

FINANCIAL STABILITY REPORT

Second Half 2019



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PREFACE

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

The Central Bank’s focus in the area of financial stability is centered mainly on the well-functioning of the system and the Chilean economy’s access to international financial markets. In this context, financial stability is said to exist when the financial system is able to operate normally or without significant disruptions, even in the face of adverse situations. The Central Bank’s tracking of financial stability is complementary to that undertaken by the specialized supervisory entities; it serves as an independent element of analysis with respect to the supervisors’ powers and functions in relation to the entities subject to their oversight.

The objective of the *Financial Stability Report (FSR)* is to provide information, on a half-yearly basis, on recent macroeconomic and financial events that could affect the financial stability of the Chilean economy, such as the evolution of the indebtedness of the main credit users, the performance of the capital market, and the ability of the financial system and the international financial position to adapt sufficiently to adverse economic situations. In addition, the *Report* presents the policies and measures that support the normal operation of the internal and external payment system, with the objective of promoting general knowledge and public debate with regard to the Bank’s performance in fulfilling this function.

The Board

SUMMARY

Since the previous Financial Stability Report, the Chilean financial system—including internal and external payment systems—maintains the strengths and risks identified in previous Reports. In the external context, lower prospects in the global growth outlook have increased the probability of facing low long-term interest rates for a prolonged period. This posits a challenge for medium—and long-term investors. At the local level, the vulnerabilities of households and firms have not shown significant changes since the last Report. The banking sector remains solvent, although its capital margins have continued to decrease, while non-bank lenders have continued to increase their loan portfolio.

Since the previous *Financial Stability Report (FSR)*, a lower global growth outlook has motivated the announcement of new monetary policy impulses on both developed and emerging economies.

In the United States, Europe and other advanced economies, in addition to several in the emerging world, new monetary policy rate cuts have been implemented. In turn, the European Central Bank increased its unconventional monetary incentives, ensuring high levels of liquidity on financial markets. As mentioned in previous FSR, this higher liquidity has encouraged risk-taking behavior and increased the demand for long-term financial instruments. Thus, long-term sovereign rates in advanced economies decreased, while prices of several financial assets remained high from a historical perspective. This represents a challenge to global investors, who have adjusted their portfolio in face of lower asset yields. In fact, commercial loans for highly leveraged companies with higher credit risk—leverage loans—have continued to increase in both the U.S. and Europe. In turn, uncertainty indicators for different regions remain high, which could trigger sudden changes on the risk appetite of these investors, affecting the financial cost for emerging markets.

Local financial conditions remained favorable. In line with their emerging economies counterparts, long-term local sovereign rates accelerated their drop. Thus, the short-term side of the real curve, less than 10 years, reached negative ground. Meanwhile, local corporate bond spreads remained below 100 basis points. In this context of favorable financial conditions, there was an increase of local bond issuance, mainly for refinancing purposes. Low long-term interest



rates for a prolonged period pose a source of vulnerability, since agents with medium—and long-term investment prospects—insurance companies and pension funds, among others—have adjusted their portfolio towards higher return assets with higher relative risk. In this sense, the announcement and implementation of capital increases among certain insurance companies go in the right direction. Overall, moving forward with the implementation of a risk-based capital model for these agents becomes a priority.

Local events that began in mid-October have had limited impact on financial markets as of the cutoff date of this Report. In particular, the funding cost in Chilean peso reached 0.45%, influenced by the reduction in the monetary policy rate. As for the funding cost in U.S. dollars, the 3-month spread on-shore is at 0.81pp. The Chilean peso depreciated 1.81% with respect to the U.S. dollar since the beginning of the local turbulence. Meanwhile, the reaction of the stock market has been somewhat greater in the same period. In turn, the local country risk rose around 4bp, while the indicators for other countries in the region decreased 8bp on average. The evolution of the impact on economic activity and expectations will depend on the future unfolding of current events.

This Report includes a thematic chapter that describes the financial situation of the Chilean companies, detailing vulnerabilities, mitigators and associated risks. Regarding the sector's indebtedness, it reached 116% of GDP in the first half of 2019, with variations mainly explained by its external debt component (45% of GDP) due to the appreciation of the exchange rate. Firms that mostly fund themselves through sources related to FDI hold part of this debt. This share of debt originates in an inter-company relationship, so the debt-renewal risk is relatively lower, especially when the loan comes from a direct parent. Another part of this debt is held by firms that report their balance sheets to the Financial Markets Commission (FMC) and corresponds mainly to external bonds. In this case, there are diverse mitigators for currency risk, such as the use of dollar accounting and the usage of derivatives among firms with peso accounting. Stress tests performed on companies that report to the FMC, indicate that interest rate and exchange rate shocks have a low impact on their financial position, given that they have limited exchange rate mismatch and long-term liabilities. In contrast, economic activity shocks would have a more relevant impact. In sum, the sector does not present significant financial vulnerabilities, but scenarios of low economic growth for a prolonged period could affect their capacity to generate income, representing a risk for the fulfillment of their financial commitments. Thus, the mid-October events—that translated into a drop of sales—could affect the payment capacity of some firms.

The real state sector has maintained the dynamism observed since the previous Report. In the residential sector, new home sales kept growing at a steady pace, as total sales and rental prices also increased. The evolution of house prices has been in line with those observed abroad and with the

dynamics of local variables, such as income and long-term interest rates. Financial conditions remained favorable and the share of debtors holding more than one mortgage loan has stabilized in recent quarters. This mitigates the potential vulnerability identified in previous *Reports*.

Since the previous *Report*, household financial indicators have remained stable, showing some evidence of a pass-through from lower interest rates toward smaller debt service to income ratios.

Total debt continued to grow in over 7% annually in real terms. Mortgage debt has continued to expand mainly through higher loan amounts, while consumer debt has been mostly driven by increases in the non-bank lender sector (NBLs). Administrative data suggests that during this year there has been a slight reduction in the debt service to income ratio for the median debtor. This takes place in a context of low mortgage interest rates, which have led to refinancing these loans. Although this mitigates previous vulnerabilities, its relevance is conditional on households maintaining their level of indebtedness. The labor market evolution will continue to be key to the performance of this sector.

The main vulnerability for the banking sector continues to be its lower capital margin. As mentioned in previous FSR, the margin in terms of capital has remained in a low level for several years and has recently decreased further. However, stress tests indicate that the sector still has a level of capital which is sufficient to withstand a severe stress scenario. In terms of risk, the indirect exposure of banks to households through commercial loans granted to NBLs is still relevant. The latter agents have increased their leverage, as their profitability has decreased.

During the second half of the year, the Bank has moved forward according to its regulatory plan. The first changes to the *Compendium of Foreign Exchange Regulations* were put out for public consultation, as part of a modernization process; it was also put out for public consultation the regulation for the extension of the Real Time Gross Settlement (RTGS) System that will allow settling interbank payments denominated in US dollars. This project is part of the initiatives for strengthening the local financial infrastructures in foreign currencies. In line with this, in July a process towards the inclusion of the Chilean peso in the global cash settlement system operated by CLS Bank was started.

Likewise, the implementation of Basel III officially started also during the second half of the year. The FMC put out for public consultation the first set of required norms; these relate to the identification of systemic banks, and the new standardized methodology for determining operational risk capital requirements. While the publication of these norms requires a prior report from the Central Bank, during its elaboration process there has been a coordinated work with the FMC, this joint effort between both institutions will continue during the preparation of the remaining norms in the next months.



Finally, this FSR includes a chapter on payment systems. It highlights that the total amount liquidated by the large value payment systems has kept on increasing. Moreover, banks participating in the RTGS system have liquidity enough to perform their daily operations, and the operational availability objectives of the RTGS system continue to be satisfactorily met. Regarding the retail payment systems, while the usage of electronic payment means continues to rise, there are still frictions preventing a full implementation of the four-party model.

I. FINANCIAL MARKET TRENDS AND EXTERNAL EVENTS

In an international context of limited growth and low global inflation, long-term interest rates have remained at historically low levels. The potential prolongation of this scenario represents a challenge for institutional investors. This scenario has been accompanied by a high appetite for risk, which has kept spreads narrow for many financial assets. A sudden reversion, due, for example, to the materialization of one of the geopolitical risks, could raise the cost of external financing for emerging economies.

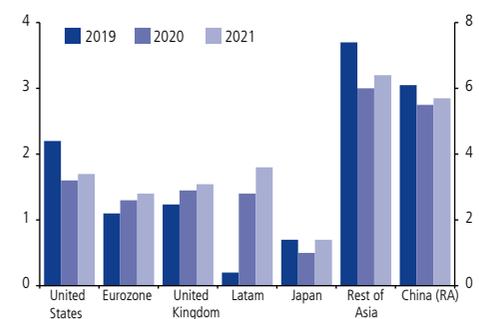
INTERNATIONAL FINANCIAL SITUATION

Since the last FSR, world economic growth has remained weak, which has led the main central banks to increase the monetary stimulus.

Global growth estimates are around 3.1% for this year, which represents a decrease of 0.3 percentage points since the last *Financial Stability Report (FSR)*. While a recovery is expected in 2020, there is still considerable uncertainty, mainly regarding the macroeconomic performance of emerging economies and the development of the trade and economic war between China and the United States (WEO Update, July 2019). Moreover, the advanced economies have adjusted their growth outlook for 2019 and subsequent years. In this context, for this year the U.S. economy is expected to grow around 2.2%; the Eurozone, 1.1%; the United Kingdom, 1.2%; and Japan, 0.7% (*Monetary Policy Report*, September 2019). Thus, expectations point to a persistence of the weak global economy (figure I.1).

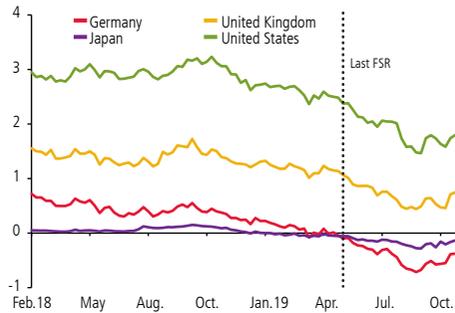
The growth and inflation outlook, which has remained low, has underlain a deepening of monetary policies, which were already in expansionary territory. At its September meeting, the U.S. Federal Reserve (Fed) lowered the federal funds rate (FFR) by 25 basis points, to a range of 1.75 to 2.0%, citing the lower growth forecast for China and Europe and the escalation of trade tensions. The market expects an additional cut of 25 basis points this year. The Bank of England (BoE), in turn, held its reference rate at 0.75% at its last

FIGURE I.1
GDP growth rate, main economies
(percent)



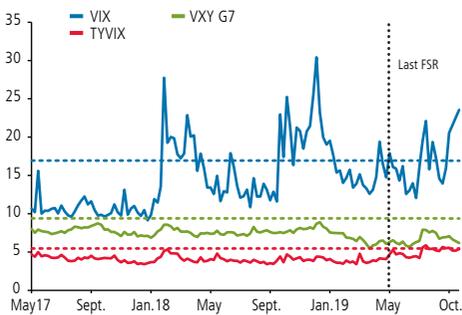
Source: Central Bank of Chile and WEO (October 2019).

FIGURE I.2
Interest rates on 10-year sovereign bonds
(percent)



Source: Bloomberg.

FIGURE I.3
Implied volatilities (*)
(percent)



(*) VIX: implied volatility of 30-day options on the S&P 500 index. VXY G7: volatility index for G7 currencies. TYVIX: volatility index for 10-year U.S. Treasury bonds. Slashed lines mark the average of the respective series from 2010 to the last available datum.

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

monetary policy meeting, in a context of political uncertainty, and emphasized its concern for future developments related to Brexit. In Europe, the inflation rate remained below the target set by the European Central Bank (ECB), which motivated a 10 basis point reduction in deposit rates, to -0.5% . In addition, the ECB announced a new asset purchase program of 20,000 million euros a month, starting on November 1st. This program is in addition to the Eurozone's targeted longer-term refinancing operations (TLTRO-III), which will be in place from September 2019 to March 2021.

In this context, long-term interest rates in the advanced economies continued to follow a downward trend.

Since the last FSR, interest rates on developed country sovereign bonds decreased around 50 basis points, on average. In particular, ten-year German Treasury bonds continued to fall, after reaching negative levels in March of this year (figure I.2). The ten-year U.S. Treasury bond rate recorded the biggest drop in this group of economies, at 0.57 percentage points, as of the cutoff date of this Report. In addition, as mentioned in the last FSR, the yield curve inverted in the United States, as well as in Germany, France, and the United Kingdom (BIS Quarterly Review, September 2019).

Given the scenario of historically low interest rates, 25% of bonds worldwide—including both sovereign and corporate—were trading at negative rates in October 2019. This trend was primarily concentrated in Japan and some countries in the Eurozone. In this context, the low interest rate scenario is expected to continue for some time, as has been recorded in the past in Japan and other developed economies. This is a context in which the effectiveness of monetary policy appears to have diminished, which leaves open the possibility of greater monetary stimuli (Christensen and Spiegel, 2019).

The risks associated with negative interest rates could have an impact on financial systems. In the banking sector, there could be a loss of some funding sources and a reduction in operating margins (Molyneux et al., 2019). Other financial system participants, such as the pension funds and life insurance companies, which face mismatches at longer maturities, could see a reduction in their ability to generate yields, which could in turn induce a shift toward riskier assets (search for yield).

Relative to the last FSR, volatility measures in the different financial markets increased slightly, pointing to a high risk appetite.

Global volatility in the foreign exchange, fixed-income, and stock markets increased slightly at the margin, after declining mid-year, due in part to uncertainty regarding economic growth and developing geopolitical conflicts (figure I.3). Additionally, the differential between implied and realized volatility reflected a greater risk appetite in financial assets and currencies, which remained above their historical averages, while other indicators demonstrated a slight downward trend in the most recent period (see the statistical appendix).

In some stock markets, price-earnings ratios have been above their historical patterns. Thus, corporate bond spreads in developed economies were narrow, in general, in line with the last FSR (table I.1).

TABLE I.1
Heat map of vulnerabilities deriving from valuation (*)

	2014			2015			2016			2017			2018			2019			
	I	II	III	IV	I	II	III												
Spreads																			
U.S. corporate	Orange																		
U.S. high-yield	Orange																		
Eurozone corporate	Orange																		
Eurozone high-yield	Orange																		
Price-earnings ratio																			
S&P 500	Orange																		
Eurostoxx 50	Orange																		
FTSE 100	Orange																		
DAX	Orange																		

(1) Green, yellow/orange, and red indicate low, medium, and high risk, respectively. Low spreads and high price-earnings ratios indicate high risk. Risk categories are based on sextiles of the distribution for each variable. Share returns were cyclically adjusted using the 10-year moving average.

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

In Europe, a no-deal Brexit continues to be a real possibility, while the Eurozone economies continue to show signs of weakening.

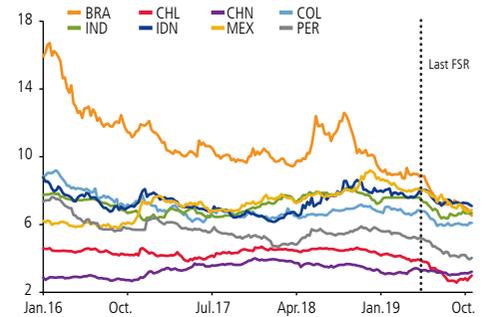
Negotiations for the United Kingdom’s exit from the European Union have shown some positive signs, but there is still uncertainty about the result. In September, the United Kingdom approved a bill to push back Brexit to January 2020, which was finalized in October. However, there is still a possibility that the United Kingdom could leave the European Union without an agreement, which could heighten volatility in the markets.

In addition, growth expectations for the Eurozone are low. The forecast for Germany has declined, increasing the risk that the economy will enter a recession, due in part to less dynamic external demand than expected. The forecasts for France and Italy have not changed, while there was a marginal revision upward for Spain in the most recent period.

Similar to the trend in developed economies, long rates have fallen in emerging countries.

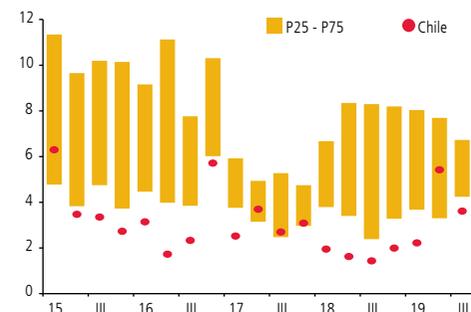
In the emerging economies, long-term sovereign rates have fallen significantly since the last FSR (figure I.4). At the same time, there has been a reduction in the associated volatility (figure I.5). The volatility of the peso-dollar exchange rate remains around 10% annually, which is in the upper part of the distribution, consistent with the flexible exchange rate regime (figure I.6). This may be

FIGURE I.4
Interest rates on 10-year sovereign bonds (percent)



Source: Bloomberg.

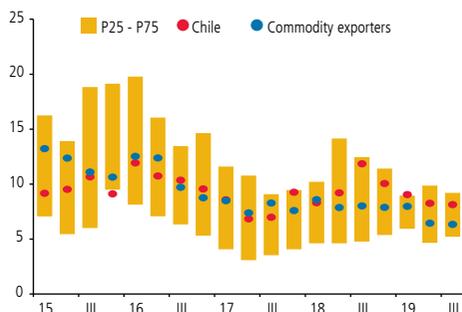
FIGURE I.5
Volatility of emerging market 10-year sovereign rates (*) (basis points)



(*) Calculated as the standard deviation of the daily change in the rates. Emerging countries include Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Poland, Russia, and Turkey.

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

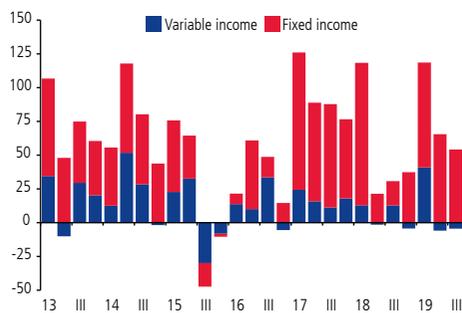
FIGURE I.6
Annualized volatility of emerging market currencies (*) (percent)



(*) Emerging currencies include Brazil, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Poland, Russia, and Turkey. Commodity exporters include Australia, Canada, Norway, and New Zealand.

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

FIGURE I.7
Portfolio flows to emerging economies (*) (billions US\$)



(*) Quarterly frequency based on weekly data.

Source: IIF.

explained by adjustments in expectations for Chinese growth, the effects on the copper price, and uncertainty regarding various events currently unfolding, such as the impacts of the trade war.

Despite the lower economic forecasts, portfolio inflows to emerging economies remain stable (figure I.7).

In China, macroeconomic forecasts have deteriorated, influenced by the impact of the trade and investment tariffs. Thus, the growth rate for this year is projected at 6.1%. Growth estimates have also fallen for the European emerging economies, with expectations around 0.8% for 2019. As a whole, the emerging and developing markets are expected to grow at 4.4%, below the historical trend, but above the advanced economies (IMF, DataMapper).

In Chile, portfolio liabilities recovered in the second and third quarters, in particular fixed-income flows (figure I.8). Additionally, at the local level, foreign direct investment (FDI) recovered at the margin (statistical appendix).

Since the last FSR, risk indicators for emerging markets were relatively stable (figure I.9).

In addition to the stable portfolio flows, the majority of the emerging economies recorded a reduction in their risk indicators. Nevertheless, some countries that suffered idiosyncratic events saw an increase in spreads. For example, there was an increase in sovereign risk in Argentina, following the primary elections in August and another drop in GDP expectations of around -1.2% for 2019. This implies that investors have thus far been able to differentiate among emerging countries. However, the materialization of more severe events could lead to a reduction in this "market differentiation effect."

A definitive agreement in the trade conflict between China and the United States remains uncertain, and there are ongoing geopolitical risks.

With regard to the trade conflict between the United States and China, the tension has diminished in recent months, following an escalation period after the last FSR. Thus, the scope of a definitive agreement is as yet uncertain. This is reflected in political uncertainty indicators, which have increased at the global level over the course of the year. At the same time, at the meetings held in October, it was announced that a "significant" agreement would be finalized toward the end of the year.

Additionally, political tension increased in various parts of the world in recent months. The attack on Saudi Arabian oil facilities in mid-September heightened the tension in the Middle East. Toward the end of that same month, the opening of impeachment proceedings against the U.S. president, and the later announcement of the withdrawal of troops from Syria, amplified political

pressure in the United States. In China, tensions remain high following the escalation of the political conflict in Hong Kong. An intensification of these events could affect economic agents' expectations and, in turn, trigger a reversal in risk appetite, thereby affecting the financial markets.

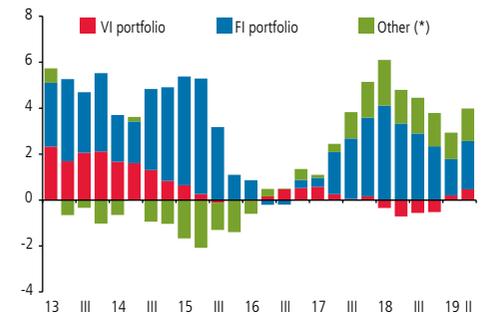
The U.S. money market was under pressure in September, leading the Federal Reserve to inject liquidity. This shows the complexities involved in the implementation of the stimulus withdrawal.

In the third week of September, the U.S. money market experienced a liquidity shortage, when the overnight repo rate spiked to 8% and the effective federal funds rate (EFFR) rose to 2.45%. The Federal Reserve Bank of New York responded by implementing the first major operation in the repo market since the global financial crisis, in order to anchor the EFFR within the FFR target range. The Fed thus provided liquidity of nearly US\$985 billion over the next three weeks. At the same time, the Fed announced that it would offer two-week repo operations (with a minimum of US\$60 billion each), as well as overnight financing of US\$100 billion a day through October 30, so as to stay ahead of possible liquidity pressures. On October 11, it announced the expansion of these measures to include the purchase of T-Bills, at least through the second quarter of 2020, and the continuation of overnight repo operations, at least through January, in order to keep financial system reserves above the level recorded in September 2019. These events reveal that the withdrawal of unconventional monetary stimulus measures is more complex than anticipated, representing a challenge for central banks that wish to reduce the size of their balance sheets.

The credit growth trend in highly leveraged firms continued, especially in the United States. In the event of an adverse scenario, these firms could generate major losses for investors, while also seeing a drastic cut in their funding, exacerbating an economic slowdown.

As mentioned, corporate bond spreads are low relative to historical patterns, reflecting a high risk appetite among investors. As a result, corporate debt continues to increase in various developed economies, especially the United States, Germany, and Japan. In the case of the United States most of this growth is explained by leveraged loans (FSR, First Half 2019) and private financing, where smaller firms are the main users of this type of funding (GFSR, October 2019). One concern, therefore, is that these resources have largely been allocated to paying shareholder dividends or buying back shares. Moreover, banks and other nonbank financial institutions with exposure to this type of credit would be subject to significant losses in an adverse scenario, which would lead them to cut back financing to this segment, thereby amplifying the downturn in the economic and credit cycle.

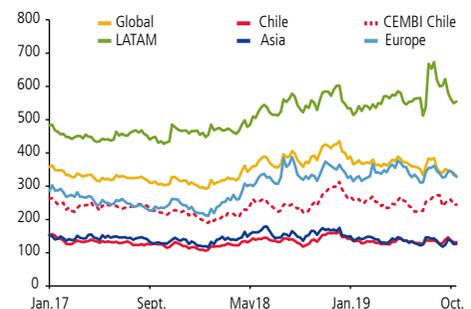
FIGURE I.8
Portfolio flows to Chile
(percent of GDP)



(*) Includes bank loans, trade credits, derivatives, and other liabilities.

Source: Central Bank of Chile.

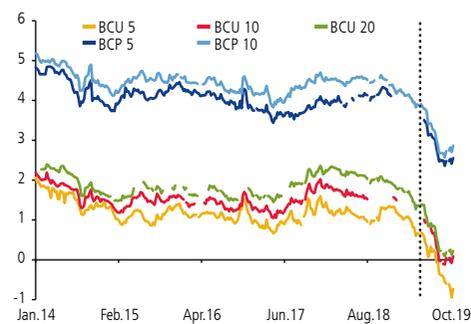
FIGURE I.9
EMBI (*)
(basis points)



(*) Weekly data.

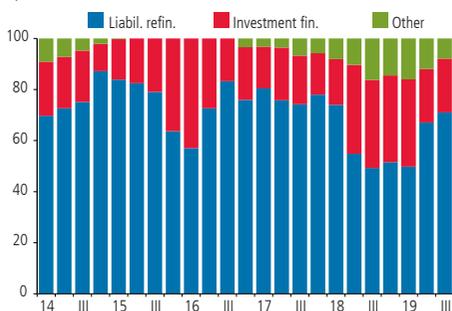
Source: Central Bank of Chile, based on data from Bloomberg.

FIGURE I.10
Local sovereign interest rates
(percent)



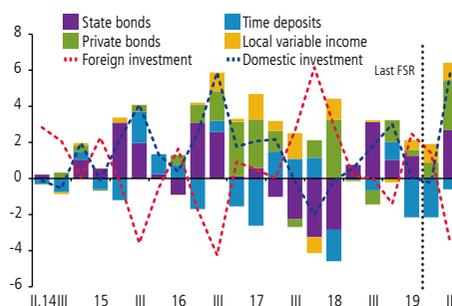
Source: Central Bank of Chile.

FIGURE I.11
Use of loans
(percent)



Source: Central Bank of Chile, based on data from the BCS and FMC.

FIGURE I.12
Pension fund investment flows (*)
(billions US\$)



(*) Net movements by instruments, including purchases, sales, redemptions, and drawings and excluding derivative maturities, rebates, dividends, and coupon cuts. Latest data updated to 30 August 2019.

Source: Central Bank of Chile, based on data from the Superintendencia of Pensions.

LOCAL FINANCIAL SITUATION

Over the course of this year, sovereign rates have declined in line with external trends.

Since the Last FSR, local interest rates, in both UFs and pesos, continued to fall significantly. In particular, UF rates decreased 1.2 percentage points on average, while peso rates declined about 1 pp in the same period, thus staying low from a historical perspective (figure I.10). In terms of agents, the share of sovereign debt held by nonresident investors continued to increase, reaching nearly 16% in the third quarter of 2019 (table I.2).

TABLA I.2
Sovereign debt by type of investor
(percent)

	2017				2018				2019		
	I	II	III	IV	I	II	III	IV	I	II	Oct.19
Banks	14.2	14.9	18.3	22.9	22.8	21.1	19.6	18.0	16.0	16.1	17.6
Pension funds	69.3	66.5	62.1	56.3	54.4	53.9	56.3	57.1	58.9	57.9	58.6
Mutual funds	8.7	9.1	8.3	7.3	7.3	7.3	7.6	7.2	6.5	6.8	6.5
Nonresident	3.5	5.3	7.3	9.5	11.3	12.2	11.7	12.6	14.1	16.6	16.1(*)
Other	4.2	4.2	4.1	3.9	4.3	5.5	4.8	5.1	4.4	2.6	1.1

(*) Nonresident data are for August 2019.

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

Local corporate and bank bond issues have increased over the course of the year. This has fundamentally been due to the low funding costs, in a context of low sovereign interest rates—which are around 0% (statistical appendix)—and a high risk appetite. In the last quarter, two-thirds of these issues were allocated to refinancing liabilities, including the prepayment of bonds, with a much smaller share going to investment financing (figure I.11). This translated into issues totaling US\$23 billion this year. Local deposit rates have remained low at the different maturities since the last FSR. Thus, the 30-day deposit rate has evolved in line with the monetary policy rate, with limited dispersion among banks (statistical appendix).

The pension funds (PF) have returned to the local market, while the mutual funds (MF) continue accumulating funds in longer-term assets.

In recent months, the pension funds have tended to return their assets to the local market, given the high levels of uncertainty in international markets. Thus, flows have increased almost US\$2.95 billion. As a result, their investment portfolios in the local market were reoriented toward sovereign and private bonds and variable-income securities, with a smaller share in time deposits

(figure I.12). The mutual funds, in turn, continue to increase the growth of their medium- and long-term funds, which grew 34% over the course of the year (statistical appendix). Finally, the life insurance companies (LICs) have opted for riskier assets in the past year, increasing their variable-income and overseas investments and also increasing the risk profile of the overseas bonds in their portfolios.

Asset adequacy testing (AAT) reveals a need for greater capitalization in the LICs.

The lower long-term interest rates have had an effect on the valuation of LIC portfolios, which is estimated using AAT. Due to the nature of the business, there is a maturity mismatch between assets and liabilities, which becomes wider between 10 and 20 years (figure I.13). This makes it difficult for the companies to protect themselves in a scenario where the yield curve is relatively flat. Consequently, the firms in the sector need to contribute to strengthening their capital base. In this sense, the capital increases that have been announced—and in some cases already implemented—go in the right direction, since they contribute to reducing the identified gaps. It is also important to move forward on the risk-based capital model (chapter V).

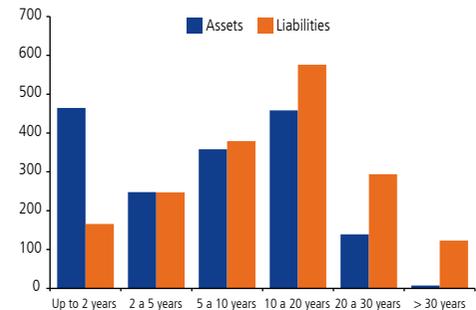
EXTERNAL THREATS FOR FINANCIAL STABILITY

The maintenance of low long-term interest rates represents a challenge for institutional investors.

In external markets, long-term interest rates have fallen sharply, such that yield curves have been relatively flat in recent months. Going forward, the low growth forecast and low inflation suggest that this scenario will continue in the medium term. The implied ten-year rates—three years ahead—in the yield curves of Germany, the United Kingdom, and the United States indicate that these rates will be relatively stable at around -0.51 , 1.68 , and 0.64% , respectively.

Internal estimates indicate that the impact of changes in external long-term rates on local long rates has grown recently (figure I.14). While this benefits borrowers—given that they have access to better financing conditions—it presents a challenge for other agents. In particular, the life insurance companies and pension funds—which have medium- and long-term investment horizons—have sought to maintain their portfolio returns by investing in riskier assets.

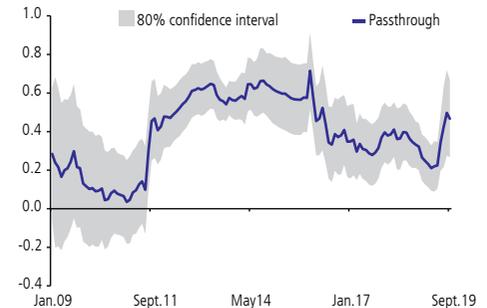
FIGURE I.13
LIC assets and liabilities by maturity segment (*)
(millions of UF million)



(*) As of June 2019.

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

FIGURE I.14
Passthrough of 10-year T-Note to BCP-10 (*)
(coefficient)



(*) Passthrough coefficient is the ratio between the accumulated response of the local rate to a shock in its external counterpart and the response of the external rate itself, both after three months. Calculated in 60-month moving windows. VAR(1) model in levels for the following: 10-year T-Note yield, expected exchange rate depreciation, EMBI Chile, BCP-10 yield.

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



A sudden reversal in global risk appetite could decompress spreads, which would affect financing costs in emerging economies.

The heightened global uncertainty, associated with the U.S.-China trade war and the possibility of a no-deal Brexit, creates a scenario in which a sudden reversal or adjustment in investors' portfolios represents a risk for global financial stability.

Internal estimates indicate that sudden changes in different measures of risk appetite would not only decompress asset spreads in developed economies, but also have an impact on the spreads paid by emerging economies. Specifically, a reduction in global risk appetite could translate into an increase in the VIX. According to Alfaro et al. (2017), a one-standard-deviation increase in the VIX would translate into an increase in the EMBI for Chile of around 20% in the short term. Furthermore, more severe stress events in some emerging economies could affect the risk perception of the whole group of countries, thereby reducing the differentiation effect currently in place.

II. BORROWERS

The financial situation of local firms has not changed significantly since the last FSR. Default indicators remain low, although some firms in the productive sectors have higher default rates. Households, in turn, have maintained a stable financial burden and indebtedness level. Thus, the vulnerability of borrowers is similar to the last Report. Going forward, a deterioration in economic activity, in particular in business sales or the labor market, could compromise the payment capacity of these agents. Consequently, the impact on output of the events in October must be closely monitored.

FIRMS

The mitigators discussed in past FSRs remain present, Accordingly, debt levels and currency risk do not represent a vulnerability for the sector.

In the second quarter of 2019, the real annual growth rate of total debt was 6.9% (table II.1). This was mainly driven by an increase in local bond debt, which grew almost 12% in real annual terms. Bank financing was less dynamic than in previous quarters. Thus, the growth of external debt was largely explained by the depreciation of the peso.

TABLE II.1

Sources of financing (1)
(real annual change, percent)

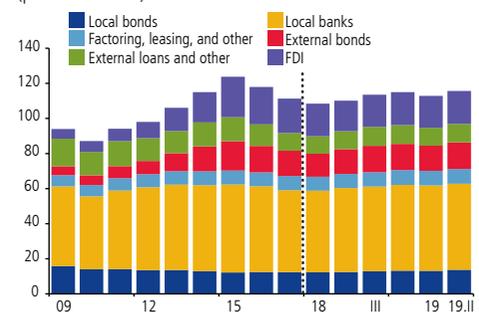
	2012	2013	2014	2015	2016	2017	2018		2019		Share	Contribution to growth
	IV	IV	IV	IV	IV	IV	III	IV	I	II		
Local debt	7.2	6.9	1.8	3.8	1.9	1.4	6.7	8.3	8.2	6.0	61.5	3.7
Bank and other loans	9.4	7.3	2.9	5.4	1.1	0.8	6.7	7.9	7.7	4.6	49.6	2.3
Commercial loans (2)	9.5	7.4	2.4	5.8	0.8	-0.2	6.5	7.9	7.7	4.3	42.4	1.9
Factoring, leasing, and other	8.5	6.9	6.1	3.0	3.1	7.4	8.1	7.5	7.6	6.5	7.2	0.5
Local publicly traded securities	-0.8	5.3	-2.8	-3.3	5.6	4.0	6.8	10.2	10.4	12.1	11.9	1.4
External debt	9.4	26.7	27.3	22.2	-6.0	-5.2	3.5	3.8	5.3	8.4	38.5	3.2
Loans	0.3	2.9	15.2	4.3	-8.1	-19.7	2.6	6.9	5.8	9.0	6.7	0.6
Trade credit	-19.1	-0.7	-3.7	-1.2	-4.1	7.0	28.6	14.1	8.8	-3.9	2.5	-0.1
Bonds	13.6	42.3	40.8	21.8	-7.2	-0.1	7.9	7.0	11.7	9.3	13.1	1.2
FDI-related loans	36.0	48.4	33.1	37.8	-4.4	-4.1	-2.7	-1.2	0.1	9.6	16.2	1.5
Exchange rate	-7.7	11.0	15.8	14.9	-5.3	-4.5	8.9	7.1	10.6	8.8		
Total	7.9	12.9	10.5	11.0	-1.5	-1.0	5.4	6.5	7.1	6.9	100.0	6.9

(1) For more detail on the series and methodology, see the figure set.

(2) Includes commercial loans to firms and individuals, foreign trade loans, and contingent loans. Excludes student loans to individuals.

Source: Central Bank of Chile, based on data from Achef and FMC.

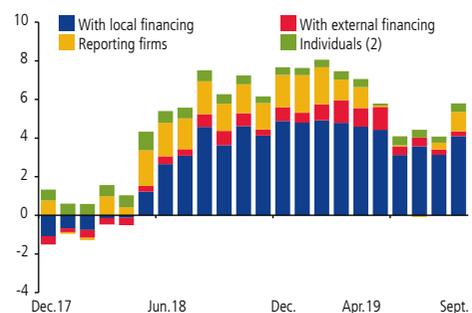
FIGURE II.1
Total corporate debt, by type of debt (*)
(percent of GDP)



(*) Based on firm-level data with the exception of factoring, leasing, and other, securitized bonds, and commercial papers. Year-end data through 2017; quarterly data thereafter. For more details on the series and methodology, see the figure set.

Source: Central Bank of Chile, based on data from Achef and FMC.

FIGURE II.2
Growth of local bank debt (1)
(real annual change, percent)

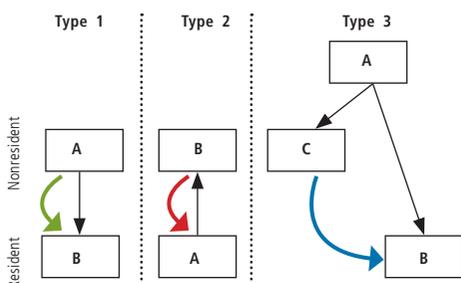


(1) Includes contingent and foreign trade loans. FMC-reporting firms include direct subsidiaries. Firms with external financing are firms that had external loans, external bonds, or FDI at least once between 2009 and 2018. For more detail, see Fernández and Vásquez (2018).

(2) Estimated using data for August 2019.

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

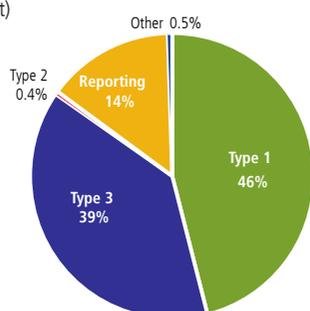
DIAGRAM II.1
Direct investment relationships and classification of FDI-related debt (*)



(*) The direction of the black arrow determines the existence of an ownership relationship (at least 10%) between the direct investor and the direct investment enterprise. The colored arrows identify the type of liability.

Source: Central Bank of Chile, based on IMF (2009) and OECD (2008).

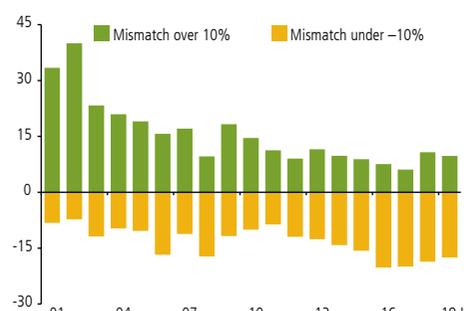
FIGURE II.3
Distribution of FDI-related debt, by agent and investment relationship, June 2019 (*) (percent)



(*) Other includes adjustments. Information based on microdata that considers outstanding balances and commercial loans associated with FDI. Type 1, type 2, and type 3 correspond to the group of firms with external financing.

Source: Central Bank of Chile.

FIGURE II.4
Currency mismatch of firms in the corporate sector (*) (percent of total assets)



(*) Based on a sample of firms that report their individual financial statements in pesos. For more detail on the series and methodology, see the figure set.

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

After starting to recover in 2018, local bank debt has slowed since mid-2019, mainly due to a lower contribution of firms that report to the Financial Market Commission (FMC) and firms that get their funding primarily from the local banking sector. The latter tends to revert at the margin (figure II.2). Reporting firms, in turn, have undertaken major operations to refinance liabilities, including bank liabilities, through the issue of local bonds.

The risks associated with external debt are mitigated by the large share of liabilities associated with foreign direct investment (FDI) and a low exposure to currency risk.

Since late 2015, external debt has been stable at around US\$120 billion^{1/}, of which approximately 45% corresponds to FDI-related loans. In the case of Chile, only a small share of these liabilities (14% in June 2019) is held by reporting firms, for which more information is available through their public financial statements. Thus, the majority of this debt is concentrated in non-reporting firms in the mining, financial services, and telecommunications sectors.

FDI-related liabilities can be roughly classified into three types, according to the relationship between the parties (IMF, 2009; OECD, 2008). Type 1 liabilities correspond to investment by a nonresident firm in a locally owned company^{2/}. For type 2, a local firm that owns a nonresident company receives investment from that company. Finally, type 3 encompasses investment between fellow enterprises—one resident and one nonresident—that do not have an equity link but do have a common direct investor (diagram II.1). In general terms, debt originating from type 1 and type 3 relationships are less enforceable than type 2 and also are less enforceable than debt from—for example—a financial institution. Type 1 and 3 are precisely the categories of the FDI-debt recorded by non-reporting firms in Chile (figure II.3).

With regard to currency exposure from external debt, in the case of FMC-reporting firms, exposure is limited because nearly two-thirds of this type of debt is contracted by firms that use the U.S. dollar as their accounting currency, which are also the main issuers of external bonds. The remaining firms, which use the peso as their accounting currency, have a low currency mismatch, on average. In particular, firms with a mismatch of over 10% of their assets do not represent more than 10% of total assets in the sector (thematic chapter and figure II.4).

^{1/} There are differences with the aggregate data, which are mainly explained by the valuation of external bonds and outstanding balances. For more information, see Roje and Vásquez (2014).

^{2/} The ownership relationship between enterprises is established in this context with at least a 10% equity share.

As of June 2019, return on assets and interest coverage were slightly down.

At the close of the first half, firms recorded a return on assets (ROA) in 12 months of 6.5% and an interest coverage ratio—earnings before interest and taxes (EBIT) over annual interest expense—of 3.2 times, which both compare negatively with one year previous (ROA: 7.1%; interest coverage: 3.7 times) (figure II.5). The deterioration in these indicators occurred in the second quarter of this year and was mainly due to three factors. First, in March, indebtedness increased relative to the previous year due, in part, to an accounting change associated with the recognition of rental contracts^{3/}. This situation also affected cash flow indicators, although the full impact will not be recorded until the close of the year. Second, there was an increase in assets relative to the previous year, due to the purchase of shares and, to a lesser extent, the aforementioned accounting change. Finally, the previous factors contributed to a drop in earnings in some firms.

The largest reporting firms with operations in Argentina have seen a reduction in income from this market, in part because of lower economic activity and in part because of the accounting treatment of the country's hyperinflation. One mitigating factor is that the debt of these corporate groups is concentrated in the Chilean parent company and is mainly composed of long-term external debt, with local bank debt accounting for a small share of their consolidated debt.

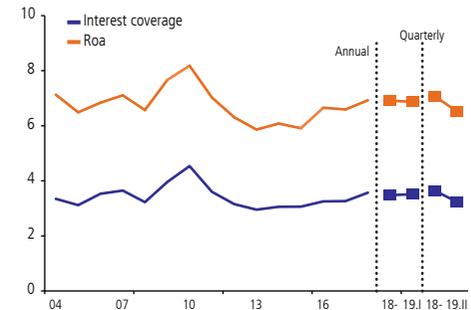
Finally, the stress tests carried out on the corporate sector show that the impact associated with a scenario involving a deterioration in financing costs and a depreciation of the peso is still relatively limited. This is because a large share of financial debt is contracted at medium and long maturities and because the firms have been active in using currency hedging. In contrast, a deterioration in economic activity—reflected in lower sales—would substantially increase the financial vulnerability of these enterprises (thematic chapter). Thus, the lower sales caused by the events in October needs to be monitored.

The arrears rate (AR) has stabilized at low levels relative to the last FSR, with a slight increase in some productive sectors (figure II.6).

In September of this year, the AR was 1.2% of total bank loans, which is similar to the rate recorded at the beginning of the year. However, there was a slight deterioration in the payment behavior of firms in the productive sector with local financing. In particular, default has increased in the manufacturing, trade, and real estate sectors in the year to date (figure II.6). In this sense, the October events could cause these indicators to deteriorate even further due to

^{3/} International Financial Reporting Standard N°16 (IFRS 16), adopted in January of this year for reporting firms, changes the accounting of operational rental contracts. In simple terms, these operations cease to be considered a financial operation, thus requiring the recognition of the associated assets, liabilities, and interest expense.

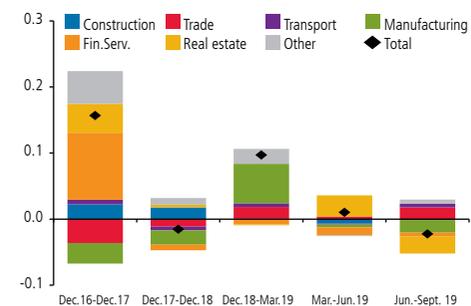
FIGURE II.5
Historical evolution of indicators (*)
(percent, times)



(*) ROA: Earnings accumulated in 12 months before interest and taxes, over total assets. Interest coverage: Earnings before interest and taxes over annual interest expense. Before the dotted line: annual data; after, quarterly comparison of March and June 2018–2019 respectively. Consolidated date. Does not consider state-owned companies or firms in the financial services and mining sectors.

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

FIGURE II.6
Change in local AR (*)
(percent of loans)



(*) Loans excluding contingent loans and personal loans. The classification of economic activity is from a 2017 directory. The results are potentially subject to change as the data are updated. Change in the AR for each sector is weighted by the loans in each sector, that is, their contribution to the total AR.

Source: Central Bank of Chile, based on data from the FMC, INE, and IRS.

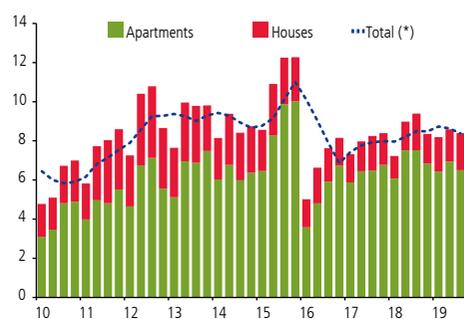
lower sales, given that many stores either did not open or operated on shorter hours while some firms took a hit in terms of their production capacity. This last point implies a potential reduction in demand for their suppliers. Thus, a comprehensive analysis is needed to assess the total impact of these events on the financial performance of businesses.

In sum, there has not been an increase in the vulnerability of firms since the last FSR. Aggregate debt has increased due to valuation effects, while several factors mitigate the risks associated with the external debt component. The financial indicators of firms that report their financial statements to the FMC show a slight deterioration relative to historical averages. A number of factors need to be monitored. First, firms with exposure to Argentina could be affected by lower demand in that economy. Second, default indicators for firms with local financing increased in the third quarter of this year, and their evolution will depend on local economic activity. Finally, the events in October could also lead to a deterioration in firms' payment capacity.

REAL ESTATE SECTOR

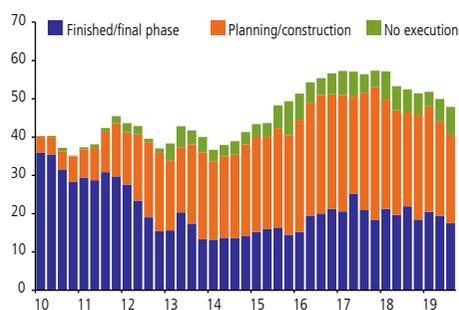
The residential real estate market has been stable since the last FSR.

FIGURE II.7
New home sales in Santiago
(thousands of units)



(*) Annual moving average.
Source: Central Bank of Chile, based on data from the CChC.

FIGURE II.8
Available supply of new homes in Santiago
(thousands of units)



Source: Central Bank of Chile, based on data from la CChC.

The residential real estate sector has continued to evolve at the same rate as in the last few years. According to information from the Chilean Chamber of Construction (CChC), new home sales in the Santiago Metropolitan Region (SMR) exceeded 25,000 units in the first nine months of the year, which is similar to the past three years (figure II.7). The majority of the units sold were apartments. In terms of the state of completion, almost 40% were close to delivery (finished or in the final phase) (statistical appendix). The CChC indicates that the supply of new homes has continued to fall from the peak recorded in late 2017, to under 50,000 units in the SMR. Thus, the available stock in Santiago is equivalent to a year and a half of sales. Most of this available stock is in the initial phases (planning or construction) (figure II.8), which will facilitate inventory management for the companies in the sector.

In the second quarter of 2019, real house price indices grew at around 7% in the moving year, both nationally and in the SMR (table II.2).

TABLE II.2
House price index (*)
(real annual change, percent)

	2013	2014	2015	2016	2017	2018	2019.II
CBC HPI							
National	7.6	8.0	10.1	2.8	7.2	7.3	6.9
Houses	7.0	7.5	9.3	1.9	7.3	8.6	8.1
Apartments	8.5	8.6	11.0	3.9	7.1	6.0	5.7
Northern region	10.6	5.6	8.6	0.3	2.1	4.2	2.9
Central region	4.8	5.8	8.9	4.1	6.8	5.5	5.8
Southern region	3.7	5.9	8.6	2.9	6.5	10.0	11.3
MR	8.9	9.6	11.0	2.7	8.1	7.5	6.7
CChC RHPI	5.9	10.7	7.1	2.3	2.9	5.0	6.9
Houses	6.3	9.8	5.1	6.3	1.0	6.7	7.8
Apartments	6.7	13.7	10.5	0.2	5.3	4.7	6.4
Clapes-UC/Real Data							
Houses	7.6	7.8	10.7	4.0	4.0	7.9	7.7
Apartments	13.0	9.7	12.7	4.4	2.5	6.8	6.2

(*) The CBC HPI reports prices based on sales deeds; the CChC index reports prices based on purchase contracts (new homes) in Greater Santiago; and Clapes-UC/Real Data index reports used home prices in the SMR based on sales deeds. Preliminary CBC data for 2018 and 2019. CBC data and Clapes-UC/Real Data are through 2019:Q2; and CChC data are through 2019:Q3.

Source: Central Bank of Chile, Chilean Chamber of Construction (CChC), and Clapes-UC/Realdata.

The rental market remains dynamic, based on online listings (www.mercadolibre.cl). Specifically, prices recorded a real annual growth rate of almost 3%, similar to the past few years.

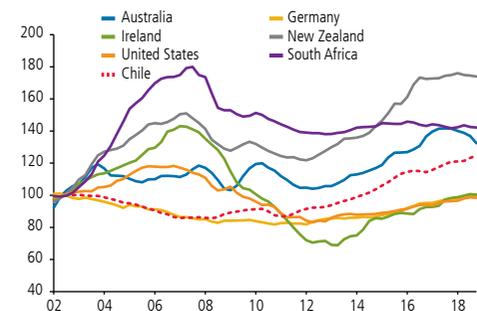
From a medium-term perspective, home prices have evolved in line with their determinants.

The ratio of house prices to per capita income in Chile has increased in line with a broad sample of countries, although locally this indicator has grown substantially since 2011 (figure II.9). This trend has occurred in a context of lower interest rates, tax changes, and high immigration—variables that have driven housing demand. As indicated in the last FSR, the increase in the share of families that rent their home is largely driven by families with a foreign head of household, which has provided an additional boost to the rental market. At the same time, the ratio of sale to rental prices is around the average of a large set of economies. Other factors, such as the relative scarcity of land, have also played an important role in this price trend (figure II.10). Taken together, these trends indicate that the recent increases in housing prices have been in line with fundamentals. Nevertheless, the importance of this market implies that these trends should be closely monitored going forward.

Since the last FSR, default indicators have deteriorated slightly for companies in the sector, although lending conditions have not changed.

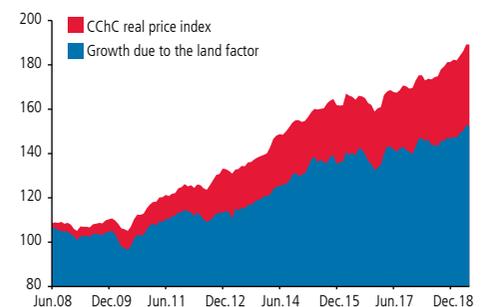
For companies that report to the FMC, the purchase contract cancellation rate decreased slightly in the second half of 2019, with less dispersion among companies (statistical appendix). For real estate companies that do not report

FIGURE II.9
Ratio of house prices to per capita income
(index: 2002=100)



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

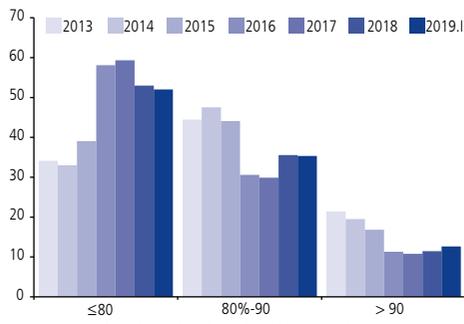
FIGURE II.10
Growth decomposition of real house prices (*)
(January 2008 = 100)



(*) The blue area shows an estimate of house price growth if the building cost had been constant from the start of the sample.

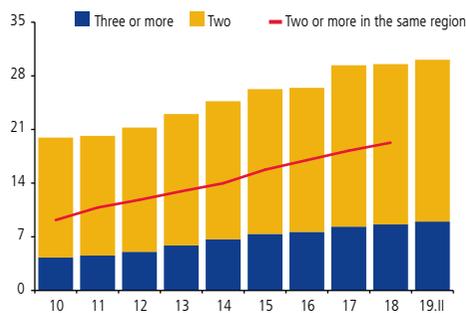
Source: Central Bank of Chile, based on data from la CChC.

FIGURE II.11
Loan-to-value ratio
(percent of sales deeds)



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

FIGURE II.12
Debt by number of loans and mortgage transactions per borrower (*)
(percent of total)



(*) December of each year. Bars: data on the number of bank mortgage loans weighted by debt (FMC). Lines: data on number of mortgage transactions in a given region weighted by debt (IRS).

Source: Central Bank of Chile, based on data from the FMC and IRS.

to the FMC and that are mostly financed by the local banking sector, the default rate increased in the second quarter, albeit with a reversion in the third quarter. On aggregate, the default indicators for these firms remain low (figure II.6). According to the most recent Bank Lending Survey (BLS), lending conditions for firms in this sector have not changed significantly since the last FSR.

Mortgage loans grew 7% in real annual terms, driven, in part, by lower mortgage interest rates, which averaged 2% in September, the lowest level on record. Furthermore, the loan-to-value (LTV) ratio was concentrated at 80% in the first quarter of 2019, with a slight increase in the share of loans financed over 90% (figure II.11). The BLS for the third quarter suggests that this situation continues, given that mortgage lending conditions have not changed significantly.

Bank mortgage borrowers with more than one loan continue to account for around 30% of total bank mortgages in the second quarter of 2019. The share of these with more than one mortgaged property in the same region was almost 20% at year-end 2018 (figure II.12).

Public investment funds in the real estate sector have grown strongly in recent years, although the residential sector continues to represent a small share.

Since 2015, real estate investment funds have grown at an annual rate of around 16%. Given this trend, it is important to include the funds in the regular monitoring of the real estate sector. However, given the scarce available information, gauging the impact of these funds on the local real estate market presents a challenge. Internal estimates suggest that the size of these funds, relative to the residential rental market, is still small, representing 1% of the stock (5% of the flow) of the real estate market in the SMR.

In the office market, rental prices remain stable, and vacancy rates declined slightly.

In the nonresidential real estate market, the situation for offices in the MR is relatively similar to the cutoff date of the last *Report*. Thus, the office vacancy rate remains low in both the class A/A+ (prime) and class B segments (statistical appendix). In particular, the vacancy rate for A/A+ offices was 4.0%; for B offices, 8.7%. As in past years, these lower vacancy rates have been recorded in

a context of a scarce addition of new offices. The gradual entry of new projects underpins the stable outlook for this sector. Similarly, office rental prices have not changed much since the last FSR, for both classes A and B.

In sum, the real estate sector remains dynamic. In the residential sector, new home sales, as well as sale and rental prices, remain strong. Different analyses suggest that there are no misalignments in these prices. Finally, the share of borrowers with more than one mortgage has stabilized in recent quarters, which attenuates the potential vulnerability highlighted in past Reports. In the nonresidential real estate sector, the office market continues to record low vacancy rates and stable rental prices.

HOUSEHOLDS

Household debt has grown around 7% in real annual terms, with the different components growing at a similar magnitude (table II.3).

In the second quarter of 2019, the growth of bank mortgages was explained, in part, by the entry rate of borrowers, which contributed 2 pp of the annual change. This is consistent with the distribution of loans by borrower, where the share of individuals with just one mortgage has been relatively stable (figure II.12). At the same time, most of the dynamism of mortgage debt has been due to the trend in average amounts, which contributed 5 pp of the annual growth, on average, in the last three years (figure II.13). This composition is consistent with the trend in house prices—as mentioned earlier—with looser lending conditions and low interest rates from a historical perspective (chapter III).

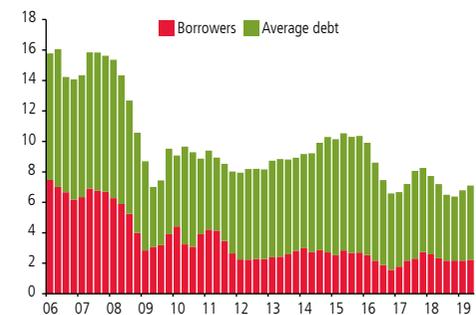
TABLE II.3
Household debt
(real annual change and percent of GDP)

Indicator	2010 2011 2012 2013 2014 2015 2016 2017 2018										2019			Contrib. to growth.	Share.			
	IV	IV	IV	IV	IV	IV	IV	IV	IV	I	II	III						
Real annual growth																		
Mortgage	6.8	7.3	7.6	8.9	9.9	9.6	6.7	8.1	6.5	6.9	7.2				4.2	58		
Bank	9.1	8.2	8.3	9.1	10.5	10.6	6.6	8.3	6.4	6.8	7.1				7.8 (*)	3.8	53	
Nonbank	-7.2	0.9	2.5	6.9	4.7	1.1	7.9	6.4	7.8	8.4	7.9					0.4	5	
Non-mortgage	8.7	10.7	6.9	8.4	3.5	5.7	6.8	6.9	7.3	7.7	6.9				2.9	42		
Total	7.6	8.8	7.3	8.7	7.1	7.9	6.7	7.6	6.8	7.2	7.1				7.1	100		
Relative to GDP																		
Mortgage	20	20	21	22	24	25	26	27	28	28	28							
Non-mortgage (*)	16	16	17	18	18	18	19	19	20	20	21							
Total	36	37	38	40	42	43	45	46	48	48	49							

(*) Includes consumer bank debt; debt with retailers, family compensation funds (CCAF), and savings and loan associations; student loans (government-backed bank and Treasury loans, private bank loans, and Corfo); leasing and insurance companies; car dealerships; and the central government (Fonasa, etc.). Starting in 2015:II, data for Cencosud are estimated based on Scotiabank's financial statements. Data for 2019:III are through August 2019.

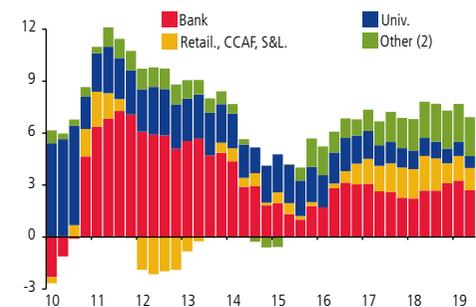
Source: Central Bank of Chile, based on data from the FMC, Dipres, and Suseso.

FIGURE II.13
Bank mortgage debt
(real annual change, percent)



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

FIGURE II.14
Non-mortgage debt (1)
(real annual change, percent)

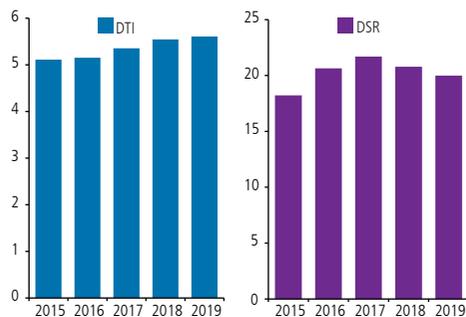


(1) As of the second quarter of 2019, the total stock of non-mortgage debt is made up of 21% bank consumer loans, 9% retailers, family compensation funds (CCAF), and savings and loan associations, 7% student loans, and 5% other.

(2) Other includes leasing and insurance companies, car dealerships, and the central government (Fonasa, etc.).

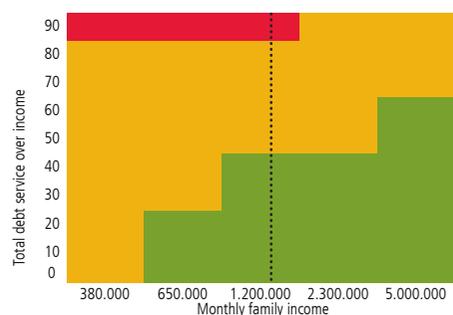
Source: Central Bank of Chile, based on data from the FMC, Dipres, and Suseso.

FIGURE II.15
Borrower indicators (*)
(times and percent of monthly income)



(*) For more detail on the series and methodology, see the figure set.
Source: Central Bank of Chile, based on data from the FMC and the Transparency Website.

FIGURE II.16
Consumer default by family DSR and monthly income (*)
(probability of default)



(*) Dotted line indicates median family income, according to the 2017 HFS. The color green denotes a probability of less than 0.3; yellow, 0.3 to 0.5; and red, over 0.5.

Source: Central Bank of Chile, based on data from the 2017 HFS.

Non-mortgage debt has been somewhat less dynamic since the last FSR, with a real annual growth rate of 6.9%. This slower growth was mainly driven by the recent evolution of the bank component, while nonbank debt continued to grow at 8% in real annual terms (figure II.14). Total household debt was around 50% of GDP and 70% of disposable income (table II.3).

Granular data reveal that both indebtedness and the bank financial burden were stable as a share of income in the last year.

A sample of administrative data for bank debtors^{4/} can be used to construct the bank debt-to-income (DTI) ratio and the debt service ratio (DSR). According to this exercise, the median DTI—including consumer and mortgage loans—has stabilized at under six times individual monthly income (figure II.15). The same sample suggests that the ratio of debt service to disposable income—excluding revolving credit—is around 20%, with no major changes relative to the previous year. Both indicators show a similar pattern to those reported for all bank borrowers (SBIF, 2018).

Various indicators suggest that the vulnerability of bank debtors has been stable over the past year.

In terms of vulnerability, it is important to monitor households with a high debt level and/or debt service to income, which could be associated with a higher default probability (Gerardi et al., 2007). In the case of Chile, Madeira (2014) uses the Household Financial Survey (HFS) and the Casen survey to analyze the default dynamics of consumer debt. He concludes that the DTI, DSR, household income, and certain household demographic characteristics are important for explaining the default probability for this type of debt. Córdova and Cruces (2019) extend this analysis to determine default on consumer debt, using both the HFS and the Employment and Unemployment Survey (EUS). They document that households with a median family income and a DSR over 40% have a 40% probability of default on their consumer debt, while those with a DSR over 80% would have over a 50% probability of default on their consumer debt (figure II.16).

Considering the sample of bank debtors mentioned earlier, we find that the share of households with a DSR of over six times increased slightly between 2016 and 2018, which is in line with the increase in mortgage debt reported in the last FSR. While the group of borrowers with a DSR over 30% followed a similar trend in the period, it has stabilized in the last year, consistent with the lower interest rates on bank loans. In particular, in the mortgage portfolio,

^{4/} Unbalanced panel with around 300 thousand monthly observations for public employees from the Transparency Portal.

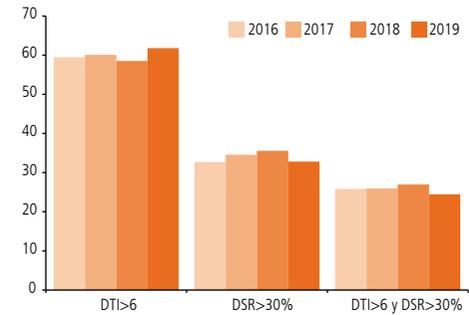
the evidence shows that borrowers have increasingly refinanced their loans in the last year, generally keeping their residual debt and maturity, such that their monthly payments have dropped (box II.1). Finally, the group of riskier borrowers (high DTI and high DSR) was stable through 2018—as a percent of the total in the sample—and declined slightly in the most recent observation (figure II.17).

Finally, default indicators (consumer and mortgage) have been low and stable, similar to the last FSR (chapter III). In particular, after the increase cited in the last *Report*—due to the incorporation into the banking sector of the financial business of two retailers—there has been a slight downward trend in the consumer portfolio.

In sum, household vulnerability has not increased since the last FSR. Default indicators have been stable at low levels, for both mortgages and consumer loans. With regard to their financial situation, debt and debt service ratios have been stable in the last year. Going forward, the evolution of the labor market will continue to be the main risk factor for households (for more detail, see the thematic chapter in the FSR for the first half of 2019).

FIGURE II.17

Distribution of debt and debt service to income (*)
(percent of borrowers)



(*) For more detail on the series and methodology, see the figure set.

Source: Central Bank of Chile, based on data from the FMC and the Transparency Website.

BOX II.1 MORTGAGE REFINANCING

Over the last decade, interest rates on mortgage loans have fallen systematically. After peaking in early 2009, amid the turbulence of the global financial crisis, the average mortgage rate has declined 375 basis points (bp). In the same period, long-term interest rates in UFs moved in the same direction, recording adjustment of a similar magnitude. In this climate of lower funding costs, borrowers have taken advantage of the opportunity to refinance their liabilities, thereby reducing their monthly payments. As counterpart, this has translated into lower income for the banks that originate these loans (chapter III).

This box presents a quantification of the share of bank mortgage loans that have been refinanced from 2013 to date; characterizes the refinancing decision as a function of its determinants; and estimates borrowers' earnings due to lower monthly payments.

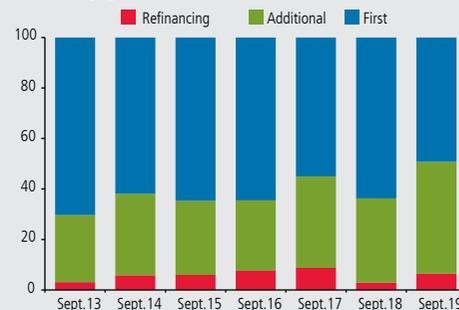
The decision to refinance

Theory indicates that a borrower will decide to refinance a loan when the future benefit obtained is equal to or greater than the cost of the operation. In the context of mortgages, the benefits are given by the lower future installment payments after refinancing. According to option valuation theory, the greater the difference between the current available interest rate and the contracted interest rate on the loan, the greater will be the benefits. The potential gains are also larger when the outstanding balance is larger, the maturity longer, and the refinancing cost lower (McConnell, 1981; Agarwal et al., 2013). With regard to the latter, the costs are associated with the time required to process the transaction and the administrative costs—which can include property appraisal, title searches, deed correction, notary expenses, and real estate registry charges.

Characterization of refinancing

Data from the bank credit registry—for the period between January 2013 and September 2019—can be used to indirectly identify refinanced loans. When a borrower obtains a mortgage loan that does not significantly modify the previous balance of outstanding debt, it is considered a refinancing operation. Internal estimates indicate that, on average since 2013, nearly 6% of loans in the monthly flow of bank mortgages (8% weighted by amount) were refinancing operations, while the remainder were granted to new borrowers and to existing borrowers who increased their debt with additional loans (64 and 30% of loans in the monthly mortgage flow, respectively) (figure II.18).

FIGURE II.18
Bank mortgage flow by type of operation
(percent of mortgage loans)



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

The vast majority of people who refinanced lowered their interest rate without making any major changes to the amount owed or the residual maturity. Consequently, the refinancing operations have translated into a reduction in monthly installment

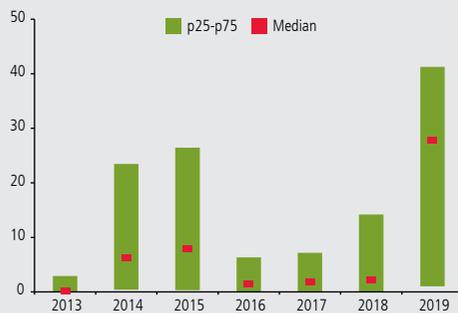
payments. Prior to 2019, the median borrower managed to reduce their monthly payment around 3% through refinancing. In 2019, the reduction for the median borrower reached 28%. This greater saving coincides with a sharp reduction in long rates in the last year, which is in line with the theory discussed above (figure II.19).

With regard to the motivations for refinancing, a probit model at the borrower level indicates that the reduction in the average mortgage rate is the primary factor increasing the probability of refinancing. The evidence also indicates that borrowers who live in higher-income areas are more likely to refinance, which could be related to their capacity to cover the costs associated with the operation. The estimate also confirms that the outstanding balance and residual maturity also raise the probability, albeit to

a technology that facilitated refinancing with an increase in debt—to extract equity by increasing the amount owed—led to an excessive leveraging of households, which had the effect of increasing systemic risk and aggravating the later recession. In 2006, 90% of U.S. mortgage refinancing operations were to increase debt. Furthermore, many studies show that a large share of the mortgage defaults during the house price bust period corresponded to borrowers who had previously refinanced in order to extract equity by increasing their debt, many of whom even accepted higher interest rates than originally contracted (Khandani et al., 2009; Laufer, 2018).

In contrast, under the Chilean institutional framework, refinancing operations are usually aimed at reducing the financial burden. Given the available financial products, equity extraction from price increases does not appear to be as prevalent as in the United States. In this context, the interest rate reductions have had a positive effect on household finances, by significantly reducing their debt service.

FIGURE II.19
Reduction in monthly mortgage payments (*)
(percent, relative to the payment prior to refinancing)



(*) Data for August of each year.

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

a lesser extent.

Implications for financial stability

In the United States—in the years preceding the global financial crisis—the combination of low mortgage lending standards, expectations that house prices would continue to rise, and

Conclusions

In an international context of low long-term interest rates, which have permeated the local economy, the lower cost of mortgage financing has led to refinancing operations. The evidence indicates that the majority of borrowers who refinance do so in order to reduce their monthly payments, which lowers their total financial burden.

The reduction of monthly mortgage payments reduces the vulnerabilities that have been growing in households, which are related to the existence of a high financial burden—as analyzed in past FSRs, in particular in the thematic chapter of the last half. The maintenance of this positive effect on household finances is conditional on their not increasing their debt level through other types of liabilities.

III. LENDERS

Commercial and consumer loans have been less dynamic since the last FSR, whereas the growth of mortgages picked up in the most recent period. Default indicators have been stable on aggregate, although the commercial portfolio has deteriorated somewhat. Stress tests show that the banking system maintains an adequate solvency level to absorb the effects of a severe scenario, but the capital cushion for facing these scenarios continues to shrink. Finally, nonbank lenders (NBLs) continue to record a higher loan growth rate than banks.

BANKING SECTOR

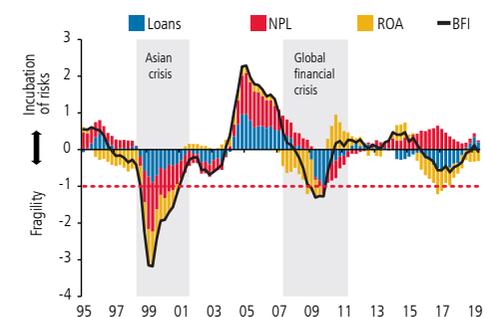
Since the last FSR, the banking sector has not displayed symptoms of financial fragility. However, there was a reduction in the demand for credit on the part of firms and a slight increase in default in the second half.

In a context of relatively limited credit risk, the dynamism of lending activity is noteworthy. Despite the favorable financing conditions and stable but low returns, income-generating capacity is low from a historical perspective, which reduces the possibility for organic capitalization. Nevertheless, current output and risk conditions put the system in a better position than in episodes of financial fragility (figure III.1).

Commercial and consumer loans have been less dynamic since the last FSR, while the mortgage portfolio had a significant recovery (figure III.2).

In a context of limited economic growth, the commercial portfolio has been less dynamic since the first quarter of this year. Thus, the growth rate of this portfolio remains below its historical ratio to output (figure III.3). While this has affected valuation and some specific operations, the slowdown in lending is consistent with lower economic activity, particularly in the manufacturing and trade sectors (figure III.4). Additionally, the results of the Bank Lending Survey (BLS) for the third quarter of 2019 point to a lower demand from large firms, while lending conditions have not changed significantly (statistical appendix). This is due to increased bond issues and, to a lesser extent, lower economic activity.

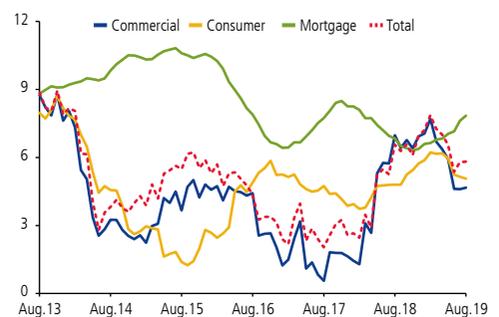
FIGURE III.1
Bank fragility index (*)
(number of standard deviations)



(*) Bank fragility index (BFI) is calculated as the sum of the standardized variables in a one-sided six-year moving window (Martínez et al., 2018), using monthly data through June 2019.

Source: Central Bank of Chile.

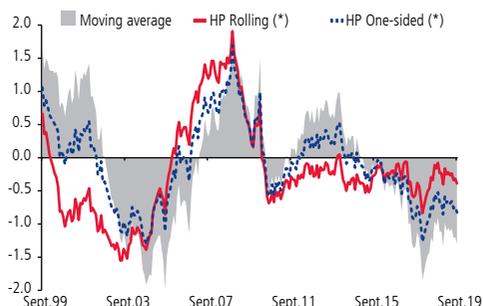
FIGURE III.2
Loan growth (*)
(percent of GDP)



(*) Based on individual financial statements.

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

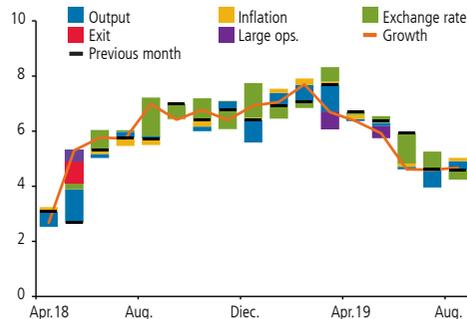
FIGURE III.3
Gap between commercial loans and the IMACEC (*)
(number of standard deviations)



(*) Gap between the ratio of commercial loans to the Imacec and its own trend, obtained using a Hodrick-Prescott filter with a lambda of 33 million in cumulative windows (one-sided) and 10-year moving windows (rolling) since January 1989. Estimated data for September 2019.

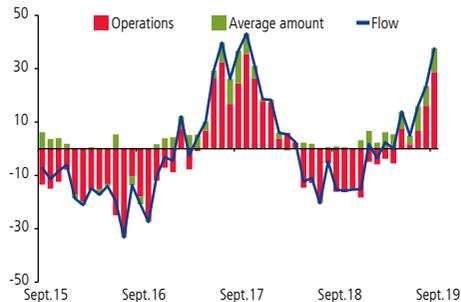
Source: Central Bank of Chile, based on data from the FMC.

FIGURE III.4
Commercial loan growth
(real annual change, percent)



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

FIGURE III.5
Mortgage loan growth
(real annual change, percent)



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

The banking system's consumer loan portfolio^{1/} remains sluggish, with a real annual growth rate of 5% in the third quarter of this year. Although the slowdown was fairly generalized across portfolio products, the use of credit lines fell more sharply (-4.4%), while the use of credit cards continued to grow above the average of the segment (6.9%). Mortgage loans, in turn, were more dynamic in the third quarter of this year, with a real annual growth rate of around 8%. This is consistent with both an increase in the number of loan operations and a larger average amount (figure III.5). With regard to the use of these mortgages, the tendency to refinance has increased (box II.1), mainly due to the downward trend in mortgage interest rates (box III.1). Finally, the results of the BLS for the third quarter of 2019 show that mortgage demand remains strong, while lending conditions have been stable.

Default indicators for the different portfolios have been relatively stable since the last Report.

The banking system's commercial loan portfolio recorded relatively stable default indicators in the third quarter of this year, although they were higher than the average of the last five years (table III.1). In this segment, the slight, but persistent increase in nonperforming loans across all institutions has occurred in line with lower output. This is consistent with the growth in the arrears rate (AR) observed in the productive sectors (chapter II and figure III.6). Additionally, the individually assessed commercial loans in the system continue to exhibit a migration toward lower credit ratings (figure III.7). Nevertheless, loan loss provisions have not increased significantly, whereas the amount of collateral used to cover expected portfolio losses has grown.

In July of this year, the standardized provisioning model entered into effect for the collectively assessed commercial loan portfolio, which mainly considers default and the collateral coverage ratio. The application of this new methodology to the portfolio stock implied the constitution of higher provisions on the order of US\$230 million, with a charge to earnings. While the impact was limited on aggregate, some banks had to constitute provisions for a significant share of their monthly income.

Default on the banks' household portfolio (consumer and mortgage loans) did not change significantly at the system level in the third quarter of this year (table III.1).

^{1/} Individual basis, excluding banking support services corporations.

TABLE III.1

Credit risk indicators (1)
(percent of respective loans)

Indicadores	2014	2015	2016	2017	2018	2019	Avg.
Arrears							
Commercial	1.7	1.5	1.5	1.7	1.7	1.7	1.7
Consumer	2.2	2.1	2.0	2.1	2.0	2.0	2.1
Mortgage	3.0	2.7	2.7	2.4	2.4	2.3	2.7
Write-offs w/o prov. (2)							
Commercial	0.7	0.7	0.6	0.9	0.9	0.8	0.8
Consumer	1.0	1.0	1.0	1.0	1.0	1.0	1.0

(1) Individual basis, thus excluding subsidiaries and banking support services companies. Data for December of each year; average from Jan.14 to Aug.19.

(2) Ratio of annualized write-offs over annualized provisions expense with a 12-month lag.

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

With regard to funding, there was an increase in the share of interbank deposits in the liability structure of the banking system, and local bond issues continued to grow.

Funding conditions for the banking system have been favorable throughout the year (chapter I), which has contributed to the issue and holding of a greater volume of debt instruments in the local market. The pension funds (PFs) continue to demand a significant share of the bonds, although the mutual funds (MFs) increased their share in this type of funding in the first half of 2019. The increase of these instruments in the funding structure has extended the duration of bank liabilities, although the duration of assets has also lengthened. Thus, the maturity gap has closed slightly in the past year, which has held down interest rate risk, as seen in the stress tests. At the same time, retail deposits decreased somewhat in 2019, as did PF deposits, whereas interbank deposits increased in the period (figure III.8).

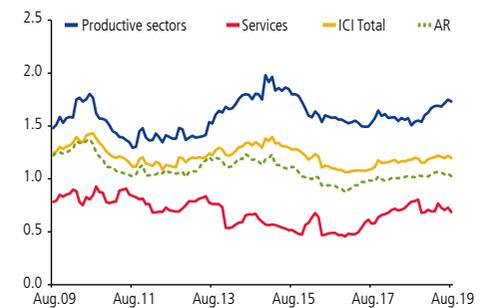
Thus, despite the marginal reduction in high-quality assets—the numerator in the liquidity coverage ratio (LCR)—the system still has a cushion relative to the regulatory limits. This is due to the fact that the reduction in these assets was offset by a reduction in net outflows in the short term, which is consistent with the increase in asset and liability duration mentioned above. As a result, the banking system's LCRs are above the required limits (figure III.9).

The banking system has maintained relatively stable profitably and solvency indicators.

Although the annualized earnings of the banking system have not change significantly since the last FSR, there has been a persistent reduction in recent years, to around 12% return on equity (ROE) and 1% return on assets (ROA) in August of this year. This reflects several phenomena associated with the maturation of the local banking industry, the flattening of the interest rate structure, and a combination of factors that affect net interest margins (for example, refinancing operations, alternative funding sources for firms, increased competition in commercial banking, technological changes, etc.).

FIGURE III.6

Arrears rate by economic sector (*)
(percent)

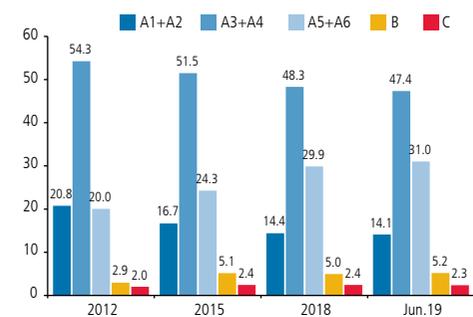


(*) The AR considers payments that are 90 days to 3 years past due.

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

FIGURE III.7

Classification of the individually assessed commercial portfolio (*)
(percent)

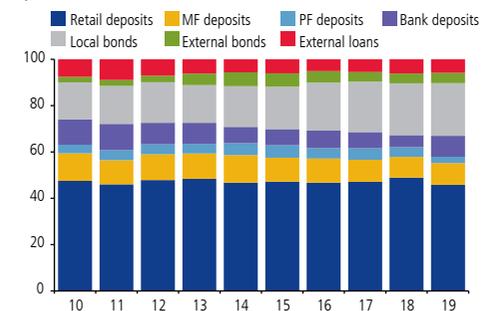


(*) Excluding the portfolio in arrears.

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

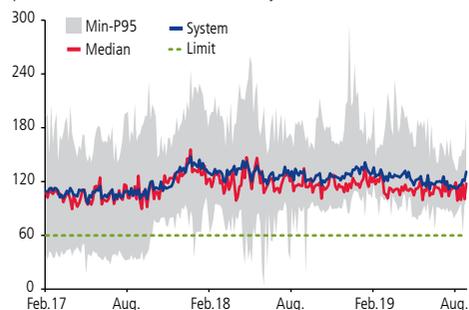
FIGURE III.8

Composition of banking system liabilities (*)
(percent of liabilities)



(*) Excluding subordinated bonds. Data through June 2019.

Source: Central Bank of Chile, based on data from the FMC and CSD.

**FIGURE III.9****Liquidity coverage ratio (*)**
(percent of net outflows for 30 days)

(*) Calculated using individual data.

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

The system's capital adequacy ratio (CAR) has been relatively stable over the course of the year at around 13%. However, some banks saw a reduction in the CAR because their distribution of dividends exceeded the amount of the associated provisions, while others used capital intensively to finance investment in local and international subsidiaries. Consequently, their buffer for facing different stress scenarios is limited.

RISK FACTORS

The banks' portfolio quality, which has diminished somewhat, could be affected if the economy remains weak.

An adverse economic scenario or slower growth could reduce the operating income of some firms, which would have an impact on the credit quality of the commercial portfolio. One sign of difficulties originating in this segment would be an increase in the default portfolio of debtor firms in productive sectors. Moreover, this scenario would also have an impact on the banking system's consumer portfolio, both directly, to the extent that it triggers a deterioration in job and wage conditions, and indirectly, through bank funding of NBLs.

The banking system's capital adequacy ratio remains below its historical average, which raises challenges for adjusting to the new regulatory framework.

The banking sector has a capital base of over 13% of risk-weighted assets, which is above the current regulatory requirement. However, as signaled in past *Reports*, the entry into effect of the new General Banking Law (GBL) presents important challenges for local banks in terms of complying with the new, more stringent solvency requirements, especially for those with a larger equity gap. Although adaptation to the new capital requirements is a gradual process, compliance problems in some banks could affect the system's intermediation process, which, combined with the observed lower profitability, could lead to changes in lending standards.

There have been few operational risk events in the banking industry, but variability is high.

Losses from operational risk events are on the order of magnitude lower than credit losses, but they are potentially significant for the banking system, especially in the case of events associated with fraud and process management (figure III.10). It is therefore critical for banks to adequately manage this type of risk, in order to maintain the continuity of their various processes and mitigate the impact of fraud events.

STRESS TESTS^{2/}

Although the banking system maintains an adequate financial position for facing stress scenarios, the capital cushion continues to shrink, in a scenario that has worsened somewhat since the last test.

Stress tests evaluate the impact of credit and market risk under a severe but plausible stress scenario. The stress tests use macrofinancial and accounting data from the banking system for June 2019. This *Report* considers two stress scenarios: a severe scenario and an adverse scenario. The severe stress scenario considers a sharp contraction of GDP, with a recovery in line with previous periods of financial fragility. The adverse stress scenario considers a weak but persistent slowdown, which would represent a significant risk for lending activity. The magnitude of the shocks in both scenarios is in line with the stress tests carried out in other jurisdictions (box III.2).

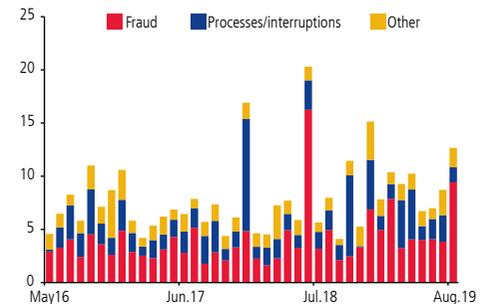
Stress tests are an analytical tool that contribute to identifying financial strengths and weaknesses in the system at a given point in time. Given their partial nature, they do not necessarily uncover all the effects of the scenarios analyzed. Consequently, they should not be interpreted as forecasts. In this framework, credit risk is estimated with a model that relates loan loss provisions, which reflect the cost of default in the banks' loan portfolios, with macrofinancial factors, such as output and interest rates. Market risk considers two types of exposure: currency and interest rates (disaggregated into valuation and repricing).

Given a less favorable starting point, the economic slowdown is sharper in both the severe and adverse stress scenarios.

The severe stress scenario considers a sharp contraction of GDP in the short term and a lower growth rate in the medium term relative to the test period. Specifically, annual output growth would reach -4.6% in the most critical quarter, to then converge in the medium term to a rate of 1.4% in 2021. This scenario is similar to past episodes of significant financial fragility. The adverse stress scenario, in turn, is based on the 5th percentile of the distribution of the GDP forecast presented in the September *Monetary Policy Report* (figure III.11). Both scenarios also consider an exchange rate depreciation and a shift in the

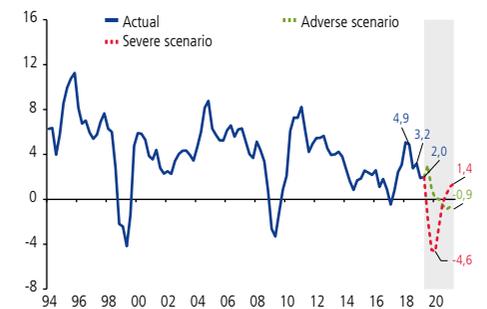
^{2/} Based on the methodology described in the FSR for the second half of 2013 and in Martinez et al. (2017a). Both the analysis and the results are regularly reported to the FMC.

FIGURE III.10
Monthly losses from operational risk events
(US\$ millions)



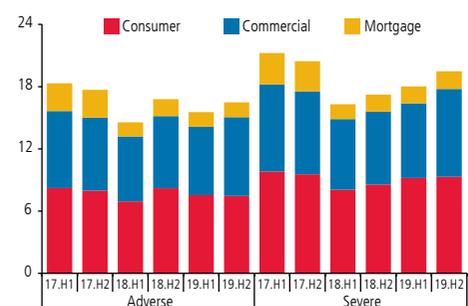
Source: Central Bank of Chile, based on data from the FMC.

FIGURE III.11
Annual GDP growth (*)
(quarterly data, percent)



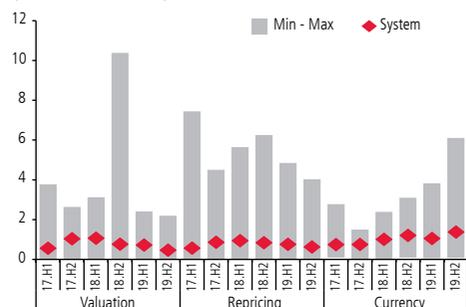
(*) Seasonally adjusted data. The gray area shows the test window.
Source: Central Bank of Chile.

FIGURE III.12
System credit risk
(percent of core capital)



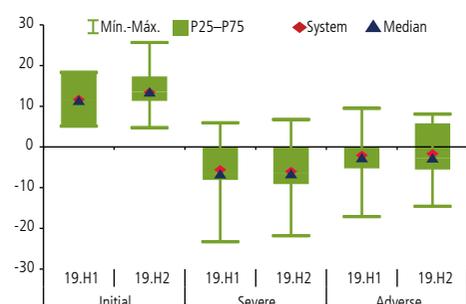
Source: Central Bank of Chile, based on data from the FMC.

FIGURE III.13
Market risks
(percent of Tier 1 capital)



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

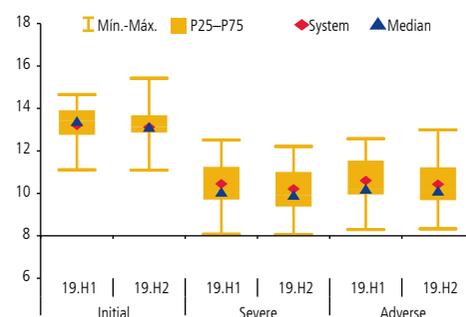
FIGURE III.14
Impact of different stress scenarios on ROE (*)
(earnings over Tier 1 capital, percent)



(*) Data weighted by the Tier 1 capital of each institution. Calculations do not include treasury, foreign trade, or consumer banks that have left the system.

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

FIGURE III.15
Impact of different stress scenarios on the CAR (*)
(regulatory capital over risk-weighted assets)



(*) Data weighted by the Tier 1 capital of each institution. Calculations do not include treasury, foreign trade, or consumer banks that have left the system.

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

spot and forward yield curves, with an increase of 300 bp in the short-term interest rate and 100 bp in the long rate. Additionally, currency risk considers exchange rate volatility equivalent to a 16% variation^{3/}.

The results indicate that credit risk increases in line with the dynamics of the macrofinancial scenario, which provides a less favorable starting point in the recent period. Market risk remains limited.

Estimated credit risk has demonstrated an upward trend over the last few exercises, due mainly to the economic slowdown, despite the fact that the traditional indicators of loan portfolio quality—default and loan loss provisions—have risen only slightly (figure III.12). In this situation, the stress test estimates a potential loss of total loans under a severe scenario of around 19.5% of system capital, versus 18% in the last test^{4/} (table III.2). Under the adverse scenario, the risk is 16.5% of capital.

TABLE III.2
Impact of the stress tests on profitability (*)
(percent of Tier 1 capital)

	Adverse						Severe					
	17.H1	17.H2	18.H1	18.H2	19.H1	19.H2	17.H1	17.H2	18.H1	18.H2	19.H1	19.H2
Initial ROE	11.3	14.1	12.2	13.8	11.7	13.4	11.3	14.1	12.2	13.8	11.7	13.4
Market risk	-1.9	-2.6	-3.0	-2.8	-2.5	-2.5	-1.9	-2.6	-3.0	-2.8	-2.5	-2.5
Credit risk	-18.3	-17.7	-14.6	-16.8	-15.5	-16.5	-21.2	-20.5	-16.3	-17.2	-18.0	-19.5
Margin	3.1	3.3	3.6	4.2	4.3	3.9	2.1	2.3	2.8	3.9	3.3	2.5
Final ROE	-5.8	-2.9	-1.8	-1.5	-2.0	-1.7	-9.7	-6.7	-4.3	-2.4	-5.6	-6.0

(*) Stressed VAR at 99% confidence. Not reported in tests prior to 19.H1. For comparative purposes, it is included as part of total risk in earlier tests.

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

With regard to market risk, rate risk decreases, in terms of both valuation and repricing. However, in a context of low interest rates, the banks could face lower profitability on the order of 1% of system capital due to the refinancing of mortgage loans. Currency risk increases slightly due to a larger foreign currency mismatch^{5/}. While market risk is lower than credit risk, as a whole it could reach over 6% of capital for some banks (figure III.13).

^{3/}A stressed VAR is used with 15-day movements in the exchange rate, at 99% confidence. While this variable is not explicitly included in exercises prior to 2019-I, it is included as part of total risk in previous results.

^{4/} Does not take into account the effect of additional provisions.

^{5/} The foreign currency asset mismatch on the balance sheet is exposed to an exchange rate appreciation; a liability mismatch, to a depreciation.

Although the profitability of the banking system is higher than in the last test, system solvency is lower, and vulnerability has increased.

In comparison with the stress tests in the last FSR, which used data for December 2018, initial profitability and margins are higher, although system capital has decreased. In particular, ROE is 1.7 percentage points (pp) higher (13.4 versus 11.7%), and the CAR is 0.1 pp lower (13.1 versus 13.2%).

The tests show that the system would have higher losses under both the severe and the adverse stress scenarios. Thus, the system ROE under the severe scenario turns negative, reaching -6% of core capital, while under the adverse stress scenario profitability is -1.7%. Within the system, banks that together account for 73 and 69% of the system's core capital would post negative earnings under the severe and adverse scenarios, respectively (76 and 72%, respectively, in the last FSR) (figure III.14).

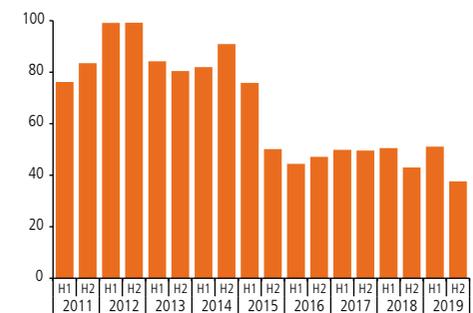
Under both stress scenarios, solvency decreases relative to the last round of tests, and there is an increase in dispersion vis-à-vis the initial distribution. This mainly reflects the fact that initial capital levels are lower for the banks that are more exposed to the risks of the stress scenarios. The results show that the CAR distribution is similar under the adverse and severe scenarios (figure III.15).

Thus, the set of banks that maintain a CAR over 10% represent 38 and 51% of system assets under the severe and adverse scenarios, respectively, down from 51% in both scenarios in the last test. Although no bank falls below the regulatory minimum, they are still lower in relation to past tests (figure III.16). Finally, the system's capital cushion maintains a downward trend, which reduces the banks' capacity to face stress scenarios (figure III.17).

An alternative test, which assesses a deepening in the reduction of long-term interest rates and its effect on loan refinancing, reveals pressure on banking system profitability, increasing vulnerability in the face of stress scenarios.

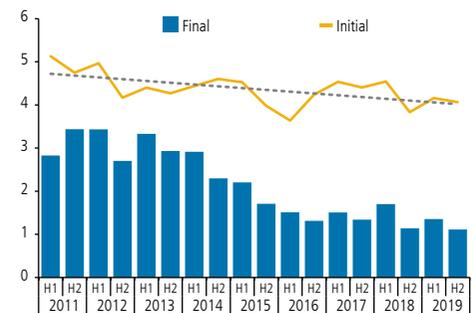
One risk factor identified in past Reports is a sudden change in the banking system's external funding conditions, triggered by a withdrawal of monetary stimulus measures and the resulting increase in interest rates. More recently, as described in chapter I, the prolonged persistence of a low interest rate scenario has become more probable. In this context, the low long-term interest rates and the flattening of the yield curve recorded over the past few years reduces the banks' potential net interest margins. First, there is a portfolio realignment, with an increase in the share of residential mortgage loans, which on average generate lower income. Second, within the mortgage portfolio, there is an increase in the share of refinancing operations at lower rates.

FIGURE III.16
Banks with a CAR of 10% or higher under the severe stress scenario (*)
(percent of risk-weighted assets)



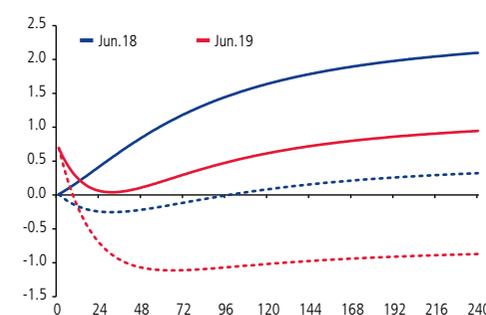
(*) Stress test results presented in the FSRs.
Source: Central Bank of Chile, based on data from the FMC.

FIGURE III.17
Capital cushion under severe stress scenario (*)
(percent of total system assets)



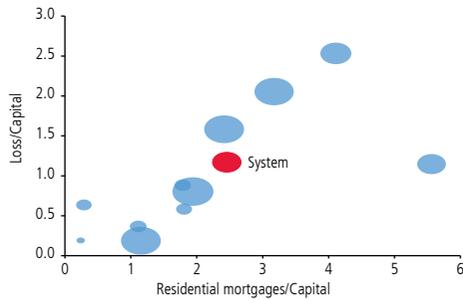
(*) Excess regulatory capital over the regulatory minimum, based on the specific requirements for each bank.
Source: Central Bank of Chile, based on data from the FMC.

FIGURE III.18
UF yield curve (*)
(percent, months)



(*) Dotted line indicates stress scenario.
Source: Central Bank of Chile.

FIGURE III.19
Losses from mortgage refinancing (*)
(percent of Tier 1 capital)



(*) Data as of June 2019.

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

Thus, given the structure of the banks' asset and liability flows, an alternative scenario featuring a 200 bp drop in long rates would cause a significant reduction in profitability (figure III.18). The banks' exposure to this risk, in terms of the size of the portfolio relative to their capital, is heterogeneous within the system. The peak in loan refinancing in the last decade ranges from 1 to 5% of the annual flow, depending on the particular characteristics of each portfolio. Taking both elements into account, a scenario with a 200 bp drop in the long rate would represent a loss of approximately 1% of system capital (figure III.19). On the other hand, refinancing benefits households, to the extent that it reduces their financial burden (box II.1).

NONBANK LENDERS^{6/}

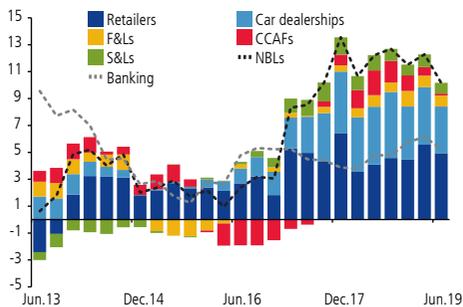
Nonbank lenders (NBL) provide credit to households and businesses. In the consumer portfolio, NBLs include retailers, family compensation funds (CCAF), savings and loan associations (S&Ls), factoring and leasing companies (F&Ls), and car finance companies. The mortgage portfolio includes endorsable mortgage loans (*mutuos hipotecarios*) issued by mutual societies, which are among the assets held by life insurance companies (LICs). Finally, factoring and leasing companies mainly provide financing options other than traditional business loans (box IV.1).

The NBLs exhibit higher consumer loan growth rates than the banking system, led by retail companies and the car sector.

Household debt from NBLs has increased as a share of total consumer debt. This was reflected in the loan portfolio of these lenders, which grew 10.2% in real annual terms in the second quarter of 2019. The share of debt with retailers and car dealers reached 4.9 and 3.5%, respectively in the period. The debt share of S&Ls was 0.8%, while the CCAFs and F&Ls saw a reduction to 0.1 and 0.8%, respectively. This occurred in a context where bank consumer loans grew 5.2% in the same period (figure III.20).

With regard to consumer loans, NBLs as a whole represent 57.9% of the volume of consumer loans in the banking system. This share has been stable since 2012, although there has been an increase for retailers since mid-2013 and, more recently, for companies oriented toward car financing.

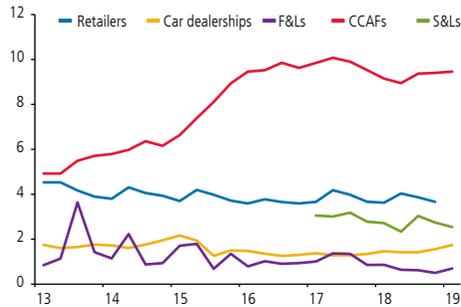
FIGURE III.20
NBL contribution to loan growth
(real annual change, percent)



Source: Central Bank of Chile, based on data from the FMC and Suseso.

^{6/} The analysis carried out in this section uses comparisons with bank data, based on individual bank financial statements.

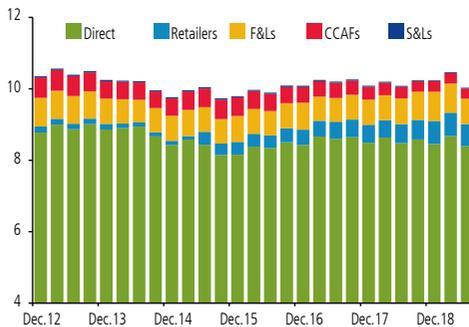
FIGURE III.21
Default rate (*)
(percent of loans)



(*) Default of 90 to 180 days, except for the CCAFs.

Source: Central Bank of Chile, based on data from the FMC and Suseso.

FIGURE III.22
Exposure to the consumer segment (*)
(percent of system assets)



(1) ROA is calculated as earnings over assets; leverage as equity over assets.

(2) F&Ls include the car loan segment.

Source: Central Bank of Chile, based on data from the FMC and Suseso.

Since the last *Report*, CCAF borrowers have maintained a higher default rate than in the case of the rest of the nonbank consumer lenders. There was also a slight increase in default in the car loan portfolio in the most recent period (figure III.21).

With regard to profitability, the different NBL segments posted a reduction in their ROA in the first quarter of the year, with the exception of the CCAFs which have recovered in the last few periods. Thus, the NBLs recorded an upward trend in leveraging (a drop in equity over assets), again with the exception of the CCAFs, where the capital base grew relative to assets (table III.3).

TABLE III.3
ROA and leverage ratio (1)
(percent)

Indicator	2015	2016	2017	2018	Mar.19
ROA					
Retailers	4.7	4.9	4.8	4.6	3.8
FL&A	3.3	3.2	2.6	2.6	2.4
CCAFs	-0.1	0.9	1.6	2.3	3.9
S&Ls	2.2	2.7	3.8	3.8	3.0
Leverage ratio					
Retailers	33.4	32.2	30.8	22.2	21.0
FL&A	21.1	20.5	17.2	16.5	17.1
CCAFs	34.5	36.9	37.7	36.9	37.6
S&Ls	32.1	29.1	28.2	27.2	26.8

(1) ROA is calculated as earnings over assets; leverage as equity over assets.

(2) F&Ls include the car loan segment.

Source: Central Bank of Chile, based on data from the FMC and Suseso.

In sum, since the last FSR, the share of NBLs in household debt has increased, in a context of incomplete information on debt and debt service levels. As mentioned in past FSRs, this results in an incomplete credit risk assessment by the rest of the financial system. In this sense, the indirect exposure of the banking system to households, though commercial loans to NBLs, has been stable since year-end 2015 at around 1.6% of system assets, equivalent to 15% of bank equity in June 2019 (figure III.22 and statistical appendix). Furthermore, the NBL sector has become more significant in recent years through consumer loans to households. Given these trends, it is important to specifically monitor this segment for potential sources of risk.

BOX III.1 THE EFFECT OF BANK LOAN PORTFOLIO COMPOSITION ON INTEREST RATES

Interest rates on bank loans by portfolio are calculated as a weighted average of their products, which can change significantly over a short period of time, particularly in the case of the commercial and consumer portfolios. This is due to the fact that because it is a weighted average of the different types of products, the portfolio change derives from both changes in the interest rates on each product (price) and changes in the product composition of the loan flows in the portfolio (quantity).

Because interest rates and product flows change over time, it is not possible to untangle the interest rate dynamics of each portfolio from the changes in its composition. Therefore, this box proposes a calculation methodology that controls for the effect of compositional changes in the portfolios on the average rates in the system, so as to be able to analyze the changes in the cost of credit with greater precision.

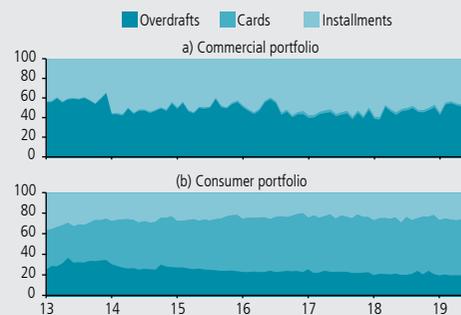
Types of product

In general terms, the types of products by portfolio can be divided into two large groups: installment loans and revolving loans (credit cards and overdraft credit lines). In the case of installment loans, the associated interest rates, number of installments, and maturities are defined for the duration of the loan, whereas revolving loans are credit that can be freely withdrawn by the borrower and that does not have a preestablished amortization plan for repaying the debt (Briones and Filippi, 2018). Consequently, changes in portfolio flows, mainly due to the use of revolving credit, can trigger changes in the system's average rates, even when interest rates are stable.

Proposed adjustment

Credit flows exhibit variable dynamics and reporting characteristics within the month. For example, for credit card operations, the recording of flows tends to be concentrated around the billing data, which is usually in the first two weeks of the month (Briones and Filippi, 2018).

FIGURE III.23
Composition of flows by type of product (percent)



Source: Central bank of Chile, based on data from the FMC.

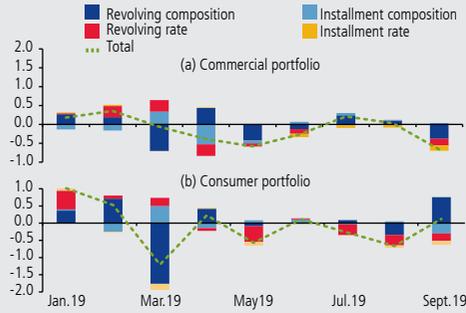
In order to correct for the daily variation described in the preceding paragraph, the monthly interest rate is calculated for each portfolio as a weighted average, using the flows in the last twelve months for each type of product as weights. This smooths the sharp changes in portfolio composition. When flows are kept stable over time, the change in average interest rates mainly reflects rate changes.

Results

In the commercial loan portfolio, the shares of installment and overdraft flows are similar, although they are highly variable over time (figure III.23). In the case of consumer loans, the use of credit cards is greater than the flow of installment loans, such that card rates have a bigger impact on the average rate.

In the recent period, the composition-adjusted rates display a downward trend, in contrast to the average rate, but consistent with the dynamics of the MPR. Thus, the increase in consumer and commercial rates in recent months reflects an increased use of revolving credit, despite the decline in reference rates (figure III.24).

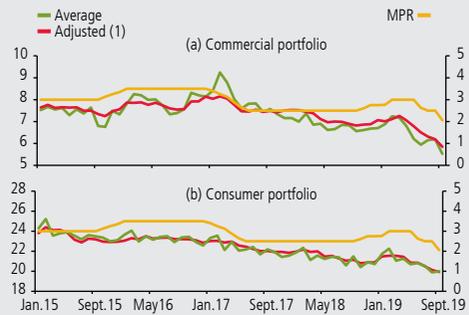
FIGURE III.24
Decomposition of the monthly change in interest rates (percent)



Source: Central bank of Chile, based on data from the FMC.

The dynamics of average interest rates for both commercial and consumer loans are more volatile than the composition-adjusted rate series (figure III.25). This greater variation is mainly associated with revolving credit, which has higher rates.

FIGURE III.25
Interest rates on bank loans (percent)



(1) Adjusted: Data corrected for composition effects: currency, amount, maturity, and product. Moving average of the composition in the last 12 months.

Source: Central bank of Chile, based on data from the FMC

In sum, average interest rates, due to composition effects within each portfolio, contain information that precludes disaggregation to exclusively identify price changes. The proposed indicator delivers more precise information on interest rate dynamics and contributes to a better evaluation of the credit cost trend.



BOX III.2

INTERNATIONAL COMPARISON OF STRESS SCENARIOS

Stress tests on the financial sector have become increasingly important over the past several years, especially in the wake of the global financial crisis (Baudino et al., 2018). They are classified as either bottom-up or top-down. The former are generally organized by the respective supervisor, in coordination with the financial institutions themselves (generally banks), and are based on highly disaggregated data and scenarios defined by the authority. In the case of the latter, the monetary or financial authority designs the scenarios and directly applies them to the exposures, using less detailed regulatory and administrative data, for the purpose of macroprudential analysis (Jobst et al., 2013). In the case of Chile, the CBC has published top-down stress tests since 2005, with the goal of evaluating the aggregate resilience of the banking system. The results and conclusions are regularly reported in the *Financial Stability Reports* and also discussed with the respective supervisor and with market agents.

To position the stress tests conducted by the Central Bank of Chile in the international context, this box highlights the assumptions and scenarios used and compares them to international benchmarks.

Guidelines for the CBC tests

The CBC stress tests measure market and credit risks, considering two stress scenarios for the dynamics of the economy: severe and adverse. The severe scenario is defined based on recent fragility episodes, namely, the Asian crisis and the global financial crisis. The adverse scenario, in turn, is based on the fifth percentile of the forecasts presented in the *Monetary Policy Reports*. This design seeks to generate scenarios that are extreme, but plausible, in line with recommendations by the Bank for International Settlements (BIS, 2018), which are described in chapter III of this Report.

International experience

In the United States, the U.S. Federal Reserve (Fed) applies the Dodd-Frank Act Stress Test (DFAST) and determines the underlying parameters and assumptions. In the most recent version, the Fed assessed the capital of 18 banks under hypothetical economic stress scenarios (Board of Governors of the Federal Reserve System, 2019). The tests were based on three stress scenarios with varying degrees of complexity: severely adverse, adverse, and a global market shock and counterparty default component. The first features a deep global recession, accompanied by nine quarters of stress for the real estate market and corporate debt markets. The second includes weak economic activity across all economies, with a moderate reduction in asset prices and rising volatility. Finally, the third further incorporates a specific module for the international economy, with a severe recession in the Eurozone, the United Kingdom and Japan and a somewhat milder recession in developing Asia. The configurations can vary in accordance with current economic conditions and are periodically revised in the Board's Policy Statement on the Scenario Design Framework for Stress Testing.

The Bank of England (BoE) defines an adverse scenario and assesses the associated capital needs. At the end of this year, the test covers the seven largest banks in terms of local loans (BoE, 2019). The scenario incorporates: (i) macroeconomic stress in the United Kingdom (U.K.), which lasts for five years; (ii) financial market stress consistent with the former; and (iii) an independent module incorporating stress from misconduct and its costs. For the 2019 test, the BoE defined a stress scenario that features a drop in world GDP and in the GDP of the United States, the Eurozone, and China. With regard to the domestic economy, the stress scenario includes a GDP contraction of 4.7%, while the unemployment rate reaches 9.2% in the second year of the test. Real estate prices also fall for residential and commercial properties, among other effects. Most recently, the BoE introduced into the scenario a variable associated with a disorderly exit of the United Kingdom from the European Union (a no-deal Brexit).

In Australia, the Reserve Bank (RBA) is in charge of carrying out the top-down stress test, which encompasses impacts on bank solvency and liquidity and considers interconnectedness and systemic risk, among other factors. In 2019, the RBA analyzed the system based on a small group of major banks (International Monetary Fund, 2019). The tests contemplate a baseline and an adverse scenario over a horizon of three years. The baseline scenario is anchored on estimates from the World Economic Outlook, including output growth, the unemployment rate, house price indices, liquidity and the exchange rate. The adverse scenario, in turn, includes three sets of shocks: a drop in house prices; lower world growth, especially in China; and less favorable global financial conditions than expected.

The Bank of Spain (BdE) has applied its Forward-Looking Exercise on Spanish Banks since 2013. The most recent version of the test covers four bank groups. In this case, the tests are coordinated by the European Banking Authority, which defines the methodology (European Banking Authority, 2018), and the European Systemic Risk Board. The tests identify four sets of risk: (i) a sudden repricing risk to spreads in global financial markets; (ii) feedback between low growth and banks with weak profitability; (iii) sustainability risks in public and private debt; and (iv) liquidity risk in the nonbank sector.

The BdE includes the baseline and adverse scenarios over a three-year horizon, with a GDP contraction, a house price correction, reductions in variable-income prices, consumption and investment shocks, etc. Current risk variables are also analyzed. For example, the 2018 test also considered a severe GDP contraction in emerging markets, with a focus on Turkey, India, and Russia.

One of the most widely discussed issues in the literature is the severity of the stress scenarios, which, because the tests are forward looking, requires making judgements in their design and calibration. The degree of severity of the scenarios used can be evaluated by comparing the biggest economic contractions in the different economies with the magnitudes applied in the most recent stress test exercises. For example, the U.S. scenario implies a somewhat larger contraction than recorded in 2009, while the United Kingdom analyzes a drop that is smaller than its historical trough. Chile, in turn, is in the middle of the severity range in terms of the economy's historical GDP contractions, but the unemployment rate is closer to the levels recorded in economic stress periods (table III.4).

TABLE III.4
International comparison of stress scenarios
(percent)

	Crisis year	Annual GDP change (peak to trough) (1)	Unemployment rate
United States	1982	-4.97	9.70
	2009	-5.39	9.25
United Kingdom	1980	-6.23	6.80
	2009	-6.79	7.54
Spain	1993	-4.81	22.16
	2009	-7.75	17.86
Australia	1983	-5.25	9.96
	2009	-1.91	5.56
Chile	1999	-7.84	11.16
	2009	-7.88	11.31

Stress scenarios			
United States	Severely adverse	Δ -8.00pp (2)	10.00
United Kingdom	Stress	Δ -4.70pp	9.50
Spain	Stress	Δ -4,00pp	25.00
Australia	Adverse	Δ -2.50pp	9.90
Chile	Adverse and severe	[-4,00; -5,30]	[10,3; 10,9]

(1) From maximum to minimum, with three year tolerance, based on the exercise horizon.

(2) Accumulated over quarters.

Source: Central Bank of Chile based on information from World Bank, Bank of Spain, Bank of England, Fed, IMF and RBA.

Final comments

The above analysis reveals that the main entities responsible for applying stress tests at the global level design scenarios with the objective of reflecting financial situations that could affect the banking system. In this sense, they use major historical changes, as well as potential shocks that have not necessarily affected the country in the past, but that could have an impact in the future. This is the case for house price reductions, which in some cases have not been recorded in the past, or the inclusion of modules for unprecedented events like a no-deal Brexit. The stress test applied by the Central Bank of Chile follows the same trend, and the applied magnitudes are in the mid-range of severity in the sample of countries presented in this box.

IV. ANALYSIS OF BUSINESS SECTOR FINANCIAL RISKS AND VULNERABILITIES

This thematic chapter analyzes the financial risks and vulnerabilities of Chilean firms. It starts by defining different groups of firms based on their sources of financing; identifying the biggest risks for each group; and quantifying their impact using stress tests. Based on this analysis, the business sector is found to be resilient to possible financial stress scenarios and short-term economic shocks. However, scenarios involving a prolonged economic contraction could lead to a worsening in firms' financial situation, with the associated potential risks for the financial sector.

1. INTRODUCTION AND SUMMARY

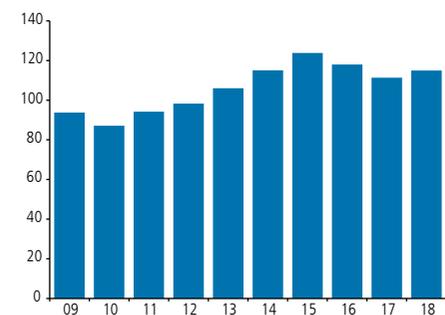
From a historical perspective, the local corporate sector has played a key role in the transmission and amplification of external shocks. The major crisis in the Chilean financial system in the early 1980s was intensified by the financial situation of firms, which had high debt levels and currency mismatches that, in a context of weak regulation, ended up compromising their solvency. The currency mismatch in the corporate sector played a similar—albeit radically less dramatic—role during the sudden stop of 1997. In contrast, during the 2008–09 global financial crisis, the stronger position of the corporate sector was one of the reasons the adverse shock did not have a persistent impact on the economy or the local financial system.

In the last decade, the debt of Chilean firms has increased from 90% of GDP to just over 115%, in a context of favorable financial conditions at the international level (figure IV.1)^{1/}. Some market analysts have expressed concern for this trend. Past FSRs have argued that this increase does not represent a clear vulnerability. Rather, the trend is associated with a more developed local financial market, debt related to a foreign direct investment (FDI), and resident investment overseas. Furthermore, the amount of external corporate debt denominated in dollars has been stable in recent years.

This chapter expands the analysis of the potential financial risks and vulnerabilities of Chilean firms, beyond the aggregate debt level. To do so, it reviews various topics related to the indebtedness and payment behavior of local firms and presents analytical exercises and stress tests, using different models and data sources.

^{1/} For most of this chapter, firms are defined as excluding banks, as in chapter II of this Report (Fernández et al., 2017). However, depending on the source of information, some of the specific exercises may use alternative definitions.

FIGURE IV.1
Indebtedness of firms (*)
(percent of GDP)



(*) Based on firm-level information excluding factoring, leasing, and other, securitized bonds and commercial effects. The moving annual GDP ending on each quarter is used. For more detail on the series and methodology, see the figure set.

Source: Central Bank of Chile, based on information from Achef and FMC.



The chapter begins with a description of the sources of financing available to firms in Chile and then presents a classification that will be used throughout the discussion. Specifically, two large groups are identified: firms that have access to external financing and firms that do not have such access. The latter represent a large share of the commercial portfolio of local banks in Chile. The firms with access to external financing are further divided into those that report their financial statements to the FMC and those that do not.

Section 3 describes the debt dynamics of the sector, with an emphasis on external debt. This is followed by a presentation of financial indicators and an analysis of the potential risks for firms with access to capital markets. In particular, the financial situation of these firms is considered in a context in which corporate debt levels—acquired after the 2008-09 financial crisis—have been a recent subject of concern at the international level (Fed Board, 2018; IMF, 2018). The discussion shows that corporate debt also increased in Chile in this period, reaching a level comparable to the developed economies. This section also analyzes the recent evolution of foreign currency mismatches in these firms and the associated currency risk. The analysis indicates that the mismatches are confined to a small percentage of firms and thus do not constitute a significant source of vulnerability for financial stability.

Section 4 analyzes the indebtedness and risks associated with firms that are primarily funded by the local banking system. It highlights the relation between the economic cycle, indebtedness, and the payment behavior of this group. In terms of the recent evolution, a series of indicators shows that both debt and default have been stable. However, there is a strong relationship between debt and changes in sales levels in these firms, which could constitute a risk for financial stability in scenarios of low economic growth over longer periods.

Section 5 presents two analyses that quantify the potential impact of the materialization of some of the risks and vulnerabilities identified in the previous sections. The first consists in a stress test on firms that report to the FMC, for which information is available from their financial statements. In line with the results presented in section 3, the analysis shows that a sudden increase in the exchange rate and financing costs would have a limited impact on the earnings of these firms, whereas an adverse output shock could generate a larger impact. The same stress test using historical data shows that firms' exposure to these risks has fallen in recent years. The second analysis investigates the vulnerability of firms that finance their debt through the local banking sector to an adverse sales shock. The results show that the evolution of sales is crucial for determining a company's default probability. The share of firms that would fall into default in response to a drop in sales declined between 2008 and 2017, moving in line with the economic cycle.

In sum, the chapter finds that the business sector in Chile has gained access to more stable financing sources and lower financing costs in recent years—including the local and external capital market. Thus, the sector as a whole does not present significant financial vulnerabilities in the face of sharp changes in interest rates or the exchange rate. However, scenarios involving a more prolonged economic contraction could incubate vulnerabilities in the sector, with an effect on financial stability.

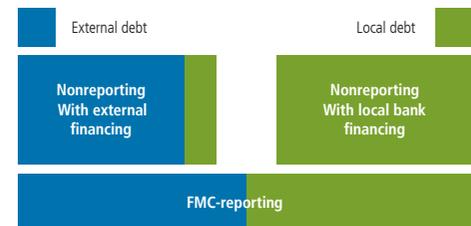
2. CLASSIFICATION OF FIRMS BY THEIR ACCESS TO FINANCING SOURCES

There is a vast literature on the relationship between firm characteristics and their debt sources and on how these firms and their lenders resolve the information asymmetry problems they face^{2/}. In this sense, different lenders have different methods for evaluating a borrower’s repayment capacity, depending on the type of information available. For example, if a company is capable of generating quantifiable information that is easily transmitted, then it will have access to a larger number of financing sources^{3/}.

In the capital market, there are retail investors that invest in corporate securities based on this type of information. However, producing this information is generally costly, since it requires, for example, third-party verification and the submission of reports to regulatory entities. Consequently, firms with access to the capital market tend to be large, have better collateral, and have projects that are relatively easy to evaluate. In contrast, smaller firms whose projects are harder to assess are usually financed by banks, through either commercial loans or factoring (box IV.1)^{4/}. There is thus a relationship between firms’ financing sources, their characteristics, and their publicly available information.

For this reason, and in line with past FSRs, this chapter distinguishes between three types of firms according to how they get their financing: those with access to external financing, including firms that report to the FMC (“reporting firms”) and firms that do not (“firms with external financing”); and those that do not report to the FMC and that are financed almost exclusively with commercial loans from the local banking system (“firms with local bank financing”) (diagram IV.1). Given that all firms that issue public securities in the local market are supervised by the FMC, only reporting firms have access to this market (figure IV.2).

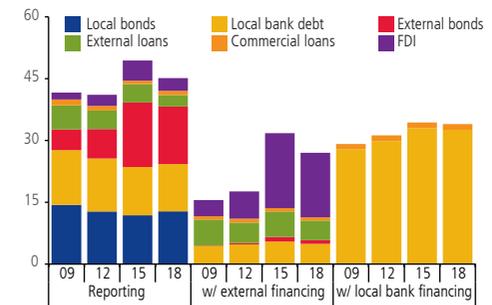
DIAGRAM IV.1
Classification of firms by available information and source of financing (*)
(percent of total debt, 2018)



(*) The size of the area corresponds to the share of total debt in 2018. FMC-reporting firms are those that report their financial statements to the FMC and their direct subsidiaries. For more details, see Fernández et al. (2017).

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

FIGURE IV.2
Total debt of nonbank firms, by type of debt and type of firm (*)
(percent of GDP)



(*) Based on firm-level data. For more detail on the series and methodology, see the figure set.

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

^{2/} See Hadlock and James (2002).

^{3/} Liberti and Petersen (2018) presents a literature survey that uses quantitative and qualitative information to explain how lenders and firms are related.

^{4/} Cantillo and Wright (2000), Denis and Mihov (2003), and Colla et al. (2013) provide empirical evidence in this regard.



Reporting firms account for around 45% of total corporate debt in Chile. The median firm has 135 employees and represents approximately 8% of jobs in the country. More than 80% of these firms are classified as large companies, that is, with annual sales of over UF100,000 (table IV.1). In general, they are older, well-established conglomerates where the default rate is practically zero. However, given their relevance in terms of sales, jobs, and credit with the local banking sector, some of these firms need to be monitored both individually and at the corporate group level (box IV.3).

The companies in this segment have access to various types of financing. In fact, they account for a large share of external and local bond issues and also use local bank debt, albeit to a lesser extent (figure IV.2). This allows them to substitute their financing sources, which helps to accommodate adverse shocks deriving from the financial system, such as a contraction in foreign or local bank credit, and reduces their real impact (Chang et al., 2016; Crouzet, 2018).

TABLE IV.1
Firm size and activity, by type (2017)

Type of firm (1)	No. firms	Employment (%)	Employees (median by type)	Size by sales segment (%) (2)		
				Micro	SME	Large
FMC-reporting	1,049	7.8	135	2	15	83
Firms with external financing	2,390	6.3	50	8	33	60
Firms with local bank financing	255,910	63.8	7	38	57	5
No debt	349,024	22.1	3	78	21	1

(1) For the purposes of this table, firms as defined as legal persons with tax ID numbers that do not correspond to banks. Total employment in the sample is 8,105,086 workers.

(2) Micro: firms with annual sales of UF 1 to 2,400; SME: over UF 2,400 UF and under UF 100,000; large: over UF 100,000. Firms with no sales are omitted.

Source: Central Bank of Chile, based on data from the FMC and IRS.

TABLE IV.2
Bank financing of firms, by type (2017)

Type of firm	% Bank debt (1)	BID (%) (1)		N° bank relations (2)
		Average	Median	
FMC-reporting	25.7	0.1	4	
Firms with external financing	10.1	0.2	3	
Firms with local bank financing	64.2	2.0	1	

(1) Calculated using data on the stock of commercial bank debt, excluding factoring. BID is the percentage of local bank debt that is in arrears by 90 days to 3 years. Percent of bank debt and BID are calculated for December 2017.

(2) Calculated using data on the flow of commercial bank debt. The percent by type of loan is calculated over the total annual flow of commercial loans. A firm is considered to have a relationship with a bank if it received at least one loan from that bank in 2017.

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

Firms in the group with local bank financing obtain their financing almost exclusively through local bank debt, and they explain a large share of the level and variations of this type of debt (figure IV.2). Because their debt tends to be concentrated in a small number of lenders (table IV.2), these firms tend to have a substantially lower ability to substitute debt sources than reporting firms (Caballero, 2002). Furthermore, empirical evidence supports the idea that some of these firms face greater financing constraints (Faulkender and Petersen, 2006), which makes them more susceptible to adverse shocks (Chang et al., 2016; box IV.4). In 2017, these firms accounted for 28% of total debt, 64% of local bank debt, and over 60% of jobs in the country (tables IV.1 and IV.2). Unlike the other groups of firms, here default is prevalent, such that this group requires a specific analysis.

In general, they are smaller companies, with a median of just seven employees, and almost all of them are classified as micro, small, or medium-sized enterprises (that is, annual sales of under UF100,000). Nevertheless, not all the companies in this group are small. In fact, some have thousands of employees and are part of a conglomerate (box IV.2).

Finally, it is important to emphasize that the groups identified above also differ in terms of the information available for the analysis and monitoring of financial stability. In the case of the FMC-reporting firms, information is publicly available from their financial statements, which supports regular monitoring with the usual financial tools. In contrast, public financial information on the other groups is almost nonexistent, so they can only be monitored using administrative data on debt and/or sales.

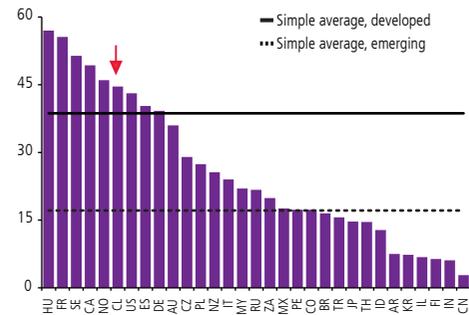
3. INDEBTEDNESS AND RISK OF FIRMS WITH EXTERNAL FINANCING

This section provides an international comparison that identifies Chilean firms' position in terms of their external debt; analyzes the recent evolution of the main components of that debt, in particular the FDI-related component; and presents an international comparison of the financial indicators of FMC-reporting firms and an analysis of their currency exposure and mismatch.

External debt dynamics

In the international context, Chile's external debt over GDP is above the average of a group of developing countries and closer to the level of the developed countries (figure IV.3). FDI-related debt has grown significantly since 2011, while the growth rate of external bonds began to slow in since 2013. Both have stabilized since 2015, however (figure IV.4). As mentioned in the FSR for the second half of 2018, corporate external debt has been stable at around US\$120 billion. At the same time, the growth in the debt of Chilean firms in recent years reflects increased access to credit and a more developed financial market relative to comparable countries (IMF, 2018).

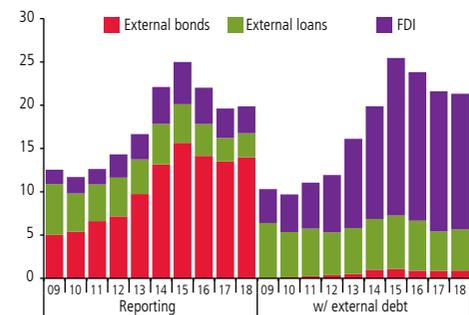
FIGURE IV.3
External debt of firms, 2017 (*)
(percent of GDP)



(*) For more detail on the series and methodology, see the figure set.

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

FIGURE IV.4
External debt by type of firm (*)
(percent of GDP)

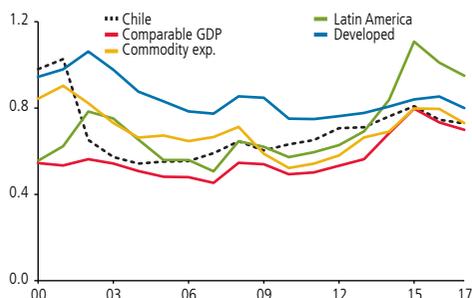


(*) Based on firm-level data. For more detail on the series and methodology, see the figure set.

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

FIGURE IV.5

Indebtedness of firms (*)
(times equity)



(*) Financial debt / equity. Weighted average by group. Excludes financial services. For more detail on the series and methodology, see the figure set.

Source: Central Bank of Chile, based on data from the FMC and Datastream.

A large share of the external debt is concentrated in bonds issued by FMC-reporting firms. This growth has been in line with the better external financial conditions, which have allowed this type of firms to refinance liabilities at a lower financial cost and to make investments abroad (figure IV.4). The second-largest component is FDI-related loans, which are in the hands of firms with external financing. As of December 2018, this component was concentrated in the mining, financial services, transport, telecommunications, and electricity, gas, and water (EGW) sectors. The external debt of this group of firms increased strongly after 2013, peaking at year-end 2015 (26% of GDP) and then declining in late 2018^{5/}.

The evolution of FDI credit is normally associated with specific cases that reflect investment or financing decisions by an overseas parent company for its subsidiaries in Chile^{6/}, as well as exchange rate fluctuations. Finally, because they are loans between related companies, they differ from bank debt in terms of their enforceability and convertibility. In particular, rollover risk is mitigated in the case of a direct loan from the parent company (chapter II).

FIGURE IV.6

Assets of the corporate sector using the dollar as functional currency, 2017 (*)
(percent of GDP)



(*) CL: Chile; CA: Canada; NO: Norway; IL: Israel; AU: Australia; PE: Peru. For more details, see Fernández et al. (2019a).

Source: Central Bank of Chile, based on data from the World Bank, FMC, Datastream, and UN Comtrade.

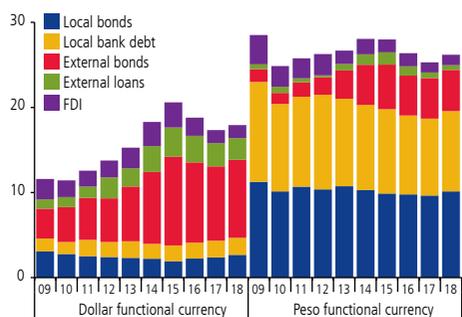
Indebtedness of firms that report to the FMC

The debt of FMC-reporting firms was 40% of GDP in 2009, peaked at 49% in 2015, and closed 2018 at 44% (figure IV.2). Their main financing sources are local bonds (13% of GDP, on average, between 2009 and 2018), local bank debt (12%), and external bonds (10%). Since 2013, external bonds have gained share to the detriment of local bank debt, peaking in 2015 at 16% of GDP. At the firm level, for a large sample of external bond issuers between 2012 and 2014, the resources obtained from the increased bond issues were mainly used for liability refinancing, in a context of low external financing costs, and new investments. In the recent period, corporate bond maturities are concentrated in the medium term, which is consistent with the liability refinancing policy documented in past FSRs.

For this group of firms, another possible international comparison involves the companies' financial indicators. In particular, past FSRs have compared profitability, interest coverage, financing costs, and indebtedness^{7/}. The leverage of the Chilean corporate sector has hovered around the level of the group of countries with a comparable GDP (figure IV.5), in a context of relatively stable financing costs for Chile.

FIGURE IV.7

Debt of FMC-reporting firms (*)
(percent of GDP)



(*) Based on firm-level data. For more detail on the series and methodology, see the figure set.

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

^{5/} External bond holding in this group is explained by specific cases of corporations that have issued securities abroad and that do not issue debt or equity in Chile, such that they are not classified as FMC-reporting firms under the criteria used in this chapter.

^{6/} One example of specific inter-firm operations is the observed increase in FDI-related debt in the third quarter of 2015, which was largely explained by a specific operation that was offset by an overseas loan in the other direction with another related entity (FSR, First Half 2016).

^{7/} For more information on the construction of the baseline and the comparison methodology, see FSR (First Half 2014 e IEF and First Half 2019).

Currency exposure and mismatch

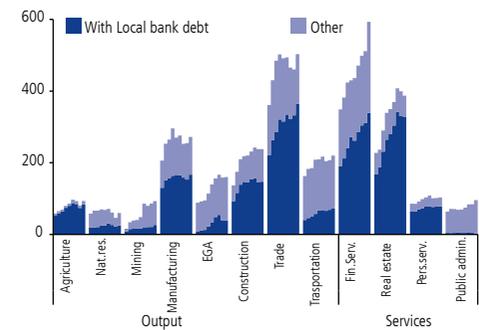
The relationship between the functional currency, that is, the currency chosen by a firm for accounting purposes, and the currency denomination of the firm’s debt is a possible source of vulnerability if the two are out of synchrony^{8/}. The implication of these choices is addressed in the Monetary Policy Report for September 2018 and the FSR for the first half of 2019. When a firm’s accounting currency is the dollar rather than the local currency, it reflects that fact that the foreign currency is more representative of the environment in which the firm does business. In this case, issuing debt in dollars is in line with the company’s accounting currency and thus would not generate a mismatch. Consequently, to evaluate the currency mismatch of a country’s corporate sector, it is necessary to identify how much foreign currency debt is in the hand of firms that use the dollar as their accounting currency. In this line, Fernández et al. (2019a) present an international comparison to gauge the share—in terms of assets—of firms in the corporate sector that use the U.S. dollar as their accounting currency. They find that Chile has a high percentage of such firms. However, this is not an isolated phenomenon considering countries with a comparable corporate sector in terms of either size or export sectors (figure IV.6).

The available information for Chile allows us to identify the functional currency of firms that report to the FMC and thus to quantify the share of foreign currency debt in the hands of firms that use the dollar as their accounting currency (figure IV.7). Firms whose functional currency is the dollar concentrate their debt in external bonds (43% of total debt, on average, between 2009 and 2018). They are mostly large companies related to the mining and forestry sectors, are mainly exporters, and/or have parent companies with investments in Latin America. Thus, the issue of external debt—primarily in dollars—is in line with the environment in which they do business, so their currency risk is limited.

Firms that use the peso as their functional currency concentrate their debt in local bonds and local bank debt (approximately 39% each, on average, between 2009 and 2018), with a low share of external bonds (13%). In this group of firms, the issue of foreign currency debt generates a currency mismatch, including their local debt in dollars. In the case of Chile, the amount of the latter is low relative to the total, and it is concentrated in export sectors, such as agriculture.

With regard to firms that use the peso and that issue external bonds, the national corporate sector has been consolidating an asset position in terms of hedging against currency depreciation, which has also been reflected in a low rate of extreme mismatches (figure II.4)^{9/}. Between 2001 and 2006,

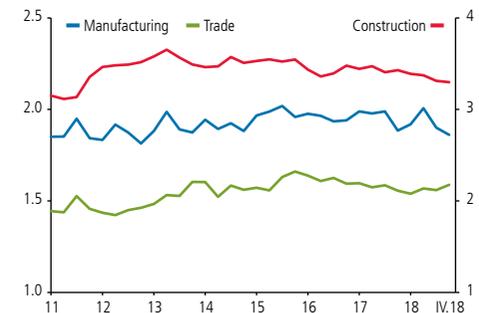
FIGURE IV.8
Local bank debt by economic sector and firm classification, 2010–18 (*)
(UF millions)



(*) Based on firm-level data. Annual data, including commercial, contingent, and foreign trade loans. Nat.res.: natural resources; Fin. serv.: Financial services; Pers.serv.: Personal services. For more detail on the series and methodology, see the figure set.

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

FIGURE IV.9
Debt over sales of firms with local bank financing (*)
(times, rolling annual sales)



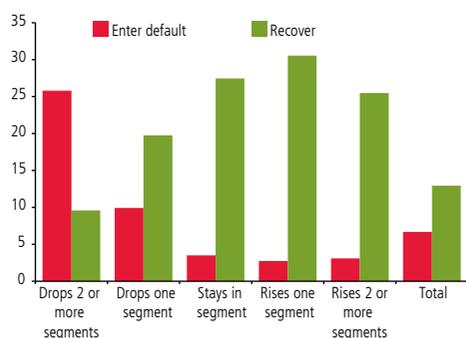
(*) Based on monthly group-level data. For more detail on the series and methodology, see the figure set and Fernández and Vásquez (2019c).

Source: Central Bank of Chile, based on data from the FMC and IRS.

^{8/} International Accounting Standard N°21 (IAS 21) defines functional currency as “the currency of the primary economic environment in which the entity operates,” such that it is related to the economic factors underlying the company’s business activity. In this chapter, we use the terms functional currency and accounting currency interchangeably.

^{9/} For more details, see Fernández et al. (2019b) and Espinosa et al. (2017).

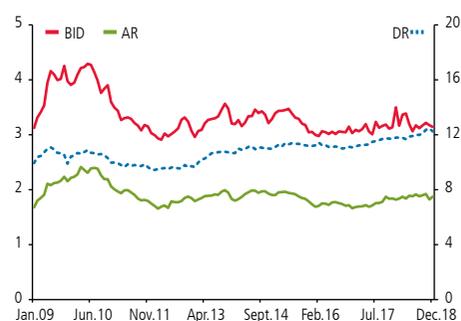
FIGURE IV.10
Probability of default and recovery, by evolution of sales, 2009–18 (*)
(percent of firms in good standing, percent of firms in default)



(*) Based on annual firm-level data. On each date, firms are classified based on a comparison of their sales segment today versus one year previous. For more detail on the series and methodology, see the figure set and Fernández and Vásquez (2019a).

Source: Central Bank of Chile, based on data from the FMC and IRS.

FIGURE IV.11
Nonpayment measures of firms with local bank financing (*)
(percent of loans, percent of firms)



(*) Based on firm-level data. For more detail on the series and methodology, see the figure set and Fernández and Vásquez (2019b).

Source: Central Bank of Chile, based on data from the FMC y el INE.

the currency mismatch was 4.3% of assets, with a peak of almost 10% in 2002. Cowan et al. (2005) note that firms have been dealing with a floating exchange rate since the late 1990s. The effects of the float on hedging were not immediate due to the existence of adjustment costs^{10/}. Between 2007 and 2018, the average currency mismatch of firms fluctuated between 2.3% at year-end 2007 and –6% in March 2017. One determinant of these fluctuations is the impact of the exchange rate hike on dollar-denominated liabilities, which was partially offset by dollar assets and currency derivatives, consistent with the development of this market in recent years^{11/}.

Other dimensions of the currency mismatch of firms that use the peso as their accounting currency include their mismatch in other currencies and its effect on earnings. An analysis shows that firms have a low exposure to currencies other than the dollar, and the effects on earnings are in line with the level of the mismatch^{12/}.

In sum, exposure to currency risk remains limited among FMC-reporting firms. This is due to the fact that a large share of foreign currency debt is in the hands of firms that use the dollar as their accounting currency. In the case of firms that report in pesos, the currency mismatch has remained low relative to the level recorded in the 2000s, in line with appropriate hedging and an active management of currency risk. Consequently, these firms would be able to resist a sudden depreciation of the peso, which is in line with the analysis in past FSRs and in the September 2018 *Monetary Policy Report*.

4. INDEBTEDNESS AND RISK OF FIRMS WITH LOCAL BANK FINANCING

This section analyzes the dynamics of indebtedness and default among firms that get most of their financing through local bank debt. This group represents the primary exposure of local banks, through their commercial portfolios. For these firms, little information is available in terms of financial statements, so the analysis focuses on their indebtedness and default, measured with administrative data.

The dynamics of bank debt, sales, and default

The debt of firms with local bank financing is concentrated in sectors such as trade, financial services, real estate, and manufacturing (figure IV.8). In the agricultural sector, as well, almost all debt pertains to firms with local bank financing. In contrast, this group of firms accounts for only a small share

^{10/} These authors also suggest that the change in the level of exposure of firms after the policy change (1999) would indicate that the floating exchange rate regime is an important factor for reducing firms' exposure, to the extent that it eliminates the implied foreign exchange insurance of the previous regime and thus forces them to internalize currency risk, at least in the Chilean case.

^{11/} For a detailed analysis of the derivatives market in Chile, see Villena and Salinas (2014).

^{12/} On the currency mismatch, see FSR (Second Half 2016) and Fernández et al. (2019b).

of sectors such as electricity, gas and water (EGW), transport, and public administration^{13/}.

Information is available for constructing a risk indicator that relates debt with output, represented by sales. Thus, an alternative indicator of indebtedness is defined as the ratio of local bank debt to the firm's sales level, using information from the FMC and the Chilean IRS. Theory suggests that firms try to maintain a balance between debt and sales, so any misalignment between the two variables would indicate the emergence of vulnerabilities. Given the importance of sales in certain business models, this indicator is computed for firms in the trade, manufacturing, and construction sectors (figure IV.9). In the last two years, this indicator has recorded a downward trend in construction—pointing to somewhat lower vulnerability—and been relatively stable in trade and manufacturing since late 2015^{14/}.

Another way to analyze potential vulnerabilities in firms with local bank financing and the relation to sales is based on their sales segment (micro, small, medium, or large)^{15/}. This information can be used to relate the change in a firm's sales segment with default and potential recovery. As expected, the probability of entering into default increases as a firm's sales fall. This probability starts to rise when the firm drops one segment and reaches four times the average when it drops two or more segments (figure IV.10)^{16/}. The probability of exiting default, in turn, is significantly lower for firms that fall more than two sales segments relative to firms that either do not move or rise to a higher segment. Thus, sales dynamics provide important information on a given firm's risk level. Therefore, to evaluate the potential effect of a scenario involving a prolonged economic slump, it is important to take into account the sales adjustment that firms could handle without undermining their payment behavior.

In terms of default, there are a number of measures based on administrative records at the borrower level that use data from the FMC^{17/}. The arrears rate (AR) is calculated based on delinquent debt; borrower in default (BID) shows the total debt of firms in default; and the default rate is calculated as the percent of borrowers in default^{18/}. All the proposed measures recorded a downward trend after the 2008–09 global financial crisis. More recently, the AR has increased somewhat since early 2016 (figure IV.11). The BID has been more volatile as it considers the total debt of firms in default, and its movements are explained by specific cases. Finally, the DR has increased systematically since mid-2013, due

^{13/} For more details, see Fernández et al. (2017).

^{14/} For more details, see Fernández and Vásquez (2019c).

^{15/} Staying in a given segment does not mean that sales were stable, but rather that any changes did not exceed the boundaries of the range. Furthermore, the highest sales segment does not have an upper limit.

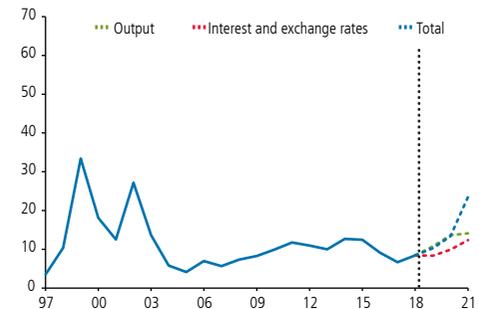
^{16/} For more details, see FSR (Second Half 2017) and Fernández and Vásquez (2019a).

^{17/} The accounting measure available for banks corresponds to commercial default, which incorporates the total outstanding debt of the loan in default.

^{18/} For more details, see Fernández and Vásquez (2019b).

FIGURE IV.12

Firms with losses, by type of shock (*)
(percent of total assets)

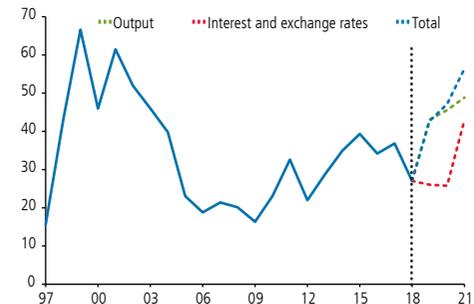


(*) Based on annual firm-level data. The effects of the shocks are evaluated over a three-year horizon, starting at the dotted line. Excludes state-owned, mining, and financial companies. For more detail on the series and methodology, see the figure set and Espinosa et al. (2017).

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

FIGURE IV.13

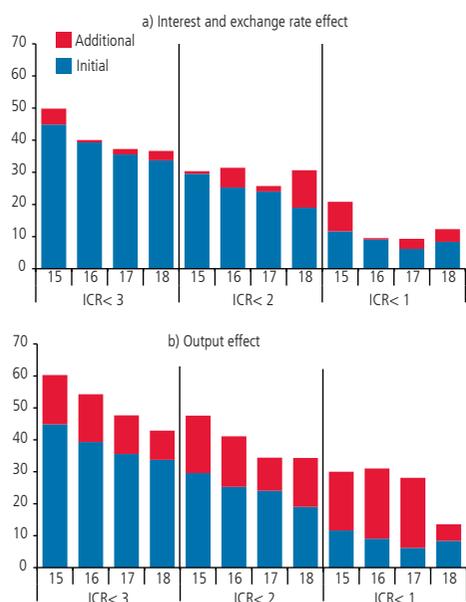
Interest coverage below two, by type of shock (*)
(percent of financial debt)



(*) Based on annual firm-level data. The effects of the shocks are evaluated over a three-year horizon, starting at the dotted line. Excludes state-owned, mining, and financial companies. For more detail on the series and methodology, see the figure set and Espinosa et al. (2017).

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

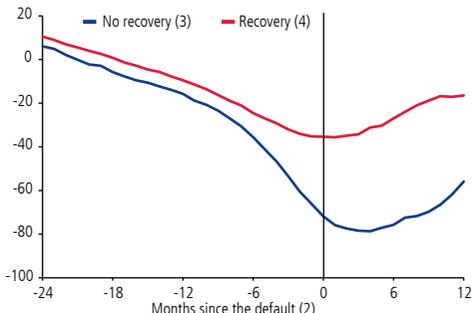
FIGURE IV.14
Historical evolution of stress tests, by interest coverage ratio (ICR) (*)
(percent of total assets, by ICR level)



(*) Each year corresponds to the December closing date used in the simulation. The "additional" effect incorporates the effect at the end of the three-year horizon. That is, the assets of firms that are added to each ICR group due to the deterioration. In the 2017 and 2018 exercises, the simulation of local bond maturities was modified.

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

FIGURE IV.15
Growth of sales around the month of entry into default (1)
(annual growth rate)



(1) Annual growth rate of quarterly sales.
(2) Negative numbers indicate months before the default; positive numbers indicate months after the default.
(3) Firms that do not exit default in the sample period.
(4) Firms that exit default in the sample period.

Source: Central Bank of Chile, based on data from the FMC and IRS.

to firms in the productive sector. The sharper increase in the DR relative to the AR reflects the fact that the firms that have entered into default in the last six years have relatively small debts, on average.

In sum, both the indebtedness and default of firms with local bank financing are largely determined by the evolution of their sales. This means that on aggregate, the risk for this segment is correlated with the evolution of the economy. In this sense, although a series of indicators shows that both debt and default have been stable in recent years, a scenario involving a prolonged economic slowdown could constitute a risk for financial stability through its effect on this group of firms.

5. THE IMPACT OF REAL AND FINANCIAL SHOCKS ON FIRMS

Stress tests are important tools for monitoring the financial risk of firms in the face of changes in current economic conditions (Chow, 2015; IMF, 2012, 2016). The results not only shed light on the companies' financial situation, but also provide information on the position of lenders and other agents in the economy, given the presence of transmission and amplification mechanisms in these relationships. This section presents two additional exercises that quantify the potential impact of the materialization of some of the risks that have been identified in the chapter. For the group of firms that report to the FMC, the test simulates the impact on earnings of adverse shocks to output, the exchange rate, and financing costs. For firms with local bank financing, based on the discussion in the previous section, the exercise relates sales and default. Note that this type of test provides a lower bound for the total impact, given that it does not consider feedback between the variables, as is characteristic of a general equilibrium model (box IV.4).

Stress test for FMC-reporting firms

The stress test for reporting firms aim to quantify potential vulnerabilities in the sector in the face of shocks to output, interest, and the exchange rate. Given their partial nature, this exercise does not necessarily capture the full effects of the applied scenarios. The results, therefore, are not forecasts.

The data used are from balance sheets, income statements, and the decomposition of financial debt by source (bank and bonds) and duration (short and long) at the firm level. We also have data on foreign currency assets and liabilities and currency derivatives^{19/}. The output shock corresponds to a drop in gross earnings equivalent to 0.6 pp of assets per year, in line with the

^{19/} For the case of Chile, Rodríguez and Winkler (2007) developed an application using information from consolidated financial statements. Espinosa et al. (2017) propose a methodology for carrying out an exercise that incorporates other sources of information. The results of the application of this methodology are presented in this section.

deterioration in profitability observed between 2010 and 2012. The interest rate shock corresponds to a 250 bp rate increase for bonds and bank debt, where the impact depends on the corresponding maturity. Finally, the exchange rate shock assumes a peso depreciation of 40% in two years. The impact after the application of the shocks is measured in terms of profitability and interest coverage^{20/}.

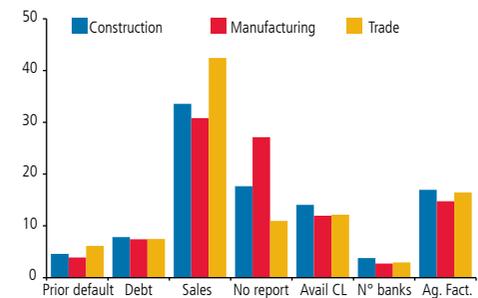
The impact of the stress scenario is measured as the increase in the share of firms with losses, which would represent 24% of total assets in the corporate sector in 2021 (figure IV.12). At the same time, there would also be an increase in the fraction of firms with an interest coverage ratio of less than two times, which account for 56% of financial debt at the end of the exercise (figure IV.13)^{21/}. In both cases, the output shock accounts for the majority of the impact, while the effects of the interest rate and exchange rate shocks are lower. These results are similar to the trend recorded during the Asian crisis, but the sources of vulnerability are different. In that period, firms had a higher return on assets, but their exposure to financial shocks was significant, due to a larger currency mismatch.

A comparison of stress test results over time reveals that the initial position of the firms has improved in the last four years, to the extent that the percentage of assets held by firms with a lower interest coverage has fallen systematically (figure IV.14). From an international perspective, the current position of the corporate sector in Chile is also favorable vis-à-vis the large economies. According to the GFSR (2019), Germany would be the economy with the lowest debt at risk—an indicator based on firms with an interest coverage ratio of less than one—which would reach 9% of total corporate debt. In the case of Chile, the most recent estimate of this indicator is 7%, after a downward trend in recent years. In sum, the results show that the corporate sector is more resilient to unexpected changes in interest rates and the exchange rate due to their use of primarily long-term debt with maturities outside the test horizon, combined with a limited currency mismatch (Fernández et al., 2019b).

Prospective analysis of repayment and stress test for firms with local bank debt

This section presents a similar analysis to the stress test for reporting firms, but with a focus on default by firms with local bank financing. As explained earlier, unlike firms that report to the FMC, default is largely explained by firms with local bank financing and can constitute a significant risk for financial stability. Based on the study of the determinants of default, a vulnerability measure is constructed to quantify, at different points in time, the share of firms that would fall into default in the face of a reduction in their sales

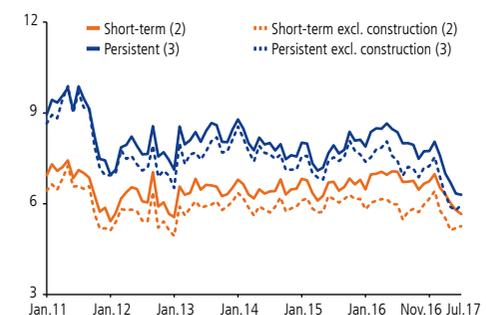
FIGURE IV.16
Relative contribution of variables to the predictive power of the random forest model (*) (percent)



(*) Contribution measured as the resulting increase in the degree of purity of all the nodes generated by the variable. Purity measured as the Gini index in each node. No report: the firm does not report its sales VAT form in the database used; Avail LC: unused credit on credit lines; and Ag. Fact.: Sectoral activity indicator. For more details, see Castro et al. (2019).

Source: Central Bank of Chile, based on data from the FMC and IRS.

FIGURE IV.17
Measure of vulnerability to sales shock (1) (percent of firms)



(1) Percent of firms that would enter into default in response to a sales shock equivalent to one standard deviation according to the complementary log-log nonlinear regression model.

(2) Drop in sales in a single quarter equivalent to one standard deviation of the quarterly growth rate.

(3) Drop in sales in four consecutive quarters, equivalent to one standard deviation of the annual growth rate of sales.

Source: Central Bank of Chile, based on data from the FMC and IRS.

^{20/} The results of these stress tests have been regularly presented in the FSR since the second half of 2016.

^{21/} The level of interest coverage normally considered in the GFSR.

^{22/} For the purposes of this analysis, a default event is defined as arrears of at least 90 days on a portion of the firm's debts.



(Castro et al., 2019)^{23/}. This exercise completes the analysis presented in this chapter of the impact of adverse shocks that are transmitted from firms to the financial sector. Boxes IV.1 and IV.3 complement this analysis by examining the potential impact of shocks that are transmitted in the opposite direction, that is, from the banking system to the real sector, and the aggregate impact of interaction between the two.

The analysis of default by firms with local bank financing considered various models, which were estimated using administrative records from the FMC and the IRS for the 2009–2017 period^{23/}. All the models analyzed find a close relationship between sales and default, which highlights the sensitivity of firms with local bank financing to the economic cycle and is in line with sales-based exercises presented in past FSRs^{24/}.

The analyzed evidence shows that companies' sales tend to drop before an episode of default. Furthermore, firms with a smaller decrease in sales are more likely to exit default (figure IV.15). Other variables are also important for predicting default events: in particular, both the failure to file the value added tax form with the IRS and a low level of level of unused credit on credit lines increase the probability of default in the future (figure IV.16).

Default forecasting models are used to construct a measure of firms' vulnerability to a drop in sales. This measure corresponds to the percentage of firms that would fall into default in the face of a typical shock (one standard deviation of the sample mean). The measure increased slightly in 2015 and 2016, a period of low economic growth, and recovered in 2017, in line with the acceleration of growth (figure IV.17).

Taken together, the results show that default episodes in firms with local bank financing are largely explained by changes in sales. This means that a prolonged economic downturn represents a risk for financial stability associated with this group of firms. Nevertheless, a vulnerability measure constructed based on the correlation between sales and default shows that this risk declined between 2011 and 2017, in line with the evolution of aggregate economic growth.

^{23/} Based on regression models and automatic learning techniques. For more details, see Castro et al. (2019).

^{24/} FSR (Second Half 2017).

6. CONCLUSIONS

Financial stability depends, to a large degree, on the interaction between firms and the financial sector. This chapter presented an analysis of the way in which firms are linked to the financial sector through their debt and the risks and vulnerabilities that emerge from these ties. In this sense, a number of points and results should be emphasized.

On the one hand, firms with access to the capital markets—whose currency mismatches make them vulnerable to sudden changes in the exchange rate or in external financing conditions, as happened during the turbulent periods of the 1980s and 1990s—do not present significant currency mismatches. This translates into a lower vulnerability to exchange rate fluctuations than in the past. A stress test simulating adverse changes in economic activity, financing conditions, and the exchange rate, on the level of the late 1990s, confirm this conclusion. Furthermore, the exercise shows that the vulnerability of these companies has fallen in recent years.

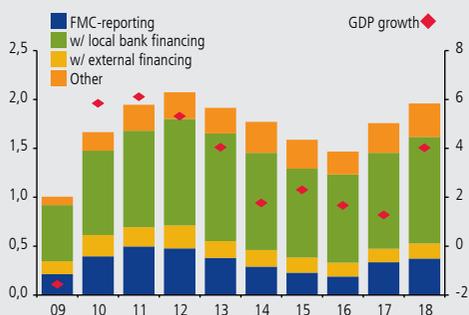
On the other hand, firms with local bank financing are sensitive to the economic cycle and a worsening of lending conditions. However, the evidence presented above suggests that the vulnerabilities associated with this group of companies has not increased significantly in recent times. Both debt levels and default indicators have been stable and low. Moreover, a default forecasting model and a stress test on these firms show that their vulnerability to a sharp drop in sales declined between 2011 and 2017. Nevertheless, they could be vulnerable to scenarios involving a prolonged economic downturn.

BOX IV.1 THE EVOLUTION OF BANK FACTORING IN CHILE

Factoring is a type of financing through which the firm (supplier) sells its accounts receivable (customer invoices) with a discount to an external institution (factor)^{1/}. When the invoices come due, the customer pays the amount owed directly to the factor, who is now the legal owner of the invoices. This operation offers advantages to the supplier, who can receive immediate financing for the productive cycle and externalize the credit assessment and collection services, given that the factor normally has competitive advantages through its specialized knowledge, economies of scale, and better access to credit data (Berger and Udell, 2006)^{2/}.

This box characterizes bank factoring from the perspective of the supplier's economic sector. At year-end 2018, total factoring represented 2% of the debt of nonbank firms (chapter II). This type of financing can be classified—from the supplier's perspective—into three groups: banks and subsidiaries (73%), bank associates (8%), and other FMC-reporting firms (19%). This box presents information on factoring operations by banks and their subsidiaries, using administrative records from the FMC^{3/}.

FIGURE IV.18
Factoring debt, by year and type of firm
(percent of GDP)



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

^{1/} In a simple example, a fruit producer that sells to a supermarket transfers its outstanding invoices to a factoring company. In this case, the producer is the supplier, the supermarket is the customer or debtor, and the factoring company is the factor.

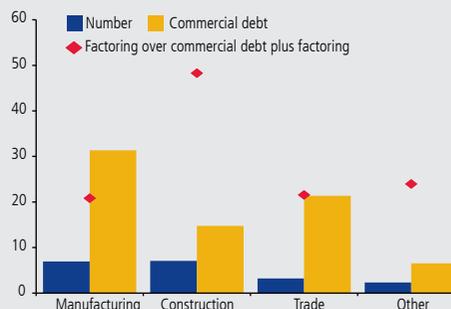
^{2/} Klapper (2006) and World Bank Group (2017) provide a detailed analysis of the types of operations, the advantages, and the role of factoring in business financing.

^{3/} There are other firms registered with the IRS as factoring companies, but they are not included in the debt calculation because public information is not available on their loans. This market also features intermediaries such as the Chilean receivables exchange, where invoices and contracts are traded, and some participatory financing platforms (PPF) that carry out financing operations similar to factoring. See Abarca (2018) and FSR (First Half 2015).

The evidence indicates that bank factoring is cyclical, peaking at year-end 2012 in terms of loans over GDP (2.1 points) (figure IV.18). This is not an idiosyncrasy of the Chilean market: at the international level there is a positive correlation between GDP growth and the growth of factoring (FCI, 2019)^{4/}. The evidence also shows that a wide range of firms use factoring, including FMC-reporting firms and firms with local bank financing.

Both the share of firms that use this source of financing (whether measured as the number of firms or the amount of commercial debt) and the intensity of use (measured as the percent of total debt obtained via factoring) vary by economic sector. In the group of firms with local bank financing, only a small share of firms with commercial debt also use factoring as a source of financing, representing 7% of firms in both the manufacturing and construction sectors in December 2018. However, the intensity of the use of factoring was around 20% for manufacturing and trade and 48% for construction. In this latter sector, the commercial debt of these firms does not represent more than 15% of total debt in the sector (figure IV.19).

FIGURE IV.19
Share and intensity of use of factoring in firms with local bank financing, 2018
(percent of total)



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

^{4/} Factors Chain International (FCI) is an international association of factoring companies. The data presented in the annual report correspond to operation flows and are limited to companies that are members of the association, which includes seven Chilean firms.

BOX IV.2

CORPORATE GROUPS AS A UNIT OF ANALYSIS FOR FINANCIAL STABILITY

There is growing interest in the study of how interconnections among economic agents influence the propagation and amplification of idiosyncratic shocks^{1/}. At the firm level, ownership relationships can accentuate or attenuate shocks affecting firms that are part of a corporate group. On the one hand, an ownership network can diversify the risk facing the group and thus function as a mitigator^{2/}. On the other, ownership networks can act as propagation and contagion channels within the group and even outside it. Consequently, the assessment of financial risks and vulnerabilities requires not only an analysis at the level of the individual firm, but also at the level of the corporate group. This is the approach that is usually adopted in this Report for the group of firms that *report* to the FMC, where there is public information on the ownership networks of these firms.

This box examines the ownership and control network for the universe of firms in Chile, extending the analysis of corporate groups to non-reporting firms, which represent the vast majority of companies in Chile (table IV.3)^{3/}. The results shows that there is a positive correlation between bank debt default at the individual level and at the level of the corporate group, which suggests that adverse events can propagate across the ownership network, in line with the literature. The analysis is based on a recent study (Canales et al., 2019) that uses IRS administrative records to identify the ownership and control relationships for all firms in Chile.

Ownership, control, and corporate groups

The IRS administrative records contain information on the ownership relationships between companies^{4/}. In 2017 there

were over 290,000 direct ownership relationships between approximately 190,000 firms, defined as the percent ownership that firm *i* has in firm *j*. Based on these direct relationships, we can obtain the universe of indirect relationships between firms, defined as the percent ownership that firm *i* has in firm *j* through its participation in firms other than firm *j*. Next, control relationships between companies are defined as the links in the final ownership network (direct and indirect) where the ownership share is over 50%. Finally, for the purposes of this box, a corporate group is defined as a set of firms that are linked through at least one control relationship.

Diagram IV.2 provides an illustration of ownership and control relationships between firms and the corporate group to which some of the firms belong. Each node in the network corresponds to a different firm, and each link represents a direct ownership relationship between the adjacent firms. At the center of the network is a purple diamond, which represents the head of the control group, in which no other firm has an ownership share. The color red represents the corporate group, and the color blue corresponds to firms that are related through an ownership, but not a control, relationship.

DIAGRAM IV.2

Example of ownership and control structures (*)



(*) The purple diamond corresponds to the top corporation in the group. The red nodes are firms that are controlled by the top corporation, and the blue nodes are corporations with which the top corporate has a non-controlling ownership relationship. The size of the nodes represents the number of direct connections (ownership and/or control relationships) of the respective firms.

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

^{1/} See, for example, Acemoglu, Carvalho, et al. (2012) or Acemoglu et al. (2016). Glasserman and Young (2016) provide a detailed summary of recent works.

^{2/} In particular, groups can reallocate resources internally to accommodate their investment, employment, and intangible resources (Giroud and Mueller, 2015, 2019; Matvos and Seru, 2014; Atalay et al., 2014). Furthermore, the availability of financial resources in related firms can reduce the need for external financing (Saona et al., 2018).

^{3/} This analysis only includes firms registered as taxpayers in Chile. This implies, for example, that some of the corporate groups of non-reporting firms with external debt may be incomplete.

^{4/} These records do not include tax information on the firms. They are based on data sources that are updated at different frequencies, and the sources used can vary year to year. This box uses data corresponding to the 2018 tax year.

This example illustrates how, in an analysis of different firms at the individual level, they may appear to be independent entities, when in reality their decision-making is potentially linked and may even be centralized. Thus, in principle, the decision to move or share resources, such as labor or financing, between the red nodes could be made centrally.

Some characteristics of corporate groups in Chile

Of the nonbank firms that are usually analyzed in this *Report*, 13% are part of a corporate group. There is a positive correlation between the size of the firms and their membership to a corporate group. Firms that are part of a group account for 70% of bank debt and 51% of jobs. In addition, corporate groups are present in different types of firms. While nearly 90% of FMC-reporting firms pertain to a group, a significant share of firms with local financing (12%) are also part of a group (table IV.3). Moreover, among firms with local financing, a large share of debt and employment is concentrated in firms that pertain to a corporate group (57 and 43%, respectively).

TABLE IV.3
Characteristics of firms with and without a corporate group (2017)
(percent of total firms, 2018)

	w/o corporate group			w/ corporate group		
	N° firms	Debt	Jobs	N° firms	Debt	Jobs
Reporting	87	30	49	13	70	51
Firms with external debt	11	6	5	89	94	95
Firms with local bank debt	23	5	8	77	95	92
No debt	88	43	57	12	57	43
	87	0	63	13	0	37

Source: Central Bank of Chile, based on data from the FMC and IRS.

Corporate groups and bank loan default

A series of recent studies identifies ownership networks as a transmission channel for adverse shocks affecting individual firms^{5/}. To the extent that this type of shock compromises a firm's repayment capacity and, through its ownership links, that of other firms in the corporate group, the linkages can amplify the impact of the original shock. In this case, the exposure of lenders to the default risk of a corporate group can be greater than the sum of the risks of the individual firms in the group.

^{5/} See for instant, Silva et al. (2018), Poledna et al. (2018), Abreu et al. (2019), Glattfelder (2013) or Larrain et al. (2019).

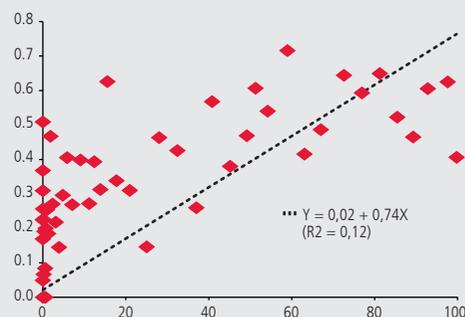
Thus, the positive correlation between the default of a firm and the default of its group can be important for the analysis of financial stability.

To evaluate the existence of this correlation in the Chilean data and, in particular, among firms with local financing—where default is a relevant phenomenon, as emphasized in section 4 of this chapter—the percent of delinquent bank debt at the individual firm level is graphed as a function of the delinquency of the corporate group to which each firm pertains, excluding the delinquency of the explained firm.

The exercise reveals that there is, in fact, a positive correlation between the two variables. Furthermore, a simple estimation of this correlation using individual data shows that it is statistically and economically significant (figure IV.20). Notably, although default is infrequent (around 4% in the sample analyzed), a 1% increase in delinquency at the group level is associated with 0.74% increase in delinquency in the member firms.

While this evidence does not provide a quantification of the transmission channel of adverse shocks through ownership networks among firms, it does show that the analysis of these networks is important for the quantification of the risks and vulnerabilities that affect financial stability.

GRÁFICO IV.20
Relation between default of the individual firm and the rest of its corporate group (*)
(percent of delinquency of the firm's total debt, 2017)



(*) The figure shows the relationship between the percent of a 90-day arrears over the total commercial bank debt of a given firm (vertical axis) and the percent of arrears of the rest of the corporate group excluding that firm, weighted by the size of the debt of each firm in the corporate group (horizontal axis). The red dots represent the averages of the variable on the vertical axis for groups of observations according to the variable on the horizontal axis. Includes 50 of these groups. The dotted line represents the results of a linear regression between the two variables using individual observations. Standard errors of estimated coefficients of the regression are in parentheses.

Source: Central Bank of Chile, based on data from the FMC and IRS.

Conclusions

This box presents an analysis of corporate groups for the universe of firms in Chile. The analysis shows that the existence of corporate groups, defined through ownership networks among companies, is not infrequent, even among firms with local financing. It also shows that there is a positive correlation between default at the level of individual firms and the level of the corporate group to which they belong. These results highlight the importance of corporate groups as a complementary unit of analysis to individual firms in terms of financial stability monitoring.

BOX IV.3

THE REAL EFFECTS OF THE AVAILABILITY OF BANK CREDIT

Section 5 of this chapter documents the possible effects of a drop in sales in firms with local financing on their repayment capacity; it thus illustrates the potential effects on the banking system of adverse shocks that originate in the real economy. This box examines the real effects, in terms of employment and growth, of the lack of access to bank credit in firms that depend on it. That is, it examines the consequences of shocks that go in the opposite direction, from the banking system to the real sector. As emphasized in box IV.4 below, the interaction of the real and financial sectors is characterized by both types of shocks, which can feed back into each other, generating aggregate effects that can affect financial stability. Unlike the analysis presented in that box, the discussion here centers on the quantification of effects at the individual level.

To this end, the box reviews some particularities of bank financing that can contribute to the transmission of financial shocks, as well as recent empirical evidence on the effects of access to financing on firms that depend on bank credit in Chile, in both normal times and times of aggregate financial stress. It also discusses the importance of the countercyclical capital requirement as a tool for mitigating the effects of these shocks.

Constraints on access to credit and its importance in normal and stressful times

Firms with local financing, which represent 64.2% of total bank commercial debt and 63.8% of employment in the country, are financed almost exclusively through banks (tables IV.1 and IV.2 and figure IV.2). Although the banks depend, to a greater or lesser degree, on the use of quantitative information to evaluate a firm's future repayment capacity, they are also characterized by their ability to generate qualitative information on the firm (Berger and Udell, 2006; Bharath et al., 2011). This type of information is difficult to transmit to third parties, so it generally constitutes private information that is kept within the bank (Boot, 2000). As a result, changing lenders can be very costly for firms that depend on banks for financing, which can have important consequences on their ability to access financing, in both normal and crisis periods.

TABLE IV.4
Elasticity of real variables to bank debt (*)

	Employment	Full-time jobs	Part-time jobs	Accumulated input purchases
Coefficient	0.48** (0,24)	0.45* (0,24)	0,06 (0,80)	0.50* (0,28)
N	14,059	13,961	9,110	23,596

(*) The table reports the effect of bank debt on different real variables 12 months after having received a guarantee, using instrumental variable methods, with the probability of being benefited by a credit guarantee such as an instrument of the growth of debt at the firm level. *, **, and *** denote statistical significance at 10, 5, and 1% respectively. Standard errors in parentheses.

Source: Mullins and Toro (2018).

A recent study provides empirical evidence on the real effects of increased credit access on some firms that are dependent on banks in Chile (Mullins and Toro, 2018). The study shows that a greater access to credit generates strong growth in these firms in terms of jobs, sales, and input purchases (table IV.4), which suggests that many of them face constraints on their access to credit. This means that these firms are more sensitive to adverse shocks, because when a firm faces financial constraints, negative events like a drop in sales not only have a direct effect, but also exacerbate their credit constraints. This mechanism is particularly important in periods of aggregate financial stress, when the adverse real and financial events tend to reinforce each other (box IV.4).

TABLE IV.5
Average impact of lower credit constraints (*)

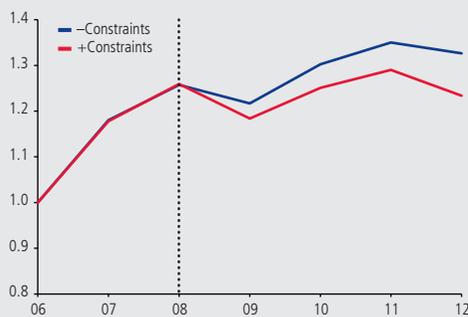
	2009	2010	2011	2012
Total credit	14.7%** (0.024)	14.0%*** (0.026)	20.6%*** (0.026)	24.2%*** (0.027)
Added value	2.95%** (0.012)	3.89%*** (0.013)	3.71%*** (0.014)	4.57%*** (0.016)
Fixed asset	4.17%** (0.017)	7.64%*** (0.019)	6.96%*** (0.020)	8.7%*** (0.022)

(*) The estimators correspond to the difference in growth rates of the two groups of firms for each variable: commercial bank debt, annual sales, average number of workers, and the book value of fixed assets at the end of each year. *, **, and *** denote statistical significance at 10, 5, and 1% respectively. Standard errors in parentheses.

Source: Toro (2019).

Another recent study focuses precisely on this type of scenario. The author estimates the potential impact of a contraction in the bank credit supply on employment, investment, and the growth of firms during a recession (Toro, 2019). The study shows that the inability to substitute sources of financing, on the part of firms that are dependent on bank financing, hindered credit access for some of the companies during the 2008–09 crisis in Chile. The firms in the study that faced tighter constraints received approximately 15% less credit, on average, which implied that their sales, employment, and fixed assets fell an additional 3.0, 2.6, and 4.2%, respectively in 2009. In the medium term, these real effects became persistent, such that four years after the start of the crisis, the sales, employment, and capital of the firms that received less financing had grown 6.7, 5.8, and 8.7% less, respectively (table IV.5 and figure IV.21).

FIGURE IV.21
Growth rate of sales (*)
(percent)



(*) The figure graphs the average growth rate of two groups: firms that faced lower constraints on access to credit during the 2008–09 crisis versus other firms. Dotted line marks the occurrence of the credit shock.

Source: Toro (2019).

The countercyclical capital requirement as a tool for mitigating the effects of shocks to the bank credit supply

The results of the two studies analyzed above show that constraints on access to credit can have real effects and aggravate the impact of adverse shocks, undermining financial stability. In particular, a sudden contraction in the bank credit supply can have negative consequences on the companies' employment and investment.

Contractions in the bank credit supply can have various causes, but they often originate in vulnerabilities associated with the banks themselves. Thus, a bank that is facing liquidity problems and does not have an adequate capital level could be forced to reduce its volume of loans. In this sense, preventing this type of situation is fundamental for avoiding a contraction in the bank credit supply and the negative effects thereof.

The countercyclical capital requirement, contained in the banking law reform (Law 21.130), serves this purpose. The objective of this macroprudential tool is to prevent the externalities associated with the excessive growth of bank credit. Thus, the CBC, with a prior report from the FMC, can require banks to constitute an additional percent of Tier 1 capital, up to 2.5%. If activated during the expansionary phase of the credit cycle, this tool has two effects that help to prevent contractions in the bank credit supply in periods of aggregate financial stress.

First, by increasing the cost of credit, it provides an incentive for banks to balance their credit portfolio toward less risky firms, which reduces their vulnerability to adverse shocks that increase default at the aggregate level. Second, the increase in Tier 1 capital makes the banks more resilient to this type of shock, allowing them to continue to loan to firms during periods of aggregate financial stress.

The lifting of the countercyclical capital requirement during the slowdown phase of the economic cycle reduces the cost of bank credit after the risks that motivated activation have materialized. This allows the banks to increase the credit supply and relax constraints on access to credit for firms that depend on this type of financing, thereby reducing the risks for financial stability associated with the availability of credit.

Conclusions

Constraints on access to credit for some firms can facilitate the transmission of adverse shocks between the real and banking sectors in times of aggregate stress. At the same time, sharp contractions in the bank credit supply can have negative consequences for firms in terms of jobs, growth, and investment, especially for those that depend on this type of financing. In this sense, it is crucial to have tools such as the countercyclical capital requirement that help prevent the occurrence of this type of situation, in that they reduce the banks' vulnerabilities in the expansionary phase of the credit cycle and increase their resilience when the cycle reverses, at the same time that they reduce the risks associated with the availability of credit during normal times.

BOX IV.4 THE AGGREGATE EFFECTS OF THE INTERACTION BETWEEN BANKS AND FIRMS AND FEEDBACK MECHANISMS

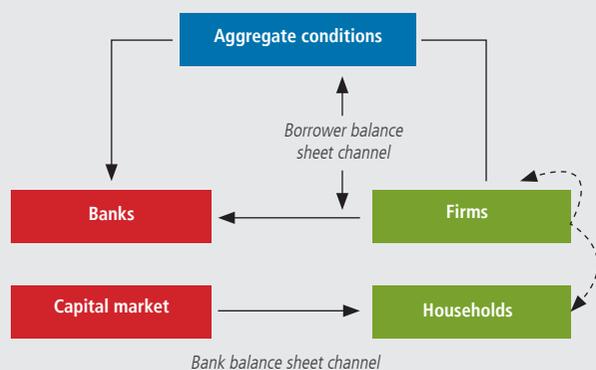
At the aggregate level, the impact of adverse shocks on banks or firms can be amplified through various feedback mechanisms (Kiyotaki and Moore, 1997; Bernanke et al., 1999). For example, a persistent output contraction that generates an increase in firms' default could trigger a contraction in the bank credit supply that intensifies the impact of the initial shock and reinforces the increase in default. This type of second-round effect is not picked up in the stress tests presented in this *Report*, since they are centered on a more detailed analysis at the individual level.

This box illustrates how the feedback mechanisms between banks and firms work, thereby complementing the analysis presented in section 5 of this chapter. To that end, the discussion addresses the most important interactions and mechanisms identified in the literature and illustrates their effects by simulating a surprise increase in corporate risk in a general equilibrium model for Chile developed by Calani et al. (2019), based on Clerc et al. (2015).

Financial frictions and the interaction between banks and firms

The economic literature identifies different mechanisms through which the interaction of the real and financial sectors can trigger episodes of financial instability (diagram IV.3).

DIAGRAM IV.3
Links between the real and financial sectors



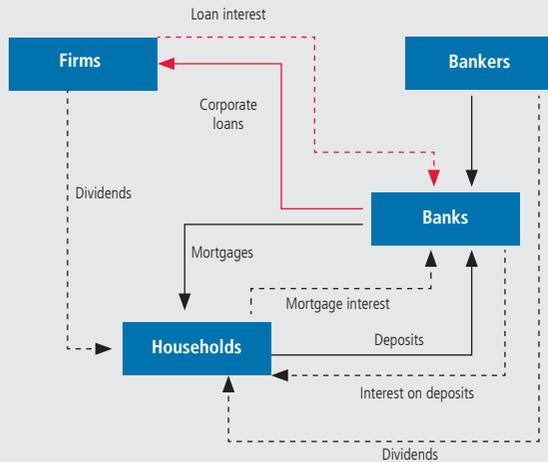
Source: Central Bank of Chile.

Essentially, the existence of financial frictions, which arise due to different types of information asymmetries in the credit markets and which are manifested as a difference between the external and internal funding costs for firms, allow shocks from the real sector to be amplified by the financial sector, and vice versa. The mechanisms through which this amplification of the initial shocks can be generated are inherently general equilibrium phenomena, and they can be classified into two groups: mechanisms that magnify the effect of an adverse shock on the lender's balance sheet; and those that magnify their effect on the borrower's balance sheet. In the former group, the amplification is generated by the effect of default on the behavior of lenders, who, by tightening the credit supply, end up amplifying the default trend that led them to do so in the first place. In the second group, the amplification is generated by the second-round effects deriving from the change in the value of assets on the borrower's balance sheet, which, in turn, affects the borrower's access to credit. The literature identifies these mechanisms through the notion of the financial accelerator^{1/}.

In this line, the dynamic stochastic general equilibrium (DSGE) model used for the simulation, designed and calibrated for Chile, incorporates a financial module in which credit relationships between banks and firms are characterized by information asymmetries. In this sense, the banks must incur a cost for knowing the return on the investment projects that they are helping to finance. This asymmetry generates a financial friction that is manifested in constraints on firms' access to bank credit (diagram IV.4).

^{1/} Recent works on the existence of a financial accelerator include Christiano et al. (2014), Clerc et al. (2015), and Brunnermeier and Sannikov (2014). For detailed review of this literature, see BIS (2011) and Brunnermeier et al. (2013).

DIAGRAM IV.4
Financial module of the DSGE model (*)



(*) Arrows represent the flow of funds and payments between lenders and borrowers. Red lines represent interactions between banks and firms that are characterized by the existence of financial frictions.

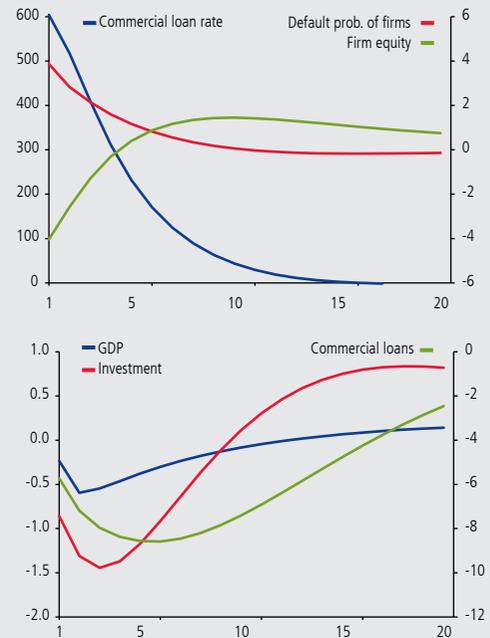
Source: Based on Calani et al. (2019).

The magnitude of the constraints on credit access facing a given firm depends on the value of its equity, which acts as collateral on its debt. To the extent that a firm has less equity, it must either reduce its investment or accept higher interest rates on financing, which makes it more sensitive to a contraction in sales. Similarly, in the model, the existence of the same type of financial frictions makes the banks vulnerable to default episodes, since they must support the losses of firms that record negative returns on their investment projects.

In this context, the exercise analyses the aggregate impact of an unexpected increase in the uncertainty of the companies' returns^{2/}. With this increase, a larger share of firms earns negative returns, and an equally large share receives positive returns, such that, in the absence of financial frictions, the increase in corporate risk would not have a direct impact on the economy's performance. Thus, all the effects of the simulated shock derive from the existence of financial frictions between banks and firms.

^{2/} The shock used increases the variance of returns on corporate projects financed with bank debt, without affecting the average return. The magnitude of the shock is calibrated to replicate the increase in loan spreads observed in October 2008.

FIGURE IV.22
Effects of a corporate risk shock at a horizon of 20 quarters, DSGE model (*)
(basis points and percent)



(*) Impulse responses of the probability of default (%) and commercial loan rate (bp) expressed in deviation from the steady state. GDP, investment, commercial loans, and firm equity expressed in percent deviation from the steady state.

Source: Calani et al. (2019).

In line with the results in the literature, the exercise shows that an increase in corporate risk generates a higher default probability in the sector. This increase in default generates losses for the banking sector and puts upward pressure on commercial loan rates for all firms. At the same time, a lower demand for capital reduces the value of the firms' equity, which, on increasing their leverage, face higher interest rates to finance the same projects. Both effects generate a tightening of the constraints on the firms' access to credit and, therefore, a contraction of output, which reinforces the increase in default. Thus, both feedback mechanisms contribute to amplifying the adverse impact of the initial shock (figure IV.22).



At the aggregate level, the increase in uncertainty has persistent effects. Investment and output fall immediately, and they only begin to recover to the extent that credit conditions in the economy improve. An increase in the value of the firms' equity and a reduction in their leverage level allows the interest rate on commercial loans to return to the equilibrium level (figure IV.22).

Conclusions

This box shows that in the face of large real or financial shocks, the interaction mechanisms, through changes in prices and aggregate conditions in the economy, can explain a large share of the fluctuations in variables that are critical for financial stability, such as default rates and the volume of credit. Usually, these mechanisms cannot be captured by an individual-level analysis, which highlights the importance of complementary tools, such as general equilibrium models, for the analysis of financial stability.

The box also emphasizes the importance of constraints on firms' access to credit in the propagation and amplification of adverse shocks. To the extent that a larger number of firms face constraints on their access to financing, the aggregate impact of these shocks is magnified. This is directly related to the evidence presented in box IV.3, which analyzes the role of bank financing on access to credit by firms that use local financing. This box presents empirical evidence for Chile on the financial constraints faced by some firms and their implications during periods of financial stress.

V. FINANCIAL REGULATION

This chapter reviews the most important issues in the regulatory agenda of the Central Bank of Chile (CBC), as well as key regulatory developments since the last FSR, describing the evolution of the regulatory context at both the local and international levels. Important developments include the implementation of Basel III and the announcement of various measures to improve the functioning of the Chilean financial market.

REGULATORY AGENDA OF THE CENTRAL BANK OF CHILE

In the second half, the Bank has advanced in line with the schedule set out in its regulatory agenda for 2019, presented in the last FSR. This agenda is focused on promoting financial system integration, increasing the cross-border use of the Chilean peso, developing infrastructures that allow more efficient and secure interbank transactions in dollars, and promoting greater transparency in the derivatives markets. At the same time, to support this agenda, work began on the incorporation of the Chilean peso into the international payment system operated by CLS Bank, a medium-term project that will require at least two or three years to complete. Additionally, in the next two weeks, the CBC will publish a report with its financial policy framework.

Publication of the CBC Financial Policy Framework report

Central banks typically have an explicit mandate with regard to inflation or price stability, as well as a financial stability mandate, which may be explicit or implicit. This second mandate tends to be associated with safeguarding the normal functioning of the payments systems, which is thus the material expression of its authority in the preservation of financial stability. In addition, central banks have the power to provide liquidity and grant credit to banks in exceptional situations, which supports its interest in mitigating and preventing systemic risks.

The CBC has decided to formalize and make transparent the way in which it addresses its financial policy objective, as it has previously done with monetary policy. To this end, it will publish, for the first time, a report that explains the link between the institution's legal mandate, the powers and authority vested in the CBC, and the functioning of the financial system. The report then presents the analytical framework under which the CBC develops its financial policy,



enhancing the systemic vision of the institution and detailing the inputs required to achieve a deep understanding of the interaction of economic agents. Finally, it explains how the Bank conducts, implements, and communicates that policy.

The publication of this report coincides with the 30th anniversary of the Central Bank's autonomy, the recent changes in the local institutional structure of financial supervision, and the implementation of the new legal framework for the banking sector.

First phase in the process of modernizing foreign exchange regulations

The CBC published for public consultation the first changes to its *Compendium of Foreign Exchange Regulations* (CFER), whose main elements are as follows:

1. A single new regulatory text (new chapter I) was introduced to integrate and harmonize all the essential elements that make up the general framework of the current foreign exchange policy and regulations.

This new chapter replaces the current chapters I and II of the CFER, so it includes some of the provisions of those texts. It also explains the relationship between the way the Bank currently applies its authority in foreign exchange matters and the current flexible exchange rate regime.

2. This regulatory review process also includes the expansion of the eligible denomination currencies for foreign securities that are traded in the local market.

3. Additionally, some chapters of the CFER were eliminated, where there are trustworthy alternative sources of information, together with the associated reporting requirements.

These changes are the starting point of the process of modernizing foreign exchange regulations and are described in more detail in the explanatory note published with the consultation, which is available on the CBC website.

In the coming months, a public consultation will be opened on the changes involving foreign exchange operations that can be carried out with Chilean pesos, which should contribute to increasing the participation of nonresidents in the local exchange market. In parallel, the CBC is promoting the incorporation of the Chilean peso in the Continuous Linked Settlement (CLS) system, which is managed by CLS Bank (see chapter VI), which will require efforts not only by Central Bank, but also by the private sector. The combination of these measures represents a highly important contribution to the internationalization of the peso.

Finally, over the course of the coming year, the requirements for nonbank entities that participate in the Formal Exchange Market will be reviewed, and work will continue on the revision of the CFER chapters, forms, and appendixes, such that this process will culminate in a conceptually reorganized compendium.

The main objectives of the process are outlined in table V.1, while the next phases and approximate timelines for issuing the new regulations are given in table V.2.

TABLE V.1
Objectives and status of regulatory initiatives

Initiative	Issue / Public consultation	Objectives
Modernization of foreign exchange regulations	Public consultation of the New Foreign Exchange Regulatory Framework (phase 1)	<ul style="list-style-type: none"> Harmonize foreign exchange regulations with the current foreign exchange regulation policy. Facilitate cross-border use of the Chilean peso.
Extension of the RTGS system to include USD transactions	Public consultation	<ul style="list-style-type: none"> Allow the transfer of U.S. dollars between Chilean banks on a secure and efficient platform. Incorporate OTC transactions in the RTGS system, following international standards.
IDIS	Definitive regulation issued	<ul style="list-style-type: none"> Increase the transparency of the OTC derivatives markets. Contribute to supervision processes and investors' decisionmaking.
Incorporation of the Chilean peso in the CLS	CBC has publicly expressed interest in moving forward on this project	<ul style="list-style-type: none"> Incorporate the Chilean peso on the most widely used spot forex settlement platform. This platform incorporates a PVP system that attenuates or eliminates counterparty risk.

Source: Central Bank of Chile.

Integrated Derivatives Information System (IDIS)

In July of this year, the CBC published the definitive regulations for the operation of the Integrated Derivatives Information System (IDIS), which aims to increase the quantity and quality of the information available on transactions in this market, following international guidelines for financial market infrastructures. For more details on this initiative, see chapter VI of the FSR for the second half of 2018.

NATIONAL REGULATION DEVELOPMENTS

Implementation of Basel III

As explained in the FSR for the first half, the General Banking Law (GBL) passed at the start of this year establishes a period of 18 months, from the incorporation of the SBIF in the FMC, to dictate and institute a series of regulations that implement the Basel III requirements. That period will end on 1 December 2020.

Many of the regulations that need to be passed must have a prior favorable report from the Central Bank Board prior to issue. Therefore, the teams of both institutions have worked in coordination, although this does not predispose the Board's position.

TABLE V.2
Phases in the foreign exchange regulation modernization process

Phase	Objective of the regulatory change	Estimated definitive issue
1	New foreign exchange policy framework and the elimination of some CFER chapters and appendices	November 2019
2	Expansion of authorized foreign exchange operations that can be carried out with Chilean pesos	First half 2020
3	Relaxation of requirements for operating on the FEM	Second half 2020
4	Finalization of the reorganization and streamlining process of the CFER and appendices	2021

Source: Central Bank of Chile.



The FMC has delineated the principles that will guide the elaboration of the Basel III regulations: (i) simplicity and parsimony, that is, the regulations should be feasible to use and supervise; (ii) adoption of all possible standards, adaptation where necessary; (iii) gradual implementation, with reasonable deadlines for the assimilation of the new systems, for both regulated entities and the supervisor; and (iv) reasonable impact with first implementation.

To date, the first two regulations necessary in the Basel III implementation process have been published for public consultation:

Determination of capital charges for systemically important banks

The proposed methodology for determining systemically important banks establishes a systemic importance scoring system that weights four factors: size, local interconnection, local substitutability, and complexity. Each of these factors is calculated, in turn, as a weighted average of sub-factors expressed as the bank's share of the total banking system. The score will take values from 0 to 10,000, as it is expressed in basis points where the maximum value is 100%. The proposed weights for the factors are 30% each for size and interconnection and 20% each for substitutability and complexity.

As published for public consultation^{1/}, the FMC regulation establishes the sub-factor "Local consolidated assets" for size, which implies that the score assigned for this factor will be the bank's market share. For local interconnection, there are three sub-factors: "Assets in the Chilean financial system," "Liabilities in the Chilean financial system : total liabilities," and "Securities in circulation in the Chilean financial system." For "local substitutability", the five sub-factors are "Payment activities," "Demand deposits," "Time deposits," "Household loans," and "Commercial loans." Finally, for "complexity", there are also five sub-factors: "OTC derivatives contracts," "Inter-jurisdictional assets," "Inter-jurisdictional liabilities," "Fair value assets," and "Third-party assets under bank management." The majority of these sub-factors are accounts on the bank's statement of financial position.

For each score interval, a range of potential requirements is established, measured as Tier 1 capital divided by risk-weighted assets (table V.3). Thus, a bank that obtains, for example, a score of 1,600 points could be required to have additional systemic capital of between 1.25 and 1.75% of risk-weighted assets. The regulation in consultation potentially contemplates other additional requirements for systemically important banks, such as additional capital over total assets, the constitution of technical reserves based on the minimum deposit level, and a reduction in the limit on interbank loans. Finally, the specific additional requirements for systemic banks will require a prior favorable report by the Board, and, according to statements by the FMC, will be defined annually, together with the updating of the calculation of the systemic importance index.

TABLE V.3
Systemic importance index and capital charge ranges

Systemic level	Systemic importance index score (bp)	Capital charge range (% RWA)
I	[1000 , 1300[1.00 - 1.25%
II	[1300 , 1800[1.25 - 1.75%
III	[1800 , 2000[1.75 - 2.50%
IV	>=2000	2.50 - 3.50%

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

^{1/}The public consultation for the regulation was closed on 25 September.

Methodology for establishing the capital requirements for operational risk

The new GBL contemplates the regulatory definition for determining the measurement of risk-weighted assets (RWA), which are the denominator in the capital adequacy ratio (CAR). The regulation proposed by the FMC measures a component of RWA, namely, operational risk, which, according to the Basel Committee, corresponds to the risk of losses due to inadequate or failed internal processes, personnel, internal systems, or external events, plus legal risk, but excluding reputation and strategic risk.

The proposed approach incorporates key elements of the standard Basel III model, defining a requirement based on the bank's level of operations, and is calculated as a function of the bank's interests, commissions, and dividends, among other factors. The result of the calculation is called the business indicator (BI), which is multiplied by the marginal coefficient α (see table V.4) to obtain the business indicator component (BIC)^{2/}.

The missing element for the calculation of operational RWAs corresponds to an internal loss multiplier (ILM), which is a function of the level of operational losses of each bank and the BIC. To determine the ILM, it is necessary to obtain the relevant systematized data on banks' losses. Thus, the calculation of the ILM will be mandatory for all banks whose BI is in bucket 2 in table V.4 and optional for the remaining banks, although the latter must comply with a series of additional requirements in terms of governance and the integrity of operational loss data. Thus, operational risk-weighted assets will be equal to:

ORWA = 12.5*BIC*ILM, for banks with a BI in bucket 2 or that have opted to use the loss component (LC); or

ORWA = 12.5*BIC, for all other banks.

Regulatory measures related to insurance companies

At one of its regular sessions, the Chilean Financial Stability Board (FSB) analyzed the effect of low interest rates on life insurance companies that sell life annuities. In this scenario, the insurers could have to constitute additional reserves, which in turn could put pressure on earnings^{3/}. Moreover, low interest rates provide incentives for greater risk-taking in their investment portfolios.

At the same time, the FSB expressed the importance of moving forward on the draft bill to modernize the insurance legislation, granting more flexibility to the companies' asset portfolios and implementing capital requirements that are proportional to the risks incurred.

TABLE V.4
Business indicator and associated coefficients

BI bucket	BI range (UF million)	Marginal coefficients for computing the BIC
1	BI ≤ 25	12%
2	BI > 25	15%

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

^{2/} The multiplier is applied marginally, that is, the first UF25 million will always be multiplied by the bucket 1 factor (12%), and for banks with a BI over 25 million, the remainder will be multiplied by the bucket 2 factor in the table (15%).

^{3/} See chapter I.



The FMC recently opened a public consultation on modifications to the asset adequacy testing (AAT) associated with life annuities. This change seeks to reduce the volatility of the discount rate vector used in the AAT and thus to reduce the variance of the capital requirements that these companies face. According to the FMC, the proposed modification does not lower the requirements or reduce the medium- and long-term safeguards of the AAT.

The CBC has previously stated, through the FSR, that moving toward a risk-based regulation for the insurance companies would contribute to the development of a more robust financial market, in particular considering the role of these companies in the pension system, through life annuity insurance and disability and survivors' insurance^{4/}. In this line, the Finance Ministry has indicated that it will send changes to the risk-based supervision (RBS) bill that has been stagnant in Congress since 2013.

Financial portability

In September, proceedings were initiated on a draft bill that aims to facilitate the process of changing suppliers of financial products or services, through the regulation of the processes involved in the supply and procurement of new products or services, as well as the termination of the original products or services.

In particular, for collateralized products, the bill contemplates the creation of the concept of "real subrogation," under which a new credit contract written in virtue of financial portability legally replaces the initial credit contract, maintaining all the associated collateral. This should reduce the costs and timelines associated mainly with the renegotiation of mortgage loans, thereby promoting competition and benefitting consumers.

INTERNATIONAL REGULATION

Dodd-Frank Act Reform

As has been reported in past FSRs, the United States approved significant changes to the Dodd-Frank Act (DFA) through the Economic Growth, Regulatory Relief and Consumer Protection Act, including a reduction in the regulatory burden of small banks (defined as those with less than US\$10 billion in total assets).

In parallel, the Fed, in conjunction with the other financial regulators and supervisors, has issued regulatory changes in the same direction, adjusting the requirements imposed after the global financial crisis, under the provisions of the new law or its own regulatory authority.

In this context, the Fed recently introduced changes to its regulations for domestic and foreign banks, so as to tailor its rules to more closely reflect the

^{4/} FSR (Frist Half 2018, box V.1).

banks' risk profiles. The changes reduce compliance requirements for banks with less risk, while maintaining the most stringent requirements for the largest and most complex banks.

The Fed estimates that these changes will result in a 0.6% reduction in capital requirements and a 2% reduction in liquid asset requirements for small banks. This does not affect the capital and liquidity requirements for larger banks, including U.S.-based global systemically important institutions.

In the same sense, the Fed recently modified the application of the Volcker Rule, exempting banks that have less active trading profiles and maintaining the exemption for small banks (less than US\$ 10 billion in assets)^{5/}.

Stablecoins

Stablecoins are a special type of cryptocurrency that have some distinctive characteristics. For example, they have a centralized administrator, and the issuer tries, or promises, to maintain the stablecoin's value over time, relative to a benchmark asset or basket of assets.

While stablecoins are not new, some recently announced developments by large financial or technology companies, which could potentially reach a global scale, have caught the attention of financial regulators at the international level.

In this context, the international Financial Stability Board (FSB) has stated that global stablecoins could bring benefits for the financial system and the economy in general, by providing a vehicle for cross-border payments and remittances by a large number of users. At the same time, however, they present a series of challenges for regulators, and they have the potential to become systemically important and could even result in the substitution of domestic currencies.

The FSB has identified a wide range of challenges involving multiple regulators: financial stability, investor and consumer privacy and data protection, asset laundering, tax evasion, competition, market integrity, etc. Consequently, in a recently published report, the FSB indicated that global stablecoin projects should comply with higher regulatory standards and be subject to prudential regulation and supervision; and that closing any possible regulatory gaps is a priority. The FSB continues to analyze this issue in detail and will publish a final report in July of next year.

Separately, a recent joint report by the G7, CPMI, and IMF (2019) analyzes the challenges presented by these instruments and reviews the applicability of current international financial regulatory principles to these cryptocurrencies. The report also calls for international regulators and agencies to work in close coordination and collaboration to define the public policy response to global stablecoins.

^{5/} This regulation generally prohibits banks from participating in certain investment activities (proprietary trading of certain assets). It was passed as part of the main DFA reform in 2010.

TABLE V.5
Main regulations issued in the first half of 2019

Date	Organization	Regulation	Material and objectives
15-Jul-2019	CBC	Chapters III.D.3 and III.D.3.1; Circulars: Banks N° 619, Nonbank FMC Entities N° 1, Other FMC Entities N° 1, Other Domiciled or Residents in Chile N° 1	Establishes the new regulatory framework for the implementation of the Integrated Derivatives Information System (IDIS) designed in accordance with internationally accepted standards, constituting the first trade repository in Chile.

Source: Central Bank of Chile.



TABLE V.6
Main regulations published for public consultation in the first half of 2019

Date	Organization	Regulation	Material and objectives
28-Jun-2019	FMC	PUBLIC CONSULTATION CLOSED MODIFICATIONS TO THE REGULATIONS ON OUTSOURCING SERVICES	Update the conditions that must be met by institutions that decide to outsource data processing services outside the country.
12-Aug-2019	FMC	PUBLIC CONSULTATION CLOSED METHODOLOGY FOR IDENTIFYING SYSTEMICALLY IMPORTANT BANKS	Establish additional requirements for systemically important banks, with the goal of limiting their impact on the local financial system and reducing moral risk, internalizing potential negative externalities that could be caused by their financial deterioration or possible insolvency.
13-Sept-2019	FMC	PUBLIC CONSULTATION CLOSED STANDARDIZED METHODOLOGY FOR DETERMINING OPERATIONAL RISK-WEIGHTED ASSETS IN THE BANKING SECTOR	Propose a methodology based on the standardized methodology established in the last international regulatory accord (Basel III), which will begin to be implemented by the G20 countries in January 2022.
13-Sept-2019	CBC	PUBLIC CONSULTATION CLOSED RECOGNITION AND REGULATION OF MASTER AGREEMENTS FOR DERIVATIVE CONTRACTS	Update CFR chapter III.D.2, in order to harmonize the CBC regulation with modifications recently incorporated in the underlying legal framework, namely, Law 20.720, which replaces the current bankruptcy regime with a law on the reorganization and liquidation of firms and individuals, and the General Banking Law (GBL).
23-Sept-2019	FMC	PUBLIC CONSULTATION CLOSED MODIFICATIONS TO THE GENERAL REGULATIONS ON EXCHANGE-TRADED SECURITIES	Improve the conditions that must be met by so-called market makers in order for the financial instrument to be considered exchange traded and establish requirements on the daily minimum amount traded that better reflect those instruments with adequate liquidity, depth, and price formation.
04-Oct-2019	CBC	FIRST PHASE OF THE FOREIGN EXCHANGE REGULATION MODERNIZATION PROCESS	Implement foreign exchange regulation modernization process gradually, undertaking both changes to the CFER and the revision of some policy definitions, so as to ensure that there are no regulatory barriers hindering the exchange market's contribution to the development of the Chilean financial system.
04-Oct-2019	FMC	PUBLIC CONSULTATION CLOSED MODIFICATIONS OF ASSET ADEQUACY TESTING FOR LIFE ANNUITIES	Modify the calculation of the discount rate vector (DRV) that is currently used in asset adequacy testing (AAT) in order to reduce its volatility and thereby reduce the variance of the AAT requirements for the insurance companies.
11-Oct-2019	CBC	RTGS SYSTEM IN DOLLARS	Allow real time gross settlement of interbank payments in U.S. dollars.

Source: Central Bank of Chile.

TABLE V.7
List of documents reviewed

Document	Title	Organization	Resolution	Regulation and supervision	Transparency and governance	FinTech	Derivatives	Other
1	Core Competencies Framework on Financial Literacy for Investors	IOSCO / OECD						*
2	Liquidity Risk Management Recommendations for Investment Funds	IOSCO		*	*			
3	Cyber Incident Response and Recovery: Survey of Industry Practices	FSB		*		*		
4	Resolution in an Integrated Global Financial System: The Role of Operational Continuity	FSB	*	*	*			
5	FSB Publishes UPI Governance Arrangements	FSB					*	
6	FSB Updates on Market Fragmentation Work	FSB		*				
7	Resolution Assessment and Public Disclosure by Firms	BoE	*	*	*			
8	The Use of Big Data Analytics and Artificial Intelligence in Central Banking	IFC-BIS				*		
9	Governance Arrangements for Critical OTC Derivatives Data Elements (Other than UTI and UPI)	CPMI-BIS / IOSCO			*		*	
10	Overview of Pillar 2 Supervisory Review Practices and Approaches	BCBS-BIS		*	*			
11	Revisions to Leverage Ratio Disclosure Requirements	BCBS-BIS		*	*			
12	Margin Requirements for Non-centrally Cleared Derivatives	BCBS-BIS					*	
13	Leverage ratio treatment of client cleared derivatives	BCBS-BIS			*		*	

Source: Websites of each institution.

BOX V.1

THE RISKS OF CLIMATE CHANGE FOR THE FINANCIAL SYSTEM IN CHILE

The increase in the planet's temperature (WMO, 2016), attributed to the emission of greenhouse gases (GHG) due to industrial activity, is known to cause climate change. This phenomenon could produce profound changes in human activity and the economic system that sustains it^{1/}.

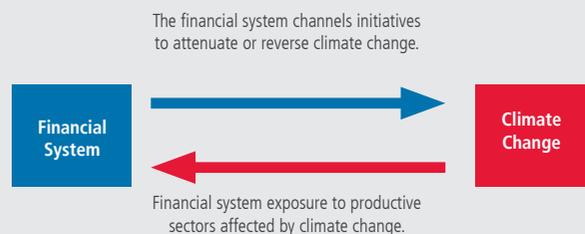
Like all other economic activities, the financial system has the potential to affect the environment, and it could even amplify the effects of climate change, for example, by channeling resources toward contaminating activities. In general, financial entities that adopt environmental sustainability commitments seem to minimize these effects, reorienting resource allocation toward initiatives that help reduce or reverse the effects of climate change.

On the other hand, climate change can have an adverse effect on the financial system, for example, when specific investments or loans are channeled toward productive assets that cease to be viable in the future as a consequence of this phenomenon. In this case, climate change becomes a source of financial risk (diagram V.1, lower arrow).

This box focuses on the analysis of this second dimension—namely, climate change as financial risk—and, in this context, describes the role of the financial regulator in identifying and mitigating climate change as an amplifier of risks to the financial system.

DIAGRAM V.1

Interaction between the financial system and climate change



Source: Central Bank of Chile.

Structural effects of climate change

Global financial markets are currently subject to various sources of structural change, such as immigration, population aging, or technological innovation.

Climate change, however, has characteristics that make it unique within these structural changes (NGFS, 2018). This view is primarily related to its potentially irreversible effects, which are vast in scope and enormous in magnitude, on multiple economic agents and the productive systems in which they operate.

Climate change as a source of financial risk

Climate change presents risks for financial activity, which, according to the conceptual framework initially used by the U.K. Prudential Regulatory Authority (PRA) and later followed by the FSB and the Bank of England, among others, can include physical, transition, and liability risks^{2/}.

Physical risks

Physical risk refers to the transmission to the financial system of the impact of severe natural events on highly exposed financial sectors. Such events can include heat waves, landslides, forest fires, floods, storms, sea level rise, droughts, ocean acidification, and changing rainfall patterns.

Traditionally, climatic disasters are a source of operational risk and thus are a central component of financial entities' contingency plans.

The phenomenon of climate change can clearly amplify this risk, to the point of threatening financial losses. These losses require a broader analysis, for example, in the context of stress test processes.

^{1/} IPCC (2018).

^{2/} PRA (2015).

In the case of the losses generated by physical risks, it is essential to identify whether they are insured. If so, the physical events would have a direct impact on insurance and reinsurance companies. Moreover, the materialization of physical risks has the potential to affect diverse financial institutions (banks, institutional investors, etc.) that may be exposed either through productive sectors affected by climate change or through changes in the value of collateral (Bank of England, 2017).

Transition risks

Transition risks reflect the financial impact of the adjustment process toward a low-carbon economy (i.e., climate policy, technology, or market adjustments). For example, the Paris Agreement is an international treaty that considers a series of public climate policies oriented toward reducing GHG emissions or becoming carbon neutral^{3/}. The global costs of these initiatives are estimated at over US\$830 billion annually^{4/}.

This will imply a transition away from productive sectors that are more intensive in GHG emissions toward green or carbon-neutral sectors, which could affect the financial sector through direct exposure or through exposure to related financial assets.

Liability risks

A third risk, known as liability risk, arises from the loss generated for financial and nonfinancial companies by people or corporations seeking monetary compensation for climate events or industry transition. In this case, the indirectly affected institution could, in turn, affect the financial sector.

Role of financial regulators and supervisors

Financial regulators and supervisors play an important role in the incorporation of climate change in the risk management frameworks of financial entities. In this sense, it is essential for financial institutions to correctly recognize, identify, measure, and manage these risks.

Logically, this is an unfolding process that requires substantially broadening the knowledge bases not only of regulators and supervisors, but also of the supervised entities.

One of the most important international actions in this area is the Task Force for Climate-Related Financial Disclosures (TCFD), a private initiative led by the FSB. The objective of the TCFD is to develop guidelines to help entities improve their ability to manage the financial risks arising from climate change; and, based on these processes, to develop voluntary, consistent disclosures that will be useful for investors, lenders, insurance underwriters, and other interested parties (diagram V.2).

In 2018, a group of financial authorities formed the Network for Greening the Financial System (NGFS) for the exchange of international standards and best practices, including requirements for increasing information on the effects of climate change, the development of a common language, the integration of financial risks into the monitoring of financial stability, and a more detailed supervision of financial institutions.

Locally, the Finance Ministry has made important efforts to ensure that the authorities and financial entities incorporate this discussion into their activities, including the creation of a Green Finance Desk.

From the perspective of the CBC, it is important to incorporate these climate issues and the associated risks for the financial system into its financial stability monitoring, which requires first understanding their characteristics, in particular in the context of the Chilean market.

DIAGRAM V.2
TCFD recommendations on information disclosure



Source: TCFD (2018).

^{3/} The Paris Agreement (2015) commits the countries that are parties to the agreement to implement actions to reduce GHG emission, with the goal of avoiding a temperature increase of over 2.5°C (ideally 1.5°C), for 2050.
^{4/} IPCC (2018).

VI. PAYMENT SYSTEMS

This chapter presents the main statistics on the payment systems and describes developments in financial infrastructure at the local and international levels.

LARGE-VALUE PAYMENT SYSTEMS

In Chile, the large-value payment systems (LVPS) are the real-time gross settlement (RTGS) system, which is managed by the CBC, and the large-value payment clearing house (CCAV), operated by Combanc^{1/}. The RTGS system settles gross transactions in the accounts of each bank immediately upon receiving payment instructions, whereas Combanc nets the transactions for each bank at the end of the day and then clears them through the RTGS system.

LIQUIDITY AND RISK MANAGEMENT IN THE RTGS SYSTEM

The total amount of payments settled in the LVPS continues to increase, mainly due to increases in interbank transactions and in the over-the-counter (OTC) securities market.

In the third quarter of 2019, the average daily value processed and settled in the LVPS was Ch\$20 trillion (+14% annually), explained by an increase in payments settled directly through the RTGS system as well as payments first processed by Combanc. By type of payment, the largest growth was in bank client-account transactions and delivery-versus-payment (DvP) transactions in the OTC securities markets^{2/}, a similar trend to past years (table VI.1 and figure VI.1).

At the same time, the RTGS system saw a reduction in settlements corresponding to payments deriving from operations processed by clearing houses (–14.5% annually), mainly due to a lower total amount from netting operations reported by Combanc.

^{1/} Its operation is governed by the regulations contained in the CBC Compendium of Financial Regulations, particularly in Chapters III.H.4 and III.H.4.1 on the Real Time Gross Settlement System and Operating Rules, respectively, and Chapter III.H.5 on Large-Value Payment Clearing Houses in National Currency.

^{2/} This mechanism is coordinated by the Switch service offered by ComBanc, where the transfer of instruments in the CSD coincides with the payment of cash, which can be realized directly in the RTGS system or through ComBanc.

TABLE VI.1

Amounts cleared and processed in the large-value payment systems (*)
(Ch\$ billion)

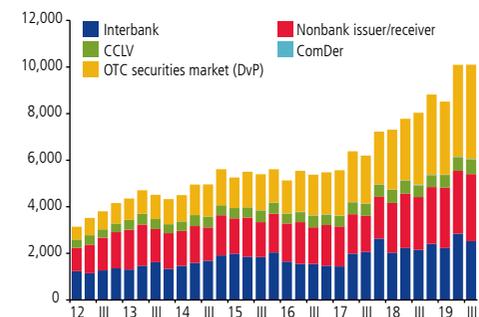
	2018	2019
Payments settled in the RTGS	13,610	15,613
Interbank	2,152	2,523
Nonbank issuer/receiver	2,266	2,880
Securities market	3,088	4,044
CCLV	501	626
ComDer	31	29
OTC securities market (DvP)	2,557	3,389
Clearing houses (net)	330	282
Checks	53	46
ATMs	24	29
Combanc	253	207
Central Bank of Chile	5,774	5,885
Payments processed in Combanc	4,501	5,029
Interbank	1,105	1,213
Nonbank issuer/receiver	1,940	2,094
OTC securities market (DvP)	1,456	1,722
Total cleared in LVPS	18,111	20,642

(*) Daily averages for each quarter.

Source: Central Bank of Chile, Combanc, CCLV, and ComDer.

FIGURE VI.1

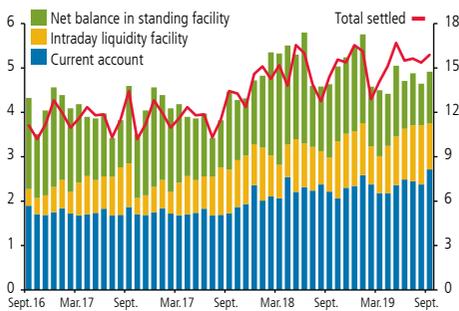
Evolution by type of payment settled in the RTGS (*)
(Ch\$ billion)



(*) Daily averages for each quarter.

Source: Central Bank of Chile, based on data from Combanc, CCLV, and ComDer.

FIGURE VI.2
Liquidity in the RTGS system (*)
(Ch\$ trillion)



(*) Monthly average.
Source: Central Bank of Chile.

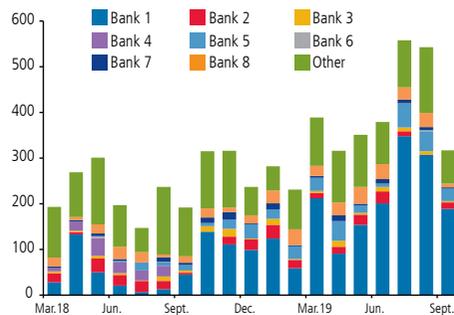
Participant banks in the RTGS system maintained adequate liquidity for carrying out their operations during the day.

The liquidity available for RTGS participant banks is constituted through the balances held in their current accounts at the CBC, together with the expiration of deposits held at the CBC (figure VI.2). Additionally, in the event of insufficient funds, the CBC offers a standing intraday liquidity facility.

In general, the intraday liquidity facility is used relatively infrequently, and it tends to be concentrated in a small number of banks (figure VI.3). This indicates that RTGS participants have an adequate liquidity buffer to cover their daily settlements and do not necessarily need to access this facility to inject liquidity into the system.

With regard to its own transactions with banks, the Central Bank settles payments first thing in the morning and charges at the end of the day, which provides the system participants with liquidity during the day. In 2019, over 50% of the interbank transactions settled in the RTGS system were completed four hours before closing time, which indicates an adequate liquidity management and reduces the potential impact of a possible service interruption on the financial system (figure VI.4).

FIGURE VI.3
Use of the intraday liquidity facility
(Number of times per month)



Source: Central Bank of Chile.

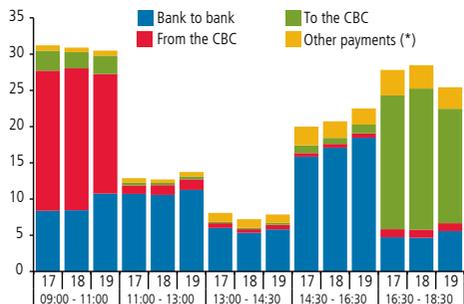
OPERATIONAL RISK MANAGEMENT IN THE RTGS SYSTEM

Ensuring the operational continuity of the LVPS is a first-order concern for the CBC, directly related to its constitutional objective of safeguarding the normal functioning of the internal and external payment systems and, from a wider perspective, the stability of the financial system.

The specific operational availability objectives established by the CBC continue to be met satisfactorily.

The CBC has established two main objectives for the RTGS system in terms of operational security: maintaining operational continuity of at least 99.8%; and having the capacity to resume operations within two hours, at most, of the verification of a service disruption. In 2019, the operational availability of the RTGS system was 99.99%, due to a specific incident in the second quarter that interrupted normal operations but was satisfactorily resolved in 44 minutes, thereby complying with the proposed operational availability objectives (figure VI.5).

FIGURE VI.4
Distribution of amounts settled in the RTGS system, by type of payment
(percent)



(1) Payments related to clearing houses (ATMs, Checks, CCLV, and Large-Value).

Source: Central Bank of Chile.

The reduction in the number of requests for an extension of operating hours by RTGS participants reflects normality in their operational management, in comparison to 2018.

The CBC is authorized to extend operating hours beyond closing time for one or more of the activities that make up the daily operating cycle of the RTGS system, when extraordinary circumstances make it advisable to do so. During

the year, the operating hours of the settlement system were extended at the request of some participants on a few occasions (figure VI.6), which contrasts with the extensions implemented due to operational incidents in the second quarter of 2018, described in the last Payments System Chapter.

RECENT DEVELOPMENTS IN LARGE-VALUE PAYMENT SYSTEMS AND INFRASTRUCTURES

In 2019 advances were made on the regulatory and supervisory framework of the LVPS, particularly in the RTGS system, as well as in other procedures that increase the fluidity of some bank operations with the CBC, specifically fund transfers and notification of dollar deposits with correspondent banks.

Public consultation on the chapter "RTGS System in Dollars"

In recognition of the importance of the payment systems for the proper functioning of the economy and in accordance with its legal mandate to safeguard the normal functioning of the internal and external payment systems, the CBC has updated and improved the regulatory framework applicable to the RTGS system, in order to allow the settlement of interbank payments in U.S. dollars, following international best practices and ensuring the security and efficiency of these operations.

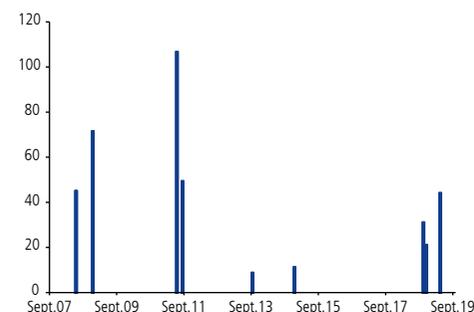
At present, the settlement of large-value payments in domestic currency for the financial system is processed through the RTGS system, where these payments are final and irrevocable, in accordance with international best practices.

However, in the case of foreign currency operations, settlement is processed through the use of correspondent banks, a process that is exposed to credit, operational, and liquidity risks on the part of the correspondent bank. Settling these operations at the CBC will support the competitiveness of local infrastructures and promote the development of the financial market, reducing the risks to which participants are exposed and thus contributing to the preservation of financial stability.

Incorporation of the peso in the Continuous Linked Settlement (CLS) system.

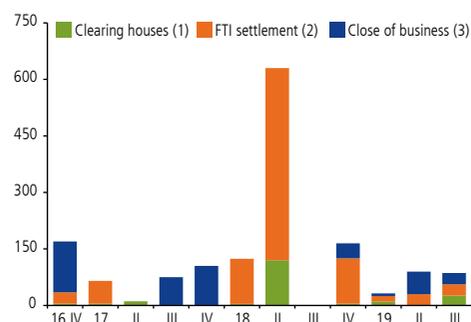
Together with the extension of the current RTGS system to include the settlement of dollar payments between local counterparties, the initiative to incorporate the peso into the CLS international settlement system, reported in chapter V of this FSR, will promote greater dynamism in the settlement of payments in pesos deriving from peso/foreign currency exchange transaction, between both local and foreign counterparties (diagram VI.1). This initiative will have important operational implications for the RTGS system in national currency. For more details on the functioning and market benefits of this settlement system, see box VI.1.

FIGURE VI.5
Service disruption in the RTGS system
(minutes per month)



Source: Central Bank of Chile.

FIGURE VI.6
Delays and extensions in the RTGS system
(minutes per quarter)



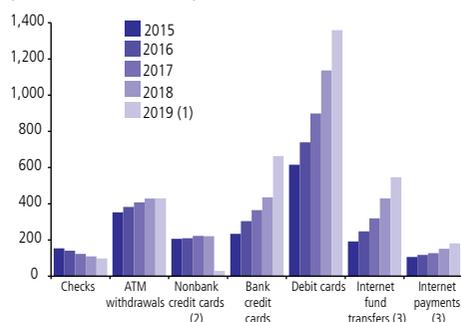
(1) Delays in the check clearing house, ATM clearing house, and large-value payment clearing house (CCAV).

(2) Extensions of the cutoff time for interbank operations (fund transfer instructions, FTI), after 17:30 hrs.

(3) Extensions of the closing time for CBC operations (CAS-RTGS), after 18:15 hrs.

Source: Central Bank of Chile.

FIGURE VI.7
Retail means of payment
(millions of transactions)



(1) Latest available data, annualized.
(2) Considers changes to a bank issuer from the companies *Promotora CMR Falabella S.A.* and *Presto S.A.*
(3) Only personal transactions.
Source: Central Bank of Chile, based on data from the FMC.

Implementation of the Payment Gateway System

On 29 April, following a two-week trial period, the CBC began operation of a new technological processing and communications system, "Payment Gateway System," applicable for all fund transfer requests (OBP) and notifications of deposit in correspondent banks (ABN), in dollars in the United States. These procedures were previously carried out through the National Financial Communications System (Sinacofi).

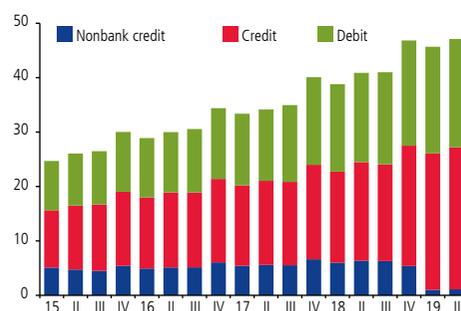
Additionally, on 6 June, a new functionality in the Payment Gateway System was enabled for RTGS participants as an operational contingency mechanism, replacing Sinacofi messaging, in the event of an access failure in the SWIFT communications network. It is estimated that this functionality will reduce the time required to process payments during contingency situations.

RETAIL PAYMENT SYSTEMS

The use of payment cards and electronic transfers continues to increase, and debit cards consolidated their position as a primary retail means of payment

As in previous years, the use of non-cash payment means continues to increase. According to the most recent data available, checks continue to concentrate the largest amounts, followed by Internet transactions (both payments and transfers), leaving behind payment cards and ATM withdrawals. As indicated in the last FSR, the amount associated with nonbank credit cards has fallen significantly, due to the transfer of the portfolios of the two main nonbank issuers to the banking sector (table VI.2).

FIGURE VI.8
Total card expenditures
(Percent of consumption)



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

TABLA VI.2
Main retail means of payment
(Ch\$billions)

	2015	2016	2017	2018	2019 (1)
Check	367,931	308,934	287,377	306,271	259,017
Internet transfers (personal)	39,123	46,551	54,589	65,722	72,762
Internet payments (personal)	48,291	60,047	72,903	60,884	61,818
Bank credit cards (2)	13,849	16,082	18,129	21,511	29,665
ATMs (withdrawals)	23,579	25,041	26,330	27,654	28,001
Debit cards	11,350	13,450	16,265	19,781	22,878
Nonbank credit cards (2)	5,687	6,131	6,662	6,936	1,224
Total LVPS settlements	18,111	20,642	18,111	18,111	18,111

(1) Estimate of the annual amount, based on the latest available data.
(2) Considers changes to a bank issuer from the companies *Promotora CMR Falabella S.A.* and *Presto S.A.*
Source: Central Bank of Chile, based on data from FMC.

In terms of the number of operations, cards continue to be the predominant payment means and also to have the highest growth rates. There has also been a steady increase in Internet fund transfers (figure VI.7).

A significant share of household expenses—approximately 40%—is paid using electronic means. In terms of payment cards, bank credit cards predominate, with 26%, followed by debit cards, which represent approximately 20% of household consumption (figure VI.8).

In relation to debit cards, the main issuer is the state bank. In the last five years, there has been a growing trend in the use of and the amounts paid with debit cards issued by the *Banco Estado*, which currently account for over 50% of payments made and over a third of the amount (figure VI.9). This is largely explained by the number of active *CuentaRut* debit cards (currently over 11 million).

With regard to card acceptance, there has been considerable growth in the number of point-of-sales (POS) terminals, which have tripled in terms of the number per inhabitant since 2009. There are currently approximately 1,700 POS terminals per 100,000 inhabitants in Chile (approximately 320,000 terminals in total). This reflects the fact that there are more cardholders and businesses using this means of payment. In comparison, the growth has occurred in a context of continuous reductions in the number of automated teller machines (ATMs) per inhabitant in the last six years (figure VI.10). Despite the steady growth, however, the quantity of POS terminals is relatively low compared to other countries (figure VI.11).

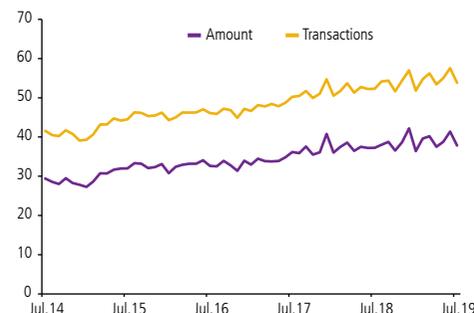
Use of payment cards and the implementation of a four-party model

The share of digital payment means and payment cards—whether credit, debit or prepaid—in total transactions has increased to the detriment of more traditional means of payment, such as checks. At the same time, the industries associated with these means are undergoing important transformations.

In the past few months, and under the framework of the implementation of the four-party model in the card industry, various entities have announced the pending launch of prepaid cards and the development of acquirer networks^{3/}. Obstacles remain, however, for the development of prepaid cards, given that not all merchants have expressly accepted the conditions associated with accepting these cards.

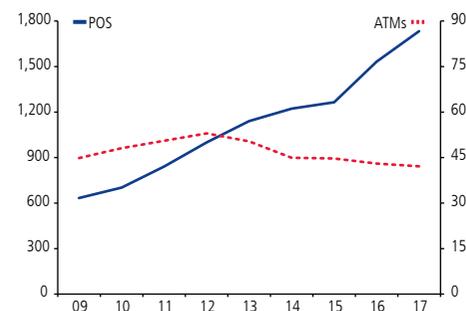
^{3/} The difficulties for implementing this model in Chile are discussed in the FSR, Second Half 2018; recent developments related to implementation are addressed in the FSR, First Half 2019.

FIGURE VI.9
Monthly *Banco Estado* debit card payments
(percent of total debit transactions)



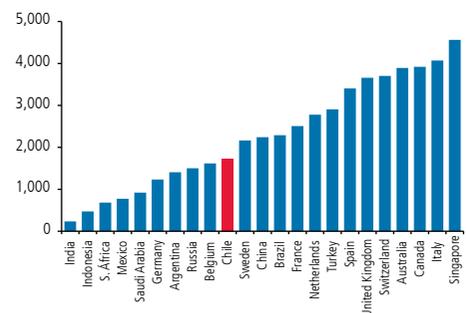
Source: Central Bank of Chile, based on data from the FMC.

FIGURE VI.10
Number of POS terminals
(quantity per 100,000 people)



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

FIGURE VI.11
Number of POS terminals per 100,000 inhabitants
(2017)

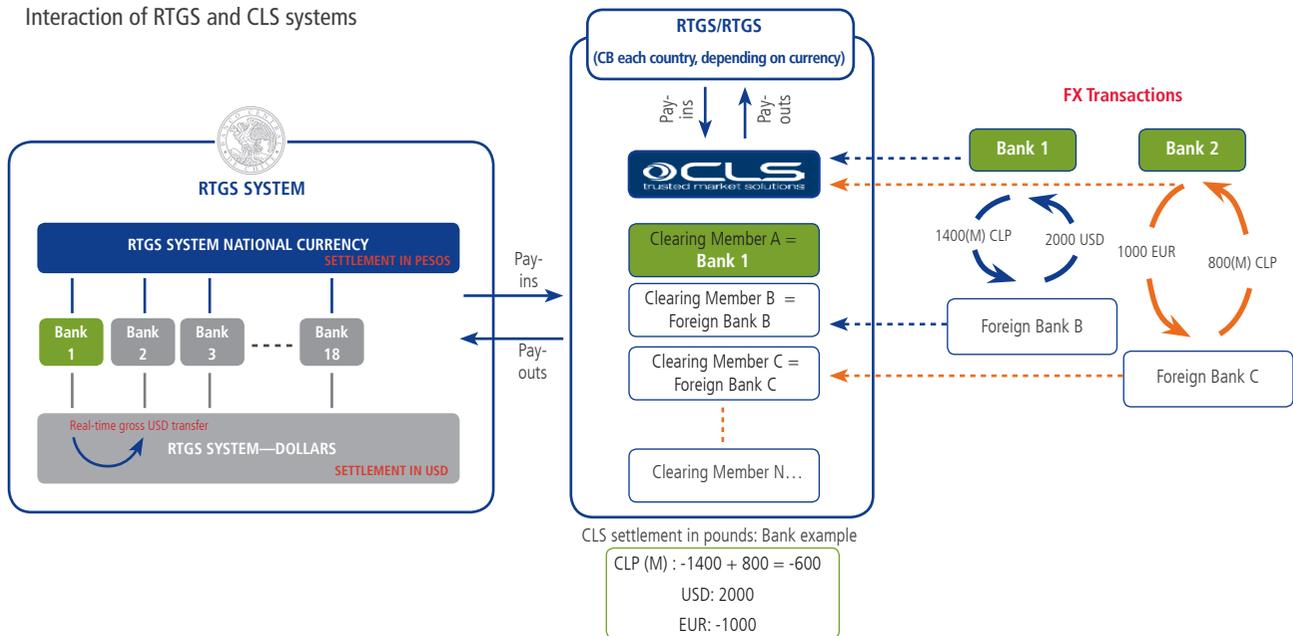


Source: Central Bank of Chile, based on data from FMC and BIS-CPMI.

In this respect, card acceptance by merchants is governed by the conditions established in their contracts with their acquirer(s). Thus, a larger number of acquirers should translate into a more varied supply and better conditions for the merchants.

Consequently, it is important, from the perspective of the CBC, for the payment card market to develop in a way that contributes to financial inclusion and offers adequate conditions of efficiency, competition, security, and access.

DIAGRAM VI.1
Interaction of RTGS and CLS systems



Fuente: Banco Central de Chile.

BOX VI.1

THE CHILEAN PESO AS AN ELIGIBLE CURRENCY IN THE CLS SYSTEM

The Continuous Linked Settlement (CLS) system is the response of private developers to pressure from regulators in the world's more advanced economies (initially the G10) to reduce the risks implied in cross-border transactions.

The CLS system was created in 2002 and initially encompassed seven jurisdictions (Australia, Canada, Europe, Japan, Switzerland, United Kingdom, and United States). Since then, new currencies have gradually been incorporated, such that the system currently settles 18 currencies.

The CLS system operates through CLS Bank International (a special-purpose financial institution located in New York) and CLS Services (a company located in London that provides technical and technological support services to CLS Bank)^{1/}. The CLS system currently has 79 direct participants or clearing members, which are mostly international banks. The system provides settlement services to over 25,000 institutions or third parties, including banks, institutional investors, investment funds, and nonfinancial companies, settling an average daily value of over US\$5 trillion.

CLS Bank International is located in New York and is thus regulated by the Federal Reserve Bank of New York. Its operations are monitored by an Oversight Committee coordinated by the Fed and composed of the 23 central banks whose currencies are settled in the CLS system^{2/}.

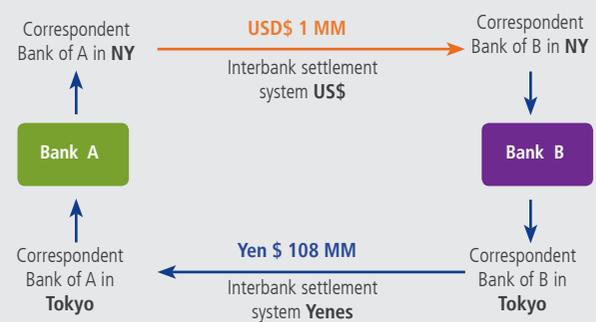
The Central Bank of Chile (CBC) has recently reiterated its interest in incorporating the Chilean peso into the CLS system. This box reviews the Central Bank's main reasons for promoting the inclusion of the Chilean peso in the CLS system and some recent actions undertaken with this objective.

Reduction of counterparty risk

Cross-border foreign exchange (FX) payments are not settled simultaneously, which generates counterparty or settlement risk. This implies that a given counterparty in the transaction delivers the currency being sold, but does not immediately receive the currency being purchased (diagram VI.2). This type of risk is amplified by the different time zones in which financial markets operate, as well as the interaction of multiple operating platforms and different intermediaries, among other factors.

To mitigate settlement risk, the internationally recommended standard is the use of payment-versus-payment (PvP) systems, which ensures that each counterparty simultaneously receives and pays the currency being bought and sold, respectively.

DIAGRAM VI.2
Settlement of cross-border FX transactions



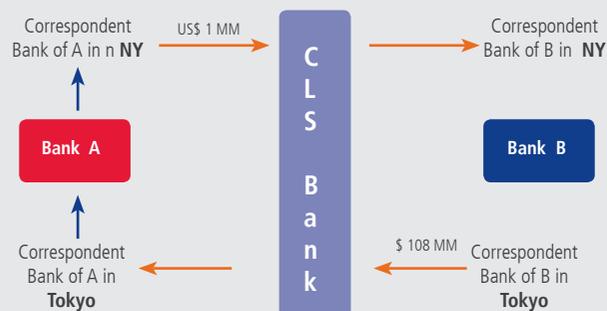
Source: Central Bank of Chile.

The CLS system provides a global payment platform that mitigates or eliminates counterparty risk by establishing a PvP system. In this sense, the CLS system holds a position in between the different correspondent banks through which cross-border transactions are channeled (diagram VI.3).

^{1/} CLS Bank International and CLS Services, part of CLS UK Intermediate Holdings Ltd.

^{2/} The 23 committee members represent 18 eligible currencies, with the exception of the Eurozone which is represented by the ECB and the national central banks of Germany, Belgium, France, Netherlands, and Italy.

DIAGRAM VI.3
Settlement of cross-border FX transactions



Source: Central Bank of Chile.

Counterparty risks in an FX transaction

The reduction of this type of risk was the core motivation for the more advanced countries to develop the CLS system, in an environment of accelerated growth of cross-border transactions and the expansion of the globalization process. In this area, a frequently mentioned example is the German bank *Bankhaus Herstatt*, which became insolvent almost exclusively due to counterparty risk management problems in cross-border transactions^{3/}.

Response capacity in a financial crisis

In periods of financial uncertainty, especially on a global scale, having a channel through which counterparty risk can be attenuated can be crucial.

During such periods, as in the last global financial crisis in 2008, international interbank markets tend to quickly lose liquidity in the face of the uncertainty and the difficulties of assessing the risk associated with their counterparties. This effect, while not eliminated, can be mitigated through the availability of a system that removes settlement risk.

^{3/} In June 1974, the *Bank (Bankhaus) Herstatt*, after having received payment from its counterparties, was declared bankrupt. As a result, the bank was unable to execute a series of payments to other financial institutions, propagating the effect in the international markets and generating losses of over US\$600 million in the period.

International integration of the payment systems

An important advantage of the CLS system is that it operates via payments in “central bank money.” To achieve this, the CLS system functions by interconnecting the RTGS systems of the different jurisdictions that participate in the system^{4/}.

The possibilities created by this infrastructure include increasing the capacity for interaction between central banks, thereby facilitating, for example, the implementation of inter-jurisdictional liquidity facilities or programs.

Access to the CLS system is a sign of financial strength

To gain access to this system, CLS imposes stringent access requirements on the participating jurisdictions, for example, in terms of country risk levels, legal certainty, the level of development of the internal payment systems, and so forth.

In this sense, pertaining to the CLS system is a signal that the local financial market and payment systems are capable of complying with rigorous international standards.

Greater financial integration favors competition

Finally, greater efficiency and security in the settlement of cross-border transactions would contribute to increasing the number of international participants that are interested in carrying out transactions with local or international counterparties using the Chilean peso. In this sense, incorporation into the CLS system could stimulate a more competitive local financial environment.

Recent actions by the CBC

Given the importance of the benefits described above, the CBC has recently undertaken concrete actions to promote incorporation in the CLS system.

In July, the CBC received a delegation of representatives from CLS Bank International and CLS Services, who held meetings with key areas of the CBC on the potential implementation of the CLS system. During the visit, the representatives of these institutions had the opportunity to describe the main characteristics and advantages of the CLS system to members of

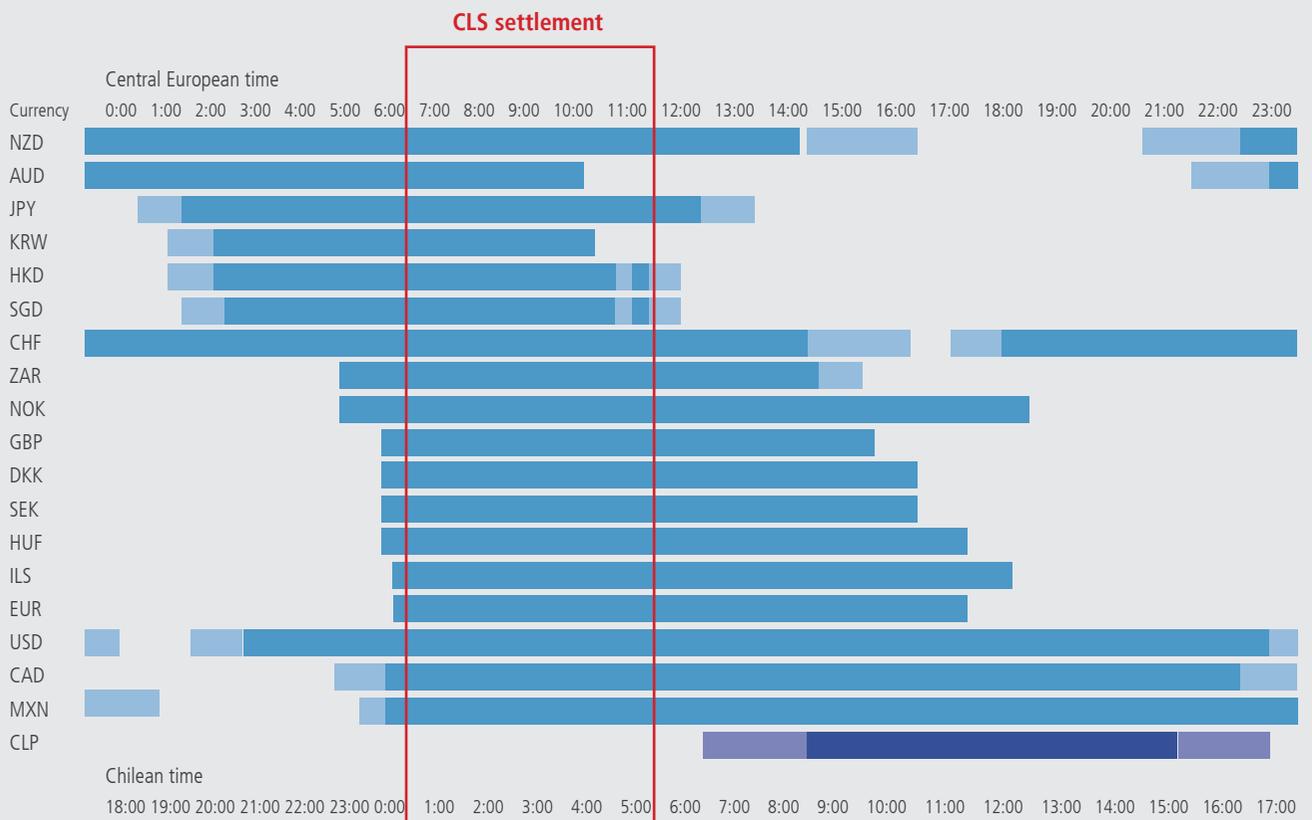
^{4/} Real-time gross settlement (RTGS) systems are, in the majority of cases, operated and managed by central banks for the processing of interbank payments. The monitoring of transactions made through the RTGS system of the CBC is normally presented in Chapter VI of this Report in the second half of each year.

the financial market, including banks, pension fund managers, and financial market infrastructures. The representatives also had conversations with financial regulators and supervisors to discuss the benefits and functioning of the system, as well as to learn about the particularities of the local financial sector.

The Central Bank of Chile is studying the adaptation of the RTGS system in accordance with the characteristics of the operations of the CLS system. Given the current high standards of the RTGS system, the main challenge will be operating outside of normal business hours. Due to the time difference with Central Europe, the RTGS system would have to operate in the pre-dawn hours to allow the settlement of payments through the CLS system (diagram VI.4).

Finally, the CBC is implementing an agenda for the modernization and flexibilization of its foreign exchange regulations, which should facilitate the expansion of the number of cross-border transactions that can be carried out with Chilean pesos and, therefore, enable an increase in the participation of nonresidents in the local foreign exchange market (chapter V).

DIAGRAM VI.4
CLS settlement hours versus RTGS system operating hours (*)



(*) The inclusion of the Chilean peso in this table is solely for the purpose of illustration, given that it is not one of the currencies settled in the CLS system. Settlement hours assume daylight saving time in the Northern Hemisphere and standard time in the Southern Hemisphere. The partially shaded areas correspond to settlement hours only during some periods of the year (from the perspective of Central European time).

Source: CLS.

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GLOSSARY

Adverse shock: An exogenous change that has a negative effect on one or more dimensions.

Application programming interface (API): A set of rules and specifications followed by software programs to facilitate communication between programs; an interface between different software programs to facilitate their interaction.

Arrears rate (AR): Also called portfolio in arrears. A measure of credit risk calculated as the ratio of loan installments that are past due by over 90 days to the total debt. For commercial loans to firms, the delinquent installments are past due by up to three years; for commercial loans to people, up to one year; for consumer loans, up to 180 days.

Asset adequacy testing (AAT): A requirement for the constitution of additional technical reserves by insurance companies that have inadequate asset flows relative to their liabilities from the sale of life annuities.

Assets received in payment: Assets received by a bank as payment for all or part of a liability in arrears.

Automatic bill payment: A service for paying bills automatically through a bank account on a preestablished due date specified by the user and offered by a merchant.

Banks, large: Banks with a large market share and wide diversification of operations (loans and derivative and nonderivative financial instruments).

Banks, medium-sized: Banks with a smaller market share but equally diversified operations as the large banks.

Basel III: A set of new capital and liquidity requirements for the banking industry, developed by the BIS with the aim of substantially strengthening the Basel II capital framework. The objectives include the following: raise the quality, consistency, and transparency of the capital base; strengthen risk hedging; introduce leverage limits; promote a countercyclical capital framework; and introduce a global liquidity standard. These requirements will be implemented gradually through 2019.

BigTech: Large, established technology companies that are expanding their range of services to include the direct provision of financial services or bank-like products.

Brexit: The term used for the result of the referendum establishing that the United Kingdom will withdraw from the European Union, held on 23 June 2016.

Buy-and-hold investors: Investors that, due to the nature of their liabilities, pursue a passive investment strategy, in which they keep the instruments in which they invest in their portfolio for a long time, independent of the short-term price fluctuations in the market.



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

Central counterparty (CCP): An intermediary that acts as the buyer for all sellers and as the seller for all buyers in a given market.

Central government: Institutions associated with the three branches of the state (executive, legislative, and judicial), as well as Law 13,196, the interest earned from recognition bonds and the oil price stabilization fund.

Central securities depository (CSD): A financial organization that provides securities accounts and central custody services and plays an important role in guaranteeing securities trade.

Clearing houses: Entities that settle financial instrument transactions between participating members, without acting as a central counterparty to the transactions.

Close-out netting: The process of early termination and settling, in the event of insolvency of one of the counterparties to multiple OTC derivative contracts under a single master agreement, through which all the contracts are reduced to a single net liability for one of the parties.

Contract for difference (CFD): An agreement through which the participants exchange the difference in the value of an underlying asset between the contract start and end dates. If the value increases, the seller pays the difference to the buyer. If the value decreases, the buyer pays the difference to the seller. The underlying assets can be currencies, commodity prices, stock indices, interest rates, etc.

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

Credit valuation adjustment (CVA): An adjustment that takes into account the risk of a deterioration in the credit quality of a counterparty to derivative or securities financing operations.

Cuenta Rut: A financial product offered in Chile by the *Banco Estado*, consisting in a demand deposit account with a debit card. The requirements for obtaining this product are relatively low: the customer is only required to have a current national identification card and meet the age requirement.

Currency mismatch: The difference between foreign currency liabilities and foreign currency assets, less the net position in derivatives (the difference between buy and sell positions in derivatives contracts). An alternative measure is calculated as the difference between external debt and the net derivatives position, scaled by exports minus imports.

Cyclically adjusted price-earnings (CAPE) ratio: Measure of the market value of U.S. securities. The ratio between the value of the S&P 500 index and the 10-year average net income after taxes, adjusted for inflation.

DAX: Stock index consisting of the 30 largest companies on the Frankfurt Stock Exchange.

Debt service ratio (DSR): Measures the payments that households must make to fulfill their consumer and mortgage loan commitments, as a percentage of their disposable income.

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

Default of 90 days or more: The total amount of a loan that is past due by 90 days or longer, even if only some of the monthly payments are past due.

Default rate (DR): The ratio between the number of borrowers with arrears of over 90 days and the total number of borrowers in the corresponding portfolio.

Delinquent loans: Loans with arrears of over 90 days from the maturity date. The full amount of the loan is considered delinquent for accounting data, versus the total debt for administrative data.

Direct investment company: A foreign direct investment company is a company that resides in one economy and in which an investor in another economy owns, either directly or indirectly, 10% or more of shares (or voting power) if the company is incorporated, or the equivalent if the company is not incorporated.

Direct investor: A foreign direct investor is an entity (an institutional unit) that resides in one economy and that has acquired, either directly or indirectly, at least 10% of the shares (voting power) of a corporation (company) residing in another economy, or the equivalent in the case a company that is not incorporated.

Emerging Market Bond Index (EMBI): An indicator calculated by JPMorgan that measures the return on government bonds issued by emerging market countries (sovereign bonds), with a specific structure and liquidity.

Eurostoxx 50: Stock market index covering the 50 largest companies in the Eurozone.

Expected shortfall: A risk measure that estimates the expected value of losses on an investment portfolio for a specified probability and time horizon.

External formal secondary market (EFSM): Market in which the financial instruments that are eligible for overseas investment by the pension funds must be traded, together with other investments that are made in international markets, without detriment to the pension funds' trading of securities from foreign issuers on a national formal secondary market, in accordance with the Securities Market Law.

Factoring: A financing operation in which accounts receivable are transferred to a financing company (the factor). These accounts are typically part of a firm's current operations.

Fair value assets: Fair value is understood as the price that a financial instrument would receive, at a given point in time, in a free and voluntary transaction between duly informed and independent parties. Bank accounting standards establish that certain assets must be reported at fair value, including held-for-trading securities, available-for-sale securities, and derivative contracts.

Federal funds rate (FFR): Monetary policy rate of the U.S. Federal Reserve.

Federal Reserve System (Fed): The U.S. Federal Reserve is the central bank of the United States.

Financial infrastructures: Institutions that enable the effective operation of financial markets, including payments systems, central counterparties, securities settlement systems, central securities depositories, and trade repositories.

Financial Stability Board (FSB): An international organization that monitors and makes recommendations on the global financial system and has the mandate to promote international financial stability.

Foreign private equity assets: Private equity is an investment in firms whose shares are traded not on the exchange, but rather directly among investors.

Formal Exchange Market (FEM) operators: A group of banks and currency exchange houses authorized by the Central Bank of Chile, to which they report all transactions.

Formal Exchange Market (FEM): The Central Bank of Chile has the authority to require that certain international exchange operations are carried out in the FEM, which is currently made up of banks and other entities authorized by the CBC.

Forward guidance: A communication tool used by central banks to signal their future monetary policy decisions in the medium term, so as to influence the expectations of economic/financial agents.

Four-party model: Industrial organization of retail payment markets comprising cardholders, merchants, issuers, and acquirers, where issuers have contracts with acquirers and cardholders, and acquirers have contracts with issuers (and brands) and merchants.

FSB Working Group on Operational Continuity (FSBWGOC): A working group established in December 2016 by Chile's Financial Stability Board (FSB) with the objective of analyzing the operational risks of the payment system and its participants and proposing legal and regulatory changes as needed to mitigate these risks and their impact on the financial system.



FTSE 100: Stock market index covering the 100 companies with the highest market capitalization on the London Stock Exchange.

G20: An international forum for cooperation and consultation among developed countries and emerging economies, on issues related to global economic stability. Members include the seven most industrialized countries in the world (G7), Russia, the European Union, and a group of other economies, including Brazil, India, China, and South Africa.

G7: An international forum for cooperation and consultation among the seven largest industrialized economies in the world: Canada, France, Germany, Italy, Japan, United Kingdom, and United States.

Greenhouse gases (GHG): Gases in the atmosphere, either naturally occurring or present as a result of human actions, that absorb and emit radiant energy within the thermal infrared range on the Earth's surface, in the atmosphere, and in the clouds.

High-quality liquid assets (HQLA): Assets that can be liquidated in markets in a stress period and, in most cases, can be used in central bank operations. Some HQLA have discounts or haircuts.

House price index (HPI): Estimated using a stratification or mixed adjustment method, based on anonymized administrative records from the Chilean IRS on actual transactions on new and used residences at the national level.

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

Interest coverage ratio: A measure of repayment capacity, defined as the ratio of earnings before interest and taxes (EBIT) to financial expense.

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

International custodian: Custodian or securities depository with primary residence overseas.

Intraday liquidity facility: Financing granted by the Central Bank of Chile to banking entities through the RTGS system. This facility operates daily through the purchase of financial instruments with a repurchase agreement. The terms and conditions of these operations are contained in the Central Bank's financial regulations.

IPSA (*Índice de Precio Selectivo de Acciones*): Selective Stock Price Index covering the 40 largest companies on the Santiago Stock Exchange.

Leverage: Measure of the banks' debt level over equity; used as a complementary tool to capital adequacy requirements.

Liquidity ratio: Official reserves in foreign currency over short-term liability financing needs in foreign currency.

Loan-to-Value (LTV) ratio: The ratio of a given loan to the value of the underlying asset purchased, usually a home.

Loans in default: Debtors and their loans for which there is little chance of recovery, due to a weak or null capacity to pay. This portfolio includes debtors who must undergo a forced debt restructuring, as well as any debtor with arrears of 90 days or more on the payment of interest or principal on a loan.

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

Master agreements for derivative contracts: Standardized contracts that allow the counterparties to establish the general terms and conditions for derivative transactions, establishing standard protocols, for example for defining default and transaction settlement procedures.

MF1: Type 1 mutual funds, which invest in short-term debt instruments with a duration of 90 days or less. This mutual fund invests in short-term debt securities and medium- and long-term debt securities. The duration of a Type 1 fund's investment portfolio must be 90 days or less. Shares are invested in short-, medium-, and long-term debt instruments.

MF2: Type 2 mutual funds, which invest in short-term debt instruments with a duration of 365 days or less. This mutual fund invests in short-term debt securities and medium- and long-term debt securities. The duration of a Type 2 fund's investment portfolio must be 365 days or less. Shares are invested in short-, medium-, and long-term debt instruments.

MF3: Type 3 mutual funds, which invest in medium- and long-term debt instruments, with a minimum duration of over 365 days. This mutual fund invests in short-term debt securities and medium- and long-term debt securities. A minimum and maximum duration are defined for the investment portfolio. This information must be contained in the definition adopted by the fund, and it must be longer than 365 days. Shares are invested in short-, medium-, and long-term debt instruments.

MF6: Type 6 mutual funds, which can be freely invested. These funds are not classified under the definitions of types 1 through 5. The investment policy is unrestricted, but while they are not subject to regulated guidelines, they must establish internal regulations.

Net international investment position (NIIP): The difference between the economy's external assets and liabilities, at the end of a given period.

Nonbank lenders (NBLs): Nonbank entities that provide consumer, mortgage, and commercial loans, including retailers, family compensation funds (CCAF), savings and loan associations (S&Ls), car finance companies, life insurance companies, and leasing and factoring companies.

Nonperforming loan (NPL) ratio: A measure of credit risk, calculated as the ratio between nonperforming loans and total loans.

Nonperforming loans: Bank loans, or a fraction thereof, that are past due by up to 90 days from the maturity date. On loans with fixed monthly payments, only the amount of the past-due payment is considered, although the full amount of the loan could be transferred to the nonperforming portfolio if acceleration clauses are enforced.

Normal loans: Loans to debtors with the payment capacity to meet their obligations and commitments, for whom there is no sign that this condition will change, based on an evaluation of their economic-financial situation.

Office class (A+, A, B, C): Classification used to categorize offices according to their characteristics, from high to low. The characteristics considered are location, access, floor plan size, absence of pillars, ceiling height, access control, closed-circuit TV, security equipment, fire detectors and extinguishers, air conditioning, elevator speed, structured cabling, and whether the building has Leadership in Energy and Environmental Design (LEED) certification.

Operational risk: Exposure to losses deriving from deficient internal processes, personnel and systems or external events, including legal risks but excluding strategic and headline (or reputational) risk.

Output floor: Percent of risk-weighted assets calculated using a standardized approach, which establishes the floor of RWAs calculated for regulatory purposes.

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

Pension fund investment regime: Regime regulating specific investment issues for the pension funds, which by nature require more flexibility and detail, and setting investment limits that promote adequate fund diversification. The Regime is elaborated by the Superintendence of Pensions and approved by the Technical Investment Board and the Ministry of Finance.



Prepaid debit cards: A physical, electronic, or computer device that has a unique identification system, tied to a fund provision account opened by the card issuer for the purpose of crediting sums of money deposited therein by the purchaser; and whose utilization as a payment instrument amounts to a financial liability for the issuer vis-à-vis the public or affiliated commercial establishments or services.

Principles of Financial Market Infrastructures (PFMIs): 24 principles developed by the Committee on Payments and Market Infrastructures (CPMI) and IOSCO, aimed at systematizing and diffusing international best practices and legal and regulatory standards applicable to financial market infrastructures.

Regulatory capital: Tier 1 (core) capital plus Tier 2 (supplementary) capital. The latter mainly includes subordinated bonds and additional provisions.

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

Return on assets (ROA): Measured as the ratio of earnings after taxes, amortizations, and extraordinary items to total assets.

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

Risk appetite: The quantity and type of risk that economic agents are willing to pursue, retain, or assume.

Risk-based capital: The higher capital level derived from a comparison of the capital necessary for maintaining debt ratios, the solvency margin, and the minimum capital required by law.

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

S&P 500: Stock index based on the market capitalization of the 500 largest companies that are publicly traded in the United States,

Secondary market: A market where financial assets are traded after issue. Every transaction implies a purchase/sale between investors.

Securities depository: Special-purpose corporation whose sole objective is to receive publicly offered securities and facilitate their transfer.

Shadow banking: Financial intermediation conducted outside the banking system.

Spread: The excess yield of a given financial asset relative to the risk-free return, charged by investors for tolerating an additional risk level.

Standing deposit facility: Overnight liquidity absorption facility, where the CBC receives deposits in pesos, which earn interest after one day.

Standing liquidity facility: Overnight liquidity window, where the Central Bank of Chile purchases eligible financial assets in exchange for an amount in pesos, equivalent to the present value of the assets discounted at the current market rate for the day of the operation, less haircuts and margins. All operations include a repurchase agreement to buy back the instrument on the next bank business day. The Central Bank charges interest on the amount initially loaned in pesos.

SWIFT: The Society for Worldwide Interbank Financial Telecommunication is an international cooperative created and owned by banks, which operates a network that facilitates the exchange of payment orders and other financial messages, called FIN messages, between financial institutions (including brokers and securities firms) throughout the world. A SWIFT payment message is an instruction to transfer funds. The resulting exchange of funds (settlement) is effected in a payment system or by a correspondent bank.

Targeted longer-term refinancing operations (TLTRO): Loans by the European Central Bank to European banks, with advantageous terms. Designed to refinance banks and reduce their dependence on the ECB.

Term spread: The excess yield charged by investors in exchange for holding a long-term bond to maturity, rather than in selling and reinvesting in a bond with a shorter-term series in the same time period.

Tier 1 capital: Paid-in capital plus bank reserves and period earnings, net of provisions for the distribution of dividends.

Trade repository: An entity that maintains a centralized electronic registry (database) of financial transactions.

Traditional assets: Fixed- and variable-income financial instruments, such as bonds and stocks, respectively.

Treasury bill (T-bill): A fixed-income security issued by the U.S. Department of the Treasury, with a maturity of up to one year.

Treasury bond (T-bond): A fixed-income security issued by the U.S. Department of the Treasury, with a maturity of 30 years. T-bonds were reintroduced in February 2006.

Treasury note (T-note): A fixed-income security issued by the U.S. Department of the Treasury, with a maturity of 2, 3, 5, or 10 years.

TYVIX: Implied volatility index a ten-year U.S. Treasury bonds.

Vacancy rate: Measure of availability in the real estate market, approximated as the ratio of the square meters available for rent or sale, over the total current stock.

Value at risk: A risk measure that estimates the losses on an investment portfolio for a specified probability and time horizon.

Virtual currencies: Also known as digital currencies. A virtual or digital (i.e., not physical) token that has some, but not all, the characteristics of a currency and can also have the characteristics of a commodity or other asset. Called cryptocurrencies when their issue and transaction validation require cryptographic mechanisms.

VIX: Chicago Board Options Exchange (CBOE) stock volatility index, based on S&P 500 index options contracts (at one month).

Yield curve: The ratio of the yield or return of fixed-income securities to their maturity.



ABBREVIATIONS

- AAMHE:** Endorsable mortgage loan managers.
- AAT:** Asset adequacy testing.
- ABN:** Notification of deposit in an overseas correspondent bank
- Achef:** Association of Chilean Factoring Firms.
- AM:** Acquirer's margin.
- APV:** Voluntary pension savings.
- APVC:** Collective voluntary pension savings.
- AR:** Arrears rate.
- BCBS:** Basel Committee on Banking Supervision.
- BCP:** Central Bank bonds denominated in Chilean pesos.
- BCS:** *Bolsa de Comercio de Santiago* (Santiago Stock Exchange).
- BCU:** Central Bank bonds denominated in UFs.
- BdE:** Bank of Spain.
- BHIF:** *Banco Hipotecario Internacional Financiero*.
- BI:** Business indicator.
- BIC:** Business indicator component.
- BIS:** Bank for International Settlements.
- BLS:** Bank Lending Survey.
- BOE:** Bank of England.
- bp:** basis points.
- CAE:** *Crédito con aval del estado* (government-backed student loans)
- CAPE:** Cyclically adjusted price-earnings ratio.
- CAR:** Capital adequacy ratio.
- CASEN:** Socioeconomic Characterization Survey.
- CAT:** *Cencosud Administradora de Tarjetas S.A.*
- CBC:** Central Bank of Chile.
- CBR:** *Conservador de Bienes Raíces* (Real Estate Registrar).
- CC:** Retailers.
- CCAF:** *Cajas de compensación y Asignación Familiar* (Family Compensation Funds).
- CCAV:** Large-value clearing house in national currency.
- CChC:** *Cámara Chilena de la Construcción* (Chilean Chamber of Construction).
- CCLV:** Securities clearing houses.
- CCP:** Central counterparty.
- CEMBI:** Corporate Emerging Market Bond Index.
- CFER:** *Compendium of Foreign Exchange Regulations*.
- CFR:** *Compendium of Financial Regulations*.
- CGFS:** Committee on the Global Financial System.
- CLS:** Continuous Linked Settlement.

COE: Critical operational events.

ComDer: *ComDer Contraparte Central S.A.*

COMEX: Foreign trade.

CORFO: *Corporación de Fomento de la Producción* (Chilean Development Corporation).

CPMI: Committee on Payments and Market Infrastructures.

CSD: Central Securities Depository.

DAX: Deutscher Aktienindex.

DFA: Dodd-Frank Act.

DIPRES: Budget Office.

DLT: Distributed ledger technology.

DPF: Time deposit.

DR: Default rate.

DSGE: Dynamic Stochastic General Equilibrium model.

DSR: Debt service ratio.

DTI: Debt-to-income ratio.

DvP: Delivery versus Payment.

DXY: Dollar index.

EBA: European Banking Authority.

EBIT: Earnings before interest and taxes.

ECB: European Central Bank.

EFFR: Effective federal funds rate.

EMBI: Emerging Market Bond Index.

EME: Emerging Market Economy.

EMIR: European Market Infrastructure Regulation.

EPFR: Emerging Portfolio Fund Research.

EPU: Economic Policy Uncertainty Index.

ESRB: European Systemic Risk Board.

EZ: Eurozone.

FDI: Foreign direct investment.

FDIC: Federal Deposit Insurance Corporation.

Fed: U.S. Federal Reserve System.

FEM: Formal Exchange Market.

FFR: Federal funds rate.

FI: Fixed income.

FL&A: Factoring, Leasing, and car loans.

FLESB: Forward-looking exercise on Spanish banks.

FLI: Intraday liquidity facility.

FMC: Chilean Financial Market Commission.

FMI: Financial market infrastructures.

FOMC: Federal Open Market Committee.

Fonasa: *Fondo Nacional de Salud* (National health insurance).

FPC: Financial Policy Committee.

FSB: Chilean Financial Stability Board.



FSBWGOC: Chilean FSB Working Group on Operational Continuity.
FSI: Financial soundness indicators.
FSR: *Financial Stability Report*.
FTSE 100: Financial Times Stock Exchange 100.
FX: Foreign exchange.
G-SIB: Global systemically important banks.
G20: Group of Twenty.
G7: Group of Seven.
GBI: Government Bond Index.
GBL: General Banking Law.
GDP: Gross domestic product.
GFC: Global Financial Crisis.
GFSR: Global Financial Stability Report.
GHG: Greenhouse gases.
HFS: Household Financial Survey.
HLA: Higher loss absorbency.
HPI: House Price Index.
HQLA: High-quality liquid assets.
IAS: International Accounting Standards.
ICO: Initial coin offering.
IDIS: Integrated Derivatives Information System.
IF: Interchange fee.
IFRS: International Financial Reporting Standards.
IFRS: *International Financial Reporting Standards*.
ILM: Internal loss multiplier.
IMF: International Monetary Fund.
INE: *Instituto Nacional de Estadísticas* (National Statistics Institute).
IOSCO: International Organization of Securities Commissions.
IPoM: *Monetary Policy Report*.
IPSA: Selective Stock Price Index.
IRS: Internal Revenue Service.
ITL: Income Tax Law.
Latam: Latin America.
LCR: Liquidity Coverage Ratio.
LIC: Life insurance companies.
LOC: Central Bank of Chile's Basic Constitutional Act.
LTV: Loan-to-value ratio.
LVPS: Large-value payment systems.
LVPSCP: Large-Value Payment System Contingency Protocol.
MC: Markets Committee.
MD: Merchant Discount.
MF: Mutual funds.
MiFID: Markets in Financial Instruments Directive.

MiFIR: Markets in Financial Instruments Regulation.
MINDHA: Ministry of Finance.
MPR: Monetary policy rate.
MSCI: Morgan Stanley Capital International.
NAFTA: North American Free Trade Agreement.
NBFI: Nonbank financial intermediation.
NBL: Nonbank lender.
NCG: Norma de Carácter General (General Regulation) of the SVS.
NGFS: Central Banks and Supervisors Network for Greening the Financial System.
NIIP: Net international investment position.
NMDR: Non-mortgage debt-at-risk.
NMNBFI: Narrow measure of NBFI.
NPL: Nonperforming loan ratio.
NR: Nonresident.
NSFR: Net stable funding ratio.
NSO: Net stressed outflows.
OCC: Office of the Comptroller of the Currency.
OECD: Organization for Economic Cooperation and Development.
O BP: Operating procedures for requesting fund transfers.
OR: Operational risk.
OTC: Over the counter.
PAC: Automatic bill payment.
PF: Pension funds.
PFM: Pension fund manager.
PFMI: Principles for Financial Market Infrastructures.
pp: Percentage points.
PRC: Prudential Regulation Committee.
PVP: Payment versus Payment.
QE: Quantitative easing.
RAN: *Recopilación Actualizada de Normas* (SBIF banking regulations).
RBA: Reserve Bank of Australia.
RBS: Risk-based supervision.
RC: Regulatory capital.
ROA: Return on assets.
ROE: Return on equity.
RTGS: Real-time gross settlement system.
RUT: Chilean tax identification number.
RWA: Risk-weighted assets.
SMR: Metropolitan Region.
S&Ls: Savings and loan associations.
S&P 500: Standard and Poor's 500.
SBIF: *Superintendencia de Bancos e Instituciones Financieras* (Superintendence of Banks and Financial Institutions).



SD: Subordinated debt.
SEC: U.S. Securities and Exchange Commission.
SELIC: Central Bank of Brazil's overnight interest rate.
Sinacofi: National Financial Communication System.
SOMA: Open Market Operation System.
SP: *Superintendencia de Pensiones* (Superintendence of Pensions).
SRP: Self-regulation plan.
Suseso: *Superintendencia de Seguridad Social* (Superintendence of Social Security).
SWIFT: Society for Worldwide Interbank Financial Telecommunication.
T-Bill: U.S. Treasury bill.
T-Bond: U.S. Treasury bond.
T-Note: U.S. Treasury note.
TCFD: Task Force for Climate-Related Financial Disclosures.
TDLC: *Tribunal de la Libre Competencia* (Competition Tribunal).
TITRP: Technical interest for scheduled withdrawals and temporary annuities.
TLTRO: Targeted longer-term refinancing operations.
TR: Trade repositories.
TYVIX: Treasury Note Volatility Index.
UF: *Unidad de Fomento*, an inflation-indexed unit of account.
UK: United Kingdom.
USA: United States of America.
VaR: Value at Risk.
VAT: Value added tax.
VI: Variable income.
VIX: Chicago Board Options Exchange Volatility Index.
VXY: Chicago Board Options Exchange DXY Volatility Index.
WEO: World Economic Outlook.
WTO: World Trade Organization.

Alejandro Zurbuchen S.

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ISSN: 0716-2219
Santiago, Chile
Agustinas 1180, Santiago, Chile
P.O Box 967, Santiago, Chile

Tel.: 56-22670 2000
www.bcentral.cl
CBC@bcentral.cl

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