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Indebtedness and labor risk sorting across consumer lender types: evidence from Chile*

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Abstract
Economic theory predicts that borrowers sort themselves in different loan contracts according to their risk and preferences, with some consumers becoming credit constrained and without access to debt. As a middle-income country, Chile has a consumer loan market with many lender types (Banks, Retail Stores, Unions, Other Lenders such as car dealers), providing a perfect setting for testing borrower-lender sorting theory. Using survey data, I show that banks have the borrowers of highest income and education and the lowest unemployment rates, while households with no access to debt have the lowest income and education and the highest unemployment risk.

Resumen
La teoría económica predice que los deudores se ordenan en diferentes contratos de préstamo según su perfil de riesgo y preferencias. Así algunos consumidores se encuentran en situaciones con restricciones de crédito y sin acceso a la deuda. Chile tiene un mercado de préstamos al consumo con muchos tipos de oferentes (bancos, tiendas minoristas, sindicatos, otros actores como concesionarios de automóviles), lo que proporciona un escenario para probar las teorías de emparejamiento entre oferentes y deudores. Utilizando datos de la Encuesta Financiera de Hogares, yo muestro que los bancos tienen los clientes con mayores ingresos y educación y las tasas de desempleo más bajas. Además, los hogares sin acceso a la deuda tienen los ingresos y educación más bajos y el mayor riesgo de desempleo.

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1 Introduction

Household debt increased consistently in the last decades, both in emerging economies and developed countries, with a strong financial innovation offering a wide range of loan products to consumers (Dynan and Kohn 2007, Madeira 2023a). Many consumers are able to access credit from a variety of sources, such as credit cards, auto loans, education loans, and due to motives as diverse as health, vacations, purchase of durable goods, or a renegotiation of previous debts. However, the question of lender and borrowers equilibrium choices are still understudied. According to the economic theory, lender screening can control the borrowers' adverse selection and moral hazard by offering different contracts, with different borrowers and lenders sorting into groups with different characteristics (Jaffee and Stiglitz 1990, Einav et al. 2012).

This paper studies the equilibrium between lenders and borrower in the consumer credit market in Chile. Consumer loans are particularly relevant in Chile, since over 60% of the households have some consumer debt. Chile is also a relevant case, because as a middle income country it has a consumer credit market with many kinds of lenders, including Banks, Retail Stores, Unions and Other Lenders (such as car dealers). Furthermore, it is a country with a significant level of socioeconomic inequality and heterogeneity (Madeira 2023a). These lenders cater to customers with different motivations, preferences and income levels (Madeira 2015b, Madeira 2023c). Using data from the Chilean Household Finance Survey (EFH), I find that families are sorted among different lenders according to their observable indebtedness levels and labor income risk.

The previous empirical literature on household finance has typically focused on one type of lender, such as banking loans (Madeira and Margaretic 2022) or automobile lenders (Einav et al. 2012). Our work improves upon the previous literature by using survey data to study all sources of consumer borrowing of the households and showing that the borrowers fitting in the market of each lender type have very different labor income characteristics, unemployment risk and indebtedness levels. It also improves upon previous research that has studied credit market segmentation in Chile by showing a non-parametric analysis of the differences among borrowers rather than a parametric model (Madeira 2023b).

2 Data: the Chilean Household Finance Survey (EFH)

The Chilean Household Finance Survey (in Spanish, *Encuesta Financiera de Hogares*, hence on EFH) is a representative cross-sectional survey with detailed information on households' assets, debts, income and financial behavior, being broadly comparable to similar surveys in the United States and Europe (Gallardo and Madeira 2022). The EFH covered a total of 21,319 urban households from 2007 to 2017 (waves 2007, 2008, 2009, 2010, 2011, 2014 and 2017). The EFH has a particularly detailed focus of the loans and debt commitments of each household. It asks for the largest 3 debts that each household has for each type of loan, among a total of 13 categories of loans: Banking Credit Card Debt, Banking Line of Credit, Banking or Financial Agency Consumer Credit Loan, Retail Store Credit Card, Retail Store Consumer Loan, Auto Loans, Union Credit, Education Loans, Loans from relatives, Loans from usurers, Pawn shops, Grocery and Shopping on credit (i.e., store tabs), and Other Debts. Therefore the survey may ask up to a total of 39 debts that the household has at the moment, although obviously few agents will report having debts with all the possible categories of loans.

The analysis is based on five consumer debt types, classified discretely with the lender type representing the largest loan amount: Banks, Banks and Retail Stores (for the families reporting the use of both kinds of loans), Retail Stores, Union Credit, and Other Debts. Other Debts represents the sum of Auto Loans, Education Loans, Loans from relatives, Loans from usurers, Pawn shops, Grocery and Shopping on credit (i.e., store tabs), and Other Debts. Note that this category is largely composed of Auto Loans, Education Loans and Other Debts, with the remaining options representing negligible numbers.

Besides asking for the details (debt amount, monthly loan payment, maturity, interest rate) of each loan, the EFH also inquires about its credit applications over the previous year: i) "Has the family made any loan request over the previous 12 months?", ii) "How many requests for loans has the family made?", iii) "How many loan requests have been rejected?", and iv) "What is the main reason why your family did not make any loan requests? Options: 1) No need for credit. 2) Dislikes loans. 3) The family would be unable to repay the loan. 4) The family would be rejected for the loan requests or the loan would not be granted. 5) Other reasons.". The last question can separate the families with "No Wish for Consumer Debt" (those that report the options 1 and 2 for

either no need for credit or disliking loans) and those with "No Access to Debt" (reporting wishing to have debt, but not making loan requests due to options 3 and 4 of being unable to repay the loans or likely to be refused for loans even if a request was made). Families are also classified as "No Access to Debt" if they made loan requests, but all of these were refused.

I summarize the overall household indebtedness in terms of three variables: i) the debt service to monthly income ratio (DSIR=$\frac{DS_{i,t}}{Y_{i,t}}$), with the debt service including the loan amortization plus all the fees and interest to be paid in a given month; ii) the consumer debt amount to the annual permanent income ratio (CDPIR=$\frac{L_{i,t}}{12 \times \bar{P}_{i,t}}$), iii) the log of the real value of the consumer debt. The debt service ratio (DSIR) is a measure of the liquidity constraints faced by households at the end of the month, while the consumer debt amount to the annual permanent income ratio (CDPIR) is a solvency measure that households may face in terms of their total debt amount. The consumer debt (in real terms) can be seen as an overall measure of indebtedness.

The EFH survey collects detailed information on the income, education, age and other characteristics of each household member, but it has limited data on some aspects, such as their income volatility or stability of employment. For this reason I estimate the income and employment risks of the EFH workers based on the mean statistics for workers with the same characteristics in another dataset.

Using the quarterly Chilean Employment Survey, which covers 35,000 households, I obtain two measures of labor risk for the period 1990 to 2017 (Madeira 2015a): the unemployment rate ($u_{k,t} = \Pr(U_{k,t} = 1 \mid t, x_k)$) and the labor income volatility even if no job is lost, $\sigma_{\zeta,t}(x_k) = \sqrt{E\left[(Y_{k,t} - E[Y_{k,t} \mid Y_{k,t-1}, x_k])^2 \mid t, U_{k,t} = U_{k,t-1}, Y_{k,t}, x_k\right]}$. The vector x_k creates 540 mutually exclusive groups, given by x_k = {Santiago Metropolitan city or Outside, Industrial Activity (primary, secondary, tertiary sectors), Gender, Age (3 brackets, ≤ 35, $35-54$, ≥ 55), Education (less than secondary schooling, secondary or technical education, college), and Household Income quintile}.

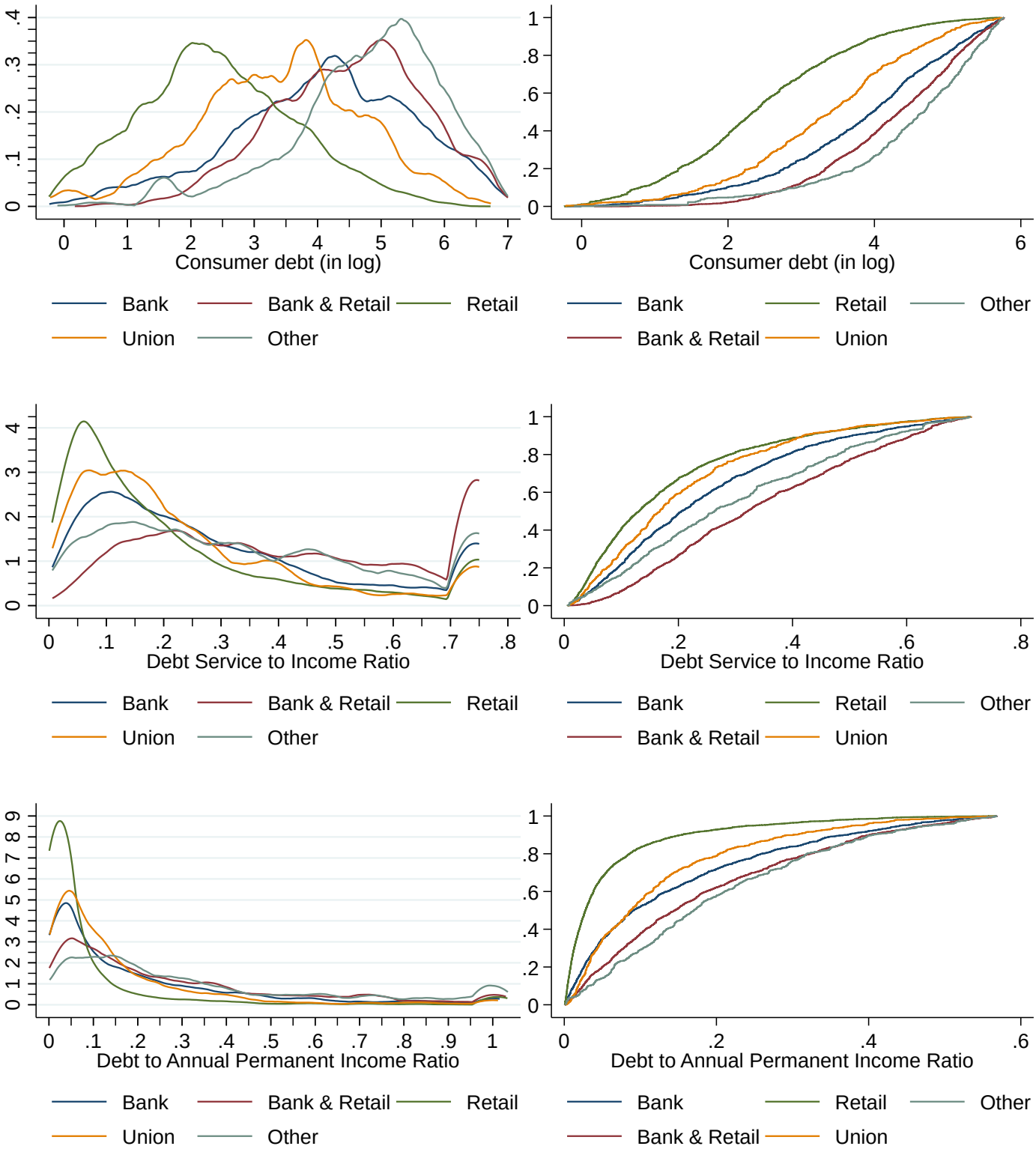
Using these labor risk measures, I calculate the expected income $\bar{P}_{i,t}$ of each EFH household i as the sum of their non-labor income, a_i, and its expected labor income, $P_{i,t}$: $\bar{P}_{i,t} = a_i + P_{i,t}$, where $P_{i,t} = \sum_k P_{k,t}$ is the sum of expected labor income of each household member k. $P_{k,t} = W_{k,t}(1 - u_{k,t}) + W_{k,t}R_{k,t}(u_{k,t})$ is each worker k's average labor income during the employed and unemployed states. The employment risk and labor income volatility of each household are then given by a weighted average of the rates of each member using their labor income relative to the total household labor income: $\bar{u}_{i,t} = \sum_k \frac{P_{k,t}}{P_{i,t}} u_{k,t}$ and $\bar{\sigma}_{i,t} = \sum_k \frac{P_{k,t}}{P_{i,t}} \sigma_{\zeta,t}(x_k)$.

2.1 Indebtedness across borrower types

Figure 1 shows both the probability density function (pdf) and the cumulative distribution function (cdf) of the consumer loan amounts, the debt service to monthly income ratio (DSIR), and the consumer debt to annual permanent income ratio (CDPIR). In terms of both the total amount of consumer debt and the debt to income ratio (CDPIR), the most indebted households are those with Other Debts, followed by the Bank-Retail and the Bank borrowers. The Union Debt are and the Retail only borrowers are the ones with the lowest debt amounts. A similar pattern happens when looking at the debt service to income ratio (DSIR), except that the Bank-Retail households now have a higher indebtedness than the Other Debt borrowers. Looking at the modal values of indebtedness in the pdf graphs, the results show modes of 5.5, 5, 4.2, 4 and 2 for, respectively, the Other Debt, Bank-Retail, Bank, Union and Retail borrowers, with Retail borrowers showing a much lower debt amount relative to all the other debtors. The mode value of the consumer debt to income ratio (CDPIR) is below 10% for all the borrower types. However, the debt service to income ratio (DSIR) presents a bimodal distribution with a first mode between 8% and 20% depending on the debt type and then a second mode around 75%, which shows there are both many borrowers with low values of debt service and also a significant number of borrowers that are liquidity constrained (that is, households dedicating 75% or more of their monthly income to satisfy their next installment payment). Union borrowers, curiously, have an almost uniform distribution of the DSIR between 8% and 15%, which is due to the lending policy of these worker institutions.

Besides their indebtedness level, household risks can also depend on their demographics and labor market profile. Figure 2 shows the entire distribution (in terms of pdf and cdf) of the households' labor characteristics. It shows all the borrower types and those with No Access to Debt, while leaving out the households with No Wish for Debt. The distribution of permanent income (in log, monthly) is mostly between 2.5 and 5.5, but with strong differences across debtor types, with Bank having the highest income borrowers, followed by the Other Debt and Bank-Retail borrowers, then the Union Debt and Retail borrowers, and finally the No Access borrowers with the lowest income. The labor income volatility is concentrated between 5% and 40%, with Union borrowers showing the lowest volatility risk, followed by the Bank-Retail borrowers, then the Retail and Bank borrowers, and finally those with Other Debt and No Access households presenting the

Figure 1: Indebtedness by debtor type: PDF (left graphs), CDF (right graphs)



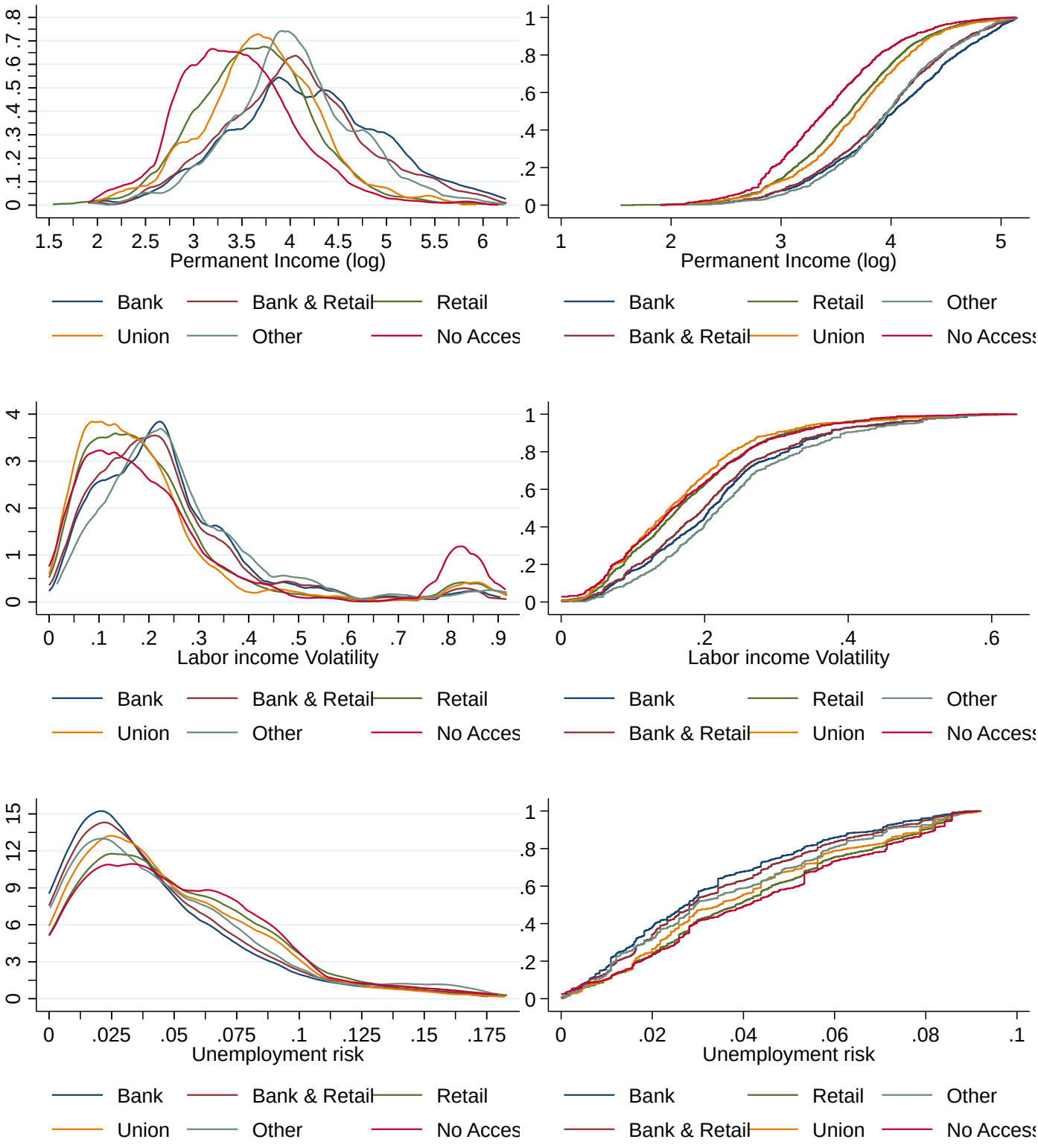
highest income volatility. The unemployment risk is mostly concentrated between 0% and 10%, with Bank borrowers showing the lowest unemployment risk, followed by Bank-Retail, then by the Union Debt and Other Debt borrowers, and finally with the Retail borrowers and the No Access households showing the highest unemployment risk.

3 Conclusions and policy implications

This paper shows how borrowers' characteristics differ substantially across lender types, such as banks, retail stores, unions and others (car lenders, education loans, others). Households with No Access to Debt have the lowest income and highest unemployment rates, therefore it is the group most subject to low income and high risk. The users of just Bank loans are the ones with the highest income and lowest unemployment rate, but they experience from a moderate wage volatility which creates a demand for debt to smooth consumption. The Bank-Retail and Other Debt borrowers have a slightly lower income than the Bank only borrowers, but these are subject to a considerably higher unemployment risk and therefore have a higher indebtedness level than Bank only borrowers. The Union Debt borrowers are a case in the middle of the debt and labor income risk profiles, because these households have a low income level but also a low wage volatility and a moderate level of unemployment risk, therefore these households also have a moderate level of indebtedness. Finally, Retail Store only borrowers show the lowest income and education coupled with the highest unemployment risk among the households with access to debt, therefore such households also have the lower debt amounts.

Our work shows that households have different debt levels and get credit from different lenders, according to their income level, wage volatility and unemployment risk. This shows the importance for regulators to increase their information of non-bank lenders in Chile, in order to promote financial stability, consumer protection and financial literacy initiatives (Cohen and Dijkman 2021). Furthermore, it is relevant to study whether access to these different lenders and types of debt has an impact on consumption smoothing, welfare and inequality (Madeira 2023a).

Figure 2: Labor income characteristics by debtor type: PDF (left graphs), CDF (right graphs)



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