RESEARCH HIGHLIGHTS

Review of the current research conducted at the Central Bank of Chile

August 2022

This issue of Research Highlights reviews the following subjects that have been recently analyzed at the Central Bank of Chile (CBC):

- Market Incompleteness, Consumption Heterogeneity and Commodity Price Shocks
- Passthrough from Monetary Policy to Bank Interest Rates: A-symmetry Analysis
- A Macro Financial Model for the Chilean Economy

Market Incompleteness, Consumption Heterogeneity and Commodity Price Shocks

Fluctuations in commodity prices are an important source of volatility in small and open economies such as Chile, where the copper price is of major importance in explaining fluctuations in output, inflation, and other relevant macroeconomic variables. In this context, it is important to understand the transmission mechanisms through which these price fluctuations affect aggregate demand. The role of factors such as government spending or exchange rate fluctuations has been extensively studied, but less attention has been paid to the heterogeneity of consumers and therefore of their responses in their spending decisions. Central Bank of Chile researcher Damián Romero, in his paper "Market Incompleteness, Consumption Heterogeneity and Commodity Price Shocks," explores the effects that differences among consumers have on the macroeconomic consequences of changes in commodity prices. He focuses on two dimensions in which consumers differ, providing confirming evidence for the case of Chile. First, the basket of goods that agents consume depends on their income level, and consequently the fluctuations of this variable generated by commodity price changes impact the allocation of expenditures across different goods. Secondly, agents have different access to financial markets and to the share of profits of the companies that produce the commodities.

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In its first part, the paper provides evidence on the differences in the consumer baskets among households with different incomes. Using the Household Budget Survey, it shows how the share in total consumption of three categories (i.e., food, manufactures, and services) differs by income percentile. He finds significant differences, particularly for foods and services. The fraction of food consumption is decreasing with the income level, with the top decile consuming 35%, almost three times that of the highest decile, which consumes about 13%. For services, the pattern is the reverse. The first decile consumes 46%, while the figure for the highest decile is 69%.

In light of this evidence, a shock that increases the income of families would be expected to change the consumer basket, increasing the expenditure on services relative to foods. As the former becomes more costly, then this mechanism should reduce the overall effect on household consumption, and consequently on aggregate output.

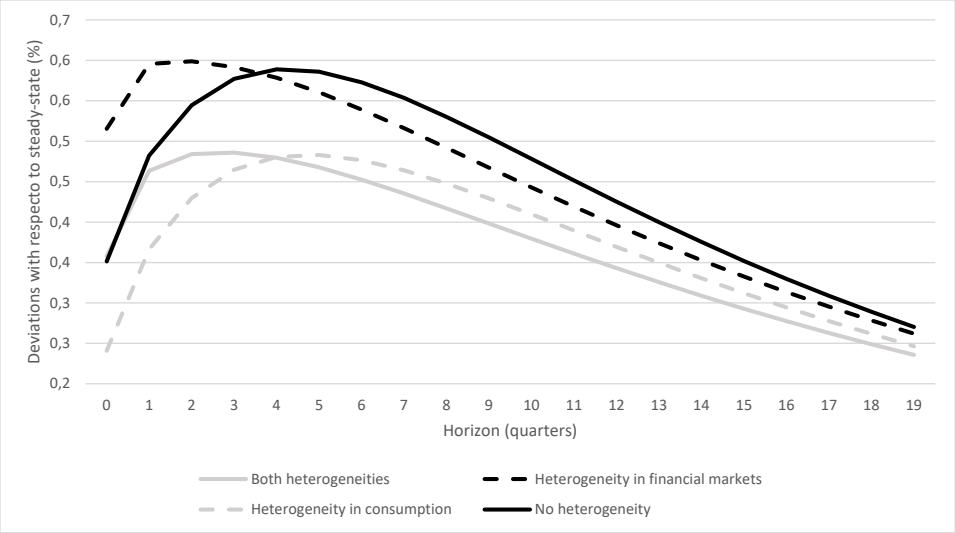
The second dimension of heterogeneity analyzed in the study refers to access to financial markets. Specifically, the study shows that around 42% of the population would be financially restricted, because their liquid assets relative to their income are insufficient to represent a stock of resources that would allow them to maintain stable consumption levels in the face of major income shocks. Thus, the change in income generated by variations in commodity prices would be reflected in a change in consumption of similar proportions, generating a larger aggregate effect. This also interacts with the heterogeneity of consumer baskets because the reallocation effect and the change in relative prices are stronger.

To quantitatively verify the significance of these mechanisms, the paper builds a general equilibrium model with the generally used elements for this type of analysis, but which also incorporates the two dimensions of heterogeneity already mentioned. The main result is the path of aggregate consumption in the face of an unexpected 10% increase in the price of the commodity (see Figure 1). The first specification is the traditional one, without heterogeneity in consumer baskets or in access to financial markets, illustrated by the black line. At the time of the shock, consumption increases by about 0.35% and follows an upsloping trajectory for the next five quarters. The second specification includes the first heterogeneity class, which corresponds to the consumer basket, represented by a gray dotted line.

As expected, the effect is significantly smaller, with an initial increase of under 0.25%, although with

a peak that is similar to the previous case. When only the second type of heterogeneity is included, (i.e., related to financial market access), the result is the opposite. As shown by the dotted black line, the initial effect is substantially larger, about 0.5%, and so is the peak, about 0.6% compared to 0.47% in the previous specifications. Finally, the trajectory generated by the full model, with the two types of heterogeneity (gray line), initially looks very similar to the traditional model. The initial effects cancel out and the response is similar in the first few quarters. However, the response continues to grow for more quarters, reaching a peak that is significantly above the traditional case. Consumption reaches an increase of almost 0.6% around the fifth quarter, after which it slowly converges to its long-term level.

Figure 1. Aggregate Consumption under Different Specifications



Passthrough from Monetary Policy to Bank Interest Rates: A-symmetry Analysis

The objective of this paper, entitled "Pass-through from Monetary Policy to Bank Interest Rates: A-symmetry Analysis", is to determine the transmission mechanism from the monetary policy rate (MPR) to bank interest rates in Chile. For this purpose, Central Bank of Chile researchers Gonzalo Marivil, Juan Francisco Martínez y Daniel Oda, Daniel Oda incorporate key dimensions such as pass-through speed, transmission asymmetries and interest rate persistence. In particular, they analyze the effect of changes in the MPR on the credit market and model the dynamics of interest rates with respect to their equilibrium level.

This paper is inserted in the literature by adapting and applying a partial adjustment model to estimate the MPR pass-through to bank interest rates in the Chilean market. In this context, the proposed methodology has certain advantages over static interest rate models, generally applied to an aggregate financial system that considers neither asymmetries in the face of monetary policy shocks, nor the interaction between lending and deposit rates. Thus, three central points are incorporated: i) the convergence of bank interest rates to the MPR and a credit spread, ii) the asymmetric convergence conditional on the direction and magnitude of the MPR, and iii) the effect of the market structure on the elasticity of interest rates.

"It is confirmed that convergence is asymmetric, i.e., deposit rates adjust faster in the face of an expansionary monetary policy, while commercial rates do so when monetary policy is more contractionary"

Along these lines, this paper applies the model to 30- to 89-day commercial and deposit portfolio interest rates for a total of 15 banks. In addition, it uses a panel data estimation with monthly frequency for the period from January 2004 to September 2019.

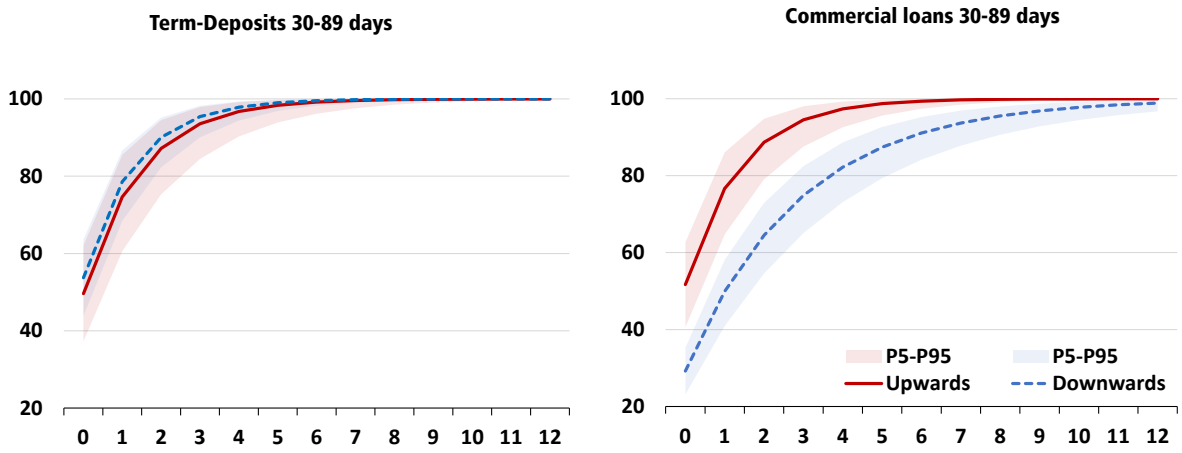
The results show that there is a direct MPR pass-through to banking interest rates, although it is not immediate. Figure 2 shows that, in the face of a permanent change in the MPR, the deposit rate adjusts almost entirely to the new equilibrium in approximately five months, while the lending rate adjusts in 12 months. In addition, it is confirmed that convergence is asymmetric, i.e., deposit rates adjust faster in the face of an expansionary monetary policy, while commercial rates do so when monetary policy is more contractionary.

The results found are robust to different econometric specifications and sample estimates and are consistent with other local findings. Also, similar to international evidence, the asymmetric effect in lending and deposit rates is related to the structure of the credit market. In this line, heterogeneity may be due to differences in the credit risk of banks' portfolios and market segmentation; the existence of interest rate adjustment costs, both passive and active; and the interaction with a secondary deposit market. On the other hand, it is worth noting that the asymmetric response of interest rates to changes in the MPR has decreased in the most recent period, which can be attributed to changes in the structure of the financial market.

Overall, the results corroborate the importance of and differences in the funding and credit channels of monetary policy. They also attest to the importance of the funding structure of banks, the market

organization, and potential financial frictions in the transmission of monetary policy. Thus, the elements found contribute to the understanding of the mechanisms present and to the appropriate calibration in policy implementation.

Figure 2: Convergence of the interest rates due to changes in the MPR.



A Macro Financial Model for the Chilean Economy

One of the main challenges that emerging economies face is to overcome financial frictions to develop the economy and stabilize fluctuations. Some entrepreneurs and households have difficulties in accessing credit and this makes their behavior, either consumption in the case of households and investment in the case of entrepreneurs, less stable and more vulnerable to perturbations of the economy. This in turn, implies policy challenges in terms of how to respond in such a context when the economy is affected by large shocks such as the COVID-19 pandemic. It is therefore crucial to understand how financial frictions shape the dynamics of macro aggregates and how can they change our understanding of the transmission channels of monetary policy.

In the paper *"A Macro Financial Model for the Chilean Economy"* Central Bank of Chile researchers Mauricio Calani, Benjamin García, Mario González Manuel Paillacar, IADB economist Tomás Gomez and Sebastián Guarda at Princeton University, study the role of financial intermediation in shaping the Chilean business cycle. This paper presents a dynamic stochastic general equilibrium (DSGE) model built with a focus on frictional financial intermediation. The model, estimated for the Chilean economy, expands the quantitative analysis toolkit of the Central Bank of Chile, allowing for the study of how financial frictions shape the transmission mechanisms of several macroeconomic and financial shocks. The model builds on a simplified version of the Central Bank of Chile's main DSGE model,

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described in Garcia et al. (2019), augmented to include a rich financial sector and financial frictions. The extensions include optimizing financial intermediaries, corporate and mortgage lending, long-term government bonds within a segmented bonds market, and the possibility for households, firms, and banks to default. The model captures many features of the Chilean economy and allows for a quantitative analysis of the financial system's role in explaining the business cycle and of the interaction between the real and financial sides of the economy.

In the model, the banking system has a central intermediation role. Households lend to banks in the form of deposits. Banks, subject to capital regulation, provide commercial and mortgage loans to entrepreneurs and households respectively. All lenders are subject to equilibrium default risk. The setup creates additional transmission mechanisms absent in models without a financial sector and financial frictions. A segmented bonds market and heterogeneous preferences on asset maturities, as in Andres et al. (2012), allow for the analysis of the economic impact of shocks that affect the slope of the yield curve. Finally, the model features a financial multiplier mechanism that amplifies the effects of demand shocks on real output, but with proportionally less inflationary pressures.

The model also features a Fisherian-type debt deflation mechanism that appears due to the existence of non-contingent nominal debt contracts and causes that, facing negative supply shocks, the unexpected inflation reduces the real financial burden of the borrowers, thus dampening the shock's impact on real activity. The authors also show that financial frictions allow us to think of shocks that otherwise would have no real effects. For instance, borrowers' idiosyncratic risk shocks, which raise lending rates and reduce credit, lead to an economic contraction.

To summarize all the forces in the model, the authors perform a variance decomposition of macro variables of interest into the different shocks that can affect the economy. Table XX shows the percentage of the variance of selected variables explained by different groups of shocks. In particular, they aggregate the

shocks into productivity, demand, monetary policy, financial-risk, financial-term premia, and others. Three conclusions can be extracted from this decomposition. First, the results show a relevant role for financial shocks explaining the cycle, mainly through the influence of risk shocks. Second, the overall impact of the financial frictions depends on the type of shock. For demand shocks, the financial multiplier mechanism dominates, resulting in an amplification of the role of demand shocks explaining GDP and its components. However, for productivity shocks, the Fisherian debt-deflation mechanism acquires a dominant role, leading to a dampened role for productivity shocks in the model with financial frictions. Finally, for monetary policy, the authors observe clear indications that incorporating financial frictions cause an increase in the sacrifice ratio. The increase is due to a financial multiplier effect combined with a financing costs channel that increases monetary policy's role in output, mainly through the investment component, with only minor changes in its role in explaining inflation.

Table 1: Unconditional Variance Decomposition, selected variables (Percent)

		Productivity	Demand	Monet. Policy	Financial: Risk	Financial: TP	Others
GDP Growth	FF	25,8	54,3	8,8	5,7	0,8	4,6
	No FF	62,1	27,8	5,3	0	0	4,7
Inflation	FF	32,8	24,1	8,9	7,3	2,2	24,7
	No FF	60,4	12,4	10,7	0	0	16,5
Consumption Growth	FF	13,2	80	2,6	0,8	2,4	1
	No FF	19,9	72	5,5	0	0	2,5
Investment Growth	FF	76,8	5,9	5,8	8,7	0,5	2,3
	No FF	95,8	1,9	0,5	0	0	1,9

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Arriagada, C., Coble, P., Lewis, B., Li, T. Post-Investment Aftercare Explained: A Guide for FDI Practitioners and Policymakers on How to Grow and Retain Investors. Forthcoming. Publisher: Routledge - Taylor & Francis Group. London, UK.

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Madeira, C. "The impact of the COVID public policies on the Chilean households", forthcoming, Applied Economics Letters.

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Latest working papers of the Central Bank of Chile

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