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The Interest Rate Derivatives Market in Chile: International Comparison and the *Swap Promedio Cámara* Market

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Resumen

Este documento describe el mercado Over-The-Counter (OTC) de derivados sobre tasas de interés en base a la Encuesta Trienal de Bancos Centrales, coordinada por el Banco de Pagos Internacionales, y presenta a una comparación internacional del mercado chileno en materia de profundidad y concentración. Adicionalmente, se incorpora una descripción del mercado de derivados referenciados al Índice Cámara Promedio, de amplio uso en el mercado financiero de Chile.

Los resultados reflejan que, a nivel internacional, el volumen transado de derivados OTC sobre tasas de interés alcanzó en 2019 su cifra más alta hasta la fecha, de US$6,5 billones diarios durante el mes de abril; lo que estuvo asociado a cambios de expectativas de crecimiento económico y de decisiones de política monetaria experimentados en ese periodo. Las negociaciones se concentraron en el Reino Unido y Estados Unidos, destacando los Swaps y Forward Rate Agreements entre los instrumentos de mayor uso. Respecto de la posición vigente global, esta fue de US$524 billones a fines de junio 2019.

Chile, por su parte, presenta un indicador de profundidad de mercado igual a 0,87 veces el PIB, lo que lo sitúa sobre el promedio de las economías emergentes, con un crecimiento en los últimos años explicado por el desarrollo del mercado de Swap Promedio Cámara y la mayor participación de inversionistas extranjeros.

Abstract

This document describes the Over-The-Counter (OTC) market for interest rate derivatives based on the Triennial Central Bank Survey of Foreign Exchange and Over-The-Counter Derivatives Market, coordinated by the Bank for International Settlements, and presents an international comparison of the Chilean market, regarding depth and concentration indicators. Additionally, a description of the derivatives market related to Índice Cámara Promedio, widely used in the Chilean financial market, is presented.

The results show that the volume of OTC interest rates derivatives traded globally reached its highest number to date in 2019, with an average of US $ 6.5 trillion per day in April. This increase was associated with changes in prospects for growth and monetary policy experienced during the period. Turnover was concentrated in the United Kingdom and the United States, with Swaps and Forward Rate Agreements standing out as the most traded instruments. with respect to the global outstanding positions, this stood at US$ 524 trillion at end-June 2019.

In the case of Chile, a market depth indicator of 0.87 times GDP is observed, which places it above the average for emerging economies. The growth in recent years is influenced by the continuing development of the Swap Promedio Cámara market and the greater participation of foreign investors.

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* The ideas and opinions presented in this work do not necessarily represent the views of the Central Bank of Chile or its authorities. Errors or omissions are the sole responsibility of the authors. Emails: ndelpiano@bcentral.cl and jvillena@bcentral.cl.

I. INTRODUCTION

The 2008 financial crisis brought to light the scarcity of information available on over-the-counter (OTC) derivatives, that is, bilateral derivative contracts traded outside the organized exchanges or centralized clearing houses. In this context, the G20 leaders agreed, at the 2009 Pittsburgh Summit, on the implementation of a series of reforms aimed at increasing transparency, minimizing systemic risks, and preventing market abuses. To contribute to the transparency and discussion on the global financial market reforms, the Bank for International Settlements (BIS) coordinates a Triennial Survey of the world's central banks and monetary authorities regarding the evolution of the OTC derivatives market.[1] This survey provides internationally comparable information on the size and structure of these markets.

The 2019 version of the Triennial Survey covered 53 jurisdictions, whose monetary authorities provided aggregate data on the transactions carried out by over 1,300 banks and financial intermediaries. This survey contains information on the volume traded and outstanding operations in the OTC derivatives market, in April and June of each year, respectively. Chile has provided information on interest rate derivatives since 2004.

Interest rate derivatives (IRDs) are financial instruments used by market participants to manage their financial risk, mainly by either hedging against future interest rate movements or speculating. The off-exchange market for these derivatives has become increasingly important globally, with trading in all the main financial centers in the world, including London, New York, Hong Kong, and Singapore.

The BIS data show that relative to foreign exchange (FX) derivatives, the interest rate market is more important in economies with more prominent currencies at the international level and whose financial markets have certain characteristics, such as a more developed bond market, widely used interest rate benchmarks, and high currency convertibility. Among the emerging economies, trading of the Chinese renminbi (RMB) increased threefold between 2016 and 2019, becoming the ninth most traded currency in the IRD market. The increased international use of the RMB has been fostered by the internationalization policies promoted by the Chinese authorities[2] and advances on other derivatives market reforms.

In the case of Chile, the local IRD market has grown significantly in recent years, at both the local and cross-border levels. Because these financial instruments can be used to infer investors' expectations on the monetary policy rate (MPR) and inflation, studying this market will continue to be an important input in the analysis of the national context for the Central Bank of Chile's monetary policy conduct, complementing other sources of information such as its Economic Expectations Survey (EES) and the Financial Brokers Survey (FBS).

A key financial market infrastructure that will be coming online in Chile in a few months is the derivatives trade repository, known as the Integrated Derivatives Information System (SIID-TR, by

[1] The BIS has conducted the "Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets" since 1986. The interest rate market was incorporated into the survey in 1995. For more details on the survey methodology, see appendix 2.

[2] The International Monetary Fund (FMI) recognized the renminbi as a reserve currency in 2016.

its Spanish acronym). This system will provide more information on these markets, supporting adequate risk management by market participants, promoting financial stability, and facilitating supervision by the regulators.

This document presents the general results of the BIS Triennial Survey on the IRD market and describes the Chilean market. Section II presents the results at the world level; section III positions Chile in the international context; and section IV describes the local IRD market, namely *Swaps Promedio Cámara*, SPC. The final section provides some closing remarks.

II. GLOBAL ACTIVITY IN INTEREST RATE DERIVATIVE MARKETS

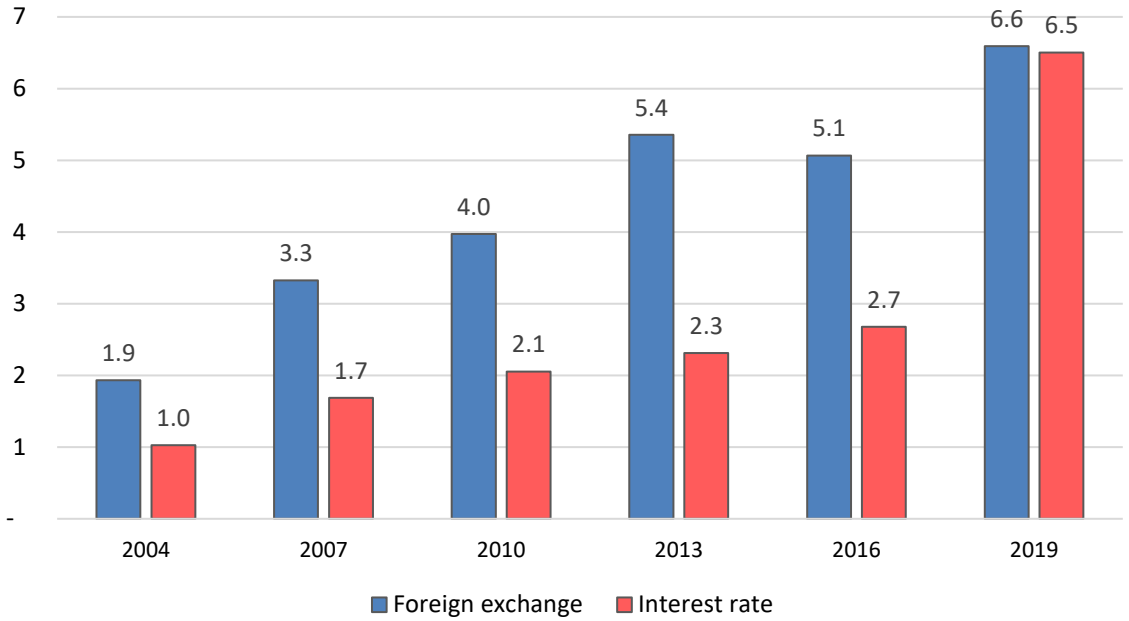
In recent years, the OTC derivatives market has undergone structural changes in terms of its regulation,[3] in order to reduce the associated systemic risks and provide more information to both regulators and investors. Important factors in this process include the development of market infrastructures (namely, central counterparties and trade repositories) and the promotion of the use of electronic trading platforms and portfolio compression services to mitigate risks. As a result, the market has acquired several characteristics typical of organized markets, such as futures exchanges. These structural changes and the development of technologies that reduce transaction costs and facilitate market interconnection have contributed to the significant growth of the OTC market (Ehlers and Hardy, 2019). According to data from the BIS, the share of this market in total IRD turnover soared from 21% in 2010 to 46% in 2019.

Daily OTC interest rate derivatives turnover averaged US$6.5 trillion in April 2019, a significant increase over the same month of 2016 (US$ 2.7 trillion) (figure 1). Moreover, for the first time ever, the volume traded in this market was similar to the volume traded in the foreign exchange market (spot and derivatives), which has historically been more active at the global level, given the frequent need for liquidity and exchange rate hedging in economies that are open to the world market.

In April 2019, the greater global activity was mainly driven by an increase in hedging and speculation by market participants, in the midst of changes in the growth outlook and monetary policy expectations in the period (BIS, 2019). Over the course of 2019, the international news on trade and monetary policy triggered large movements in the IRD markets, where trading was mainly concentrated in the short term, in response to the scenario of heightened uncertainty.

[3] International OTC market reforms include the EMIR in Europe and the Dodd-Frank Act in the United States.

Figure 1. Average Daily Turnover in the Global OTC Market, in April
(trillions of USD)



Source: BIS.
Notes: For both FX and IRDs, daily turnover is net-net, that is, adjusted by the BIS for local and cross-border inter-dealer double-counting. FX turnover includes both spot and derivatives transactions.

With regard to types of instrument, in 2019, for the first time, the Triennial Survey separated out overnight index swaps (OIS). This reflects the fact that the main international authorities are offering new overnight risk-free rates, based on actual transactions,[4] as benchmarks to replace the LIBOR, which is based on surveys and whose methodology and trustworthiness[5] has been questioned (Enrich, 2017). Swaps, including OIS and other types of swap, continue to dominate the international interest rate market, accounting for 64% of daily turnover in April 2019 (US$4.1 trillion), although the share has contracted somewhat since the previous Survey (69%). Half the swap volume traded in April 2019 corresponded to OIS (US$2.0 trillion or 31% of total turnover).

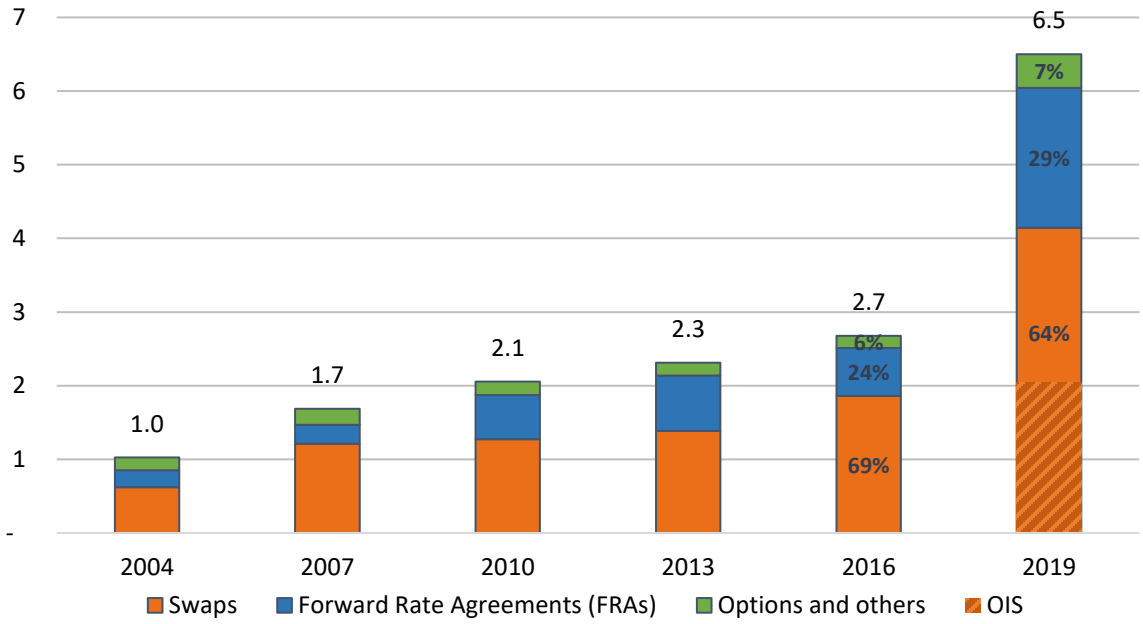
Forward rate agreements (FRAs) and options and other products increased their market share vis-à-vis 2016. FRAs represented 29% of total turnover in April 2019 (US$1.9 trillion), while options and other derivative products accounted for 7% of the market (US$456 billion) (figure 2).

The BIS emphasized that a large share of the volume traded in the survey measurement period corresponded to short-term contracts, which tend to increase turnover due to their high rollover

[4] Some of the main risk-free rate benchmarks include the secured overnight financing rate (SOFR) for the U.S. dollar, the euro short-term rate (€STR) for the euro, the sterling overnight index average (SONIA) for the pound sterling, the Swiss average rate overnight (SARON) for the Swiss franc, and the Tokyo overnight average rate (TONA) for the Japanese yen.
[5] During the 2008 global financial crisis, there were cases of inappropriate behavior in relation to the rates reported by the banks for the calculation of the LIBOR. Since 2015, the legal authorities of the United States and Europe have pressed criminal charges against traders for their participation in data manipulation for the LIBOR.

rate. OIS and FRAs, which are generally short-term products, together accounted for 61% of the daily turnover.

Figure 2. Average Daily IRD Turnover, by Type of Instrument, in April
(trillions of USD)

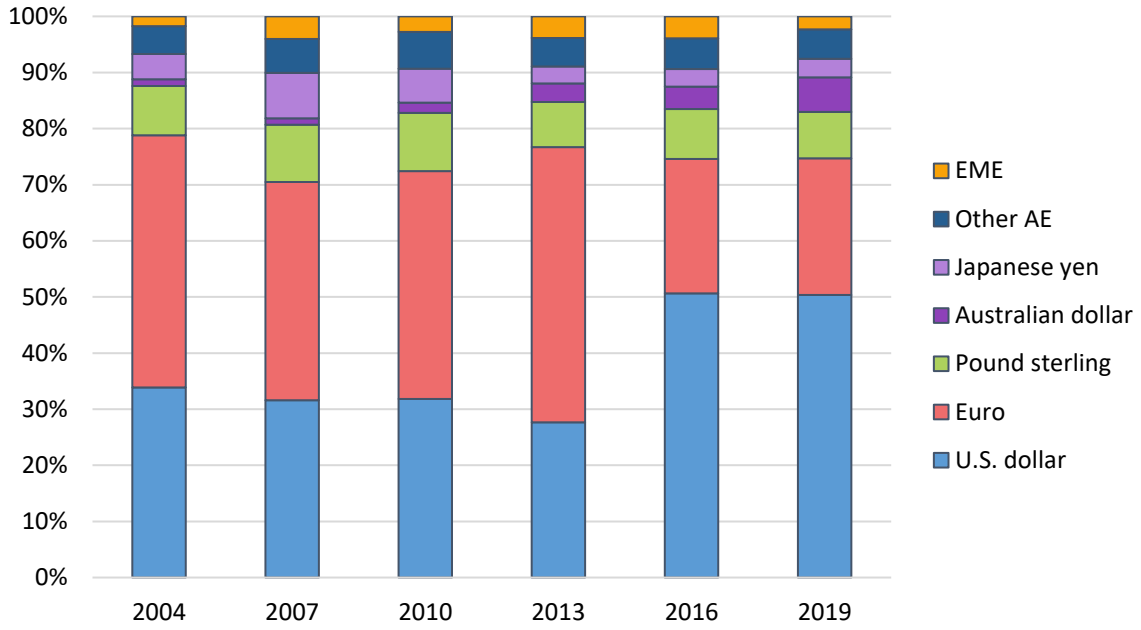


Source: BIS.
Note: Starting in 2019, the Triennial Survey disaggregates swaps to identify overnight index swaps (OIS).

In terms of currencies, interest rate contracts denominated in U.S. dollars recorded a daily average of US$3.3 trillion in April 2019, representing around half of total turnover in all currencies and continuing to lead the market, as in 2016. The second-most-active currency was the euro, with a turnover of US$1.6 trillion or 24% of the total market (a similar share to 2016, but lower than in earlier surveys). After the euro, the pound sterling recorded total turnover of US$538 billion, followed by the Australian dollar and the Japanese yen, with US$401 billion and US$213 billion, respectively.

In contrast to the advanced economies, emerging currencies account for a minor share of the international market, together representing just 2% of total turnover (figure 3).

Figure 3. Currency Shares of the Global IRD Market, in April

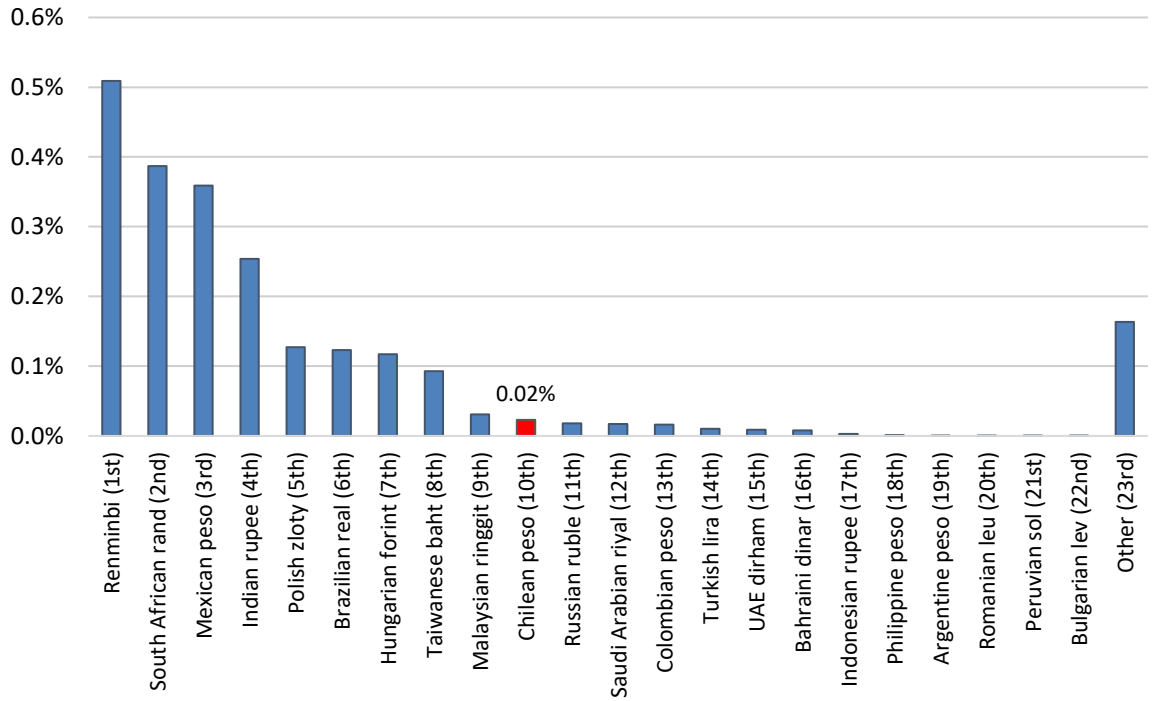


Source: BIS.
Notes: EME: Emerging market economies; AE: advanced economies.

Within the group of emerging market currencies,[6] contracts denominated in Chinese renminbi (RMB) were the most actively traded, with a market share of 0.51%, followed by the South African rand and the Mexican peso, representing 0.39% and 0.36% of the global market, respectively. The Chilean peso was tenth in the emerging currency ranking, with a 0.02% share of total turnover (figure 4).

[6] The classification of emerging economies is based on the 2019 WEO. For more information, see appendix 3.

Figure 4. Ranking of Emerging Market Currencies in the Global IRD Market, April 2019
(percent share of global market)



Source: BIS.

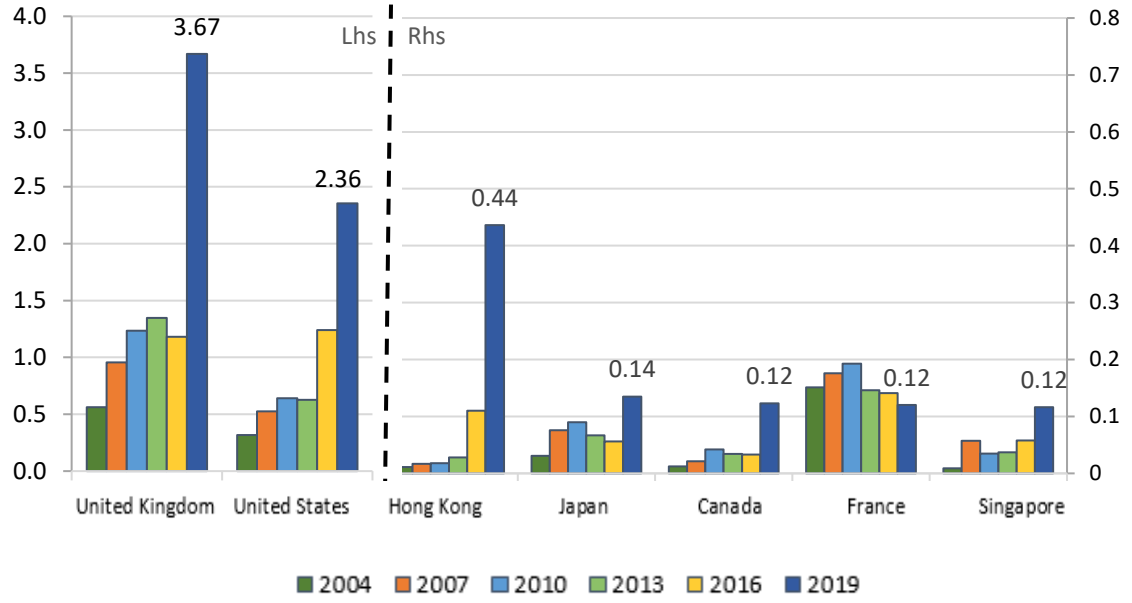
With regard to geographical distribution, OTC derivatives market activity is highly concentrated, with the United Kingdom leading the market at 50.1% of total turnover in April 2019 (US$ 3.7 trillion). This market share is higher than in 2016 (39%), when there was lower turnover in euros, but in line with earlier surveys (50% in 2013; 47% in 2010) (figure 5). The United Kingdom has historically been the main financial center for euro-denominated transactions, accounting for 86% of total trading in that currency in April 2019. This economy also showed an increase in its share of the U.S. dollar interest rate market, from 14% in 2016 to 33% in 2019 (BIS, 2019).

In second place, the United States accounted for US$2.4 trillion, equivalent to 32% of total global turnover. Thus, these two economies have a combined market share of 82%.

With the exception of France, the other international financial centers increased their turnover in the period. Hong Kong, in particular, grew from a market share of 3.6% in 2016 to 6.0% in 2019.

Figure 5. Main Location of Daily Interest Rate Derivatives Trading, in April

(daily average, in trillions USD)

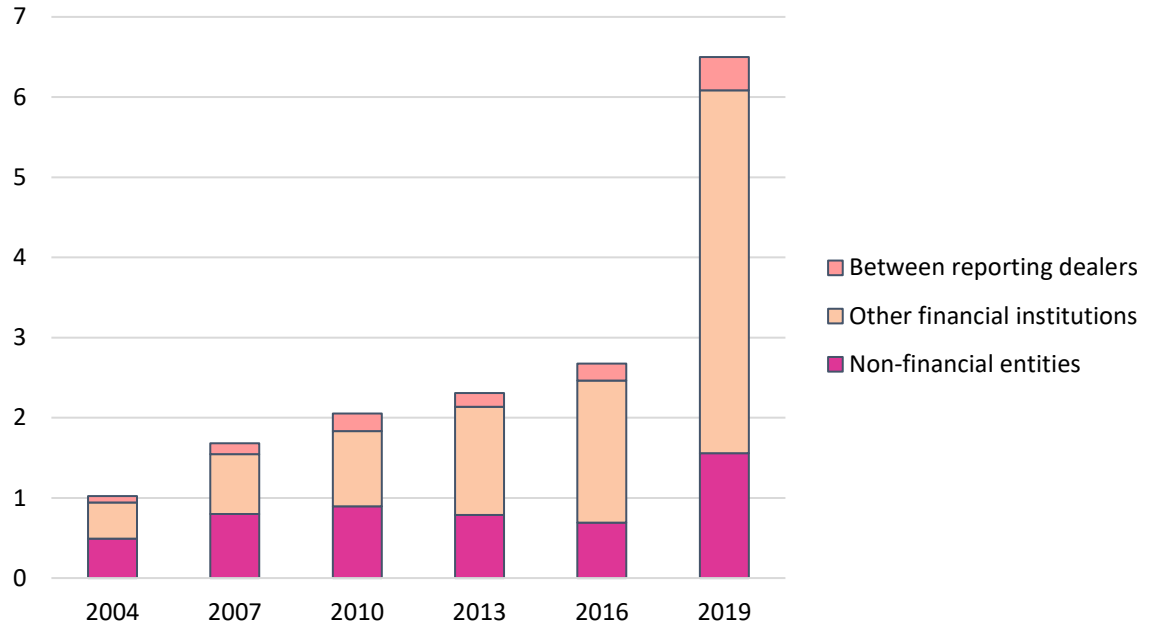


Source: BIS.

In terms of participants, transactions between financial institutions that report to the Triennial Survey (reporting dealers),[7] as identified by national monetary authorities or central banks, increased 124% relative to 2016, while transactions between reporting and non-reporting dealers grew 156% in the same period. The increase in the activity level of the latter group reflects greater demand by investment funds and other asset managers, which was mainly driven by the reduction in transaction costs due to the proliferation of electronic trading platforms (BIS, 2019) (figure 6).

[7] Reporting dealers are the main commercial and investment banks that actively buy and sell foreign currency and OTC derivatives, both for their own purposes and on behalf of their clients, as identified by the national monetary authorities or central banks that report to the BIS on the "Turnover" part of the Triennial Survey.

Figure 6. Average Daily IRD Turnover, by Type of Counterparty, in April
(trillions USD)

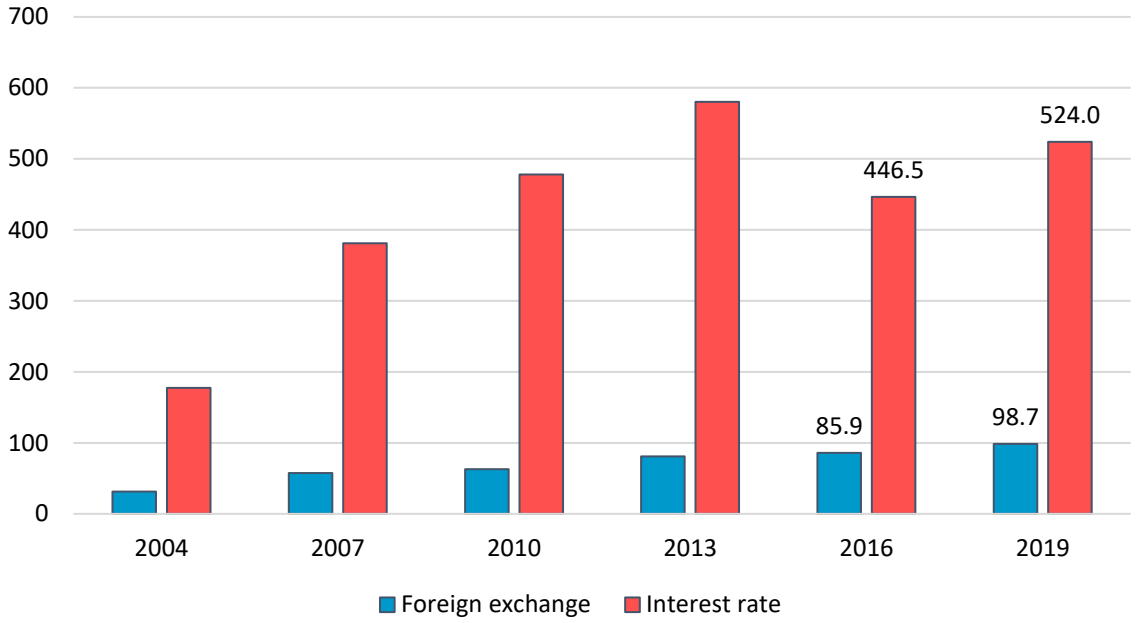


Source: BIS.
Notes: In transactions between reporting dealers, both counterparties are classified as such, that is, the more active banks and financial institutions in the market, as identified by the respective national monetary authority or central bank.

With respect to the notional amounts of outstanding positions, referenced in June of each year in the Triennial Survey, IRDs remain the primary risk category in the international market,[8] closing the first half of 2019 with a share of 84%, versus 16% for FX derivatives, with an increase in the position of US$77.5 trillion relative to 2016. This growth is mainly explained by higher turnover of interest rate derivatives in USD in 2019 (figure 7).

[8] In the Triennial Survey, the BIS classifies information on outstanding derivative positions into five risk categories (namely, exchange rate, interest rate, equity, commodity, credit, and other), in accordance with the relative size of the underlying market for each derivative instrument.

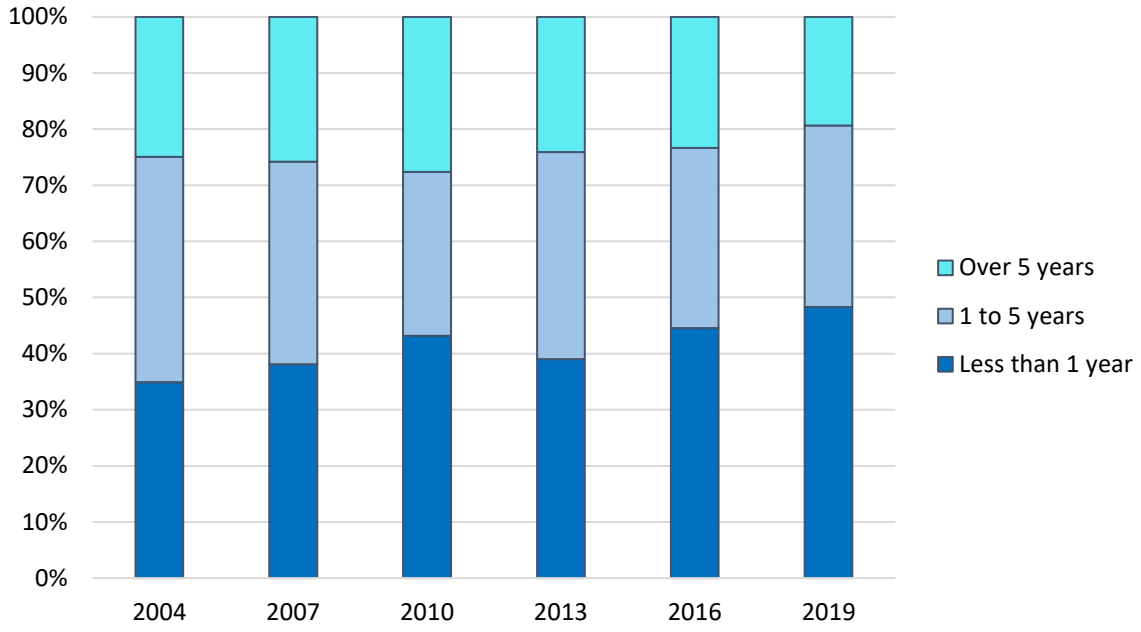
Figure 7. Notional Amounts Outstanding in the Global OTC Derivatives Market, at end-June
(trillions of USD)



Source: BIS.
Note: FX turnover includes both spot and derivative transactions.

Contracts with a residual maturity of up to one year represented 48% of notional amounts outstanding; one to five years, 32%; and over five years, 19% (figure 8).

Figure 8. Residual Maturity of Global Interest Rate Derivatives, at end-June



Source: BIS.

III. CHILE'S INTEREST RATE DERIVATIVES MARKET IN THE INTERNATIONAL CONTEXT

This section presents an international comparison of the Chilean IRD market relative to other economic blocs in terms of depth and market concentration, following the methodology used in Villena and Salinas (2014). For the analysis, countries are grouped into three blocs: advanced economies, emerging economies, and Latin American economies, in accordance with the International Monetary Fund's *World Economic Outlook* (WEO).

Depth Index

One indicator of the size of a country's IRD market is the ratio between the amount traded annually in the market and the country's GDP. The index thus reflects how active the market is relative to the size of the economy.

For a group of economies, market depth is calculated as the weighted average of the individual countries' indicators, using GDP as the weight. Additionally, the notional amounts traded in U.S. dollars in April of each year, taken from the 2004 to 2019 BIS surveys,[9] were annualized based on the number of business days in the London trading calendar.[10]

Throughout the period analyzed, the five advanced economies with the largest international financial centers (London, New York, Singapore, Tokyo, and Hong Kong)[11] had the deepest markets, with an average activity level of 58.5 times GDP in 2019 (an increase of 136% relative to the previous survey). The rest of the advanced economies had an indicator of 6.5 times GDP.

Chile's indicator is above the average for emerging and Latin American economies, at 0.87 times GDP in 2019. This is almost triple the level recorded in 2016. The local interest rate market has grown strongly in the last three years, in terms of both the domestic and cross-border markets, reflecting greater interest among non-residents in investing in the Chilean financial market (figure 9).

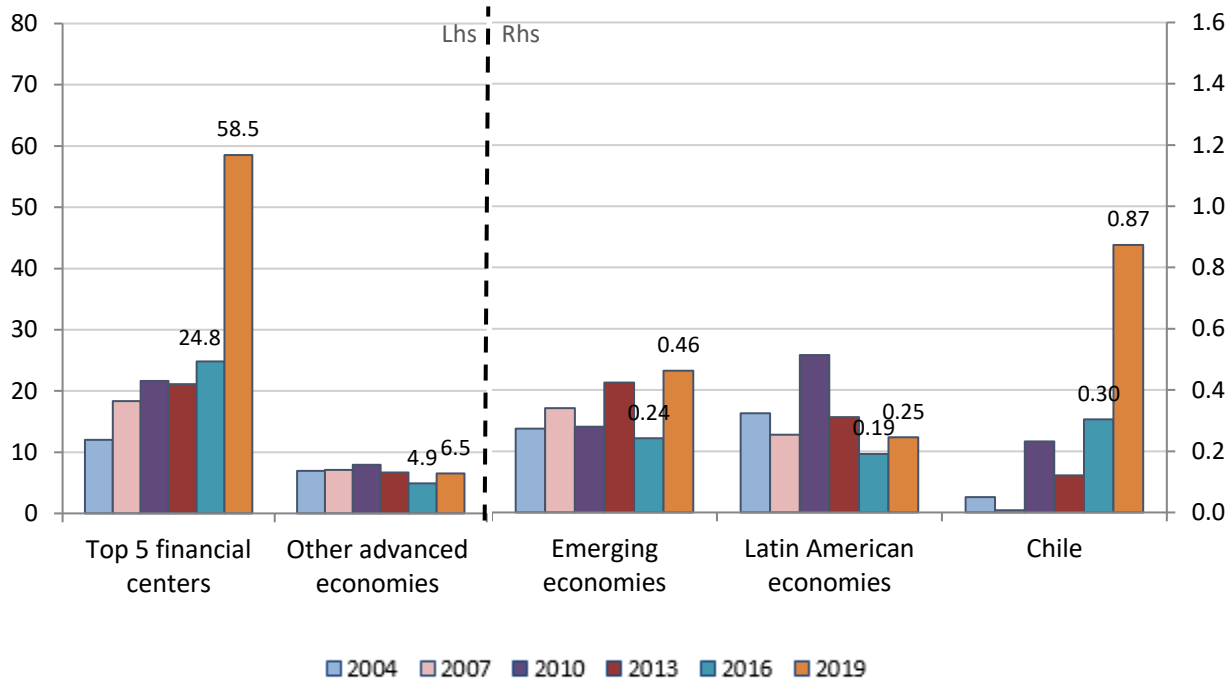
[9] The BIS indicates that, prior to 2013, the Triennial Survey results for emerging and other less liquid currencies may be underestimated due to incomplete reporting for the survey. In 2013 the BIS introduced a methodological change to the survey to ensure better coverage of these markets.

[10] For more details on the methodology used to calculate the market depth index, see appendix 3.

[11] According to the ranking in *The Global Financial Centres Index* 26 (China Development Institute, 2019).

Figure 9. IRD Market Depth, in April

(annual IRD transactions/GDP)

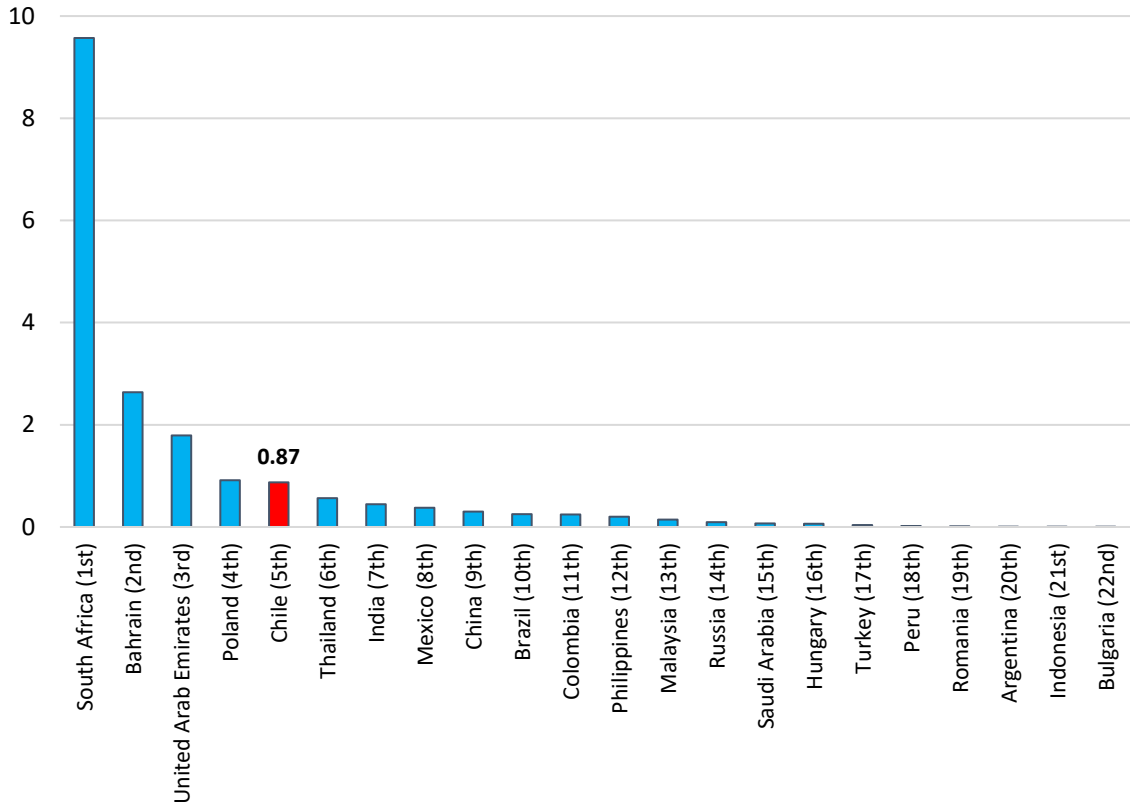


Source: Authors' calculations, based on BIS data.

Note: The financial centers category includes the five largest financial centers in the world, as classified in the 2019 Global Financial Centers Index (GFCI) (China Development Institute, 2019).

Among emerging economies, Chile ranks fifth for market depth. It has the most mature market in Latin America, relative to the size of the economy (figure 10).

Figure 10. Emerging Markets: Ranking of IRD Market Depth, April 2019
(annual IRD transactions /GDP)



Source: Authors' calculations, based on BIS data.

Concentration Index

The Herfindahl-Hirschman Index (HHI) is a measure of market concentration, calculated as the sum of squared market shares of the participants in a given industry, using the following formula:

$$\mathrm{HHI} = \sum_{i=1}^{N} s_i^2$$

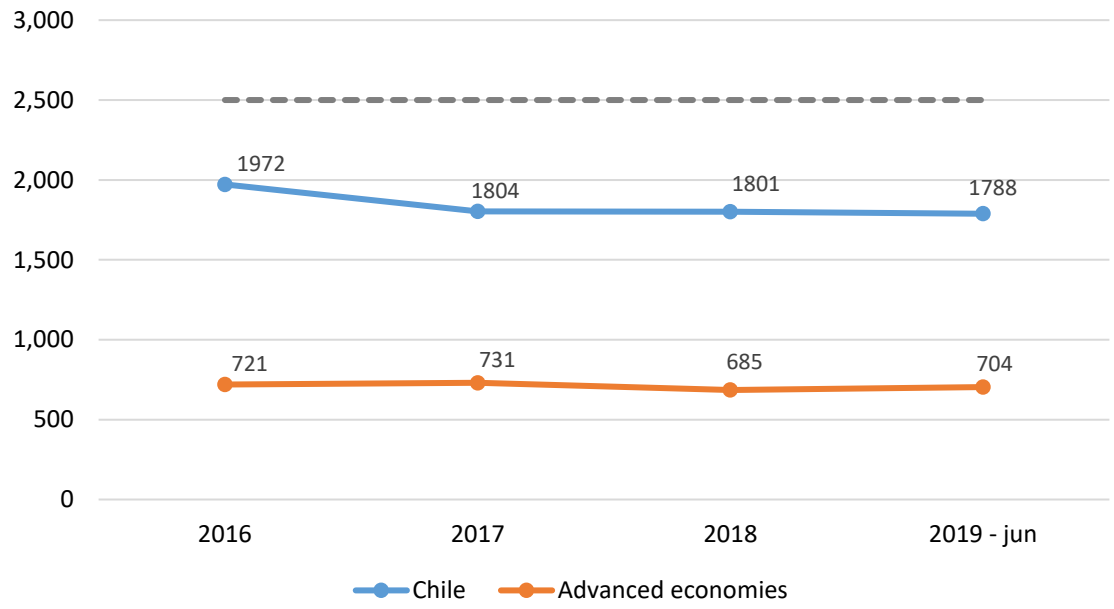
where s_i is the percentage market share of participant *i*.

According to the U.S. legal system,[12] an index between 1,500 and 2,500 reflects moderate market concentration, while levels above 2,500 indicate highly concentrated markets. The maximum value of the index, indicating extreme concentration (monopoly), is 10,000.

The BIS calculates this indicator, by type of instrument, for the advanced economies that report on their derivatives markets weekly.[13] In terms of the notional amounts outstanding in the swap market, the market concentration of this group of economies is historically low, with a weighted index of 704 in June 2019 (figure 11).

In the case of Chile, the index was estimated for the local swap market to provide a comparison with the figures published by the BIS. The results show that, while higher than in advanced economies, swap market concentration is moderate and has improved in recent years, as the market has developed.

Figure 11. Herfindahl-Hirschman Index of Market Concentration in the Interest Rate Swap Market, in December of Each Year and June 2019



Source: Authors' calculations, based on BIS data for advanced economies and Central Bank of Chile data for the local market.
Note: The dashed line indicates the limit above which market concentration is considered high, according to the U.S. Department of Justice.

[12] U.S. Department of Justice and the Federal Trade Commission, "Horizontal Merger Guidelines," Section 5.3: Market Concentration, 2010.
[13] The following countries participate in the BIS weekly survey: Australia, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom, and United States.

IV. THE *SWAP PROMEDIO CÁMARA* MARKET

This section presents the main characteristics of the average interbank index swap market (*Swap Promedio Cámara*) in Chile in terms of its conventions and functioning, as well as stylized facts on its evolution between 2014 and 2019. The data used for the statistics on turnover and outstanding positions are reported to the Central Bank by the banks, as stipulated in Chapter IX of the Procedures and Forms Manual of the Compendium of Foreign Exchange Regulations. Additional sources include Central Bank of Chile surveys.

Background

Up until 2001, the floating benchmark used for interest rate swaps (IRSs) in Chile was the active bank rate (*tasa activa bancaria*, TAB) in UFs (*unidades de fomento*, an inflation-indexed unit of account)[14] and in pesos (nominal) published by the Chilean Association of Banks and Financial Institutions (ABIF) since 1992 and 2001, respectively. However, one of the secondary effects of the nominalization of the Central Bank's monetary policy in 2001 was the increased volatility of real rates in the financial system and also of the TAB (Varela, 2007). This raised the need to build a less volatile interest rate index based on actual market transactions, which would support compliance with international standards on benchmark indexes and interest rates. In this context, the average interbank interest index (*Índice Cámara Promedio, ICP*) was developed to represent the funding cost equivalent to financing a position at the overnight rate. It was published daily by the ABIF starting in 2002 for the nominal index and 2008 for the real (UF) index, with the calculation based on the interbank rate (TIB)[15] published by the Central Bank of Chile. In 2019, the ABIF outsourced the administration of reference rates and indexes to the Chilean Benchmark Facility, a subsidiary of Global Rate Set Systems, which has international experience in the publication and administration of interest rate benchmarks.[16]

Fixed-for-floating IRSs that use the interest rate derived from the *Índice Cámara Promedio* are called *Swaps Promedio Cámara* (SPC). These instruments can be traded over a notional principal in either Chilean pesos (SPC-CLP) or inflation-indexed UFs (SPC-UF), referencing the nominal or real ICP, as appropriate. In these derivatives, the counterparties commit to exchanging future interest payments for a specified period, with one counterparty paying a fixed rate and the other a floating rate tied to the ICP, over the same notional principal amount.

Sotz and Alarcón (2007) indicate that these instruments have become a benchmark for the analysis of market expectations on monetary policy and inflation in Chile, as they are considered to be very close to risk-free by the financial market. On the one hand, the interbank rate used to calculate the ICP stays close to the monetary policy rate (MPR), given the open market operations conducted by

[14] See the methodological note, "Unidad de Fomento" (Central Bank of Chile, Statistics Division, 2019b).
[15] See the methodological note, "Tasa de Interés Interbancaria" (Central Bank of Chile, Statistics Division, 2019a).
[16] See *Reglamento Índice de Cámara Promedio e Índice de Cámara Promedio Real*, published in the Official Gazette on 5 May 2017. These regulations establish responsibilities in relation to the calculation and publication of the Average Interbank Index and the Real Average Interbank Index; they were adopted by the Chilean Benchmark Facility (CBF) when the administration of these rates and indexes was transferred from the ABIF to the CBF on 18 November 2019.

the Central Bank of Chile.[17] On the other, this type of derivative does not involve an exchange of principal (only interest payments on a notional amount in a single currency), so the default risk is considered to be lower than for other types of swap that do exchange principal.

Participants and Uses

The main participants in the SPC market are local banks and non-resident financial companies in Chile (hedge funds and foreign banks), which use this type of instrument primarily to protect against exposure to interest rate risk or to make bets on the future behavior of the monetary policy rate and short-term inflation.

Swaps in Chilean pesos (SPC-CLP) with terms of up to two years are widely used by financial agents to speculate on the future path of the MPR, so it is possible to infer changes in market expectations for the MPR (the implied MPR), within the monetary policy horizon, through the estimation of the forward curve[18] at different maturities.

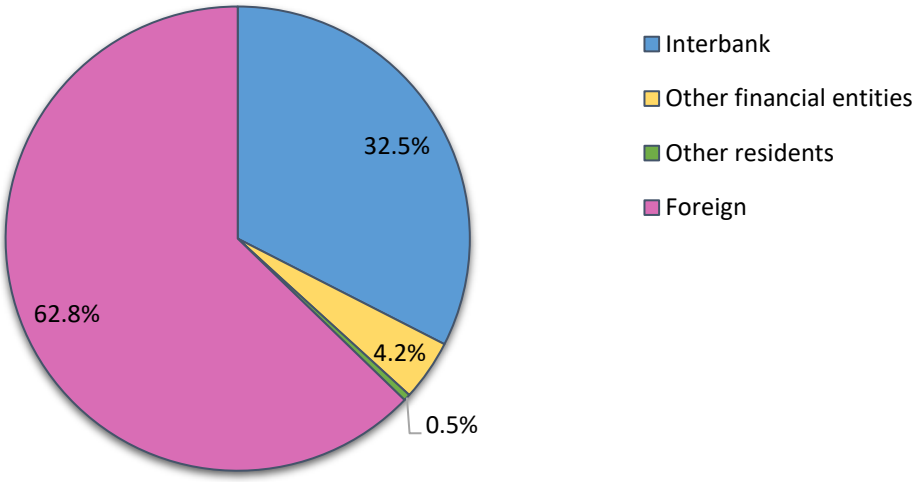
In April 2019, SPC-CLP swap turnover by local banks was largely cross-border, accounting for 62.8% of the total volume contracted by these financial entities. Interbank operations[19] represented 32.5% of total turnover, while transactions between local banks and local nonbank counterparties were less than 5% (figure 12).

[17] One of the instruments through which the Central Bank of Chile conducts its monetary policy is liquidity facilities. By injecting or withdrawing liquidity, the Bank sets a floating band for the interbank rate of +/– 25 basis points.

[18] Although the relation between the MPR and the ICP swap rate is not perfect, the market prices of rate swaps in Chilean pesos can be used to make inferences on expectations for changes in the MPR at the relevant maturities, under certain assumptions. Based on the zero swap curve, it is possible to derive the forward rate curve (or implied MPR), considering that, under the no-arbitrage principle, the zero swap rate at a given maturity corresponds to the weighted average of the forward rates that make up that maturity.

[19] Interbank operations are adjusted for double-counting and are thus counted only once.

Figure 12. Chilean Banks' Counterparties in SPC-CLP Swaps, April 2019
(percent)



Source: Authors' calculations, based on data from the Central Bank of Chile.
Note: Interbank transactions are adjusted for double-counting.

Negotiation

In negotiating a contract, the first parameter to define is the maturity, which determines the duration of the swap and has a direct impact on the interest flows that will be paid in the future (Burrus, 2016). The counterparties then quote the value of the fixed rate, primarily through broker terminals or by telephone. As with any other IRS, the fixed interest rate is negotiated in such a way that no flows are exchanged at the start of the contract; in other words, the present value of the contract is equal to zero.

Under market risk management practices, agents quote swaps based on the DV01 risk measure[20] at the portfolio level, which allows them to evaluate the sensitivity of their portfolio value to parallel 0.01% changes in the swap curve.

Settlement

Swap operations by Chilean banks are settled bilaterally between counterparties, with a net payment in Chilean pesos or the equivalent in dollars in the case of contracts traded in an external market, using the benchmark exchange rate published by the Central Bank of Chile (*dólar*

[20] A swap's DV01 (an abbreviation of dollar value of one basis point) reflects the change in the value of the instrument in response to a reduction in the swap curve of one basis point (0.01%). Swaps with different underlying rates and maturities respond differently to changes in the swap curve.

observado). The net settlement, at the end of the interest accrual period, corresponds to the difference between the fixed rate on the origination date and the floating market rate on the fixing date (the agreed reference date established in the contract), times the fraction of the year in the period and the notional principal.

For settlement, the theoretical interest rate for the floating component is known as the nominal annual rate (NAR) for swaps denominated in Chilean pesos and the real annual rate (RAR) for swaps in UFs. It is calculated as a function of the ICP and the UF, using the following formulas:[21]

(1) $$\mathrm{NAR} = \frac{\left(\frac{\mathrm{ICP}_1}{\mathrm{ICP}_0} - 1\right) * 360}{T_1 - T_0}$$

(2) $$\mathrm{RAR} = \left[\frac{\left(\left(\frac{\mathrm{ICP}_1}{\mathrm{ICP}_0} - 1\right) - \left(\frac{\mathrm{UF}_1}{\mathrm{UF}_0} - 1\right)\right)}{\left(\frac{\mathrm{UF}_1}{\mathrm{UF}_0}\right)}\right] * \frac{360}{T_1 - T_0}$$

where

- NAR: Average nominal annual rate, during a given settlement period;
- RAR: Average real annual rate, during a given settlement period;
- ICP_1: Value of the *Índice Cámara Promedio* at the end of a given settlement period;
- ICP_0: Value of the *Índice Cámara Promedio* at the start of a given settlement period;
- UF_1: Value of the *Unidad de Fomento* at the end of a given settlement period;
- UF_0: Value of the *Unidad de Fomento* at the start of a given settlement period;
- T_1: End date of a given settlement period;
- T_0: Start date of a given settlement period;
- $T_1 – T_0$: The interest payment period.

The use of the ICP facilitates the calculation of accrued interest, as well as the valuation of referenced contracts. The ACT/360 convention[22] is used to calculate the number of days in the swap, and the floating component is then calculated by multiplying the contract's notional principal by the change in the ICP in the corresponding period.

The number of net settlements will depend on the type of instrument. In general, SPC-CLP swaps with a maturity of 18 months or less have a single settlement at the end of the contract (zero-coupon structure), while swaps with a maturity of over 18 months are settled weekly (bullet structure).

Turnover and Outstanding Positions in 2014–19

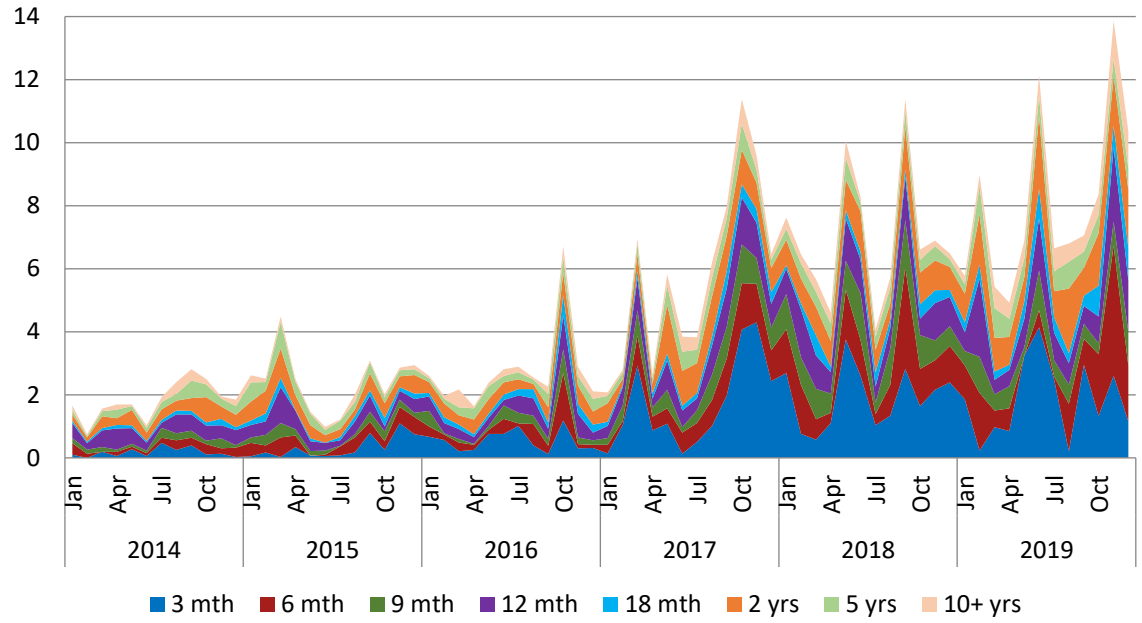
In recent years, Chile's financial markets have undergone significant development, with increased access to the international capital markets thanks to greater foreign trade, investment, and debt.

[21] Bolsa de Comercio de Santiago, Appendix: Valorizador Swap Promedio Cámara (VSPC) (ww2.sebra.cl).
[22] The ACT/360 day-count convention implies counting the actual days in a given period and dividing by a 360-day year.

This has favored the growth of local IRD activity, due mainly to rising interest among non-residents in investing in the Chilean market.

Over the last three years, cross-border turnover has grown, with a peak annual growth rate of 111% in 2017 and total turnover of $97.21 trillion in 2019. In April 2019, the measurement period for the Triennial Survey, turnover was $4.9 trillion, an increase of 7%, 74%, and 62% relative to April 2018, 2017, and 2016, respectively. In general, foreign agents trade at the shortest maturities, because that is where they make their bets on the MPR and the main benchmark curves in Chilean pesos. Otherwise, the most active trading coincides with periods of changes in expectations, when market participants adjust their positions relative to the interest rate to be paid in the future (fixed or floating) (figure 13).

Figure 13. Monthly Bank Cross-Border SPC-CLP Swap Transactions, by Original Maturity
(trillions of Chilean pesos)

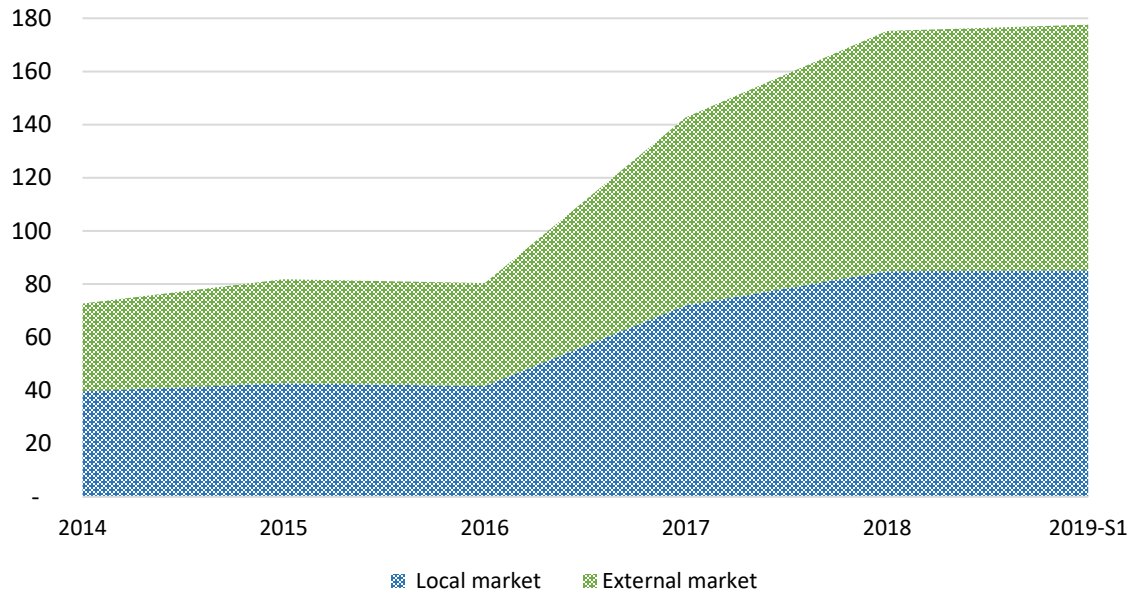


Source: Central Bank of Chile.
Note: Contract duration is defined as the original maturity, as follows: 3 months: 1–149 days; 6 months: 150–239 days; 9 months: 240–329 days; 12 months: 330–479 days; 18 months: 480–659 days; 2 years: 660–1,259 days; 5 years: 1,260–2,339 days; and 10+ years: over 2,339 days.

Starting in 2016, there is an upward trend in the outstanding volume of SPC-CLP swaps, in both the local and cross-border markets. At end-June 2019, the total gross position was around $178 trillion.

The growing use of these instruments by foreign agents is in line with the increasingly dynamic domestic market, given that the main Chilean banks provide liquidity for cross-border market transactions (market makers) and settle these positions in the local market (figure 14).

Figure 14. Banks' Outstanding SPC-CLP Swap Position, by Residence of Counterparty, December and June 2019
(trillions of Chilean pesos)



Source: Authors' calculations, based on data from the Central Bank of Chile.
Notes: The outstanding position is in terms of notional amounts. For the local market position, interbank transactions were adjusted for double-counting.

Market Expectations

Market expectations on interest rates can be inferred from positioning indicators for a set of investors, complementing the analysis of market price behavior and official expectations surveys. For example, an informed investor who foresees an interest rate cut will have incentives to operate in the swap market with a net short position in floating rates or net long in fixed rates (pay floating and receive fixed), in order to benefit from the lower interest rates in the future.

For the group of foreign agents that participate actively in the Chilean IRS market, we analyze the net position (floating rate purchases minus sales) at the close of each month, for operations with a residual maturity of up to two years, in the 2017–19 period.[23] Negative values indicate that, at that point in time, foreign investors expected a reduction in the monetary policy rate (MPR). Similarly, a net positive (or long) floating rate position indicates expectations of an upward trend in the MPR in the next period.

For most of 2017, foreign investors in the SPC-CLP market had a net short floating rate position, implying that, at that time, expectations were predominantly for an accommodative monetary

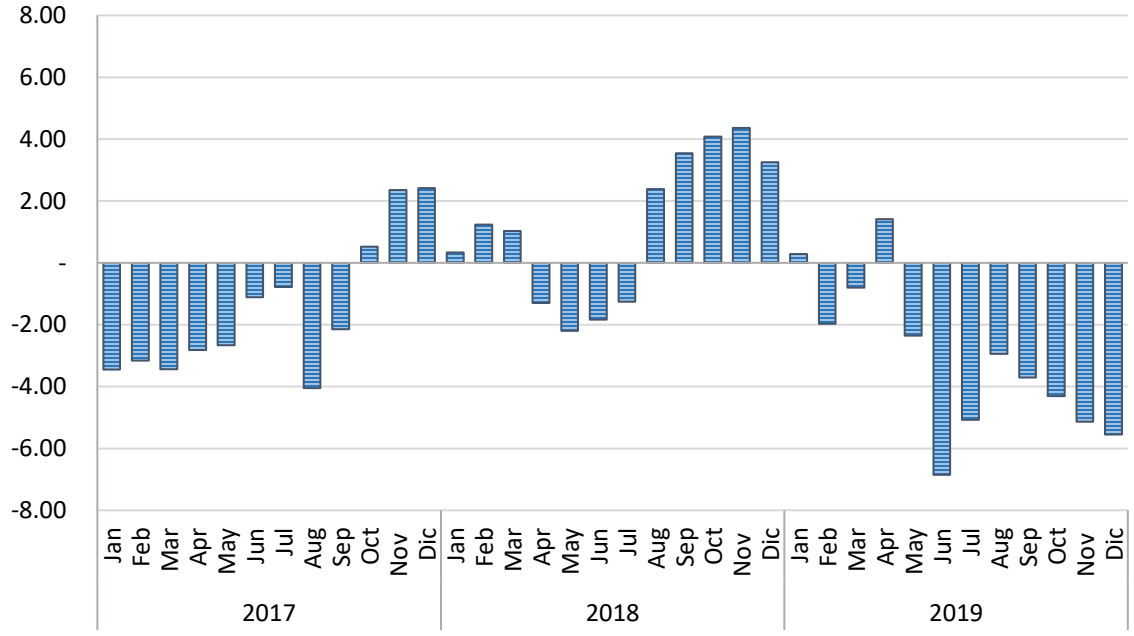
[23] The analysis covers the period after 2017, as the Chilean market has good liquidity and depth indicators starting that year.

policy, with low interest rates in the short term. Over the course of 2018, the bets varied, but by year-end the market expected an upward trend in the MPR (net long floating rate position), taking into account an acceleration of the monetary policy normalization process, with a real increase in the MPR in October (figure 15).

In 2019, the market mostly predicted a drop in rates, especially in June, when the largest net short floating rate position was recorded. This was driven by a surprise MPR cut of 50 basis points, a magnitude not seen since the subprime crisis. Since September, expectations of interest rate cuts picked up again, in the context of the outbreak of the social crisis in Chile and the uncertainty regarding its impact on the economic outlook.

Figure 15. Net Position (in Floating Rates) of Foreign Investors in SPC-CLP Swaps with a Residual Maturity of up to Two Years: 2017–19

(trillions of Chilean pesos)



Source: Authors' calculations, based on data from the Central Bank of Chile.
Note: Negative values imply a net short forward position on the NAR (ICP) for foreign agents, who benefit from lower rates relative to spot prices. Similarly, positive values indicate a net long position on the NAR (ICP) for these agents, who would earn a return in a scenario of rising interest rates.

V. FINAL COMMENTS

This document has provided information on the interest rate derivatives market in order to increase transparency and improve market analysis, based on the results of the BIS Triennial Survey and information available in the Central Bank of Chile.

At the global level, the IRD market grew significantly in 2019, and turnover in April was similar to the turnover in the currency market.

In Chile, the use of interest rate derivatives in local currency has increased over the last three years, in both the domestic and cross-border markets. This reflects a greater need for hedging and a growing interest among investors in taking positions relative to future movements in the Chilean monetary policy rate.

The Integrated Derivatives Information System (SIID-TR), which will come online over the next few months, is expected to provide more information on the characteristics of this market, contributing to transparency, supporting a better understanding by investors, and improving the available data for market supervision and modernization.

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APPENDIX 1

Glossary

Central counterparty: An entity that provides clearing and settlement services for derivatives market transactions and whose main function is to act as the reciprocal buyer and seller in the originally contracted operations. This reduces the key risks, including counterparty, operations, settlement, and default risks.

Cross-border: A transaction between counterparties residing in different countries.

Derivatives position: The balance (expressed in notional amounts) of outstanding derivatives contracts on a given date. The net position equals the long position minus the short position in a fixed or floating rate, as specified.

Dodd-Frank: The Dodd-Frank Act was passed in the United States in 2010 to restructure the financial regulation system after the 2008–09 financial crisis. A key component of this initiative was to address perceived defects in the OTC derivatives markets and, in particular, to minimize systemic risk from OTC trading, create greater transparency, and prohibit speculative investments with customers' deposits.

DV01: Dollar value of one basis point. A risk measure that quantifies the change in the value of the instrument in response to a uniform reduction in the swap curve of one basis point (0.01%).

EMIR (European Market Infrastructure Regulation): The EMIR, which entered into force in 2012, primarily aims to increase transparency in the OTC derivatives markets, in order to support the regulation and supervision of these markets by the European Union and the European Securities and Markets Authority (ESMA). A complementary objective is to reduce the number of counterparties involved in trading and lower operational risk for participants.

Fixing date: The date on which the value of the floating interest rate or index referenced in a swap contract is observed for calculating the variable payment in the swap.

Formal Exchange Market (FEM): According to Article 41 of the Central Bank of Chile's Basic Constitutional Act, "the Formal Exchange Market (*Mercado Cambiario Formal*) is comprised of banks. The Central Bank can authorize other entities or people to participate in the FEM, in which case they will only be permitted to engage in the specific foreign exchange operations authorized by the Bank." These other entities are primarily broker-dealers, which are identified in Chapter III (Appendix 2) of the Procedures and Forms Manual of the Compendium of Foreign Exchange Regulations, "Personas jurídicas autorizadas por el Central Bank of Chile para formar parte del Mercado Cambiario Formal" (Legal Entities Authorized by the Central Bank of Chile to Participate in the Formal Exchange Market).

Forward rate agreement (FRA): An interest rate derivative contract in which the counterparties agree to exchange interest rate payments for a specific liability in the future, for an established period of time, which begins on a future date determined at the start of the contract.

Global Financial Centres Index (GFCI): A ranking of the competitiveness of financial centers based on over 29,000 assessments collected through an online questionnaire. It is a widely cited source

for ranking financial centers. The first index was published in March 2007, and it has been jointly published, semiannually, by Z/Yen Group in London and the China Development Institute in Shenzhen since 2015.

Gross domestic product (GDP): The total market value of the goods and services produced in an economy in a given period, normally one year.

Herfindahl-Hirschman Index (HHI): A measure of market concentration, calculated as the sum of squared market shares of the individual participants in a given market. The index ranges from 0 to 10,000. If a single entity dominates the market, the measure takes the maximum value of 10,000.

Índice Cámara Promedio (ICP): The Average Interbank Index measures the funding cost equivalent to financing a position at the overnight rate. The calculation methodology and administration of the index is regulated (see *Reglamento Índice de Cámara Promedio e Índice de Cámara Promedio Real*).

Interest rate swap (IRS): A contract establishing the periodic exchange of interest payments over a notional amount in a single currency. The exchange can be fixed-for-floating or floating-for-floating, using different indexes and/or maturities.

LIBOR (London Interbank Offered Rate): The rate charged on interbank loans in the London money market.

Liquidity: An attribute of a financial asset that can be bought or sold in the market without triggering significant changes in its price. An asset is considered to be liquid when it is easily converted into cash.

Onshore: The local market.

Offshore: Foreign markets.

Option: A contract in which the buyer obtains the right to pay or receive a given price for an underlying asset, in this case a specific interest rate, relative to a notional amount and for a specified period.

Over-the-counter (OTC): Off-exchange transactions, between two counterparties, that are not channeled through a centralized exchange.

Overnight Index swap (OIS). A contract establishing the periodic payment of fixed-for-floating interest rates, over a given notional principal in a single currency, in which the floating component is defined relative to a benchmark overnight rate or index.

***Reglamento Índice de Cámara Promedio e Índice de Cámara Promedio Real*:** The regulation establishing responsibilities in relation to the calculation and publication of the Average Interbank Index (*Índice de Cámara Promedio*, *ICP*) and the Real Average Interbank Index (*ICP Real*). The regulation was approved by the Board of the Chilean Association of Banks and Financial Institutions (ABIF) on 27 March 2017 and published in the Official Gazette on 5 May 2017. The regulation was adopted by the Chilean Benchmark Facility (CBF) when the administration of these rates and indexes was transferred from the ABIF to the CBF on 18 November 2019.

Rollover: The process of keeping a position open after maturity.

Spot: In the spot market, assets that are bought or sold are delivered immediately at the market price in effect when the purchase/sale is contracted, and not at the price in effect at the moment the asset is delivered.

Swap Promedio Cámara (SPC): A fixed-for-floating interest rate swap used in Chile, where the floating component is calculated based on the Average Interbank Index (*Índice Cámara Promedio*, ICP).

TAB (*Tasa activa bancaria*): The active bank rate is the average interest rate, weighted by turnover of inflation-indexed operations at 90, 180, and 360 days, calculated every bank business day, in accordance with the regulation, "Reglamento Tasas TAB nominal, en UF y TADO," published in the Official Gazette on 5 May 2017, and subsequent modifications and replacements. This regulation was adopted by the Chilean Benchmark Facility (CBF) when the administration of rates and indexes was transferred from the ABIF to the CBF on 18 November 2019.

Trade repository (TR): A financial market infrastructure for the centralized recording and storage of information on derivatives transactions.

UF (Unidad de Fomento): An inflation-indexed unit of account that is widely used in Chile. It is calculated monthly for each day from the 10th of a given month through the 9th of the following month.

APPENDIX 2

Methodological Aspects of the BIS Triennial Central Bank Survey of Foreign Exchange and Over-The-Counter Derivatives Market

Every three years, the BIS requests countries to provide information on activity in their foreign exchange and OTC derivatives markets. This information is not freely available at the world level, because it involves transactions that are traded off-exchange between two counterparties. The BIS survey is the most comprehensive source on the size and structure of these OTC markets.

The data collection process is conducted in two phases, and the BIS reports the results in July and September. In the first phase (Turnover), participating countries submit data on average daily transactions in their OTC markets in the month of April. In the second phase (Outstanding), they report outstanding notional amounts of all derivatives at the end of June. The 2019 version is the twelfth survey in the series.

Central banks or other monetary authorities are responsible for compiling the data in their respective jurisdiction for submission to the BIS. The survey sample comprises the reporting dealers of each participating country.[24] In 2019, nearly 1,300 dealers participated.

In the survey, information on interest rate derivatives is disaggregated into the following categories:

- Instrument: Forward rate agreements (FRAs), overnight index swaps (OIS), other swaps, and options and other OTC products, which in turn are broken down by residual maturity in the Outstanding section;
- Counterparty: Reporting dealers, other financial counterparties, and nonfinancial counterparties, broken down into local and cross-border trading and, in the Outstanding section, novations to central counterparties for transactions with Other financial counterparties;
- Currency: 39 specific currencies and an Other category;
- Market value: Net asset-liability market value; and
- Trading relation: Related-party trading.

The BIS publishes the preliminary results on volumes traded in September. The final report is released in December, with more detailed information on volumes traded and data on outstanding positions.[25] Prior to publication, the information is always disclosed to the reporting central banks for verification and validation.

[24] Commercial banks, large investment banks, and securities brokers.
[25] See www.bis.org/quarterlyreviews/index.htm.

APPENDIX 3

BIS Sources, Economic Blocs, and GDP Data

The economies that participate in the BIS Triennial Survey were divided into blocs according to their classification (advanced or emerging) in the International Monetary Fund's *World Economic Outlook* (WEO) for each year. Additionally, the blocs were created excluding the Latin American economies, which are classed separately. Chile is not included in any of the three blocs used for the analysis.

The blocs are composed as follows:

Advanced economies:

Australia, Austria, Belgium, Canada, Czech Republic,[26] Denmark, Estonia,[27] Finland, France, Germany, Greece, Hong Kong, Ireland, Israel, Italy, Japan, Latvia,[28] Lithuania,[29] Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovakia,[30] Slovenia,[31] South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and United States.

Emerging economies:

Bahrain, Bulgaria, China, Hungary, India, Indonesia, Malaysia, Philippines, Poland, Romania, Russia, Saudi Arabia, South Africa, Thailand, Turkey, and United Arab Emirates.[32]

Latin American economies:

Argentina, Brazil, Colombia, Mexico, and Peru.

For figures 9 and 10, market depth is calculated as the ratio of annual flows in each market to GDP.

The BIS publishes daily average derivatives flows, which were annualized by multiplying by the number of international trading days, in order to approximate total trading days in the year for all countries. The number of days is calculated as the number of calendar days in the year, minus weekends and minus bank holidays in London, where the latter was chosen because of its importance in global markets.

Normalizing volumes traded by the size of the economy makes it possible to compare different countries or blocs. In the comparative analysis of economic blocs, the countries with the largest offshore financial centers (London, New York, Singapore, Tokyo, and Hong Kong) were separated out of the advanced economy bloc, since their activity level is much higher than would be implied by the size of their economies.

[26] The Czech Republic is considered advanced starting with the 2010 survey.
[27] Estonia is considered advanced starting with the 2013 survey.
[28] Latvia is considered advanced starting with the 2016 survey.
[29] Lithuania is considered advanced starting with the 2016 survey.
[30] Slovakia is considered advanced starting with the 2010 survey.
[31] Slovenia is considered advanced starting with the 2007 survey.
[32] The United Arab Emirates entered the survey for the first time in 2019.

$$\text{Depth} = \frac{\text{Annual transactions}}{\text{GDP}}$$

The depth of a bloc of economies is estimated by calculating the weighted average of the individual country ratios, using GDP as the weight:

$$\text{Bloc depth} = \frac{\sum_{i=1}^{n} w_i \text{DR}_i}{\sum_{i=1}^{n} w_i}$$

where *w* is the GDP of country *i* and DR is the depth ratio of country *i.*

Figures 9 and 10 use GDP data published by the IMF in the WEO database for April 2019, using current prices in USD equivalents. The 2019 series in the figures were calculated with 2018 GDP data. To date, real GDP data are not available for all countries, so the following were calculated based on the estimates published by the local source: Austria, Bahrain, Belgium, Colombia, Czech Republic, France, Greece, Ireland, Israel, Italy, Luxembourg, Mexico, New Zealand, Norway, Portugal, Russia, Slovakia, Slovenia, Singapore, South Africa, South Korea, Switzerland, Thailand, and United Arab Emirates.

APPENDIX 4

Interest Rate Derivative Statistics Published by the Central Bank of Chile

The data on interest rate derivatives are published by the Central Bank of Chile in its Statistics Database (SDB) on the 23rd of each month, under "Derivatives and Spot Statistics."

This platform provides statistics on cross-border foreign IRD turnover and outstanding positions, by institutional sector; and on local IRD turnover and outstanding positions (nominal average interbank swaps), carried out by participants in the Formal Exchange Market with the external sector, disaggregated by type of interest rate and maturity.

Once the IDIS trade repository comes online, the data published on the website will be complemented with information from this market infrastructure.

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