very high correlation with GDP, although it is more volatile. Also, loans generally lag the GDP cycle. Demand (and checking account) deposits are procyclical and lead the cycle.[21]/

The capital adequacy ratio (Basel index) and banks' liquid assets and financial investments are countercyclical, which shows that in recession, when risk increases, banks probably restrict the supply of loans and maintain financial investments. Thus, this first evidence, although descriptive in nature, tends to support the existence of a credit channel.

This channel is important in terms of magnitude, considering that loan fluctuations can represent up to 15% of GDP. In fact, loans correspond to approximately 75% of GDP, and they had a maximum positive deviation from trend of 9% and negative deviation of 10% in the period analyzed. Loans can thus contribute to accentuating the GDP cycle, as this approach sustains.

The nonperforming loan ratio of consumer loans from local and retail banks leads the cycle, but in this case its behavior is markedly countercyclical. Thus, when the nonperforming loan ratio starts to rise, output growth begins to slow down.

In the case of many variables, foreign banks have generally behaved acyclically, which is very different from what happens in the banking system as a whole.

[20]/ The volatility of the MPR is influenced by the major fluctuation observed from 1998 to 1999.

[21]/ In other words, what happens in Chile is the opposite of what happens in the United States, where bank credit is a better leading indicator than demand deposits or money.

When comparing loan and GDP trends, we found that the elasticity of loans in relation to GDP could have risen in the 1999–2006 period (table 7). This would explain, in part, the greater momentum of loans over the past two years. However, a suitable estimation of this elasticity requires an econometric estimation that also considers other variables like the interest rate.

Table 7

Analysis of trends in GDP, loans, and demand deposits

	Growth rates			Elasticities	
	GDP	Loans	Demand deposits	Loans	Demand deposits
	(percent)				
89-06	5.8	8.6	9.8	1.5	1.7
89-98	7.9	10.9	9.6	1.4	1.2
99-06	4.4	7.3	12.2	1.6	2.8

Source: Authors' calculations, based on data from the SBIF and the Central Bank of Chile.

Finally, we carried out a projection within the sample, using a simple regression between the cyclical component of loans and the cyclical component of GDP, lagged two quarters. We found that the current cyclical behavior of loans is slightly higher than what was projected two years ago, but this recent evolution is within the range of two standard deviations. In light of this exercise, the current evolution of loans is not especially abnormal.

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A measure of default risk in the Chilean banking system*

Authors: Dale Gray**, Cristián Echeverría***, and Leonardo Luna***

This article develops a basic contingent claims analysis model for monitoring financial risk in the Chilean banking sector. Default risk measures are estimated for the most important private banks in the system, as an approximation to assessing the risks to their financial stability. To this end, we combine historical data from their balance sheets with prospective information based on the value and volatility of their stock price. The results are similar to those obtained in other studies on banking systems in advanced economies.

I. Introduction

Twenty-five years after its deepest crisis, the Chilean banking system stands out as one of the most solid in the world.[1]/ This notable recovery is the result of healthy reforms, a regulatory scheme founded largely on the disciplinary role of the market, and an environment of high and sustained growth rates.

The main concern in this article is analyzing distance-to-default measures for a bank or group of banks that could affect the banking system's financial stability. This leads us to focus the analysis on the largest private banks in the system.

There are various approaches to measuring financial stability. In general terms, we can distinguish between aggregate-level, or macroprudential, analytical approaches and microeconomic-level analytical approaches.[2]/

Applications of macroprudential analysis are traditionally based on historical indicators of solvency, liquidity, capital adequacy, or portfolio quality, among others, which are used in the aggregate to perform a sectoral or system-level assessment. This approach is complemented with macroeconomic information, such as liquidity conditions, interest rates, exchange rates, or national credit growth, which are used as leading indicators of the system's degree of financial stability. This approach provides very valuable information, but it is limited by the availability of historical data, which is generally lagged, and by the fact that aggregating the data could hide problems at the individual bank level.

Applications of microeconomic analysis are traditionally confined to the analysis of each bank separately, and they take as a starting point the historical and accounting data on the banks' balance sheets. This approach assesses the evolution of various indicators of financial health (profitability, liquidity, leverage), and it is frequently complemented with individual estimates of the probability of default based on historical data for the industry. This approach provides valuable information on the individual banks considered. The risk of interbank contagion is generally addressed separately in ad hoc models, as is the financial links between the banking system and the other sectors in the economy.

Within the macroeconomic approaches, one methodology that stands out is contingent claims analysis. This approach, adopted in this article, extracts information from market variables, including risk measures based on the level and volatility of stock prices, and combines it with data from individual balance sheets to monitor the credit risk of agents or sectors, depending on the desired level of aggregation. In this case, we monitor default risk for the largest private banks in the Chilean system. We also construct aggregate indices of their default risk.

II. The methodology for contingent claims analysis

This methodology forms part of a more general approach in modern financial theory that combines balance sheet information for the agents and sectors involved with prospective market information related to the pricing of their debt and equity. This information provides the basis for estimating the evolution of their default risk. The contingent

* The opinions expressed in this article are the exclusive responsibility of the authors and do not necessarily represent the opinions of the Central Bank of Chile, its Board, or the International Monetary Fund. We thank Karol Fernández for efficient assistance; and Kevin Cowan, Carlos Medeiros, an anonymous referee, and participants in the in-house Financial Policy Division Management seminar for comments.

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*** Central Bank of Chile.

[1]/ International Monetary Fund (2005).

[2]/ See Chan-Lau (2006) for a discussion of microeconomic approaches.

claims method is a generalization of option pricing theory (Black-Scholes, 1973; Merton, 1974), which develops a general framework for analyzing and pricing every contingent claim or liability in an economic unit. Its application allows us to obtain measures of the distance-to-default, the probability of default, the credit risk premium, and other financial risk indicators for an agent or group of agents. These are estimated by comparing the economic value of their assets, given by the value and volatility of their debt and equity, and the contractual value of their liabilities.

Contingent claims analysis is based on three simple principles:

- the economic value of debt obligations and equity is derived from and is equal to the economic value of assets (unobservable).
- debt and equity have different degrees of subordination or priority and, therefore, different degrees of risk.
- there is a stochastic component in the temporal evolution of the value of assets (stemming from price variations and volatility, shocks to market variables, etc.) and, therefore, of debt and equity.

The approach uses the analogy between:

- an underlying financial (contingent) guarantee and a put option, and
- a residual (contingent) claim and a call option, to price equity. This is based on the idea that the market price of an entity's assets is equal to the sum of the market price of the contingent (or implicit options) of the owners of equity and creditors, respectively, on the underlying price of their assets, which has a stochastic component. Thus the market price of the assets is equal to the market price of their risky debt and equity, which incorporates the price of the underlying options.

Given that market prices represent the collective forecasts and projections of many investors, contingent claims analysis is prospective, in contrast to analyses based on historical financial reports. The ability to incorporate market information, which is constantly adjusted, is important in the pricing of an entity's assets, for two main reason: first, the speed of change in economic and financial conditions is much greater than the frequency of the available historical information from financial statements; second, the contingent claims approach explicitly considers the volatility of assets in monitoring and evaluating default risk. Asset volatility is central in this process, since two entities with a similar capital structure (book value of debt and equity) can have very different probabilities of default if the underling volatility of their asset prices is different.

Contingent claims analysis also has some limitations, which are mainly related to the markets' capacity to correctly assess risks.[3]/

First, market prices can reflect changes in conditions that might not be related to financial stability. For example, market price increases that are reflected in a higher distance-to-default (lower default risk) could be due to abundant liquidity, market overreactions to good news, herd behavior, or a different risk assessment than that of the authorities (due to the opaqueness of banks), more than to improvements in fundamentals.

Another disadvantage is that measures of the distance-to-default and the default probability do not adequately capture very short-term financial risks, since they do not allow discontinuities in asset prices, and an agent's debt level is assumed to be constant.

Finally, resorting to ad hoc methods of aggregating data from different agents can lead to mismeasurement of systemic risk, by averaging differences between the agents' capital structure and, implicitly, assuming that the measures of different agents' risks are not correlated. Consequently, the methodology should be used as a complement to the regular analysis of the risks for banks' financial stability.

In addition, while contingent claims analysis is a conceptually robust tool for monitoring financial risks in general and credit risk in particular, its data requirements are high. Furthermore, it is computationally complex to implement, mainly due to the difficulties of splicing and integrating diverse data from multiple sources.

Nevertheless, indicators based on the behavior of market prices have proved to be good predictors of financial stress, risk ratings, and several credit risk indicators.[4]/ Numerous studies show that the model is robust, since it correctly reflects and anticipates the behavior of other measures of the financial fragility of banks, such as risk ratings and various indicators of portfolio quality.[5]/

Moreover, the results satisfy several of the supervisory authorities' needs, since the model enables the evaluation and monitoring of a variety of risks, including interbank contagion, default, illiquidity in both national and foreign currency, and a range of macroeconomic and financial risks. The model also has robust microeconomic foundations and allows analyzing heterogeneous agents and their contingent ties with other agents and sectors, so it is a very good complement to the monitoring of systemic risk.

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[3]/ Persson and Blavarg (2003).

[4]/ Tudela and Young (2003), as well as Gropp, Vesala, and Bulpes (2001), find that the distance-to-default measure anticipates changes in the risk ratings of banks in Europe.

[5]/ See Chan-Lau and Gravelle (2005); Chan-Lau *et al.* (2004).

II.1 Measuring distance-to-default

In contingent claims analysis, equity is understood as a subordinate (or junior) claim whose value is derived from the residual value of the firm once all priority (debt) claims have been met. Thus an entity's equity owners implicitly have a call option on the residual value of the entity's total assets. The economic value of this call option fluctuates with the market prices and volatility of the entity's equity.

Debt is a priority (senior) claim on asset value, but it is risky because the entity's asset value may be insufficient to cover promised payments. The economic value of the debt is thus equal to its risk-free value (or the present value of promised payments), less the expected loss in the event that the asset value falls below the value of promised payments, which is called the default barrier.

This expected loss is generated when the asset value falls beloww the default barrier debt, since the owners have an incentive to declare bankruptcy and turn over the remaining assets to the creditors for liquidation. Creditors are owed the full value of debt but are exposed to the expected loss, with can be modeled as an implicit put option. In the event the assets fall bellow the distress barrier the creditors would pay out the value of the put option to the equity holders and receive the assets of the defaulted entity. So the net position of the creditors is to receive the default-free value of the debt, but have losses equal to the implicit put option. The value of this implicit guarantee or expected loss is equivalent to the value of an implicit put option on the debtor's assets, whose strike price is given by the default barrier and whose value fluctuates according to the market value and volatility of the asset value.[6]/

As the underlying asset value moves closer to the default barrier, the value of the creditors' implicit put option (implicit guarantee) increases, and the value of the risky debt falls. At the same time, the value of the equity owners' implicit call option (contingent claim) on the assets also falls. The result is that the market value of the assets approaches the default. Thus, using contingent claims analysis to monitor this proximity —that is, the distance-to-default— is especially useful for monitoring financial stability.

More precisely, the distance-to-default (*DD*) is defined as the difference between the implicit market value of assets and the default barrier, divided by the standard deviation of the implicit market value of assets. It is interpreted as the number of standard deviations at which the implicit asset level, at market value, is away from the default barrier, given the value and volatility of equity, the default barrier, the risk free interest rate, and the horizon period. The *DD* thus combines, in a single indicator, the difference between the market value of assets (*A*) at the horizon period and the default barrier (*DB*), with the volatility of the market value of assets (σ_A):

$$DD = \frac{A - DB}{A^* \sigma_A}$$

This formula can also be used to estimate the default probability. This involves establishing the relationship between the calculated DD and the associated probability under the assumption that the DD has a standard normal distribution.

III. Methodology and assumptions for analyzing banks

The selected private banks represent approximately half of the system's assets and total loans in the period (table 1).

Table 1

Share of selected banks in industry totals
(millions of pesos)

	1998			2002			2006 (*)		
	System	Group	%	System	Group	%	System	Group	%
Number of banks	31	4	13	26	3	12	24	3	13
Assets	32,656	15,103	46	45,016	22,877	51	69,331	33,696	49
Basic capital	2,553	1,073	42	3,558	1,626	46	4,743	2,033	43
Stock market capitalization	1,758	1,387	79	5,227	4,285	82	9,105	7,578	83
Total loans	24,398	11,646	48	31,675	16,896	53	48,874	25,832	53
Checking accounts	3,146	1,612	51	4,842	2,812	58	7,097	4,156	59
Subordinate bonds	693	447	64	1,197	835	70	1,670	1,053	63
Senior bonds	243	178	73	556	370	66	1,460	1,005	69

(*) As of June 2006.

Source: Central Bank of Chile.

These banks display strong similarity, which is reflected in a high correlation between their assets and equity. This suggests that the analysis of their financial risks may provide a good approximation to the analysis of systemic financial risk.

Assets, liabilities, and equity

To obtain the market value of the banks' assets, which is unobservable, we take the market value of their equity and the book value of total debt liabilities (which is very close to market value in normal times, given the regulatory requirements). The banks' debt liabilities include demand deposits, bank loans in foreign currency (short and long term), time deposits, senior or ordinary bonds, and subordinate commercial bonds such as those issued by the Central Bank.

Equity has a higher degree of subordination (residual) in bank capital structure. To implement the model, we use daily stock price data for each of the selected banks to get the daily market capitalization and default barrier.

Asset value is inferred from the annualized volatility of the banks' market capitalization and default barrier.

[6]/ Merton (1974); Chacko *et al*. (2006).

Default barrier

The default barrier is defined as the risk-free accounting value of the banks' debt liabilities.[7]/ When interpreting the default barrier and the distance-to-default as a measure of bank default risk, some considerations that distinguish banks from nonfinancial firms should be taken into account. First, the risk associated with a given leverage level is different for banks and firms. Second, the regulatory and supervisory authorities normally initiate corrective actions and interventions long before equity is depleted. Thus, from the regulatory perspective, a bank's total debt liabilities is not the only breakpoint that is relevant to the problem of default, and in practice there are several distress barriers that can reflect financial problems in banks.

IV. Assessing the default risk of the banking system

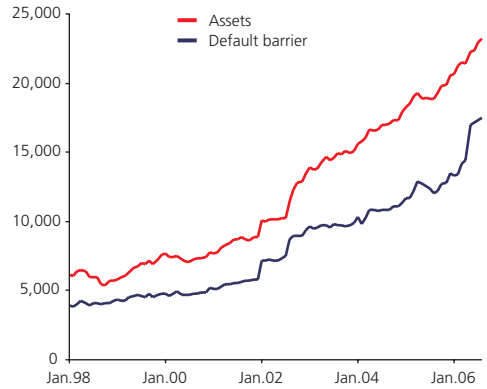
IV.1 Results

The results show that, except in specific periods, the nominal amount of the distance between the asset value and the default barrier of the three largest private banks has increased over time (figure 1).

Figure 1

Average distance-to-default (*)

(millions of April 2006 pesos)



(*) Measures the value of assets and the value of the default barrier of the three largest banks in the system.

Source: Central Bank of Chile.

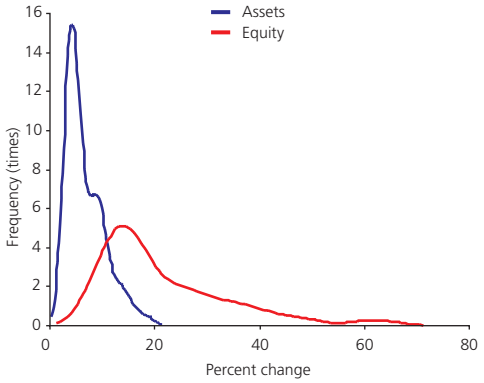
At market value, the banks' assets display much less volatility than their equity.[8]/ The average percent change in the level of assets in the period is approximately 5%, while that of equity is 15% (figure 2). This result is explained by the banks' leverage.[9]/

The market volatility of assets and equity adequately reflects moments of stress in the macrofinancial environment in which the banks were operating in the period (figure 3). It clearly increases in the turbulent periods identified, especially between 1998 and 1999, which includes the Russian crisis and the Long-Term Capital Management (LTCM) crisis, and in 2002 with the devaluation of the Brazilian real.

Figure 2

Average distribution of the change in assets and equity, January 1998 to April 2006

(percent, times)

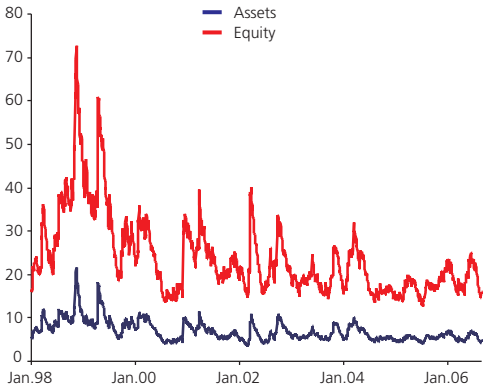


Source: Central Bank of Chile.

Figure 3

Market volatility of assets and equity

(percent)



Source: Central Bank of Chile.

[7]/ We use the value of the banks' total liabilities, adjusted for liquidity, to calculate the default point, in order to compare the results with similar studies for other banking systems. Alternatively, we could use the level of liabilities associated with the regulatory limits on capital adequacy to calculate a regulatory point, or the fraction of short-term liabilities to calculate a liquidity point, or foreign-currency-denominated liabilities to calculate a foreign-currency liquidity point.

[8]/ Asset volatility is a nonlinear function of the volatility of liabilities and equity and of the correlation between them.

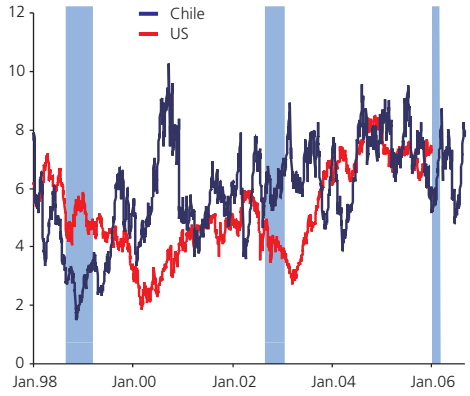
[9]/ This result is exactly opposite to the evolution of the accounting value of assets and equity. In this case, equity normally remains relatively stable during the year, and assets are more variable.

The results also show that the financial strength of these three banks, measured through the distance-to-default, is at comparable levels to other banking systems in advanced economies. The three banks fluctuated between 2 and 10 standard deviations in the period, while the United States, for example, fluctuated between 2 and 8 standard deviations and the European banking system average ranged between 6 and 9 standard deviations (figure 4)[10]/.

In particular, this measure reflects to a surprising extent the effect that periods of financial stress in international markets can have on the banks' financial strength. For example, the weighted average of the distance-to-default fell sharply in the months surrounding the Russian and LTCM crises in 1998 and the devaluation of the real in 2002. Finally, the distance-to-default of the three banks fluctuated moderately in the recent episode of high volatility in the international financial markets in May and June 2006 (figure 4).

Figure 4

Distance to default (*)
(standard deviation)



(*) Each bank's distance to default, weighted by the share of its assets in the system total.

Sources: Central Bank of Chile, and IMF.

IV.2 Consistency and robustness of the results

The results show that the distance-to-default estimates for these three banks leads the behavior of several traditional credit risk indicators by two to three quarters (table 2). Thus, an increase in the distance-to-default in one quarter is highly correlated with reductions in loan loss provisions, the stock of provisions, and nonperforming loan portfolio indices in the next two quarters. These correlations are statistically significant and range between –0.31 and –0.46 one quarter after the increase in the distance-to-default and between–0.37 and –0.51 two quarters after the increase. We also estimate the correlation between these indicators and the default probability. The results (not reported here) are similar but have a lower statistical significance.

Table 2

Correlation between provisions and nonperforming loans and the distance to default, January 1998 to April 2006 (*)

	Corr(-9)	Corr(-6)	Corr(-3)	Corr(0)	Corr(3)	Corr(6)	Corr(9)
Total loan loss provisions	**0.40**	**0.28**	0.12	-0.07	**-0.31**	**-0.43**	**-0.41**
Commercial loan loss provisions	**0.46**	**0.32**	0.08	-0.15	**-0.41**	**-0.51**	**-0.47**
Stock of total provisions	**0.33**	**0.26**	0.12	-0.07	**-0.32**	**-0.37**	**-0.27**
Stock of commercial loan provisions	**0.39**	**0.32**	0.13	-0.09	**-0.38**	**-0.48**	**-0.38**
Total nonpeforming loans index	**0.34**	**0.22**	-0.02	**-0.25**	**-0.46**	**-0.40**	-0.13
Commercial nonpeforming loans index	**0.45**	**0.31**	0.08	-0.17	**-0.38**	**-0.38**	-0.16

(*) Correlation between the distance to insolvency in the current period and the future value (in months) of the nonperforming quality variable. Values that are significant at 95% are in bold.

Source: Central Bank of Chile.

V. Conclusions

The model developed in this article is focused on identifying and evaluating the evolution of default risk in the three largest private banks in Chile. The results show that their financial strength, measured as the distance-to-default, has been situated at comparable levels to other banking systems in advanced economies. The estimated distance-to-default and default probability measures adequately reflect, in a timely fashion, the various financial stress events that the banks faced in the period of analysis. The high and expected correlation with several credit risk indicators, such as the nonperforming loan portfolio and provisions, also confirms the robustness of these measures.

[10]/ European Central Bank (2006); International Monetary Fund (2006).

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Methodological appendix

Calculating the distance-to-default

Following Gapen et al. (2005), we calculate the distance-to-default by calculating d_2, defined according to the Black-Scholes formula for option pricing, where:

$$d_1 = \frac{\ln(A/K) + (r + \sigma_A^2/2)T}{\sigma_A\sqrt{T}}$$

$$d_2 = d_1 - \sigma_A\sqrt{T}$$

The direct use of the Black-Scholes formula provides the market value of equity (E). In our study, we implicitly calculate asset value (A) taking as given the value and volatility of equity. For the equity value we use the market value of the analyzed institution's stock market capitalization. To carry out this calculation, however, we need an additional equation.

We therefore use a second equation as proposed by Merton (1974), which relates the volatility of assets with the volatility of equity:

$$E = \frac{\sigma_A}{\sigma_E} A \cdot N(d_1)$$

Both equations define a system of nonlinear equations, which, in our case, we solve numerically.

A: is the economic value of assets at time zero. This value is unobservable, but we derive it implicitly from the market value of equity using the two equations above.

K: is the strike price of the implicit put option. In the contingent claims approach, it corresponds to the default barrier (DB), or the point at which losses would be generated for creditors of risky debt.

σ_A: is asset volatility. This variable is also unobservable, but it is inferred from the volatility of equity and asset value using the two equations above.

r: is the nominal one-year risk free interest rate, which in this study is assumed to be fixed and equal to 6% for the whole period.[11]/ This assumption may be important, because interest rates fell between 1998 and 2006. Given that the interest rate today is less than 6%, this implies that the distance-to-default today would be even greater than what we report in this study, since the present value of assets would also be greater.

T: is the time horizon for the option calculation, or rather the horizon over which the default probability is calculated. In this case, it was held fixed for all periods and equal to one year.

Calculating the volatility of equity

The volatility of equity (σ_E) is calculated based on a moving average with exponential decay of the daily returns of a stock market capitalization time series, in nominal terms.[12]/

Use of nominal series

We use nominal time series for stock prices, equity, liabilities, and the default barrier. This is the standard procedure in the literature. Alternatively, we could have used real series, but, on one hand, the results would have lost comparability with other studies, and, on the other, we would have introduced a source of volatility that is not relevant for the evaluation in each moment of the distance-to-default. In any case, in the period under study, the twelve-month inflation rate fluctuated around 3%, and it was relatively constant with a maximum close to 4.1% and a minimum around –0.7%.

[11]/ Alternatively, a different interest rate could have been used for each period, but the literature does not have a clear definition in that respect. Furthermore, this could be an extra source of volatility in the distance-to-default, which we prefer to omit in this exercise.

[12]/ This is a simplification of a GARCH (1,1) model for calculating volatility.

Financial position and vulnerability of Chilean households*

Authors: Paulo Cox**, Eric Parrado***, and Jaime Ruiz-Tagle V.***

I. Introduction

Over the past decade, the rate of indebtedness of Chilean households has far surpassed the growth of household income. Total household debt currently averages 58% of disposable income, which is far greater than the 30% registered at the end of 2001. The rapid accumulation of debt raises questions about how sustainable this indebtedness really is.

The increased financial exposure of households could have an impact on financial stability if a significant number of households have a difficult time paying off credit. To assess this situation, we need to analyze the financial position of households and the financial burden associated with their levels of indebtedness and income.

Until now, the indebtedness of Chilean households and its impact on financial stability have been studied using aggregate information. This type of analysis, however, may conceal financial stress in some households. Therefore, this article complements the aggregate analysis by conducting a study that focuses on information about debts, assets, and income at the individual household level, using the recent Social Protection Survey (*Encuesta de Protección Social*, *EPS*).[1/][2/] The study has produced a series of interesting results. One noteworthy conclusion is that the sector's debt, assets, and income are concentrated in a relatively small share of households. In general, the heads of these households are young, highly educated adults who have formal work contracts. Another conclusion is that most households have low levels of financial vulnerability, as they have assets and income that back their debts. Only 4% of households exhibit negative net wealth —that is, debt greater than assets— and a relatively high financial burden. This group holds 9% of the total debt.

II. Growth of household debt

Chilean household debt has grown significantly over the past decade. Banking debt —the main component of household debt— rose to 23% of GDP in 2005, up from 15% in 1996. Over the last three years, household indebtedness continued to be dynamic, with annual growth rates near 20%. The growth of banking debt has been accompanied by a significant increase in loans from non-banking institutions, which rose from 3% of GDP in 2001 to 8% in 2005.

The considerable growth of household debt has increased the financial system's exposure to this sector. Households currently receive one-third of all banking loans, whereas in the 1990s they only received 15%. This phenomenon reflects sustained increases in both mortgage and nonmortgage debt.

The notable growth of debt has been sustained by a series of factors that have favored credit conditions for households. Disposable income has grown strongly in recent years, while interest rates have dropped to historically low levels in both real and nominal terms. This scenario is coupled with an extended cycle of macroeconomic stability that has not been experienced in decades.

The growth of household debt also has its foundation in labor market conditions, which have demonstrated a favorable evolution over the period. For example, female labor participation has increased significantly, which has contributed to both raising household income and diversifying the risk associated with income from working at home. At the same time, job formality has reduced employment insecurity and assured better conditions for indebtedness. Similarly, an

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1/ The EPS was created by an alliance between the Undersecretariat for Social Security (of the Ministry of Labor and Social Security) and the universities of Chile and Pennsylvania. The EPS was carried out for the first time in 2002 and then, in its second version, in late 2004 and early 2005.

2/ This type of microeconomic analysis has become standard practice in central banks of industrialized countries that monitor threats to financial stability. For example, Tudela and Young (2003) and Barwell, May, and Pezzini (2006) conduct a similar analysis for the United Kingdom; Bucks, Kennickell, and Moore (2006) analyze the United States; and Johansson and Persson (2006) examine the Swedish case.

increase in the payroll, combined with a decrease in population growth and household size, has led to more favorable conditions for contracting debt.

More active capital markets have also been considered a key factor in the expansion of credit to households. This development reflects businesses' capacity to contract debt through bonds or other financial instruments, which has led banks to concentrate on loans to niches of small-scale debtors.

III. Financial position of households

This analysis uses the recent Social Protection Survey (EPS), which in its latest version included a financial section consisting of questions aimed at estimating the assets and liabilities of households.[3]/ The most recent EPS compiled information from 16,727 respondents, who represent a cross-section of the national population 18 years and older.

All the information gathered in the survey is self-reported, which means there are potential biases stemming from the nondeclaration or underdeclaration of income, debt, and possession and valuation of assets. The methodology used to construct total household income is similar to that used in the *Casen* survey.[4]/

Debt is categorized as mortgage and nonmortgage. If no information is available on the exact amount of debt, the mortgage is calculated using data on dividends, average interest rates, and number of residual periods. Nonmortgage debt includes bank credit cards, bank overdrafts, retail debts, consumer loans from banks, loans from financial institutions, car loans, loans from social institutions, and school loans. All these debts are combined under the category "amount owed," so there is no direct information about the financial cost involved.

Assets are classified as real estate and nonreal estate. Real estate assets are the self-reported value of the property (or properties) owned by the household. Nonreal estate assets include financial assets (savings accounts in banks and pension funds, fixed-term deposits, stocks and bonds, investment funds, and others), automobiles (self-reported value of all motorized vehicles owned by the household), and other capital assets like machinery, land, livestock, and others.[5]/

What follows is an analysis of the financial situation of households, broken down by income, age, and employment vulnerability. The purpose of these categories is to measure a household's capacity to cover its debts in the present and the future, and thus to analyze its financial fragility.

III.1 Debt by income quintile

More than half of Chilean households report having some kind of formal debt. Only 16% of total households reports having a mortgage debt, while 50% reports having some kind of nonmortgage debt. Total debt is mainly mortgage debt (64%). This pattern is similar in all income quintiles except the lowest, in which mortgage and nonmortgage debt are similar.

Total household debt is concentrated in the higher income quintiles. The highest quintile holds 57% of total debt, while the lowest quintile holds only 5%. In disaggregate terms, mortgage debt is more concentrated than nonmortgage debt: the wealthiest quintile has 61% and 49% of mortgage and nonmortgage debt, respectively, while the lowest income quintile only has 4% of mortgage debt and 8% of nonmortgage debt (figure 1).

Figure 1

Debt by household income quintile
(percent of corresponding debt)

Source: Authors' calculations, based on data from the 2004 EPS.

On average, households with some kind of debt have a debt-to-income ratio (DIR) of 40%. The quintiles on both extremes have a higher DIR. The average mortgage DIR is 26% of annual income and is similar in all quintiles except the highest, where the average is 32%. The nonmortgage DIR is 17% of annual income, on average, and only the lowest income quintile has a significantly higher percentage (figure 2).

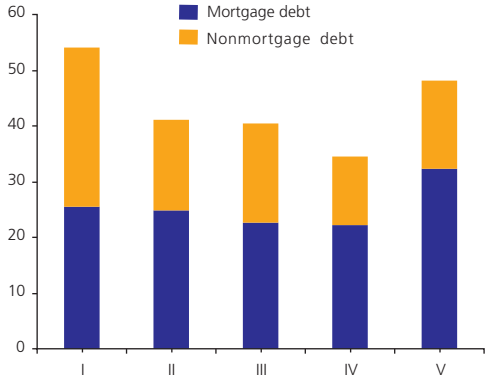
[3]/ The original data can be found at www.proteccionsocial.cl.

[4]/ In the case of the EPS, income figures are not assimilated into the national accounts, and imputations are not made for nondeclaration. For the *Casen* survey, these two measures are taken.

[5]/ See Bover (2004) for a review of the methodologies used for collecting financial information in household surveys.

Figure 2

Debt-to-income ratio, by household income quintile
(households with debt; percent)



Source: Authors' calculations, based on data from the 2004 EPS.

Figure 3

Assets by household income quintile
(percent of corresponding asset)

Source: Authors' calculations, based on data from the 2004 EPS.

III.2 Assets by income quintile

As a counterpart to debt, most households (84%) hold some kind of asset. In all of the income quintiles, more than two-thirds of households own real estate, while 40% of households own nonreal estate assets.

Like debt, assets are concentrated in the higher income quintiles, although the distribution of assets is more even among income quintiles. The concentration of assets is 43% in the wealthiest quintile, while the share of assets held by the two lowest income quintiles (I and II) is 10 and 13%, respectively (figure 3).

The most significant asset owned by households is real estate, particularly the home in which they live. Real estate assets account for 88% of households' total assets.[6]/ In this case, the high rate of ownership of subsidized housing tends to reduce the concentration of assets.[7]/ The highest income quintile holds 40% of real estate assets, while the poorest quintile holds 11%.

Some households also hold nonreal estate assets, but these represent a very small share of total assets.[8]/ Financial assets listed by survey respondents constitute 3% of total assets. The concentration of nonreal estate assets in the wealthier quintiles is high, representing more than 75% in quintiles IV and V together.

Two aspects of the distribution of debt and assets are worth mentioning. First, the high concentration of debt in the higher income quintiles is backed by a high concentration of assets in the same quintiles. Second, the level of household indebtedness measured as a proportion of income does not display any major differences that would imply significant levels of financial stress in any given income quintile. These two partial aspects suggest that the degree of indebtedness is adequate and proportional to the income level.

III.3 Debt and assets by age and job vulnerability

From the perspective of financial stability, individuals with a longer horizon of future income should be able to sustain a heavier financial burden. Similarly, and given the fact that household income essentially comes from labor income, households with higher human capital and higher employment formality should have more stable income and thus should be in a stronger financial position to deal with their credit commitments.

According to the EPS, most of the debt is concentrated in households between 35 and 54 years old[9]/ (63% of total debt and 66% of mortgage debt). However, nonmortgage debt is held by older age groups (individuals between the ages of 55 and 64), which account for 20% of this type of debt (figure 4). Although the debt-to-income ratios vary from one age group to the next, no age group has a particularly high DIR.

Total assets are very much concentrated in mature or senior age groups, mainly because of real estate ownership. The distribution of nonreal estate assets is more even across all age groups. Between 30 and 40% of households in all age groups owns this type of asset (figure 4).

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[6]/ Assets do not include pension savings or human capital valuation.

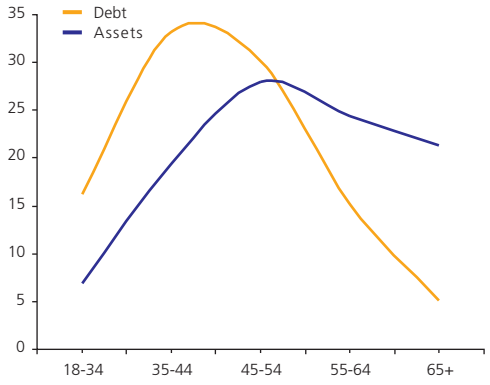
[7]/ According to the 2003 *Casen* survey, 43.3% of households that own the home in which they live have been beneficiaries of a state housing program.

[8]/ The low rate of financial asset ownership may be due to problems of underdeclaration or nondeclaration. To address these problems, financial household surveys —like the ones carried out in Spain, the United States, and the United Kingdom— include an over-representation of the higher income quintiles. The EPS does not make this type of adjustment.

[9]/ Households are classified according to the head of household's age.

Figure 4

Debt and assets, by age bracket
(percent of debt and assets)



Source: Authors' calculations, based on data from the 2004 EPS.

There is a greater share of indebted households among households with a job contract (71%), which reflects both demand and supply effects from more stable income. One-third of total debt is concentrated in the group with tertiary education and a job contract, and one-third is concentrated in households with secondary education and a job contract (table 1). Assets, in turn, are highly concentrated in households with a job contract and in inactive households headed by a senior citizen who no longer participates in the labor market.

Table 1

Debt and assets, by job formality and education
(percent of debt and assets)

	Without formal job contract		With formal job contract		Inactive		Total	
	Debt	Assets	Debt	Assets	Debt	Assets	Debt	Assets
Secondary education or lower	15	22	33	27			48	50
Higher education	9	8	34	17			43	25
Total	24	31	66	44	9	25	100	100

Source: Authors' calculations, based on data from the 2004 EPS.

This analysis demonstrates that the households with the greatest share of debt are those that have the lowest employment vulnerability and the highest level of asset ownership. This indicates that the financial fragility of these households is relatively low.

IV. Net wealth of households

Net wealth determines whether households' assets are sufficient to pay off their debts, allowing to assess the financial strength of households. Thus, mortgage debt is potentially balanced out by the value of the property. Debts undertaken to purchase automobiles, machinery, or other vehicles can be backed by the value of these assets. Consequently, negative net wealth generally originates from consumer debt or from changes in the valuation of assets when there is a guarantee.

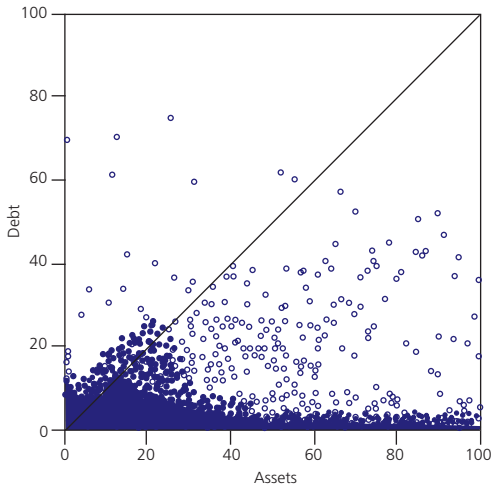
According to the EPS, the majority of households (80%) have positive net wealth, meaning that its assets are greater than its liabilities. Only 11% of households has negative net wealth and is therefore in a weaker financial situation. The remaining households have neither debts nor assets. Most of the debtors with negative net wealth have a relatively small debt and few assets (figure 5). Among the different income quintiles, at least three-quarters of households have positive net wealth, and no more than 12% has negative net wealth.

The households with negative net wealth hold 18% of the total debt. As stated above, however, most households own the property in which they live. This means that the households with negative net wealth tend to be those with high levels of nonmortgage debt.

In addition, the households with net negative wealth are distributed homogeneously among quintiles. They are generally younger and are not particularly concentrated in groups with high employment instability.

Figure 5

Debt and assets, by household
(millions of pesos)



Source: Authors' calculations, based on data from the 2004 EPS.

V. Financial burden and vulnerability of households

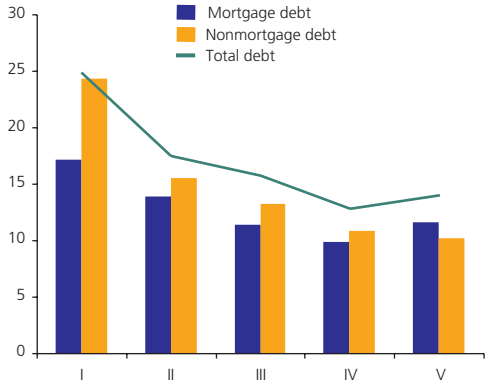
Although household debt seems to be balanced in relation to income, the financial burden is the most direct way to measure a household's payment capacity.[10]/

There are no questions in the EPS that directly measure a household's financial burden, so it must be estimated using a series of assumptions about interest rates and the residual terms of different kinds of loans. To do this, we used aggregate information on interest rates and average residual terms.[11]/

Estimates indicate that half of all households have a financial burden as a share of income (service-to-income ratio) of less than 16%.[12]/ Financial burden indicators are lower among the higher income quintiles than in lower income groups. Considering that debt is highly concentrated in the wealthiest quintile, the fact that this quintile has a median service-to-income ratio of 14% implies just a minor impact on financial stability (figure 6).

Figure 6

Ratio of financial burden to income, by household income quintile (households with debt; median percent *)



(*) Only households with mortgage debt are considered in the calculation of the median ratio of financial burden to income of mortgage debt. The financial burden ratio of nonmortgage debt is similarly calculated.

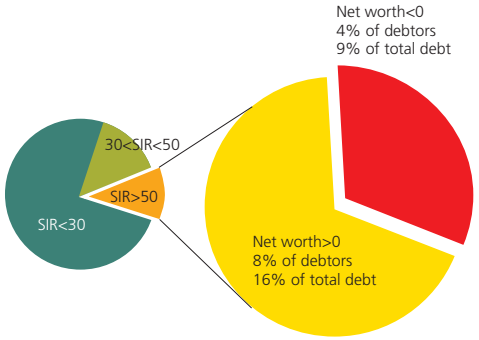
Source: Authors' calculations, based on data from the 2004 EPS.

A more detailed analysis of the data shows that three-quarters of all households have a service-to-income ratio (SIR) below 31%, and only one in ten has an indicator higher than 57%. This last group could be considered highly vulnerable, since it also holds 13% of total mortgage debt and 40% of nonmortgage debt.

In a situation of extreme financial stress, households that have greater difficulty meeting their debt service could liquidate their assets, so net worth is a key element for evaluating financial fragility. Households with a service-to-income ratio of more than 50% and negative net wealth represent only 4% of total household debtors, but they hold 9% of total debt (figure 7).

Figure 7

At-risk debt



Source: Authors' calculations, based on data from the 2004 EPS.

VI. Conclusions

An individual household analysis helps determine their degree of indebtedness and indicates how vulnerable the sector is to unfavorable macroeconomic and financial scenarios. This article shows that the microeconomic diagnosis is consistent with the aggregate analysis of vulnerability, by concluding that the households sector has not become a source of systemic risk to financial stability.

While more than half of all households have some type of debt, total debt is mainly composed of mortgages and is concentrated in the higher income quintiles. Relatively young households, with formal job contracts and a high level of education, hold the biggest share of debt. This indicates that debt is mainly in the hands of households with high levels of current income and high levels of expected future income. Only a small fraction of households is considered particularly vulnerable in financial terms, although this group's at-risk debt is significantly lower.

The above evidence makes it possible to conclude that most Chilean households are sufficiently sound financially to meet their debt service.

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[10]/ Financial burden is the sum of amortization and interest payments on debts over a specified period.

[11]/ Average residual terms were adjusted so as not to overestimate the residual term of those who are finishing paying off their debts or to underestimate the average term of those who are just starting to make payments. For more detail, see Cox, Parrado, and Ruiz-Tagle (2006).

[12]/ This figure compares with 14% in the US, while three-quarters of the population of the United Kingdom has a service-to-income ratio (SIR) below 25%, and Spain has a median service-to-income ratio of 18% considering only mortgage debt.

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Currency mismatch in the Chilean banking system*

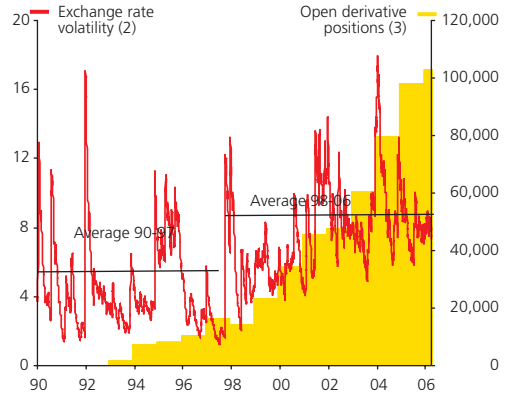
Authors: Luis Figueroa** and Alejandro Jara**

I. Introduction

A potential source of systemic risk stems from the currency risk that banks face. The combination of unexpected changes in currency parities and mismatches in foreign currency can generate significant losses and deteriorate the equity solvency position of these institutions.

Figure 1

Exchange rate volatility and derivatives
(percent, US$ million) (1)



(1) Average exchange rate 1996–2006.
(2) Annualized standard deviation (GARCH (1,1)).
(3) Sum of the notional value of bank derivative assets and liabilities.

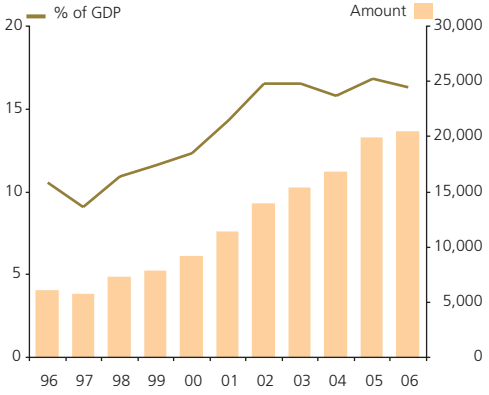
Source: Central Bank of Chile.

In practice, direct foreign currency (FX) risk is measured based on the variability of the exchange rate and the effective mismatches or net exposure between foreign-currency-denominated assets and liabilities. In Chile, the average exchange rate volatility rose beginning in 1999 as a result of several structural factors, thus increasing the potential risk that the banking system faces.[1]/ Consequently, market agents have increasingly incorporated the use of exchange derivatives as part of their risk management strategy. The open position in bank derivatives has grown steadily since their authorization in 1993, particularly in periods of higher exchange rate volatility (figure 1).

At the same time, total bank financing in FX (deposits, external lines of credit, and so forth) has increased steadily following these changes and is currently situated at around 16% of gross domestic product (GDP) (figure 2).

Figure 2

Bank liabilities in foreign currency
(percent of GDP, US$ million) (*)



(*) Average exchange rate 1996–2006

Sources: SBIF; Central Bank of Chile.

In this context, it is legitimate to ask how an environment of higher exchange rate volatility and a growing increase in foreign exchange volumes has affected the banking system's exchange rate risk.

Historically, the direct exchange rate risk of Chilean banks has been low, measured in relation to capital. Even before the 1982 crisis, the main source of foreign currency exposure was not in the banking system (Cowan and De Gregorio, 2005).

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* The opinions expressed are the exclusive responsibility of the authors and do not necessarily represent the opinions of the Central Bank of Chile or its Board. We thank Luis Ahumada, Kevin Cowan, Pablo García, Sergio Huerta, José Matus, Sergio Rodríguez, and an anonymous referee for valuable comments.

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[1]/ Some of the factors that explain this higher volatility are the adoption of a flexible exchange rate regime and the increased volatility of currency parities seen in international markets.

Nevertheless, the risks to the banking system generated by exchange rate fluctuations originate not only in direct mismatches, but also in counterparty risk, liquidity risk, and risks stemming from the mismatches of banking clients (individuals and firms), whose materialization could come back to the banking system in the form of credit risk.

This paper describes the origin of currency mismatches in the local banking system and the differences among banking institutions. The following section presents the sources of mismatch and their evolution before and after exchange liberalization. Section III focuses on aspects related to the banks' counterparties in the derivatives market, and the last two sections explores the implications for currency risk management and draws conclusions.

II. Evolution of the banks' foreign currency exposure

Given its nature as a financial intermediary, the sources of the banking system's currency exposure lie in both their assets and liabilities. FX assets are made up primarily of loans, cash and due from banks, and investments in debt instruments, while the main sources of FX bank financing correspond to external lines of credit, deposits, and loans in foreign currency. In addition, banks act as a counterparty in the FX derivatives market, and they are equally active in the role of supplier and user of this type of instrument.

Table 1

Breakdown of banks' currency mismatch (*)
(US$ million)

	Assets	Liabilities	Mismatch
Assets	20,210		
Disposable	4,294		
Loans	10,710		
Financial investment	2,454		
Other	2,751		
Liabilities		21,124	
Deposits		7,807	
Lines of credit		6,231	
Bonds		1,091	
Other		5,995	
Gross mismatch			-914
Derivatives (net)			1,402
Long position	46,603		
Short position		45,202	
Net mismatch			
Amount			487
% total assets			0.4
% basic capital			5.8

(*) As of December 2005.

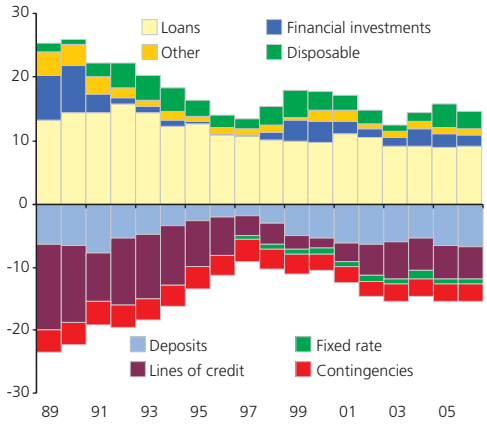
Source: SBIF.

The exposure or net mismatch in foreign currency corresponds to the sum of the gross mismatch (the difference between assets and liabilities in foreign currency) and the net derivatives position.[2]/ Table 1 shows the magnitude of the local banking system's FX assets and liabilities at the end of 2005. Remarkable is the spot FX short position of US$914 million, that is 0.8% of total assets. This position is reversed when the long position in the forward FX market, at 1.2% of total assets, is taken into account. The notional value of derivatives is significant, at over US$90.000 billion between asset and liability positions.

Figure 3 shows the evolution of the banking system's FX assets and liabilities, which reflects the evolution of the system's spot position. The loan component has been remarkably stable, holding its share at around 10% of total assets even in periods in which FX assets have fluctuated significantly.

Figure 3

Bank assets and liabilities in foreign currency, 1989–2006
(percent of total assets)



Source: SBIF.

In the period before 1997, bank liabilities in dollars fell notably, in particular the use of external lines of credit; this coincided with the period in which the nonfinancial corporate sector opted for contracting debt directly with the exterior. The changes in the banking system's exposure to foreign exchange also reflects the industry's decisions with regard to privileging the growth of credit in local currency, as well as the growth registered in consumer credit before 1997 and later in 2000.

The 2001–2002 period was marked by growth in dollar assets and adjustable assets tied to the exchange rate, associated with exchange rate interventions by the Central Bank of Chile. However, the banks compensated this larger gross mismatch with an inverse position in the derivatives market, thereby managing to reduce this exposure.

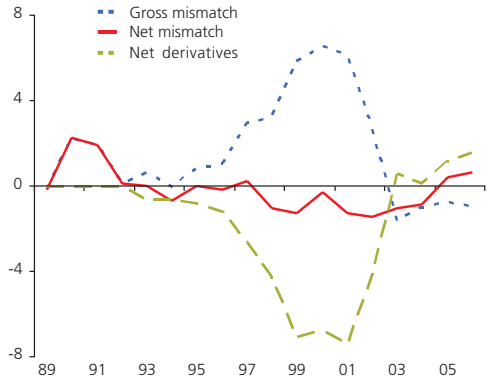
[2]/ The difference between the notional value of foreign currency purchase commitments (long position) and foreign currency sales commitments (short position). Starting in 2006, the accounting treatment of derivatives changes from notional value to reasonable value.

At the aggregate level, the banking system exhibited a net liability exposure for a large part of the 1989–2006 period. Exchange rate depreciations therefore had a negative impact on the banking industry's earnings. Starting in 2005, the net FX exposure shows a reversal, which is explained primarily by the increasing long position in the FX futures market (figure 4).

Figure 4

Net and gross foreign currency exposure of the banking system, 1989–2006

(percent of total assets)



Source: Authors' calculations, based on data from the SBIF.

Disaggregating the FX balance by type of bank reveals, on average, important differences between large banks (multibanks), medium-sized banks, and treasury banks (table 2).[3]/ Treasury banks present a larger relative FX mismatch and a high proportion of derivatives, relative to both their own balance sheets and the rest of the system. This illustrates the predominate role that treasury banks play in the FX market; it contrasts with their low relative share of total deposits and lending, which reflects the nature of their business.[4]/ The rest of the banking system maintains a relatively low level of exposure in both gross and net terms.

The significant mismatch displayed by the treasury banks should be analyzed at the consolidated level, given that the main actors in this market carry out part of their FX operations through related financial companies or their foreign parent companies. Recent developments include the growth of FX deposits in the state-owned bank (*BancoEstado*), in a period in which the Treasury has accumulated significant surpluses.

Table 2 also shows that the mismatch between loans and deposits in foreign currency shrank in all types of banks after exchange rate liberalization. This is contrary to the findings of Arteta (2005), whose study does not find significant evidence of a connection between the application of flexible exchange rate regimes and reductions in the mismatch between loans and deposits.

Table 2

Foreign currency mismatch, by type of bank, 1989–2006

(average percent of total assets)

	Private multibanks		State-owned bank		Medium-sized banks		Treasury banks	
	Pre 99	Post 99	Pre 99	Post 99	Pre 99	Post 99	Pre 99	Post 99
Assets	20	19	13	9	18	18	35	38
Loans	14	11	7	4	13	10	19	12
Financial investment	3	2	2	3	1	2	3	2
Liabilities	19	19	11	8	17	15	27	27
Time deposits	4	6	0	3	4	5	7	10
Lines of credit	8	5	7	2	7	4	10	3
Gross mismatch	1	0	2	0	1	3	8	11
Long position	3	19	2	15	8	26	32	295
Short position	5	19	2	17	10	30	34	305
Net mismatch	3	0	3	3	3	7	10	21

Source: Authors' calculations, based on data from the SBIF.

In general terms, net exposure has remained contained and stable, in a context in which the banking system is increasing its participation in the FX derivatives market. Bank loans have diminished in all types of banking institutions, reducing the need for direct indebtedness through foreign lines of credit. Even with the large increase in derivative operations starting in 2000, no important deviations in the net mismatch have been detected at the individual level.

III. Banks and currency derivatives

While the banking institutions' mismatch (both gross and net) represents a low level in relation to their assets, the absolute volume of derivatives contracts constitutes a significant share of the bank balance sheet. In the last five years, the notional value of the stock of contracts grew over 30% a year, on average, and to date the amount of asset and liability positions surpasses US$50.000 billion, respectively (figure 5).

From the perspective of financial stability, it is important to distinguish the factors that explain the development of the derivatives market,[5]/ together with the risks to the banking system associated with this greater activity.

Some of the most important risks tied to the growth of derivatives are the following: rollover risk, counterparty risk, settlement risk, interest rate risk on derivativesoperations.

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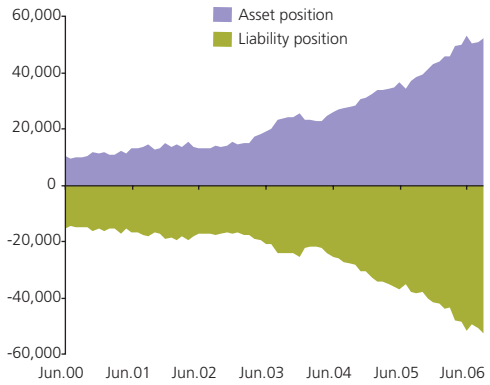
[3]/ Treasury banks are those that do not actively participate in holding third-party resources or in traditional credit lending. This group includes JP Morgan, DeutscheBank, HSBC, Monex, ABN Amro, Tokio-Mitsubishi, and the Banco de la Nación Argentina. Large private banks correspond to Banco Santander-Santiago, BCI, and Banco de Chile. All other banks are medium sized.

[4]/ Total deposits and loans (local and foreign currency) of the treasury banks represent 2 and 1% of the system total, respectively.

[5]/ See Dodd and Griffith-Jones (2006); Ahumada *et al.* (2006).

Figure 5

Bank foreign currency derivatives, 2000–2006
(notional value, US$ million)



Source: Central Bank of Chile.

Rollover risk arises when the term of the contracts differs from the position covered. In this case, in addition to interest rate risk, the bank is exposed to leaving the position open, and it could suffer losses from variations in the exchange rate.[6]/ An example of the need to rollover contracts is found in the forward transactions carried out by the Chilean pension funds, where nearly 50% of the contracts mature within 90 days.

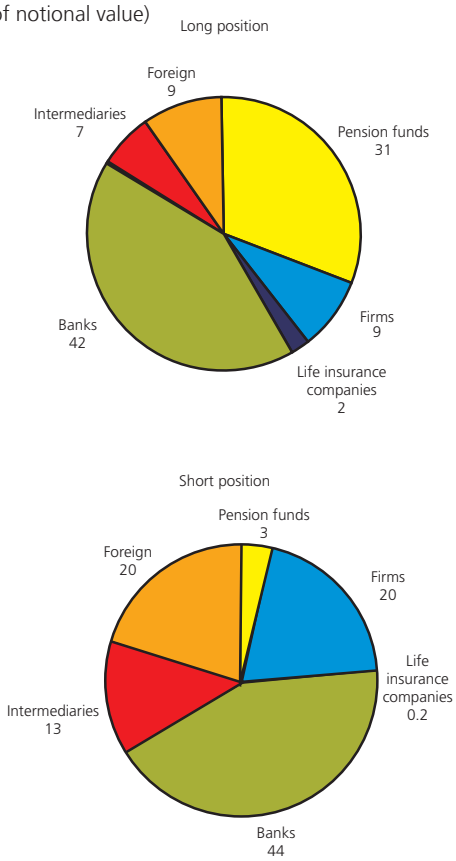
The possibility that some of the parties involved will not comply with the terms established in the contracts highlights the importance of knowing the nature and origin of the derivative counterparties. Figure 6 shows the share of the asset and liability positions of bank derivatives by counterparty. The figure reveals that the main counterparty corresponds to institutional investors and the banks themselves. If we exclude interbank transactions, which differ in nature from the rest of the hedges, the pension funds account for more than half of the banks' long positions.

Fully 80% of interbank operations correspond to FX swaps, whose main objective is to match the banks' own positions. Evidence shows that the mismatch of the majority of banks runs in the same direction and that in general it is offset by the position of the treasury banks.

The pension funds are the most important nonbank financial investors in terms of the volume of derivatives contracts. Their high share of currency hedging is due to the increase in their foreign investments.[7]/ Moreover, the hedging strategy pursued by pension funds in the last five years has been to hedge a stable share (around 15% of their assets), which translates into a constant flow of forward dollar sales (figure 7).[8]/

Figure 6

Counterparty of bank foreign currency derivatives (*)
(percent of notional value)



(*) As of December 2005.

Source: Central Bank of Chile.

Securities dealers and financial investment firms also hold an important place among banks' counterparties in forward operations. The majority of these financial intermediaries are affiliates of foreign banks, whose objective is to channel a large share of the conglomerate's foreign exchange operations.

Nonfinancial firms, in turn, are another important counterparty of the banking system, and, as of December 2005, they displayed a net sales position. However, the existing empirical evidence for Chile shows that in the aggregate, derivatives do not play a significant role in reducing the currency exposure of firms (Cowan *et al.*, 2006).

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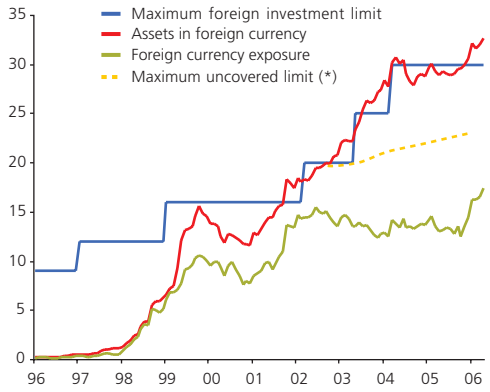
[6]/ The direct consequences of the materialization of this risk could be observed during the Asian crisis in the late 1990s (Allayannis *et al.*, 2003).

[7]/ Any hedging contracted by pension funds must, by regulation, be carried out with local banks when one of the currencies involved in the contract is local (dollar/peso or dollar/UF).

[8]/ A deeper discussion would attempt to determine if the level of hedging/ exposure maintained by pension funds is optimal from the point of view of portfolio management (Walker, 2006).

Figure 7

Net foreign currency exposure of pension funds, 1996–2006
(percent of total assets)



(*) Each fund's limit, weighted by size.

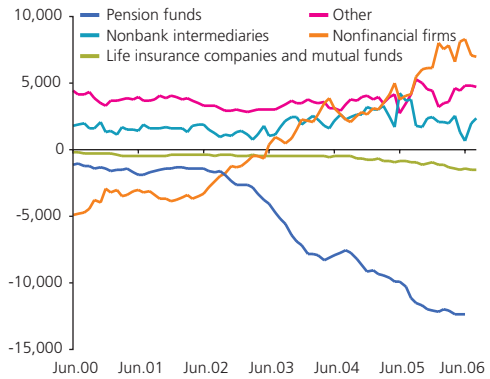
Source: Authors' calculations, based on data from the SAFP.

Other institutional investors have recently expanded their use of derivatives. The life insurance companies, for example, have increased their share of derivatives through the growing use of cross currency swaps. These operations convert dollar flows to UF flows, which allows the companies to seek a higher return on instruments abroad while at the same time complying with regulations on currency matching.[9]/

All of the above reflects the low level of indirect risk that the banking system faces as a result of the significant increase in the absolute level of derivatives in Chile, given that the main counterparties are institutional. In particular, rollover risk is low from the banks' perspective, since the pension funds' behavior is relatively stable and predictable.

Figure 8

Currency derivatives, 2000–2006
(net positions, US$ million)



Source: Central Bank of Chile.

At the local level, there is a certain degree of equilibrium between the positions held by the bank counterparties. The growing long position of agents in the derivatives market is offset by the position of pension funds (figure 8). The banks, however, do not have to match each one of their clients' positions, because they carry out synthetic operations in the spot market that transform currency risk into interest rate risk.

IV. Currency risk management and regulation

The market risk management implemented by local banks must be consistent with both the internal policies defined by the board of directors and the application of provisions established in the banking regulations.

In practice, currency risk management encompasses the daily monitory of the trading book and the monthly monitoring of the banking book. This translates into the application of specific limits on exposure, both in absolute terms and as a percentage of capital.

In Chile, banking regulation has gradually incorporated the main international recommendations and best practices in the area of risk management. Starting in 2005, currency risk, like all market risks, is taken into account in the calculation of capital requirements, in line with the provisions of the Basel Committee.[10]/

The regulation of market risk is founded on giving a more active role to the board of directors through the formulation of internal risk management policies, the establishment of quantitative limits, and the periodic use of stress tests.

The regulatory limits establish the minimum capital levels required to face significant variations in currency parities.[11]/ To calculate currency risk exposure in accordance with the current established framework, banks in Chile obtain their net FX positions for the total balance sheet, based on the sum of the net spot position and the net derivatives position, weighted by a sensitivity factor, which captures extreme movements in the different types of foreign currency.[12]/

[9]/ The net derivatives position of the life insurance companies tripled in the last two years, reaching a value of nearly US$900 million.

[10]/ The current regulations on market risk incorporate the international standards and recommendations contained in the 1996 amendment to the Basel Committee's 1988 Capital Accord and the 2004 recommendations on interest rate risk management and supervision incorporated in the New Capital Accord (Basel II).

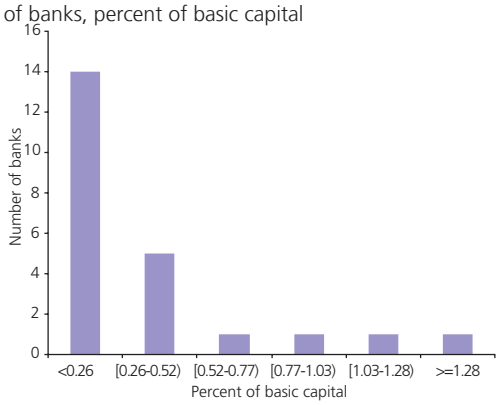
[11]/ In Chile, foreign exchange risk is regulated by article III.B.2. of the Compendium of Financial Regulations (*Compendio de Normas Financieras del Banco Central*).

[12]/ This sensitivity is 8% and 35% depending on the risk rating of the issuing country.

Figure 9 shows the distribution of the currency risk exposure reported by banks, using the methodology mentioned in the last paragraph. As of September 2006, this exposure fluctuated between 0.01 and 2.5% of basic capital, which confirms that banking institutions in Chile maintain a low exposure to currency risk. As shown in the figure, the large majority of banking institutions need a low level of capital to face significant exchange rate fluctuations. The institutions situated at the extreme of the distribution are the treasury banks, whose capital level is greater than the system average.

Figure 9

Distribution of foreign currency risk exposure (*)
(number of banks, percent of basic capital



(*) As of September 2006.

Source: Authors' calculations, based on data from the SBIF.

In addition, the current banking regulatory framework incorporates elements that tend to capture the indirect risks deriving from exchange rate fluctuations. When evaluating credit risk and constituting provisions, banks must explicitly consider the financial risks to which credit users are exposed, particularly risks stemming from currency mismatches.[13]/ Furthermore, the credit risk exposure implicit in asset derivative transactions is taken into account in the calculation of risk-weighted assets, which incorporates the credit equivalent of these operations and forms part of the general capital adequacy requirements.

V. Conclusions

This paper emphasizes the low level of direct currency mismatch in the Chilean banking system. The growing participation of banks in the FX market has been consistent with the strong development of hedging instruments in an environment of greater foreign exchange volatility.

The majority of the operations carried out in the derivatives market are either between banks or between banks and institutional investors. The pension funds are the main nonbank counterpart; this trend is consistent with the strong increase in their foreign investment. This characteristic limits potential rollover and counterparty risks, from the perspective of the banking system.

Treasury banks display the largest mismatches in both gross and net terms. This limits the implications for financial stability, given their relative size and their high level of capitalization.

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[13]/ Chapter 7-10 of the SBIF's *Recopilación Actualizada de Normas*.

Index of tables and figures

Tables

Figures

Tables in the papers

Figures in the papers

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