Financial Stability Report

FIRST HALF 2006

BANCO CENTRAL
DE CHILE

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

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[2/] The closing date for figures included in this *Report* was 15 June 2006.

Foreword

As established in its Basic Constitutional Act, the objectives of the Central Bank of Chile include safeguarding monetary stability and the normal functioning of internal and external payments. These objectives are not fully independent. Monetary stability is one of the basic conditions for the proper functioning of the payment system, which is also related to incentives, regulations and the infrastructure that support the operation of the financial system. To fulfill its objective in this area, the Bank continuously tracks developments in international capital markets and the domestic financial sector, seeking to identify trends that could, in the short or medium term, have an impact on the financial stability of the economy or the functioning of the payment system.

Financial stability refers to the preservation of the fundamental functions of credit and savings intermediation, the provision of payment services, and risk allocation that are performed by the financial institutions and markets. In this area, the design and implementation of adequate policies for financial regulation, supervision, and financial transparency play an important role in strengthening the ability of the economy and its financial system to face disturbances of different origins, both internal and external.

The *Financial Stability Report* covers the analysis of developments in the financial and macroeconomic environment both in Chile and abroad that are relevant for the stability of the financial system; trends in the indebtedness and payment capacity of the main credit users in the economy, including households, nonfinancial companies, and the consolidated government sector; an analysis of the financial position of nonbank financial intermediaries, including pension funds, insurance companies, and mutual funds; and the impact of these developments on the banking system and the country's international financial situation.

The *Financial Stability Report* is a semiannual publication based on publicly available information. It analyzes the state of the financial system as a whole, not of individual financial entities. This work is complementary to projects carried out by other supervisory organizations with respect to these entities or to groups of institutions with similar characteristics.

The publication of this *Report* is intended to contribute to the public discussion and analysis of issues that are relevant for the development and stability of the Chilean economy.

The Board

I. Summary

Despite corrections and turbulences experienced by the prices of stocks and commodities in recent weeks, Chile's macroeconomic environment has remained favorable. Good terms of trade have lasted longer than expected last December, where the very high price of copper in the year to date is worth singling out. The world economy is growing strongly and in a more balanced way between the various economic zones. Even after the corrections of recent weeks, international financial conditions remain benign, with a low cost of foreign credit and tight sovereign spreads by historical standards. Looking ahead, however, the world economy and financial markets should continue to accommodate less expansionary monetary conditions. This transition is likely to induce further adjustments in financial asset prices and moderate the pace of world growth.

So far, the response of domestic demand to external stimulus has been modest, consistently with the temporary nature of the terms of trade hike. After the fast expansion of consumption and investment over the better part of last year, domestic demand and growth are returning to their medium-term paths, according to projections. Government spending has continued to evolve within the structural fiscal surplus rule, and the extra revenues from copper exports have been saved. Inflationary prospects are well contained and in line with the center of the target range for a horizon of one year and beyond, as are inflation expectations among the public. The conduct of monetary policy has caused no surprises to financial markets. Investors foresee gradual increases in local interest rates for the next few quarters. The current account of the balance of payments is projected to post surpluses this year and next.

Firms have taken advantage of the good cyclical conditions to strengthen their balance sheets and financial situation. Increased sales margins and the moderate rise in financing costs have allowed firms to post strong profitability indicators and accrue sufficient resources to finance the large increases in fixed investment without a hike in corporate leverage. During the past twelve months, the firms most favored by the conjuncture have been those in sectors linked to exports of raw materials and to domestic demand, while other sectors have been hurt by the strengthening of the peso.

From December to date, household credit continues to grow above income. The performance so far of household payment compliance indicators shows proper management of loans. Nonetheless, the increase in consumers' debt

requires to pay more attention to the potential effects of a scenario with higher interest rates, slower economic growth and fewer job opportunities.

The consolidated government will post a significant enlargement of its financial surplus during the current year, owing to the high copper price and the application of the fiscal rule. The fiscal surplus will significantly exceed the provisions in the budget law for 2005, resulting in a substantial decline in the public sector's gross debt to a level below that of other economies with similar sovereign risk rates. The Central Bank of Chile will also attain reductions in its interest deficit and its gross debt. The strength of public finances grants the flexibility needed to accommodate a potential deterioration of the external scenario and so it enhances the economic and financial stability of the Chilean economy.

While prospects look favorable, some risks persist that could alter the course of the business cycle. The main uncertainties for the Chilean economy are coming from abroad, particularly associated to the intensity of the interest rate rise process in the larger economies. In recent weeks its effects have been visible on the volatility of financial markets and risk premiums, which may worsen if inflation expectations in industrial economies deteriorate. Financial asset prices in emerging economies, in particular those with weaker fundamentals, seem to be the most vulnerable, considering the strong valuation of the past two years. Another cause for concern is a housing prices' correction taking place in some industrial countries because of its potential impact on global consumption.

Global current account imbalances persist, and an abrupt correction of financial asset prices caused by reduced credit inflows cannot be ruled out. Keeping the picture unchanged requires a continual, substantial credit flow from the Asian and oil-exporting economies to the United States. So far, the interest rate differential favoring the US dollar against other main currencies has favored these flows, but things are beginning to change. A sharp adjustment of investors' perception on risks and returns could cause large swings in international interest rates and parities that, given some scenarios, might slow down the global economy, prompt a correction in commodity prices or even an increase in emerging economies' risk premiums.

The Chilean economy has no need for external net financing for this year or next, and faces low risk of access to foreign loans. In the past six months, external debt indicators have continued to fall, as a result of the current account surplus, output growth and increased exports, even after excluding the effects of copper price rises and peso appreciation. On the other hand, firms and financial institutions have gained experience with a floating exchange rate regime; currency mismatches are limited and hedging instruments are increasingly used. All these factors allow the Chilean economy to adjust soundly to changes in the external scene. In addition, the Central Bank has a safe level of international reserves to address more adverse conditions, which combines favorably with the recent hoarding of international assets on the part of the central government deriving from the extra resources generated by the extraordinary price of copper.

In the course of the past six months, savers have made some adjustments to their investment portfolios. Pension fund contributors have gravitated toward

funds with a higher share of variable income, lured by the returns of these instruments in the last two years. On the other hand, mutual fund shareowners have reduced their exposure to long-term rate volatility after the decline in the returns of medium- and long-term fixed-income funds by the end of 2005.

The banking system keeps a good equity position and balance sheet risks are fairly small. From December to date, financial institutions' profitability rates, accrued provisions and equity have remained in levels consistent with the risks they show in their balance sheets. At the same time, the fraction of past-due loans is close to its all-time low. In the baseline scenario, the strong equity situation is expected to last for local households and firms, which are the main recipients of bank credit. Still, provisions are likely to rise as the economic and financial situation tends to normalize. Under alternative scenarios—involving a sharper slowdown of output and/or large rises in interest rates and the exchange rate—, a bigger increase in provisions and nonperforming loans can be expected, but which is very unlikely to match the numbers of the period 1999-2001.

Risk rating indices of insurance companies show an improvement. Capitalization levels are consistent with balance sheet risks while the rise in long-term interest rates has reduced these institutions' reinvestment risk.

In conclusion, the risks threatening domestic financial stability are within safe limits. The prudent response of the Chilean economy to the extraordinarily good terms of trade and international financing, together with the fiscal, monetary and exchange rate policy framework in operation, provide the necessary buffers to absorb the economic and financial impact of a possible turn of world conditions.

II. Macroeconomic and financial environment

The expected trend and volatility of economic growth, the terms of trade, interest rates, the exchange rate, risk premiums, and other financial variables decisively influence the credit, liquidity, and market risks affecting financial intermediaries and other agents. This chapter reviews recent patterns and the outlook for the world and domestic economy, with special emphasis on threats to the financial stability of the Chilean economy.

Advanced economies

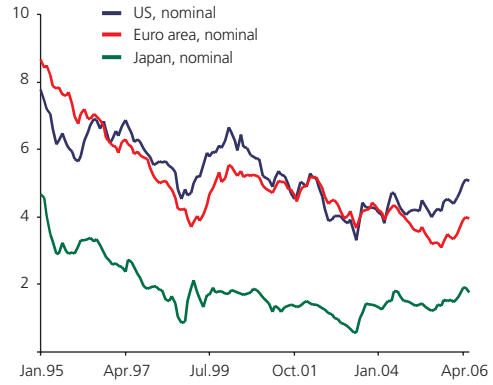
The world economy continues to grow dynamically, and the outlook for this year and next is positive. In contrast with previous years, global expansion is more balanced among the main regions, given the recovery of Japan and, more recently, the euro area.

In the last six months, the process of normalizing monetary conditions has continued in the advanced economies, as they absorb global excess capacity. In the United States, short- and long-term interest rates increased more sharply than expected, and the market expects new hikes. In the euro area, the increase has been gradual and in line with investors' expectations, while in Japan a faster withdrawal of monetary stimulus is expected than was projected at year-end 2005. Despite these rises, international interest rates remain at relatively low levels compared with the average of the last decade (figure II.1).

Figure II.1

Ten-year government bond yields in advanced economies

(percent)



Source: Bloomberg.

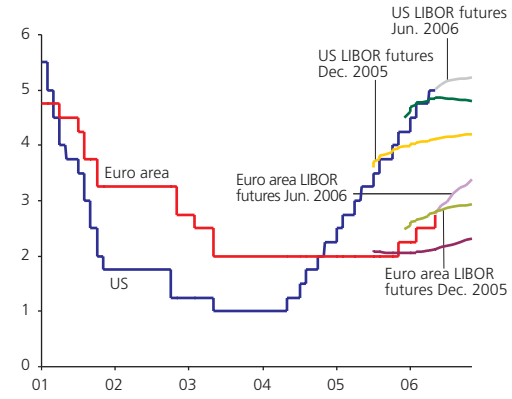
The normalization of monetary conditions was largely predicted by the markets, so no sharp adjustments in the international financial markets were expected. As we have seen in recent weeks, however, more volatile scenarios featuring price corrections on riskier financial assets cannot be ruled out. The solid equity position of financial intermediaries and the global corporate sector should facilitate their adaptation to this scenario of higher interest rates.

The revaluation of the riskiest financial assets and the search for higher returns on the part of investors continued through early May, in a context of falling financial volatility and a greater appetite for risk. This trend dropped off in recent weeks as uncertainty grew regarding the path of inflation and, therefore, of monetary policy in the advanced economies. At the same time, the price of real estate assets in the main economies has begun to level off.

Figure II.2

Monetary policy rates and three-month LIBOR futures in advanced economies

(percent)



Source: Bloomberg.

The most likely scenario for the international economy, as described in last May's *Monetary Policy Report*, is for short-term interest rates to continue to increase in the advanced economies over the coming quarters. This rise will probably be gradual, to the extent that the inflationary outlook of the industrialized economies continues to be contained (figure II.2). In the case of the United States, this process could come to an end in the second half of this year; in the euro area, it could extend through the end of 2007, while in Japan it could start up in the second half of 2006.

Table II.1

Main variables for the international scenario

	2004	2005	2006 (f)	2007 (f)
		(annual change, percent)		
Terms of trade	19.7	10.5	12.6	-8.1
PPP World GDP (*)	5.3	4.8	4.9	4.7
External prices (in US$)	8.9	7.6	5.9	5.1
		(levels)		
BML copper price (US¢/lb)	130	167	260	225
WTI oil price (US$/barrel)	42	56	67	62
US$ LIBOR (% nominal, 90 days)	1.7	3.6	5.1	5.3

(*) Regional growth weighted by the share in world GDP at purchasing power parity (PPP).
(f) Projection.

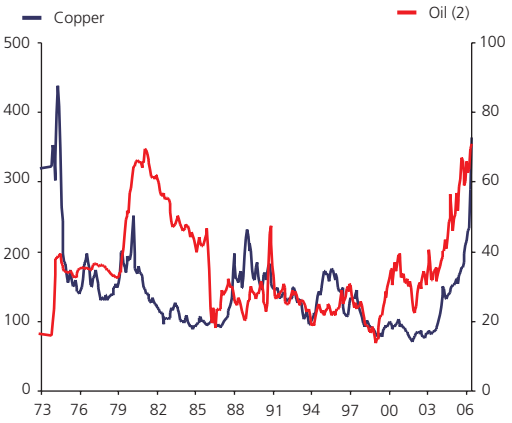
Source: Central Bank of Chile. *Monetary Policy Report*. May 2006.

Emerging economies

Figure II.3

Commodity prices

(US¢/lb, US$/barrel) (1)



(1) Deflated by the U.S. producer price index, December 2005.
(2) WTI since 1983. Figures spliced with the US fob import price.

Sources:
Energy Information Administration.
Central Bank of Chile.

The buoyancy of the world economy and, in particular, the Asian economies continues to be expressed in very high commodities prices relative to the last decade (figure II.3). The increases in energy and metals prices have been especially significant, even after the fall observed in recent weeks, because the supply response to the higher prices has been slower than expected. In addition, these markets have been more volatile, and financial investors account for a more significant share. With a few exceptions, the increase in commodities prices improves the emerging economies' terms of trade. The Chilean economy has particularly benefited from the rise in copper prices, which more than compensates for increased oil prices.

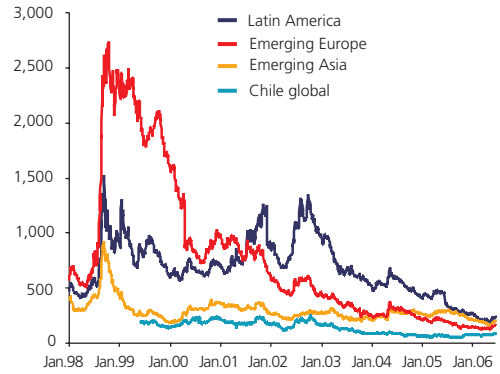
The emerging economies have taken advantage of this juncture to strengthen their external financial position. The result includes a generalized reduction in external debt, larger current account surpluses, prepayments of sovereign debt to multilateral organizations, advanced international refinancing, and, in some cases, substantial expansion of international reserves. At the same time, fiscal accounts are more solid, and countries are adopting more flexible exchange systems. The more solid fundamentals of these economies have been acknowledged with a considerable number of risk rating upgrades throughout this period.

The better fundamentals of the emerging economies, the search for higher returns, and a greater appetite for risk on the part of international investors explain the heightened interest in investing in assets in these economies,

Figure II.4

Sovereign bond risk premiums

(basis points)

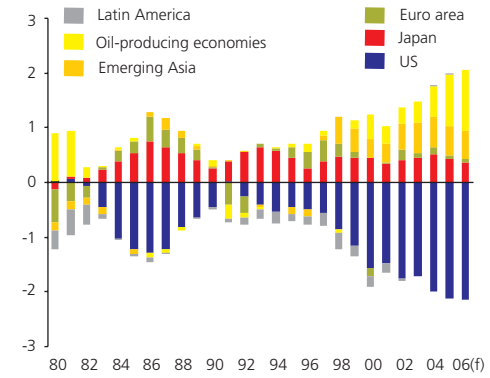


Source: Bloomberg.

Figure II.5

Current account balances in main economic areas

(percent of world GDP)



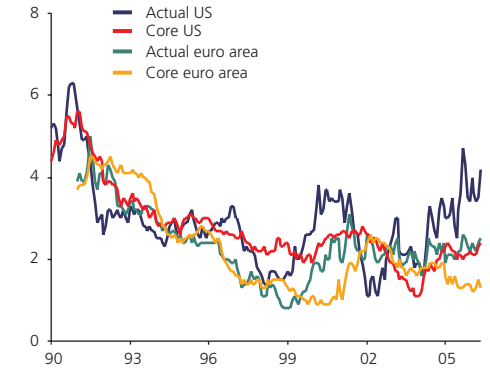
(f) Projection.

Source: International Monetary Fund.

Figure II.6

Inflation in advanced economies

(annual change, percent)



Source: Bloomberg.

including in local markets. This trend was apparent through mid-May in the generalized increase in emerging market stock indices, a revaluation of their currencies, a generalized reduction in the financial spread paid on sovereign debt, and a drop in local interest rates (figure II.4). In recent weeks, the developed markets have become more volatile; this has produced a correction, which has been reflected in an increase in the risk premiums on emerging markets' sovereign bonds, a generalized depreciation of their currencies, and, generally, a fall in the prices of risky financial assets.

International risks

The significant and persistent gaps between the savings and investment flows of the main economic areas continue to be a source of risk in the international setting. The maintenance of the US current account deficit is dependent on the Asian economies and the oil producers continuing to accumulate assets in dollars (figure II.5).

The risk of a sharp portfolio adjustment —triggered, for example, by a reduction in the interest rate differential in favor of the dollar— could induce a fast correction of the international value of that currency, as well as unexpected increases in inflation and interest rates and a correction of other financial prices. The probability of this scenario occurring, however, has dropped in the last year (box I.1).

Another relevant risk is an acceleration of global inflation. Thus far, inflationary pressures have been contained in both the advanced and emerging economies (figure II.6). The risk that global inflation will accelerate increases, however, as global excess capacity disappears and the cost pressures stemming from high commodities prices are accentuated. The materialization of this risk could accentuate and accelerate the rate of increase in international interest rates.

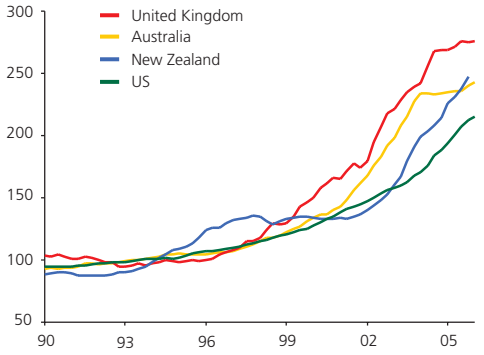
Consumers in the US and other industrialized economies appear to be more vulnerable to an interest rate hike, especially if a correction in housing prices occurs. However, the recent experience of other advanced economies that have already experienced an adjustment in the housing market, such as the United Kingdom and Australia, shows that it can occur without provoking financial tensions (figure II.7).

The events of recent weeks illustrate the fragility of asset prices in emerging economies in the face of changes in international financial conditions. Furthermore, stock and bond prices in these countries could undergo a more pronounced correction in the face of a default on payments in some systemically important emerging economy, but the probability that an event of this nature would occur appears to be lower under current circumstances.

Figure II.7

Housing prices in advanced economies

(nominal, average 1987–1997=100)

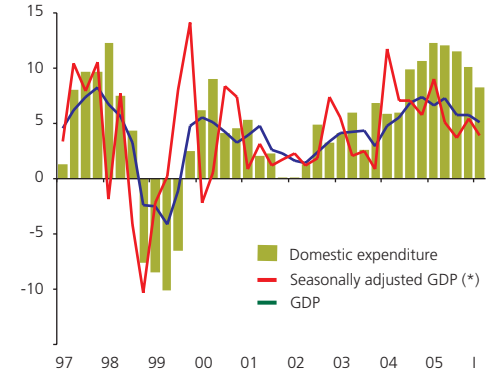


Source: González and Pistelli (2006).

Figure II.8

Economic growth

(real annual change, percent)



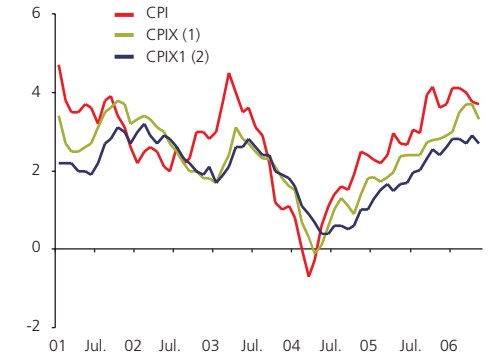
(*) Annualized quarterly change.

Source: Central Bank of Chile.

Figure II.9

Inflation

(annual change, percent)



(1) CPI minus fresh fruits and vegetables and fuels. This index is used by the Central Bank as an indicator of core inflation.

(2) Corresponds to the calculation of core inflation deducting the prices of fuels, perishables, regulated tariffs, indexed prices, and financial services, which together represent 30% of the total basket.

Sources: INE.

Central Bank of Chile.

National economy

The Chilean economy continues in an orderly expansionary phase. The growth in economic activity and demand are converging toward their trend values, while excess capacity is being reduced. Wage employment and labor force participation continue to increase.

Domestic demand has begun a process of slowing down, following the strong 11% annual growth registered in 2005 (figure II.8). This moderation has been led by the normalization of fixed investment and the accumulation of stocks, while household expense has slowed more gently. The convergence trend of private consumption should deepen in the coming quarters, while fiscal expense could show a higher growth rate, within the framework of the structural fiscal surplus rule. Last May's Monetary Policy Report projected that the growth of the economy would lie between 5% and 6% this year, while the growth in demand would be between one and two percentage points higher (table II.2).

Table II.2

Economic growth, current account and inflation

	2004	2005	2006 (f)
		(annual change. percent)	
GDP	6.2	6.3	5.0-6.0
Domestic demand	8.1	11.4	6.8
Gross fixed capital formation	11.7	24.7	9.0
Total consumption	6.1	7.6	6.3
Exports of goods and services	11.8	6.1	4.7
Imports of goods and services	18.0	20.4	8.1
Current account (% of GDP)	1.7	0.6	1.7
Current account measured at trend prices (% of GDP)	-	-3.0	-3.0
		(percent)	
CPI inflation. December	2.4	3.7	3.4
CPIX inflation. December	1.8	2.9	3.4
CPIX1 inflation. December	1.2	2.6	3.1

(f) Projection.

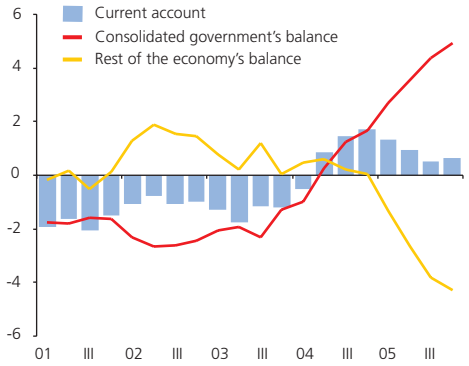
Source: Central Bank of Chile. *Monetary Policy Report*. May 2006.

Inflation expectations and the Central Bank's projections are consistent with the inflation target. Trend inflation, measured by the Core Price Index (CPIX), is around 3% (annual), while annual inflation measured by the Consumer Price Index (CPI) has held at around 4% (figure II.9). Annual inflation is expected to return to the center of the target (3%) in the coming months. Wages show moderate increases, and the evolution of labor costs is consistent with the reduction of excess capacity.

The current account of the balance of payments should post a surplus this year, as in the two previous years (figure II.10). This situation reflects the extraordinary gains in the terms of trade that the Chilean economy has made in the period and the way they have been absorbed, although the situation is expected to gradually normalize. Using trend prices for exports, imports, and financial services, the balance of the current account should be equivalent to a deficit of 3% of output.

Figure II.10

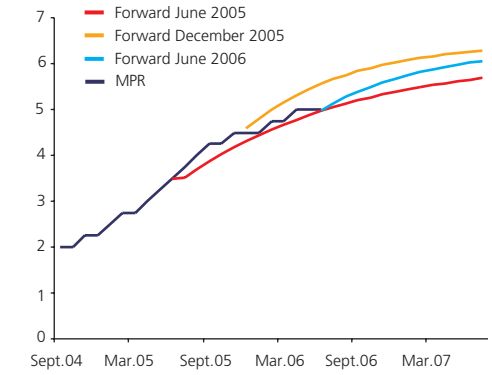
Current account and the consolidated government's balance
(moving year, percent of GDP)



Source: Central Bank of Chile.

Figure II.11

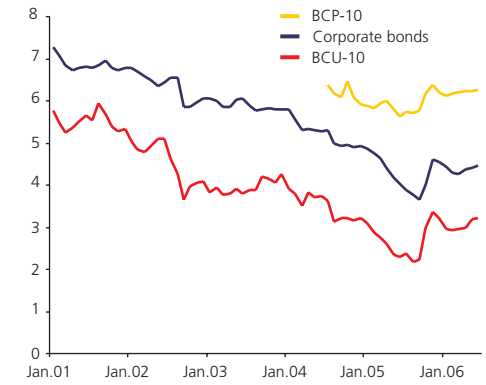
Monetary policy in Chile
(percent)



Source: Central Bank of Chile.

Figure II.12

Long-term bond rates
(percent)



Sources:
IVA Índices.
Central Bank of Chile.

National financial markets

In the last six months, the Central Bank has continued the process of gradually reducing the monetary stimulus, and estimates indicate that the monetary policy rate is still below its neutral level.

Both investors and analysts expect the monetary policy interest rate to continue to increase gradually and steadily in the coming quarters. The future rates curve reveals that the market expects the monetary policy rate to approach 6% toward the end of 2007, with some increases thereafter (figure II.11).

The monetary policy trend does not differ greatly from the implicit trend in financial asset prices over the last twelve months. Therefore, the adjustments to the monetary policy rate have provoked no surprises in the financial markets. The issue rate on corporate bonds, mortgage bills, and endorsable mortgage credits has not continued to increase after the hike at the end of last year. The cost of commercial and consumer loans shows increases consistent with the evolution of short-term rates. The rates on long-term Central Bank debt instruments have remained stable, despite some degree of volatility in indexed interest rates in the last few quarters (figures II.12 and II.13).

The recent depreciation of the peso is tied to the change in tone in the emerging and developed financial markets, which have registered stronger fluctuations. In any case, the volatility is similar to what has been observed since 2001 (figure II.13), and it is also comparable to other currencies' (table II.3). In the monthly survey of analysts' expectations, the projection prior to the recent peso depreciation pointed to exchange rate values similar to those of the last few weeks.

Table II.3

Unconditional volatility (*)

Parities	Daily	Annualized
Chilean peso	0.6	9.2
Euro	0.6	9.9
Pound sterling	0.5	8.3
Yen	0.6	9.4
Real	1.6	25.9
Argentine peso	2.3	35.6

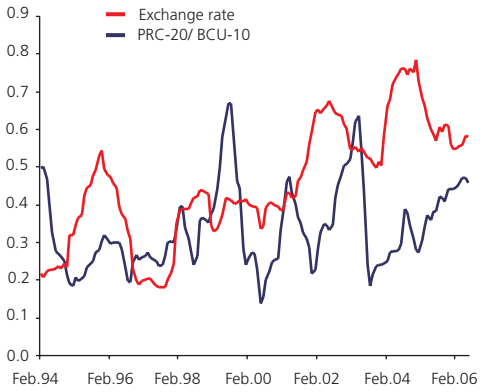
(*) Calculated with daily data for the 2000-May 2006 period, using a GARCH (1,1) model.

Source: Central Bank of Chile.

Figure II.13

Volatility of the exchange rate and the long-term interest rate (*)

(twelve-month moving window, percent)



(*) Calculated based on the daily yield of the exchange rate and interest rate (PRC-20/ BCU-10).

Source: Central Bank of Chile.

National risks

The strong increase in the terms of trade accrued between 2005 and 2006 could provoke a renewed growth of internal expense, which in turn could cause a faster rise in internal and/or external debt, an appreciation of the currency, and a widening of the trend deficit of the current account. In the medium term, this scenario could require a sharper correction of the economy, causing increased volatility in growth, interest rates, and the peso.

As discussed in the *Monetary Policy Report*, the probability of this risk scenario appears lower today. On the one hand, although the copper price remains high, there are already signs that private demand is converging. On the other, the ratification of the structural fiscal surplus rule by the new Administration contributes to stabilizing the impact of the extraordinary income from copper on internal demand.

Another risk involves the impact of the oil price on domestic inflation, in an economy where excess capacity is steadily being reduced. This situation could also affect the future evolution of interest rates and output growth. The effects of this situation could be milder, however, to the extent that monetary policy maintains its credibility and the scenario is not accompanied by a marked deterioration of the external environment.

Taking these internal and external risks into account, the main threats to the financial stability of the Chilean economy are considered to be the possibility of a violent adjustment of emerging asset prices and, to a lesser extent, a sharp correction of the high US current account deficit. Although both events have a low probability of occurrence, their adverse effects on financial and real variables could be significant.

Box II.1: Real and financial consequences for the Chilean economy of a sharp correction of global imbalances

Although the probability of a sharp adjustment to global imbalances is perceived to be lower than a year ago, the subject continues to draw attention. These imbalances are characterized by a significant current account deficit in the U.S. and a corresponding surplus in other advanced economies, emerging Asia, and oil-exporting countries.

Last May's *Monetary Policy Report* examines the causes of these disequilibria and explores possible correction scenarios, including those featuring a mild, orderly correction. This box focuses on scenarios outlining a fast, disorderly correction of global imbalances and its impact on the world economy and the financial markets [1]/.

This sharp correction of global imbalances could be triggered by several factors: a reduction in the demand for dollar-denominated assets on the part of central banks: protectionist measures that inhibit international trade flows; more flexible currencies in emerging Asia; or an economic slowdown in the United States.

The sharp correction of these imbalances may have real and financial consequences. An important slowdown of growth in the advanced economies and lower prices for commodities could affect aggregate demand and economic activity in the emerging economies. At the same time, the fall in demand for dollar-denominated assets, stemming from the international adjustment of asset portfolios, could produce an important depreciation of the dollar, a contraction of international liquidity, and a rise in interest rates.

In the financial realm, the higher risk premiums and interest rates could raise the cost of international financing, provoking a greater volatility in short-term financial flows for emerging economies and a correction of their asset prices.

[1]/ For a detailed description of the quantitative impact of a real adjustment to the global imbalances, see International Monetary Fund (2005), appendix 1.2.

Should this threat materialize, the effects on the Chilean economy would be an increase in its sovereign spread, in the real exchange rate, and a fall in the copper price, in line with the general reduction in commodity prices. Output growth would also slow significantly. In any case, these effects would be strongest in the short term, after which the growth rate should return to its long-term trend, as the international situation normalizes.

The consequences of an adjustment of global imbalances for the financial stability of the Chilean economy are included in the different scenarios and stress tests carried out in the following chapters of this *Report*. It is considered that the impact would be mitigated by the solidity of the emerging economies, which have strengthened their equity position by taking advantage of recent favorable external conditions, among other things.

III. Macroprudential analysis

The possibility of default on loan commitments is one of the main risks on the balance sheets of banks and other financial intermediaries. In Chile, the banking system is exposed through loans to households and domestic firms and, to a lesser extent, through its investments in public debt certificates. Meanwhile, its direct exposure to international credit risk is minimal. This chapter examines the financial situation of firms, households, and the government, with an eye to evaluating the evolution of credit risk in the Chilean economy and its sensitivity to the macroeconomic threats described in chapter II.

Loan payment indicators for domestic firms and households continued to improve in the last six months. The annual cost of the financial system's provisions for bad debt has followed a sustained downward trend throughout the last six months, converging at levels below 1% of loans. The credit risk ratings of firms that issue public offerings have held steady at favorable levels. This improvement in the indices is explained by the good conditions of the Chilean economy, as described in the previous chapter. The decreasing trend for credit risk, measured through the provision expense of the banking system, has broken off only in the case of consumer loans.

Firms

Loans to domestic nonfinancial firms constitute the main asset on banks' balance sheets (56%). The banks' main sources of exposure are in the construction, real estate, services, trade, and industrial sectors. The majority of these loans corresponds to large firms and corporations. In the case of the institutional investors, holdings of bonds, promissory notes, and nonfinancial corporate stocks constitute around 25% of their assets, and the external debt of these firms accounts for around 72% of the external debt of the economy.

The last year has seen an increase in the banks' exposure to the construction, real estate, and transport sectors, while their exposure to the industrial sector has dropped. At the same time, the faster growth of credit to smaller firms is notable. In the nonbank financial sector, life insurance companies have increased their exposure to the corporate sector through their investment in corporate bonds.

Both international and national studies show that the main determinants of default risk among nonfinancial firms, in addition to macroeconomic

disturbances, are profitability, the level of indebtedness, and financial mismatches. In general, the favorable macroeconomic conditions of the last year have allowed firms to continue to consolidate their equity positions. Firms' profitability and operating margins have increased, and their debt level has declined.

Profitability, debt, and financial mismatches

As of March 2006, the operating flows of firms listed with the Securities Registry [1]/ increased 27% [2]/, and the profitability of average assets rose to historic levels (7.8%) (figure III.1). This trend has been widespread, but with some sectoral differences. Worth pointing out are the performance of firms tied to mining and nontradables sectors, while firms in other tradables sectors show greater variation, in part owing to the evolution of the exchange rate and export prices. Average financial costs continues to fall, despite the increase in market interest rates.

Looking ahead, sales are expected to continue growing at a more moderate rate, close to the growth rate of output, especially in sectors tied to domestic demand. Average financial costs for firms should increase. Both factors should bring firms' return on equity rates closer to historical values.

In 2005, investment undertaken by firms increased well above the growth rate of output, and it has slowed down as expected this year to date. In the cases of firms listed with the Securities Registry, investment in fixed assets was greater than corporate acquisitions; investment flows in the nontradables sector were also notable.

Firms have been able to finance this expansion of their productive capacity with their own funds, without significant effects on their debt level. The total debt of nonfinancial firms, including bank debt, market securities, and international financing, has continued to grow (6.5% annual), slightly above real economic activity. As of March 2006, the total debt of firms was $58.9 billion, or 89% of gross domestic product (GDP) (figure III.2).

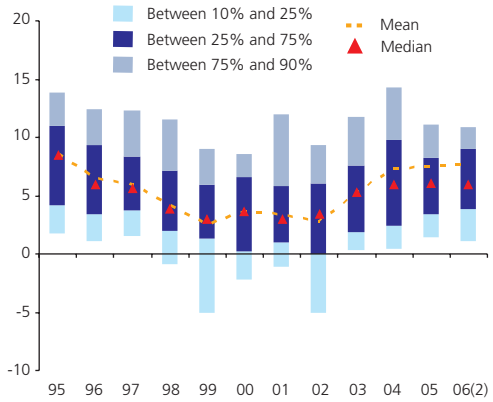
Firms continued to substitute external financing with domestic sources. The growth of domestic bank loans is particularly notable (10.3% annual), followed by bond issues and trade effects in local currency, while international debt continues to fall (figure III.3).

The accounting debt-to-equity ratio of firms listed with the Securities Registry remained stable at around 68%, while equity-to-market capitalization fell slightly, to 22%. Debt and interests measured as a percentage of operating flows continued to fall in the last six months, registering 86% and 3%, respectively, as of March 2006.

Figure III.1

Return on assets (ROA)

(Indicator weighted by asset size) (1)



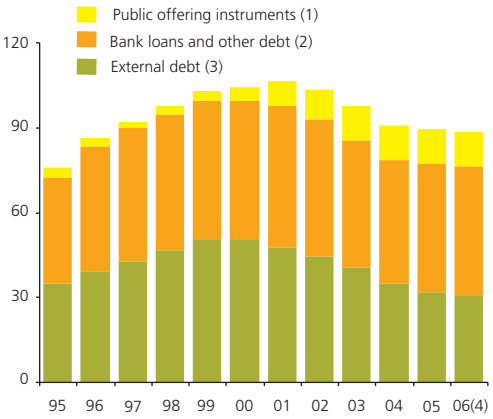
(1) The percentile indicates the amount of assets accumulated.
(2) Data as of March.

Source: Own calculations, based on SVS data.

Figure III.2

Total debt

(percent of GDP)



(1) Includes corporate bonds (except Codelco), securitized bonds with nonbank underlying assets and commercial papers.
(2) Considers commercial loans, foreign trade loans, leasing and factoring.
(3) Converted to pesos using the average exchange rate for the 2002–2005 period.
(4) Figures as of March. GDP data annualized based on a moving year.

Source: Own calculations, based on data from the SBIF, SVS, and Achef.

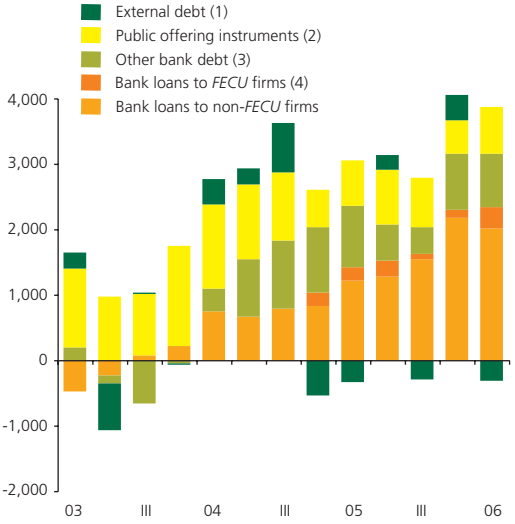
[1]/ Corporations registered in the Securities Registry of the Superintendency of Securities and Insurance (SVS). The analysis in this chapter is based on financial information contained in the standardized financial statements (known as *FECU*).

[2]/ Moving average of the annualized growth rates in each quarter.

Figure III.3

Sources of financing

(annual flows, billions of pesos of March 2006)

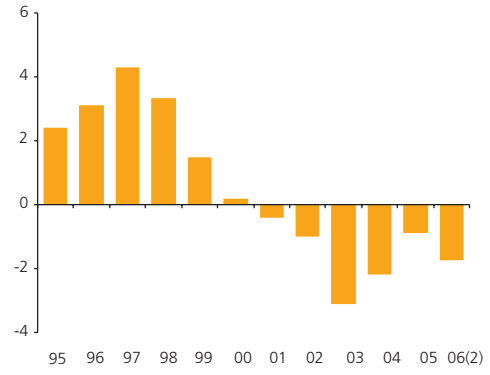


(1) Converted to pesos using the average exchange rate for the 2002–2005 period.
(2) Includes corporate bonds (except Codelco), securitized bonds with nonbank underlying assets and commercial papers.
(3) Considers foreign trade loans, leasing and factoring.
(4) *FECU*-level breakdown only available since December 2004.
Source: Own calculations, based on data from the SBIF, SVS, and Achef.

Figure III.4

Net indebtedness in dollars (1)

(percent of total assets)



(1) Considers forward position. Outlying values or data relative to the respective series are replaced by zeros.
(2) Figures as of March.

Source: Own calculations, based on data from the SVS and Cowan, Herrera and Hansen (2005).

Table III.1

International comparison of credit risk indicators (*)

Economic sector	Country or region	Interest coverage (times)	ROE (percent)	Debt/ equity ratio (percent)
Telecommunications	Chile	3.1	11.9	54.2
	Latin America	1.1	3.6	50.1
	United States	3.2	11.9	52.7
Electricity	Chile	6.9	10.9	50.7
	Latin America	1.8	6.8	49.4
	United States	2.1	7.0	57.5
Mining	Chile	1.9	12.9	42.1
	Latin America	2.6	10.2	49.1
	United States	2.5	5.0	35.5
Retail	Chile	1.5	5.6	39.5
	Canada	7.3	12.7	47.8

(*) Median as of March 2006 for Chile and average of medians in 2002–2004 for Canada. United States and Latin America.

Sources:
Standard & Poor's.
Central Bank of Chile.

After transitory elements are isolated, the debt, profitability, and interest coverage ratios of the large Chilean firms are comparable to international levels (table III.1).

The exposure of the larger firms to interest rate fluctuations, proxied by their share of short-term debt net of liquid assets, remained stable at around 16% of equity. However, their exposure to the external interest rate is higher, considering that nearly half of their total external debt is contracted at a variable rate. The exposure of smaller firms to local rates is probably higher, but direct data are not available.

The currency mismatches of the larger firms have remained low, at levels significantly below the levels that prevailed in the previous expansionary phase in the middle of the last decade. A contributing factor in this trend is the increased use of currency hedging instruments (figure III.4). As could be expected, firms in the nontradables sector employ these hedging instruments the most, covering nearly 45% of their debt in foreign currency, while export firms tend to use dollar-denominated debt as a natural hedging mechanism [3]/.

Bankruptcy and risk ratings

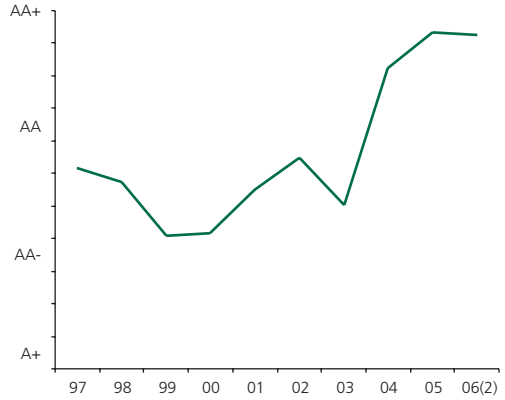
The last six months have seen an improvement in the payment indicators of firms. The share of past-due loans in the banks' commercial portfolio fell between September 2005 and March 2006. The cumulative number of firms declared bankrupt in the period from January to May 2006 fell 25% relative to the same period last year.

[3]/ A more detailed analysis of these topics can be found in the articles included in this *Report*: "Currency Mismatches in Chilean Manufacturing Firms" and "The Development of the Currency Derivatives Market in Chile."

Figure III.5

Aggregate risk rating index (1)

(rating category)



(1) Calculated by converting current debt rating categories into a numerical scale from 0 to 20, weighted by the amount of that debt.
(2) Figures as of March.

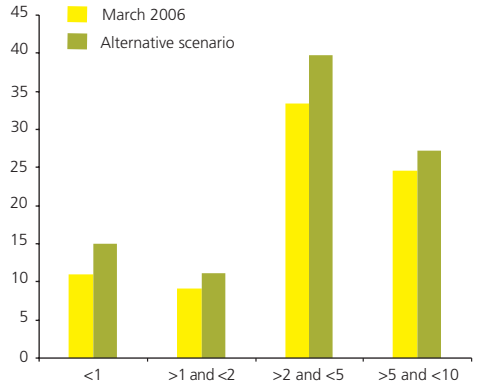
Source: Own calculations, based on SVS data.

Figure III.6

Payment capacity under the alternative scenario:

distribution of local bank debt around the coverage indicator

(percent, times)



Source: Own calculations, based on SVS data.

Risk ratings remained stable, with 39% of debt classified as AA or better (figure III.5). This is consistent with the low credit risk premiums on corporate bonds and with the drop in bank provision expense for commercial trade credit as a share of the portfolio.

Corporate credit risk

As indicated earlier, under the most likely scenario presented by the Central Bank in May's *Monetary Policy Report* (*IPOM*), corporate net profit generation is expected to continue to be robust, allowing for a moderate increase in firms' indebtedness. However, projections point to a normalization of the patterns of default on commercial loan payments, in line with the expected convergence in the economy's growth rate and the increase in interest rates.

The alternative scenarios examined in the previous chapter consider a possible worsening of the external environment, with lower economic growth, higher interest rates, and a depreciation of the currency. Estimates indicate that firms' financial indicators could be affected by such scenarios, but they would remain within acceptable ranges. As shown in figure III.6, under 20% of the local bank debt of the sample analyzed was with firms that exhibit interest coverage indicators of less than 2 times in March 2006. This share would increase moderately in the most extreme scenario. However, the share of local bank debt in firms in a risky position (with a coverage indicator below 1) would continue to be low.

Among the firms listed with the Securities Registry, those that are potentially most exposed to a deterioration of the external scenario are firms tied to the nontradables sector: electricity, consumption, and construction. Firms in these sectors would be affected by the lower growth of domestic demand, higher financial costs, and the depreciation of the peso. Firms in commodities-exporting sectors, such as forestry and mining, would also be affected, in this case by low world growth and their dependence on external financing.

The effects of these alternative scenarios on the credit risk absorbed by the financial institutions are addressed in depth in chapter IV of this *Report*.

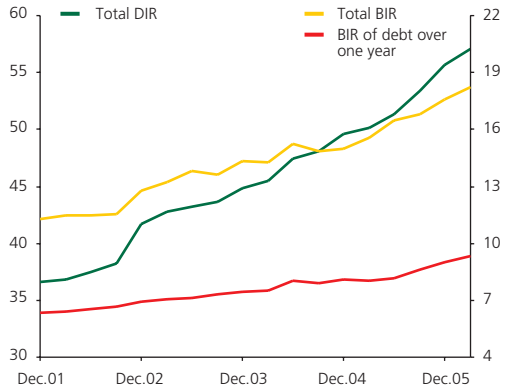
Households

Consumer loans account for nearly 25% of bank assets. Of this total, about 60% corresponds to housing mortgage loans; the remainder is made up of consumer loans and other loans tied to the use of credit cards and checking account overdrafts. The household loan share is still below the levels of advanced economies [4]/.

[4]/ Other intermediaries that are exposed to household credit risk include life insurance companies and pension funds, which buy endorsable mortgage credits and securitized bonds; retailers, granting loans to their clients; savings and loan cooperatives; and private compensation funds.

Figure III.7

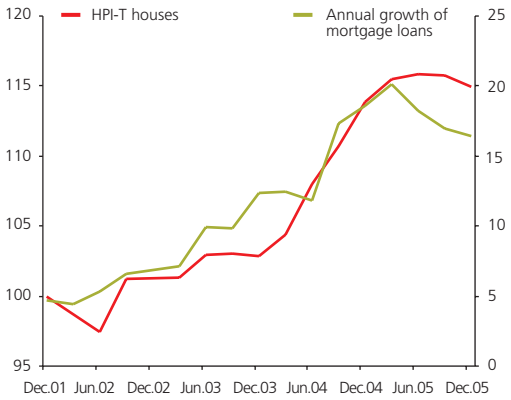
Indebtedness (DIR) and financial burden (BIR)
(percent of annual disposable income)



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

Figure III. 8

Housing price index (HPI-T) and mortgage debt (*)
(Base index December 2001=100, percent)



(*) Fourth quarter 2005 includes transactions completed only through November.

Source: Own calculations, based on data from *Asociación de Corredores de Propiedades de Chile (ACOP)* and SBIF.

Total consumer debt continues to grow at real rates on the order of 15%–20% annually, led by consumer bank loans. As discussed in Mays *Monetary Policy Report*, favorable economic, financial, and labor conditions have bolstered the growth of household expenses and credit demand. The credit supply, in turn, has responded elastically, drawn by attractive margins and improved risk indicators. The bank loan survey carried out by the Central Bank of Chile captures this greater willingness to loan to households, as well as the existence of better term and rate conditions.

International studies indicate that household credit risk depends not only on macroeconomic conditions (that is, unemployment, real wages, and interest rates), but also on the size of the household's debt and the price of the assets that serve as its collateral, mainly housing.

Indebtedness and financial burden

Consumer debt has grown more rapidly than consumer income, with the stock of debt representing 57% of annual income, compared with 37% at year-end 2001 (figure III.7). Total household debt is estimated at $21.3 billion pesos as of March 2006, with a real annual growth of 18%. This growth continues to be driven by bank credits, especially consumer loans.

The financial burden of consumers —interest and amortization, excluding amortization of loans shorter than one year— sits at 9% of disposable income, the same level as year-end 2005 (figure III.7). The available evidence for 2004 indicates that both debt and assets are concentrated in the highest income quintiles (box III.1).

Housing prices, measured as the median price of registered housing transactions in the larger communities of the Santiago Metropolitan Region, continue to increase, albeit moderately (figure III.8). After rising nearly 13% between 2003 and 2004, the housing price indicator stabilized in the last quarters of 2005 [5]/.

Internationally, the size of domestic household debt as a share of income is consistent with the Chilean economy's degree of financial development (figure, III.9). For this reason, the household debt level is expected to continue increasing, as the Chilean capital markets continue to develop and new sectors that currently do not have access to credit are incorporated. However, domestic household debt includes a larger share of consumer loans, which is traditionally the most risky form, than is observed in the more advanced financial systems. The speed with which these loans are growing is also notable, since this has preceded a deterioration in loan quality in some international experiences.

The large share of household debt could accentuate the credit risk from this sector in the face of a possible slowdown of employment, a drop in real wages, or a reduction in housing prices. At the same time, the direct exposure of households to other risk factors, such as interest rate hikes or exchange rate fluctuations, remains low.

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

Figure III.9

International comparison of indebtedness (DIR) and financial development (1)

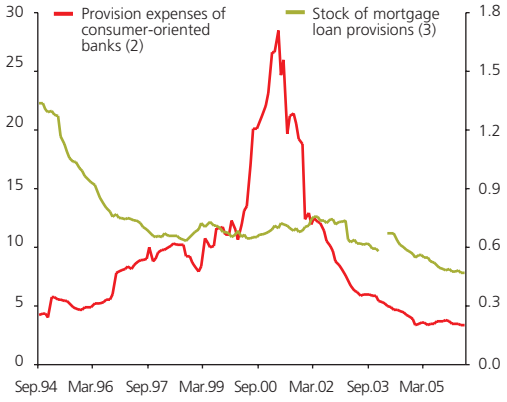
(1) Financial development measured as private credit / GDP.
(2) Figures for the debt-to-income ratio (DIR) correspond to 2002, except for Chile which corresponds to 2005.
(3) Figures for financial development correspond to the 1999–2003 average.

Sources:
Debelle (2004).
Djankov *et al.* (2006).
Central Bank of Chile.

Figure III.10

Household credit risk (1)

(percent)



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

Source: SBIF.

As discussed in the *Monetary Policy Report*, the growth in private consumption is expected to converge toward the growth rate of the economy, which should moderate the growth of demand for consumer and housing loans. Supply, however, will probably remain dynamic, to the extent that interest rate margins remain attractive and the performance of household payments does not deteriorate significantly.

Household credit risk

The available evidence indicates that households are adequately managing their debt, as are loan providers. After following a downward trend for the last few years, the main consumer loan portfolio risk indicators have remained low and stable in recent months. The risk on housing mortgage loans continues to be very low (figure III.10). It is necessary to recognize, however, that risks usually start forming in this phase of the economic cycle to be manifested later, when economic conditions become less favorable or simply deteriorate.

Therefore, tighter credit conditions (with less slack for increases in employment and income) are seen to imply a gradual increase of household credit risk. Nevertheless, consumer payment performance could deteriorate markedly if any of the risk scenarios described in chapter II materializes.

Indebtedness, financial burden, and default risk could increase substantially in the face of a drastic slowdown of output and employment growth, together with higher interest rates. The greatest risk for households would be in scenarios featuring significant drops in output and employment, which would cause a substantial impact on the banking system's provision expense starting in 2007. This situation is addressed in the stress tests on the banking sector presented in chapter IV of this *Report*.

Consolidated Government [6]/

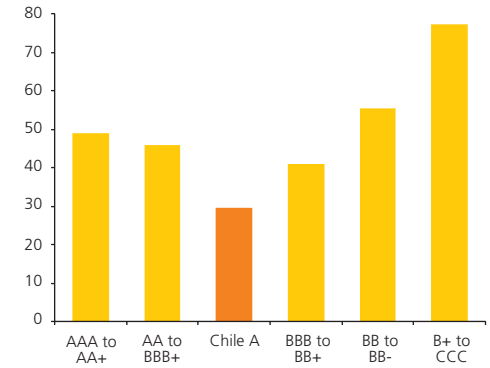
The public sector's degree of financial solidity has repercussions on the quality of financial intermediaries' assets, the confidence of foreign and national investors, and the availability and cost of financing for the rest of the agents in the economy. In the case of Chile, the exposure of national and international investors to public debt, which includes the central government and the Central Bank, is low. The external debt of the central government is around US$4 billion, equivalent to 8.9% of the country's foreign debt, while the banks' investments in public debt certificates account for 7.4% of their assets.

[6]/ 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.

Figure III.11

Gross public debt (*)

(percent of GDP)



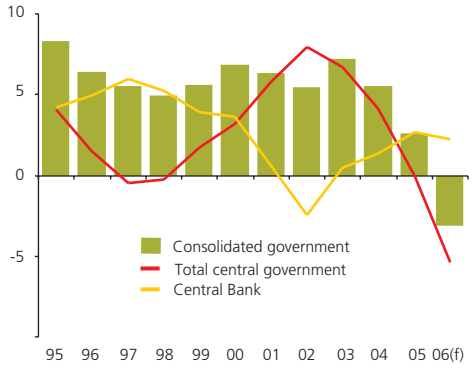
(*) Figures as of 2004.

Sources:
Moody's.
Standard & Poor's.
Central Bank of Chile.

Figure III.12

Net debt

(percent of GDP)



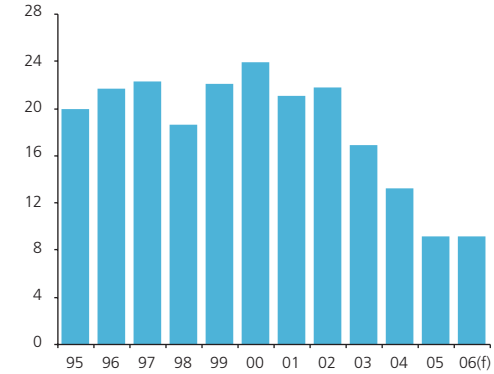
(f) Projection.

Sources:
Budget Division.
Central Bank of Chile.

Figure III.13

Central Bank's net position in dollars (*)

(percent of GDP)



(*) Includes bonds in local currency indexed to the dollar.
(f) Projection.

Source: Central Bank of Chile.

Debt and financial exposure

The size of the gross and net Chilean public debt continues to be small relative to other economies with a similar country risk rating (figure III.11). Moreover, this debt has diminished over the last two years as a result of savings from the extraordinary income from copper, in the framework of the prevailing fiscal rule and the use of the accumulated surpluses to prepay debt and accumulate external assets. The new Administration has confirmed that the public budget will be framed within this rule; it is therefore projected that the reduction in net public debt will continue this year and next. As of December 2005, the gross consolidated debt of the government and the Central Bank had fallen to 25.1% of output, from 28.9% in 2004, while net debt reached 2.6% (figure III.12).

The majority of public debt corresponds to medium- or long-term commitments with a fixed interest rate. Excluding instruments used for the administration of liquidity, debt with a maturity of less than one year accounted for 9% of the total in April 2006. As of the same date, the consolidated government's short-term commitments in foreign currency were US$5.1 billion, which equals 25% of the Central Bank's total international reserves and the central government's international assets (without taking into account foreign currency deposits in the domestic financial system). Thus the public sector's exposure to interest rates and liquidity risk is low.

However, the consolidated government has a significant direct financial exposure to currency risk. The Central Bank has a net asset position in dollars of nearly 10% of GDP (figure III.13), which is partially compensated by the deficit position of the central government, at around 4% of GDP. The government, however, has an additional exposure deriving from future income from copper, and the net position in dollars of the Central Bank has dropped relative to the levels observed in the past decade.

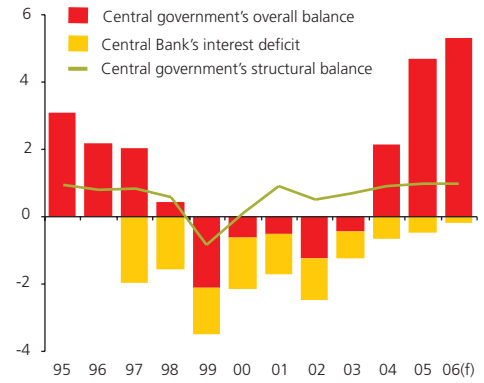
The financial liabilities of the Republic of Chile hold an A+ rating in local currency and an A (or its equivalent) in foreign currency, according to two of the three international risk rating agencies. The third rating agency upholds the A+ rating for local currency debt and gives a BBB+ for foreign currency debt.

Under the most likely scenario, the central government is expected to continue generating important surpluses in the three-year period from 2006 to 2008, mainly because the copper price should remain above its long-term level while GDP should keep very close to its trend level (figure III.14). The Central Bank, in turn, is expected to post practically balanced returns in the same period. Consequently, it, too, should continue to reduce both its gross and net debt, in a context of a lower interest deficit than in the last decade. In the medium term, the actual fiscal balance is expected to normalize, steadily approaching the structural objective of 1% of GDP. In the transition, gross public debt should continue to fall as a percentage of GDP, and the Treasury should accumulate a significant foreign currency liquidity position. Thus, at this point, the accumulation of international liquidity stemming from the better terms of trade is being realized by the central government and not by the Central Bank. This evolution should strengthen the public sector's liquidity and solvency indicators even further.

Figure III.14

Central government's balance and Central Bank's interest deficit

(percent of GDP)



(f) Projection.

Sources:
Budget Division.
Central Bank of Chile.

Risks

Although the main risks for the government stem from scenarios involving a lower copper price and/or slower economic growth[7]/, the fiscal situation should continue to be robust. Under the assumption that the fiscal rule remains in force, the stress tests carried out on the fiscal budget show that Chile's public finances are in a solid position, and that a significant deterioration of the country risk, either internally or externally, is highly unlikely. The strength of the public finances also reduces risks for other sectors.

External Financing

The continuity of the Chilean economy's access to external financing is crucial for its financial stability. The international capital market is an important source of financing for national firms and, to a lesser extent, for banks and the government. A sharp, significant deterioration in the conditions of access to international markets could bring a drastic depreciation of the currency or a pronounced portfolio adjustment, which could result in financial and/or balance-of-payments stress. This chapter examines the recent evolution of the Chilean economy's external financing and international liquidity and its outlook, as well as the risks that could affect its continuity.

External debt currently represents around 39% of GDP, 38% of the total debt of local firms, and 7% of total bank financing. The external debt of the public sector is low in comparison with the debt of the private sector. For the latter, 14% corresponds to loans contracted by subsidiaries with their parent companies abroad.

The low growth path of the Chilean economy's external debt has prevailed over the last six months, in a context of a current account surplus. External credit indicators have continued to strengthen, while residents' conditions of access to international financing continue to be favorable, despite the recent volatility of global financial markets. The country risk rating in foreign currency has remained stable. The only novelty is Moody's announcement last March that it would review the current classification with a view to a possible upgrade; this revision is currently being implemented. The country risk premium on public debt issued abroad has been very stable, although it rose in recent weeks, as it did for the rest of the emerging economies.

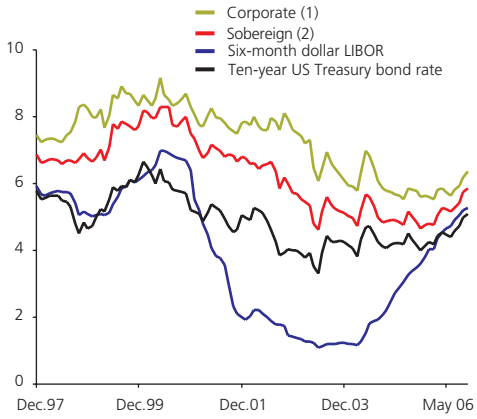
While the country risk premium continues at record lows, short- and long-term international interest rates have risen in the last quarter, and new upward adjustments are expected (figure III.15). The economy's cost of external financing will thus continue to increase gradually.

[7]/ One cent lower on the copper price reduces the central government's income by around US$40 million. Similarly, every point of lower growth implies a reduction in tax yields of nearly 0.2% of GDP.

Figure III.15

Cost of external financing

(percent)



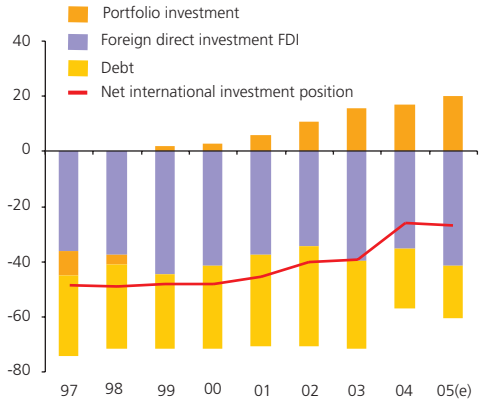
(1) *Chile empresas* index + ten-year US Treasury rate.
(2) Chile EMBI Global index + ten-year US Treasury rate.

Source: Bloomberg.

Figure III.16

Net international investment position

(percent of GDP) (*)



(e) Estimate.
(*) GDP at the real constant exchange rate (base index December 2005=100).

Source: Central Bank of Chile.

External financial position

The Chilean economy has maintained a relatively stable net debtor position for the past ten years. Since 2003, however, it has shown a reduction, measured both in dollars and as a share of output (figure III.16). This reduction is primarily the result of the current account surplus of the last two years.

The main external liabilities of the Chilean economy correspond to foreign direct investment (FDI). By their nature, these liabilities are contingent on the conditions of the economy and the currency. The main assets correspond to pension fund investments abroad, which are relatively liquid investments.

The Chilean economy's external financial position is solid in comparison with other investment-grade emerging economies. This evaluation is based on the size and composition of its external financing, the economy's capacity for growth, and, in the more immediate term, the high price of copper.

Table III,2

External debt of the Chilean economy (*)

(US$ million)

	2002 Dec.	2003 Dec.	2004 Dec.	2005 Dec.	2006 Apr.
Total external debt	40,504	43,068	43,283	44,847	45,327
Short-term external debt	5,652	7,176	7,625	7,214	7,224
Banks	1,289	2,426	2,319	1,161	1,208
Firms and individuals	4,352	4,741	5,290	6,037	5,998
Consolidated government	11	9	16	16	18
Long-term external debt	34,852	35,892	35,658	37,633	38,103
Banks	2,536	2,996	3,967	6,160	7,341
Firms and individuals	28,750	28,344	26,970	27,437	26,732
Consolidated government	3,566	4,552	4,721	4,036	4,030

(*) Contractual maturity.

Source: Central Bank of Chile.

External debt

In the last six months, the total external debt of the Chilean economy has increased slightly, continuing the slow growth trend observed since 2003 (table III.2). This trend, together with a higher growth rate of GDP and exports and the appreciation of the peso, explain the notable and sustained improvement in the external solvency indicators (table III.3). The ratios of external debt to GDP and of external debt to exports have fallen and today are around two-thirds of their averages for the last five years. The external debt service as a percentage of exports has fallen to around 80%.

Chile's external debt is comparable to the liabilities of other emerging economies with a similar risk rating (figure III.17). In contrast with those economies, however, Chile's external debt corresponds mainly to the

Table III.3

External liquidity and solvency indicators

(percent)

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

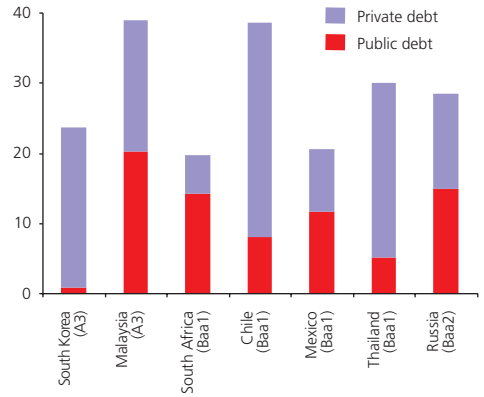
(1) STRED: short-term residual external debt.
(2) Unrestricted net international reserves: The Central Bank's official reserves minus short-term commitments in foreign currency (deposits, current maturities, swaps) and Treasury deposits at the Central Bank.

Source: Central Bank of Chile.

Figure III.17

International comparison of external debt/ GDP (*)

(percent)



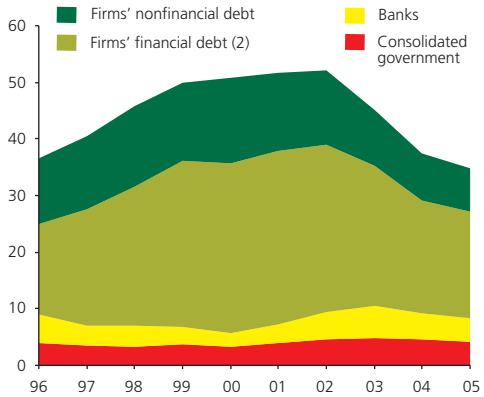
(*) Figures as of 2005; Moody's risk rating.

Sources:
Institute of International Finance.
Central Bank of Chile.

Figure III.18

Gross external debt by institutional sector

(percent of GDP) (1)



(1) GDP at the real constant exchange rate (base index December 2005=100).

(2) Excludes commercial credits and loans associated with FDI.
Source: Central Bank of Chile.

liabilities of private nonfinancial firms (61%) —and approximately half of these liabilities pertain to foreign-owned firms [8]/. Of the latter, around 25% is contracted with related firms abroad.

Private sector debt explains the total increase in external debt in 2005, mainly in the form of bank debt and foreign trade credits. The financial debt of firms, which are more sensitive to market conditions, has remained stable at around 68% of the total, while the public sector has reduced its international financing (figure III.18).

The majority of external debt corresponds to long-term loans (85%) at a fixed rate (55%) [9]/ (table III.2). Additionally, almost two-thirds of the variable-rate debt is contracted at the six-month Libor, which registers little volatility.

International liquidity

The official international liquidity indicators, measured as the ratio between international liabilities coming due within a year and international reserves, have remained stable (table III.3). This trend represents the combined effect of the swell of long-term commitments coming due and the continued increase in the stock of official reserves resulting from foreign currency deposits by the Treasure and commercial banks with the Central Bank.

A more acid measure of the ratio of residual short-term external debt to reserves, which subtracts the Central Bank's short-term foreign currency liabilities [10]/ and government deposits from reserves, displays a growing trend since 2003. This stems from the amortization of foreign-currency-denominated Central Bank certificates and the almost 30% increase in residual short-term external debt in the same period.

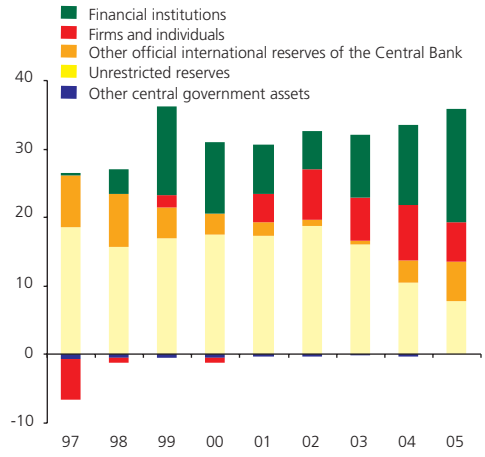
[8]/ A firm is said to be foreign-owned if 50% of equity or more is held by one or more investment firms controlled by foreign capital.

[9]/ Net of interest rate swap transactions.

[10]/ Private bank deposits, maturing bonds, and repurchase agreements.

Figure III.19

Availability of net external financial liquidity
(percent of GDP) (*)



(*) GDP at the real constant exchange rate (base index December 2005=100).

Source: Central Bank of Chile.

Nonetheless, the Chilean economy's overall supply of liquidity in foreign currency increased almost 70% in the last two years [11]/. This includes the accumulation of foreign currency assets by the Treasury as a counterpart to the fiscal surplus, as well as investments abroad by pension funds and other institutional investors (figure III.19).

Outlook and risks for external financing

No significant deterioration is expected in the Chilean economy's conditions for external financing, even when, as discussed in chapter II, a moderate increase is expected in interest rates and in the financial spread on emerging economy bonds, including in the case of the Chilean economy.

External debt should continue to increase at a very moderate rate, provided the current account shows a surplus this year and next. The public external debt should continue to fall, thanks to the high fiscal surpluses. The share of flows from foreign direct investment should increase, to the extent that profits continue to be reinvested.

Under more adverse external scenarios, such as those described in chapter II of this *Report*, the main threats to external financing are tied to a violent adjustment in the terms of trade and an increase in the cost of external financing, stemming from an increase in both international interest rates and the risk premiums paid by the emerging economies.

The exposure of balance-of-payments flows to the terms of trade and, in particular, to the price of copper and other commodities is moderate. The exposure to fluctuations in international interest rates and credit risk premiums is also moderate (capital outflows on the order of US$240 million after one year for each 100 basis points in the increased cost of external financing).

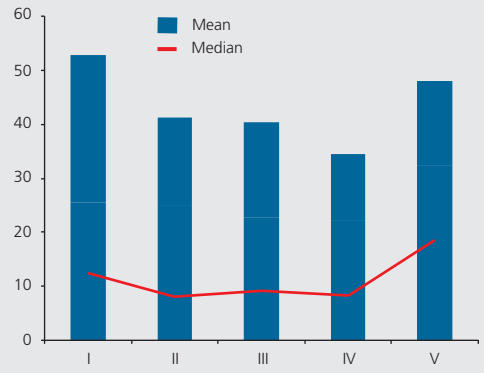
The Chilean economy is in a good position to absorb this type of shocks, considering that the starting point is an external-debt-to-GDP ratio of 39% and an actual current account surplus of close to 2%, with an estimated deficit of 3% of output measured at trend prices. External debt could increase moderately under more negative scenarios featuring commodity prices, GDP growth, and interest rates, but external indicators would not deteriorate materially, and the increase would not imply a sustained deterioration of the country premium. However, this type of scenario could always trigger a more marked volatility in the domestic financial markets, at least in the short term.

[11]/ The aggregate liquid assets in foreign currency of the Central Bank, the government, the financial system, and institutional investors soared from nearly US$30 billion in December 2003 to nearly US$50 billion in April 2006 (provisional data).

Box III.1: Household balance sheet and financial exposure

Figure III.20

Debt-to-income ratio (DIR) of indebted households
(percent, income quintile)



Source: Own calculations, based on data from the 2004 SPS.

Figure III.21

Distribution of household debt
(percent, income quintile)

Source: Own calculations, based on data from the 2004 SPS.

Aggregate debt indicators are insufficient for monitoring the risks associated with the financial exposure of households in Chile, because they may be hiding the situation of the most financially vulnerable groups. Based on the 2004 Social Protection Survey (SPS) [12]/, which does not include corrections for undeclared or underdeclared income [13]/, we can analyze the financial risk position of these groups, in particular, in greater detail.

The relative size of the debt with respect to household income is one indicator of payment capacity [14]/. This item is reflected in the financial indicator measuring the ratio of debt to income accumulated over 12 months (DIR). The analyzed data show that the average DIR is similar in the different income quintiles [15]/, registering 43% for all households with some level of debt [16]/. The extreme income quintiles display the highest DIRs, reaching 53% for the first quintile and 48% for the fifth quintile (figure III.20). The median indicates that half of all households have a DIR of less than 11% (for the highest income quintile, the median is 19%).

A little more than half the households interviewed reported having some type of debt. The share of households with mortgage debt was 16%, while 50% of households reported some level of nonmortgage debt. Even so, mortgage debt represents between 49% and 69% of the total aggregate debt of each income quintile (figure III.21).

[12]/ The SPS was first carried out in 2002, and it continued as a panel survey with a second version applied through late 2004 and early 2005. This survey was created through an alliance between the Subsecretary of Social Security (Ministry of Labor and Social Security) and the universities of Chile and Pennsylvania. The SPS is designed as a representative sample of the total population of the country, aged 18 years or more on December 2003. The number of individual surveys rose to nearly 17,000.

[13]/ The Casén survey does include this type of correction.

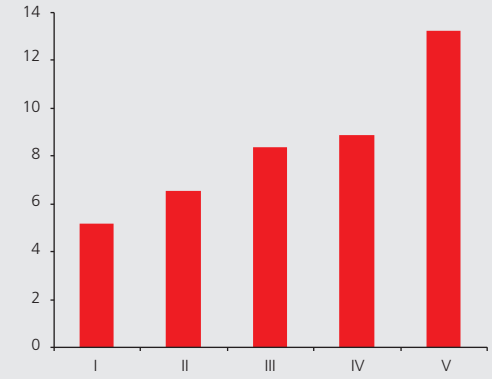
[14]/ A more direct indicator of consumers' payment capacity is the financial burden. This measures the cost of servicing contracted debt, and its estimation requires knowing the residual maturities and interest rates on loans. The 2004 SPS does not include questions related to the household financial burden.

[15]/ Income quintiles are calculated using the total per capita income of households (personal income plus transfers plus imputed rent).

[16]/ This indicator is not strictly comparable with the DIR estimates based on aggregate accounts in chapter III.

Figure III.22

Aggregate debt-to-assets ratio (DAR) of households (percent, income quintile)



Source: Own calculations, based on data from the 2004 SPS.

Both debt and assets are concentrated in the highest income quintiles. Although the highest income quintile accounts for the largest percentage of total debt, it also has financial backing owing to its greater accumulation of assets. As a result, no quintile has an aggregate debt-to-assets ratio of over 14% (figure III.22).

Mortgage debt is backed by the value of the housing property, which can also serve as collateral for other types of loans. If we focus the analysis on the subgroup of households that do not have mortgage debt, we find that the number of households with the greatest financial exposure (defined as those households whose DIR is in the highest 25%) represent only 7% of total debtor households. This group accounts for 40% of total nonmortgage debt, and the highest income quintile of this same group accounts for 20% of this debt.

Finally, the debtors with an even greater exposure are those who, in addition to having a high DIR and exclusively nonmortgage debt, display a negative net equity position —that is, their debts exceed their assets. However, this comparatively riskier group of debtors constitutes only 2% of total debtors. Moreover, this group accounts for barely 5% of total debt and 14% of nonmortgage debt.

Box III.2: Emerging economies' foreign currency credit risk rating

Table III.4

Country risk rating of emerging economies and selected variables (1)

	Variation required to increase one grade (2)
	(percentage points)
Ratio of current account deficit/ GDP	-11.1
GDP per capita (adjusted by purchasing power parity)	12.0
Ratio of short-term external debt/ total external debt	28.6
Ratio of international reserves/ total external debt	5.0
Ratio of private external debt/ total external debt	52.6
Ratio of time deposits in US$/ total deposits in the local financial system	-16.7
	(number of grades)
Average risk rating of the other countries in the region	1.9

(1) Only the variables that were significant in the estimations are shown.
(2) Represents the increase that would be required in each variable to improve the country's risk rating in foreign currency by one grade, according to the model estimated.

Source: Central Bank of Chile estimates.

International risk rating agencies undertake periodic evaluations of the credit risk of sovereign debt in foreign currency. This evaluation covers the capacity and willingness of governments to repay in full an on time their liabilities backed by said instruments. Various empirical studies find that the risk ratings of sovereign debt in foreign currency can be explained based on a set of macroeconomic variables [17]/.

The variables with the greatest explanatory power in these studies are as follows: per capita gross domestic product (GDP) (adjusted for purchasing power parity, or PPP); the GDP growth rate; the inflation rate; the ratio of the current account deficit to GDP; the ratio of total external debt to exports; and the ratio of short-term external debt to total external debt. These variables reflect the position of the economy's fundamentals, as well as its institutional solidity.

Other relevant variables in the case of emerging economies are the average risk rating of the region to which each country pertains (because of the contagion effect); the ratio of private external debt to total external debt; and the dollarization of the financial system.

Table III.4 summarizes the average relation between the above variables and changes in risk ratings for a set of 53 emerging economies, from 1990 to 2003 [18]/.

The results show that with regard to the changes in risk ratings of the economies in the region to which this one pertains, the per capita GDP (adjusted for PPP) and the ratio of the current account deficit to GDP appear to be the variables most closely related to an emerging economy's sovereign risk rating in foreign currency.

Applying these relations to the Chilean economy suggests that the loan quality of its sovereign debt in foreign currency is consistent with its current rating by some international ratings agencies. This result also suggests that the current sovereign risk rating is not very sensitive to normal changes in the most determinant variables, but rather could only be affected by very significant variations.

17/ Alexe, Hammer, Kogan, and Lejeune (2003); Cantor and Parker (1996); Monfort, Brieuc, and Mulder (2000); Mora (2004).

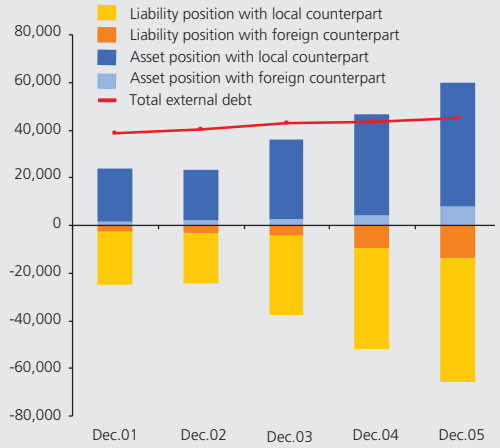
18/ To be able to make empirical estimates, the ordinal scales of the rating agencies were transformed into a numerical index, with a lineal unit increase for each step-up in risk rating. It is thus possible to study the relation between the numerical equivalence of the risk rating and the most significant macroeconomic variables.

Box III.3: Currency derivatives and external debt

Figure III.23

External debt and currency derivatives positions of the Chilean economy (*)

(US$ million)



(*) Derivatives positions correspond to the total amount of (nominal) notional values of outstanding contracts at the date of the report.

Source: Central Bank of Chile.

Currency mismatches on the balance sheets of economic agents, originating in foreign-currency-denominated debt, is one of the main sources of financial risk. This is particularly relevant for the Chilean economy, which has a flexible exchange rate, whose external debt represents 39% of GDP, and where 79% of that total is private debt. The growing development of the currency derivatives market in the past few years reveals a rise in the use of currency risk hedging as a share of external debt, which is thought to increase the stability of the economy's external financial flows in the face of exchange rate shocks [19]/.

In its simplest form (forward), a currency derivative is a financial instrument that allows the purchase (long or asset position) or sale (short or liability position) of foreign currency at a predetermined future date and a predetermined exchange rate. This makes it possible to reduce exchange rate uncertainty.

The evolution of the currency derivatives market in Chile in the last five years has been considerably more dynamic than the external debt market (figure III.23). The asset position grew 148% in the period 2001–2005, while the liability position increased 165%. This takes on particular importance in the case of cross-border contracts or currency derivatives contracts between residents and nonresidents, even though the current position (notional value) of these contracts represents only a small fraction of the total (less than 15% of total asset and liability positions, on average).

The use of currency derivatives to hedge external debt in Chile has increased progressively in the last five years. In 2001 economic agents used financial hedging of currency risk equivalent to just 13% of external debt, whereas this figure was nearly 25% in 2005 (table III.5).

[19]/ This analysis excludes the natural coverage of agents whose returns are in the same denomination as their debt flows. The base used covers almost all of Chile's external debt, except in the case of incomplete information on commercial credits.

Table III.5

External debt and net positions of agents using currency derivatives (1)

	2001 Dec.	2002 Dec.	2003 Dec.	2004 Dec.	2005 Dec.
			(US$ million)		
External debt	38,538	40,504	43,068	43,283	44,847
Of agents that use derivatives	12,057	11,515	13,217	14,201	14,906
Of agents with a net asset position	7,506	6,243	8,481	8,228	10,802
Net asset position	5,197	4,672	6,134	7,175	12,066
			(percent)		
Debt coverage (2)	13	12	14	17	24

(1) Derivatives positions correspond to the total amount of (nominal) notional values of outstanding contracts at the date of the report.
(2) Debt coverage with currency derivatives is an estimate, calculated as the minimum between the net asset position and the debt of the agents that hold those derivatives positions, divided by total debt.

Source: Central Bank of Chile.

A more detailed analysis reveals that among the economic agents with external debt, the banks are increasing their use of currency derivatives the fastest (table III.6). In 2001, currency hedging by the banks was barely 13% of their external debt, while in 2005 this figure was 45%. Firms, in contrast, use currency derivatives to a lesser extent, holding steady at around 10% of their external debt throughout the period. Other economic agents have maintained a hedging rate of around 20% of their external debt in the period. Within this group, the nonbank financial institutions are the entities using currency derivatives; they maintained net asset positions greater than their debt in the full period.

Table III.6

Currency hedging of external debt (*)

	2001 Dec.	2002 Dec.	2003 Dec.	2004 Dec.	2005 Dec.
			(US$ million)		
Corporate debt	32,941	32,942	32,957	32,156	33,359
Of agents with a net asset position	6,471	5,030	5,718	5,628	6,712
Net asset position	3,746	2,958	3,000	3,184	4,153
			(percent)		
Debt hedged	11	9	9	10	12
			(US$ million)		
Bank debt	2,521	3,820	5,422	6,286	7,321
Of agents with a net asset position	316	400	1,932	1,717	3,276
Net asset position	441	506	1,544	2,085	5,479
			(percent)		
Debt hedged	13	10	28	27	45
			(US$ million)		
Other debt	3,076	3,742	4,689	4,841	4,167
Of agents with a net asset position	719	813	830	883	814
Net asset position	1,010	1,209	1,590	1,906	2,434
			(percent)		
Debt hedged	23	22	18	18	20

(*) Debt hedged with currency derivatives is only an estimate, calculated as the minimum between the net asset position in currency derivatives and the debt of the agents that hold those derivatives positions, divided by the total debt of each sector.

Source: Central Bank of Chile.

Nevertheless, firms account for the largest percentage of external debt in Chile. About 80% of the debt of firms that maintain net asset positions corresponds to the nontradables sector, and these are precisely the firms that are the most exposed to currency risk. For this subset of firms, their external debt backed by currency derivatives rose to 66% last year (from an average of 60% in the period of analysis) [20]/.

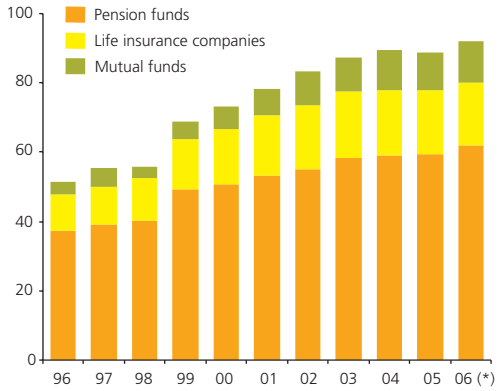
In sum, the use of currency derivative instruments in the Chilean economy has risen at an increasing rate over the last five years. A notable result of this process is the growth in currency hedging as a share of external debt, mainly on the part of banks and firms in the nontradables sector. This situation favors the continued financial stability of the country.

[20]/ However, nearly a third of the external debt of agents that do not use currency derivatives also corresponds to the nontradables sector.

IV. Financial institutions

Figure IV.1

Relative importance of nonbank financial institutions
(percent of GDP)

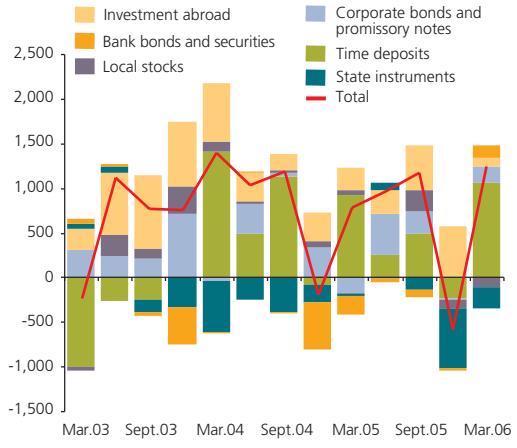


(*) Figures as of March.

Sources:
SVS.
SAFP.
Central Bank of Chile.

Figure IV.2

Net portfolio changes of nonbank financial institutions
(billions of pesos of March 2006)



Source: Own calculations, based on data from SVS and SAFP.

IV.1 Nonbank financial sector

The investment decisions of the nonbank financial institutions (NBFIs) included in this Report (namely, the pension funds, life insurance companies, and mutual funds) affect the financing conditions of credit users and banks, as well as the distribution of risk within the system. Their analysis is therefore of interest for the financial stability of the economy.

The assets administered by the NBFIs grew 10.6% in real annual terms as of the close of the first quarter of 2006. This is above the growth rate of the economy, although slightly lower than the growth rate of previous years. The performance of mutual funds' equity in the last quarter of the year largely explained this lower growth. Even so, the assets of the NBFIs represent nearly 90% of GDP (figure IV.1).

Investment growth has been concentrated in foreign instruments (table IV.1), led by mutual fund investments abroad [1]/. At the same time, the search for more profitable investments and the reduced availability of long-term debt instruments in the local market have been reflected in a lower share of state securities and mortgage bills. The share of bank time deposits has been stable, despite the negative flow of net purchases in the last quarter of 2005 (figure IV.2).

Table IV.1

Nonbank financial institutions' investment portfolio
(percent, billions of pesos of March 2006)

	2002	2003	2004	2005		2006
Instruments	**Dec.**	**Dec.**	**Dec.**	**Jun.**	**Dec.**	**March (p)**
State fixed-income	25.9	22.1	17.4	16.9	14.9	13.8
Time deposits	22.3	16.8	20.4	21.5	21.7	22.4
Bank bonds	3.0	2.6	2.4	2.9	3.3	3.4
Mortgage bills	12.5	10.8	8.7	7.1	6.4	6.1
Mutual mortgage loans	2.3	2.2	1.9	1.9	2.0	2.0
Corporate bonds and promissory notes	10.8	12.8	13.0	12.9	12.9	12.5
Local stocks	7.3	10.9	11.9	12.9	12.0	12.2
Investment abroad	11.8	16.7	19.0	19.6	21.8	23.1
Other	4.0	5.1	5.2	4.4	4.9	4.6
Total (billions of pesos)	41,650	47,287	53,613	56,980	57,637	61,239

(p) Provisional figures.

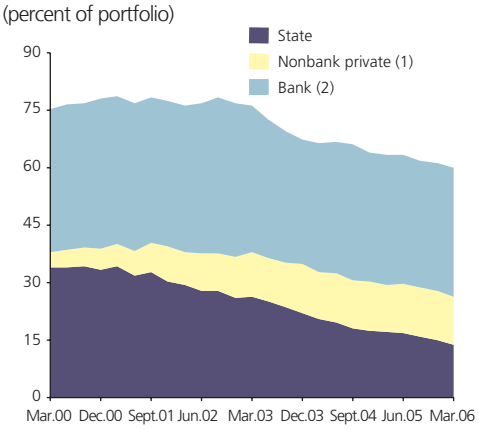
Sources:
SVS.
SAFP

[1]/ As of April 2006, the pension funds' investments abroad represented 32.5% of their assets, surpassing the 30% limit established in the regulations. This excess investment abroad is mainly explained by the higher returns on these investments throughout much of 2005.

Figure IV.3

Domestic fixed-income instruments in NBFI's portfolios

(percent of portfolio)



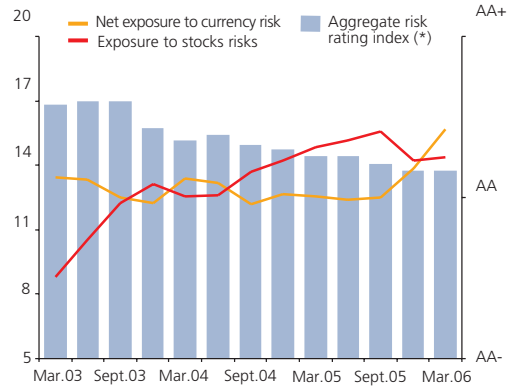
(1) Corporate bonds and promissory notes.
(2) Time deposits, bonds and mortgage bills.

Source: Own calculations, based on data from SVS and SAFP.

Figure IV.4

Risks in pension funds and mutual funds' portfolios

(percent of assets, risk rating category)



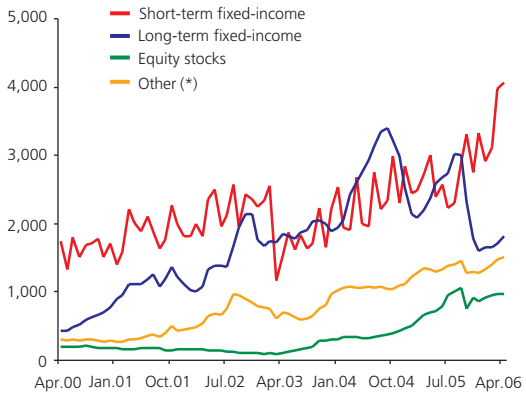
(*) Calculated by converting current debt rating categories into a numerical scale from 0 to 20, weighted by the amount of that debt.

Source: Own calculations, based on data from SVS and SAFP.

Figure IV.5

Net equity of mutual funds

(billions of pesos of April 2006)



(*) Includes medium-term (90 to 365 days), non-restricted, mixed, structured and institutional funds.

Source: SVS.

Credit and market risk exposure

In the period from September 2005 to March 2006, the credit and market risk exposure of the institutional investors increased slightly. In March 2006, the relative share of investments in state instruments had fallen to half its 2003 level, giving way to greater investments in corporate debt and fixed-income bank instruments (figure IV.3). The mutual fund portfolios saw a slight increase in risk exposure, consistent with the search for instruments yielding higher returns in an environment of low interest rates. The weighted credit risk index on the mutual funds' debt instruments remained stable. While the low share of fixed-income holdings in assets has generated a fall in credit risk exposure, the higher share of variable-income instruments and investments abroad has increased the exposure to market risk (stocks and currency risk) (figure IV.4).

In accordance with the long-term rate adjustment in the last quarter of 2005 and agents' expectations of a normalization of monetary policy, the mutual funds reduced their exposure to interest rate risk. The average portfolio maturity in the first quarter of 2006 was 344 days, which is 130 days shorter than the average of the last two years. This lower exposure also reflects the contraction experienced by the mutual funds in the last quarter of 2005; this trend mainly affected the long-term fixed-income funds, which saw their equity fall by 47% in the period (figure IV.5). The mutual funds' portfolio maturity registered a slight upward trend, reaching 1,187 days in March 2006, or 8% higher than in March 2005. In the case of the life insurance companies, the negative impact of the low interest rates of recent years on investment returns was mainly felt in 2005 (figure IV.6). The interest rate risk associated with the reinvestment of their assets has started to fall as long-term interest rates normalize.

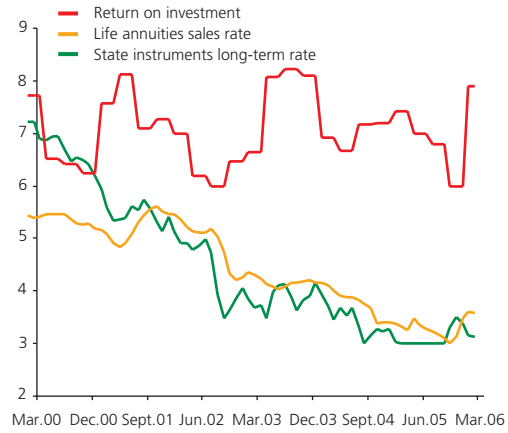
The positive return on investments abroad has increased NBFIs' exposure to the exchange rate. As of March 2006, foreign-currency-denominated assets accounted for 23% of total assets, which is above the average of the last five years (17%). This exposure has been partly compensated by the greater use of currency derivatives, mainly forward sales contracts. In particular, the growing transfer of affiliates into funds with a higher share of foreign investment (A and B funds), which in practice use a lower share of currency hedging, has increased the net currency exposure from 13.7% of assets in 2004 to 16.5% in March 2006 (figure IV.4). The mutual funds have also increased the share of their portfolio exposed to exchange rate fluctuations, to over 11%.

The NBFIs' exposure to stock market risk has grown in the last three years. This trend eased off slightly in the fourth quarter of 2005, when the performance of the local stock market worsened. A contributing factor in this trend is the development of stock mutual funds, which peaked in September 2005 with an equity of $1,044 billion. At the same time, the transfer of affiliates into riskier pension funds increased the share of A and B funds in

Figure IV.6

Long-term spread and return on investment of life insurance companies (*)

(percent)



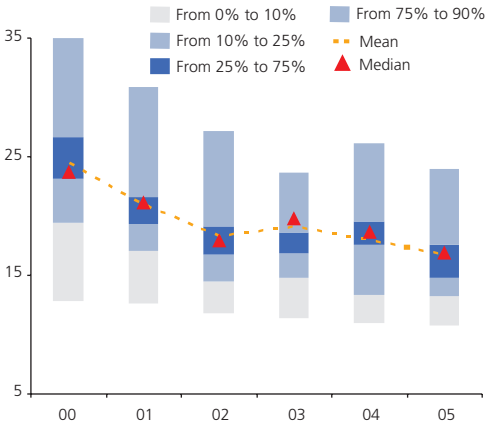
(*) Long-term reference spread: the difference between State instruments long-term rate and the life annuities sales rate.

Source: SVS.

Figure IV.7

Solvency of life insurance companies (*)

(equity/ risk-weighted assets)



(*) The percentile indicates the amount of life insurance companies' equity accumulated.

Source: Figueroa and Parrado (2005).

total funds, rising steadily from 25% in January 2004 to 38% at the end of the first quarter of 2006 [2]/. Life insurance companies, in turn, maintained a low stock market exposure, at around 3.5% of their portfolio.

Under the most likely scenario (chapter II), portfolios are expected to gradually move toward longer-term fixed-income instruments. The diversification strategy pursued by mutual funds supports the projection that investment abroad will continue at the established limit. However, if returns fall relative to variable-income instruments, the recent transfers toward riskier funds could be reversed and the demand for these instruments reduced.

The financial position of the life insurance companies

Life insurance companies, unlike mutual funds and pension funds, have fixed obligations to their insurees that are backed up by their assets. However, in contrast with banks, their main liabilities —namely, life annuities— are long term.

Life insurance companies display favorable solvency indicators, with a debt level of around eight times equity, which provides a sufficient gap with the maximum 16 times established in the regulations (figure IV.7). The evolution of long-term interest rates affected the profitability of the life insurance companies. In December 2005, the average return on investment was 5.8%, and return on equity (ROE) was 9.1%; these are the lowest levels posted for these indicators in the last three years. The losses from the fourth quarter of 2005 were reversed in March 2006, however, as a result of the good performance of variable-income and investments abroad and the lower costs associated with the fall in life annuity sales (figure IV.6) [3]/. Despite the interest rate level and the competitive environment prevailing in the industry, the equity coverage of the companies and the adequate management of business in recent years have contributed to improving the risk ratings of some companies, which has been reflected in a recovery of the industry's aggregate risk indicator (figure IV.8) [4]/.

In the most likely scenario, the outlook for the life insurance companies is favorable because the normalization of long-term rates improves the expected returns on the fixed-income instruments that cover their liabilities.

[2]/ The last age-based transfer from C funds to B funds took place in December 2003. From that date on, all fund transfers are exclusively the decision of the contributors.

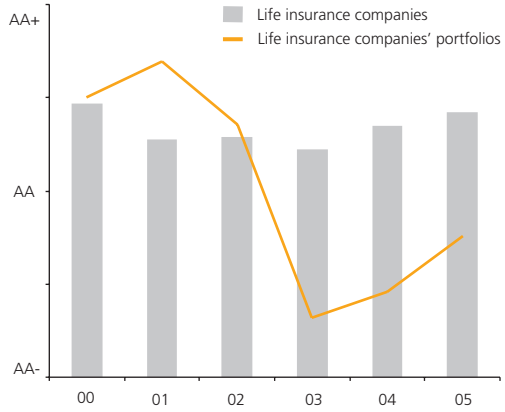
[3]/ Life annuities registered a real annual drop of 22% in March 2006, which was partly offset by an increase in group insurance (mainly mortgage life insurance).

[4]/ In April 2003, the life insurance industry experienced a generalized reduction in risk ratings (one level), based on the lower prevailing market interest rates and the higher degree of competition in the industry.

Figure IV.8

Aggregate risk rating indices (*)

(rating category)



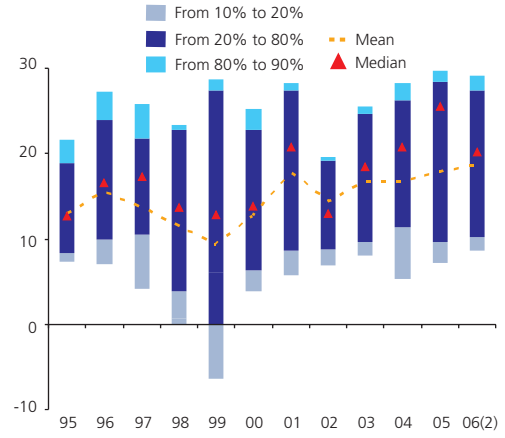
(*) Calculated by converting current ratings categories of life insurance companies (debt instruments in their portfolios) to a numerical scale from 0 to 20, weighted by the size of their assets (amount of those instruments).

Source: Own calculations, based on SVS data.

Figure IV.9

Return on equity (ROE) (1)

(percent)



(1) The percentile corresponds to the amount of total loans accumulated.

(2) Figures as of April.

Source: Own calculations, based on SBIF data.

IV.2 Banking sector

This section analyzes the local banking system —whose assets are currently close to 100% of GDP— from the perspective of financial stability. The financial strength of the banking institutions depends on their exposure to credit, market, and liquidity risks and their capacity to absorb shocks.

Equity solvency and profitability

The banking system's return on equity (ROE) sits at around 18% in 2006, which is above the average registered for the last ten years. The relatively larger private banks have achieved capital yields of 27% in the last twelve months thanks to the strong growth of retail loans, while the niche banks, dedicated mainly to the consumer segment, posted 24% in the same period (figure IV.9).

Although recently the return on equity has been stable, its composition has changed significantly. As highlighted in the last *Report*, the greater volume of banking activity allowed banks to compensate the reduction of interest margins in the period from June 2004 through April 2005. Since the middle of last year, however, this margin has become more stable, while bank equity has increased (box IV.2).

The return on assets was flat at 1.4%, on average, in the first four months of 2006. Provisions expense rose slightly relative to December 2005, reaching 0.8% of assets, and was offset by higher income from commissions. Interest margins and operational efficiency, on the other hand, remained stable at around 3.0% and 2.2% of assets, respectively.

As the normalization process of interest rates continues to unfold, provisions expenses are expected to rise —especially in banks that are more exposed to consumer loans. This would have a negative impact on the profitability of the banking system. If the current macroeconomic conditions persist, interest margins could continue to recover as a result of stronger growth in loans to small firms, especially on the part of the relatively larger banks.

The system's capital adequacy level reached 13.2% in April 2006, which is similar to that of countries with the same risk rating but lower than the level recorded in recent years. The observed reduction in the capital adequacy index reflects the strategy adopted by the banks —namely, expanding their loans using the slack in their capital base (figure IV.10). Even so, all the banking entities maintain a capital adequacy index above 10%.

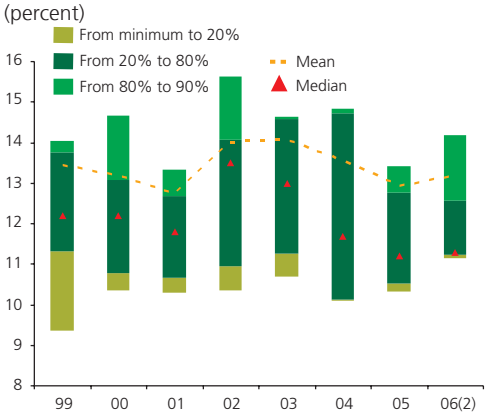
The recent capitalization of a share of earnings by a number of systemically important entities has allowed them to strengthen their equity base this year so far. In the future, banks can be expected to increase their equity in step with the growth in loans.

The high profitability of the banking industry and its current equity position are reflected in the positive and stable risk ratings of these institutions (N-1 or over AA) and in the general evaluation of the financial strength of the banking system (table IV.2).

Figure IV.10

Capital adequacy index (CAI) (1)

(percent)



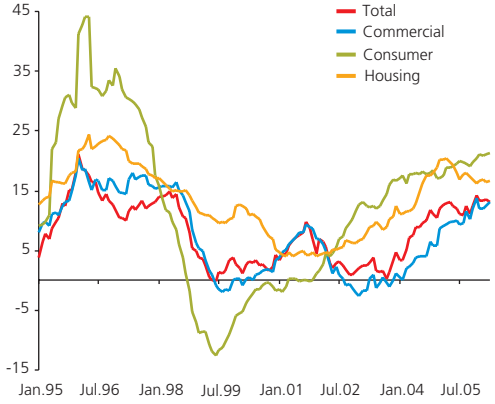
(1) The percentile corresponds to the amount of risk weighted assets accumulated.
(2) Figures as of April.

Source: Own calculations, based on SBIF data.

Figure IV.11

Growth in loans

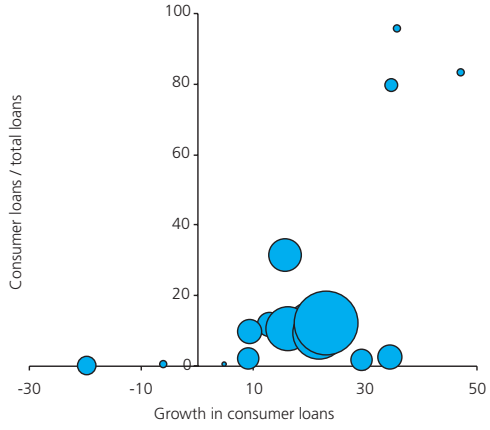
(real annual change, percent)



Source: SBIF.

Figure IV.12

Growth in consumer loans (*)
(real annual change, percent)



(*) The size of the circle indicates the share in the basic capital of the industry as of April 2006.

Source: Own calculations, based on SBIF data.

Table IV.2

Bank financial strength index (1)(2)

(Index points, on a scale of 0–100)

	Countries			
	Higher ranking than Chile	Chile	Same ranking than Chile	Lower ranking than Chile
Index	70	58	45	25

(1) Weighted average of Moody's financial strength index.
(2) Countries ordered by their Standard & Poor's country risk rating.

Sources:
Moody's
Standard & Poor's
Central Bank of Chile.

Credit risk

Consumer loans have continued to grow at real annual rates of 20% in recent months (figure IV.11). This expansion has been concentrated in the relatively larger banks, whose exposure to this segment of the loan market is less than 10% (figure IV.12). This figure represents a maximum historical level and partly explains the recent rises in the main credit risk indicators of the sector.

Consumer portfolio provisions increased 20 basis points relative to year-end 2005, reaching 3.8% of the total portfolio and 5.8% in the case of loans to lower-income sectors (bank consumer loan divisions).

Commercial portfolio provisions have upheld their downward trend. Although loans to firms have grown steadily since 2004, the aggregate nonperforming portfolio index has remained stable at 0.9% (figure IV.13), and the provisions coverage level reached its highest value of the last ten years (1.8 times).

Methodological differences in the calculation of the past-due portfolio relative to other countries tend to underestimate the percentage of unpaid loans. If we define the nonperforming portfolio based on a payment arrears greater than or equal to 30 days, the April nonperforming portfolio index increases slightly to 1.08%[5]/. If the outstanding balance of nonperforming loans is also incorporated, this figure climbs to 2.4% [6]/.

Loans to microenterprises have grown 30% in the last two years, although they continue to account for less than 2% of the total commercial loan portfolio. Loans to relatively larger firms are also growing strongly again. At the sectoral level, loans to the construction sector have grown at faster rates than in previous years, raising its relative share to more than 11% of total corporate loans.

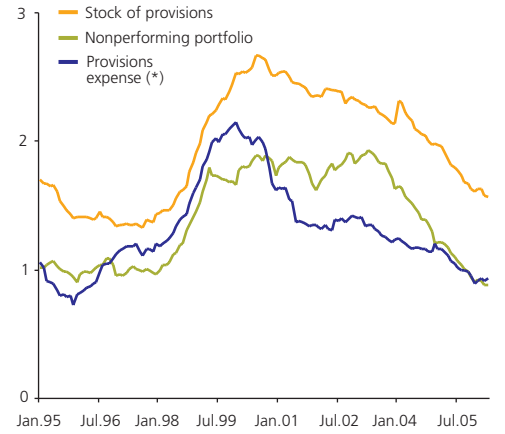
[5]/ See "Indicadores de riesgo sujetos a tensión," published by the Superintendency of Banks and Financial Institutions (SBIF) starting in May 2005.

[6]/ See the box, "Adjusted nonperforming loan index," in the *Financial Stability Report*, second half 2005.

Figure IV.13

Credit risk indicators

(percent of loans)



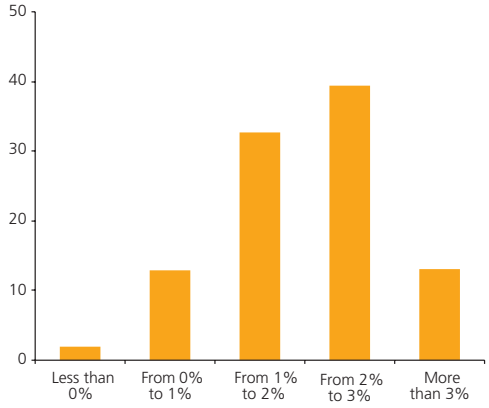
(*) Annualized based on the twelve-month moving sum of the monthly flow.

Source: SBIF.

Figure IV.14

Currency risk exposure (*)

(percent of capital in the total system)



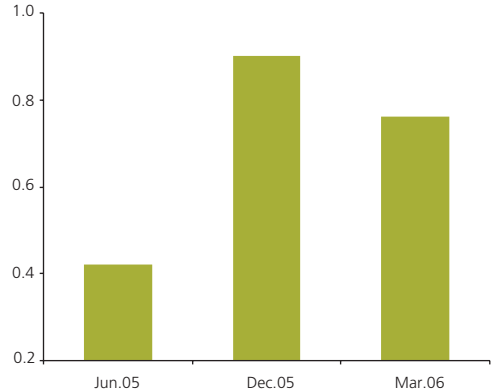
(*) Net asset position/ basic capital as of April 2006.

Source: Own calculations, based on SBIF data.

Figure IV.15

90-day maturity gap (1) (2)

(times basic capital)



(1) Difference between income and expenses.
(2) Includes only the relatively large private banks.

Source: Own calculations, based on data published by the banks.

Housing loans continue to grow vigorously, although they are slowing slightly in 2006 (a real annual rate of 16%). This stems from the interest rate hikes and the significant fall in refinancing that that caused.

Market risks

The duration of liabilities has remained stable despite the reduction in fixed-income instruments in the structure of bank financing since mid-2002. In fact, the larger issue of bank bonds —over 13 million UFs (unidades de fomento, an inflation-indexed unit of account) since last September— has failed to offset the drop in mortgage bills.

Given the banking system's current exposure to interest rate risk, the normalization of monetary policy that is expected under the most likely scenario would have a negative impact on bank earnings, reducing return on equity by approximately one percentage point.

At the aggregate level, the banking system maintains a positive net exposure to a rise in the exchange rate, despite the recent increases in its foreign currency liabilities position (figure IV.14). While time deposits in dollars rose by more than US$2 billion in the last twelve months, external indebtedness grew over US$1.7 billion in the same period. External financing (credit lines and bank bonds) reached 6.9% of total bank financing.

Liquidity

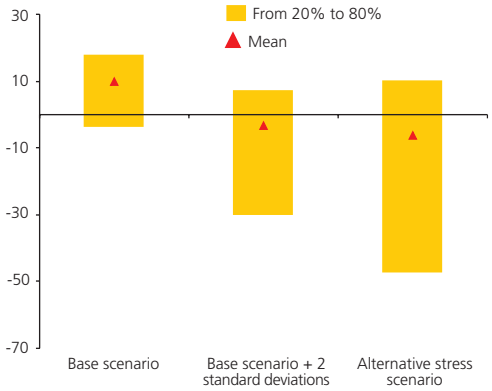
The liquidity mismatch on banks' balance sheets has grown as a result of the strong growth of total loans. While the financial investment portfolio continued to shrink in the first months of 2006 (to an average real annual rate of 12% in the period), the contracted maturities of both mortgage and consumer loans have increased.

The ratio of total deposits to loans has increased to 82% this year, as a result of the strong, stable growth of total deposits at a real annual rate of over 15% in the last eighteen months. Furthermore, the rise in deposit interest rates beginning in 2004 has allowed banks to lengthen the average maturity of bank deposits. Thus, while time deposits grew at a real annual rate of 19%, on average, in 2006, the average annual growth rate of demand deposits was only 3%. The most noticeable impact of this development was on the relatively larger private banks, whose deposit base surpasses the system's average; this allowed them to reduce their exposure to 90-day liquidity risk in the first quarter of 2006 (figure IV.15).

The banks' strong dependency on financial wholesalers (45% of time deposits) persists. This factor could generate market turbulence in more volatile financial contexts.

Figure IV.16

Distribution of ROE under alternative scenarios (1) (2)
(percent)

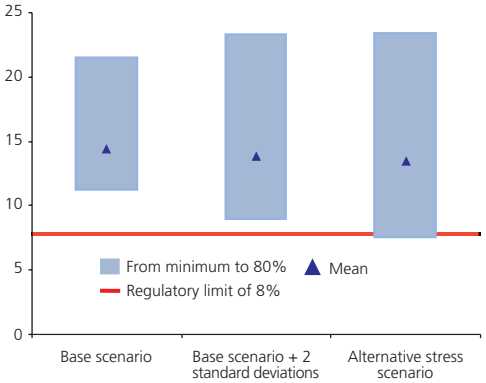


(1) The percentile indicates the comulative amount of total assets.
(2) As of February 2006.

Source: Own calculations, based on SBIF data.

Figure IV.17

Distribution of CAI under alternative scenarios (1) (2)
(percent)



(1) The percentile indicates the amount of risk-weighted assets accumulated.
(2) As of February 2006.

Source: Own calculations, based on SBIF data.

Main threats

The materialization of the risk scenarios facing the economy (chapter II) would have a direct impact on banking institutions by deteriorating the payment capacity of debtors (credit risk) and originating losses or gains from interest rate fluctuations (interest rate risk) and exchange rate volatility (currency risk).

The historical sensitivity of the consumer portfolio to cyclical fluctuations of the economy suggests that institutions that are more exposed to this segment of the credit market could face significant erosion of earnings in the face of extreme scenarios.

Of the market risks, the exposure to interest rate risk has risen slightly since the last *Report*, while the exposure to foreign currency risk remained contained.

Under the most adverse scenario, the aggregate impact of these risks could reduce return on equity by 300 basis points, on average, which could translate into negative earnings for a considerable number of institutions (figure IV.16). This situation, however, does not necessarily represent a big threat to the financial stability of the system as a whole. The banking system's provisions and capital levels would allow the majority of the institutions to maintain capital adequacy levels similar to current ones (figure IV.17).

Box IV.1: Mutual funds and short-term variations in financial conditions

Investors in the mutual fund industry are highly sensitive to short-term changes in financial conditions. Some recent events allow us to characterize the investment decisions of shareholders and evaluate the potential implications of this reallocation of financial resources vis-à-vis bank liquidity.

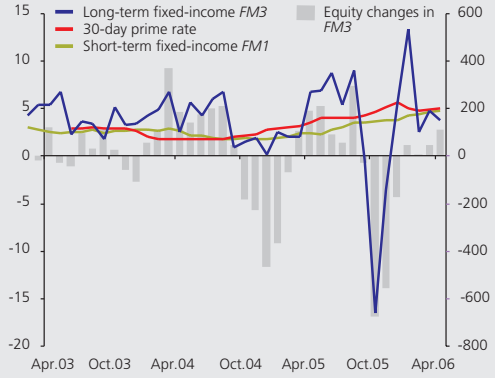
The latest significant fluctuation in mutual funds occurred in October and November 2005. Those two months registered a pronounced increase in long-term interest rates, negative inflation, and drops in the Selective Stock Price Index (known as *IPSA*). This scenario reduced the returns on long-term fixed-income mutual funds (denominated *FM3*), triggering an outflow of shareholders and a 41% reduction in equity in just two months. At the same time, the stock market posted a negative performance in the fourth quarter, which affected returns on capitalization (equity stocks) funds (*FM5*), whose equity shrunk 13% in that period (table IV.3).

A similar pattern occurred in late 2004, when an increase in short-term deposit rates, combined with negative inflation, positioned the *FM3* yields below the returns offered by short-term mutual funds and below the yields on bank deposits. This triggered an average monthly equity contraction of 11.4% for the *FM3* funds in November and December (figure IV.18).

Figure IV.18

Comparative return on instruments

(annualized monthly rates, billions of pesos of April 2006)



Sources:
SVS.
Central Bank of Chile.

Table IV.3

Financial volatility and mutual funds' equity

(average monthly change)

Variables	2002-2006 Mean	2002-2006 Standard deviation	2004 Nov.-Dec. Mean	2005 Oct.-Nov. Mean
		(basis points)		
BCU-5	0.0	24.0	16.2	72.3
Bank rate (*)	5.0	25.0	36.0	54.0
Monthly inflation	0.0	43.8	-33.3	-61.5
		(percent)		
IPSA	2.1	4.1	0.8	-2.9
Total mutual funds	1.9	9.6	-4.5	-10.5
FM 1	4.2	20.8	0.2	-1.3
FM 3	0.5	9.0	-11.4	-23.1
FM 5	6.0	9.9	7.9	-3.5

(*) 90-day peso bank lending rate.

Sources:
SVS.
Central Bank of Chile.

Table IV.4

Mutual funds and bank deposits
(average monthly change)

Variables	2002-2005 Mean	Std. dev.	2004 Nov.-Dec. Mean	2005 Oct.-Nov. Mean
		(percent change)		
Mutual fund deposits	1.3	6.7	-4.6	-2.1
Bank deposits	1.0	1.5	0.6	2.1
		(percent)		
Mutual fund deposits/ bank deposits	15.9	1.7	17.1	15.7
Larger banks	7.9	1.0	9.0	7.5
Medium-sized banks	26.1	3.6	28.1	28.0
Treasury banks	54.5	8.6	48.7	65.5
Mutual fund deposits/ bank assets	6.9	0.8	7.3	7.2
Larger banks	3.2	0.4	3.5	3.3
Medium-sized banks	13.2	2.0	14.3	14.3
Treasury banks	20.3	4.3	14.8	19.7

Sources:
SVS.
SBIF.
Central Bank of Chile.

The strong growth in assets administered by the mutual funds in the recent period and the high share of time deposits in their investment portfolios have led to a situation in which this industry contributes, on average, close to 16% of the banking system's time deposits. Consequently, the greater volatility of the mutual funds' investment portfolios has significant potential effects on the liquidity and financing of the banking system.

During the two episodes described above, the mutual funds' bank deposits fell at an average monthly rate of 4.6% and 2.1%, respectively (table IV.4). However, the banks were able to recapture the resources directly by offering more attractive deposit rates to their clients, such that total bank deposits continued to grow, especially in late 2005. The recent growth of short-term mutual funds (*FM1*) —whose assets are primarily made up of bank deposits— will also help limit the final impact on the banking sector by absorbing part of the reduction in bank deposits caused by the performance of the *FM3* funds.

Box IV.2: Origins of bank profitability

Earnings represent the first buffer for banks in the face of unexpected adverse shocks. If earnings are not sufficient to absorb these changes, banking institutions could reduce their capital to below the required minimums, which constitutes a factor of financial instability. The factors that explain the return on equity (ROE) are diverse in nature and have different implications for the financial solidity of the banking system. Increases in ROE that are explained by a rise in leverage or by a greater appetite for risk could reduce a bank's financial strength. Thus, banks with similar profitability levels are not necessarily equally well-equipped to face adverse shocks.

A bank's return on equity can be decomposed as follows [7]/:

$$\text{ROE} \quad \frac{\pi}{K} \quad \frac{\pi}{OI} \quad \frac{OI}{RWA} \quad \frac{RWA}{TA} \quad \frac{TA}{K}$$

The first expression measures the ratio of profits (π) to operating income (OI). An increase in ROE as a result of this factor can be attributed to an increase in operating efficiency and/or better portfolio quality, that is, lower support and provisions expenses, respectively.

The ratio of OI to risk-weighted assets (RWA) is a measure of the intermediation margin or spread [8]/ (net interests and inflation adjustments).

The ratio of RWA to total assets (TA) measures the banking system's appetite for risk. Thus, an increase in ROE through this factor reflects a greater exposure of the banking system to riskier assets.

The ratio of TA to basic capital (K) measures the banking system's leverage. An increase in ROE through this item can undermine the financial solidity of the banking system to the extent that it reduces the system's capital adequacy index.

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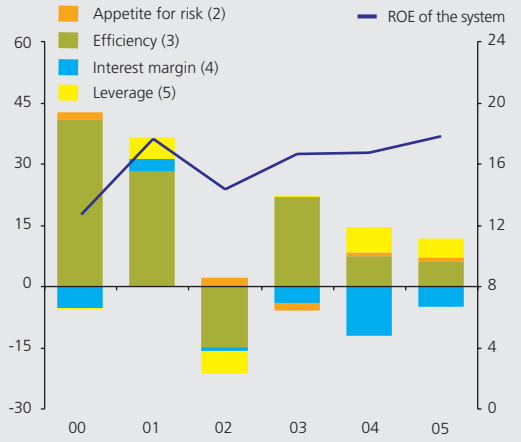
[7]/ See *Financial Stability Review*, December 2003, page 74, Bank of England; and *Informe de Estabilidad Financiera*, number 6, pages 42–43, Banco de España.

[8]/ The intermediation margin accounts for approximately 80% of operating income, on average.

Figure IV.19

Contribution to ROE (1)

(annual change, percent)



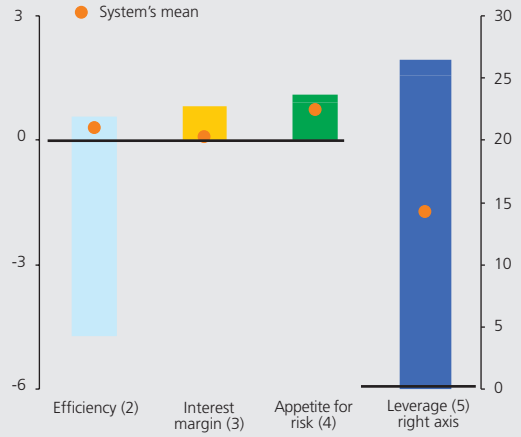
(1) Earnings/ basic capital.
(2) Coefficient of risk-weighted assets and total assets.
(3) Coefficient of earnings and operating income.
(4) Coefficient of operating income and risk-weighted assets.
(5) Coefficient of total assets and basic capital.

Source: Own calculations, based on SBIF data.

Figure IV.20

Breakdown of ROE (1)

(times)



(1) Each component of ROE shows the range between the minimum and maximum in the system as of 2005.
(2) Coefficient of earnings and operating income.
(3) Coefficient of operating income and risk-weighted assets.
(4) Coefficient of risk-weighted assets and total assets.
(5) Coefficient of total assets and basic capital.

Source: Own calculations, based on SBIF data.

Figure IV.19 charts the evolution of ROE and the contribution of its components to the annual growth of profitability. As the figure shows, operating efficiency has been the most important factor in the banking system's profitability over the last six years, and, with the sole exception of 2002, its contribution to the system's ROE has been consistently positive. The margin, in turn, made a negative contribution to system profitability beginning in 2003, which was partly compensated by increased leverage[9]/.

The ROE breakdown into the factors that explain its variation is shown in figure IV.20. In 2005, ROE ranged between –21% and 30% of capital, mainly because of the heterogeneity of the Chilean banking system's operating efficiency.

[9]/ While the greater contribution of leveraging to ROE weakens the equity solidity of the banking system, the fact that banks are currently maintaining capital adequacy indices above the required minimum have prevented a weakening of the banking industry's financial position.

V. Financial regulations and infrastructure

This chapter reviews recent initiatives regarding 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.

V.1 Financial framework and prudential regulation

V.1.1 Regulatory framework dictated by the Central Bank of Chile

Creation of the Large-Value Payments Clearing House (December 2005)

In December 2005 the Large-Value Payments Clearing House in Chilean Currency (*CCAV* [1]/) began operations. This clearing house is managed and operated by Combanc S.A (*Combanc*), a firm offering support services to the banking industry and whose corporate purpose is to provide payment services and undertake activities that are complementary to the industry.

The *CCAV* is a clearing system that participating banks can use to effect payments due to other participants, whether through own account or of third parties. Payments sent by the participants and accepted by the clearing house are definitive and irrevocable. Once a payment cycle is completed, the net balance from the payment process is settled through the Central Bank's Real-Time Gross Settlements (RTGS) System.

The Central Bank recognizes the utility of payment clearing systems in providing payment settlement services. Therefore, the Bank's policies and regulation in this area are oriented toward ensuring their safe and efficient operation, so that these systems can contribute both to the payment system and to the economy at large. Given that the transactions involve systemically important payments, compliance with the "Core Principles" recommended by the Committee on Payment and Settlement Systems of the Bank for International Settlements (BIS) [2]/ is an essential requirement for the *CCAV*'s operations.

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[1]/ *CCAV* stands for *Cámara de Compensación de Pagos de Alto Valor en Moneda Nacional*.

[2]/ Bank for International Settlements (2001a).

Modernization of the regulatory framework for issuing and operating credit cards (March 2006)

In March, the Central Bank enacted the new regulatory framework on issuing and operating credit cards, which was drawn up jointly with the Superintendency of Banks and Financial Institutions (SBIF). The core elements of this framework are related to defining nonbank credit cards, which constitute a significant means of payment, and strengthening the safeguards and mechanisms for managing and controlling credit, liquidity, financial, and operating risks, which the respective issuers and operators must adopt.

The prudential requirements that these companies must implement are ranked according to the importance of the respective cards as a generally accepted means of payment in the economy and the risks that this acceptance carries for commercial establishments and other affiliates. In particular, card systems are considered significant when they are used to effect payments and other transactions with entities unrelated to the issuer for an annual amount greater than or equal to one million UFs.

The SBIF will oversee compliance with these regulations and with other applicable legal stipulations, including provisions on the conventional maximum rate.

Modifications to the regulatory framework of the check payment clearing houses (May 2006)

In May, the Central Bank incorporated modifications to the regulatory framework for the Payments Clearing Houses for checks and other notes receivable in Chilean currency. These modifications address operational aspects of the payment process, with the objective of improving efficiency and safety. They support the consolidation of the check payment process at the national level, eliminating intermediate stages that occasionally generate errors and/or delays.

Modifications to the requirements for participating in the formal exchange market (May 2006)

In May, the Central Bank modified the regulatory framework on requirements for participating in the formal exchange market. All legal or other entities that are not subject to oversight by the Superintendency of Securities and Insurance (SVS) were requested to provide the Bank with an annual report issued by an external auditing firm. The report must include, among other things, the auditor's opinion on the firm's compliance with minimum equity requirements, on the application and adequacy of policies to verify the identity of the firm's clients, and on the firm's use of procedures of due diligence in these areas, in accordance with international recommendations in this area and the instructions issued by the Financial Analysis Unit.

V.1.2. Regulations issued by other supervisory organizations in the country

Accounting criteria for financial instruments acquired for trading or investment, derivatives instruments, accounting hedging, and financial assets write-off (SBIF, December 2005)

The SBIF is currently formulating new accounting standards with the goal of incorporating international principles and standards into the regulatory framework. These new standards should be fully applied no later than the 2007 fiscal year. As part of this process, last December the SBIF issued instructions on the accounting treatment of derivatives instruments and instruments that to date have been included in the "financial investments" portfolio.

The new regulations identify the following categories and accounting criteria for the abovementioned instruments: (a) trading instruments: financial instruments (including derivatives instruments) that are purchased with the intent of selling in the short term, that are recorded at fair value, and whose fluctuations are reflected in earnings; (b) held-to-maturity investments: financial instruments that have fixed or determinable flows and fixed maturity, that are purchased with the intent of holding through maturity, and that are recorded at their amortized purchase price; and (c) instruments available for sale: financial instruments not covered in the other categories, which are recorded at fair value and whose fluctuations must be booked in equity.

The new measures will come into force for the 2006 fiscal year and will begin to be applied to data as of June 30, 2006. The differences in valuation will be reconciled directly against equity, so that the earnings on the 2006 financial statements will only represent what would have been obtained if the new criteria had already been applied in the previous fiscal year.

Prevention of money laundering and terrorist financing (SBIF, March 2006)

The SBIF introduced amendments to the regulatory framework on the "Prevention of Money Laundering and Terrorist Financing" [3]/. The goal of these changes was threefold: to incorporate the recommendations of the International Financial Action Group, to draw on relevant elements of the "Core Principles for Effective Banking Supervision" and "Customer Due Diligence for Banks," both from the Basel Committee on Banking Supervision, and to take into account the related provisions in Law 19,913, created by the Financial Analysis Unit.

The subjects for analysis within the regulatory framework include the "System for the Prevention of Money Laundering and Terrorist Financing," which all financial entities must have in place. This essentially covers the following: customer due diligence; a policy and procedures manual; a

[3]/ "*Prevención del lavado de activos y del financiamiento del terrorismo*".

compliance officer; a committee on the prevention of money laundering and terrorist financing; tools for detecting, monitoring and reporting unusual operations; personnel selection; training programs; an internal code of conduct; and auditing.

Asset adequacy analysis (SVS, October 2005)

The SVS has modified the regulatory framework that applies to the life insurance companies, incorporating the obligation to undertake an adequacy analysis of the assets that back up their liabilities to pensioners.

The goal of this modification is to complement the current regulation on technical reserve constitution, by taking into account aspects not considered therein. Of particular concern is asset quality, in terms of credit risk, prepayment, and reinvestment. Companies demonstrating inadequate asset flows that are not offset by an adequate equity level must constitute additional technical reserves to make up for this higher risk.

V.2 Payments system and financial infrastructure

V.2.1 Large-value payments system: recent developments

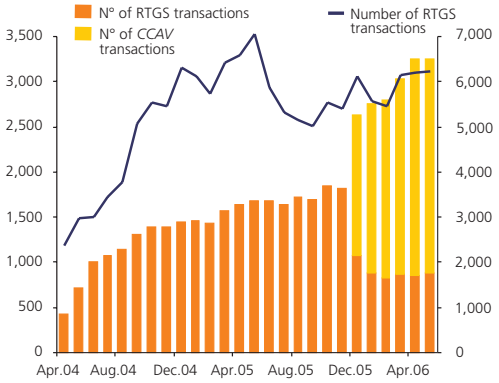
Two large-value payments systems operate in Chile: the RTGS system, managed by the Central Bank, and the *CCAV*, managed and operated by *Combanc*, a banking industry support company. In the RTGS system, payments are settled on a gross, individual level. The *CCAV*, in turn, is a clearing system, in which net earnings from the payment process are settled through the RTGS system once a payment cycle is completed.

The number of transactions settled in the large-value payments systems has increased steadily thus far in 2006, registering 3,252 daily transactions, on average, in April (figure V.1). Moreover, with the start-up of *CCAV* in December 2005, a share of the transactions settled in the RTGS system began to be processed in the new system. More than 70% of transactions between January and April of this year were processed in the *CCAV*. This is explained, in part, by the fact that clearing or payments systems require less liquidity for their operations.

The amount of transactions settled in the large-value payments systems tended to stabilize at around $6,000 billion a day in the first months of 2006 (or $1.92 billion per payment). Of this amount, $3,500 billion were processed in the RTGS system and $2,700 billion in the *CCAV* (figure V.1).

Figure V.1

Payments settled in the large-value payments system (*)
(number of transactions, billions of pesos)



(*) Monthly daily average.

Sources:
Combanc.
Central Bank of Chile.

V.2.2 Retail payments system: recent developments

The main means of payment used in Chile to carry out retail transactions are bank checks, credit cards, debit cards, and Internet transfers. Table V.1 presents statistics on the relative importance of each of these payment means, including automatic teller transactions associated with the withdrawal of cash from bank checking accounts. As the table shows, the share of checks has fallen in recent years, replaced by the growing use of electronic means of payment. Of the latter, credit cards posted the strongest growth in 2005 in terms of both the amount paid and the number of transactions, followed by debit cards.

At the same time, the number of bank credit cards issued increased 43% relative to 2004, totaling 3.8 million in December 2005. This growth is due, in part, to new commercial strategies on the part of banks, which have offered incentives for their use.

Table V.1.

Evolution of main retail means of payment

	2000	2001	2002	2003	2004	2005
	(value in billions of pesos of each year)					
Checks	518,574	545,627	568,040	512,007	503,038	462,985
Automatic tellers	4,969	5,795	6,710	7,058	7,673	8,633
Credit cards	920	1,010	1,072	1,269	1,495	1,996
Debit cards	31	175	319	597	804	942
Internet transactions	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
Automatic tellers	161,576	184,980	210,930	221,464	233,617	246,115
Credit cards	39,832	41,974	42,427	46,121	50,799	63,780
Debit cards	1,972	11,490	20,459	34,058	42,645	52,157
Internet transactions (*)	5,969	12,244	23,184	34,065	46,556	59,133

n.a: Not available.
(*) Annualized figures based on transactions carried out in June and December.

Source: SBIF.

Box V.1: **Basel II and its implementation in Chile**

The box provides a brief description of the new capital adequacy framework, known as Basel II, together with a clear time line for its implementation in Chile [4]/.

Basel II

The Basel Committee on Banking Supervision published the document, "International Convergence of Capital Measurement and Capital Standards" (that is, Basel II), in June 2004. This framework will replace the 1988 Capital Accord (Basel I) in 2007.

The New Capital Accord is founded on three pillars that are complementary, integrated, and mutually reinforcing. Its goal is to measure, manage, and supervise the risks assumed by banks and to establish adequate capital safeguards. The three pillars are as follows:

- First pillar: Minimum capital requirements
- Second pillar: Supervisory review process
- Third pillar: Market discipline

The first pillar represents an updating and extension of Basel I and constitutes the most substantial part of the new Accord. This pillar modifies the definition of risk-weighted assets through two main components: (1) changes in the treatment of credit risk relative to the current Accord; and (2) the introduction of an explicit treatment of operating risk. The second pillar addresses the supervision of capital adequacy, aiming to keep banks' regulatory capital in line with economic capital. The third pillar, in turn, rests on the transparency of risks and of the banks' financial position. The goal here is to involve investors and depositors in actively applying market discipline as a factor in preserving solvency, in addition to the role of the supervisory entity.

[4]/ To date, all the events included in the time line through May 2006 have been implemented, although there are some minor lags relative to the original period.

Implementation in Chile

Over the past few years, the SBIF and the Central Bank have jointly produced a series of documents related to the implementation of Basel II in Chile. In January 2005, representatives of the banking industry, as well as the general public, were issued guidelines for the transition to Basel II (in a document whose title in English would be "Road Map Guidelines for the Transition to Basel II"). This document addresses the main aspects in the adoption of the three pillars that make up the New Capital Accord. In addition, to ensure an orderly implementation of the main points published in that document, a time line was published in May of the same year, outlining the main activities that banking entities must undertake, together with the corresponding regulatory framework of the SBIF (table V.2).

Table V.2

Implementation time line

Issue	Associated activities	Date
1) Nomination or confirmation of the executive responsible to the SBIF on this issue.	The nomination or confirmation of the responsible executive must be approved by the Board of Directors of the entity or whoever acts in its place, and the SBIF must be informed of the decision.	May-June 2005
2) Incorporation of market risk on the basis of the standardized approach.	2.1) Issue of complementary guidelines by the SBIF: Market risk guidelines and instructions for new files.	May-June 2005
	2.2) Issue of accounting guidelines for financial and hedging instruments.	September 2005
	2.3.1) Entry into force (optional) of standard market risk models (the standard model coexists with C09, C07 and C05).	July 2005
	2.3.2) Entry into force of measurement based on standard market risk models.	September 2005
	2.4) First public disclosure of the market risk situation based on standard models.	December 2005
	2.5) Announcement by the Board of Directors or whoever acts in its place with regard to the bank's intention of advancing toward internal market risk models, which must be reported to the SBIF.	December 2005
	2.6) Entry into force of the new accounting guidelines.	2006
	2.7) Second public disclosure of the market risk situation based on standard models.	March 2006
	2.8) Entry into force of the possibility of opting for internal models (VaR).	April 2006
3) Internal auditors' report.	Auditors' report on the correct calculation of the capital indicator, in accordance with the current regulatory framework.	December 2005
4) Simulation exercises.	Realization of quantitative impact simulations for credit, market and operating risks. To be determined. Realization of capital stress tests.	To be termined June 2006

Box V.2: **Delivery versus payment in securities settlement systems**

Securities settlement systems (SSS) are an essential component of financial market infrastructure, because they facilitate the development of securities intermediation and contribute to the proper functioning of financial markets.

In 1988, the Group of Thirty [5]/ published a set of recommendations with the goal of fostering improvements in the security and efficiency of securities settlement systems. One of the recommendations was to adopt the principle of delivery versus payment (DVP) as a method of settling all securities transactions [6]/. This entails establishing a mechanism that ensures the exchange of securities if, and only if, the corresponding payment occurs.

In 1992, the BIS Committee on Payment and Settlement Systems (CPSS) published a report analyzing the securities settlement systems of G10 countries and identifying three methods for implementing DVP [7]/. In 2001, the CPSS issued a series of recommendations for the proper functioning of securities settlement systems, in which principle N° 7 addresses the need for a DVP system [8]/.

Delivery-versus-payment models

According to the CPSS, all DVP models must fulfill three fundamental requirements: the legal delivery of the securities, the irrevocable payment of the funds, and the transfer of the securities if, and only if, the corresponding transfer of funds is final. The CPSS further identifies three general models for implementing a DVP system. These vary depending on whether the securities and/or funds are settled on a gross (trade-for-trade) or net basis, and on the moment at which the transfer is considered irrevocable. Each of the three models is briefly described below.

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[5]/ The Group of Thirty, established in 1978, is a private international organization that includes representatives from the public and private sectors and academia.

[6]/ Group of Thirty (1989).

[7]/ Bank for International Settlements (1992).

[8]/ Bank for International Settlements (2001b).

Model 1: Gross, real-time settlement system

The gross, real-time settlement model is a system in which the final, irrevocable transfer of securities from the seller to the buyer and of funds from the buyer to the seller takes place on a "trade-for-trade" basis, that is, one by one and simultaneously. In case of nonfulfillment by one of the parties, that is, if the seller does not deliver the securities or the buyer does not effect the payment, the operation is rejected and the securities or funds are returned to the complying participant. This model completely eliminates principal risk, but it increases the liquidity requirements of the participants. To avoid these inconveniences, it is common for the system to provide a fund or securities lending facility with collateral requirements.

Model 2: Mixed system

The main characteristic of the mixed system is that securities transfer instructions are settled on a gross (or trade-for-trade) basis throughout the processing cycle, while funds are paid on a net basis at the end of the processing cycle. Buyers cannot withdraw the securities as long as payment has not been made, and the securities and funds transfer is irrevocable as for soon as the transaction is entered in the DVP system's books. Furthermore, if one of the participants does not fully satisfy the obligation to deliver the funds, the entity responsible for the process [9]/ must have sufficient resources to ensure the final settlement of all transactions or, otherwise, to contain the participants' insolvency risk by setting limits on their exposures or requiring guarantees.

Model 3: Net systems

Net systems settle securities and funds transfer instructions on a net basis, in which the final transfer is made at the end of the processing cycle. In this model, the net settlement usually occurs between the participants and the central counterparty [10]/ that guarantees the settlement of all net transactions. Worldwide, many large systems employ a multilateral net mechanism, with transaction settlements occurring either once a day or several times during the day.

DVP and the modernization of the payments system in Chile

Following the implementation of the RTGS system (April 2004), it became feasible to establish a DVP model. The choice of the model sought to reduce the risks faced by participants and improve the efficiency of the securities settlement system. International standards and recommendations in this area were also taken into account, as was the mode of operations of the local market. Given this background, models 1 and 2, (described above) were chosen for implementation.

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[9]/ The responsible entity could be a settlement institution or a payments clearing house.

[10]/ The central counterparty (which is usually the settling entity) acts as the buyer for all sales and as the seller for all purchases.

The first model achieves the settlement of funds on a gross, real-time basis in the RTGS system [11]/ and, concurrently, the transfer or settlement of securities in the Central Securities Depository (CSD), such that the two are interconnected. Furthermore, the financial institutions have permanent access to the liquidity credit facility furnished by the Central Bank.

The other model was developed by the banking sector, and it led to the formation of an industry support company called the Large-value Payments Clearing House (*Combanc*) [12]/. Once *Combanc* receives a payment instruction for a DVP transaction and enters it into the settlement process, this transaction is irrevocable, and in that instant the transfer or settlement of the securities is realized in the CSD jointly with the transfer of funds. *Combanc* also guarantees settlement of the transactions; to that end, it has in place a settlement guarantee mechanism [13]/.

The first model began operating in June 2005 and the second in January 2006. Both have operated without setbacks.

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[11]/ The system uses a model or interface for carrying out DVP called a third-party submitter. Under this model, an authorized entity requests that a payment be settled through the corresponding transfer of funds between the settlement accounts in the banks of the parties involved in the transaction.

[12]/ *Cámara de Compensación de Alto Valor* or *Combanc* began operating in December 2005. See the summary of regulatory changes in this *Report*, in the section on financial regulations and infrastructure.

[13]/ Namely, a set of procedures created to ensure the final liquidity of the transaction (bilateral and multilateral credit lines, real guarantees).

Box V.3: Use of retail means of payment in the 1998–2005 period

I. Introduction

Retail payment systems and means of payment contribute significantly to the financial system's ability to adequately carry out its functions and to preserve financial stability. Two important characteristics of the payment methods, including cash, are the efficiency and security with which they are designed and used. These attributes constitute the basic factors for gaining users' confidence in the methods.

Retail means of payment are characterized by a large volume of transactions and a significant number of users, and they are commonly used to finalize transactions associated with the exchange of goods and services. Payments are made through a growing variety of instruments or means of payment —checks, credit and debit cards, automatic teller transactions, and Internet transfers— whose development has benefited from technological innovations.

Central banks are responsible for ensuring a regulatory framework that allows these systems to operate with high standards of security and efficiency [14]/. They also work with other public and private organizations to incorporate advances into the systems.

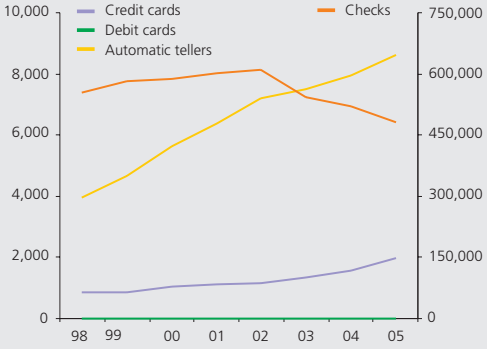
II. Retail means of payment

To provide an overview of the development of the main payment methods in Chile, the remainder of this box describes the degree of their utilization in the period 1998–2005. It also includes, for each means of payment, a brief comparison of Chile's position with that of selected emerging and developed economies.

[14]/ As set forth in its Basic Constitutional Act, one of the objectives of the Central Bank is to safeguard monetary stability and the normal functioning of internal and external payments (article 3).

Figure V.2

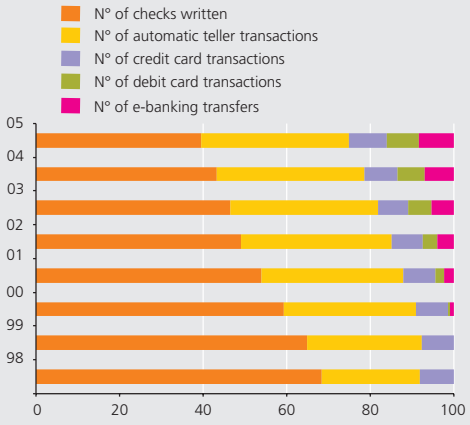
Value of transactions using retail means of payment
(billions of pesos of December 2005)



Source: Own calculations, based on SBIF data.

Figure V.3

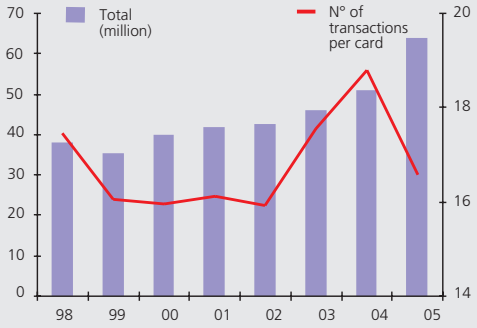
Use of retail means of payment
(% share in the total number of transactions)



Source: Own calculations, based on SBIF data.

Figure V.4

Credit cards
(annual transactions)



Source: Own calculations, based on SBIF data.

Checks

Checks constitute the most commonly used payment method in Chile. For each transaction carried out with a debit card (DC), 5.3 checks are written; 4.3 for each bank credit card transaction (CC); and 4.7 for each Internet purchase. The value of transactions carried out with checks was over $480 trillion in 2005, followed distantly by automatic teller transactions, with only $8.6 billion (figure V.2).

In recent years, however, checks have lost ground to electronic payment methods, falling from 68% in 1998 to 40% of transactions last December. DC transactions, which represented just 0.1% of the total number of transactions in 1998, accounted for 7.5% last December. Internet transfers, which only began in 2000, had captured 8.5% of the total five years later (figure V.3).

Comparing the situation in Chile with selected emerging and developed economies reveals a similarity with Singapore, not only in the number of checks written per inhabitant per year, but also in the average value of each check. Of the countries in the sample, the United States uses checks most intensively, but the average amount per check is lower. In Japan, by contrast, this means of payment is seldom used, and the average value of each check is over US$35,000 (table V.3). One notable trend is that the amounts traded through checks are significantly above that carried out with credit and debit cards, except in Australia. In Chile, this amount represented more than nine times GDP in 2004 (table V.4).

Table V.3

Check transactions

Country	1998	2000	2002	2004
	(annual number per inhabitant)			
Germany	5.6	4.8	1.8	1.4
Australia	49.4	44.7	30.8	26.7
Chile	21.6	19.8	18.1	17.7
United States	163.6	148.4	133.1	118.5
Japan	2.1	1.8	1.5	1.2
Mexico	1.7	2.0	4.2	4.2
New Zealand	76.2	64.5	56.8	n.a.
Singapore	22.3	22.8	21.8	20.3
	(average value in US$)			
Germany	7,225	2,309	4,870	6,256
Australia	2,428	n.a.	1,907	2,596
Chile	2,984	2,968	2,797	3,166
United States	889	951	1,027	1,103
Japan	43,174	43,223	31,579	35,038
Mexico	1,176	1,436	1,531	1,371
New Zealand	n.a.	n.a.	n.a.	n.a.
Singapore	3,250	3,001	2,458	2,857

n.a: Not available.

Source: Own calculations, based on BIS data.

Table V.4

Use of means of payment
(value of transactions as a percent of GDP) (*)

Country	Checks	Credit cards	Debit cards
Chile	947	3	2
Mexico	88	2	13
United States	327	14	6
Germany	23	1	5
Singapore	233	8	5
Japan	122	6	0
Australia	26	62	27

(*) Figures as of 2004.

Source: Own calculations, based on BIS data.

Table V.5

Credit card transactions

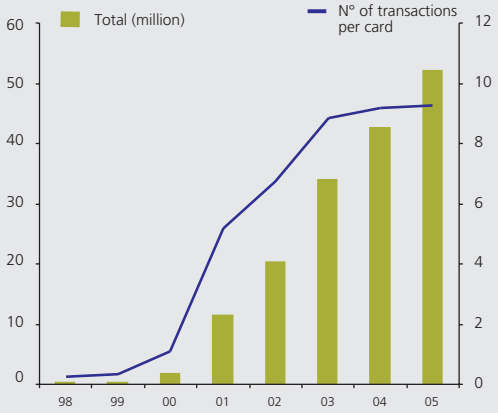
Country	1998	2000	2002	2004
	(N° of transactions per card)			
Germany	21	18	17	18
Australia	52	73	93	101
Chile	17	16	16	19
United States	19	23	23	24
Japan	6	13	13	17
Mexico	n.a.	30	27	21
Singapore	n.a.	35	33	31
	(average value in US$)			
Germany	106	82	95	87
Australia	66	63	73	92
Chile	40	40	35	53
United States	88	87	84	80
Japan	122	70	67	68
Mexico	n.a.	54	58	58
Singapore	n.a.	72	65	48

n.a: Not available.

Source: Own calculations, based on BIS data.

Figure V.5

Debit cards
(annual transactions)



Source: Own calculations, based on SBIF data.

Credit cards

Today, 3,850,000 bank CCs are circulating in Chile. This number increased 77% in 1998–2005, while the volume of CC transactions rose 68%, from 37.9 million to 63.8 million transactions per year. The value of the transactions, in turn, more than doubled in the period (129%), reaching slightly less than $2 trillion in 2005. Thus, each CC is used to carry out 16.6 transactions per year, with an average value of $31,000 per transaction (figure V.4).

In Chile, one out of every six inhabitants has a CC. In Mexico, this ratio is 1:9; in Australia, 1:2; and in the United States, 2.3:1. CC use is most intensive in Australia, with around 100 transactions per year. The average value per transaction is highest in Germany (table V.5).

Debit cards

The number of debit cards outstanding tripled between 1998 and 2005, reaching 5,650,000 cards at the end of last year. The number of DC transactions carried out each year, which was barely more than 360,000 in 1998, today exceeds 52 million. The average use per card is nine transactions a year, for an average of $19,000 per transaction. DCs began to be used more extensively in 2001, when this payment instrument was relaunched under the trade name *Redcompra* (figure V.5).

In Chile and Mexico, one out of three inhabitants has a debit card. In the United States and Germany, the ratio is 1:1, and in Japan, it is 3:1. With regard to Japan, while there are three cards per inhabitant, they are hardly ever used; the amount per transaction, however, is higher than in the other countries in the sample, at over US$600 on average (table V.6).

Table V.6

Debit card transactions

Country	1998	2000	2002	2004
	(N° of transactions per card)			
Germany	9	12	16	21
Australia	32	29	34	37
Chile	0.25	1	7	9
United States	28	37	54	74
Japan	0.002	0.01	0.02	0.03
Mexico	n.a.	30	32	39
Singapore	19	29	18	20
	(average value in US$)			
Germany	89	67	63	77
Australia	35	37	35	49
Chile	34	27	22	34
United States	42	37	36	37
Japan	69	435	424	603
Mexico	n.a.	67	67	73
Singapore	37	46	41	45

n.a: Not available.

Source: Own calculations, based on BIS data.

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Currency Mismatches in Chilean Manufacturing Firms [1/]

Authors: Kevin Cowan, Alejandro Micco and Álvaro Yáñez [2/]

I. Introduction

There is extensive literature emphasizing the real effects of currency mismatches on firms in the non-financial sector. Such mismatches result from differences between the currency composition of company earnings (real exposure) and the currency composition of net financial liabilities (financial exposure). The problem arises because fluctuations in the exchange rate lead to suboptimal behavior by currency–mismatched firms. Such is the case of firms that are faced with some type of financial imperfection, which limits their access to sources of financing that might alleviate a liquidity shock or makes their funding costs a function of their balance sheets [3/]. In such cases, an exchange rate shock leads to a suboptimal response of production and investment, and possibly to bankruptcy.

Understanding the degree of currency mismatch has gained importance steadily since the floating exchange rate regime was established in September 1999, increasing the volatility (and thus the uncertainty) of the exchange rate. This point is especially relevant considering that exporting firms, which theoretically should be the most affected by exchange rate volatility, are also the most productive firms [4/].

The effects of currency mismatches can be expected to be nonlinear. Bankruptcy only occurs when cash flows fall below a minimum level. As a result, it is important to analyze not only the average mismatch levels, but also their whole distribution, so as to learn both the share of firms with high mismatches and the share of firms with positive and negative mismatches [5/].

Progress has been made in measuring both currency mismatches and their real effects on large firms [6/]. In the case of Chile, Cowan, Hansen, and Herrera (2005) demonstrate that (i) currency mismatches are low in Chile, but (ii) they have important effects on investment decisions. Additionally, they find that the firms "match" their real exposure with their financial exposure so that exporting firms or firms holding dollar assets take on more dollar-denominated debt.

In contrast, little advances have been made in understanding currency mismatches in small firms, due to data limitations. There is good reason to believe that the currency exposure of small firms differs from that of large ones. This creates a problem for analyzing the aggregate effects of exchange rate volatility. On the one hand, it can be assumed that small firms are more reluctant to risk a mismatch. They probably have a limited number of stockholders with little asset diversification, making them risk averse and thus leading them to try to minimize cash flow (or balance sheet) volatility. Additionally, these firms have more precarious access to financing, which makes it difficult for them to absorb temporary fluctuations in cash flow or equity without having to modify their production or investment decisions [7/].

On the other hand, it has been argued that small- and medium-sized businesses have limited hedging options, especially for the use of forward contracts. This is partly due to the fixed

[1/] Opinions expressed herein are those of the authors and are not necessarily shared by the Superintendency of Banks and Financial Institutions, the Central Bank of Chile, or any of its Board Members. We are grateful for comments made by Pablo García and Andrea Repetto on an earlier version of this paper.

[2/] Cowan and Micco are with the Central Bank of Chile; Yáñez is with the Superintendency of Banks and Financial Institutions.

[3/] See Holmstrom and Tirole (1997), Bernanke and Gertler (1989), and Chang, Céspedes, and Velasco (2005).

4/ See Bernard *et al*. (2003) and Bernard and Jensen (1999) for the Untied States; see Álvarez and López (2006) and Repetto *et al*. (2005) for Chile.

[5/] The type of mismatch (positive or negative) that carries the most risk depends on the distribution of exchange rate variations. For example, if a country's currency has a "peso problem" (that is, low probability of very high depreciation), then negative mismatches will be riskier than positive mismatches.

[6/] For a summary of this literature, see Galindo, Panizza, and Schiantarelli (2003) and Bleakley and Cowan (2005). For the case of Chile, see Benavente, Johnson, and Morandé (2003) and Fuentes (2003).

[7/] This is coupled with the fact that smaller firms tend to have more growth opportunities, which is positively related to a greater use on derivatives, as empirical evidence shows.

costs associated with the use of such instruments, and partly due to the restrictions on the debt capacity of small firms, which prevent them from credibly committing to cover possible contract losses [8]/.

This paper is the first attempt to quantify the degree of currency mismatch in Chilean firms along the whole size distribution. To do so, we combine data from the Annual National Industry Survey (*ENIA*) with data on domestic debt (in pesos and dollars), external debt, and derivatives positions from the Superintendency of Banks and Financial Institutions (SBIF) and the Central Bank of Chile (BCCh).

The database used has three limitations. First, it only covers the manufacturing sector. Second, it does not contain the currency composition of the firms' financial assets. Finally, the financial data covers all activities that the firms carry out, whereas the *ENIA* data only includes manufacturing activities. Nevertheless, we believe that the benefits of broader coverage outweigh the disadvantages.

In order to analyze the currency mismatch situation, the study constructs measures of real exposure, understood as the sensitivity of a firm's operating income to the exchange rate. The measures are based on the share of each firm's export sales, the importance of direct imports in intermediary inputs, and the degree of openness of the sector in which the firm operates. These measures of real mismatch are then compared with the currency composition of the firm's liabilities (its financial exposure) and with the use of currency derivatives.

II. The database

The main source of information for this study is the 2004 *ENIA* manufacturing survey. The *ENIA* covers manufacturing firms with ten or more workers and includes information on the subsector in which each firm operates, as well as on direct imports and exports. We complement the *ENIA* data with information of domestic bank debt in pesos and dollars (SBIF), external debt (BCCh), and currency derivatives positions (BCCh as of 31 December 2004 [9, 10]/.

We then build a measure of the openness of each ENIA subsector (two-digit ISIC rev3) using data from the 1996 input-output matrix. Specifically, the degree of openness corresponds to the ratio between total imports plus exports to total supply for each sector.

III. Real and financial exposure

We define real exposure as the sensitivity of a firm's earnings (or cash flow) to fluctuations in the exchange rate. To approximate this sensitivity, we assume that external market prices in pesos are more sensitive to fluctuations in the exchange rate than local market prices. On the other hand, it is reasonable to assume that the sensitivity of local market prices (pass-through) depends on the degree of openness of the sector. This same set of assumptions can be applied to the peso price of intermediate goods imported directly by the firm. Thus, the sensitivity of earnings to the exchange rate depends on the share of sales that is exported, the share of directly imported intermediate goods, and the openness of the sector in which the firm operates.

Our currency mismatch measure results from the combination of a firm's real exposure, its financial exposure (understood as the amount of foreign-currency-denominated debt), and its net currency derivatives position.

IV. Description of the sample and real exposure

Table 1 summarizes the study's real variables, separating the firms into four size categories based on sales figures. The total sample consists of 4,849 firms. Although nearly half of the firms are small, they only represent 1.5% of total sales. The "mega firms," however, contribute close to 85% of sales, but they account for only 7.5% of the sample.

The table's second panel shows the size distribution of the export firms. Approximately one out of every five firms in the sample exports. There is a positive correlation between a firm's size and its tendency to export: 78% of the mega firms export, whereas only 4% of the small firms do so. As a result, manufacturing exports are almost entirely concentrated in the mega firms (94%). This correlation is not surprising considering that the most efficient and, therefore, the largest firms are those that reach exporter status. [11]/

[8]/ This size effect is even evident in studies carried out on large businesses. See Allayanis and Ofek (2001), Bartram *et al.* (2004), and Cowan *et al.* (2005).

[9]/ To ensure the quality of the fit, we analyzed in detailed the correlation of the debt variables reported by the SBIF with the debt variables reported by firms listed in the Stock Exchange, in their standardized balance sheets *FECU* (*Fichas Estadísticas Codificadas Uniformes*) in the *ENIA*.

[10]/ In the *ENIA*, plants were grouped by RUT (taxpayers' ID number) in order to work at the firm level.

[11]/ The appendix reports the distribution of the share of export sales conditional on exporting. This distribution is not dependent on firm size, which suggests that there are fixed costs in exporting. Bergoeing *et al*. (2005) report a similar result for the entire 1992-2001 period.

Table 1

Firms, sales and real exposure

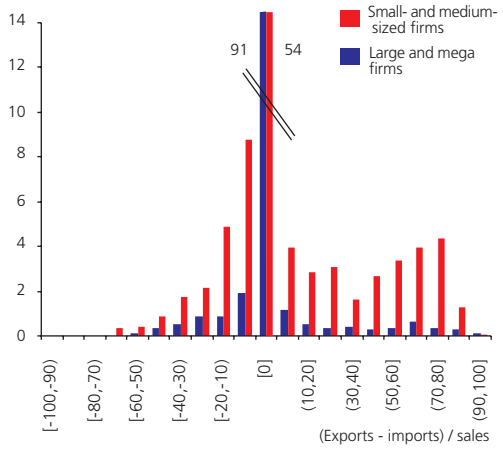
Size (1)	Units (2) [thousands of UFs]	Small (3) (0,25]	Medium (25,100]	Large (100,600]	Mega (600,∞]	Total [0,∞)
Full sample						
Firms	[number]	2,368	1,329	787	365	4,849
	[% of total]	48.8	27.4	16.2	7.5	100.0
Sales	[% of total]	1.5	3.8	11.2	83.6	100.0
Exporters						
Firms	[number]	92	223	358	284	957
	[% of total]	9.6	23.3	37.4	29.7	100.0
	[% of group]	3.9	16.8	45.5	77.8	19.7
Amount	[% of total]	0.1	0.6	5.0	94.3	100.0
	[% of group sales]	1.5	5.4	14.3	36.3	32.2
Importers						
Firms	[number]	136	270	361	236	1,003
	[% of total]	13.6	26.9	36.0	23.5	100.0
	[% of group]	5.7	20.3	45.9	64.7	20.7
Amount imported	[% of total]	0.2	1.6	9.9	88.2	100.0
	[% of group sales]	1.3	3.9	8.2	9.7	9.2

(1) Of the firms in *ENIA*, 67 have *FECUs*. Of these, 55 are mega firms.
(2) [% of total] refers to the percent that the size group represents in the total. [% of group] is the fraction of firms in the size group that present values different from zero for the variable in question. [% of group sales] is the percent that the variable in question represents in the total sales of the group.
(3) Small firms include 134 microfirms (sales < 2,400 UFs).

Source: Authors´ calculations.

Figure 1

Distribution of real exposure (*)
(percent)



(*) Percentage of firms without real exposure =78%

Source: Authors´ calculations.

The last row of the second panel shows the share of sales that is exported in each firm category. This share provides an initial approximation of the degree of real exposure. Small-and medium-sized firms export a very small fraction of their total sales. More efficient firms have lower marginal costs, which enables them to both capture a larger share of the domestic market and cover the transport costs incurred by the exporting activity [12]/. This implies that exchange rate volatility has a stronger impact on the most efficient firms.

A second factor to take into consideration in determining a firm's degree of real exposure is the importance of imported inputs. As shown in the third panel, the share of firms that directly import inputs is very similar to the share of firms that export, at 20%. Once again, size plays a role: imported inputs represent a larger share of sales in larger firms [13]/.

As mentioned above, the effects of a currency mismatch may be non-linear. To illustrate this point, figure 1 shows the distribution of real exposure for two categories: SMEs (small-and medium-sized enterprises) and LMEs (large and mega enterprises). Some conclusions can be drawn: (i) the majority of firms (78.8%) have no real currency exposure; (ii) a share of large firms have some degree of real currency exposure is greater than that of small firms; (iii) even the firms with some degree of exposure generally report low exposure, particularly among small and medium-sized firms; and (iv) the distribution of mismatched LMEs is shifted to the right relative to SMEs, since a larger share of LMEs have positive mismatches (exports > direct imports). Nearly 25% of the LMEs (with mismatches) report mismatches on the order of 50 to 80% of total sales.

Thus, real exposure is concentrated in large and mega firms: they are more likely to have some exposure, and that exposure is more likely to be significant. But, what about the measure of exposure based on sector openness? Table 2 groups the firms in sectors with low levels of openness ([X+IM]/Supply<10%), with medium levels of openness (10%<[X+IM]/Supply < 40%), and high levels of openness ([X+IM]/Supply > 40%) [14]/. Each column shows the percentage of firms belonging to each sector, for each of the four size categories. There is no clear relationship between the degree of sector openness and the significance of

Table 2

Distribution of firms by degree of sector openness

Size (1)	Units (2) (thousands of UFs)	Small (3) (0-25)	Medium (25-100)	Large (100-600)	Mega (600-∞)	Total (0-∞)
	sectors with a low degree of openness: (exp+imp)/supply < 10%					
Firms	[number]	810	307	241	124	1,482
	[% of total]	54.7	20.7	16.3	8.4	100.0
Sales	[% of group sales]	33.6	22.3	33.0	24.2	25.3
	sectors with a medium degree of openness: 10% < (exp+imp)/supply < 40%					
Firms	[number]	910	534	245	86	1,775
	[% of total]	51.3	30.1	13.8	4.8	100.0
Sales	[% of group sales]	38.0	40.7	31.3	18.9	21.4
	sectors with a high degree of openness: 40% < (exp+imp)/supply					
Firms	[number]	648	488	301	155	1,592
	[% of total]	40.7	30.7	18.9	9.7	100.0
Sales	[% of group sales]	28.4	37.0	35.7	56.9	53.3

(1) Of the firms in *ENIA*, 67 have *FECUs*. Of these, 55 are mega firms.
(2) [% of total] refers to the percent that the size group represents in the total. [% of group] is the fraction of firms in the size group that present values different from zero for the variable in question. [% of group sales] is the percent that the variable in question represents in the total sales of the group.
(3) Small firms include 134 microfirms (sales < 2,400 UFs).

Source: Authors´ calculations.

[12]/ See Melitz (2005) and Bernard *et al.* (2003).

[13]/ As for exports, the share of imported inputs, conditional on importing, does not increase with increasing sales figures (appendix 1).

[14]/ In these definitions, in contrast to the firms' direct imports, X and IM refer to exports and imports of goods in the same industrial sector.

the SMEs.

V. The financial situation of *ENIA* firms

Table 3 describes the firms' financial debt. The first panel shows the degree of access to financing and the average levels of domestic bank debt. Of all firms, 79% report having bank debt. This figure increases to ~90% for large and mega firms, and 72% for small ones. As a percentage of total sales per category, the total bank debt of mega firms is the lowest in the scale, which is explained by their broader access to alternative sources of financing, be it bonds or external credit. In fact, as illustrated in the third panel, close to one-third of the mega firms have some form of external debt, a figure that far exceeds that of the three other categories.

The firms in the sample have two sources of financing in foreign currency: external loans and debt in foreign currency contracted with domestic banks. The latter source is more common than external loans, which is consistent with the higher fixed costs associated with an offshore loan (23% of the firms have domestic debt in dollars, whereas 14% report external debt)[15]/. In contrast to total debt, which is accessed by a high percentage of firms of all sizes, foreign currency debt is more common among larger firms and constitutes a bigger percentage of sales in large and mega firms (6.8% and 11.3%, respectively) than in the remaining categories.

The results shown in tables 1 and 3 suggest that there is a degree of matching between the firms' real exposure and their financial exposure. The following section explores this matching in more detail, using data at the company level.

Note that several SMEs in the sample report having foreign currency debt, which implies that this is a hedging option not completely closed to smaller firms. The information included in the database, however, does not allow us to shed any light on differences in the conditions under which the different categories of firms access foreign currency debt.

The second financial hedging option is the use of financial derivatives (table 3), but it is not used frequently. Only 3.5% of the entire sample has some type of derivatives contract. Even mega and large firms report a small share, and SMEs simply do not use derivatives contracts. Despite these trends, notional amounts, as a proportion of sales, are significant in the LMEs: derivatives account for nearly one-fifth of total foreign currency debt among large firms and one-tenth in the case of mega firms.

Table 4 combines the data on real and financial exposure for 717 firms with positive real exposure (X>IM) [16]/. The first column shows the average of each item as a percentage of the sample's total sales; the second column shows the residual mismatch. This table assumes that real and financial exposures

Table 3

Financial debt and the use of derivatives

Size (1)	Units (2) (thousand of UFs)	Small (3) (0-25)	Medium (25-100)	Large (100-600)	Mega (600-∞)	Total (0-∞)
Total domestic bank debt (4)						
Firms	[number]	1,713	1,113	688	330	3,844
	[% of group]	72.3	83.7	87.4	90.4	79.3
Amount of debt	[% of total]	2.6	5.8	19.4	72.2	100.0
	[% of group sales]	17.4	15.4	17.6	8.7	10.1
Domestic debt in foreign currency						
Firms	[number]	110	326	421	265	1,122
	[% of group]	4.6	24.5	53.5	72.6	23.1
Amount of debt	[% of total]	0.4	1.6	14.0	84.0	100.0
	[% of group sales]	1.2	2.0	5.9	4.7	4.7
External debt						
Firms	[number]	8	16	41	76	141
	[% of group]	0.3	1.2	5.2	20.8	2.9
Amount of debt	[% of total]	0.1	0.3	1.7	98.0	100.0
	[% of group sales]	0.3	0.4	0.8	6.6	5.6
Currency derivatives (short and long positions)						
Firms	[number]	2	15	81	65	163
	[% of group]	0.1	1.1	10.3	17.8	3.4
Notional amount (5)						
	[% of total]	0.6	0.3	11.6	87.5	100.0
	[% of group sales]	0.5	0.1	1.4	1.4	1.3

(1) Of the firms in *ENIA*, 67 have *FECUs*. Of these, 55 are mega firms.
(2) [% of total] refers to the percent that the size group represents in the total. [% of group] is the fraction of firms in the size group that present values different from zero for the variable in question. [% of group sales] is the percent that the variable in question represents in the total sales of the group.
(3) Small firms include 134 microfirms (sales < 2,400 UFs).
(4) The simple average of bank debt over sales for the *FECU* firms in the sample is 18%. The same average, using bank liabilities and operating income of the *FECU* forms, is 20%. For this same group of firms, the simple average of the ratio of the notional amount of derivatives (short and long positions) and the sales reported in the *ENIA* is 3.6%. The same ratio using operating income from the *FECUs* is 3.6%, and it falls to 1.8% if total assets from the *FECUs* are used instead of operating income.
(5) The value of the notional amount over total sales for small firms is determined by a firm that has a ratio of the notional amount to sales of 600%.

Source: Authors' calculations.

Table 4

Currency mismatches (*)
Percent

	Amount	Residual mismatch
	(Fraction of sales)	
Real exposure (exports- dir. imports)/ sales	51.7	51.7
Domestic debt in dollars Domestic debt in dollars/ sales	6.0	45.7
External debt External debt/ sales	8.2	37.6
Net derivatives (asset position) Net derivatives/ sales	-0.3	37.3

(*) The table shows the exchange mismatches for the subgroup of firms with positive real exposure (X > IM).

Source: Authors' calculations.

[15]/ The assumption that all external debt is denominated in dollars is reasonable, given the international evidence (Eichengren, Hausmann, and Panizza, 2005).

[16]/ Firms with negative real exposure use a hedging strategy that combines derivatives and dollar assets. Without information on dollar assets, the hedging of these firms is underestimated. This is a minor problem in the regressions presented below, as will be discussed later.

are comparable on a one-to-one basis (this assumption is supported by the firm-level analysis). Average real exposure is 51.7% of sales. Domestic dollar-denominated debt and external debt reach 6% and 8.2% of sales, respectively, bringing the mismatch down to 37.6%. The derivatives only come to –0.3% and have no significant impact on the mismatch. These aggregate results are completely determined by large and mega firms. With regard to the SMEs (265), their average real exposure is 31% of sales, which drops to 27% when dollar-denominated debt is taken into account. For this group, derivatives have no visible effect.

In summary, the most widely used hedging tools in manufacturing firms in 2004 —especially in the case of SMEs— were not financial derivates, but rather the currency composition of liabilities.

VI. Real and financial exposure: firm-level analysis

This section presents the results from firm-level regressions between financial exposure (defined as the use of foreign currency debt and/or derivatives) and real exposure, measured through net exports per firm and through the degree of openness of the sector in which the firm operates. For all specifications, the firm-level variables are scaled by total sales.

The first estimate (table 5, column A) demonstrates that firms with greater net exports and firms that operate in more open sectors have higher domestic debt in foreign currency. This indicates that the firms match the elasticity of their revenues to the exchange rate with the sensitivity of their liabilities to the exchange rate.

Column B adds a measure of firm size (the log of sales) to the previous specification. The estimated coefficient for sales indicates that large firms use significantly more foreign currency debt than small firms, controlling for the degree of real mismatch. This result suggests the existence of fixed costs, including the cost of access to the banking system.

The optimal amount of foreign currency debt is as much a hedging issue as a financing issue. To separate these two components, column C includes total indebtedness as a control variable. The estimated coefficient is positive and significant, as expected. The remaining coefficients show no change with respect to column B. This result rules out the idea that the cost of access to the banking system, in and of itself, explains the decreased use of dollar-denominated debt over peso-denominated debt among small firms.

The cost of creating a foreign trade channel may be independent from the amount that will ultimately be exported. Column D includes a dummy variable that takes the value of 1 for firms that export and/or import directly. The estimated coefficient for this dummy is positive and highly significant; the simple fact of exporting or importing increases the use of dollar-denominated debt. One possible explanation is that the perception of the pass-through (and thus of currency risk) is higher for import or export firms. The investment in human capital that accompanies exporting activities changes the perception of currency risk. Another possible explanation is that export firms are better managed, and they are consequently more aware of currency mismatch risks.

The next two columns (E and F) explore the determinants of external debt and total debt in foreign currency. The results for both external debt and total dollar-denominated debt are qualitatively equal to the results reported for domestic dollar-denominated debt: namely, large firms with some level of exports or imports and with greater net exports have higher levels of external debt. The degree of sector openness has a positive effect, although the coefficient is not significant for external debt.

The regressions for the firm-level determinants of net nominal currency derivatives positions (asset minus liability positions) indicate that they are substitutes for real exposure. After controlling for the level of dollar-denominated debt, we find that firms with higher net exports have a lower derivative asset position (that is, fewer dollar forward purchase contracts). These results are in line with the results presented by Cowan *et al.* (2005) for large firms. As the intersections in table 3 predict, the data show that larger firms have higher notional derivative positions.

The last columns of table 5 (H and I) show that the largest firms have high derivative asset positions, as well as high derivative liability positions. Derivative asset positions are larger in firms with higher dollar-denominated debt, and smaller in firms with higher net exports. This relationship between real and financial exposure is not as clear for derivative liability positions, which may simply be due to the limited number of observations that are different from zero.

In summary, the evidence indicates that firms match their real exposure with their financial exposure, mainly by using dollar-denominated debt and, to a lesser extent, currency derivatives. Finally, the largest firms tend to use foreign currency debt or currency derivatives more than the small firms.

Table 5

Firm level regressions (*)

	Dependent variable								
Independent variables	**Domestic debt in dollars/ sales**				**External debt/ sales**	**Total debt in dollars/ sales**	**Net derivatives/ sales (asset position)**	**Net derivatives (asset position)/ sales**	**Net derivatives (liability position.)/ sales**
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Real exposure	0.2603	0.0964	0.0736	0.0457	0.3957	0.0958	-0.0164	-0.6017	0.0436
(exp.- dir. imp.)/ sales	(0.0233)***	(0.0229)***	(0.0206)***	(0.0200)**	(0.0870)***	(0.0266)***	(0.0017)***	(0.0917)***	(0.0464)
Real exposure dummy				0.1641	0.1973	0.2210		0.1315	0.0941
(exp.- dir. imp.) > 0			(0.0127)***	(0.0691)***	(0.0167)***		(0.0533)**	(0.0463)**	
Sectoral openness	0.1934	0.1655	0.1516	0.1079	0.0910	0.1589	0.0023	0.0067	-0.0723
(sectoral exp.- sectoral imp.)/ sectoral supply	(0.0294)***	(0.0307)***	(0.0278)***	(0.0283)***	(0.1420)	(0.0369)***	(0.0017)	(0.1205)	(0.0888)
Domestic debt			0.2053	0.1968					
Domestic debt/ sales					(0.0102)***	(0.0100)***			
Total debt in dollars							0.0108	0.7949	0.0460
Debt in dollars/ sales							(0.0029)***	(0.0592)***	(0.0656)
Size		0.0886	0.0876	0.0631	0.1393	0.0753	0.0011	0.1268	0.0760
Sales (ln)	(0.0038)***	(0.0034)***	(0.0036)***	(0.01837)***	(0.0047)***	(0.0002)***	(0.0160)***	(0.0128)***	
Estimation method	Tobit	Tobit	Tobit	Tobit	Tobit	Tobit	OLS	Tobit	Tobit
Observations	4,849	4,849	4.849	4.849	4.849	4.849	4.848	4.849	4.849
Truncated at 0	3,727	3,727	3.727	3.727	4.708	3.679		4.725	4.797
Pseudo R2/ R1	0.046	0.298	0.413	0.469	0.257	0.326	0.026	0.356	0.402
LR chi2	146.73	948,44	1,313.62	1.490.63	294.99	1.201.08		367.91	175.14
Log likelihood	-1,517.66	-1,116.80	-934.21	-845.70	-426.68	-1.244.30		-332.68	-130.35

(*) *, **, and *** denote coefficients that are significant at 10, 5, and 1 percent, respectively. Standard deviation in brackets. Net derivatives are long positions minus short positions at the firm level. Net asset derivatives are the net asset position at the firm level.

Source: Authors´ calculations.

VII. Conclusions

The increase in exchange rate volatility has intensified concern for currency mismatches in Chile. The absence of data on small-and medium-sized firms has limited the study of the levels, determinants, and consequences of these mismatches. Using information from the *ENIA*, the SBIF and the BCCh, we have constructed measures of the real exposure (exports-direct imports) and financial exposure to fluctuations of the dollar for 4,849 firms with *ENIA* coverage, 75% of which are small and medium-sized firms.

First, this study has found that for the set of small firms, the sum of the amounts exported and directly imported represents less than 3% of sales. This percentage rises to 8% for medium-sized firms, 18% for large firms, and 37% for mega firms. Real exposure to movements in the exchange rate thus represents a direct potential source of vulnerability for large and mega firms.

Second, we have found that firms reduce their currency mismatch —and, therefore, their vulnerability— by changing the currency composition of their debt. This result is similar to the findings of earlier studies on large firms, which is not surprising given the concentration of real mismatches in larger firms. The full sample registered a substantial share of dollar-denominated debt (domestic and external) close to 10% of total sales. Firm-level regressions show that this debt increases with the degree of real exposure and the size of the firm. Interestingly, this debt is almost entirely domestic (5.9% of sales) in the case of large firms, whereas it is mostly composed of external debt (6.6% of sales) in the case of mega firms. Both results point to a reduced aggregate vulnerability to the exchange rate. Real exposure is concentrated in those firms with fewer financial restrictions, and these firms adjust the currency composition of their liabilities to reduce their aggregate mismatch.

Despite market development, the use of derivatives in 2004 was almost nonexistent among manufacturing firms [17]/. Even for mega firms, the notional value of the sum of asset and liability positions did not exceed 1.5% of sales. For SMEs, this percentage was, for all practical purposes, zero.

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Appendix

Exports/ imports

(% total sales) by size, 2004

Thousands of UFs	Units (1) (thousands of UFs)	Small (2) (0-25)	Medium (25-100)	Large (100-600)	Mega (600-∞)	Total (0-∞)
Plants	(number)	2,368	1,329	787	365	4,849
% of total	(% of total)	48.8	27.4	16.2	7.5	100.0
Firms that export						
	(% of group)	3.9	16.8	45.5	77.8	19.7
Fraction of sales exported						
(0,10)	(% of group	36.2	42.3	48.5	32.6	41.1
(10,20)	exporting)	19.1	15.0	10.5	12.2	12.9
(20,30)		8.5	6.6	6.9	6.3	6.8
(30,40)		3.2	6.2	4.7	6.3	5.4
(40,50)		6.4	4.8	2.2	4.5	3.9
(50,60)		4.3	4.4	5.0	7.3	5.5
(60,70)		4.3	4.4	5.3	8.3	5.9
(70,80)		6.4	7.9	6.9	9.0	7.7
(80,90)		4.3	4.4	8.9	7.6	7.0
(90,100)		7.4	4.0	1.1	5.9	3.8
Firms that import						
	(% of group)	5.7	20.3	45.9	64.7	20.7
Fraction of sales imported						
(0,10)	(% of group	50.0	51.1	46.4	51.9	49.5
(10,20)	importing)	24.3	18.8	23.6	20.5	21.7
(20,30)		10.3	7.7	12.6	12.6	11.0
(30,40)		6.6	10.7	7.7	6.3	8.0
(40,50)		3.7	6.3	4.9	4.6	5.0
(50,60)		2.2	3.3	1.9	1.7	2.3
(60,70)		0.7	1.8	1.9	1.7	1.7
(70,80)		0.0	0.4	0.8	0.8	0.6
(80,90)		0.7	0.0	0.0	0.0	0.1
(90,100)		1.5	0.0	0.0	0.0	0.2

(1) (% of total) refers to the percent that the size group represents in the total. (% of group) is the fraction of firms in the size group that present values different from zero for the variable in question. (% of group exporting) is the percent of firms that export the fraction of their sales in question.
(2) Small firms include 134 micro firms (sales < 2,400 UFs).

The Development of the Currency Derivatives Market in Chile [1/]

Authors: Luis Antonio Ahumada, Felipe Alarcón, Jorge Selaive and José Miguel Villena

I. Introduction

Exchange-rate volatility can affect the financial stability of economies through several channels. Its effects can be seen on firms' balance sheets through the currency denomination of assets and liabilities, as well as in the competitiveness of firms oriented to external markets or import substitution. In this context, financial derivatives are instruments available to economic agents to help them lower their exposure to currency risk.

The goal of this paper is to evaluate the development of the Chilean currency derivatives market [2/]. To this end, we provide a characterization of the market, in which we examine terms, subscribed amounts, and the main instruments, and describe the evolution of these variables in the period 1998–2005. We also present an econometric analysis identifying economic factors that explain the development of the derivatives market in the economies included in the foreign exchange survey by the Bank for International Settlements (BIS). We use this exercise to evaluate, in light of these factors, the current degree of development of the Chilean currency derivatives market and the outlook for the future.

In Chile, an exchange rate band was eliminated in September 1999 and all exchange rate controls were removed in 2001. The ensuing boost has been associated with a greater share of agents in the real sector and a significant increase in cross-border transactions in the so-called non-delivery forward (NDF) market [3/].

Part of the evidence presented in this paper indicates that the level of activity on the Chilean spot market does not differ much from the average of advanced economies. On the other hand, the increased activity in the derivatives market in recent years has positioned it slightly above other emerging economies', but it is still a long way from the advanced economies. Furthermore, Chile presents lower spreads in the derivatives and spot markets relative to other emerging economies [4/]. Finally, our panel estimations for the group of economies analyzed point to the currency derivatives activity converging toward levels that are in line with the fundamentals of the Chilean economy.

II. The world currency market: Chile in the international context

II.1 Traded instruments: A global perspective [5/]

At the world level, the daily volume of transactions for all foreign exchange instruments reached US$2,585 billion in 2004, 52% more than in 2001. The contraction of 2001 relative to 1998 is attributed to the introduction of the euro, large banking mergers, and a loss in initiative from hedging funds (BIS, 2001). Consequently, the increase in 2004 could be associated with a greater interest on the part of investors in using foreign exchange as an alternative to investing in fixed- and variable-rate assets, together with a renewed interest in this market on the part of the hedging funds (BIS, 2004).

The volume of spot transactions was around a third of total transactions in 2004, with currency swaps being the most used instrument at the world level (table 1).

In Chile, the figures on exchange activity show sustained growth. In 2001, the currency market recorded transactions valued at US$2,118 million, while in 2005 that figure rose to over US$3,700 million daily, on average (table 1).

[1/] We are grateful for comments by Luis Óscar Herrera, Esteban Jadresic, Alejandro Micco, two anonymous referees, and participants of the internal seminar of the Financial Policy Division. Any errors or omissions are solely the responsibility of the authors.

[2/] For a description of the methodology applied in the Chilean currency market, see Alarcón, Selaive, and Villena (2004).

[3/] The non-delivery forward (NDF) market involves offshore currency derivatives transactions, which are settled under a clearing system and are conducted under foreign legislation. These transactions take place between resident and nonresident counterparties.

[4/] The appendix provides a brief definition of the main foreign exchange instruments.

[5/] We include all foreign exchange instruments reported in the BIS surveys.

Table 1

Transactions by type of instrument: global statistics (*)
(US$ billion)

		Instruments				Total	
		Spot	Forwards	FX swaps	Other	Transactions	Transactions/ GDP (%)
World	1998	772	157	1,053	131	2,113	40
	2001	520	164	933	88	1,705	27
	2004	830	260	1,318	177	2,585	25
Chile	1998	0.9	0.5	-	-	1.3	4.3
	2001	1.5	0.6	-	0.00	2.1	8.7
	2004	2.0	0.7	0.2	0.03	3.0	6.6
	2005	2.4	1.0	0.4	0.02	3.7	7.4

(*) Includes data for all the economies that participated in the respective surveys. Figures correspond to daily averages for the month of April reported in the BIS surveys, while transactions over GDP are constructed as annualized figures for the years 1998 to 2004 for all the economies. For 2005, in Chile we consider actual transactions carried out in the calendar year.

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

Cross-border exchange activity, in both the spot and the derivatives markets, is the main component of total transactions worldwide. These transactions accounted for 72% of total transactions in 2004. In Chile, however, transactions with nonresidents represented only 6% of total derivatives traded in 2004, and they were almost nonexistent in the spot market (table 2). This situation could be associated with a low internationalization of the market for fixed-rate instruments denominated in Chilean pesos, the lower cost of operating in the NDF market, and the administrative and transaction costs necessary for nonresident investors to effect spot and derivatives transactions with physical delivery in the local market [6]/.

II.2 Traded instruments: Overview by groups of countries

This section compares the depth of the Chilean currency market with that of other representative economies. Market depth is measured through the buy and sell figures available in the BIS survey and in the currency statistics of the Central Bank of Chile [7]/.

Depth is thus calculated by annualizing average daily transactions, normalized by the nominal GDP of each economy[8]/. To facilitate comparison, we constructed an indicator for economic groups, in which each grouping takes the simple average of the indicators of the economies that make up the group. In constructing the groups, we considered the classifications proposed by J.P. Morgan-Chase for emerging economies and the International Monetary Fund's for the advanced economies [9]/.

The evidence shows that the activity of the Chilean derivatives market is similar to the average of Latin American and other emerging economies. Chile maintains a significant gap, however, with the advanced economies (figure 1).

Table 2

Local and cross-border transactions: 2004 (*)
(US$ billion)

	Spot transactions		Derivatives transactions		Total cross border transactions / total transactions (percent)
	Local	Cross-border	Local	Cross-border	
World	232	597	487	1,267	72.1
Chile	1.5	-	0.8	0.1	5.9

(*) Includes data for all the economies that participated in the respective surveys. Figures for Chile correspond to daily averages for the month of April, reported in the BIS surveys.

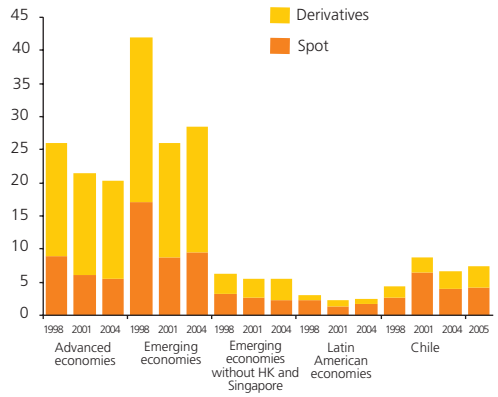
Source: Authors' calculations, based on data from the BIS and Central Bank of Chile.

For spot transactions, we find that the degree of market depth in Chile is not very far from the average of the advanced economies, and it is above other emerging economies.

Thus, the activity of the Chilean derivatives market is lower in relative terms than the spot market, in comparison with advanced economies. However, also in relative terms, the derivatives market has grown more in Chile than in the rest of the groups included in this exercise [10]/.

Figure 1

Spot and derivatives currency market transactions (*)
(times GDP in nominal dollars)



(*) Annualized figures for the month of April of each year, except for Chile, which corresponds to total annual transactions in 2005.

Source: Own calculations, based on data from the Central Bank of Chile, BIS and World Bank.

[6]/ One of the most significant costs for nonresidents to operate in the local market is the process of opening bank checking accounts.

[7]/ The implementation of the market depth measure is determined by the availability of foreign exchange information in each economy.

[8]/ Average daily transactions are for April. To annualize, we multiplied the average daily transactions by the number of working days in each year. Our conclusions from the comparisons are not affected by the normalization of transactions by other variables, such as external debt or foreign trade flows.

[9]/ The appendix includes a list of the economies that make up each group.

[10]/ The ratio of derivatives to spot transactions at the world level was around 2 in 2004. Chile displayed a ratio of 0.4 in 2001 and 0.6 in 2004.

II.3 Bid-ask spreads

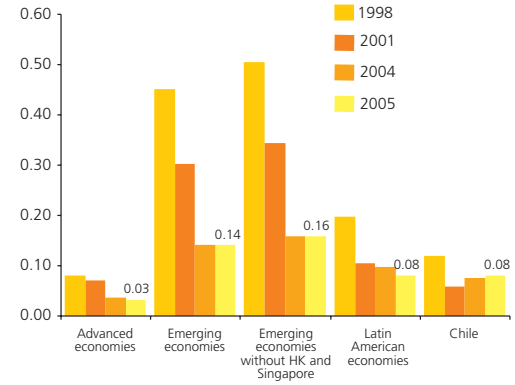
Thus far, we have examined foreign exchange activity in terms of transactions. In this subsection, we compare the same groups of countries in terms of spreads, although the analysis is limited by the data on buy/sell rates available from Bloomberg. The spread, or the difference between the bid price and the ask price, is simultaneously a measure of transaction costs, liquidity provisions, and part of the costs for banks to maintain open currency positions. The latter is particularly related to future projections on the exchange rate, interest rates, and exchange activity carried out by agents (Jorion, 1996).

We constructed daily spreads for spot transactions and one-month forward transactions. The spread was constructed as the difference between the nominal ask rate (domestic currency/US$) and the nominal bid rate (domestic currency/US$), normalized by the average of both. The annual spread reported in figures 2 and 3 considers the simple average of the daily figures, calculated as described above.

Figure 2

Average spread in the spot market

(percent)

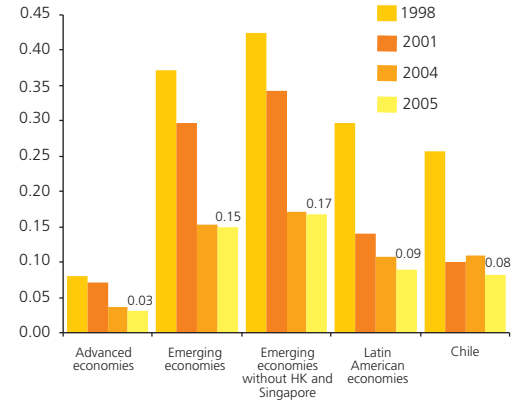


Source: Authors' calculations, based on data from Bloomberg.

Figure 3

Average spread in the forward market (*)

(percent)



(*) Constructed from the bid and ask prices of 30-day forward contracts.

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

In general, Chile's spreads in the forward and spot markets are below those of other emerging economies, similar to other Latin American economies, and a long way from advanced economies. No important changes have been registered since 2001 (figures 2 and 3).

II.4 Contractual terms of derivatives transactions

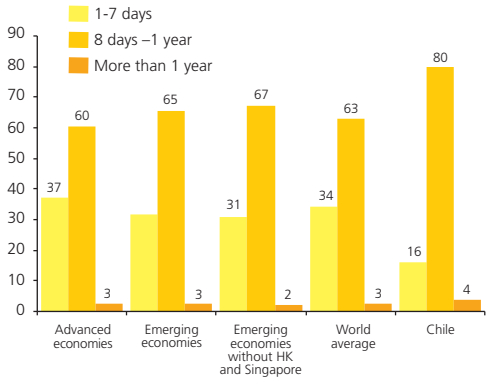
An analysis of the term structure of derivatives contracts reveals that maturities are concentrated between eight days and one year, which is in line with other groups of economies. The second maturity segment in terms of concentration is from one to seven days (figure 4).

Chile's relatively higher concentration in intermediate maturities could reflect the greater share of liquidity transactions in other economies, which typically have a maturity of not more than one week. This hypothesis is difficult to verify with the available information, however.

Figure 4

Concentration by maturity range

(percent share, 2004)



Source: Own calculations, based on BIS data.

III. Characterization of the local currency derivatives market [11]/

The Chilean currency market grew relatively steadily in terms of transactions and participating agents in the period 1998–2005.

III.1 Transactions

Annual statistics on derivatives transactions display strong growth in the period analyzed. The subscribed notional amount grew from US$112 billion in 1998 to over US$382 billion in

[11]/ This section draws exclusively on the exchange data compiled by the Central Bank of Chile through the *Compendium of Foreign Exchange Regulations*. The statistics correspond to actual data for each calendar year.

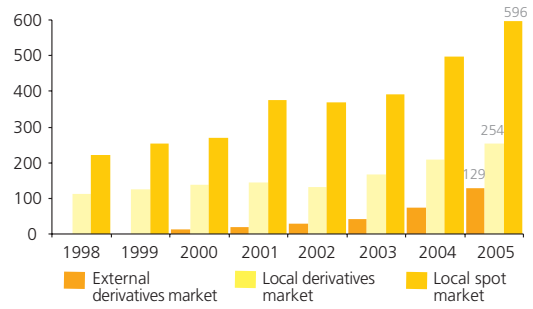
2005. The latter figure can be decomposed into US$254 billion traded between residents and US$128 billion between resident and foreign counterparties (figure 5).

Derivatives transactions between residents were distributed quite homogeneously in 2005 between the nonfinancial and institutional sector, interbank transactions, and the nonbank financial sector (table 3a). This partly reflects the significant growth in the subscribed amounts of institutional agents, in particular the pension funds. Transactions with external agents, in turn, have been strongly centered on local banks, with a very small share for the nonfinancial and institutional sector (table 3b)[12]/. Finally, transactions on the spot currency market totaled nearly US$600 billion in 2005, with sustained growth since 2002 (figure 5).

Figure 5

Spot and derivatives transactions in Chile (*)

(US$ billion)



(*) Corresponds to the actual total buy and sell transactions realized in the calendar year. The figure thus may not coincide with annualized figures reported previously for the international comparison.

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

Tabla 3

Currency derivatives by type of counterparty: local and external market

(US$ billion)

(a)

Year	Contracts with counterparties from the local bank market			
	Nonfinancial institutional sector	Banks	Nonbank financial sector	Total
1998	13	36	63	112
1999	21	45	59	125
2000	22	52	66	139
2001	30	50	63	143
2002	26	42	63	131
2003	38	63	65	166
2004	57	74	78	208
2005	70	101	83	254

(b)

Year	Contracts with foreign counterparties (NDF)			
	Nonfinancial institutional sector	Banks	Nonbank financial sector	Total
1998	-	-	-	-
1999	-	-	0	0
2000	1	1	10	12
2001	0	6	14	20
2002	0	10	21	30
2003	0	14	27	42
2004	1	35	37	72
2005	1	88	40	129

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

III.2 Counterparties

The number of buyers of currency derivatives has risen significantly in recent years. Local banks' counterparties went from 407 in 1998 to 1,685 in 2005, in direct response to the increasing inflow of agents from the nonfinancial sector into the currency derivatives market (table 4a).

External counterparties —mainly intermediaries/brokers— have also witnessed considerable growth, with 42 agents in 2005 (table 4a). This big rise could reflect a number of factors, including the elimination of currency controls and the consolidation of the floating exchange rate regime.

External agents carried out transactions with 14 local banks in 2005 and with a similar number of nonfinancial agents and nonbank financial agents (table 4b).

Table 4

Counterparties by type of transaction: local bank market and external market

(Number of counterparties)

(a)

Year	Counterparties from the local bank market			
	Nonfinancial and institutional sector	Nonbank financial sector	External market	Total counterparties
1998	374	33	-	407
1999	349	30	-	379
2000	358	33	8	399
2001	712	33	19	764
2002	732	31	20	783
2003	962	31	28	1,021
2004	1,269	42	40	1,351
2005	1,607	36	42	1,685

(b)

Year	Local counterparties of the external market			
	Nonfinancial and institutional sector	Banks	Nonbank financial sector	Total counterparties
1998	-	-	-	-
1999	-	-	1	1
2000	5	7	6	18
2001	12	15	5	32
2002	8	9	5	22
2003	8	10	6	24
2004	11	11	8	30
2005	9	14	4	27

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

[12]/ Pension funds are authorized to trade derivatives only through local banks.

IV. Quantitative evaluation of the development of the currency derivatives market

This section presents panel estimates incorporating the years 1998, 2001, and 2004 for the group of economies included in the BIS foreign exchange surveys. The dependent variable is the natural logarithm of the volume traded or turnover (currency derivatives purchases plus sales) over GDP. This is the only variable available at the economy level, and we adopt it as a proxy for the development of the currency derivatives market.

The explanatory variables included are similar to those used by Caballero, Cowan and Kearns (2004) in crosscut estimations for 2001. Using the same survey, we incorporated the years 1998 and 2004, thereby obtaining more representative and robust estimates. Thus, per capita GDP tries to capture the role of the overall development of the economies. Financial development is proxied by the volume of domestic loans over GDP. We control for each economy's exchange rate regime, so as to identify the role these play as policy mechanisms providing implicit currency insurance for domestic agents in fixed exchange rate regimes. We also control for the existence of financial centers for the six economies identified as such by the BIS [13]/. Real GDP is incorporated to control for the size of the economies [14]/.

Table 5 presents the results for the base estimations [15]/. Like Caballero *et al.* (2004), we find that the variables associated with overall economic development are significant. Other variables, however, also emerge as important factors for explaining the development of the currency derivatives market. Exchange rate regimes are significant and of the right sign. This result confirms the intuition that, for example, floating exchange rate regimes contribute to the development of derivatives markets at the economy level, while fixed exchange rate regimes tend, on average, to reduce the activity of derivatives markets. Finally, the existence of a regional financial center could provide a strong boost for the development of derivatives markets, as suggested by the evidence in figure 1.

Table 6 presents alternative specifications that incorporate the set of explanatory variables from the base specification (table 5, column 1). International reserves have a negative and significant effect on derivatives market development in some specifications. This could suggest that a large accumulation of international reserves may discourage the use of currency insurance, as it may be perceived as implicitly insured through a greater probability and disposition on the part of the authority to intervene directly in the currency market. Other variables, such as commercial openness, control by commodities-exporting countries, exchange rate volatility, and financial integration, were not significant [16]/.

Table 5

Panel results: base specifications (*)

	Dependent variable ln (derivatives turnover/ GDP)		
	[1]	[2]	[3]
Log real GDP per capita	0.688	0.964	0.818
	(2.87)**	(3.82)**	(3.41)**
Log real GDP	-0.224	-0.324	-0.315
	(2.21)*	(3.12)**	(2.94)**
Log financial development	1.358	1.423	1.443
	(4.40)**	(4.85)**	(4.80)**
Financial center dummy	2.394	2.375	2.283
	(5.28)**	(5.54)**	(5.18)**
Fixed regime		-0.83	
		(2.50)*	
Floating regime			0.722
			(2.08)*
Observations	132	132	132
R^2	0.72	0.76	0.75

T statistics in parentheses.
* significant at 5%, ** significant at 1%.

(*) Turnover corresponds to the sum of the buy and sell currency derivatives transactions. A constant is included but not shown.

Source: Own calculations.

Table 6

Panel results: alternative specifications (*)

	Dependent variable ln (derivatives turnover/ GDP)				
	[1]	[2]	[3]	[4]	[5]
International reserves	-0.732	-0.781	-1.177	-1.176	-1.202
	(1.33)	(1.41)	(1.97)+	(1.95)+	(2.01)+
Financial integration		-0.007		-0.003	
		(1.14)		(0.39)	
European Monetary Union			-0.933	-0.885	-0.971
		(1.71)+	(1.53)	(1.78)+	
Exchange rate volatility					8.418
					(1.19)
Observations	131	130	131	130	130
R^2	0.72	0.72	0.73	0.73	0.74

T statistics in parentheses.
+ significant at 10%.

(*) We control for all the variables of the base specification. A constant is included but not shown.

Source: Own calculations.

[13]/ The estimation results do not change significantly when financial centers are excluded. For simplicity, transparency, and to identify the quantitative importance of these centers, we opted to run the estimation using all the economies reported in the BIS surveys. See the appendix for a list of the economies defined as financial centers.

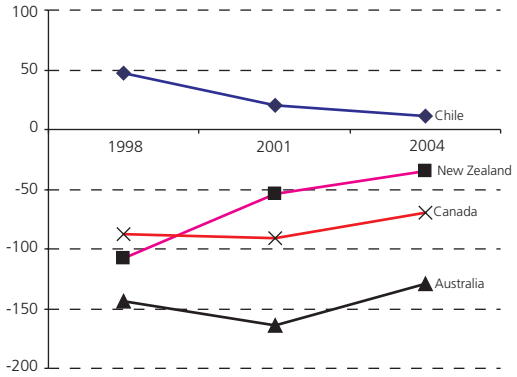
[14]/ The appendix describes the data sources and the specific construction of each variable.

[15]/ Alternative specifications generate similar results; they are not presented here for reasons of space.

[16]/ One extension of this study would be to evaluate other measures of international financial integration that are not associated with asset and liability stocks, as are the measures used here.

Figure 6

Percentage difference between estimated and observed turnover (*)



(*) Elaborated with the base specifications, column [1].

Source: Own calculations.

Figure 6 shows the difference between observed development and the level estimated by the base model in table 5, for four selected economies. The vertical axis represents the difference between the level of development estimated by the model and the volume of transactions observed in the year. Chile lies around 50% below the level suggested by its fundamentals in 1998. In 2001 and 2004, there is a slight convergence toward the levels suggested by its determinants. The Chilean currency derivatives market, however, is still far from economies like Australia, New Zealand, and Canada, whose markets are clearly deeper than would be suggested by their fundamentals.

V. Final comments

The currency derivatives market in Chile has grown steadily in recent years, in terms of both activity and number of participants. In particular, the market has added more economic agents from the real sector, and transactions between banks and intermediaries operating in the NDF market have increased significantly.

At the world level, the volume of derivatives transactions is greater than the volume of spot transactions. Within derivatives transactions, cross-border transactions account for the largest share. In the Chilean currency market, however, spot transactions continue to top derivatives transactions, although the latter have grown strongly in recent years.

The activity level of the Chilean spot market is not far off the average of the advanced economies. In contrast, the currency derivatives market is slightly above that of other emerging economies, but it is still a considerable distance from the advanced economies. Likewise, the spreads in the Chilean derivatives and spot markets may be lower than in other emerging economies.

Finally, based on panel estimations for a set of analyzed economies, we find a convergence in currency derivatives activity toward the levels suggested by the Chilean economy's fundamentals. Nevertheless, the country is still far from economies like Australia, New Zealand and Canada, which display much deeper markets.

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Appendix

Glossary of derivative instruments

Spot: A single transaction consisting of the exchange of two currencies at a rate or price stipulated at the moment the contract is finalized, and whose value, payment, or physical delivery is realized within two working days.

Forward: A transaction consisting of the exchange of two currencies at a rate or price stipulated at the moment the contract is finalized, and whose value, payment, physical delivery, or settlement is realized after a given period greater than two working days.

Future: Similar to a forward, except that it is traded on a market through agents or brokers and the notional amounts and term dates are standardized.

Foreign exchange swap (FX swap): A transaction consisting of the exchange of two currencies at a price stipulated at the moment the contract is finalized, whose physical delivery can be spot or forward, where simultaneously another transaction is contracted for the same notional amount reversing the first transaction, also at a price stipulated at the moment the contract is finalized (generally different from the price of the first transaction), but whose delivery of the foreign exchange is exclusively forward and at a longer term than the first transaction.

Currency swap: Contract whereby two counterparties exchange interest payment flows in different currencies over a period of time, and also stipulate the exchange of the principal amounts in different currencies at the end of the contract at a pre-established rate or price.

Option: Contract whereby the buyer, upon paying a premium, obtains the right to buy or sell a certain currency against another currency at an agreed rate or price during a specified period of time.

Sources of information

International comparisons are based on the triennial BIS survey, available for 1998, 2001 and 2004 [17]/. This survey collects data from central banks regarding off-market currency transactions; the last version (2004) incorporates a group of 52 economies.

Data on spot and derivatives transactions for Chile are compiled by the Central Bank of Chile, under the *Compendium of Foreign Exchange Regulations*. These data cover all the foreign exchange transactions undertaken by domestic banking firms in the domestic and foreign markets, as well as all transactions by non-bank entities with nonresidents [18]/.

The Chilean exchange transactions database covers around 95% of the transactions involving Chilean pesos in the local market. The transactions that are not included correspond mainly to transactions between non-bank agents. These transactions do not represent more than 5% of the transactions recorded by the Central Bank of Chile in a survey of exchange transactions implemented in the first half of 2005 [19]/.

Derivatives data at the economy level are taken from the triennial BIS surveys implemented in 1998, 1999 and 2001. These surveys only provide figures on exchange turnover (purchases plus sales).

Data on gross domestic product, money, imports, exports, international reserves, and exchange rate volatility (this last measured as the annualized standard deviation of the log of exchange rate variation) are obtained from the International Monetary Fund's *International Financial Statistics*. Figures on external debt are from the World Bank's *World Development Indicators*; they are complemented with data from the International Investment Position of economies that do not report on these indicators.

Exchange rate regimes are obtained from Levy-Yeyati and Sturzenegger (2005), available at www.utdt.edu/~ely/Base_2005.zip. The identification of commodities-exporting economies is based on the work of Cashin, Céspedes and Ratna (2004). External asset and liability series for the 1998, 2001, and 2004 are from Lane and Milesi-Ferretti (2005), available at www.imf.org/external/pubs/ft/wp/2006/data/wp0669.zip.

[17]/ For more information on the methodology used in the BIS survey, visit www.bis.org.

[18]/ The provisions for the collection of exchange data carried out by the Central Bank of Chile are established in chapters I and IX of the *Manual de Procedimientos y Formularios de Información del Compendio de Normas de Cambios Internacionales*, available at www.bcentral.cl.

[19]/ The aggregate findings of this survey are available on request.

Economies included in the study

Advanced economies (1)			Emerging economies (2)			Latin American economies		
1998	**2001**	**2004**	**1998**	**2001**	**2004**	**1998**	**2001**	**2004**
Germany	Germany	Germany	Argentina	Brazil	Argentina	Argentina	Brazil	Argentina
Australia	Australia	Australia	Brazil	Colombia	Brazil	Brazil	Colombia	Brazil
Austria	Austria	Austria	South Korea	South Korea	Colombia	Mexico	Mexico	Colombia
Belgium	Belgium	Belgium	Philippines	Slovakia	South Korea		Peru	Mexico
Canada	Canada	Canada	Hong Kong (3)	Philippines	Eslovaquia			Peru
Denmark	Denmark	Denmark	Hungary	Hong Kong	Philippines			
Spain	Spain	Spain	India	Hungary	Hong Kong			
United States (3)	United States	United States	Indonesia	India	Hungary			
Finland	Finland	Finland	Malaysia	Indonesia	India			
France	France	France	Mexico	Israel	Indonesia			
Greece	Greece	Greece	Poland	Malaysia	Israel			
Holland	Holland	Holland	Czech Republic	Mexico	Malaysia			
Ireland	Ireland	Ireland	Russia	Peru	Mexico			
Italy	Italy	Italy	Singapore (3)	Poland	Peru			
Japan	Japan	Japan	South Africa	Czech Republic	Poland			
Norway	Norway	Norway	Thailand	Russia	Czech Republic			
New Zealand	New Zealand	New Zealand		Singapore (3)	Russia			
Portugal	Portugal	Portugal		South Africa	Singapore (3)			
United	United	United						
Kingdom (3)	Kingdom	Kingdom		Thailand	South Africa			
Sweden	Sweden	Sweden		Turkey	Thailand			
Switzerland	Switzerland	Switzerland			Turkey			

(1) The advanced economies are thus classified by the IMF, except for those countries that are in the EMBI Global index.

(2) The emerging economies are those included in JP Morgan's EMBI Global index.

(3) Corresponds to financial centers. Luxembourg is also a financial center, but it is not considered an advanced economy by the IMF.

Characterization of Financial Account Asset and Liability flows: Chile, 1993-2004

Authors: Luis Antonio Ahumada, Cristián Echeverría, Sergio Godoy and Nancy Silva

I. Introduction

An increase in capital flows to and from emerging economies has been detected in recent decades. In this context, the Chilean economy has experienced one of the most vigorous and sustained increase, together with greater integration with international financial markets. In terms of the level of external assets and liabilities, Chile surpassed the average emerging economy in 2001 [1]/. The dynamic capital flows in Chile have been accompanied by growing diversification in the structure of external financing flows. While this greater financial integration has spurred economic growth and the development of domestic financial markets, it may also increase the economies' sensitivity to liquidity fluctuations in international financial markets.

This paper provides a characterization of the level and composition of Chile's financial account asset and liability flows, their relative importance with regard to GDP, and their volatility. To do so, we make a comparison with economies that have a similar country risk rating, highlighting some implications for the stability of the economy's external financing. We also analyze the correlation of external asset and liability flows with a set of international macrofinancial variables.

We find that the structure of assets and liabilities in the Chilean economy is more balanced and less volatile than emerging economies as a group, which demonstrates their more volatile debt liabilities. Additionally, the most significant liability flows in the Chilean economy have been in the form of direct investment, whereas debt flows predominate in emerging economies. All of these factors contribute to creating a context in which capital account movements pose no serious threat to the financial stability of the economy.

II. The importance of the level and structure of external financing flows

In general terms, a financial crisis can be triggered by a variety of factors. For example, it could be caused by a change in investor expectations as a result of a shock to emerging or developing markets, or by a deficient financial regulation that distorts the allocation of capital. Crises can be characterized by pronounced fluctuations in external asset and liability flows that may alter the normal payment schedule of an economy, as it occurred in the financial crises of the late 1990s [2]/. Consequently, capital flows are constantly monitored today, and there is an interest in understanding their characteristics and determining factors.

The types of financial instruments endorsing gross external asset and liability flows can differ in their terms, enforceability, liquidity, and currency denomination. It is possible to distinguish three categories: foreign direct investment, portfolio investment (capital), and debt. This latter category includes lending operations, commercial credit, bonds, and promissory notes [3]/.

[1]/ See Jadresic *et al.* (2003).

[2]/ See Calvo and Mishkin (2003) for a synthesis of the most recent analyses. One dramatic example of a sharp capital outflow in the form of bank debt, primarily short term, was the crisis in Thailand, which amounted to 38% of GDP in the first quarter of 1998.

[3]/ The Fifth *Balance of Payments Manual* (2003) of the International Monetary Fund distinguishes five kinds of flows in the financial account: (1) foreign direct investment, which, by convention, represents more than 10% of the wealth of a corporation and reflects a lasting interest in resident companies; (2) portfolio investment, which includes capital shares representing less than 10% of wealth and debt titles (bonds and promissory notes); (3) other investments, commonly called debt, which include loans from banks and international bodies as well as trade credit; (4) financial derivatives; and (5) international reserves. This study only covers investment and debt flows, in a standard grouping in the literature (see, for example, Lane and Milesi-Ferreti, 2001).

An adequate balance between flows of assets and liabilities is important for financial stability, since greater sensitivity to changes in international financial conditions or to agents' expectations may provoke abrupt shifts in capital inflows and outflows. Although major alterations in access to external financing are not usual under normal circumstances, in situations of stress both resident and nonresident brokers may decide to rapidly change the composition of their foreign asset and liability portfolios [4]/.

In general, direct investment flows are associated with longer terms and financing sources that are less sensitive to market conditions (Hausmann and Fernández-Arias, 2000). In contrast, external debt flows —especially short-term ones— tend to react more quickly to a change in market conditions (Chumacero *et al.*, 2001; Claessens *et al.*, 1995). In fact, these flows, especially loans from financial institutions, experienced the biggest contraction during the Asian crisis.

Another consideration is that the risk/return ratio of financial account flows varies. This is so because fixed-rate external debt and portfolio flows have binding contractual payment conditions, and are therefore less profitable, on average, than direct investment, although they have lower credit risk. In this sense, it would be desirable —in principle— to maintain a well diversified foreign asset and liability portfolio.

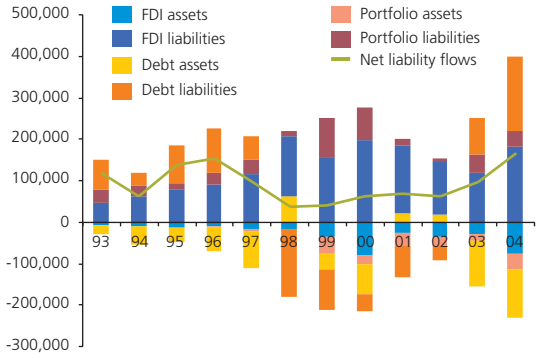
Finally, capital market regulations and institutional factors (i.e., taxes, regulation of capital inflows and outflows, payment infrastructure, and trade agreements) also influence the conditions of access to external financing, in terms of its composition, average maturity, and currency [5]/.

III. An international comparison of net external asset and liability flows, 1993–2004

Figure 1 shows the annual evolution of asset and liability flows for a group of 14 emerging economies, including Chile, for the period 1993–2004 [6]/. As expected for emerging economies, net liability flows show a consistently positive balance, which is coherent with a capital account surplus and is the natural counterpart of a current account deficit [7]/. At the beginning of the period, liability flows were concentrated mainly in debt flows, followed by direct investment and a lesser share for portfolio flows [8]/. Later, during the Asian crisis, debt flows underwent a significant reversal, a trend that continued until 2003. Direct investment liabilities maintained a stable growth rate and were not very sensitive to the effects of the crises in that decade. Portfolio liabilities, however, clearly increased after the Asian crisis, later returning to the levels they had at the beginning of the period.

Figure 1

Financial account flows in emerging economies (*)
(US$ million)



(*) By convention, liability flows are registered with a positive sign and asset flows with a negative sign. A positive (negative) liability flow corresponds to an increase (decrease) or a liability entry, while a positive (negative) asset flow reflects a decrease (increase) of these in a given period.

Source: Own calculations, based on statistical data from the IMF and Central Bank of Chile.

Despite the apparent similarities between the evolution of total asset and liability flows in Chile and in the group of emerging economies, a look at the composition of these flows reveals important differences (figure 2). First, contrary to what is seen in other emerging economies, the inflow of direct investment to Chile has been larger than debt flows throughout the period, with an annual average of US$4.5 billion (6% of GDP) [9]/. Second, the trend of direct investment asset flows is similar

[4]/ For example, Faucette, Rothenberg and Warnock (2005) show that one third of the episodes classified in the literature as sudden stops that occurred in the 1990s were induced by an increase in asset flows from local investors rather than by an abrupt halt in liability flows toward the affected country.

[5]/ For further information on the effects of regulations on capital movements in Chile, see Le Fort and Lehmann (2003).

[6]/ The series used in this paper, except for Chile, are from the International Monetary Fund's *International Financial Statistics*. The asset and liability data for the Chilean economy come from the financial account of the *Balance of Payments of Chile*, Central Bank of Chile.

[7]/ The countries included in this analysis are: Chile, China, Czech Republic, Hungary, India, Malaysia, Mexico, Poland, Russia, South Africa, South Korea, and Thailand. The criterion for selecting these countries was that they had a Moody's risk rating of up to three grades higher or lower than Chile in 2006. Brazil and Turkey do not meet this criterion, as they both have a rating below their investment grade, but they are included because of their systemic importance within emerging markets. According to the Standard and Poor's rating, all countries chosen (except Brazil and Turkey) also fulfill the previously established criteria.

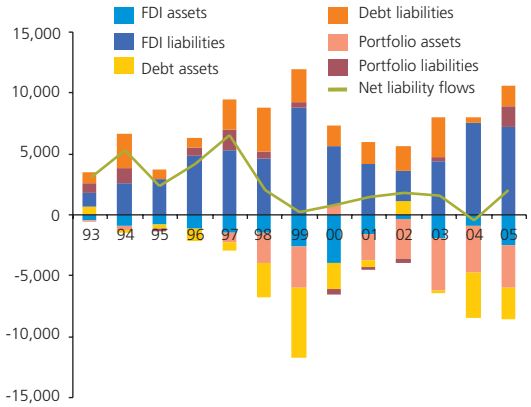
[8]/ It is a known empiric result that among investment liability flows, FDI tends to be more important in emerging economies, while portfolio investment dominates in developed economies (Amaya and Roland, 2004).

[9]/ Last year, FDI liabilities totaled around US$7.2 billion (approximately 7.2% of GDP), positioning Chile among the top ten emerging economies that are recipients of direct investment, as indicated in the World Bank's *2006 Global Development Finance Report*.

Figure 2

Financial account flows in Chile

(US$ million)



Source: Central Bank of Chile.

for Chile and the rest of the economies, even though they are a much bigger proportion of GDP in Chile, as shown below.

Moreover, while the external credit flows to emerging economies suffered a significant reversal after the Asian crisis, this phenomenon did not reach the Chilean economy. In fact, the decrease in the capital account surplus in this period has more to do with an increase in asset flows.

Portfolio investment inflows have been less important in Chile. They became negative after the Asian crisis, and only in 2005 did they become positive, with an inflow of approximately 1.7% of GDP. In contrast, the portfolio liabilities of emerging economies have always been positive. Another major difference with respect to the group of emerging economies are the significant flows of portfolio investment assets. These flows are attributable mainly to pension funds, which have invested a combined annual average of US$2.4 billion (about 3.2% of GDP) abroad since 1998.

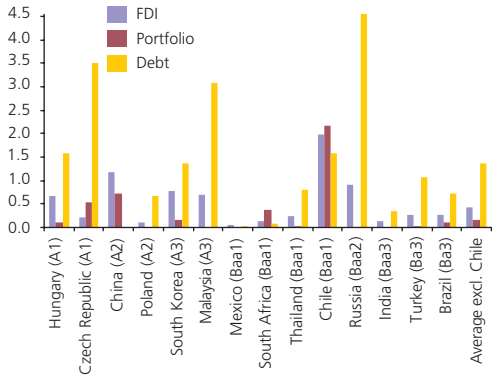
What follows is a country-by-country review of some indicators on the performance of components of capital account asset and liability flows. In terms of their behavior as a share of GDP, external asset flows were relatively more important and more balanced for Chile than for other economies with a better or equal risk rating (figure 3a). For example, several countries practically have no portfolio investment asset flows abroad, and direct investment is very low. This last point, however, can be explained partly by a bias toward more attractive investment opportunities in the local markets of those countries. In comparison, Chile holds the first place in direct and portfolio investment assets.

Figure 3

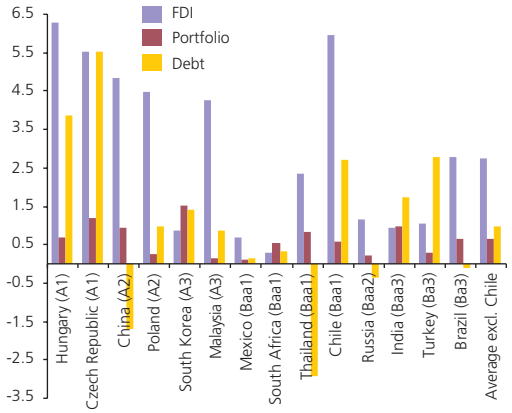
Asset and liability flows in economies with a similar risk rating

(percent of GDP)

(a)Asset flows as percent of GDP



(b) Liability flows as percent of GDP



Source: Own calculations, based on statistical data from the IMF and Central Bank of Chile.

Chile is second in direct investment liabilities, with twice the group's average for the period and comparable to countries considered major recipients of foreign direct investment, such as Hungary, the Czech Republic, and China. Regarding portfolio liabilities, Chile is slightly below the group's average. Its debt flows are proportionally greater than the average of countries with a similar rating, although this is influenced by a heavy decline in flows into emerging Asian economies starting in 1998. Compared with countries with a better risk rating, however, Chile's debt liability flows are proportionally lower for the period under study (figure 3b).

In terms of volatility measured by the variation coefficient, flows of both assets and liabilities in the Chilean economy (with the exception of debt assets) were more stable than the weighted average of the countries in the sample. Their volatility

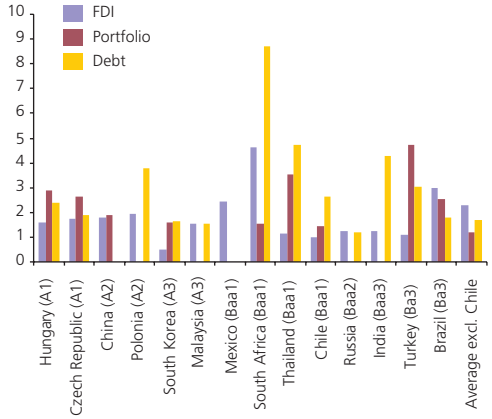
was similar or even inferior to that of countries with the same risk rating (figure 4) [10]/.

In most countries, direct investment and debt asset flows were more volatile than liability flows. The main flow of assets to Chile in the period —namely, portfolio investment— considerably surpasses the average of the countries in the sample (figure 3a), and yet it is the least volatile among the countries included in this comparison (figure 4).

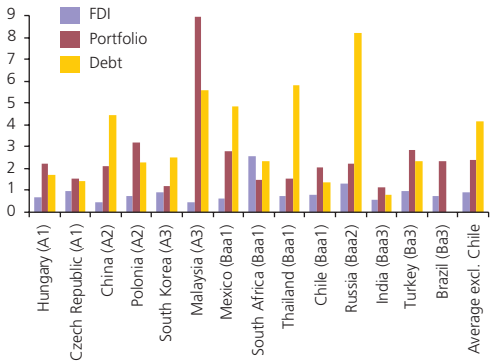
Figure 4

Volatility of external financing flows (*)

(a) Coefficient of variation: assets



(b) Coefficient of variation: liabilities



(*) GDP-weighted average. Flow volatility is measured through the coefficient of variation, which measures the relation between the standard deviation of a series and its sample average.
Source: Own calculations, based on statistical data from the IMF and Central Bank of Chile.

It has repeatedly been noted that the stock of Chile's external debt is high relative to countries with the same risk rating. This indicator in Chile (39%) is comparable to that of Malaysia (38%), the Czech Republic (35%) and Poland (42%), and is considerably lower than that of Hungry (68%) [11]/. However, the overall composition of external financing in the Chilean economy is better diversified, and the volatility of capital flows is substantially less. In particular, Chile's debt liability flows are less volatile and represent a smaller share of GDP than all countries with a better risk rating, as the above figures show.

Our analysis of the components of capital flows can be extended by exploring their comovements using correlations analysis [12]/. We start by reviewing the correlation between total asset and liability flows and between components of the flows for the countries in the sample.

The correlation between total asset and liability flows is positive and significant in most countries (figure 1, last column), which is consistent with the evolution of total flows shown in figures 1 and 2. However, the correlations between assets and liabilities for each type of flow indicate that, with the exception of China, none of the countries in the sample demonstrate positive and significant correlations for each of the components of their capital account. A positive correlation is shown between FDI assets and liabilities and debt, which explains the observed correlation between total flows.

If the correlation between asset and liability flows is positive and significant, which is the case for almost every country shown in table 1, then these should react similarly to changes in external or internal variables. For example, when faced with an improvement in external financing conditions, residents can be expected to expand their foreign indebtedness, thus increasing external liabilities. At the same time, this improvement could

Table 1

Correlation between assets and liabilities: international comparison

	FDI	Portfolio	Debt	Total
Hungary (A1)	0.13	0.38*	0.21	0.44*
Czech Republic (A1)	0.07	-0.15	0.55*	0.50*
China (A2)	0.81*	0.43*	0.79*	0.95*
Poland (A2)	0.31*	-0.05	0.42*	0.54*
South Korea (A3)	0.42*	0.13	0.44*	0.53*
Malaysia (A3)	-0.13	-0.53*	0.27	0.04
Mexico (Baa1)	0.69*	-	0.34*	0.60*
South Africa (Baa1)	-0.78*	-0.09	0.33*	0.61*
Thailand (Baa1)	-0.03	-0.06	0.15	0.26
Chile (Baa1)	0.44*	-0.04	0.05	0.68*
Russia (Baa2)	0.79*	-0.03	0.31*	0.41*
India (Baa3)	0.78*	-	0.43*	0.52*
Turkey (Ba3)	0.57*	-0.05	0.26	0.27
Brazil (Ba3)	0.29*	-0.37*	0.01	-0.07

(*) Correlations are statistically significant at 5%.

Source: Own calculations, based on quarterly statistics from the IMF and the financial account of the Central Bank of Chile, for the period 1993–2004.

[10]/ We also reviewed the volatility of capital flows, proxied by the variability of the ratio of annual flows to the GDP of each country. Our main results do not change substantially. The exception to the evidence presented in figure 4 is the greater volatility of direct investment liabilities in Chile. This greater volatility is influenced by the significant capital inflow ($3.15 billion) associated with Endesa-Spain's takeover of Enersis and Endesa-Chile in the second quarter of 1999.

[11]/ Foreign debt as a percentage of GDP was obtained from the IMF's Financial Stability Institute database.

[12]/ The analysis of correlations does not necessarily imply the existence of causality between the variables considered.

stimulate a greater volume of loans from residents to foreign entities, increasing external assets. In contrast, in the face of worsening international liquidity, a decrease in external asset flows would compensate somewhat for a possible contraction of foreign indebtedness.

On the other hand, if the correlation between asset and liability flows is not significant, then they can be expected to not respond similarly to macrofinancial stimuli. This case would threaten financial stability, because systemic liquidity restrictions could be generated under turbulent conditions in international markets. Of course, an economy with sufficient international reserves would have a lower probability of facing liquidity restrictions.

With regard to Chile, the positive correlation between total asset and liability flows is explained exclusively by the positive and significant correlation of direct investment liabilities with all the asset flows of the financial account (table 2). Portfolio asset and liability flows are not related to each other, which is not different from the rest of the economies and may reflect their intrinsic volatility. Debt flows do not demonstrate a positive and significant correlation, possibly because the maturity structure is concentrated in longer terms in the Chilean economy.

Table 2

Correlation between the components of the Chilean capital account

	FDI		Portfolio		Debt	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
FDI assets	1					
FDI liabilities	0,44*	1				
Portfolio assets	0,09	0,50*	1			
Portfolio liabilities	-0,15	0,04	-0,04	1		
Debt assets	0,13	0,53*	0,27	0,02	1	
Debt liabilities	0,23	0,00	0,26	-0,09	0,05	1

(*) Correlations are significant at 5%.

Source: Own calculations, based on quarterly data from the financial account of the Central Bank of Chile, for the period 1993–2004.

Finally, table 3 shows the quarterly correlation for the period 1993–2004 between Chilean capital account asset and liability flows and a set of global factors that can influence the movement of these flows. We distinguish between factors of contagion, accounted for by capital flows and the country premiums of emerging economies; international liquidity conditions, represented by international interest rates and the volatility of the Standard and Poor's VIX index; and the evolution of the Chilean economy's terms of trade and the growth of world economic activity, measured by the growth of the economy's main trade partners.

Direct investment liabilities have a significant degree of correlation with the aggregate evolution of direct investment and portfolio asset and liability flows to emerging economies. This suggests that there may be a contagion effect on foreign investment flows. However, direct investment liability flows are less volatile than the rest of the capital account flows (figure 4a). An opposite result is found for the Chilean economy's portfolio investment liability flows. Portfolio asset flows also have a negative and significant correlation with international short- and long-term rates, while portfolio liabilities are positively related to the volatility of international capital markets and long-term interest rates.

Table 3

Correlation between capital flows and macrofinancial variables

	FDI		Portfolio		Debt	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Financial conditions						
Three-month LIBOR	0.27	0.08	-0.47[1]	0.21	0.12	0.03
Ten-year US Treasury bonds	-0.05	-0.14	-0.58[1]	0.38[1]	-0.02	-0.03
VIX (twelve-month variation)	-0.02	-0.03	-0.20	0.35[1]	-0.08	0.11
Contagion						
EMBI Global (twelve-month variation)	-0.10	-0.01	0.15	0.05	0.20	0.22
FDI asset flows in emerging economies	0.42[1]	0.43[1]	0.20	-0.24	0.26	-0.05
FDI liability flows in emerging economies	0.43[1]	0.38[1]	0.25	-0.35[1]	0.30[1]	0.08
Portfolio asset flows in emerging economies	0.33[1]	0.60[1]	0.39[1]	-0.30[1]	0.48[1]	-0.02
Portfolio liability flows in emerging economies	0.55[1]	0.34[1]	0.06	-0.03	0.25	0.02
Terms of trade and growth						
Terms of trade (twelve-month variation) (2)	0.10	0.14	0.07	-0.08	-0.09	-0.24
World growth (twelve-month variation)	0.17	0.15	-0.22	0.14	0.04	-0.01

(1) Correlations are significant at 5%.
(2) The terms-of-trade index considers the copper price and the oil price, weighted by their importance in the export and import baskets, respectively, with base year 1996=100.

Source: Own calculations, based on quarterly data from the statistical database of the Central Bank of Chile, IMF, Bloomberg and Chicago Board Option Exchange (CBOE), for the period 1993–2004.

IV. Final comments

This paper has characterized the financial account flows of Chile and other emerging economies with a similar sovereign risk rating for the period 1993–2004, in terms of size, relative importance, volatility, and correlation with each other and with macrofinancial variables. To do this, we separated financial account flows into asset and liability flows, and these, in turn, into foreign direct investment, portfolio investment, and debt flows. An adequate balance between these components is important for financial stability, because greater sensitivity of one of them to international financial conditions, or to agents' expectations, can provoke sharp changes in capital inflows and outflows.

We find that capital flows to and from the Chilean economy are less volatile than in the group of emerging economies included in this paper. In particular, Chile's debt liabilities are less volatile and represent a smaller share of GDP than all countries with a better risk rating. At the same time, the external financial integration of the Chilean economy is greater (measured as the share of asset and liability flows in GDP).

The paper also finds that the structure of foreign assets and liabilities is more diversified in Chile than in the rest of emerging economies. Chile's percentages of external debt, portfolio, and direct investment assets with respect to GDP are all very similar. Chile ranks first among these economies in terms of direct investment and portfolio flows from residents to foreign entities.

Finally, the most important liability flows in the Chilean economy have been direct investment, whereas debt flows tend to predominate in emerging economies. On the other hand, we found a positive correlation between Chile's direct investment liabilities and investment flows in emerging economies, suggesting that a contagion effect may exist. Nevertheless, these flows are less volatile than the rest of the financial account flows.

All of the above contributes to creating a context in which capital account movements do not threaten the economy's financial stability.

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