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The potential impact of financial portability measures on mortgage refinancing: Evidence from Chile*

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Abstract

This study analyses the potential impact of a recent Financial Portability Law in Chile, which substantially reduces the monetary and time costs of mortgage modification. I show that mortgage refinancing is positively associated with financial education, liquidity needs and the timing for optimal refinancing. A counterfactual exercise shows that the new legislation can substantially increase refinancing rates and bring significant welfare gains, especially if it lowers the cognitive costs of the process. Welfare gains are larger for owners of second properties and top valued homes. Finally, bank switching decisions for consumer loans are found to be unaffected by mortgage refinancing.

Resumen

Este estudio analiza el potencial impacto de la reciente Ley de Portabilidad Financiera en Chile, la cual reduce significativamente los costos monetarios y de tiempo para el refinanciamiento hipotecario. Los resultados muestran que el refinanciamiento hipotecario está positivamente asociado a la educación financiera, necesidades de liquidez y al período de tiempo para realizar un refinanciamiento óptimo. Un ejercicio contrafactual muestra que la nueva legislación podrá aumentar sustancialmente las tasas de refinanciamiento y otorgar ganancias de bien-estar, especialmente si bajaren los costos cognitivos del proceso. Las ganancias de bien-estar son mayores para propietarios de segundas propiedades y de viviendas de mayor avalúo. Finalmente, se encuentra que las decisiones de cambio de banco para deudas de consumo no son afectadas por el refinanciamiento hipotecario.

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1 Introduction

Credit competition among lenders is a significant concern, since banks are multiproduct firms in a oligopoly market (Farrell and Klemperer 2007, Degryse et al. 2019). In particular, mortgages are one of the financial institutions' most important products, since these represent large amounts in households and firms' budgets (Campbell 2013). Also, mortgages are a long-term contract that often hinders borrowers that wish to switch to a new bank (Brunetti et al. 2016), even if it is to take advantage of other banking offers such as credit cards (Calem et al. 2006) or payments, insurance and savings products (Brunetti et al. 2016). The diversity of mortgage options, the size of its loans, the length of its contracts and the complexity to make an optimal decision (Deng et al. 2000) make mortgages a special product where additional clarity of choices and competition could bring significant welfare gains (Woodward and Hall 2012, Campbell 2013). Finally, there is extensive evidence of search frictions and switching costs for customers in both mortgages (Allen et al. 2019, Bhutta et al. 2020) and other credit products (Calem et al. 2006), which allows lenders to charge substantially higher rates and fees from individuals even after accounting for observable risk characteristics (Woodward and Hall 2012, Allen et al. 2019, Bhutta et al. 2020), especially among less financially literate customers (Campbell 2013, Bhutta et al. 2020).

For this reason, several countries have implemented new legislation to compel financial institutions to allow customers' banking accounts to be closed quickly and ease mortgage refinancing, so that clients may switch banks more easily and take advantage of competing offers. Such Financial Portability laws were implemented in Mexico in 2014, Italy in 2015, France in 2017, Spain in 2019¹ and in Chile in 2020 (Chilean Congress 2020). These legislations allow to subrogate a mortgage plus its collateral guarantees and all the customers' financial accounts with a single document², an expedite process (a maximum of 12 days in Italy, 13 days in Spain, 15 days in Mexico, 22 days in France, 30 days in Chile) and at a reduced cost (such as avoiding new notary

¹After Mexico's Financial Reform in 2014, the number of subrogated mortgages increased more than 17 times, from just 948 loans in 2013 to 7,205 loans in 2014, 8,975 loans in 2015 and 16916 loans in 2016 (Government of Mexico 2016). However, in Spain the number of subrogated mortgages in the first quarter after the new law (April to June of 2019) was more than 25% lower relative to the previous year (INE 2019).

²This single document obtained contract must detail all the fees and costs of closing the financial accounts in a simple and standardized statement, in order to facilitate borrowers' comprehension and ease their move.

fees and home appraisal)³. Furthermore, in 2014 the European Union, following a proposal of the European Central Bank, issued the Directive 2014/92/EU to encourage member countries to adopt financial portability laws and standardize access, switching, and fees related to payment accounts. The Chilean law was published on June 3 of 2020, although its implementation only started on September 8 of 2020 to give financial institutions the adequate time for adjusting.

This work analyzes the potential future impact of the Financial Portability law in Chile on household financial choices and welfare, in particular in terms of mortgage refinancing or renegotiation. Mortgage refinancing is an important financial decision since it involves large sums. Furthermore, there is strong empirical evidence that households do not take advantage of mortgage refinancing opportunities, losing substantial savings (Keys et al. 2016). Using data from the Chilean Household Finance Survey (in Spanish, *Encuesta Financiera de Hogares*, hence on, EFH), I show that few homeowners have ever completed a mortgage refinancing. Estimating a discrete choice model from the household survey data, I find that mortgage refinancing is more frequent among higher income and more financially literate households and for customers of mid-sized and small banks. Households also renegotiate due to higher liquidity needs or debt burden, confirming empirical evidence for the USA (Hurst and Stafford 2004). Finally, households are more likely to renegotiate during a long period in which renegotiating has a positive net present value or in periods of higher credit demand, although refinancing is unrelated to higher bank supply slack, suggesting again a liquidity motive rather than banks' initiative. I then calibrate the impact of the Financial Portability law for the future mortgage refinancing rates and its welfare gains, taking into account two channels: one, the reduction in the pecuniary costs of the refinancing process; two, the reduction in the complexity and time costs of the documents required for the proceedings, which implies that households will find it easier to manage the refinancing process, even with lower financial literacy levels. Considering just the reduction in financial costs, the results show that the mortgage refinancing rate would

³In particular, the Financial Portability laws differ from the "portable mortgage" schemes which are used in the USA, Canada and the Netherlands. The "portable mortgage" schemes allow the borrowers to move their mortgage loan with them when they buy a new house and keep the same interest rate and terms or get reduced costs of prepayment. However, in such schemes the borrower must still pay for notary fees to obtain a new loan and such schemes do not reduce the costs of refinancing the loan, switching to a new financial institution or closing other bank accounts. Also, the "portable mortgage" characteristic is optional among lenders in the USA, Canada and the Netherlands, therefore borrowers must choose such a contract and pay higher fees to obtain it.

increase from 17.9% to 19.5% of all mortgage borrowers, implying an average welfare gain of 4.2 Chilean UF (a sum around 177 USD) per borrower⁴. However, by considering both the reduction in pecuniary costs plus the lower time and cognitive requirements, then the legislation implies that mortgage refinancing rates could increase from 17.9% to 28.6%, with an average welfare gain of 31.9 UF per borrower (a sum around 1,344 USD). Accounting for both the pecuniary and cognitive channels, there is an increase in the refinancing rates across all income levels and home values, but with larger welfare gains in absolute value for the homes of higher value and for the second homes purchased as an investment or to rent as an additional income source.

Finally, using the panel component of the Chilean Household Finance Survey, I show that bank switching for consumer debt (installment loans, credit cards and lines of credit) is quite common in Chile, with more than two thirds of the borrowers changing institutions within three years⁵. An empirical model of the bank switching decisions shows that bank switching is negatively related to financial education, debt levels, and mortgage ownership, while being positively related to the number of past bank relationships of the household. However, bank switching is unrelated to either past mortgage refinancing and to the past periods with positive refinancing opportunities, therefore it appears unlikely that the new law may impact consumer debt markets significantly.

This paper fits into a larger literature that uses microdata to study household finance issues (Bover et al. 2016, Madeira and Zafar 2015, Madeira 2018), which are affected by over-borrowing (Angrisani et al. 2019, Bahadir and Valev 2020), low competition (White 2020) and myopic decisions (Campbell 2013, Roll and Moulton 2019). This article is related to . It is also related to the literature on mortgage refinancing and the substantial gains lost by customers (Green and Shoven 1986, Agarwal et al. 2013). Furthermore, since mortgage refinancing is often a feasible alternative to loan default, this study is also related to how better loan contracts and option flexibility can reduce delinquency and improve financial stability (Das and Meadows 2013, Agarwal and Zhang 2018). The study is also related to how financial literacy impacts consumer decisions and their choice of complex products with risky characteristics (Campbell 2013, Disney and Gathergood 2013, Gathergood and

⁴The UF is a real monetary unit that is updated for inflation in Chile and it is widely used for many long term contracts, such as rents, mortgages, consumer loans, and wages. Between 2010 and 2019, the average value of the UF was 42.13 USD and fluctuated between 38.25 and 46.43 USD.

⁵Using similar survey data for Italy, Brunetti et al. (2016) show that less than a quarter of the households switch their main bank within 2 years. Therefore the observed bank switching in Chile is high relative to other countries.

Weber 2017), which is especially detrimental for women’s wealth (Goldsmith-Pinkham and Shue 2020). Empirical evidence for the US shows that 20% of financially unconstrained households fail to refinance when it is optimal to do so and such a puzzle happens across all education levels, suggesting that psychological factors such as procrastination, trust, and the inability to understand complex decisions are significant barriers (Keys et al. 2016). Finally, this article is also related to how regulatory and technology advancements can impact financial markets structure to simplify choices and bring benefits to consumers (Bennett et al. 2001, Bhutta et al. 2020).

This paper is organized as follows. Section 2 summarizes the EFH survey data and the mortgage refinancing rates across different demographic groups. Section 3 describes the Financial Portability legislation and the empirical model of mortgage refinancing, based on the loan contract info, the household’s tax rate and financial education, and the new mortgage loan rates observed on the market. Section 4 shows the results, while section 5 exhibits a calibrated exercise for the welfare gains of the new law for borrowers, and section 6 concludes with policy implications.

2 The Chilean Household Finance survey (EFH)

For this study I use the Chilean Household Finance Survey (in Spanish, *Encuesta Financiera de Hogares*, hence on EFH), which is a representative national survey with detailed information on assets, debts, income and financial behavior. The EFH is comparable to similar surveys in the United States and Europe, such as the Survey of Consumer Finances (SCF) and the Household Finance and Consumption Survey (HFCS). The seven EFH survey waves (2007, 2008, 2009, 2010, 2011, 2014, 2017) covered 21,319 urban household interviews, with an over representation of richer households (which is common also in other countries). To adequately correct for the over representation of wealthier households, all the statistics in this article use expansion factors (or population weights), meaning each observation is weighted with a number f_i representing the statistical number of households equivalent to i . Since the survey sample was randomly selected according to a predetermined characteristic (the appraisal value of the household residence for tax purposes, this information is valid from administrative records and available whether the household is a homeowner or rents the property from someone else), then all the sample statistics are consistent once the sample expansion factors are applied (Madeira 2018).

Due to the absence of a single administrative credit register that includes all the non-banking lenders, the EFH survey is the only micro data source in Chile with information on household loans from all types of lenders and with extensive detail on the characteristics of borrowers. The survey has detailed measures of income, assets (financial portfolio, vehicles and real estate) and debts, including mortgage, educational, auto, retail and banking consumer loans (including credit cards, lines of credit or loan contracts). In order to cover debts exhaustively, the survey elicits the loan terms (debt service, loan amount, maturity) for the 4 largest mortgages (including both the main mortgage and associated unsecured loans for related expenses such as contract fees, appraisal or remaining home payments) and the 3 main loans for each category of debt (loan categories include credit cards and installment loans with banks, retail stores, labor and credit unions, auto loans, education loans, and informal lending). The survey also asks for each mortgage about "whether the household has refinanced, renegotiated or modified some of the original loan terms since the start of the loan" and "for what reason". Therefore the mortgage refinancing studied in this article corresponds to a very broad definition of refinancing or renegotiation, since it includes all the renegotiations and modifications implemented as a mutual agreement between borrower and lender, besides the exercise of the refinancing options in the original contract.

The survey also elicits the identity of the bank or financial institution with whom the borrower contracted its mortgage and consumer loan contracts. For simplicity, I will represent the results in terms of 4 groups of banks. The first category corresponds to the Large Banks, which includes Banco de Chile, Banco Estado, BCI and Banco Santander. A second category corresponds to Median or Mid-sized Banks which are smaller than the Large Banks, but still command a significant market share, especially among higher income households. The Median or Mid-sized Banks category includes BBVA, Itau-Corpbanca and Scotiabank. The third category corresponds to banks that are part of a larger business holding that also includes retail stores and therefore these banks are largely specialized in small consumer loans, but also sell mortgages. This third category of Retail Banks includes three institutions: Falabella, Paris and Ripley. Finally, the fourth category corresponds to small banks and includes the banks BICE, Security, Penta, plus other banks. Finally, in the case of mortgages there is a significant share of non banking players, which include State Credit (loans directed at low income households from the Ministry of Housing), Labor Unions⁶, Insurance

⁶For workers with formal contracts in Chile it is compulsory to be a member of one of the labor unions. Labor

companies, and Credit Cooperatives (often popular among farmers and small businesses).

The EFH survey has little information on financial education. However, the Survey of Financial Capabilities (in Spanish, *Encuesta de Capacidades Financieras*, hence on, ECF) measured in 2016 an extensive set of financial literacy indexes for 1,224 Chilean households, using the same methodology applied to other members of the OECD / INFE (International Network on Financial Education) network (Atkinson and Messy 2012). It is therefore possible to impute the financial literacy indexes for each EFH household head using the mean indexes of similar ECF individuals, based on age (10 year dummies), gender, education level and household income quintile. Table 1 shows the mean levels of 4 different financial literacy indexes: Financial Attitudes, Financial Behavior, Financial Knowledge, and Search Behavior for Financial Information. Financial Attitudes measures on a scale from 0 to 5 whether households prefer to spend money instead of saving it. Financial Behavior measures on a scale from 0 to 8 a set of behaviors such as thinking before making a purchase, paying bills on time, budgeting, saving or borrowing to make ends meet. Financial Knowledge measures on a scale from 0 to 8 the basic knowledge of a range of financial topics, such as division, risk-return trade off, inflation, interest rates, and asset diversification. The Search Behavior for Financial Information measures on a scale from 0 to 3 measures how much information the household gathers on different financial products and financial institutions, the diversity of its information sources on financial products (internet, financial advisors whether in person or by phone, friends, newspapers...) and how frequently the household has borrowed over the last year. In a developing economy like Chile, the Attitudes index is not strongly related to households with better financial management, but it rather shows a more conservative spending among the least educated and lower income. The other 3 indexes - Behavior, Knowledge and Search - are all increasing in the income and education of the household. An overall Financial Education Index is therefore given by the sum of the Behavior, Knowledge and Search sub-indexes⁷. The

Unions in Chile can extend loans to their members, but have some restrictions relative to other lenders. In particular, unions cannot charge different interest rates according to the borrower profile (that is, union loans can have different interest rates according to its maturity and loan amount, but the same offer must be given to all borrowers). However, unions have the advantage that the credit can be paid directly from a fraction of the wage transfers of the employer, therefore unions will receive some payment even if the borrower chooses to engage in strategic default.

⁷In the original definition of Financial Literacy of the OECD / INFE network, Education was the sum of all the Attitude, Behavior, Knowledge and Search indexes. In developed economies, the Attitude questions are related to households that prefer "savings" over "debt" financial products. Since in Chile the Attitude index is more related

Table 1: Mortgage refinancing during the past life of the loan and financial literacy by education and income of the households that had a mortgage (currently or in the past)

Household income quintile (poorest=1, wealthiest=5)	Financial Literacy Indexes					Mortgage refinancing (%)		
	Attitude	Behavior	Knowledge	Search	Education	Any home	Main home	Other
1	3.3	5.2	4.9	0.8	10.9	12.2	11.7	8.8
2	3.2	5.3	4.9	0.9	11.2	10.6	10.1	7.8
3	3.1	5.6	5.1	1.1	11.8	10.4	10.3	7.2
4	3.0	5.8	5.2	1.3	12.3	11.5	11.3	10.1
5	2.9	6.3	5.4	1.5	13.2	19.5	17.7	14.7
All households	3.0	5.8	5.2	1.3	12.3	14.3	13.4	12.2
Never renegotiated mortgage	3.0	5.8	5.2	1.2	12.2	0	0	0
Renegotiated some mortgage	3.0	6.0	5.3	1.4	12.7	100	94.4	58.3
Elementary education	3.4	4.8	4.6	0.7	10.1	7.4	7.3	3.7
Secondary education	3.1	5.6	5.1	1.1	11.8	12.5	12.1	8.5
Technical or Some college	2.8	6.0	5.5	1.5	12.9	14.1	14.2	5.6
College education	2.9	6.4	5.5	1.5	13.3	16.1	14.4	16.0
Post-graduate education	2.7	6.4	5.3	1.6	13.3	30.7	27.9	20.5

Sample size: a total of 6,088 households from the EFH survey (2007 to 2017 waves).

Financial Education overall index is strongly increasing in income, going from 10.9 for the lowest income quintile to 13.2 for the highest. Mortgage refinancing rates are also increasing in education and income, with values going from 7.4% for household heads with Elementary school to 16.1% and 30.7% for the college educated and postgraduate, respectively. Around 19.5% of the borrowers in the highest income quintile have renegotiated a mortgage. However, the mortgage refinancing rates are much lower for the other income quintiles, with values between 10.4% and 12.2%. Mortgage refinancing rates are slightly higher for the main home (13.4% of the borrowers with mortgages for their main home) than for Other properties (12.2% of the borrowers with mortgages from other properties) and such a pattern is similar across all income levels. This can perhaps be explained by the fact that main homes are typically more expensive and require larger loans and with longer maturities, which increases the absolute value of renegotiating (Agarwal et al. 2013).

to the conservative spending background of the low income and less educated households that lack access to debt, then I opted to exclude it from the overall Financial Education index. All the results in the article, however, are very similar, whether in quantitative terms and statistical significant levels, if the analysis uses the total sum of the financial literacy indexes that was suggested in the original OECD / INFE article (Atkinson and Messy 2012).

Table 2 shows the fraction of borrowers and the refinancing rates by lending institution. 71.7% of all home mortgages were issued by banks, with the four Large Banks representing 56% of the borrowers. Mid-sized banks represented 12% of all mortgages, while the Retail and Other Banks represented just 3.6% of the borrowers. State Credit is the second largest player with almost 25% of all mortgages. Unions, cooperatives and insurance companies are minor players, representing just 3.3% of all mortgages. refinancing rates are highly heterogeneous among different institutions. For banks and cooperatives around 17.1% and 17.6% of the borrowers have refinanced their mortgages at some point in the past, while for insurance, state credit and unions the rates are only 12.1%, 10% and 6.5%, respectively. However, rates are also highly heterogeneous among different bank types, with Retail banks only renegotiating just 8.0% of their mortgages.

3 Legislation description and empirical strategy

The Financial Portability Law aims to reduce two costs for the mortgage refinancing and bank switching (Chilean Congress 2020): i) to lower the monetary fixed cost of a mortgage refinancing from 24.1 UF (around 1,015 USD) to 8.7 UF (around 365 USD), saving 15.4 UF (650 USD) for the borrowers; ii) to reduce the time span and complexity of the process. The reduction of the monetary fixed cost implicated by the law involves easing 3 steps of the refinancing process: one, it erases the need for the lender to provide copies of the house deed (saving 3.1 UF, around 130 USD); two, it reduces the notary costs for signing the house deed (saving 2.7 UF, around 114 USD); and three, only the borrower and the new lender need to register the new loan at the Real Estate Registrar office, therefore the former lender is no longer required to update the status of the old loan (saving 9.6 UF, around 405 USD). Furthermore, the Financial Portability Law reduces the number of days required for the mortgage refinancing, by saving 10 days that were required before for a custody letter of the mortgage deeds and documents with the former lender and it also saves 20 days that were required at the notary to modify the loan of the former lender (since now both the modification of the past loan and the registry of the new loan are completed by the new lender in a single step and it does not require intervention of the former lender). By saving 30 days from the time processing and erasing the requirement of 2 steps (the custody letter, plus the notary modification of the old loan by the previous lender), the new law should benefit households that

Table 2: Mortgage refinancing by type of lending institution

Mortgage Institutions	Fraction of mortgage borrowers			Mortgage refinancing (%)		
	All homes	Main home	Other properties	All homes	Main home	Other
Non-Banks:						
State Credit	24.9	28.0	9.5	10.0	9.9	3.9
Labor Union	1.3	1.4	0.9	6.5	5.2	2.4
Insurance	0.4	0.5	0.2	12.1	10.6	13.9
Credit cooperative	1.6	1.7	0.9	17.6	17.4	12.9
Bank type:						
Large	56.2	54.1	67.6	16.5	14.9	10.7
Retail	1.1	1.1	1.0	8.0	7.0	9.0
Median	12.0	11.2	16.2	19.8	15.4	19.1
Other banks	2.5	2.1	3.7	20.7	15.6	24.6
All banks	71.7	68.4	88.5	17.1	14.9	12.8
Bank:	Fraction of bank mortgage borrowers			Mortgage refinancing (%)		
	All homes	Main home	Other properties	All homes	Main home	Other
Banco de Chile	11.0	8.3	16.1	16.2	10.9	16.4
Banco Estado	46.7	41.2	31.7	14.8	14.4	6.1
Scotiabank	8.5	6.9	8.5	15.8	12.0	16.9
BCI	5.2	4.3	5.7	22.4	17.4	18.3
Corpbanca	2.6	1.6	4.1	19.9	11.5	34.5
BICE	0.7	0.5	1.3	33.7	17.9	26.9
Santander	14.8	11.6	20.4	23.2	19.6	16.6
Itaú	1.0	0.7	1.3	16.9	17.7	5.2
Retail banks	1.4	1.1	1.0	7.9	7.7	8.5
BBVA	5.0	4.1	6.2	31.1	26.1	25.3
Other Banks	3.0	19.0	3.6	19.7	13.8	27.0

Sample size: a total of 6,088 households from the EFH survey (2007 to 2017 waves).

were unable to complete the previous procedures due to their complexity. Finally, the law also facilitates the comparison of different financial offers and customers' understanding of the total costs of the mortgage refinancing and switching of other financial accounts by requiring lenders to provide a standardized and simple format describing all the fees and interests to be charged.

To estimate the potential impact of the Financial Portability Law in Chile, I consider a discrete choice model of whether a household i at time t has ever renegotiated its mortgage or not ($Y_{i,t} \in \{0, 1\}$, with 1 representing a mortgage refinancing at some point in the life of the loan):

$$1) Y_{i,t} = F(\beta x_{i,t} + \varepsilon_{i,t})$$

with $x_{i,t}$ denoting the explanatory variables, $\varepsilon_{i,t}$ an idiosyncratic error (or an unobserved preference of household i at time t for renegotiating) and $F(\cdot)$ denoting a parametric function, such as the logit or probit models. I chose to apply the logit function throughout the article.

The vector of explanatory variables includes some measures of the benefits of refinancing from the optimal closed-form solution in Agarwal et al. (2013). For the case of Chile with Fixed-Rate Mortgages in real monetary units, the same formula applies with a zero inflation rate to account that the value of the mortgage does not change with inflation. In the case of our sample of households, the value of renegotiating depends on factors such as the current mortgage interest rate at time t , the marginal tax rate of household i , plus the interest rate and mortgage value of their mortgage contracted at time $c(i)$. Let r_t denote the mortgage interest rate currently observed at time t , while $r_{c(i)}$ represents the mortgage interest rate made by household i at time $c(i)$ (with $c(i)$ in the past, $c(i) < t$). Agarwal et al. (2012) argue that an optimizing agent with no liquidity frictions should refinance when the current interest rate falls by an amount of $ADL_{i,c(i),t}$ or more relative to the contractual rate: $Y_{i,c(i),t}^{optimal} = 1(r_t + ADL_{i,c(i),t} < r_{c(i)})$, with $1(\cdot)$ being the unit function, $ADL_{i,c(i),t} = \frac{1}{\psi_{c(i),t}} \left[\phi_{i,c(i),t} + W(-e^{-\phi_{i,c(i),t}}) \right]$, where $W(\cdot)$, is the Lambert W-function, $\psi_{c(i),t} = \frac{\sqrt{2(\rho + \lambda_{c(i),t})}}{\sigma}$ and $\phi_{i,c(i),t} = 1 + \psi_{c(i),t}(\rho + \lambda_{c(i),t}) \frac{\kappa_{i,c(i),t}}{M_{c(i)}(1 - \tau_i)}$. τ_i is the marginal tax rate faced by the main head member of the household i ⁸. $M_{c(i)}$ is the total debt of the mortgage contract $c(i)$ of household i . σ represents the annual standard-deviation of the mortgage real interest rate

⁸The marginal personal income tax in Chile is 0% for an annual income between 0 and 8,038,926 pesos, 4% from 8,038,926 to 17,864,280 pesos, 8% from 17,864,280 to 29,773,800 pesos, 13.5% from 29,773,800 to 41,683,320 pesos, 23% from 41,683,320 to 53,592,840 pesos, 30.4% from 53,592,840 to 71,457,120 pesos, 35% above 71,457,120 pesos.

and it is calibrated as 0.0061⁹. This standard-deviation is smaller than for the US, because in Chile all mortgage contracts are defined in real monetary unit value (UF). The mortgage interest rate in Chile is a fixed real interest rate contract and not a fixed nominal rate as in the US, therefore it is not affected by inflation volatility. The fixed real interest rate contracts implemented in Chile are a good intermediate combination between the trade-off implied by the income risk (given by the volatility of the nominal payments) in Adjustable Rate Mortgages (ARMs) versus the wealth risk (given by inflation volatility) in Fixed Rate Mortgages (FRMs), as suggested in Campbell (2013). ρ is the agent's real discount rate and it is calibrated as 0.05 (as in Agarwal et al. 2013 and in several papers of the macroeconomics literature). The parameter $\lambda_{c(i),t}$, the expected real repayment rate of the mortgage, is calibrated as $\lambda_{c(i),t} = \mu + \frac{r_{c(i)}}{e^{r_{c(i)}\Gamma_{c(i),t}} - 1} + \pi$, where $\mu = 0.05$ is the probability of a household moving to another home in each year (around 5%), $\Gamma_{c(i),t}$ is the remaining maturity (in years) at time t of the mortgage contract of household i . $\kappa_{i,c(i),t}$ represents the present value for household i at time t of the total refinancing costs of the mortgage $c(i)$ net of the future tax benefits, with $\kappa_{i,c(i),t} = F_t + fM_{c(i)} \left[1 - \frac{\tau_i}{\theta + \rho + \pi} \left[\left(\frac{1 - e^{-(\theta + \rho + \pi)N}}{N} \right) \left(\frac{\rho + \pi}{\theta + \rho + \pi} \right) + \theta \right] \right]$, where $N = 20$ is the maturity (in years) of a new mortgage contract after refinancing (according to the EFH survey more than 46% of the mortgages in Chile have a maturity of 20 years), $f = 0.01$ is a variable cost of refinancing proportional to the loan value (which in Chile is around 1%, similar to the US, Agarwal et al. 2013), and $\theta = 0.01 + \mu$ is an exogenous probability of refinancing due to a decision of moving to another house, death of a relative or an unexpected liquidity demand. In both expressions $\pi = 0$ because in Chile the contracts are in real terms and therefore the future payments do not fall in real value. Finally, F_t is the fixed cost of refinancing a mortgage and this is the parameter targeted by the new Financial Portability Law. Therefore I calibrate $F_t = 24.1$ UF (around 1015 USD) before the Financial Portability Law ($t < July 2020$) and $F_t = 8.7$ UF (around 365 USD) after the Financial Portability Law ($t \geq July 2020$), which are the pecuniary costs targeted by the legislative change. One could also use a second-order Taylor approximation to the Agarwal et al. (2013) formula, which would approximate the required interest rate fall relative to the original contract as $ADL_{i,c(i),t} \approx \sqrt{\frac{\sigma}{1 - \tau_i} \frac{\kappa_{i,c(i),t}}{M_{c(i)}}} \sqrt{2(\rho + \lambda_{c(i),t})}$. Using this simpler second-order approximation does not require the use of Lambert's W-function and it does not

⁹The standard deviation for the monthly differences of the average mortgage interest rate between January of 2003 and January of 2020 is 0.0017624, which gives under a Brownian motion assumption $\sigma = .0017624\sqrt{12} = 0.0061$.

change much the results of this article. However, I prefer to apply the full optimal rule, since it gives a more conservative view about how frequent the mortgage refinancing should be.

Many households are far from fully-optimizing agents and may deviate from the optimal refinancing rule. Therefore I consider that households are more likely to renegotiate not only if it is optimal to do so (i.e., $Y_{i,c(i),t}^{optimal} = 1$), but also for how long it has been optimal to renegotiate (time-dependent inaction) and how large are the gains of refinancing (state-dependent inaction), as suggested in Gomes et al. 2020). In particular, the empirical model includes the logarithms of the Months for a positive refinancing $g_{i,c(i),t} \equiv \sum_{c(i)}^t Y_{i,c(i),t}^{optimal}$ and of the maximum value observed in the past for the Present Value of a refinancing, $PV_{i,c(i),t} \equiv \max_{c(i),\dots,t} \frac{(r_{c(i)} - r_t)M_{c(i)}}{\rho + \lambda_{c(i),t}} - \frac{\kappa_{i,c(i),t}}{1 - \tau_i}$.

The vector $x_{i,t}$ of explanatory variables therefore includes two characteristics of the optimal mortgage refinancing rule, which are the $\ln(\text{Months for refinancing}_{i,c(i),t})$ and the $\ln(\text{Present Value of refinancing}_{i,c(i),t})$, plus household characteristics such as the household head's Financial Education $_i$ and the household's current monthly Debt Service to Income Ratio ($DSR_{i,t}$). Since Financial Education is likely to matter for the correct understanding of the mortgage contract, I also include the interaction between Financial Education and the optimal refinancing rules: $\text{Financial Education}_i \times \ln(\text{Months for refinancing}_{i,c(i),t})$, $\ln(\text{Present Value of refinancing}_{i,c(i),t})$. Finally, as a robustness check to account for the issue that some lending institutions may make it harder to renegotiate mortgages, I include characteristics of the bank with mortgage $c(i)$, such as its size (measured by the logarithm of its total assets, $\ln(\text{bank assets}_{c(i)})$), profitability (Bank $c(i)$'s Return on Assets, i.e., ROA), plus dummy variables for the type of banking institution (Retail Bank $_{c(i)}$, Median Bank $_{c(i)}$, Other Bank $_{c(i)}$, with Large Bank $_{c(i)}$ being the baseline category). I also include two time-varying variables that measure aggregate credit conditions faced by the Chilean banks: Supply factors $_t$ and Demand factors $_t$. To obtain these variables I use the Senior Loan Officers Survey (SLOS), a quarterly survey of senior loan managers of the Chilean commercial banks¹⁰. The survey answers are

¹⁰The Chilean SLOS survey is similar to the ones implemented in the USA, Japan, Canada, Europe and other countries. The SLOS asks about the perceptions of market conditions relative to the previous quarter, in terms of supply lending standards (with five options: strongly loosened, moderately loosened, unchanged, moderately tightened, strongly tightened) and credit demand (with five options: strongly higher, moderately higher, unchanged, moderately weaker, strongly weaker). Bank managers provide their perceptions in terms of supply and demand factors for each market segment: corporate loans (for large companies, small and medium companies, and the construction sector), consumer loans, and household mortgages. Mortgage supply conditions are measured for the following aspects:

used to build two perception indicators of composite supply and demand conditions for each bank, with positive values implying, respectively, looser supply conditions and higher credit demand. The aggregate banking system indicators are given by the cumulative level from the first wave until the current period, with banks weighted by their market share (Jara et al. 2017).

4 Results

4.1 Mortgage refinancing models

Table 3 shows the results of the Mortgage refinancing model, estimated from the pooled sample of the EFH survey (all waves between 2007 and 2017). The same model is estimated for Any mortgage refinancing of the household, for the mortgage of its main home, and for other properties (whether held as an investment for future sale or to rent) owned by the household. Note that since some households may have more than one mortgage, then the subscript $i, c(i), t$ can denote different mortgages. However, that is rare, since 87.9% of the mortgage borrowers have only one mortgage¹¹. For the main home by definition the household has only one mortgage. For the models estimated for "any mortgage" and for mortgages in "other properties", the mortgage contract variables denoted by $i, c(i), t$ use the values for the oldest mortgage of the household.

The models in Table 3 include all lenders, therefore the bank specific controls are omitted. The results show that the mortgage refinancing probability increases with the number of past Risk of the loan portfolio (delinquency, loan loss provisions), Competition from other banks and non-banking lenders, Regulatory changes, Loan terms (which includes the maximum size of the loan payment relative to the borrower's income, maximum size of the complementary credit loan relative to the mortgage, fees or loan spread relative to banks' funding costs, lowest credit score standards, number of loans granted to subprime customers). Mortgage demand factors measure the following aspects: Income and employment conditions of the borrowers, customers' easiness of substitution between bank and non-bank lending, attractiveness of the interest rates.

¹¹ Among EFH mortgage borrowers, 92.9% have a mortgage on their main home, 18.5% have a mortgage on another property and 11.5% have mortgages both on their main home plus on another property. Since the EFH survey counts both the main home and up to three other properties of the household, then a few wealthy households can report up to 4 mortgages. In the pooled EFH sample, 87.9% of the mortgage borrowers have only one mortgage, 10.7% have 2 mortgages, 1.1% have 3 mortgages, and 0.3% have 4 mortgages. For households with mortgages in other properties, 88.9% have a only one mortgage, 8.7% have 2 mortgages, and 2.3% have 3 mortgages on other properties.

Table 3: Mortgage refinancing models (Logit model): all lenders

Variables	Renegotiated any mortgage _i			Renegotiated main home _i			Other properties _i	
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 2	Model 3
ln(Months for refinancing _{i,c(i),t})	0.0946*	0.125***		0.119**	0.111***		0.135***	
	(0.0522)	(0.0171)		(0.0561)	(0.0187)		(0.0397)	
ln(Present Value of refinancing _{i,c(i),t})	0.0232		0.0880***	-0.00668		0.0746***		0.113***
	(0.0380)		(0.0125)	(0.0408)		(0.0136)		(0.0283)
DSR _{i,t}	0.752***	0.759***	0.740***	0.722***	0.721***	0.710***	0.0748	0.0299
	(0.148)	(0.147)	(0.147)	(0.158)	(0.158)	(0.158)	(0.330)	(0.332)
Financial Education _i	0.387***	0.392***	0.377***	0.366***	0.364***	0.353***	0.330***	0.310***
	(0.0385)	(0.0378)	(0.0381)	(0.0404)	(0.0396)	(0.0399)	(0.106)	(0.106)
Pseudo R2	0.0584	0.0583	0.0578	0.0487	0.0486	0.0477	0.0732	0.0769
Observations	6,088	6,088	6,088	5,589	5,589	5,589	1,375	1,375

Marginal effects at the means:

ln(Months for refinancing _{i,c(i),t})	0.0122*	0.0161***		0.0146**	0.0135***		0.0147***	
	(0.00673)	(0.00219)		(0.00683)	(0.00226)		(0.00433)	
DSR _{i,t}	0.00299		0.0114***	-0.000815		0.00913***		0.0122***
	(0.00491)		(0.00161)	(0.00498)		(0.00166)		(0.00309)
ln(Present Value of refinancing _{i,c(i),t})	0.0972***	0.0980***	0.0957***	0.0881***	0.0879***	0.0868***	0.00812	0.00324
	(0.0189)	(0.0189)	(0.0189)	(0.0191)	(0.0191)	(0.0192)	(0.0359)	(0.0359)
Financial Education _i	0.0500***	0.0506***	0.0488***	0.0446***	0.0445***	0.0432***	0.0358***	0.0336***
	(0.00476)	(0.00466)	(0.00472)	(0.00472)	(0.00462)	(0.00468)	(0.0113)	(0.0113)

Other Controls: dummies for the year of the survey wave.

Robust Standard-errors in (), ***, **, * denote 1%, 5% and 10% statistical significance.

months with a positive refinancing opportunity, although the present value of renegotiating is only statistically significant for the other properties or if the number of months is omitted. Perhaps the higher significance of the present value in the refinancing probability of other properties is due to the business motivation of such borrowers, therefore paying more attention to positive refinancing opportunities. The debt service ratio (a proxy of liquidity needs) and financial education are also strongly associated with higher refinancing rates, as expected. Looking at the marginal effects, one sees an increase of around 1.5% in the refinancing probability for each point in the log number of months, while each point of financial education increases the refinancing probability by 5%. Similar coefficients were estimated for any mortgage, the main homes and other properties.

Adding interaction effects with financial education to the models, the results in Table 4 confirm

again that debt service and financial education are strongly associated with higher refinancing probabilities. The interaction coefficients show that financial education increases significantly the marginal impact of the number of months with a positive refinancing probability or the present value of renegotiating. Although the coefficient for the log of the number of months and present value is negative, once one adds the interaction impact with the financial education, the impact of these variables is close to null for the lowest educated households (since, as shown in Table 1, few households have a value of financial education below 10). In particular, each additional unit of financial education if interacted with the number of past months increases the refinancing probability by 0.88%, 0.61% and 1.36%, respectively, for all homes, main homes and other properties, if interacted with the present value of renegotiating. These are large effects considering that the difference in financial education between the least (those with elementary school) and the highest educated (postgraduates) is 3.2 points, as shown in Table 1. It is interesting to note, however, that the interaction with the number of past months has a higher impact on renegotiating the main home, while the interaction with the present value has a higher impact on other properties. Again, this shows that the borrowers in other properties are more motivated by business interest, therefore paying attention to the monetary gains of refinancing.

For the bank mortgages models, the results in Table 5 show that the number of past months with a positive refinancing opportunity, the debt service ratio, financial education and Other Banks are strongly associated with a higher refinancing probability. Median and Other banks are also positively associated with renegotiating other properties. In terms of aggregate shocks, the impact of supply factors is small and statistically insignificant. However, the demand factors are strongly associated with a higher refinancing probability, especially for the main home. Therefore refinancing activity is mostly driven by borrowers' needs and it is not hindered by capital requirements or balance-sheet restrictions of lenders.

4.2 Switching behavior in consumer loans

I also test how the Financial Portability Law and its effect on mortgage refinancing may affect bank switching and consumer loans. Mortgage contracts have maturities of 20 years or more and in Chile banks often apply the house collateral used for mortgages to all the other credits (consumer

Table 4: Mortgage refinancing models (Logit) with Financial Education interactions: all lenders

Logit model	Any mortgage _i		Main home _i		Other properties _i	
Variables	Model 2	Model 3	Model 2	Model 3	Model 2	Model 3
ln(Months for refinancing _{i,c(i),t})	-0.759*** (0.253)		-0.533** (0.267)		-1.528* (0.809)	
ln(Present Value of refinancing _{i,c(i),t})		-0.566*** (0.195)		-0.395* (0.208)		-0.917 (0.569)
DSR _{i,t}	0.786*** (0.147)	0.775*** (0.148)	0.742*** (0.158)	0.736*** (0.158)	0.0959 (0.331)	0.0460 (0.333)
Financial Education _i	0.309*** (0.0432)	0.298*** (0.0435)	0.306*** (0.0453)	0.299*** (0.0457)	0.205* (0.116)	0.197* (0.119)
ln(Months for refin. _{i,c(i),t})	Fin. Education _i × (0.0193)		0.0496** (0.0205)		0.125** (0.0604)	
ln(PV of refin. _{i,c(i),t})		Fin. Education _i × (0.0148)		0.0358** (0.0158)		0.0767* (0.0424)
Pseudo R2	0.0607	0.0599	0.0499	0.0488	0.0772	0.0798
Observations	6,088	6,088	5,589	5,589	1,375	1,375

Marginal effects at the means:

ln(Months for refinancing _{i,c(i),t})	-0.0983*** (0.0328)		-0.0652** (0.0327)		-0.166* (0.0889)	
ln(Present Value of refinancing _{i,c(i),t})		-0.0735*** (0.0254)		-0.0484* (0.0256)		-0.101 (0.0643)
DSR _{i,t}	0.102*** (0.0190)	0.101*** (0.0191)	0.0907*** (0.0192)	0.0902*** (0.0193)	0.0106 (0.0361)	0.00597 (0.0362)
Financial Education _i	0.0401*** (0.00544)	0.0387*** (0.00551)	0.0375*** (0.00538)	0.0367*** (0.00545)	0.0225* (0.0126)	0.0219* (0.0127)
ln(Months for refin. _{i,c(i),t})	Fin. Education _i × (0.00251)		0.00607** (0.00251)		0.0136** (0.00663)	
ln(PV of refin. _{i,c(i),t})		Fin. Education _i × (0.00193)		0.00439** (0.00195)		0.00843* (0.00479)

Other Controls: dummies for the year of the survey wave.

Robust Standard-errors in (), ***, **, * denote 1%, 5% and 10% statistical significance.

Table 5: Refinancing of bank mortgages (Logit model)

Logit model	Renegotiated any mortgage _i			Renegotiated main home _i			Other properties _i	
Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 2	Model 3
ln(Months for refinancing _{i,c(i),t})	0.134** (0.0626)	0.106*** (0.0210)		0.124* (0.0665)	0.0912*** (0.0230)		0.129*** (0.0471)	
ln(Present Value of refinancing _{i,c(i),t})	-0.0213 (0.0448)		0.0685*** (0.0150)	-0.0250 (0.0472)		0.0572*** (0.0164)		0.107*** (0.0332)
DSR _{i,t}	0.743*** (0.173)	0.738*** (0.173)	0.726*** (0.173)	0.693*** (0.185)	0.689*** (0.185)	0.684*** (0.185)	0.0691 (0.367)	0.0327 (0.368)
Financial Education _i	0.372*** (0.0519)	0.369*** (0.0515)	0.363*** (0.0516)	0.354*** (0.0549)	0.350*** (0.0545)	0.346*** (0.0547)	0.325** (0.128)	0.309** (0.129)
ln(bank assets _{c(i)})	0.0856 (0.0920)	0.0848 (0.0920)	0.0828 (0.0919)	0.106 (0.103)	0.105 (0.102)	0.102 (0.102)	0.266 (0.180)	0.264 (0.180)
Bank's ROA _{c(i)}	4.838 (8.295)	4.415 (8.246)	3.182 (8.250)	-3.343 (8.687)	-3.815 (8.640)	-4.808 (8.643)	26.73 (19.60)	25.83 (19.62)
Retail Bank _{c(i)}	-0.236 (0.514)	-0.237 (0.514)	-0.249 (0.514)	0.187 (0.518)	0.185 (0.518)	0.167 (0.518)		
Median Bank _{c(i)}	0.0967 (0.143)	0.0924 (0.142)	0.0802 (0.142)	0.0628 (0.154)	0.0573 (0.153)	0.0438 (0.153)	0.885*** (0.286)	0.867*** (0.287)
Other Bank _{c(i)}	0.374** (0.185)	0.373** (0.185)	0.369** (0.185)	0.203 (0.207)	0.203 (0.207)	0.205 (0.207)	1.024*** (0.358)	1.033*** (0.359)
Supply factors _i	-0.0325 (0.0612)	-0.0319 (0.0612)	-0.0284 (0.0611)	-0.0162 (0.0706)	-0.0165 (0.0706)	-0.0162 (0.0705)	0.0720 (0.122)	0.0777 (0.122)
Demand factors _i	0.131*** (0.0373)	0.132*** (0.0372)	0.136*** (0.0372)	0.141*** (0.0418)	0.142*** (0.0418)	0.145*** (0.0418)	0.0595 (0.0764)	0.0613 (0.0765)
Pseudo R2	0.0482	0.0481	0.0470	0.0386	0.0385	0.0376	0.0831	0.0861
Observations	4,041	4,041	4,041	3,694	3,694	3,694	1,125	1,125

Marginal effects at the means:

ln(Months for refinancing _{i,c(i),t})	0.0191** (0.00891)	0.0151*** (0.00298)		0.0168* (0.00896)	0.0123*** (0.00310)		0.0142*** (0.00516)	
ln(Present Value of refinancing _{i,c(i),t})	-0.00304 (0.00637)		0.00977*** (0.00214)	-0.00337 (0.00637)		0.00773*** (0.00221)		0.0117*** (0.00364)
DSR _{i,t}	0.106*** (0.0245)	0.105*** (0.0245)	0.103*** (0.0245)	0.0935*** (0.0248)	0.0929*** (0.0248)	0.0923*** (0.0248)	0.00758 (0.0402)	0.00358 (0.0403)
Financial Education _i	0.0530*** (0.00719)	0.0526*** (0.00714)	0.0518*** (-0.00718)	0.0477*** (0.00722)	0.0473*** (0.00718)	0.0467*** (0.00721)	0.0356** (0.0139)	0.0338** (0.0139)

Other Controls: dummies for the year of the survey wave.

Robust Standard-errors in (), ***, **, * denote 1%, 5% and 10% statistical significance.

installment loans, credit cards, lines of credit) and financial accounts of the customer. To study the impact of mortgage refinancing on bank switching for consumer loans, I use the panel component of the EFH survey. One third of the EFH sample in each wave is kept to be interviewed in the next wave around three years later, allowing to study debt dynamics of the same households over that period. Since household members change over time (young adults may leave the family, some couples divorce, other people marry and therefore increase the household), I consider this rotating sample to represent a panel in cases where at least one member appears in both survey waves.

Using the Panel EFH survey samples, Table 6 shows that bank switching is quite common for consumer loans in Chile. It is noticeable that households that never renegotiated a mortgage actually have a higher probability of switching banks for a consumer loan than the households that chose to renegotiate a mortgage. Perhaps this is because the households that failed or chose not to renegotiate are unsatisfied with their bank relationship or maybe they finished paying their mortgage loan. Therefore mortgage refinancing should not matter much for bank switching in consumer loans. Around 69% of the Chilean borrowers that report banking consumer loans in two different surveys have changed their bank after three years. The switching rate for consumer loans, however, is 94% for the "other banks", which are the smallest in size. For the retail banks (which are specialized in consumer loans), the bank switching rate is 61%, while it is 77% and 65% for the median sized and large banks, respectively. It is interesting to note that the poorest income quintile has a substantially lower bank switching rate (perhaps due to the lack of bank branches in the poor counties), but otherwise the bank switching rates are fairly constant for the income quintiles 2 to 5. It is also noticeable that less educated customers (those with secondary schooling or less) have even higher bank switching rates for consumer loans than the more educated households. Therefore Chilean households do not appear to have obstacles in looking for different consumer loan offers.

Using the Panel survey data, Table 7 shows three discrete choice models for the decision of switching banks for a consumer loan. The results show that financial education, debt levels (as measured by the Consumer Debt to Annual Permanent Income Ratio in the first survey wave), a dummy variable for whether the household was paying a mortgage in the first period ($Mortgage_{i,t-1}$), are negative associated to the probability of bank switching. This makes sense, since households that have a large debt or a mortgage to pay are likely to keep paying those commitments for a longer period and therefore less likely to switch. Also, it is possible that

Table 6: Switching banks for consumer loans (Panel EFH, 2011-2014, 2014-2017)

Bank type (year 1):	All households	Never Refinanced	Refinanced	Secondary	Technical or	College
		a Mortgage	Mortgages	or less	some college	or more
All banks	69.3	71.7	45.6	73.9	63.5	65.2
Large	64.6	69.4	25.2	77.9	53.2	55.1
Retail	60.9	61.5	53.3	59.2	61.8	63.9
Median	76.6	80.0	55.8	92.4	79.7	69.8
Other banks	93.8	94.9	79.3	96.9	91.6	88.9
Income quintile						
1=poorest	58.0	58.0		62.6	49.5	49.2
2	71.1	72.9	26.8	70.4	43.7	87.4
3	71.2	72.9	34.9	69.8	75.7	74.0
4	70.4	71.6	55.1	78.8	60.3	62.6
5=wealthiest	68.2	72.4	45.7	79.2	64.6	63.8
Bank (year 1):						
Banco de Chile	59.3	65.0	18.4	75.7	28.6	61.2
Banco Estado	74.4	77.9	33.9	83.9	49.4	65.4
BCI	60.3	61.6	47.0	70.6	84.2	47.3
Santander	62.5	70.1	18.3	73.8	88.6	44.7
Retail banks	60.9	61.5	53.3	59.2	61.8	63.9
Median banks	76.6	80.0	55.8	92.4	79.7	69.8
Other Banks	93.8	94.9	79.3	96.9	91.6	88.9

Sample: 1,257 households that were interviewed twice (on 2011-2014 or 2014-2017) and that reported a banking consumer loan (installment loan or credit card debt) in both survey years.

more financially educated households are better able to choose a good bank right from the start. Perhaps less financially literate customers are more likely to be unsatisfied with their first bank choice and therefore more likely to switch. The variables denoting the attraction of renegotiating a mortgage (the log of the past months with a positive refinancing opportunity and the present value of renegotiating) do not impact the bank switching choice, which confirms that mortgage refinancing does not hinder the search for consumer loans. In the same, having renegotiated a mortgage in the past is unrelated to the switching probability (model 3, Table 7), after accounting for whether the household has a mortgage or not. Some households have multiple bank relationships (for instance, different banks for their mortgage, consumer loans and credit cards). The number of bank relationships is strongly associated with bank switching, a result also confirmed in the previous literature for other countries (Brunetti et al. 2016, Degryse et al. 2019), since multiple relationships reduce search costs and the "customer capture" from lenders. Finally, customers of the smaller banks ("other banks") and mid-sized banks are more likely to switch, which is perhaps due to their more reduced coverage of different services and fewer bank branches. Overall, both the descriptive and the multivariate model analysis confirm that Chilean households find it easy to switch banks for consumer loans and that mortgage refinancing is not an obstacle for this choice.

This brief analysis of the decision to switch banks for getting a new consumer loan shows that having a mortgage decreases the probability of moving to a new bank. Perhaps this result is explained by banks offering better valued products to retain both their customers' mortgages and their other financial accounts, therefore mortgage borrowers may have more bargaining power and the incentives to choose a good bank relationship from the very start. Depending on the unknown motives that lead mortgage borrowers to stay with the same bank, then it is hard to verify the impact of the Financial Portability law on the competition of other financial products.

5 Counterfactual impact of the new policy

5.1 Mortgage refinancing before and after the law

Now I consider some counterfactual exercises for how the Financial Portability law may change the mortgage refinancing probability and its implied welfare gains. The counterfactual exercises

Table 7: Switching behavior of consumer loans between banks (Logit model)

Panel EFH data (2011-2014, 2014-2017)

Logit model	Model 1		Model 2		Model 3	
Variables	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Financial	-0.200***	-0.0378***	-0.199***	-0.0376***	-0.199***	-0.0377***
Education _i	(0.0706)	(0.0133)	(0.0705)	(0.0133)	(0.0706)	(0.0133)
Consumer Debt to	-0.848**	-0.161**	-0.831**	-0.157**	-0.834**	-0.158**
Income Ratio _{i,t-1}	(0.390)	(0.0739)	(0.390)	(0.0737)	(0.389)	(0.0736)
Mortgage _{i,t-1}	-0.553***	-0.105***	-0.532***	-0.101***	-0.545***	-0.103***
	(0.177)	(0.0335)	(0.175)	(0.0332)	(0.174)	(0.0330)
Renegotiated in the					-0.321	-0.0607
past dummy _{i,t-1}					(0.282)	(0.0534)
ln(Months for	-0.424	-0.0802	-0.135	-0.0256		
refinancing _{i,t-1})	(0.337)	(0.0637)	(0.104)	(0.0197)		
ln(Present Value	0.199	0.0377				
of refinancing _{i,t-1})	(0.220)	(0.0417)				
Nr of Banks _{i,t-1}	1.149***	0.217***	1.147***	0.217***	1.148***	0.217***
	(0.111)	(0.0202)	(0.111)	(0.0202)	(0.111)	(0.0202)
Retail Bank _{i,t-1}	-0.259	-0.0612	-0.257	-0.0606	-0.252	-0.0595
	(0.161)	(0.0378)	(0.161)	(0.0377)	(0.161)	(0.0377)
Median Bank _{i,t-1}	0.502*	0.105*	0.509*	0.106*	0.543*	0.112**
	(0.293)	(0.0563)	(0.293)	(0.0562)	(0.293)	(0.0556)
Other Bank _{i,t-1}	2.822***	0.321***	2.825***	0.321***	2.832***	0.323***
	(0.296)	(0.0276)	(0.296)	(0.0276)	(0.297)	(0.0277)
Pseudo R2	0.1739		0.1733		0.1731	
Observations	1,257		1,257		1,257	

Other Controls: dummies for the year of the initial panel EFH survey wave.

Robust Standard-errors in (), ***, **, * denote 1%, 5% and 10% statistical significance.

involve a scenario with: i) a pure reduction in the fixed pecuniary costs of mortgage refinancing from 24.1 UF (around 1,015 USD) to 8.7 UF (around 365 USD); ii) both a reduction in financial costs and a reduction in complexity which is calibrated as an increase in the financial education of each household, with $\text{Financial Education}_i^{\text{After-Law}} = \text{Financial Education}_i + \sigma_{F.E.}$. This increase in practice of the "financial education" of the households is reasonable, because the law standardizes all the fees and costs of the refinancing in a single document, reduces the time processing in at least 30 days, and erases the requirement of two steps (the custody letter, plus the notary modification of the old loan by the previous lender). In the baseline calibration the parameter $\sigma_{F.E.}$ is taken to be one standard-deviation of the financial education across the population: $\sigma_{F.E.} = 1.19$. As a robustness check, I also present the results for other calibrations which increase financial education by a smaller amount such one quarter, a half or 3 quarters of a standard-deviation: $0.25 \times \sigma_{F.E.}$, $0.50 \times \sigma_{F.E.}$, $0.75 \times \sigma_{F.E.}$. Since the Financial Portability Law applies to all private institutions, the counterfactual exercise uses all lenders (banks and non-banks), except for the state credit (which is a government policy that has not been extended in recent years, although some borrowers are still benefitting from old mortgages granted by the housing state department).

Table 8 shows the mortgage refinancing probability before and after the law, by applying two models estimated using the mortgage contracts for all lenders and all properties (Tables 3 and 4). The first model does not include interactions between financial education and the implied optimal decision from the mortgage contract (Model 2 in Table 3), while the second model includes interactions between the financial education and the optimal decision of an unconstrained borrower (Model 2 in Table 4). Using the baseline model (Model 2 in Table 3), the mortgage refinancing probability would increase from 17.9% of all borrowers before the Law to 19.5% after the Law if we just consider the effect of the lower fixed monetary costs of the refinancing. However, the refinancing probability could increase to 28.6% if one considers the additional boost in financial understanding of the process. This increase in mortgage refinancing rates happens across all income levels and home values. If one considers just the effect of the lower fixed costs, then the law increases the refinancing probability by 1% in quintiles 1 and 2 (the lowest income), 1.3% in quintile 3 (the middle class), 1.6% in quintile 4, and 2% for the quintile 5 (the richest households). When considering both the reduction in fixed costs and increased financial understanding, then the law implies an increase in the refinancing probability of 7.5% for the lowest income (quintiles 1 and 2), 8.5% for the middle

class (quintile 3), 10% for quintile 4, and 13% for the upper income (quintile 5) households. It is interesting to note that the wealthier households are more likely to benefit from the law, either with just pecuniary costs or pecuniary plus cognitive costs.

Across home values in Table 8 there is a similar pattern. A reduction in pecuniary costs increases the refinancing probability by 1% for homes with lower value (percentiles 1 to 50, i.e., below the median), by 1.5% for the middle value homes (percentiles 51 to 80, i.e., above the median home appraisal), and 2.2% for the top valued homes (percentiles 81 to 100). Again, considering both lower pecuniary and cognitive costs, the law would increase the refinancing probability in 8.4%, 9.9% and 13.1% for the low, middle and top valued homes, respectively. The results also show that the new law has a strong impact on both main home and other properties. With just lower pecuniary costs, the refinancing rate increases by 1.6% for both main homes and other properties. With both lower pecuniary and cognitive costs, the refinancing rate increases by 9.1% for main homes and other properties. Finally, considering the model with interactions between financial education and the optimal mortgage decision (model 2 of Table 4) does not affect the results much.

As a robustness check, Table 9 shows results for three counterfactual simulations in which the increase in financial education from the law is lower than one standard-deviation. The results show that these alternative scenarios would still implicate a strong impact of the new law on refinancing probabilities. In particular, the refinancing probability for any home would increase in 3.2%, 5.5% and 8%, respectively, with a change in financial understanding of 0.25, 0.50 and 0.75 fractions of a standard-deviation ($\sigma_{F.E.}$), respectively. The impact on main homes and properties is very similar, with an increase in the refinancing probability of 2.8%, 4.7% and 6.8%, for changes in financial understanding of 0.25, 0.50 and 0.75 fractions of a standard-deviation.

In summary, the cognitive cost channel could potentially be the more powerful channel of the new law, with the number of refinancings increasing by 9% for lower pecuniary costs ($\frac{19.5\%}{17.9\%}$) and increasing by 60% ($\frac{28.6\%}{17.9\%}$) with both lower pecuniary and cognitive costs.

5.2 Welfare gains

Now I apply the estimated refinancing model to obtain the expected welfare gains of the refinancing for the borrowers, denoted by the present value of the refinancing (in UF) times the probability that

Table 8: Refinancing probability (in %) before and after the law

Panel A calibration: Model 2, Table 3

Group	Before the law			After the law					
	Any home	Main	Other	Lower pecuniary costs			Plus cognitive costs ($\sigma_{F.E.}$)		
				Any home	Main	Other	Any home	Main	Other
All households	17.9	16.6	14.4	19.5	18.2	15.9	28.6	25.7	23.4
Household Income Quintile:									
1	12.8	11.9	10.0	13.8	13.0	10.2	20.3	18.4	15.1
2	12.2	11.7	7.6	13.3	12.8	7.9	19.4	18.0	11.7
3	14.5	13.6	9.7	15.8	14.9	10.3	23.0	21.0	15.4
4	17.0	16.0	11.6	18.5	17.6	12.9	27.0	24.7	18.3
5	22.0	20.2	16.7	24.0	22.3	18.6	35.2	31.3	27.5
House value strata:									
1 (percentiles 1-50)	14.1	13.2	14.8	15.1	14.2	16.1	22.5	20.4	22.9
2 (percentiles 51-80)	16.7	16.1	15.5	18.2	17.7	17.0	26.6	24.9	24.9
3 (percentiles 81-100)	22.0	20.2	18.0	24.2	22.4	20.2	35.1	31.2	30.5

Panel B calibration: Model 2, Table 4

Group	Before the law			After the law					
	Any home	Main	Other	Lower pecuniary costs			Plus cognitive costs ($\sigma_{F.E.}$)		
				Any home	Main	Other	Any home	Main	Other
All households	17.8	16.5	14.4	19.4	18.1	15.9	28.4	25.6	23.4
Household Income Quintile:									
1	12.7	11.8	10.3	13.6	12.9	10.6	20.1	18.3	15.5
2	12.2	11.6	8.2	13.2	12.7	8.5	19.3	17.9	12.3
3	14.3	13.5	9.5	15.6	14.8	10.1	22.8	20.9	15.2
4	16.7	15.8	11.7	18.2	17.4	13.0	26.7	24.5	18.4
5	21.9	20.1	16.7	24.0	22.2	18.5	35.1	31.3	27.5
House value strata:									
1 (percentiles 1-50)	13.7	12.9	14.6	14.7	13.9	16.0	22.1	20.1	22.7
2 (percentiles 51-80)	16.6	16.1	15.4	18.1	17.7	17.0	26.5	24.9	24.9
3 (percentiles 81-100)	22.0	20.1	18.2	24.1	22.4	20.4	35.1	31.1	30.7

Table 9: Refinancing probability (in %) after the law for distinct levels of cognitive costs

Model 2, Table 3		After the law: Lower pecuniary and cognitive costs								
Cognitive improvement		$0.25 \times \sigma_{F.E.}$			$0.50 \times \sigma_{F.E.}$			$0.75 \times \sigma_{F.E.}$		
Group		Any home	Main	Other	Any home	Main	Other	Any home	Main	Other
All households		21.1	19.3	17.2	23.4	21.3	19.1	25.9	23.4	21.2
Household Income Quintile:										
1		14.8	13.8	11.2	16.4	15.2	12.4	18.3	16.7	13.7
2		14.2	13.5	8.7	15.8	14.9	9.6	17.5	16.4	10.6
3		17.0	15.8	11.4	18.8	17.4	12.6	20.8	19.2	13.9
4		19.9	18.6	13.7	22.1	20.5	15.1	24.5	22.5	16.7
5		26.0	23.5	20.1	28.9	26.0	22.4	32.0	28.6	24.9
House value strata:										
1 (percentiles 1-50)		16.4	15.2	17.2	18.3	16.8	19.0	20.3	18.5	20.9
2 (percentiles 51-80)		19.7	18.8	18.5	21.8	20.7	20.5	24.1	22.7	22.6
3 (percentiles 81-100)		26.0	23.5	22.0	28.9	25.9	24.6	32.0	28.5	27.5

the borrower decides to renegotiate to earn those gains¹²: $Welfare-gains_i = E [Y_{i,t}PV_{i,c(i),t} | x_{i,t}]$, with $Y_{i,t}$ being the refinancing decision (0 or 1) and $PV_{i,c(i),t}$ the present value of refinancing at time t for household i with mortgage obtained at time $c(i)$. The average welfare gains are computed for the population of all mortgage borrowers and not just over the borrowers who refinance. Again, the counterfactual considers a scenario with just a reduction of the fixed pecuniary costs of refinancing plus a second scenario with both lower pecuniary and cognitive costs.

The results show that just with lower pecuniary costs there is a gain of 4.2 UF (around 177 USD)¹³ for the average borrower, but these gains increase to 31.9 UF (around 1,344 USD) when both lower pecuniary and cognitive costs are included in the calibration. In absolute terms, the gains are concentrated on the owners of top valued homes and households of higher income. For the scenario with lower fixed payment costs only, the law implies a gain of 2 UF, 3 UF and 7.2 UF for the lower (percentiles 1 to 50), median (percentiles 51 to 80) and top valued (percentiles 81 to 100) homes, respectively. With both lower pecuniary and cognitive costs, there is an expected gain of 13.5 UF, 18.2 UF and 60.7 UF, for the lower, median and top valued homes, respectively.

The expected gains for borrowers are 10 UF (421 USD), 17 UF (716 USD) and 24 UF (1,028

¹²This option can be justified by either a linear utility function or a linear approximation of any function with continuous derivatives. For moderate amounts of risk, the linear approximation should be reasonable.

¹³I apply the conversion of 42.13 USD per 1 UF, which was the average value between 2010 and 2019.

Table 10: Expected welfare gains of refinancing for the mean mortgage borrower (in UF)

Panel A: a: Before the law; b: After the Law (lower pecuniary costs only)

c: After the Law (lower pecuniary costs and lower cognitive costs of $\sigma_{F.E.}$)

Model 2, Table 3	Before the law			After the law						
	Group				Lower pecuniary costs			Plus cognitive costs ($\sigma_{F.E.}$)		
		Any home	Main	Other	Any home	Main	Other	Any home	Main	Other
All households	41.2	30.9	39.2	45.4	34.5	42.8	73.1	53.5	74.5	
Household Income Quintile:										
1	15.5	13.9	10.8	17.0	15.2	11.8	27.0	23.3	20.0	
2	10.6	9.8	4.5	12.3	11.4	5.1	19.0	17.0	9.1	
3	15.2	13.3	9.8	17.3	15.4	11.2	27.6	23.5	18.7	
4	23.0	20.0	12.2	26.3	23.0	14.7	41.6	35.0	24.5	
5	73.6	53.3	55.9	80.2	58.8	60.4	129.8	92.1	105.6	
House value strata:										
1 (percentiles 1-50)	17.8	16.0	17.7	19.8	17.8	19.7	31.3	27.2	32.3	
2 (percentiles 51-80)	23.1	22.9	32.6	26.1	25.9	36.0	41.3	39.8	61.0	
3 (percentiles 81-100)	78.9	55.4	78.9	86.1	61.3	85.1	139.6	96.0	151.3	

Panel B: c. After the Law (lower pecuniary and cognitive costs)

lower cognitive costs by $0.25 \times \sigma_{F.E.}$ (c.1), $0.50 \times \sigma_{F.E.}$ (c.2), $0.75 \times \sigma_{F.E.}$ (c.3)

Model 2, Table 3	After the law: Lower financial and cognitive costs									
Cognitive improvement	$0.25 \times \sigma_{F.E.}$			$0.50 \times \sigma_{F.E.}$			$0.75 \times \sigma_{F.E.}$			
Group	Any home	Main	Other	Any home	Main	Other	Any home	Main	Other	
All households	51.2	38.0	49.7	58.2	42.9	57.6	65.6	48.1	66.0	
Household Income Quintile:										
1	18.8	16.7	13.1	21.2	18.7	15.1	24.0	20.9	17.4	
2	13.4	12.3	5.9	15.1	13.7	6.9	17.0	15.3	7.9	
3	19.2	16.7	12.6	21.7	18.8	14.4	24.5	21.0	16.4	
4	29.1	25.0	16.4	33.0	28.1	18.9	37.2	31.4	21.6	
5	90.9	65.3	70.4	103.6	73.9	81.8	116.7	82.8	93.6	
House value strata:										
1 (percentiles 1-50)	22.0	19.6	22.3	24.8	21.9	25.4	27.9	24.5	28.8	
2 (percentiles 51-80)	29.1	28.5	41.5	32.9	32.0	47.8	37.0	35.8	54.4	
3 (percentiles 81-100)	97.6	67.8	99.7	111.3	76.8	116.2	125.4	86.3	133.6	

USD) if one considers lower financial education benefits such as $0.25 \times \sigma_{F.E.}$, $0.50 \times \sigma_{F.E.}$ and $0.75 \times \sigma_{F.E.}$. Borrowers with mortgages in main homes and other properties earn approximately the same, 3.6 UF (152 USD), in a scenario with lower pecuniary fixed costs only. However, when one includes both lower pecuniary and cognitive costs, borrowers of other properties are the largest beneficiaries, with borrowers gaining an average 22.6 UF (952 USD) and 35.3 UF (1,487 USD) from refinancing of main homes and other properties, respectively. With alternative values for the increase in financial education understanding of just 0.25, 0.50 and 0.75 fractions of a standard-deviation of financial education ($\sigma_{F.E.}$), the corresponding expected benefits of the law are 7 UF (299 USD), 12 UF (506 USD) and 17 UF (716 USD) for borrowers of main homes and 11 UF (442 USD), 18 UF (775 USD) and 27 UF (1,129 USD) for borrowers of other properties. Therefore the calibration exercise shows that owners of second properties stand much more to gain from a reduction of cognitive costs. Even for a low reduction of cognitive costs such as $0.25 \times \sigma_{F.E.}$, the gains of borrowers in other properties are larger than for main homes. Perhaps this is because households pay a substantial amount of their first property before deciding to engage in the purchase of second properties, therefore the debt value of other properties is more recent and with a larger remaining amount.

6 Conclusions

Most borrowers across several countries fail to take advantage of mortgage refinancing opportunities, foregoing substantial wealth (Keys et al. 2016, Gomes et al. 2020). Financial Portability Laws are a recent regulatory attempt to ease the mortgage refinancing process and allow households to take better advantage of such gains. Chile just implemented such a law in 2020, following the legislative experience of other countries, such as Mexico, France, Spain and Italy, in recent years. This law aims to reduce both the fixed pecuniary costs of refinancing, but also to standardize the fees and costs for easier understanding of the borrowers and to reduce the number of procedures and the time processing required. This article estimates an empirical model of the refinancing decision from Chilean survey data and then uses it to calibrate the impact of the new Financial Portability Law.

Mortgage refinancing is positively associated with financial education, liquidity needs, and with the number of past months in which a positive refinancing opportunity was observed. I also find a positive interaction effect between financial education and the number of past months with a

positive refinancing opportunity. Furthermore, I show that aggregate credit demand factors drive up the mortgage refinancing, which confirms that borrowers use refinancing as a source of liquidity.

A counterfactual exercise shows the refinancing probability and welfare gains for the scenarios in which the law simply reduces the pecuniary costs of refinancing and also for a reduction in both the pecuniary and cognitive costs of the process. Accounting just for the reduction in pecuniary costs, the households' refinancing rate increases from 17.9% before the law to 19.5% after the law, with expected welfare gains of 177 USD per borrower. However, accounting for both a reduction in pecuniary and cognitive costs could increase the refinancing rate to 28.6% and the expected welfare gains to 1,344 USD. The increase in the refinancing rates happens across all income levels, but the welfare gains in absolute terms are concentrated on the owners of higher priced homes which have larger debts. Mortgage borrowers for main homes and second properties benefit equally from the reduction in pecuniary costs, but the owners of second properties benefit much more from the reduction in cognitive costs. This is an especially important result, since the share of households with second properties as investment vehicles has been increasing in recent years in Chile, a similar trend to other countries such as the US (Bhutta 2015).

One important aspect of mortgage modification is that it represents an additional liquidity tool for distressed borrowers and may help them prevent default (Agarwal and Zhang 2018) and the large costs of foreclosures (Das and Meadows 2013). Easing the process of mortgage refinancing could therefore improve financial stability by lowering default and bankruptcy risks (Das and Meadows 2013, Agarwal and Zhang 2018) and also improve the efficiency of monetary policy through its transmission channel to consumption (Gomes et al. 2020). Finally, the goal of reducing the complexity of household financial contracts (Woodward and Hall 2012, Campbell 2013, Gomes et al. 2020) and increasing competition for credit markets (Degryse et al. 2019) has received more attention from policy makers in recent years. Therefore a standardization process of financial contracts' fees and costs could be important to improve households' optimal use of debt and become an example for future policies in other financial instruments, which could improve financial welfare, especially for groups with lower financial education and understanding (Gomes et al. 2020).

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