RESEARCH HIGHLIGHTS

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

August 2023

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

- **Employment in new firms and effects on the workers' future labor performance.**
- **Monetary policy surprises in the banking sector: the role of pure monetary and information shocks.**
- **Exposures to climate change's physical risks in Chile.**

Employment in new firms and effects on the workers' future labor performance

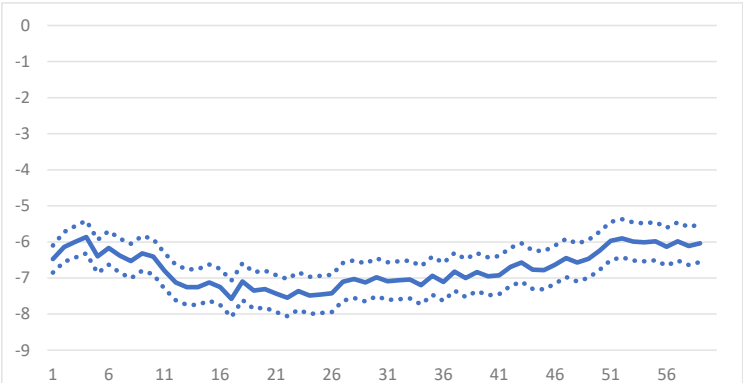
"(...) the effect is greater in larger ones, while [it] is considerably reduced, from 6.5% to 1%, but it does not disappear if only new firms that survive the five years analyzed are considered. (...) if only the most successful new firms in each sector are considered, there is a significant gain in their future revenue trajectories."

The process of creating a new firm is key to the aggregate dynamics of the economy, in terms of both production and employment. This has led to great academic interest in understanding the behavior of firms that have recently entered the market. It is well known, for example, that these firms are more likely to close in the short term, but that those that survive exhibit above-average growth rates. What are the consequences of these patterns for the workers in new firms? On the one hand, poorer average performance of new firms can be expected to hurt the wages and future job prospects of their workers. On the other hand, however, the higher risk of closure might also be expected to force these firms to pay a premium over the average market wage, or that the growth in wages for workers who stay in successful new firms would compensate for their lower starting level.

Central Bank of Chile academic Gonzalo García-Trujillo, jointly with World Bank researcher Nathalie González-Prieto and Alvaro Silva, University of Maryland, analyze this issue in their paper *"Startup Employment and Career Trajectories"*, where they estimate the wage differential between new-firm workers and those from established ones both in the short and medium term. There are several factors, however, that make this comparison a complex exercise. Perhaps the most relevant is the selection process: it is probably the workers with the lowest productivity who are employed in new firms, so the wage differential could be explained by the characteristics of the workers rather than by the age of the firm in which they work, which is the effect the authors are trying to identify.

The paper uses a comprehensive database with sufficient information to implement an empirical strategy that isolates the effect of interest. Specifically, the authors use the Chilean unemployment insurance database, which provides historical information of wages and the firms that employed the individuals, together with data on their age, gender, and nationality. This last information combined with the previous work history of the individuals allows the authors to compare individuals who differ solely (or mainly) by the firm in which they work. This also allows them to solve other types of problems, such as estimating the wage differential for workers who are new entrants to the firms, thus allowing them to clean up for the positive effect of longer tenure in the firm, which should be greater the older the firm is. It also allows them to identify the effect on wages and employment up to five years after having joined a certain firm.

Figure 1: Earnings effects dynamics



Note: Difference in earnings between a worker entering a startup and a established firm, for the 5 following years (scatter lines show confidence bands).

The main result is that workers joining a new firm are paid about 6.5% less in their first five years than they would have received had they joined an established firm. Figure 1 shows the estimated effect for each of the months in this 5-year period, and demonstrates that there is quite a bit of persistence. This effect is lower than the average difference, which is not only explained by the firm they enter, but also by differences specific to the workers, which is roughly 16%. The authors also show that the 6.5% difference is explained almost equally by a reduction in their wages while employed and by a shorter amount of time in formal employment.

The authors perform a series of additional exercises to better characterize the results. They find that the effects are quite persistent over the five years analyzed. In addition, they show that, during those five years, workers who enter a new firm are 3% less likely to be employed, get 0.7 fewer jobs, and are 4% less likely to move immediately to a new job. Finally, they find that the effects are similar by gender, declining with age and greater for lower-income workers. On the firm side, they find that the effect is greater in larger ones, while the effect is considerably reduced, from 6.5% to 1%, but it does not disappear if only new firms that survive the five years analyzed are considered. In any case, if only the most successful new firms in each sector are considered, there is a significant gain in their future revenue trajectories.

Monetary policy surprises in the banking sector: the role of pure monetary and information shocks

Estimating the transmission of monetary policy (MP) surprises to economic and financial activity is crucial for policymakers, especially central banks. When the central bank announces an increase in its policy rate, it is possible to estimate the magnitude of this contractionary shock by comparing the new policy rate with that expected by the market. However, this interest rate hike may unveil two components. One is associated with the inflationary process observed by the monetary authority, and the other with new information related to new macroeconomic data. Accordingly, recent evidence stresses that monetary policy surprises can generate heterogeneous and persistent effects on the economy, depending on the main factor behind the Central Bank's announcement.

"On the one hand, a pure PM contractionary shock has persistent contractionary effects on activity, unemployment, prices and credit growth. (...) On the other hand, a contractionary PM shock driven by its information component has less adverse effects on the economy than the pure PM shock."

By using high frequency data to identify both a "pure" MP component of the shock and an "information component of the shock", in the working paper *"Monetary Policy Surprises on the Banking Sector: The Role of Information and Pure Monetary Shocks"* by BCCh economist Felipe Beltrán and IMF economist David Coble, the authors contribute to decomposing the effects of the above two underlying reasons behind an MP shock. Using 90-day bank lending rate movements around central bank announcements (pure monetary policy shock) and labor market information publications (information shock), they estimate an SVAR model with external instruments to measure the effects of PM shocks driven by each component on the Chilean economy. This exercise yields two main results:

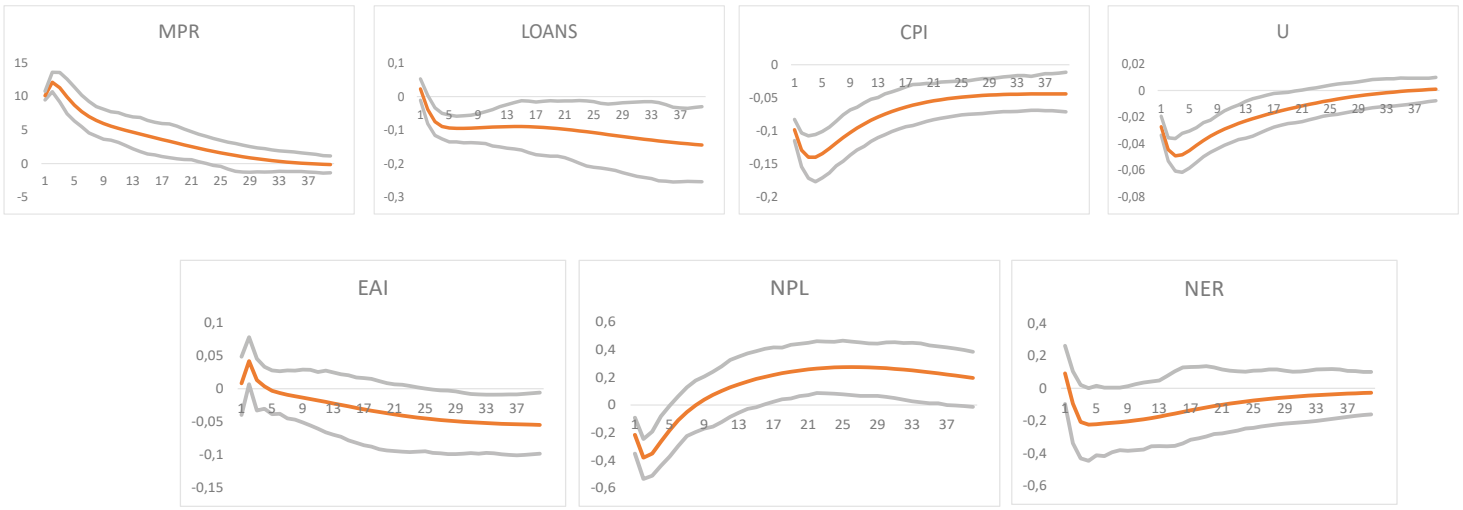
On the one hand, a pure PM contractionary shock has persistent contractionary effects on activity, unemployment, prices and credit growth. It also appreciates the domestic currency and increases spending on provisions (figure 2A). This is consistent with standard macroeconomic theory for small, open economies with free-floating exchange rates and very limited intervention in capital markets. These findings are consistent with other works on

Figure 2A: Pure monetary policy shock

emerging and advanced economies (Gertler and Karadi, 2015; Burger et al., 2017; Lakdawala, 2019; Jarocinski and Karadi, 2020; Hoek et al., 2022; Ciminelli et al., 2022).

On the other hand, a contractionary PM shock driven by its information component has less adverse effects on the economy than the pure PM shock (figure 2B). In the face of a 10 basis point informational shock, inflation falls by almost the same magnitude as the pure PM shock, but is considerably less persistent. However, unlike the pure PM shock, the nominal exchange rate appreciates slightly, economic activity reacts positively, and there is a decline in the unemployment rate. As a result, credit falls less than in the pure PM shock and there is an initial drop in provisioning expenses, which is balanced out after a year of tighter financial conditions. These findings are consistent with the cyclical dampening role of monetary policy and the findings of Nakamura and Steinsson (2018), who show the tendency of market analysts to change their forecasts upward in response to monetary policy surprises, which is interpreted as evidence of the information effect. When the Central Bank tightens its policy due to a better-than-expected economic outlook, it helps to offset the effects of demand shocks at least partially.

Figure 2B: Information shock



Exposures to climate change's physical risks in Chile

Climate change has the potential to cause substantial economic disruption in the coming decades, particularly in areas with lower possibilities of adaptation to the new weather. However, forecasting climate risks is challenging due to the unpredictability of natural weather events, uncertainty about the damages, probability of tail-risks and the long-time horizons over which the risks may materialize.

Contributing to this debate, in the working paper *"Exposures to climate change's physical risks in Chile"*, Central bank economists Magdalena Cortina and Carlos Madeira explore the exposure of real estate properties in Chile to physical risks from climate change over the next 30 years. In the paper real estate properties are measured in terms of the number of properties and their tax appraisal value across various property types and regions.

"(...) flooding represents the strongest exposure to the real estate, followed by the risks of drought, wildfire and coastal deterioration, while the labor productivity loss due to heat has almost no implications for properties risk."

Physical risk is the economic impact stemming from the expected increase in the frequency and magnitude of natural hazards, such as riverside and coastal floods, wildfires, heat and water stress and windstorms. These risks can be measured from various data sources that summarize current scientific measurements of the exposure of each geographical area in Chile. These climate physical risk indicators are then matched to the addresses of individual companies and real estate properties to account for heterogeneous climate exposures across geographical regions.

The authors use the Climate Risk Atlas database (hereafter, ARCLIM) from the Chilean Ministry of Environment and the Climate Impact Explorer (hereafter, CIE) database published by Climate Analytics to obtain the exposure of each geographical area (municipality or region) to five distinct climate risks: loss of labor productivity in heat waves, fires, floods, drought and coastal deterioration. These data are obtained as measures for risks occurring until the year 2050 or within the next 30 years, assuming a scenario in which current policies are unchanged. Using these two climate databases, the authors

build three overall indicators of physical risks: i) the ARCLIM indicator, which is available at the municipality level, ii) the CIE indicator available at the municipality level and iii) the ARCLIM-CIE indicator, which is expressed as the maximum value between the ARCLIM and CIE indicators for each area. Finally, they use the Real Estate Registry dataset, which captures the universe of real estate properties in Chile, to measure the exposure of all the real estate properties (in terms of number and their total appraisal value) in each geographical area (whether a municipality or region) to the climate change physical risks, according to the ARCLIM, CIE and ARCLIM-CIE indicators.

According to the ARCLIM, CIE and ARCLIM-CIE indicators, around 31%, 16% and 39% of the total appraisal values of all the real estate properties in Chile are exposed to climate change risks, respectively. In terms of the number of properties affected, the ARCLIM, CIE and ARCLIM-CIE indicate that around 28%, 17% and 37% of all the real estate properties in Chile are exposed to climate risks, respectively. According to the joint ARCLIM-CIE indicator, the appraisal value of all real estate properties is subject to exposures of 20.2%, 6.7%, 6.1%, 5.4% and 0.1%, for the risks of flooding, drought, wildfire, coastal deterioration, and labor productivity loss due to heat, respectively. Therefore, flooding represents the strongest exposure to the real estate, followed by the risks of drought, wildfire and coastal deterioration, while the labor productivity loss due to heat has almost no implications for properties risk.

Furthermore, they show that the North and Central macro-regions have the highest economic exposure to climate changes physical risks, whether in terms of appraisal value or in the fraction of properties exposed, according to any of the ARCLIM, CIE and ARCLIM-CIE indicators.

The appraisal value of the North macrozones has exposures of 36%, 12% and 36%, according to the ARCLIM, CIE and ARCLIM-CIE indicators, respectively. The Central macrozone is the most exposed area, according to the joint ARCLIM-CIE indicator, with its appraisal showing exposures of 35%, 38% and 51%, according to the ARCLIM, CIE and ARCLIM-CIE indicators, respectively. Therefore, while the North macrozone is the most exposed area, according to the ARCLIM indicator, the exposure of the Central macrozone is much higher according to the CIE and ARCLIM-CIE indicators. The South macrozone is the least exposed area, according to the ARCLIM and the ARCLIM-CIE indicators, with its appraisal showing exposures of 15%, 14% and 27%, according to the ARCLIM, CIE and ARCLIM-CIE indicators, respectively. The Metropolitan macrozone is the least exposed area according to the CIE indicator, with its appraisal showing exposures of 31%, 8% and 36%, according

Table 1: Overall exposure of the real estate properties across macrozone regions

Macro	All real estate properties			Residential properties		
zone	ARCLIM	CIE	ARCLIM-CIE	ARCLIM	CIE	ARCLIM-CIE
	Exposures in % of the appraisal value					
Chile	31.1	15.9	38.6	30.6	15.6	38.2
North	35.6	11.5	36.1	37.5	10.7	38.1
Central	35.0	37.7	51.0	33.8	35.0	49.2
South	14.5	14.4	26.7	14.7	14.4	26.8
Metro	30.8	7.5	35.5	30.1	7.5	34.8
	Exposures in % of the number of properties					
Chile	27.9	16.8	36.9	27.9	16.9	37.3
North	33.8	9.4	34.5	34.1	9.3	34.8
Central	29.9	32.6	46.4	29.3	31.5	46.3
South	12.8	14.9	25.6	13.5	14.9	26.1
Metro	28.7	7.5	33.6	29.0	7.5	33.7

Estimates are under the RCP 8.5 scenario. Regions are divided as follows, North: XV, I, II, III, IV; Center: V, VI, VII, VIII; South: XIX, X, XII, XII XIV; Metro: XIII (Metropolitan region).

Publications in academic journals by researchers of the Central Bank of Chile

Acosta-Henao, M., Pratap, S., & Taboada, M. (2023). "Four facts about relationship lending: The case of Chile 2012-2019". *Journal of Corporate Finance*, 80:102415.

Acosta-Henao, M. (2023). "Law enforcement and the size of the informal sector". *Economic Modelling,* 1006400.

Albagli, E., Contreras, G., Tapia, M., & Wlasiuk, J. M. (2022). "Earnings cyclicality of new and continuing jobs: The role of tenure and transition length". *Labour Economics*, 78, 102242.

Alfaro, R. & Drehmann, M. (2023). "The Holt-Winters filter and the one-sided HP filter: A close correspondence". *Economics Letters* 222 (January): 110925.

Alfaro, R. & Inzunza, A. (2023). "Modeling S&P 500 returns with GARCH models" *Latin America Journal of Central Banking* 4(3): 100096.

Alfaro, R. & Piña, M. "Estimates of the US Shadow-Rate" (2023) *Latin America Journal of Central Banking* 4(1): 100080.

Calani, M., & Paillacar, M. (2022). "The pass-through of loan-loss-provisioning on mortgage lending: Evidence from a regulatory change". *Journal of Banking & Finance,* 135, 106359.

Carlomagno, G., & Albagli, E. (2022). "Trade wars and asset prices". *Journal of International Money and Finance*, 124, 102631.

Carlomagno, G., Fornero, J; Sansone, A. (2023). "A proposal for constructing and evaluating core inflation measures". *Latin American Journal of Central Banking*, Vol. 4 (3), 100094.

Ceballos, L., & Romero, D. (2022). "International portfolio bond spillovers". *Economics Letters*, 220, 110847.

Cortina, M., & Madeira, C. (2023). "Exposures to climate change's physical risks in Chile". *Latin American Journal of Central Banking*, 4(2), 100090.

Cravino, J., Levchenko, A., & Rojas, M. (2022). "Population aging and structural transformation". *American Economic Journal: Macroeconomics,* 14(4), 479-498.

de Elejalde, R., Ponce, C. J., & Roldán, F. (2022). "Multidimensional innovation responses and foreign competition". *Industrial and Corporate Change*, 31(6), 1397-1427.

Diz, S., Giarda, M., & Romero, D. (2023). "Inequality, nominal rigidities, and aggregate demand". *European Economic Review*, 158, 104529.

Donovan, K., Lu, W. J., & Schoellman, T. (*Forthcoming*). "Labor market dynamics and development". *Quarterly Journal of Economics*.

Inzunza, A. & Ruiz, J. (*Forthcoming*). "Pension knowledge in Chile and regional development characteristics". *Journal of Pension Economics & Finance.*

Madeira, C., Madeira, J., & Monteiro, P. S. (*Forthcoming*). "The origins of monetary policy disagreement: the role of supply and demand shocks". *Review of Economics and Statistics.*

Madeira, C. (2023). "Adverse selection, loan access and default behavior in the Chilean consumer debt market". *Financial Innovation*, 9(1), 49.

Madeira, C. (2023). "The evolution of consumption inequality and risk-insurance in Chile". *Emerging Markets Review,* 100996.

Pasten, E., Schoenle, R., & Weber, M. (*Forthcoming*). "Sectoral Heterogeneity in Nominal Price Rigidity and the Origin of Aggregate Fluctuations". *American Economic Journal: Macroeconomics*.

Cao, J., Hansen, C., Kozbur, D., & Villacorta, L. (2022). "Inference for Dependent Data with Learned Clusters". *Review of Economics and Statistics.*

Latest working papers of the Central Bank of Chile

Number	Title	Authors	Date
991	The impact of the Covid Pension Fund Withdrawals in Chile on the future retirement income of the Social Security affiliates and their households	Alejandra Inzunza, Carlos Madeira	August 2023
990	Financial and real effects of pandemic credit policies: an application to Chile	Felipe Garcés, Juan Francisco Martínez, M. Udara Peiris, Dimitrios P. Tsomocos	August 2023
989	Hard Commodities Hit Harder: Global Financial Risk and Commodity Exporters	Gabriela Contreras	August 2023
988	Precios y Holgura en el Mercado de Arriendo: Análisis de Avisos Listados	Felipe Córdova, Alejandra Cruces, Sergio Díaz	August 2023
987	Measurement of Efficiency and its Drivers in the Chilean Banking Industry	Adriana Cobas, Alexandros Maziotis, Andrés Villegas	July 2023
986	Disentangling Demand and Supply Inflation Shocks from Chilean Electronic Payment Data	Guillermo Carlomagno, Nicolas Eterovic, L. G. Hernández-Román	July 2023
985	Entrepreneurship and the Efficiency Effects of Migration	Gustavo González	July 2023
984	Heterogeneous Impacts of Commodity Price Shocks on Labour Market Outcomes: Evidence and Theory for the Chilean Mining Sector	José Valenzuela, David Coble	June 2023
983	Effectiveness of Foreign Exchange Interventions: Evidence and Lessons from Chile	Jorge Arenas, Stephany Griffith-Jones	June 2023
982	Freight costs and domestic prices during the COVID-19 pandemic	Gustavo González, Emiliano Luttini, Marco Rojas	June 2023
981	Anatomy of Firms' Margins of Adjustment: Evidence from the COVID Pandemic	Elías Albagli, Andrés Fernández, Juan Guerra-Salas, Federico Huneeus, Pablo Muñoz	June 2023
980	The Impact of Monetary Policy on a Labor Market with Heterogeneous Workers: The Case of Chile	Carlos Madeira, Leonardo Salazar	June 2023
979	Monetary Policy Surprises on the Banking Sector: the Role of the Information and Pure Monetary Shocks	Felipe Beltrán, David Coble	April 2023
978	Startup Employment and Career Trajectories	Gonzalo García-Trujillo, Nathalie González-Prieto, Alvaro Silva	April 2023
977	Commodity Price Shocks and Production Networks in Small Open Economies	Alvaro Silva, Petre Caraiani, Jorge Miranda-Pinto, Juan Olaya-Agudelo	April 2023
976	Exposures to climate change's physical risks in Chile	Magdalena Cortina, Carlos Madeira	April 2023

975	Global monetary policy surprises and their transmission to emerging market economies: an external VAR analysis	Felipe Beltrán	April 2023
974	Use of Financial Instruments among the Chilean households	Carlos Madeira	April 2023
973	The evolution of consumption inequality and riskinsurance in Chile	Carlos Madeira	April 2023
972	Government Purchases, the Labor Earnings Gap, and Consumption DynamicsFrom Patriarchy to Partnership: Gender Equality and Household Finance	Mario Giarda	April 2023
971	Spatial Production Networks	Costas Arkolakis, Federico Huneeus, Yuhei Miyauchi	February 2023
970	From Dominant to Producer Currency Pricing: Dynamics of Chilean Exports	José De Gregorio, Pablo García, Emiliano Luttini, Marco Rojas	January 2023
969	Where is the Inflation? The Diverging Patterns of Prices of Goods and Services	Gent Bajraj, Guillermo Carlomagno, Juan M. Wlasiuk	January 2023
968	From Patriarchy to Partnership: Gender Equality and Household Finance	Luigi Guiso, Luana Zaccaria	January 2023
967	The COVID-19 Shock and Firm Financing: Government or Market? Or Both?	Miguel Acosta-Henao, Andrés Fernández, Patricia Gomez-Gonzalez, Sebnem Kalemli-Ozcan	December 2022
966	Monetary Policy in Small Open Economies and the International Zero Lower Bound	Marco Rojas	December 2022
965	Business Cycle Asymmetry and Input-Output Structure: The Role of Firm-to-Firm Networks	Jorge Miranda-Pinto, Alvaro Silva, Eric R. Young	December 2022
964	Stocks, Bonds and the US Dollar - Measuring Domestic and International Market Developments in an Emerging Market	Nicolas Eterovic, Dalibor Eterovic	October 2022
963	Global Drivers and Macroeconomic Volatility in EMEs: a Dynamic Factor, General Equilibrium Perspective	Gent Bajraj, Andrés Fernández, Miguel Fuentes, Benjamín García, Jorge Lorca, Manuel Paillacar, Juan Marcos Wlasiuk	September 2022
962	Exchange rate volatility and the effectiveness of FX interventions: the case of Chile	Alejandro Jara, Marco Piña	September 2022
961	Trade Credit and Sectoral Comovement during Recessions	Jorge Miranda-Pinto, Gang Zhang	August 2022
960	Capital Ratios and the Weighted Average Cost of Capital: Evidence from Chilean Banks	Rodrigo Cifuentes, Tomás Gómez, Alejandro Jara	August 2022
959	The Holt-Winters filter and the one-sided HP filter: A close correspondence	Rodrigo Alfaro, Mathias Drehmann	August 2022