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Overindebtness and mortgage credit in households portfolios: a simultaneous analysis for Mexico

Sobreendeudamiento y crédito hipotecario en las carteras de los hogares: un análisis simultáneo para México

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ABSTRACT

This paper uses a non-linear simultaneous equation approach to examine the factors driving household overindebtedness and mortgage credit tenure for Mexican households. As both variables are endogenously determined by household debt portfolio management, this approach allows the identification of the role played by variables such as income, education, household structure, and wealth. Our results suggest that, once we consider the endogeneity of both variables of interest, overindebtedness might result from Mexican households' desire to obtain a real-state asset through mortgage credit, which ones obtain is reflected in higher debt levels.

RESUMEN

En este trabajo se utiliza un enfoque no lineal de ecuaciones simultáneas para examinar los factores que determinan el sobreendeudamiento de los hogares y la tenencia de crédito hipotecario de los hogares mexicanos. Como ambas variables están determinadas endógenamente por la gestión de la cartera de deuda de los hogares, este enfoque permite identificar el papel que desempeñan variables como el ingreso, la educación, la estructura del hogar y la riqueza. Nuestros resultados sugieren que, una vez que consideramos la endogeneidad de ambas variables de interés, el sobreendeudamiento podría ser resultado del deseo de los hogares mexicanos de obtener un activo inmobiliario a través de un crédito hipotecario, lo que se refleja en mayores niveles de deuda.

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INTRODUCTION

Household financial portfolio management analysis is a fundamental tool for understanding the economic dynamics of income and wealth distribution. For instance, Samphantharak and Townsend (2006) show how a financial approach to studying household decisions is helpful for various topics in economic development, including analyzing household enterprises' productivity, capital structure, liquidity, financing decisions, and risk management.

Access to credit has been recognized as a key driver of economic development, enabling households to finance durable goods and long-term assets, such as housing (de la Cruz and Alcántara, 2011; Villarreal, 2024). Access to the credit mortgage market remains crucial to a robust financial system necessary to build a developed economy. Housing property is a fundamental

asset in the household portfolio, and the characteristics of this market, both in access and depth, play a central role in promoting development and wealth.

Studying mortgage credit is crucial for several reasons. Access to mortgage loans is a cornerstone of financial inclusion. It allows individuals and families to purchase homes, which is often the most significant investment they will make in their lifetime. By studying mortgage access, we can identify barriers preventing certain groups from obtaining loans and work to address them, thereby promoting greater financial inclusion.

The housing market plays a substantial role in the overall economy. Easy access to mortgages can stimulate housing demand, leading to economic growth. However, if access is limited or restricted, it can hinder economic stability and growth. By understanding mortgage access, policymakers can implement measures to ensure a healthy housing market, which is crucial for economic stability.

Access to mortgage loans can also have profound implications for social equity. Historically, certain demographic groups, such as minorities and low-income individuals, have faced challenges in accessing mortgage financing. Studying mortgage access helps identify disparities and discriminatory practices, allowing policymakers to enact policies to promote fair and equal access to housing finance.

Additionally, in the mortgage debt market context, the over-indebtedness phenomenon is particularly relevant due to the magnitude of the commitments involved. According to Adelino *et al*. (2018), the rapid growth of mortgage credit was one of the main drivers of the 2008 financial crisis, as the unchecked expansion of mortgage credit often failed to consider households' actual repayment capacity. Furthermore, the relationship between debt levels and the value of mortgaged assets can become critical in cases of property depreciation, increasing financial vulnerability. Also, it is relevant to mention that access to the mortgage credit market is essential for financial inclusion (Sanchez-Moyano, 2022). However, it also carries significant risks, particularly regarding household over-indebtedness.

Over-indebtedness occurs when households take on financial commitments that exceed their payment capacity, leading to severe economic difficulties, financial stress, and negative impacts on well-being. Studies such as those by Dumitrescu *et al*. (2022) and Abd *et al*. (2020) have pointed out that factors such as easy access to credit, low interest rates, and a lack of financial literacy are critical determinants of rising household debt levels.

From a social perspective, over-indebtedness has significant equity and social cohesion implications. Over-indebted households tend to reduce consumption, which can have contractionary effects on the broader economy. Moreover, research by Lusardi and Tufano (2015) highlights that households with lower levels of financial literacy are more likely to take on unsustainable debt, exacerbating existing economic inequalities. Moreover, household characteristics also affect the probability of over-indebtedness, specifically in emerging economies, according to Chichaibelu and Waibel (2018) and Karambakuwa and Ncwadi (2021).

In this context, analyzing the balance between access to mortgage credit and household over-indebtedness is crucial, assuming these two decisions can be made simultaneously. This analysis promotes responsible financial regulations and financial education programs that empower households to make informed and sustainable long-term decisions.

However, the gathered research on mortgage markets and household credit, both theoretical and empirical, is heavily biased toward analyzing and understanding the US and the Western European developed markets, and less research concentrates on developing countries.

While incipient literature has been conducted to analyze household portfolio and mortgage conditions in developing economies (see, for instance, the set of studies in Ben-Shahar *et al*. 2008), this type of investigation is scarce in Mexico. This imbalance leaves a vast potential and under-cultivated ground for enriching the research

and understanding of mortgage markets and overindebtedness outside developed economies, particularly for identifying the codependency and dynamics of these financial variables in Mexico.

On the supply side, mortgage lending could be closely related to household debt levels, which is inherently risky for lenders. Studying mortgage access enables financial institutions and regulators to effectively assess and manage these risks. By understanding the factors influencing mortgage access, lenders can make more informed lending decisions, reducing the likelihood of defaults and foreclosures.

The evidence shows that access to the mortgage credit market and household over-indebtedness are studied separately, but the literature proves they are closely related. In this sense, the motivation of this paper is to demonstrate the link between access to the mortgage credit market and household over-indebtedness. To ensure that, this investigation studies the determinants of mortgage credit access and debt management in Mexican households, analyzing both variables as a simultaneous equation system. From this point of view, we want to prove the causal bidirectional relationship between these two variables, ones we control by socioeconomic variables. In particular, this paper uses Mexico's National Survey on Household Finances (ENFIH) for 2019 to study household portfolio debt management (as defined by their overindebtedness condition) and the current use of mortgage credit to identify the socioeconomic determinants of both variables. For this purpose, we employ a simultaneous equation model based on an equation system, where we use some similar regressors for both equations and two different explanatory variables, one for each equation, to identify the system.

As expected in related literature, the household head's age, wealth, education, and household size significantly determine overindebtedness and mortgage use, with mixed results regarding size and sign among their different levels. One of the main contributions of our work is to demonstrate, among other results, that overindebtedness and mortgages are not independent once considered and controlled by socioeconomic determinants; households face them simultaneously. Under this idea, it can be argued that, for instance, to obtain a home, households become overindebted, given that this type of credit has the most weight within the total debt of Mexican households. Similarly, suppose households are in a state of over-indebtedness. In that case, this can be explained by their current mortgage credit access since it is a debt granted for high amounts and long periods compared to other types of debts that households may contract.

The paper is organized into four sections. The first section presents a literature review of the topic we address. The second section describes the data characteristics we use for our study. The third section develops our empirical strategy using a non-linear simultaneous equation system. The fourth section shows the results of our estimations. At the end, are the conclusions of the document.

I. LITERATURE REVIEW

Regarding the literature review, it is essential to comment that there is research that evaluates the effect of sociodemographic and financial variables associated with the household on over-indebtedness and possession or access to mortgage credit. However, these studies are carried out in one direction, in some cases using over-indebtedness as a dependent variable and in others using access to the mortgage debt market. In this sense, no evidence of a simultaneous analysis between these two variables was found, so this work provides a new approach to analyzing this topic. This section focuses on the investigations related to access to the debt market (in any way) and household indebtedness/overindebtedness to support the determinants we use to simultaneously explain mortgage credit access/tenure and over-indebtedness.

Access to the debt market

Ceballos (2022) analyzes the effects of access to credit on the consumption structure of Mexican households. The author estimates credit card ownership and bank loan models by explaining five consumption items and validating the results using Propensity Score Matching. The results show that credit cards boost aggregate consumption through spending on health, durable goods, and other non-durable goods. Loans, an instrument used by households with a lower socioeconomic level, have few positive effects. The analysis shows that these sources of credit smooth consumption but do not contribute to reducing gaps between households in the country.

Ceballos and Santiago (2019) analyzed the effects of credit card (CC) ownership on the structure and distribution of spending by Mexican families in 2016. To do so, they use two-stage quantile regressions to estimate the determinants of consumption, instrumenting the effect of CC by spending category. The authors find a positive effect of CC on aggregate consumption, mainly the increased spending on health and less essential items such as clothing, communications, and entertainment. In addition, they find that they do not significantly affect spending on education and durable goods. The effects of CC are higher at the top of the consumption distribution, so these effects on the reduction of inequality and the future well-being of families can be questioned, given the conditions of the financial inclusion process in the country.

Gutiérrez (2023) explores the social reproduction in households and how the credit-debit process has mutated in Mexico, focusing on analyzing the links between the financialization process and the functioning of households. The author carries out an empirical exploration of aggregate data on production, consumption, and private credit. The results show periods in which consumption grows faster than production. During the study period, there is a clear relationship between consumption and credit, whose dynamics are framed by economic growth and decline phases. In addition, they find that reported income is one of the most significant factors that explain the differentiated use of financial instruments and debt patterns. The Household Financial Autonomy Index proposed by this author allows us to note, through a logistic model, the relevance of the size of the localities, the head of the household, and their income level.

Castellanos and Garrido (2017) analyze decisions related to the ownership and use of credit cards by households in Mexico using a sample selection model. These authors find that household aspects such as income, education of the head of the household, and ownership of collateral assets are related to credit card ownership. In addition, the concentration of branches and point-of-sale terminals (POS) in the locality also influences this decision. However, in spending related to credit cards, the concentration of POS terminals is significant, but not so much income, once its effect on ownership is considered. The authors conclude that in Mexico, the use of credit cards would increase to a greater extent due to the expansion of the POS infrastructure than to the promotion of traditional "reward programs" of discounts or income transfers for paying with this instrument.

Cotler and Rodríguez-Oreggia (2017) analyze the access and participation of the Mexican popular sectors in the formal credit market using probabilistic binary models and sample selection. These authors find that the decision to participate depends on four variable groups: the employment situation and position in the job, the wealth of the individuals, the presence of local shocks, and the receipt of government transfers. Regarding the effect of adverse shocks, the results suggest that loans tend to be demanded to a greater extent when the shocks are local rather than family-natured. In this sense, the demand for financial services is more common when the shock is associated with a transitory shock to income. Finally, it is shown that recipients of government transfers are less likely to demand institutional credit services.

Vaessen (2001) explores the accessibility of rural credit in the case of a rural bank in Northern Nicaragua. Both the point of view of the potential client and the bank are addressed. He illustrates that local networks of

information and recommendations are important low-cost screening mechanisms for the rural bank. It is also shown that individual access to these networks of information and recommendations related to existing clients or bank staff members is the principal factor determining household access to the bank's credit. The evolution of the bank into a professional financial organization has significantly impacted outreach over the territory. Expansion in the bank's portfolio went hand in hand with geographical expansion and more dispersion of the clients over the territory. This development has affected poor households' access to the bank's credit since they depend on dense and elaborate local networks of clients for information and recommendation effects as elements of social collateral to develop.

In addition, Murcia (2007) evaluates the determinants of access to credit for Colombian households using a probit model. This author uses variables associated with household characteristics similar to those discussed previously, finding that income, education, age, and household wealth positively impact access to the mortgage debt market. Likewise, Camelo *et al*. (2018) use a logit model to explain the same phenomenon, but specifically for Bogotá. These authors find similar results and reinforce the idea that education is a highly relevant factor in explaining the use of mortgage credit for purchasing housing in Colombia.

Indebtedness and over-indebtedness

Considering the overindebtedness, some authors have investigated the determinants that explain this dependent variable. In this sense, Díaz *et al*. (2019) study the determinants of indebtedness of Mexican households through neuronal networks. Controlling for the characteristics of the households, such as the economic stratum, age, and educational level of the head of household, among others, these authors find that the leading cause of indebtedness in Mexican households is the possession of a bank credit card, which does not necessarily imply that it is the cause of their over-indebtedness.

Salgado and Chovar (2010) analyze for Chile the effect of having credit cards and mortgage debt on the probability that a household becomes over-indebted. Through a bivariate probit, these authors find that having credit cards has a higher impact on household over-indebtedness than having mortgage debt. The household head's employment situation is also significant in the probability of household over-indebtedness. Additionally, Ruiz-Tagle *et al*. (2013) investigated the determinants of indebtedness and overindebtedness for the same country using a probit-type binary response model. These authors find that health and employment shocks, household size, education, age, gender, and income level significantly impact household overindebtedness.

Georgarakos *et al*. (2010) analyze the attitudes of 12 European countries towards household mortgage debt through a probabilistic model. The authors find that variables such as age, education, employment, marital status, household income, and the level of mortgage debt relative to income, among others, affect households' financial stress. This relationship is due to the high financial burden associated with housing costs.

Additionally, some authors analyze this phenomenon in emerging economies like Thailand, Vietnam, and South Africa. On one hand, Chichaibelu and Waibel (2018) study the determinants of household over-indebtedness and its persistence for rural household borrowers in Thailand and Vietnam, finding that, for Thailand, but not for Vietnam, past experience of over-indebtedness increases the probability of being over-indebted in the present, controlling for other household characteristics. Village support systems in Vietnam may be more effective in delivering households out of over-indebtedness than in Thailand, where heavy debt burdens are taken more for granted. Household characteristics that significantly increase the probability of over-indebtedness. On the other hand, Karambakuwa and Ncwadi (2021) also analyze the determinants of household debt distress in South Africa and suggest some recommendations for managing household debt. The findings show that households lack the necessary finance management skills and proper protection from predatory

practices by lenders. Also, indebtedness is caused by the rising cost of living, which leads to low household disposable income and savings, high interest rates, misfortunes, adverse trigger events, and income inequalities. Education, age, and receiving a social grant all positively and negatively impact household indebtedness. Results also suggest that female-headed households, renting households, large households, urban-based households, households with a mortgage, and households where the head is not working, is sick, or disabled are more likely to be over-indebted.

Other authors study household debt without considering the factors determining their over-indebtedness. In this sense, Farinha (2007), González and León (2007), and Gutiérrez-Rueda *et al*. (2011) consider variables associated with household characteristics and binary response models in general to find significant effects that explain family debt. The results are consistent, where income, education, age, and gender of the head of household play a relevant role in explaining the dependent variable.

Mortgage credit access/tenure

On the other hand, some investigations address the topic of mortgage credit. From this perspective, Farfán-Pérez (2024) analyzes how the level of over-indebtedness in Mexican households significantly impacts the ownership of mortgage credit. This author uses a logit model with instrumental variables, considering the endogeneity of the over-indebtedness variable. Additionally, she uses control variables such as income, debt level, gender, age, and employment status of the head of household. Her results show that over-indebted households with higher incomes and a higher level of debt increase the probability of having a mortgage loan in their debt portfolio.

Vega *et al*. (2024) analyze the determinants of credit use, considering mortgage credit, for Mexican households using a simultaneous multivariate probit model. They find that precisely in the case of mortgage credit, household characteristics (income, debt level, total assets, age, and education of the head of household, among others) play an essential role in its use. They also show that mortgage and automobile credit are substitutes for Mexican families.

Also, Loya (2023) analyses the differential access in mortgage credit considering ethno-racial stratification. This author shows that applicant disparities in loan outcomes vary when factoring in the neighborhood's spatial type and racial composition. Borrowers seeking a mortgage in predominantly minority rural communities are more likely to be denied a mortgage than borrowers applying across all other neighborhood types and racial compositions. Also, when comparing the community's racial composition and neighborhood type, the observed lending pattern provides evidence of constrained mortgage access in rural areas, especially among minority rural communities.

Furthermore, Sánchez and Moreno (2021) mention that, in Mexico, there is a greater propensity to have a home using mortgage credit (mainly through Infonavit) if you are an employee or independent worker and belong to the highest income quintile compared to those who receive less salary. These authors use a multinomial logit model to explain access to mortgage credit, using variables such as education, income, and occupation status of the head of the household.

Libertun the Duren (2023) looks at whether there is a gender gap in access to housing loans, one of the main tools available for housing. In addition, she explores the characteristics of FHHs and to which extent they can impact their access to adequate housing. This study shows how FHHs face more significant housing deficits. The findings indicate that gender gaps in other areas, most notably in labor markets, are conditioning income and access to financial services. However, once results are controlled for observable variables, the gender gap in obtaining a mortgage in LAC shrinks but persists. At all income levels, women had a lower proportion of housing credit ownership than men did at the same income level. Likewise, gender gaps are noticeable even

when comparing men and women with housing loans. The study also supports the notion that FHHs tend to prioritize housing location over housing, which may explain why FHHs are overcrowded even if not poor.

Anenberg *et al*. (2019) study mortgage credit availability by constructing a new measure using a technique developed for production frontier estimation. The resulting "loan frontier" describes the maximum amount obtainable by a borrower of given characteristics. They estimate this frontier using mortgage origination data from 2001 to 2014. The authors find a substantial mortgage credit expansion for all borrowers during the housing boom, not only for low-score or low-income borrowers. The subsequent contraction in credit was most pronounced for low-score borrowers. Using variation in the frontier across metropolitan areas over time, they show that borrowing constraints played an important role in the recent housing cycle.

II. DATA

Information source

This research uses Mexico's National Survey on Household Finances (ENFIH) for 2019. The ENFIH is a nationally representative survey whose main objective is to collect information on the financial situation of households in Mexico. Furthermore, this survey provides detailed information on the sociodemographic characteristics of household members in Mexico.

The sample comprises 17,386 households, of which only people over 18 are interviewed. Our main study's limitation is that we analyze data cross-sectionally, so we cannot conduct temporal comparative analyses.

We use this dataset for two main objectives. First, we want to isolate the COVID-19 pandemic effect because this unexpected phenomenon could cause relevant changes in individual consumption patterns, which is not the objective of this research. Second, we want to give visibility to this survey, which presents relevant financial information to households and is rarely used in the literature.

Dependent (endogenous) variables: Mortgage credit access/tenure and overindebtedness

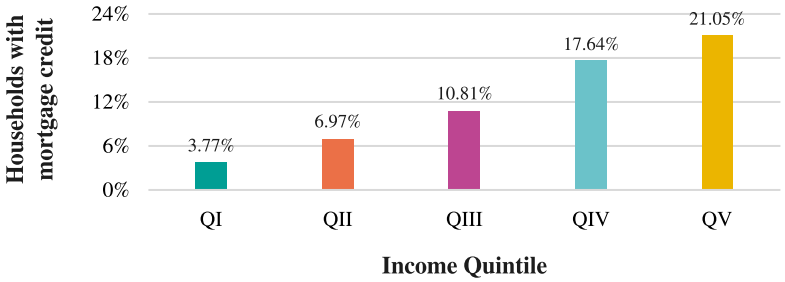
This research attempts to explain the simultaneous relationship between the possession of mortgage credit and the over-indebtedness of Mexican households. Therefore, these are the variables that are identified as dependent variables.

In the case of having a mortgage loan (*M_Loan*), this variable is dichotomous. It is considered to take a value equal to 1 if a household has at least one credit related to the purchase of real estate and zero otherwise, represented as follows:

$$M_i \begin{cases} 1 & if\ (M\_Loan)_i^* \geq 0 \\ 0 & otherwise \end{cases} \tag{1}$$

Figure 1 shows the percentage of households with mortgage credit by income quintile. It can be seen that 21.05% of households with more financial resources (income) have at least one mortgage credit. This quintile has the highest number of households with mortgage credit. In this sense, these numbers indicate that access to mortgage market debt can be related to household income.

Figure 1
Mortgage credit tenure by income quintile



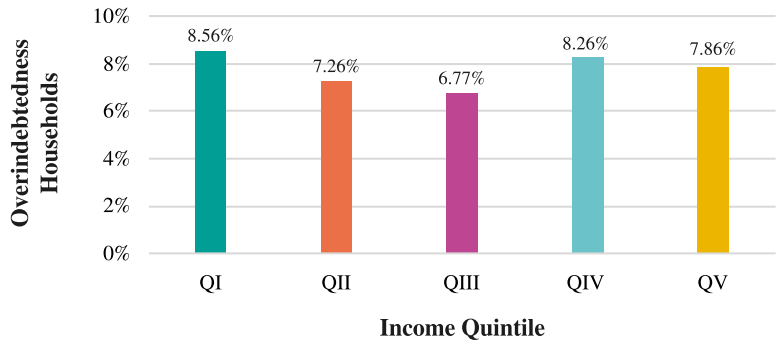
Source: authors' elaboration with ENFIH 2019 data.

Considering the overindebtedness variable, this depends on the household's financial burden. In this sense, a household with a financial burden ratio greater than 50% is considered over-indebted. Therefore, this variable is equal to 1 if the financial burden (FB) is equal to or greater than 0.5 and 0; otherwise, its specification is the following:

$$O_i \begin{cases} 1 & if\ (FB)_i^* \geq 0.5 \\ 0 & otherwise \end{cases} \tag{2}$$

Figure 2 shows a first approach to overindebted Mexican households by income quintile. The first quintile concentrates the highest number of overindebted households, with 8.56% of the total households in this group. From this perspective, the only way those households can buy a real estate property may be through the debt market.

Figure 2
Overindebtedness households by income quintile



Source: authors' elaboration with ENFIH 2019 data.

Independent variables: sociodemographic and economic-financial household characteristics

Table 1 summarizes the explanatory variables related to the characteristics of Mexican households. This chart shows variables associated with the household economy and their sociodemographic situation. We also introduced other cross-effect relationships to capture the potential locality heterogeneity in accessing mortgage credit and becoming overindebted.

Table 1
Description of the independent variables

Variables	Description	Formulation	References
Total income	It is a categorical variable defined by income quintile, considering the total household income, including labor and non-labor income. **Earned income:** - Income from financial investments - Income from the rental of real state **Income from sources other than work:** - Government support programs - Retirement or pension - Transfers from family or friends living within the country - Transfers from family or friends living outside the country - Rental of property (other than real estate) - Sale or pawning of goods - Profits or gains from business - Scholarships - Other income	QI. Between 0 - 52,740 QII. Between 52,800 - 98,400 QIII. Between 98,600 - 156,000 QIV. Between 156,200 - 254,800 QV. Between 255,000 - 12,400,000	ENFIH (2019) Vega *et al.* (2024)
Household locality	It is a dichotomous variable considering a rural area with up to 14,999 inhabitants, while the urban area is where 15,000 people or more live.	0. Rural 1. Urbana	ENFIH (2109) Dávila *et al.* (2021)
Household size	It is a categorical variable that defines the number of individuals composing a household.	1. One inhabitant 2. Two inhabitants 3. Three inhabitants 4. Four inhabitants 5. Five inhabitants 6. Six inhabitants or more	ENFIH (2019) Okurut (2006)
Non-financial assets	Assets with a physical value include real estate, vehicles, inventory, furniture, machinery, and equipment.	ln(non financial assets)	ENFIH (2109) Vega *et al.* (2024)
Debt concentration index (DCI)	To create this variable, each debt instrument households have contracted is considered. The ENFIH describes the following: mortgage credit, credit card, departmental credit card, payroll credit, personal credit, automotive credit, and other credits.	$\sum_{i=1}^{6}(s_i)^2$	ENFIH (2019) Farfán-Pérez *et al.* (2025)
Household head sex	It is a dichotomous variable that defines whether the head of household is male or female.	0. Female 1. Male	ENFIH (2109) Libertun de Duren (2023)

Variables	Description	Formulation	References
Household head age group	It is a categorical variable that defines the age group corresponding to the head of household.	1. Under 35 years old 2. Between 35 and 44 years old 3. Between 45 and 54 years old 4. Between 55 and 64 years old 5. Between 65 and 74 years old 6. Over 75 years old	ENFIH (2019) Díaz *et al.* (2019)
Household head education level	It is a categorical variable that defines the educational level of the head of household.	0. No Education 1. Basic Education 2. Higher Secondary Education 3. Bachelor's degree or equivalent 4. Postgraduate	ENFIH (2019) Dávila *et al.* (2021)

Source: authors' elaboration considering previous literature and ENFIH 2019.

Descriptive statistics

This section will discuss and describe the variables that characterize Mexican households and intervene in the econometric model estimates. Table 2 shows that in the case of the dependent variables, 12% of Mexican households have at least one mortgage loan, and 8% are over-indebted.

Analyzing the explanatory variables, we see that the predominant income quintile in the Mexican population is the third. However, around 42% of the inhabitants of Mexico are within the poorest quintiles (QI and QII). The contrast between poverty and wealth is evident, with the first income quintile (QI) receiving up to 52,740 pesos per year and the fifth quintile up to approximately 12.4 million (QV). Moreover, households with four inhabitants are the most prevalent in Mexico, reported by 22% of households. Related to the place where the household is located, the data shows that 64% of households are located in an urban area. Additionally, the average non-financial assets of Mexican households is 741,413.70, with a minimum of zero and a maximum of 909 million Mexican pesos. Likewise, the debt concentration index averages 0.88, representing that most Mexican households have concentrated debt in a few (or only one) debt financial instruments.

Regarding the household head characteristics, we observe that around 69% of heads are males. Also, the age group that stands out in the survey is between 45 and 54 years old, with 22%, and the predominant educational level is basic education, with 57%.

Table 2
Descriptive statistics

Household variables	Observations by category	Mean	Std. dev.	Min	Max	Total observations
Mortgage credit tenure						36,633,576
No tenure	32,399,958	0.88	0.32	0	1	
Tenure	4,233,618	0.12	0.32	0	1	
Overindebtedness						35,192,039
No tenure	32,399,958	0.88	0.32	0	1	
Tenure	4,233,618	0.12	0.32	0	1	

Household variables	Observations by category	Mean	Std. dev.	Min	Max	Total observations
Income quintile (in pesos)						36,633,576
QI (0 - 52,740)	7,840,919	0.21	0.41	0	1	
QII (52,800 - 98,400)	7,711,108	0.21	0.41	0	1	
QIII (98,600 - 156,000)	7,865,786	0.21	0.41	0	1	
QIV (156,200 - 254,800)	6,836,943	0.19	0.39	0	1	
QV (255,000 - 12,400,000)	6,378,821	0.17	0.38	0	1	
Size						36,633,576
One inhabitant	5,201,180	0.14	0.35	0	1	
Two inhabitants	7,215,294	0.20	0.40	0	1	
Three inhabitants	7,314,692	0.20	0.40	0	1	
Four inhabitants	7,961,744	0.22	0.41	0	1	
Five inhabitants	5,022,588	0.14	0.34	0	1	
Six inhabitants or more	3,918,078	0.11	0.31	0	1	
Locality	23,369,379	0.64	0.48	0	1	36,633,576
Rural	13,264,197	0.36	0.48	0	1	
Urban	23,369,379	0.64	0.48	0	1	
Non-financial assets	36,633,576	741,413.70	5,585,133.00	0	909,000,000.00	36,633,576
DCI	19,528,410	0.88	0.19	0.24	1	19,528,410
Household head variables						
Sex		0.69	0.46	0	1	36,633,576
Female	11,385,880	0.31	0.46	0	1	
Male	25,247,696	0.69	0.46	0	1	
Age						36,572,261
< 35 years old	6,638,849	0.18	0.39	0	1	
35 - 44 years old	7,805,987	0.21	0.41	0	1	
45 - 54 years old	8,134,976	0.22	0.42	0	1	
55 - 64 years old	6,783,928	0.19	0.39	0	1	
65 - 74 years old	4,447,117	0.12	0.33	0	1	
≥ 75 years old	2,761,400	0.08	0.26	0	1	
Age square	36,633,576	2,776.75	1,697.60	324.00	9,801.00	36,633,576
Education level						36,555,024
< 35 years old	6,638,849	0.18	0.39	0	1	
35 - 44 years old	7,805,987	0.21	0.41	0	1	
45 - 54 years old	8,134,976	0.22	0.42	0	1	
55 - 64 years old	6,783,928	0.19	0.39	0	1	
65 - 74 years old	4,447,117	0.12	0.33	0	1	

Source: authors' elaboration with ENFIH 2019 data.

III. EMPIRICAL STRATEGY

To identify the potential relationship between mortgage market tenure and Mexican households' overindebtedness, we start with two behavioral models that integrate the potential simultaneity of both variables of interest (overindebtedness and mortgage access) and their dichotomic nature. The empirical strategy of the model statistical structure is to consider two probability models whose marginal parameters are jointly estimated through a simultaneous maximum likelihood.

In particular, define overindebtedness as a dichotomic variable taking values if we observe this value in the financial burden exceeds 0.5 ($O_i = 1$) or the opposite otherwise ($O_i = 0$); this variable depends on a set of observed variables X_i^O through a vector of coefficients β^O (which includes a constant), if the household currently has a mortgage credit, M_i through a coefficient δ and a set of unobserved variables, which is summarized by the random variable ε_i^O. Hence, we can express this relationship using an indicative function $1(\cdot)$ as follows:

$$O_i = 1(X_i^O \beta^O + M_i \delta + \varepsilon_i^O \geq 0) \tag{3}$$

Similarly, let us assume that accessing and having a mortgage credit can be defined as a conditional dichotomous variable M_i that takes a value of 1 if the household declares that it currently has that type of instrument and 0 if not. This variable depends on a latent condition, which is a function of a set of observed variables X_i^M through a vector of coefficients β^M (which includes a constant), and a set of unobserved variables, which is summarized by the random variable ε_i^M. Let us use an indicative function $1(\cdot)$ as follows:

$$M_i = 1(X_i^M \beta^M + \gamma O_i + \varepsilon_i^M \geq 0) \tag{4}$$

For this case, if we assume that ε_i^O and ε_i^M are jointly distributed under a bivariate normal, both with zero means, finite variances, and a covariance that empirically determines the hypothesis of simultaneity correlation on the unobservables, it is possible to estimate this system of equations using the maximum likelihood method while taking advantage of the available information; in particular:

$$\begin{bmatrix} \varepsilon^O \\ \varepsilon^M \end{bmatrix} \sim N_2\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_{\varepsilon^O, \varepsilon^O} & \sigma_{\varepsilon^O, \varepsilon^M} \\ \sigma_{\eta^O, \varepsilon^M} & \sigma_{\varepsilon^M, \varepsilon^M} \end{bmatrix}\right) = N_2(0_{[2]}, \Sigma_{[2X2]}) \tag{5}$$

In particular, it is possible to use this joint multivariate normal distribution over the simultaneous non-linear system given by equations (3) to (5) and introduce identification variable conditions on each of them (namely, $X_i^0 \neq X_i^M$), estimate the entire mixed non-linear system through a joint likelihood function defining as parameters of interest: 1) the set of vectors given by $\{\beta^O, \beta^M, \delta, \gamma\}$, 2) the variance-covariance matrix $\Sigma_{[2X2]}$ comprising all the variances of each unobservable term, and 3) the potential correlation between overindebtedness and mortgage credit use and access.

To identify the simultaneous equations system defined by the combined normality of dependent variables and their covariates, we introduced two instruments as exclusion restrictions: non-financial assets, to identify the access to credit mortgage as a proxy for collateral capacity of the agent, while the debt concentration index is used as an instrument to identify the overindebtedness, following Farfán-Pérez *et al*. (2025).

IV. ESTIMATION AND RESULTS

Empirical findings

The results presented in Table 3 of this section show that there is indeed a significant simultaneous relationship between access to mortgage credit and household over-indebtedness. This result provides evidence for the central hypothesis of this research and implies that both variables are endogenous, and households jointly decide to become overindebted and have mortgage debt within their debt portfolio. We observe that households with mortgage debt increase the likelihood of being overindebted by approximately 21%. Conversely, overindebted households decrease the probability of access to the mortgage debt market by approximately 11%.

Additionally, household head characteristics significantly impact households' becoming overindebted and access to mortgage credit. The sex of the household head is employed in the literature as a relevant factor closely related to these two dependent variables. In this study, the sex variable is positively related to overindebtedness and access to mortgage credit. This result means that men's heads of households increase the probability of overindebtedness and access to the mortgage credit market compared to women in the same situation. In this sense, Libertun de Duren (2023) proves the gender gap in access to loan housing.

To explain the overindebtedness through age groups, households with heads aged between 35 – 44, 45 – 54, 55 – 64, 65 – 74, and 75 years old and older increase the probability of being overindebted in 2.59%, 2.29%, 3.74%, 4.56%, and 5.80%, respectively, compared to households with young heads under 35 years old. Analyzing the relationship between age and the probability of access to a mortgage loan, households with heads aged 65 – 74 decrease the likelihood of becoming overindebted by 1.51%, compared to households with heads under 35. Household heads aged between 35 – 44, 45 – 54, and 55 – 64 years old increase the probability of their households becoming overindebted compared to younger heads (< 35 years) by 7.71%, 5.42%, and 2.04%, respectively. Concerning the age-squared, the sign is negative for explaining both dependent variables, indicating a maximum age point from which the probability of access to the mortgage credit market and being overindebted begin to decrease.

The education level of the household head plays an important role in these simultaneous decisions. Regarding overindebtedness, household heads with upper-secondary education and a bachelor's or postgraduate degree increase the probability of being overindebted by 2.81%, 8.44%, and 21.28%, respectively, compared with household heads with no education. Household heads with basic education decrease the likelihood of becoming overindebted by 0.75%. From a mortgage credit access perspective, household heads' education level shows the same signs as overindebted households. On the one hand, households' heads with basic education decrease the probability of having a housing loan by 3.34%. On the other hand, household heads with upper-secondary education and a bachelor's or postgraduate degree increase the likelihood of accessing a credit mortgage by 4.11%, 1.18%, and 5.62%, respectively, compared with no-educated household heads.

Additionally, income level is a relevant determinant of household finances. Considering the relationship between income level and over-indebtedness, we can say that with increases in the household's monetary resources, households with higher incomes tend to reduce over-indebtedness between 16% and 30%, compared to households with lower resources (QI). Also, higher-income households tend to increase their probability of having mortgage debt between 0.4% and 4% compared to poorer households (QI). Regarding this explanatory variable, we can conclude that the increase in the probability of having a mortgage loan and the decrease in becoming overindebted due to increased income levels are expected and intuitive results. First, this positive relationship may be associated with households' increased availability and liquidity once their income increases,

showing financial stability and a lower risk of default. In the second place, the negative sign may be associated with a lesser need and more profitable not to go into debt.

The results associated with the household size are heterogeneous. Those with two or three inhabitants tend to increase the probability of becoming overindebted by 2.22% and 0.85%, respectively. Conversely, households with four, five, and six or more inhabitants decrease the likelihood of becoming overindebted by 1.43%, 1.71%, and 3.85%, respectively. After analyzing mortgage credit access, household size presents a negative relationship with this dependent variable, with values between 0.48% and 5.09%. In this sense, increasing the number of household members decreases the probability of having access to a mortgage credit. The base category for this independent variable is households with one inhabitant.

The household locality impacts household over-indebtedness in Mexico. From this perspective, households in an urban area, relative to rural areas, increase the probability of becoming overindebted by 5.96%. For mortgage credit tenure, urban households increased the likelihood of having a housing loan in their debt portfolios by approximately 12%. These results may be associated with urban households having greater access to financial institutions, given that these institutions tend to be scarce or non-existent in rural areas.

The identifier variables show significance in both equations. To explain the overindebtedness, we employ the debt concentration index. In this sense, households using fewer credit instruments decrease the probability of becoming overindebted by approximately 42%. This result is consistent with Farfán-Pérez *et al*. (2025), where they prove that Mexican households face difficulties managing various financial instruments. Additionally, access to the mortgage credit market is closely related to non-financial assets. When this explanatory factor increases, the likelihood of having a housing loan increases by 5.95%. The household can use non-financial assets as collateral when taking out a mortgage loan, reaffirming the positive relationship between these two variables.

Another relevant finding is the interaction between mortgage credit access and locality. These interacted variables represent the access to the mortgage credit market in urban areas. Households with mortgage credit located in urban areas are less likely to become overindebted at 22.41%, compared with households in rural areas with no mortgage credit in their debt portfolios. From this perspective, this result can be based on the idea that an urban household that contracts a mortgage loan typically uses this financing to invest in a real estate asset that increases in value over time. In contrast, a rural household without access to a mortgage loan can finance its needs with short-term loans, often through informal channels, leading to a cycle of growing and unproductive debt. It is relevant to emphasize that the measure of overindebtedness includes formal and informal credits, whereas the second one typically represents a higher financing cost. Moreover, we also find that the interaction between overindebtedness and locality shows an interesting result. Households overindebted and located in urban areas increase the likelihood of having a mortgage credit by 9% compared with households not overindebted in rural areas. This result seems to be very intuitive. On the one hand, urban households are more likely to access mortgage loans due to a combination of factors such as higher income, familiarity with financial products, and a higher supply of these services in cities.

On the other hand, this vast supply can lead them to poor debt management and over-indebtedness. In this sense, it is much more likely that this type of household has at least one mortgage loan in its debt portfolio. Along the same line, rural households face structural and cultural barriers limiting their financing access, including mortgages. This limitation can lead to a low level of household debt, explaining that they do not have any mortgage loans in their portfolios, reflecting the inequalities in access to formal credit between urban and rural areas.

Table 3
Simultaneous relationship between mortgage credit access and overindebtedness

Equation 1: Overindebtedness			**Equation 2:** Mortgage credit tenure		
Mortgage credit tenure	0.2124 (0.0057)	***	**Overindebtedness**	-0.1165 (0.0038)	***
Household Head variables			*Household Head variables*		
Sex	0.0075 (0.0002)		Sex	0.0122 (0.0002)	***
Age			Age		
35 - 44 years old	0.0259 (0.0003)	***	35 - 44 years old	0.0771 (0.0003)	***
45 - 54 years old	0.0229 (0.0004)	***	45 - 54 years old	0.0542 (0.0005)	***
55 - 64 years old	0.0374 (0.0007)	***	55 - 64 years old	0.0204 (0.0008)	***
65 - 74 years old	0.0456 (0.0010)	***	65 - 74 years old	-0.0151 (0.0011)	***
≥75 years old	0.0580 (0.0014)	***	≥75 years old	0.0311 (0.0016)	***
Age²	-7.0e-06 (2.4e-07)	***	Age²	-3.5e-05 (2.8e-07)	***
Education level			Education level		
Basic Education	-0.0075 (0.0004)	***	Basic Education	-0.0334 (0.0005)	***
Upper-Secondary Education	0.0281 (0.0005)	***	Upper-Secondary Education	0.0411 (0.0005)	***
Bachelor's degree or equivalent	0.0844 (0.0005)	***	Bachelor's degree or equivalent	0.0118 (0.0005)	***
Postgraduate	0.2128 (0.0007)	***	Postgraduate	0.0562 (0.0008)	***
Household variables			*Household variables*		
Income quintile			Income quintile		
QII	-0.1559 (0.0004)	***	QII	0.0119 (0.0005)	***
QIII	-0.2187 (0.0004)	***	QIII	0.0042 (0.0005)	***
QIV	-0.2334 (0.0004)	***	QIV	0.0418 (0.0005)	***
QV	-0.3018 (0.0004)	***	QV	0.0044 (0.0005)	***
Size			Size		
Two inhabitants	0.0222 (0.0004)	***	Two inhabitants	-0.0509 (0.0004)	***
Three inhabitants	0.0085 (0.0003)	***	Three inhabitants	-0.0238 (0.0004)	***
Four inhabitants	-0.0143 (0.0004)	***	Four inhabitants	-0.0103 (0.0004)	***

Equation 1: Overindebtedness			**Equation 2:** Mortgage credit tenure		
Household variables			*Household variables*		
Size			Size		
Five inhabitants	-0.0171 (0.0004)	***	Five inhabitants	-0.0048 (0.0004)	***
Six inhabitants or more	-0.0385 (0.0004)	***	Six inhabitants or more	-0.0410 (0.0004)	***
Locality	0.0596 (0.0006)	***	Locality	0.1191 (0.0005)	***
DCI	-0.4223 (0.0005)	***	Non-financial assets (ln)	0.0595 (0.0001)	***
Mortgage credit*Locality	-0.2241 (0.0057)	***	Overdebtedness*Locality	0.0900 (0.0038)	***
Constant	0.6464 (0.0009)	***	Constant	-0.5639 (0.0010)	***
R-Square	0.1071		R-Square	0.1328	
Sample Size: n	18,622,608		Sample Size: n	18,622,608	
Prob>Chi2	0.0000		Prob>Chi2	0.0000	

1) The threshold level indicators for statistical significance (p-values) are: [*] p<0.10, [**] p<0.05, [***] p<0.01.

2) The base categories of the categorical or dichotomous variables are the following: Overindebtedness = Overindebted, Mortgage Credit Tenure = Have at least one mortgage credit, Sex = Male, Locality = Urban, Income Quintile = First quintile (QI), Age = Less than 35 years old, Household Size = One inhabitant and Education Level = No education.

Source: author's elaboration using ENFIH 2019 (INEGI, 2021).

Policy recommendations

The findings from the simultaneous equation estimation highlight the hypothesis of a bidirectional relationship between mortgage credit access and overindebtedness. Access to mortgage credit increases the likelihood of overindebtedness, while overindebted households face challenges in maintaining or obtaining mortgage financing. These insights call for targeted policy interventions to promote responsible lending and mitigate financial distress.

First, for financial institutions, the results aim for stricter credit risk assessments and responsible lending policies. Financial regulators should enforce comprehensive creditworthiness assessments to prevent excessive debt accumulation. Also, mortgage lenders must adopt enhanced risk-based pricing models to align loan terms with borrowers' repayment capacities. As a result, debt-to-income (DTI) and loan-to-value (LTV) ratio limits should be strictly monitored to ensure financial stability. The significant negative interaction effect of mortgage credit and localization on overindebtedness suggests that regional factors influence financial stability. Financial institutions should adjust mortgage credit terms based on regional economic conditions, ensuring credit availability aligns with local economic resilience. Also, in this same line, smaller households (one or two inhabitants) exhibit higher overindebtedness risks, while larger households demonstrate better financial stability. Mortgage lending policies should incorporate household size as a risk factor, offering customized financial products that reflect borrowers' financial resilience. Finally, structured repayment plans and debt restructuring mechanisms should be implemented to assist overindebted households in financial distress.

A second set of policies derived from the results emphasizes the need for targeted financial literacy programs. In particular, given that higher education levels correlate with increased mortgage credit access and overindebtedness, financial literacy programs should be tailored for high-income and highly educated borrowers. Governments and financial institutions should promote educational campaigns on sustainable debt management, emphasizing the long-term risks of overindebtedness.

Third, from a government policy perspective looking to improve homeownership to increase wealth and improve distribution, policy measures should incentivize responsible borrowing through preferential mortgage rates and tax deductions for low-risk borrowers. Governments could expand access to affordable mortgage options, particularly for lower-income households, by offering subsidized interest rates or partial loan guarantee programs.

Finally, regarding regulatory policies, the positive relationship between non-financial assets and mortgage credit tenure suggests that asset accumulation facilitates mortgage access but does not necessarily mitigate overindebtedness risks. Policies should encourage liquidity buffers for mortgage borrowers, ensuring they maintain sufficient liquid assets to manage financial shocks. Also, consumer protection laws should be reinforced to ensure transparent lending practices and prevent predatory mortgage lending. Regulatory institutions should promote financial advisory services that help borrowers navigate their mortgage obligations effectively.

In summary, the simultaneous equation estimation underscores the complex interplay between mortgage credit access and overindebtedness. A multi-faceted policy approach, including stricter credit assessments, targeted financial education, regionally adjusted credit regulations, and enhanced consumer protections—can foster a more stable and inclusive financial system. Implementing these recommendations will help mitigate overindebtedness risks while ensuring that mortgage credit remains accessible to financially capable households.

CONCLUSIONS

Buying a home is probably one of the most important decisions in anyone's life because it usually requires external financing that will be paid over several years. In this sense, obtaining a mortgage loan makes this decision easier. Likewise, households use this type of financing to buy homes and create wealth in the long term. However, a financial decision of such relevance based on ignorance can have serious consequences. Mortgage loans are generally high amounts, so the monthly payments also become high. From this perspective, contracting excessive debt or incorrectly managing it can lead a household to exceed the limits of its available resources to meet its obligations and become over-indebted to the point of defaulting on its payments.

In this work, we found empirical evidence of the impact of sociodemographic and economic-financial characteristics on the possession of mortgage credit and over-indebtedness. Beyond this, what is interesting is that these decisions made by the household are not independent; instead, households face them simultaneously. Under this idea, it can be argued that it is very likely that households that become overindebted do so to obtain a home, given that this type of credit is one of the ones that has the most weight within the total debt of Mexican households (55.4% of the total debt of Mexican households corresponds to housing debt, according to ENFIH 2019 data). On the contrary, if households are in a state of over-indebtedness, this can be explained through mortgage credit since it is a debt granted for high amounts and long periods compared to other types of debts that households may contract.

The results are consistent with previous literature, where variables related to household head, such as sex, age, and education level, and household characteristics like household size, locality, and household income are relevant in explaining the possession of mortgage credit and household overindebtedness. In this sense,

it is pertinent to comment that associated with household income level, although the wealthiest households (QV) increase the probability of having a mortgage loan compared to the poorest (QI), they do so to a lesser extent than households from lower quintiles (QII-QIV). This result is not alarming if it is analyzed from the point of view of liquidity. Wealthier households have more immediate available resources to purchase high-value assets, including real estate, than families with more limited resources. On the contrary, when households become the wealthiest, they reduce the probability of becoming overindebted in an increasing way compared with the poorest households. This result is also expected because the wealthiest households have access to more financial resources, making it easier to pay their debts.

Additionally, the positive relationship between the dependent variables and the place where the household is located, as well as the sex of the head of the household, have an essential intuitive meaning. This result reflects the deficient implementation of public policies that promote financial inclusion for minority groups. In this sense, households in urban areas have greater access to mortgage loans, as does the fact that the head of household is male.

It is essential to comment that this work has limitations. Most importantly, the data is only available for 2019, so a pattern cannot be established in household financial decision-making. In this sense, a temporal analysis cannot be carried out, nor can shocks in the debt market be considered at other times, such as the COVID-19 pandemic. Likewise, it is impossible to analyze the mortgage market conditions by constructing a proxy variable for this phenomenon since most households report that they do not know the interest rate they are paying on their mortgage loan. Another limitation is related to the housing cost in urban and rural areas. The data does not identify whether individuals buy a house in an urban or rural area, only whether households with mortgage loans are located (in rural or urban areas).

This research becomes relevant, opening a line of work for possible studies on the impact of mortgage credit on Mexican households' finances. From this perspective, the differentiated effect in the administration of mortgage debt payment at the household level can be studied considering the gender of the head of the household. To this end, there is evidence that affirms that in Mexico, as in other parts of the world, women have less credit default than men in loans with similar financing characteristics, and their participation in the debt market puts downward pressure on the credit delinquency rate (BANXICO, 2023).

Another relevant line of future research can be related to the COVID-19 pandemic. As we know, this situation was an unexpected shock in the world economy. From this perspective, it could be interesting to study how the household consumption pattern changed and how households faced their payments in this period since many people lost their jobs.

Finally, investigating the different costs of housing loans associated with their location (urban or rural areas) can fill out the existing gap in the literature related to mortgage credit access. It is well known that the area is an important determinant in establishing the price of a real estate asset (Kiel and Zabel, 2008). Explaining this phenomenon to Mexican households or individuals can help public institutions address the public policies of those who need them the most, making the process more efficient.

REFERENCES

Abd, K., Mohd, S. N., & Mohd, N. R. S. (2020). Determinants of household debt in emerging economies: A macro panel analysis. *Cogent Business & Management*, *7*(1). https://doi.org/10.1080/23311975.2020.1831765

Adelino, M., Schoar, A., & Severino, F. (2018). The Role of Housing and Mortgage Markets in the Financial Crisis. *Annual Review of Financial Economics*, *10*(1), 25–41. https://doi.org/10.1146/annurev-financial-110217-023036

Anenberg, E., Hizmo, A., Kung, E., & Molloy, R. (2019). Measuring mortgage credit availability: A frontier estimation approach. *Journal of Applied Econometrics*, *34*(6), 865–882. https://doi.org/10.1002/jae.2720

Banco de México. (2023). *Reporte de Estabilidad Financiera*. Banco de México (BANXICO). https://www.banxico.org.mx/publicaciones-y-prensa/reportes-sobre-el-sistema-financiero/%7B6B881BAE-59D7-05D2-0B38-1E72528030BA%7D.pdf

Ben-Shahar, D., Ka, Ch., & Eng, S. (2008). *Mortgage markets worldwide*. Blackwell Publishing. http://doi.org//10.1002/9781444302301

Camelo, M. S., Amaya, J. S., & Parra, J. F. (2018). Determinantes del uso del crédito de vivienda por parte de los hogares bogotanos. *Ecos de Economía*, *22*(47), 38–57. http://doi.org/10.17230//ecos.2018.47.2

Cotler, P., & Rodríguez-Oreggia, E. (2017). Acceso y participación de los sectores populares mexicanos en el mercado formal de crédito. *El Trimestre Económico*, *76*(303), 671–693. https://doi.org/10.20430/ete.v76i303.493

Castellanos, S. G., & Garrido, D. (2017). Tenencia y uso de tarjetas de crédito en México. Un análisis de los datos de la Encuesta Nacional de Ingresos y Gastos de los Hogares 2006. *El Trimestre Económico*, *77*(305), 69–103. https://doi.org/10.20430/ete.v77i305.435

Ceballos, O. E. (2022). Credit services to finance the consumption of Mexican households in 2020. *Análisis Económico*, *37*(94), 43–62. https://doi.org/10.24275/uam/azc/dcsh/ae/2022v37n94/ceballos

Ceballos, O. E., & Santiago, L. E. (2019). Efectos de las tarjetas de crédito en la estructura de consumo y la desigualdad de los hogares mexicanos. *Revista Finanzas y Política Económica*, *11*(2), 299-320. https://doi.org/10.14718/rfype.2019.11.2.2262

Chichaibelu, B. B., & Waibel, H. (2018). Over-indebtedness and its persistence in rural households in Thailand and Vietnam. *Journal of Asian Economics*, *56*(C), 1–23. https://doi.org/10.1016/j.asieco.2018.04.002

Dávila, G., Ortiz, F., & Cabrera, A. (2021). Las finanzas de los hogares mexicanos: análisis con redes bayesianas. *Investigación Económica*, *80*(317), 109–134. https://doi.org/10.22201/fe.01851667p.2021.317.77127

de la Cruz, J. L., & Alcántara, J. Á. (2011). Crecimiento económico y el crédito bancario: un análisis de causalidad para México. *Revista de Economía*, *28*(77), 9-38. https://doi.org/10.33937/reveco.2011.25

Díaz, H. E., Sosa, M., & Cabello, A. (2019). Determinantes del endeudamiento de los hogares en México: un análisis con redes neuronales. *Problemas del Desarrollo*, *50*(199), 115-140. http://dx.doi.org/10.22201/iiec.20078951e.2019.199.67463

Dumitrescu, B. A., Enciu, A., Hândoreanu, C. A., Obreja, C., & Blaga, F. (2022). Macroeconomic Determinants of Household Debt in OECD Countries. *Sustainability*, *14*(7), 3977. https://doi.org/10.3390/su14073977

Farfán-Pérez, L. (2024). Crédito hipotecario y sobreendeudamiento de los hogares: una interpretación del caso mexicano con enfoque de género. *Revista Vivienda Infonavit*, *8*(1), 94-100. https://revistavivienda.infonavit.org.mx/grupos-y-territorios-vulnerables/#dearflip-df_6189/94/

Farfán-Pérez, L. Moreno, J. O., & Zamudio Christopher. (2025). Determinants of debt portfolio diversification in Mexican households. *Revista Mexicana de Economía y Finanzas (The Mexican Journal of Economics and Finance)*, *20*(1). https://doi.org/10.21919/remef.v20i1.893

Farinha, L. (2007). *Indebtedness of Portuguese households: recent evidence based on the Household Wealth Survey*. Banco de Portugal Financial Stability Report. https://www.researchgate.net/publication/227486718_Indebtedness_of_Portuguese_Households_Recent_Evidence_Based_on_the_Household_Wealth_Survey_2006-2007

Georgarakos, D., Lojschova, A., & Ward-Warmedinger, M. E. (2010). Mortgage Indebtedness and Household Financial Distress. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1551227

González, M. A., & León, J. J. (2007). Análisis del endeudamiento de los hogares colombianos. *Revista Desarrollo y Sociedad*, (60), 127–154. https://doi.org/10.13043/dys.60.4

Gutiérrez, J. G. (2023). La financiarización desde el hogar: el caso de la economía mexicana. *Economía UNAM*, *20*(60), 50-73. https://doi.org/10.22201/fe.24488143e.2023.60.818

Gutiérrez-Rueda, J., Estrada, D. A., & Capera-Romero, L. (2011). Un análisis del endeudamiento de los hogares. *Temas de estabilidad financiera*, *61*. Banco de la República. https://doi.org/10.32468/tef.61

Instituto Nacional de Estadística y Geografía. (2021). Encuesta Nacional sobre las Finanzas de los Hogares (ENFIH) 2019. INEGI.

Karambakuwa, R. T., & Ncwadi, R. (2021). Determinants of household over-indebtedness in South Africa. *International Journal of Business and Economic Development*, *09*(02). https://doi.org/10.24052/ijbed/v09n02/art-02

Kiel, K. A., & Zabel, J. E. (2008). Location, location, location: The 3L Approach to house price determination. *Journal of Housing Economics*, *17*(2), 175-190. https://doi.org/10.1016/j.jhe.2007.12.002

Libertun de Duren, N. R. (2023). *Household Led by Women: Understanding Access to Housing Credit in Latin America and the Caribbean*. Inter-American Development Bank. https://doi.org/10.18235/0005295

Loya, J. (2023). Differential access in mortgage credit: the role of neighborhood spatial and racial stratification. *Rural Sociology*, *88*(2), 546-577. https://doi.org/10.1111/ruso.12485

Lusardi, A., & Tufano, P. (2015). Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics and Finance*, *14*(4), 332–368. https://doi.org/10.1017/s1474747215000232

Murcia, A. (2007). Determinantes del acceso al crédito de los hogares colombianos. *Ensayos sobre Política Económica*, *25*(55), 40–83. https://doi.org/10.32468/espe.5502

Okurut, F. N. (2006). Access to credit by the poor in South Africa: Evidence from Household Survey Data 1995 and 2000. *Department of Economics, University of Botswana Stellenbosch Economic Working Papers*, 13/06. https://www.ekon.sun.ac.za/wpapers/2006/wp132006/wp-13-2006.pdf

Ruiz-Tagle, J., García, L., & Miranda, A. (2013). Proceso de endeudamiento y sobre endeudamiento de los hogares en Chile. *Documento de trabajo*, *703*. https://www.bcentral.cl/documents/33528/133326/DTBC_703.pdf

Salgado, H., & Chovar, A. (2010). ¿Cuánto influyen las tarjetas de crédito y la deuda hipotecaria en el sobre endeudamiento de los hogares en Chile? *Departamento de Economía*, *12*. https://www.researchgate.net/publication/254399614

Samphantharak, K., & Townsend, R. M. (2006). *Households as Corporate Firms: Constructing Financial Statements from Integrated Household Surveys*. https://ssrn.com/abstract=911964 or http://dx.doi.org/10.2139/ssrn.911964

Sánchez, R. B, & Moreno, J. O. (2021). El financiamiento y la tenencia de vivienda en México. *Revista Vivienda Infonavit*, *5*(2), 122-127. https://online.flippingbook.com/view/582522194/122-123/

Sanchez-Moyano, R. (May 24, 2022). *Housing and access to credit are two sides of the Financial Inclusion coin*. Community Development & District Engagement. https://www.frbsf.org/research-and-insights/blog/community-development/2022/05/24/housing-and-access-to-credit-two-sides-of-financial-inclusion/

Vaessen, J. (2001). Accessibility of rural credit in northern Nicaragua: the importance of networks of information and recommendation. *Savings and Development*, *25*(1), 5–32. http://www.jstor.org/stable/25830748

Vega, J. I., Moreno, J. O., & Farfán-Peréz, L. (2024). Determinantes del uso de crédito de los hogares mexicanos: un análisis simultáneo por tipo de instrumento. *Contaduría y Administración*, *69*(4), 143-165. https://doi.org/10.22201/fca.24488410e.2024.5164

Villarreal, F. L. (2024). Crédito y crecimiento económico. El papel estratégico de las instituciones públicas en el Ecuador. *European Public & Social Innovation Review*, *9*, 1–18. https://doi.org/10.31637/epsir-2024-1557