

The dollar versus the peso: Currency of debt choices among Mexicans working in the U.S.

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1 Introduction

In this project, I intend to empirically understand the choice of Mexican households, which have at least one member working in the United States, to borrow in pesos or dollars. The two experiments will involve a select group of respondents recruited via a Facebook targeted advertisement presented with a hypothetical choice to obtain small, short-to-medium-term (3 to 5 years) household loans. The participants are selected based on their primary residence in Mexico and their status as immigrant workers in the United States. For the purposes of this study, I will focus on low-wage, manual labor workers and seasonal workers employed in major metropolitan areas in the United States. I will attempt to derive the elasticity of the debt portfolio fraction¹ in pesos for households given household characteristics (risk aversion, income in dollars, other financials) following their responses to the interest rate reduction experiment when presented with an opportunity to borrow in either pesos or dollars. I also intend to identify the elasticity of the level of dollar borrowing if the agent only intends to borrow in dollars.

Exploiting two empirical facts that (1) Mexican immigrant workers earn their wages directly in U.S. dollars and remit at least some of the earnings back to their families and households in Mexico and (2) that peso rates are historically higher than dollar rates, in my first experiment, all participants will receive a 25 bps reduction in hypothetical interest rate on peso loans, which is modeled based on comparable real bank loan rates. The treatment group will receive a 50 bps reduction in hypothetical interest rate on peso loans and the interest payment forgiveness for the first year of the loan. Holding the total loan size unchanged, borrowers should shift at least some of their total borrowing to peso loans, and the borrowers who received larger interest rate reductions and interest payment forgiveness should be shifting a larger fraction of their borrowing away from dollar loans. I compare the before-treatment and post-treatment estimates of the dollar debt fraction in the household portfolio chosen by the borrowers to the predicted dollarization derived from the mean-variance portfolio model by Ize and Yeyati (2003).

In the second experiment, all borrowers who intend to borrow only in dollars receive a hypothetical interest rate reduction of 25 bps. The treatment group will receive a hypothetical interest rate reduction of 50 bps and fixed exchange rate conversion terms for the first year of the loan. The improved borrowing terms relative to the standard loan contracts should provide incentives for the participants to request a larger loan size, and for the treatment group members to request the largest levels of loans. I compare the before-treatment and post-treatment estimates of the levels of dollar debt from the second experiment and the dollar deposit levels to the estimates of the net dollar position stemming from the model by Montamat (2020) [23], which incorporates household labor income, risk aversion, and interest rate differentials.

My paper attempts to address the currency selection problem faced by borrowers in emerging economies, who have to decide between borrowing in their national currency and borrowing in a reserve currency such as the U.S. dollar, given (a) current and expected foreign exchange rates, (b) interest rates on loans denominated in local currency and foreign currency, and (c) local and foreign inflation rates. The unique setting that involves immigrant workers earning their wages in U.S. dollars and having the ability to keep their assets in dollars or pesos, as well as access to banking both in the U.S. and in Mexico, allows for clean experiments with an interest rate reduction on hypothetical household loans in pesos and dollars. I primarily intend to focus on the effects of the interest rate differential reduction. I also intend to explore heterogeneity in treatment effects based on various personal and financial characteristics of the borrowers. Finally, the paper tests the uncovered interest parity condition in the household/individual agent setting, which is largely unexplored in the existing literature. My approach to deriving the optimal dollar share of the loan portfolio and optimal net position in dollars for the individual borrower is informed by Ize and Yeyati (2003) and Montamat (2020).

The demographic that I am focusing on in this paper - Mexican immigrant workers who are employed in manual labor and seasonal jobs - is optimal for studying the choice between two currencies. Workers who are in the United States on temporary work visas are likely to have sustained ties to Mexico. They are more

¹This includes existing loans and the experiment loan.

likely to continue remittances of their earnings to families back home and to maintain financial accounts and investments in their home country. [30] Familial and social ties may also mean better knowledge of the local economic conditions. Workers with more transient status in the U.S. may thus contemplate borrowing in either dollars or pesos, depending on their expectations for the macroeconomic variables and knowledge of the current interest, inflation, and exchange rates. In contrast, those with a more permanent immigration status in the U.S. are less likely to have strong ties to Mexico as time passes. As a result, their financial decisions are likely to be based in dollars only and the two-currency setting is no longer relevant.

1.1 Motivation

Emerging literature emphasizes dollar borrowing and macroeconomic shocks that affect borrowing decisions of households. Households outside of the U.S. can obtain short-term and long-term financing in foreign currency through local commercial banks and lending institutions. Compared to local currency-denominated loans, foreign currency-denominated loans offer lower interest rates [33] [34] [21] [20]. Another major advantage for certain consumer debt types like mortgages is having a fixed interest rate for at least the first year of the mortgage [34]. In Mexico, the borrowers have a choice between dollar-denominated and peso-denominated loans.

The foreign currency of choice in my experimental setting is the U.S. dollar. The U.S. dollar is the dominant currency in lending worldwide, including household debt. U.S. GDP makes up for 24.4% of the world GDP (World Bank, 2019 data), and dollar-denominated loans make up for 80% of cross-border loans to emerging market economies [8]. In Estonia and Latvia, 2 small Baltic economies that are a part of the European Union, dollar debt made up for 70-80% of all private debt as of 2010 [6]. The global preference for the dollar is unlikely to change in the near future, even if the U.S. Federal Reserve policies aren't particularly strong [27]. Compared to other major currencies, the dollar has been supported by well-established infrastructure [22], which in fact allowed other currencies, such as the euro, to be broadly used due to the incumbency effect [24] [26].

Dollarization of financial operations is relevant to many emerging countries due to macroeconomic instability; the dollar is often seen as a hedge against potential losses in local currency assets. In some cases, there is also a high degree of substitutability between the dollar and the local currency. Trade openness and financial liberalization tend to increase dollarization [28]. NAFTA adoption by Mexico increased the degree of dollarization among Mexican workers and households [7].

1.1.1 Currency mismatch

The key friction in foreign currency borrowing arises from the exchange rate risk. While in some emerging economies pegged exchange rates minimize the exchange rate risk [6], this is not the case for most borrowers around the world. The currency mismatch arises when borrowers earn their income in a domestic currency and have to repay their debt in another currency (and vice versa), making them vulnerable to exchange rate shocks. Given information about contemporaneous and predicted exchange rates, domestic and foreign inflation, and borrowing rates, borrowers essentially face a problem of having to match their future domestic currency-denominated income to interest payments and debt principal in a foreign currency to minimize their financing and foreign exchange conversion costs. If there is an exchange rate shock (i.e. the domestic currency gets severely devalued) after they borrow, without (sufficient) hedging, borrowers are faced with higher interest and principal repayments than expected. In my setting, this friction is resolved by the fact that surveyed workers all have earnings in dollars, which can be exactly matched to dollar-denominated debt payments.

1.1.2 Currency revaluations

As briefly discussed earlier, foreign currency-denominated debt makes borrowers vulnerable to periodic currency revaluations and in more extreme cases, currency crises in their respective home countries. Recent literature discusses the effects of such exchange rate shocks on consumer credit and other household finance metrics. In Hungary, the 2008 forint devaluation crisis was associated with rise in default rates even for households with soft (local) currency debt only, decline in housing prices, and decline in durable and non-durable consumption [33]. At the start of the 2014 Russian ruble crisis, many borrowers experienced a "payment shock" with their ruble-denominated incomes being insufficient to repay foreign currency loans (the majority of which were in U.S. dollars) [34] [21].

While payment shocks may not be a major concern for immigrant workers earning their income in dollars, they nevertheless face the challenge of maximizing their utility from the loan given the peso-dollar exchange rate volatility. When the peso is severely devalued, it may make more sense to borrow in pesos, as the dollar earnings are now worth more in pesos. This makes interest payments more affordable for dollar earners. The first proposed experiment seeks to incentivize all of the borrowers to shift their borrowing preferences towards peso-denominated loans by reducing the interest rate and bringing it closer to the dollar loan interest rate.

1.1.3 Banking coverage

Banking access and coverage by immigrant workers is an important factor affecting dollar earnings remittances. Paulson and Rhine (2008) show that Hmong refugee households more likely to use currency exchanges and less likely to use savings accounts and credit cards than non-immigrant workers [25]. In 2000-2002, 35% of Mexican immigrants had bank accounts in the United States [2].

Banking may affect remittances and subsequently, dollar assets and liabilities that Mexican workers hold back in their home countries. On the one hand, having a U.S. bank account may signify reduced ties with Mexico, which leads to lower earnings remittances. However, U.S. account ownership may also mean higher chances of having a bank account in Mexico to which the immigrant is transferring money to support the family. In fact, banked immigrants bring home 3 times the earnings of unbanked immigrants [2]. Bank accounts provide easier access to money as well: the immigrant's family or himself can use an ATM to withdraw money from the debit account. This is more convenient and safer than cashing in a money order/transfer or using informal means to remit money (money in mail, personal delivery, etc.).

1.1.4 Dollar earnings remittances

One of the main sources for dollarization of assets by Mexican households comes from dollar earnings remittances by Mexican immigrant workers. Mexican immigrants tend to send at least some of their U.S. dollar earnings back home [2]. Several well-documented mechanisms include household consumption smoothing, target and precautionary saving, insurance in case the immigrant loses employment, and the need for personal loan repayment. In 2009, the volume of remittances reached \$21.2 billion in over 67,000 transactions, in contrast with \$4 billion in 13,000 transactions in 1996, according to the Bank of Mexico data [31]. The average remittance value per transaction has not changed much: it was \$320 in 1996 and \$317 in 2009.

There are various channels for remittances: bank deposits and transfers, money orders and money transfers, other electronic payment transfers, and unofficial channels without a "paper trace", such as cash included in regular mail or personal deliveries of cash by designated persons to the families back in Mexico. 70% of transfers were done through money transfer firms in the early 2000s. This changed after the 2000s, when preferences switched mostly to bank transfers, even among illegal immigrants. \$20.5 billion in remittances in 2009 was sent via wire transfers, which makes up for about 96.7% of total remittances [31]. The switch to wire transfers from money orders is associated with a broader acceptance of *matricula consular* card² as a form of identification required to open a U.S. banking account. [31] While documented immigrants transfer more money than undocumented immigrants, longer tenure in the U.S. is associated with lower rates of remittances.

Earnings remittances also have important macroeconomic effects for the Mexican economy [30]. Shocks to remittances have a positive effect on domestic money demand. There is a documented bi-directional relationship between remittances and the exchange rate. Remittances tend to appreciate the Mexican peso on the one hand; on the other hand, peso depreciation increases remittances. This leads to lower holdings of U.S. dollars and higher peso holdings, as families tend to convert dollar earnings into pesos during peso depreciation. But this relationship between peso depreciation and remittance rates is not always obvious. Ruiz and Vargas-Silva (2009) show that if peso is devalued substantially, those with ordinary, non-urgent consumption needs and those close to retirement may decrease remittances, as the higher value of the dollar allows them to match their financial goals with fewer dollars (while the value of the income when converted to pesos stays the same). However, if the worker has investments in both Mexico and the United States, remittances may increase to allow for higher contributions in pesos (especially if Mexican investments have been performing well). Those with urgent consumption needs also tend to increase remittances [30].

The experimental setting with the survey respondents applying for hypothetical loans allows me to explore both the role of dollar income in the form of remittances and behavioral motivations (more specifically, an individual's risk aversion), which were previously studied in the context of household asset allocation and wealth building, in decisions to take on a household loan. I plan to include a question on the personal financial goals in the survey to better understand why immigrant workers may be interested in a household loan (such as house repairs and home improvements, supporting relatives back in Mexico, children's education, etc.). The survey will also include questions on the worker's dollar income and household financials.

1.2 Contribution to existing literature

While the bulk of recent literature mostly focuses on the macroeconomic foundations of the optimal currency choice in depositing and borrowing, I attempt to understand the microeconomic and behavioral foundations of the actual/imputed currency choice by households. While there are papers that study

² *Matricula consular* card is an identification card issued by the Mexican government to citizens residing outside Mexico.

effects of certain macroeconomic shocks on the corporations’ decisions to borrow in foreign currency, such as Keller (2019) [19], there are no similar papers that study household decisions. Gyongyozsi and Verner (2021) use macroeconomic shocks and change in foreign currency debt burden of households as a channel for change in political preferences, but do not explore the question of foreign currency debt choice in the first place. Rather, the foreign currency borrowing is used as an instrument [13]. Verner and Gyongyozsi (2020) exploit variation in exposure to foreign currency debt by Hungarian households and revaluation of debt burdens to find effects on various macroeconomic indicators. [33] Finally, I utilize a unique setting where individuals from marginalized communities have access to dollar income and the banking systems of both their home country and the United States.

2 Demographics

2.1 Statistics on border crossings

The demographic reach of my study is largely defined by the border crossing statistics provided by the U.S. Bureau of Transportation Statistics. The agency tracks entries for every legal U.S.-Mexico border crossing through designated checkpoints. Figure 1 indicates the locations of all official border crossings as of October 2022. The heat spots indicate the monthly volume of individuals at every border crossing, with yellow spots being the most populated border crossings.

San Diego, CA, Imperial County, CA, and El Paso, TX constitute the 3 largest border crossings by the number of people entering every month. In October 2022, 4 checkpoints located in San Diego County served roughly 3.9 million travelers. 3 checkpoints in El Paso County served 2.3 million people. These numbers are equivalent to 9.9% and 7.9% of the state population for California and Texas respectively. Figure 2 summarizes border crossings by county located at the U.S.-Mexico border.



Figure 1: U.S.-Mexico border crossing locations and entry volume. Data: U.S. Bureau of Transportation Statistics, October 2022.

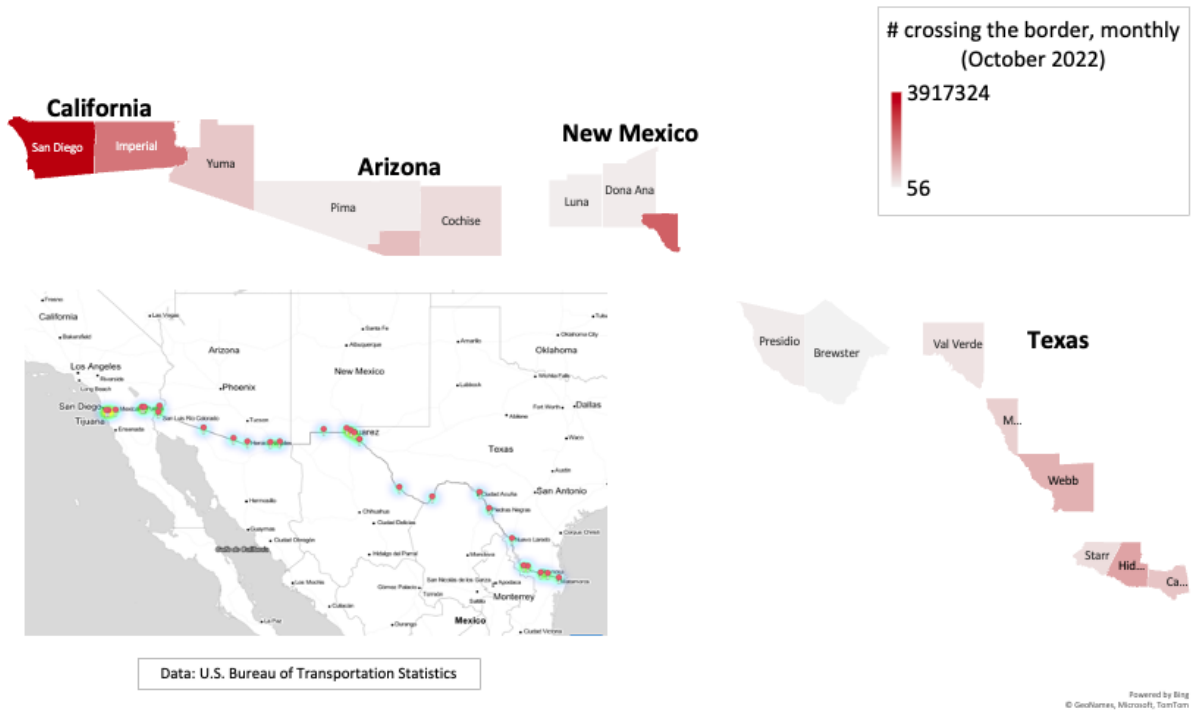


Figure 2: Monthly border crossings by county, October 2022. Data: U.S. Bureau of Transportation Statistics, October 2022.

Mexican workers make up for a significant proportion of immigrant manual laborers in the United States. In 2021, 95.6% of admitted seasonal agricultural worker visa holders and 80.7% of seasonal non-agricultural workers were from Mexico. This is equivalent to 73.3% of all admitted qualified and non-qualified immigrant workforce from Mexico. In contrast, Mexican citizens held only 4.2% of specialty occupation, high-skill (H1B) visas and 28.2% of work visas classified as "other", which includes TN NAFTA visas for temporary admission of immigrant professionals (Department of Homeland Security). These statistics further demonstrate the impact of Mexican workers in the U.S. and Mexican economies.

3 Theoretical framework

3.1 Optimal dollar borrowing

Several papers have attempted to derive the optimal dollar position and level of dollar borrowing. Montamat (2020) defines optimal real wealth and net position in dollars in her model, which establishes optimal real wealth in dollars as a function of 3 terms: an uncovered interest parity term, a price hedging term, and an income hedging term. The model setup involves savers and borrowers: borrowers are more risk-averse (typically households), while borrowers have higher tolerance for risk (typically corporations and entrepreneurs). The U.S. dollar offers households and entrepreneurs a hedge against exchange rate pass-through into prices and income risk. While dollar savings can partially hedge against exchange rate risk, households are more negatively exposed to exchange rate risk than the firms. [23] In Ize and Yeyati (2003), dollarization is defined as a dollar share of the optimized mean-variance asset portfolio and flows into the dollar share of the borrowers' optimal portfolio. Other variables are included in the term that involves the coefficient of risk aversion, the lending rate differential, and the variance of the interest rate differential. Dollar loans can optimize credit portfolios. [16] Higher deposit dollarization leads to higher borrowing in dollars, while higher risk aversion is correlated with lower dollar borrowing. Basso et al. (2011) similarly find that higher mean-variance portfolio dollarization leads to higher deposit and loan dollarization. [3] In my paper, I use measures from Montamat (2020) and Ize and Yeyati (2003) to compare borrower-level estimates to actual experiment results.

3.2 Measures of risk aversion with incentives

As a part of my experiments, I conduct a risk aversion assessment of the bank customers. I specifically utilize methodology by Holt and Laury (2002), which allows for measuring risk aversion with incentives and also estimation of a utility functional form. Unlike earlier papers on the subject, such as Binswanger (1980) [5], the lottery involves large cash prizes that are actually to be paid to the select experiment participants. [15]

In this paper, the lottery will be conducted in 4 rounds. In the first round, there are 10 paired lottery choices. One of the choices is selected at random ex-post and played to determine the earnings for the option selected. In the second round, there are same 10 decisions as in the first round, but with hypothetical payoffs 20 times the original levels. In the third round, there is a high-payoff task, but payoffs are paid in cash. In the fourth round, the lottery returns to baseline payoffs from the first round. In order to

participate in the high-payoff decision, the subjects are required to give up what they earned in the first low-payoff task.

Such an experiment design has several advantages over other measures of risk aversion. Measurements of risk aversion with low laboratory incentives can be rather unrealistic and can't properly replicate "real-world" risks [18]. Higher stakes and potential prizes allow to compare behavior under real and hypothetical incentives. Moreover, this approach can help specify and estimate a hybrid utility function that permits increasing payoffs and decreasing absolute risk aversion needed to avoid "absurd" predictions for high-payoff treatments [15].

4 Experiment

4.1 Proposed setting/environment

I intend to conduct my experiment with a sample of Mexican citizens whose primary residence is in Mexico. I then plan to narrow eligibility by asking a question about employment in the United States as a manual labor or seasonal worker. The participants will be recruited via Facebook targeted advertisements that appear in the home page feed. The ad and the survey will be in Spanish. I plan to use machine translation to translate the ad and the survey from English to Spanish.

4.2 Experiment design

The first experiment that aims to explore the borrowing currency mix shift involves a choice between equivalent local currency and dollar loans. In the survey designed as a personal credit survey, the respondents who intend to obtain a household loan and don't indicate a strict preference for either a dollar loan or a local currency loan will need to decide between the two equivalent loans, where the interest rates are set according to the real UIP parity.

A group of 300-500 participants who have been targeted with Facebook ads will have an opportunity to fill out a personal credit survey in exchange for \$5 if the survey is completed, as well as a chance to win a \$25 prepaid Visa gift card. In the survey, the customers will be asked to fill out personal data and financial information. The personal data survey includes questions about age, marital status, occupation, education level, and zip code. Even though all participants will be pre-screened on the basis of their occupation as a manual laborer or a seasonal worker, as well as their geographic location, these questions serve as an additional check. Then the subjects will be asked to indicate whether they have a preference for dollar loans only, peso loans only, equally for either type of the loan, or neither. If the customer selects the "either" option, she then has to indicate the requested (equivalent) loan size in both currencies, as well as loan term (same loan term for both currencies). The current exchange rate will be provided. The initial hypothetical credit offer is then generated with accordance to the real UIP parity. If the customer chooses to proceed with either the dollar loan or the peso loan, she becomes a part of the first experiment.

The customer will then complete a risk aversion assessment (following the methodology by Holt and Laury 2002), a questionnaire that contains questions about knowledge of primary economic and financial indicators (inflation, interest rates, and exchange rates), and a questionnaire that seeks responses to various economic scenarios involving the Mexican and the U.S. economies. Reception of the new credit offer is conditional on completion of at least the first round of the risk aversion assessment, and completion of both the economic knowledge and the economic scenario questionnaires. Then a new credit offer is generated that involves an interest rate reduction on the local currency loan for all of the customers, and a larger interest rate reduction as well as interest payment forgiveness for the first year for the treatment group. The loan term does not change. The customer will need to make a choice between the dollar loan and the peso-denominated loan of an equivalent size, as indicated in the original loan offer. After the final selection, the participant receives the payment and is entered into the raffle for the gift card.

The second experiment evolves around dollar-denominated short-to-medium-term household loan products. After filling out the personal data and the financial information sections of the personal credit survey, the subjects who indicate strict preference for dollar loans will be asked to indicate the requested loan size in USD. The initial credit offer is then generated. If the customer chooses to "proceed" with the loan, she becomes a part of the second experiment.

The customer will then complete a risk aversion assessment (following the methodology by Holt and Laury 2002), a questionnaire that contains questions about knowledge of primary economic and financial indicators (inflation, interest rates, and exchange rates), and a questionnaire that seeks responses to various economic scenarios involving the Mexican and the U.S. economies. Reception of the new credit offer is conditional on completion of at least the first round of the risk aversion assessment, and completion of both the economic knowledge and the economic scenario questionnaires. Then a new credit offer is generated that involves an interest rate reduction on the dollar loans for all customers and a larger interest rate

reduction as well as fixed exchange rate for interest payments for the first year for the treatment group. The customer will then be asked if she would like to increase the borrowing limit. After the final selection, the participant receives the payment and is entered into the raffle for the gift card.

4.2.1 Sample

The sample will be selected from the pool of Mexican citizens who receive services or keep contacts with a select immigrant outreach or immigrant services organization. The introductory section of the survey will include a question about the potential participant’s employment status: ”Are you employed in the United States in a manual labor occupation or in seasonal work?” If the response is ”yes”, the person becomes eligible for the survey and experiment.

The survey responses will be anonymized in Qualtrics. Moreover, to prevent the respondents from participating in the survey multiple times, I will use RelevantID software that prevents fraudulent responses.

4.2.2 Randomization

I intend to randomize the hypothetical loan applications using simple computerized block randomization in SurveyMonkey or Qualtrics, similar to the Bryan, Karlan, and Osman (2022) randomization of business loan applications. That guarantees the 50-50 assignment to treatment and control groups. If there is an odd number of loan applicants, the additional applicant can be assigned with the independent 50% probability to treatment or control. [10]

4.3 Experimental treatment

4.3.1 Treatment assignments and summary

Below is the summary of treatment and control loan terms for both experiments.

Assignment	Interest rate reduction	Other conditions
Control	25 bps	Interest payment forgiveness for 1 year
Treatment	50 bps	

Table 1: Currency composition experiment: treatment and control assignment summary

Assignment	Interest rate reduction	Other conditions
Control	25 bps	Fixed exchange rate for interest payments for 1 year
Treatment	50 bps	

Table 2: Dollar loan levels experiment: treatment and control assignment summary

4.3.2 Survey design

I use Qualtrics to design a personal credit survey with immediate feedback on a hypothetical loan upon receiving applicant data.³ The baseline demographic and financial characteristics of the borrowers are inferred from the first part of the personal credit survey, before the loan is ”approved”. The characteristics reported by the loan applicants include occupation, salary and other income, total assets and liabilities, age, gender, education level, and marital status. There are also questions on the state of residence in Mexico, immigration status, and intent to stay in the United States permanently. Income, assets, and liabilities are broken down by currency of denomination (pesos and dollars). Income is broken down by source. I will also include a question on U.S. earnings and whether any fraction of these earnings is converted to pesos. I also ask a a set of questions on the borrowers’ credit history: loan denials by U.S. and Mexican credit institutions, FICO 4 score for Mexico, and FICO 8 score for the United States.

Borrowers then will be asked whether they would be interested in a 3-5 year household loan. If they respond ”Yes, in USD” or ”Yes, either currency”, they become a part of the experiment. If they choose the peso-only option in that question, they will be directed to the confirmation page of the application after completing the lottery questions, the financial knowledge questions, and the economic scenario assessment questions.

Those participants interested in borrowing are asked to indicate the desired loan term: 3, 4, or 5 years. For participants’ convenience, monthly equivalents of these terms are mentioned as well (36, 48, 60 months). Participants are also asked about how much they would like to borrow if they were to borrow either in USD or in pesos. After the responses are recorded, 2 credit offers are generated. Offer A is a peso-denominated credit offer and Offer B is a USD-denominated credit offer. The APRs are set according to the real uncovered interest rate parity. The borrowers can accept either offer or neither one of them. If

³The survey can be converted to another platform.

the participant selects "neither," she will be asked an optional question about her reasons not to borrow with a text box for response.

The second part of the initial survey involves a lottery with 4 rounds of 10 paired choices, following Holt and Laury (2002). The earnings from the third and fourth rounds are deposited as cash into the participant's e-wallets linked to Amazon MTurk or another platform. In order to participate in the second and further rounds of the lottery, participants need to give their hypothetical earnings from the first lottery. For every lottery, one choice out of ten is selected randomly and the participant is informed of which choice was selected to be played out. The prompt shows the decision situation and the choice that they made for that specific decision situation. After that, the participant proceeds to a random number generator. If the number generated is less or equal to the probability threshold %, the participant wins the first payout option. If it's greater than the probability threshold %, then the participant wins the second payout option. Participants will also be given an option to skip the lottery part altogether.

The third and the fourth parts of the initial survey are focused on understanding participants' knowledge of major economic indicators and their reactions to different economic and financial scenarios involving the Mexican and the U.S. economies. The economic knowledge survey consists of questions on current indicators and expectations for future indicators 3 months from the date of the survey, such as exchange rates, inflation rates, and interest rates. Participants can also check the "Don't know" box if they don't have an answer to a certain question. The economic and financial scenario questionnaire consists of hypothetical 12-month-ahead scenario descriptions with simple up and down graphs, which lead to questions about the preferred currency of borrowing given the scenarios. The answer options are "USD", "Peso", "Either currency", or "Neither currency". Participants will also be given an option to skip the questionnaires.

New credit offers are generated upon completion of all 3 assessments. In the first experiment, participants will be asked to once again choose between a peso and a USD credit offer, but with the peso credit offer having a reduced APR for all borrowers and interest payment forgiveness for the treatment group. The final choice will be the actual loan contract that the participant subscribes to. In the second experiment, the borrower receives a new credit offer and will have an option to enter a new desired loan size, if they choose to do so. They can also keep the previous loan size, but with a new offer APR.

The second survey, which is implemented 1 year after the initial survey, includes all of the above, except for the loan offers. All of the surveys can be filled out by applicants using personal computers and mobile devices using a link for the personal credit survey.

5 Empirical analysis

Following Ize and Yeyati (2003), I estimate the optimal dollar share of the loan portfolio for each of the borrowers as

$$\lambda_L = \lambda^* + \frac{\delta_L^I}{c_L V},$$

where $\delta_L^I = E(r_L^H - r_L^F)$ is the lending rate differential, $\lambda^* = \frac{S_{\pi\pi} + S_{\pi s}}{S_{\pi\pi} + S_{ss} + 2S_{\pi s}}$ is the mean-variance portfolio dollarization defined by the volatilities of inflation and the rate of real depreciation, $c_L > 0$ is the coefficient of risk aversion and V is the variance of the interest rate differential.

Following Montamat (2020), I estimate the optimal net position in dollars for an agent who has exogenous labor income y_t as

$$\theta_t^s = \frac{r^s + \mu^\epsilon - r^{LC}}{\gamma(\sigma^\epsilon)^2} + \frac{\nu_t^P}{\gamma} P_t \beta_{\frac{dP}{P}, \frac{d\epsilon}{\epsilon}} + \frac{\nu_t^y}{\gamma} y_t \beta_{\frac{dy}{y}, \frac{d\epsilon}{\epsilon}},$$

where γ is the coefficient of risk aversion, ν_t^s is aversion to risk to a state variable s , and $\beta_{\frac{ds}{s}, \frac{d\epsilon}{\epsilon}}$ is the regression coefficient of innovations in the growth of the state variable on innovations in the depreciation of local currency.

I then calculate the borrower-level estimates of changes in these two variables between the initial hypothetical loan contract and the acceptance of the special offer with the data from the baseline and the follow-up survey. These estimates will be compared to the first-stage, intent-to-treat and treatment effect estimates. I also intend to explore stratified treatment effects by level of education, household income levels and currency composition, risk aversion, and household balance sheet composition following methodology by Jann, Brand, and Xie (2010) [17]. I will use propensity score estimates from probit and logit regressions and variance weighted least squares to estimate the trends of treatment effects across propensity score strata.

In the first experiment, the left-hand-side variable in the first-stage regression is the change in the peso-denominated debt APR and the interest payment forgiveness dummy variable. The OLS regression will be estimating the take-up of the hypothetical loan offer. I then compute the ITT estimates of the currency mix shift regressed on the treatment indicator. I then estimate the treatment effect of the change in borrowing conditions on the change in chosen currency composition of the debt product using a 2SLS specification. The randomized experimental assignment is used as an instrument for the change in borrowing conditions.

In the second experiment, the left-hand-side variable in the first-stage regression is the change in the dollar-denominated debt APR and the fixed exchange rate dummy variable. The OLS regression will be estimating the take-up of the hypothetical loan offer. I then compute the ITT estimates of the levels of foreign currency borrowing regressed on the treatment indicator. I then estimate the treatment effect of the change in borrowing conditions on the change in chosen dollar loan size using a 2SLS specification. The randomized experimental assignment is used as an instrument for the change in borrowing conditions.

5.1 Elasticities

I estimate the elasticity of increase in peso-denominated debt as a percentage of the total household debt portfolio following the peso interest rate decrease and the interest payment forgiveness. The basic model specification is as follows:

$$\Delta LCDebtFraction_i = \alpha + \beta_1 \Delta r_i^{LC} + \beta_2 P_i + \beta_3 X_i + \epsilon_i, \quad (1)$$

where Δr_i^{LC} is the interest rate reduction on the peso-denominated loan, P_i is the dummy variable indicating interest payment forgiveness on the peso debt, and X_i is the vector of personal and financial characteristics of borrower i .

The price (local currency interest rate) elasticity of demand for peso-denominated debt relative to dollar debt is then formally defined as

$$\mu_i = \frac{\Delta LCDebtFraction_i}{\beta_{1,i}}, \quad (2)$$

where β_1 is the coefficient of interest from equation 1 and $\Delta LCDebtFraction_i$ is the change in the peso-denominated debt fraction in the total household debt portfolio.

In the second case, the model specification is

$$\Delta Y_i^{\$} = \alpha + \beta_1 \Delta r_i^{\$} + \beta_2 FX_i + \beta_3 X_i + \epsilon_i, \quad (3)$$

where $\Delta r_i^{\$}$ is the interest rate reduction on the dollar loan, FX_i is the dummy variable indicating fixed exchange rate term in the loan contract, and X_i is the vector of personal and financial characteristics of borrower i .

The price (dollar interest rate) elasticity of demand for dollar debt is then defined as

$$\mu_i = \frac{\Delta Y_i^{\$}}{\beta_{1,i}}, \quad (4)$$

where $\beta_{1,i}$ is the coefficient of interest from equation 3 and $\Delta Y_i^{\$}$ is the change in the amount of the requested dollar debt.

I then calculate the country-wide measure of borrowing outcomes as

$$\Delta LCDebtFraction_j = \frac{1}{n} \sum \Delta LCDebtFraction_{i,j}, \quad (5)$$

$$\Delta Y_j^{\$} = \frac{1}{n} \sum \Delta Y_{i,j}^{\$}, \quad (6)$$

as the averages across all borrowers in a given country j , which in my case is Mexico.

The country elasticities of demand are defined as

$$\mu_j = \frac{\Delta LCDebtFraction_j}{\beta_{1,j}}, \quad (7)$$

$$\mu_j = \frac{\Delta Y_j^{\$}}{\beta_{1,j}}. \quad (8)$$

6 Predictions

Based on the potential outcomes of the two experiments, I establish 2 sets of predictions. The predictions for the debt currency composition experiment are as follows:

1. Households with lower levels of dollar-denominated assets (higher levels of peso-denominated assets) have higher price (peso interest rate) elasticities of demand for peso debt.

2. Households with higher degrees of risk aversion have higher price (peso interest rate) elasticities of demand for peso debt.
3. Households with almost no dollar income have higher price (peso interest rate) elasticities of demand for peso debt.

Another set of predictions is for the dollar debt level experiment:

1. Households with higher levels of dollar-denominated assets have higher price (dollar interest rate) elasticities of demand for dollar debt.
2. Households with lower degrees of risk aversion borrow more in dollars and have higher price (dollar interest rate) elasticities of demand for dollar debt.
3. Households with higher dollar incomes have higher price (dollar interest rate) elasticities of demand for dollar debt.

7 Mechanisms

7.1 Risk hedging by heterogeneous households

Foreign currency debt can serve as a hedging device by households for price-level/consumption and income motives. Aiba, Odajima, and Khou (2018) find that Cambodian households with a lot of foreign currency income tend to borrow more in foreign currency in order to resolve currency mismatch issues. However, currency of debt choices are also correlated with the level of education. Highly educated households tend to make currency choices consistent with risk hedging and resolution of currency mismatch, while less educated households tend to borrow in the currency in which most purchases are made [1]. Beckmann and Stix (2015) find that among borrowers in Central and Eastern Europe, better knowledge about exchange rate risks decreases demand for foreign currency-denominated loans [4].

Fidrmuc, Hake, and Stix (2013) find that the probability of foreign currency borrowing in Central and Eastern Europe is higher for those households who declare preferences for foreign currency savings over local currency. Such preferences indicate lack of "monetary credibility" of the domestic currency – borrowers try to insulate themselves from inflationary risks of the domestic currency by saving in a foreign currency. As a result, foreign currency borrowing increases to match the deposits. On the other hand, higher trust in local currency decreases the probability of planning for a foreign currency loan. [12] Vargas-Silva (2007) documents a somewhat similar dynamic among Mexican workers employed in the United States - remittances of dollars tend to increase with the depreciation of peso, allowing for more flexibility in financial decisions of households. Remittances also tend to be countercyclical with Mexican business cycle indicators [32].

To sum up, education level, risk aversion and asset currency composition all seem to define heterogeneity in debt currency choices. Moreover, negative expectations around exchange rate volatility and domestic inflation expectations make households shift towards foreign currency loans. While the education component is not something I explore in my experiment in detail, risk aversion and asset currency composition are both important variables I'm trying to understand.

7.2 Reaction to interest rate differentials

Another mechanism that will be explored in this project is the reaction to the change in interest rate differentials. Brown, Ongena, and Yesin (2014) find that information asymmetries cause local currency earners (small firms) to borrow in foreign currency due to lower interest rates compared to local currency loans. Since the banks have imperfect information about the firms' revenues (currency denomination and level), this allows the firms to borrow in foreign currency without incurring the full cost of the credit risk. [9] This may also be the case for households, so it's important to investigate heterogeneous treatment effects based on household income levels and currency composition.

8 Research progress

As of now, I have conducted the literature review and identified the research methodologies to use in this paper. I submitted a request for a project concept institutional review board approval at Washington University in St. Louis in December 2022. My next steps would be finishing the survey design, putting the survey on the SurveyMonkey or Qualtrics platform, and securing financing for the project from Olin Business School or external sources.

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