



Gender identity and relative income within households:

Evidence from Mexico

Pietro Eugenio Messina

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Pietro Eugenio Messina

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Supervisor: Joana Silva

Abstract

This dissertation investigates the impact of gender identity norms on income distribution within married households in Mexico, employing census data from 1990, 2000, and 2010. Central to the analysis is the McCrary density test, which assesses the discontinuity when a wife's income equals or exceeds her husband's, challenging conventional gender roles. Our findings indicate a significant societal aversion to wives earning more than their husbands, evident across Mexico's diverse regional, temporal, and sectorial settings. This study underscores the profound influence of gender norms on household economic behaviors, highlighting how deeply cultural and social norms can shape family financial decisions.

Keywords

Gender Identity, Income Distribution

Identidade de Género e Rendimento Relativo dentro das Famílias:

O Caso Mexicano

Pietro Eugenio Messina

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Supervisor: Joana Silva

Resumo

Esta dissertação investiga o impacto das normas de identidade de género na distribuição de rendimentos dentro das famílias casadas no México, utilizando dados dos censos de 1990, 2000 e 2010. Central na análise é o teste de densidade de McCrary, que avalia a descontinuidade quando o rendimento da esposa é igual ou superior ao do marido, desafiando os papéis de género convencionais. Os nossos resultados indicam uma aversão significativa da sociedade a que as esposas ganhem mais do que os maridos, evidente nas diversas configurações regionais, temporais e setoriais do México. Este estudo sublinha a profunda influência das normas de género nos comportamentos económicos das famílias, destacando como as normas culturais e sociais podem moldar profundamente as decisões financeiras familiares.

Palavras-chave

Identidade de Género, Distribuição de Rendimento

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1. Introduction

The social role associated with a person's identity can significantly influence their economic decisions. This is the crucial concept of identity economics, a theory that challenges the classical assumptions that individuals always make decisions based only on rational self-interest. Traditional gender norms, such as that men should earn more than women, influence people's economic lives.

Bertrand et al. (2013) pioneer work provided empirical evidence linking gender identity norms and critical economic outcomes. They aimed to understand how the aversion to a wife earning more than her husband can affect marriage formation, labor force participation, and household income distribution. In their conclusion, the authors encouraged other researchers to replicate their work in diverse settings to expand the conversation further and provide valuable insights into how universal the gender dynamics treated are. The research was replicated in many countries, including the US, Canada, Sweden, Finland, Germany, Brazil, and China, expanding the literature and giving new angles to the topic. The impact of gender identity norms on household economics varies across different cultural, economic, and social contexts.

Mexico presents a unique case with its diverse economic landscapes and cultural variety – from historically conservative regions to more progressive urban environments – making it a compelling setting to explore these gender norms further. This country presents a rich landscape of indigenous traditions and colonial influences that have shaped the social layers over the centuries. Studying Mexico can provide new perspectives on the literature, a country where rapid economic development and integration into the global market have coexisted with persistent traditional values and roles.

This research explores the impact of gender identity norms, particularly the aversion to a wife earning more than her husband, on the economic outcomes within married households in Mexico. The study uses census data from Integrated Public Use Microdata Series (IPUMS) International, a rich dataset covering 1990, 2000, and 2010 from Mexico. The subject of the analysis are married couples active in the labor force: we retrieved couples in which both spouses are between 18 and 64 years old and have a positive income. The core analytical method is the McCrary density test, which detects discontinuity in the density of a running variable at a specific cutoff. In this context, this point is when relative income is equal to 0.5, the value at which the wife and husband contribute equally to the household's financial entry. The methodology helps understand how economic behaviors and gender norms influence each

other, checking for any unusual pattern when a wife's income approaches or exceeds her husband's, the point that challenges traditional gender roles.

This thesis has three main findings. First, we found significant negative discontinuities at the 0.5 relative income threshold across the entire sample in 1990 and 2000, indicating a societal aversion to wives earning more than their husbands. Second, Northern Mexico, with its historical ties to stronger gender norms, exhibits the most pronounced effects, while urban areas and regions influenced by Mexico City's progressive environment show moderated impacts. Third, the primary economic sector shows the most extensive estimates of discontinuity magnitude. Moreover, households where spouses work in the same sector exhibit more significant discontinuities, suggesting that sector-specific norms reinforce traditional gender roles.

This thesis contributes to the literature by providing new empirical evidence on how gender identity norms affect household income distribution in Mexico.

The work is structured as follows: The next section covers the relevant literature, examining fundamental theories and significant studies in the field, focusing on the Mexican context. Section 3 outlines the methodology adopted in our research, describing the data and the McCrary density test. Section 4 presents all the results and prepares for the conclusion in Section 5.

2. Literature Review

Identity Economics

Our conceptual framework is based on the identity economics theory. It considers social identity as one factor influencing people's economic behaviors. In identity economics, decisions rely not only on rational calculations of costs and benefits but also on how people perceive themselves and their desire for society to perceive them in a certain way. This includes conformity to norms and behaviors associated with specific social identities, which can make players make choices that may seem irrational (or just not optimal) according to traditional economic models. Some examples can be gender discrimination on the job, poverty economics, social exclusion, or housework division within couples.

Akerlof and Kranton (2000) propose specific terms to represent social identity and its interplay with economic behaviors. Below is reported their utility function:

$$U_i = U(a_i, a_{-i}, I_i)$$

Where:

- U_i is the utility of individual i ,
- a_i represents the action or choice of individual i ,
- a_{-i} represents the actions or choices of other individuals that influence individual i ,
- I_i is the identity of individual i , which depends on its actions, on actions made by others, and from its social position and the norms associated with it.

In our context, this model can be applied considering men and women as the two relevant social categories. The norm associated with gender identity can be summarized in this prescription: '*A man should earn more than his wife.*' In the presence of this prescription, Violating this expectation would be a cost for the two social categories.

Bertrand et al. (2013) studied this norm and focused their analysis on examining its causes and consequences on relative income within households. Their research found that gender identity and the women's aversion to earning more than the men influence many aspects of a married couple: marriage formation, women's labor participation and income, marriage satisfaction, divorce probability, and housework division.

They found that gender identity has a crucial role in marriage formation. They analyzed the relative income distribution drop at 0.5 for US married couples, showing that couples are less willing to match if the woman's income exceeds the man's. They assigned the couples to marriage markets (categorized on age, education, and race) and simulated two matching games based on different utility functions. Under traditional utility functions, men and women in a marriage market prefer a partner with a higher income. While under identity utility functions, women always choose a partner with a higher income to maximize their utility, and men always prefer a partner with a higher income only if it does not exceed his own. The simulation with the identity preferences was similar to the actual relative income distribution for US married couples. Fisman et al. (2006) found something similar in a speed dating context: men value women's intelligence or ambition until it exceeds their own, while this limitation is not present in the other gender's preferences.

Bertrand et al. (2013) suggest that couples may have a strong preference against the wife being the primary breadwinner. Their work was a game changer in the field, encouraging the research to search for similar patterns in other countries.

Doumbia and Goussé (2021) investigated gender identity and relative income within Canadian households. They confirmed the presence of gender norms similar to those in the United States, showing a significant drop at the 0.5 relative income distribution. This result was consistent at national and regional levels, with different regional variations in the magnitude of the drop. The study suggests that historical and cultural differences may contribute to this effect in different regions. Dongcheng et al. (2021) used China Household Financial Survey data to find similar evidence when women earn more than men in households, indicating a social pressure to make women not earn more than their partners. They further explore the phenomenon through income and education levels, finding that women in the lower layers of these variables are more liable to gender norms.

Many studies have been conducted in Germany to check for similar patterns. First, Wieber and Holst (2015) built on Bertrand et al. (2013) studying relative income distribution and its relationships with job offers and the informal market using German Socio-economic Panel Study data. The results show that gender identity significantly impacts full-time job offers for women, but only in the western part of Germany. This divergence evidences socio-economic policies and cultural behaviors towards gender roles in ex-East and ex-West Germany. Later work investigates the theme further, finding that in Western Germany only, couples adjusted the wife's labor market outcomes to avoid earning more than the husband (Sprengholz et al., 2022). Moreover, the influence of the norm declined over time, tending to the more egalitarian norms of eastern Germany. Lippmann, Georgieff, and Senik (2020) drew similar conclusions examining the long-term effects of the diverging policies from Eastern and Western Germany. They argue that pre-reunification views on gender roles persist in the two sides, observing that the Eastern part shows less adherence to traditional male-centric gender norms. They found that in western Germany, higher female income is associated with more housework and has a negative impact on the labor market.

Zinovyeva and Tverdostup (2021) also found the discontinuity at 0.5 in the context of Finland but proposed a different explanation for it. Their study still examines the relative income distribution within households but focuses on co-working couples and their contribution at the 0.5 discontinuity. They do not attribute the phenomenon to only gender norms but explain that

these schemes are consequences of the converging earnings of co-working couples and self-employed couples. In a similar social context, Hederos and Stenberg (2022) do not find any evidence that gender norms influence Swedish households' dynamics. They found no significant discontinuity in the distribution after removing the agglomerate at 0.5 relative income. The authors reflect on the solid gender equality state in the country studied, where the norm proposed by Bertrand et al. (2013) does not influence the individuals.

A similar analysis in a developing country was done by Codazzi, Pero, and Sant'Anna (2018) who extended Bertrand et al. (2013) finding the discontinuity in relative income within households in Brazil. They found evidence about gender norms influencing women's probability of being in the workforce, working hours, and entering the informal economy. Using census data from 1991, 2000, and 2010, they reveal that women likely to earn more than their spouses are less inclined to participate in the labor force, and those who do are often underemployed, working fewer hours or having informal jobs. This study highlights how gender norms influence women's participation in the labor market and shape their earnings potential and occupational choices. The findings align with the identity economics theory, suggesting that deviations from these norms incur identity costs, leading women to adjust their labor supply to conform to societal expectations. This paper enriches the literature on how gender norms affect economic behavior, especially in developing countries with rigid labor institutions and prevalent informal employment.

Using a different methodology, Kosec et al. (2021) further enrich the discussion in a developing country: Papua Nuova Guinea. They explore the impact of economic status on gender behaviors, focusing specifically on the sustaining economic participation of women within the household and the community. They apply an innovative experiment on around one thousand families utilizing a 'relative poverty prime' to slightly alter their perception of their financial situation. The findings reveal that increased feelings of relative deprivation make men and women more likely to support girls' schooling and women's paid employment, suggesting that relative economic insecurity can enhance support for women's economic participation. However, the study shows how increased feelings of relative deprivation increase women's desires for more decisional authority. However, the behavior of men in traditional roles of making decisions does not change. This suggests that the increase in economic participation is only led by the need for rising family income and not a change in women's independence.

Giommoni and Rubolino (2022) introduce a central theme: how policy can influence and impact gender norms (even in counterproductive ways). Their research examines the connection between a spouse tax credit and the job market in Italy. The authors show that gender identity norms represent a significant friction preventing family income maximization and that household decisions are not Pareto-efficient when men are the second earners within the couple. Their results highlight a significant group of second-earner women who strategically reduce their income to maximize their family's income, setting it below the tax credit threshold. On the other hand, this behavior only occurs if the second earners are women: there is no significant evidence of men reducing their income to benefit from the tax. Traditional gender norms can attribute this mismatching behavior, influencing economic inefficiencies and contributing to gender income disparities.

Studying gender norms across different global contexts offers important insights into how cultural identities influence economic decisions. This highlights the significant role of social norms in shaping individual choices and broader economic interactions. Focusing on Mexico makes it clear that the interplay between historical influences and contemporary gender norms is crucial in understanding economic behaviors. Research in Mexico demonstrates a unique combination of traditional gender roles, rooted in Indigenous and colonial histories, with modern economic realities.

Our study adds to existing literature by presenting new empirical findings on the effects of gender identity norms on household income distribution in Mexico. This work delves into temporal and geographical variations to address a changing social context. Moreover, by disaggregating the data by economic sectors (primary, secondary, and tertiary), the research studies sector-specific dynamics that have been overlooked in previous works. The goal is to highlight the influence of cultural and social norms on family financial choices and provide valuable insights for policymakers and scholars interested in exploring these themes further.

Mexican context

Gender identity in Mexico has evolved significantly over time, modeled by a complex relationship between Indigenous traditions, colonial influences, and modern global movements. This transformation has progressed from pre-colonial times to the modern world, reflecting the highly impactful changes that Mexican society has experienced over the centuries.

Carrier (1985) writes how, before Spanish colonization, many Indigenous cultures had fluid definitions of gender. In the XVI century, the country imported the European gender identity, which featured a strict binary gender division heavily influenced by the Catholic moral vision. According to Gonzalez (1982), it was the Mexican Revolution (1910-1920) the first big event that had an impact on the traditional gender view: during the revolution, the women, known as “soldaderas”, actively participated, challenging the conventional view of the female. Consequently, ‘Machismo’ (male dominance) and ‘Marianismo’ (ideals of female purity) strongly marked the post-revolution period as central components of Mexican societal identity. From the second part of the XX century on, gender identity was deeply influenced by feminist global movements all over the globe, which pushed Mexican women to challenge the patriarchal structure and fight for their rights, including labor rights and equal pay (Casique, 2019). These movements fought for rights and shifted societal perceptions, encouraging more egalitarian views on gender and work.

The economic impact of these changes in gender identity and social norms has many consequences. Much research empirically proves how these changes affect women's economic participation and preferences. Fernandez et al. (2004) found that male mobilization during WW2 led to more women working in the generation after the one affected by the war. This suggests that growing up in a different family model, where the mother works, increased female labor force participation. Campos-Vazquez and Velez-Grajales (2014) continue finding that having a working mother strongly reduces the probability of daughters being tasked to care for siblings and fosters preferences for a more egalitarian allocation of educational resources among children. These studies suggest how the promotion of female labor force participation can have important implications in the dynamics of the economy, benefitting the whole society. Arceo-Gomez and Campos-Vazquez (2010) found that Mexico's female labor supply elasticity sharply decreased between 1990 and 2000, suggesting that women became increasingly attached to the labor market.

Cultural beliefs like machismo and marianismo profoundly influence gender norms and economic behaviors. They are eradicated in the Mexican culture and society, affecting the job market and household dynamics. Rueda, Hoffman, and Grytza (2019) explore how those norms influence perceptions of good and toxic relationships between young Mexican couples from rural areas, evidencing how gender roles keep male domination and female submission. They conclude that these cultural patterns influence personal and professional relationships, limiting

women's potential economic participation and strengthening wage disparities between genders in the job market.

The effects caused by gender norms are different between Mexican regions. Urban areas tend to gradually have more egalitarian views, while change is slower in less developed rural areas. This dichotomy is reflected in a regional variation of economic disparity. In urban contexts, where economic activities are more diversified, women can access education and job opportunities more quickly. In rural areas, traditional views often confine women to more housework or the informal economy, with a lower salary, which worsens economic disparity (Perrotte et al., 2018).

Moreover, the consequences of machismo and marianismo influence the economy and mental health. Nuñez et al. (2016) found that adherence to gender norms is associated with negative cognitive-emotional factors, such as depression and anxiety, which can be ulterior barriers to economic empowerment and participation of women.

Mexico's integration into the global economy, which brought liberalization of commerce and economic reforms, catalyzed job market changes with significant implications for women—the opening and expansion of markets regarding the manufacturing sector to export-oriented canalized women to the formal economy. The research found that although globalization reduced the opportunity gap and economic participation, the benefits are not the same for women of different sectors and regions (de la O & Pacheco, 2019). The maquiladora (manufacturing) sector, for instance, has been a double-edged sword—employing women but also embedding gender segregation in low-wage and low-skill positions.

Geographical diversity within Mexico is significant, with economic conditions, societal norms, and employment opportunities varying widely across different regions. Sánchez-Reaza and Rodríguez-Pose (2002) argue that the transition to a more open economy, marked by Mexico's entry into GATT (1986) and NAFTA (1994), brought divergence in regional growth. They showed that this period of economic integration is strictly associated with an increase of disparity in which the states that benefitted were the northern ones, closer to the US, leaving behind the southern. Complementarily, Rodríguez-Oreggia (2003) studied the determinants of regional growth, identifying factors like human capital as crucial in this divergent trend. He also highlighted how, in the post-liberalization, the economy of 'winners' northern states was boosted by growing investments and commerce, while the others were defined as losers. Using economic complexity helped Chávez et al. (2017) highlight regional differences in Mexico. The

northern states present an elevated level of complexity, the central states an intermediate level, and the southern states present a low complexity. This measure is an important point being positively correlated with states' richness and growth rates, proposing that the different growing paths depend on states' economic specialization and localization of productive activities.

Economic disparity highly influences women's possibilities and independence, as visible from the World Bank's Mexico Gender Assessment (2019). It offers a detailed evaluation of gender inequalities in the country, analyzing many aspects, like health, education, economic opportunities, and agency. It uses data from various sources, including national surveys, government reports, international databases, and academic studies, to offer a complete view of women's situation in Mexico. According to the document, significant regional disparities exist in education access and scores. Women from rural areas and southern regions (like Chiapas, Guerrero, and Oaxaca) live through many challenges, including higher rates of illiteracy and lower school enrollment and completion rates. Access and quality of education are higher in northern states and Mexico City—various socioeconomic factors, like poverty and lack of educational infrastructure, cause the situation. Urban areas and northern states also offer women higher salaries and more formal job opportunities. Jobs in the informal economy lack social security benefits and present lower income, impacting women's independence and security. The observed effects are even stronger for Indigenous women.

Technological progress and the digital economy have started a new era of opportunities and challenges. The information technology sector in Mexico, even if it is experiencing significant growth, reflects gender disparity, with women often subject to worse conditions compared to their male colleagues (Parés et al., 2020). The research observed this disparity in the number and quality of opportunities, the possibility of full-time jobs, and career advancement possibilities.

The role of education and competencies becomes a critical factor in turning the situation around, giving women the weapons and tools needed to get better opportunities presented thanks to emerging technologies and globalization. Training programs aimed at enhancing technical and life skills for women from low socioeconomic backgrounds have shown promise in improving employability in sectors such as sales, retail, and customer service (Worthman & Rueda-Barrios, 2022). According to Wright (2019), policies to reduce technological illiteracy and technical education can mitigate the risk of an increasing gender gap in digitalization and automation, particularly in transportation and other transforming sectors.

Understanding these dynamics is important for our analysis as they provide the socio-economic context within which gender identity norms operate in Mexico. This context helps explain the persistence of traditional gender roles and the impact of these roles on household economic behaviors. By exploring these historical, cultural, and economic factors, we can better interpret our findings and their implications for gender equality and economic policy in Mexico.

3. Data & Methodology

The dataset used in this study consists of three rounds of the Mexican census, specifically the years of 1990, 2000, and 2010. These datasets were accessed through the Integrated Public Use Microdata Series (IPUMS) International. This period marks a significant era in Mexico's socio-economic development, capturing the essence of the country's evolving economic landscape and societal norms, particularly regarding gender roles and economic participation.

Aiming to capture the most economically active segment of the population, we focused the analysis on individuals aged 19 to 64. This age filter ensures that the analysis centers on those most likely to participate in the labor market, providing more precise insights into income distribution dynamics within married households.

The variable earned income in the dataset presents varying patterns for men and women across different census years. According to IPUMS, this variable reports the person's total income from their labor (wages, a business, or a farm). Considering currency devaluations and the transition to a "new" peso in 1993¹, the absolute income figures from 1990 are not directly comparable with those from 2000 and 2010.

Looking at the aggregated data for all the years, women have a lower mean income than men, with a notably high standard deviation reflecting wide income disparities. For men, 1990 shows a considerably high mean income (950,290.3 pesos). In the same year, women also reported a high mean income (659,460.2), slightly less than men's. In 2000, the data for women showed a lower mean income than men, with women averaging 3,343.36 pesos and men 5,085.73 pesos. By 2010, the average earned income for both genders had risen, reflecting overall economic growth or possibly a shift in labor market dynamics. Women's income showed an average of 5,836.12 pesos, which, while still lower than men's, represents a significant increase from 2000. Men's income increased to an average of 8,367.40 pesos.

¹ For IPUMS, the new peso is equivalent to one thousand old pesos.

Because absolute figures are non-comparable, the analysis will pivot from absolute to relative income. This metric will allow for a more accurate assessment of the economic standing between genders over time, focusing on the intra-household income distribution that reflects the relative financial contributions of household members.

Starting from earned income, we built the relative income variable. It is calculated like this:

$$relativeIncome_i = \frac{wifeIncome_i}{wifeIncome_i + husbandIncome_i}$$

For the analysis, the couples of interest must be active in the labor force. For this reason, we kept only the married couples with a relative income value between 0 and 1. A value of 0 indicates that the man is the only income provider, and a value of 1 denotes that the woman is the only income provider.

Figure 1: Relative Income Distribution

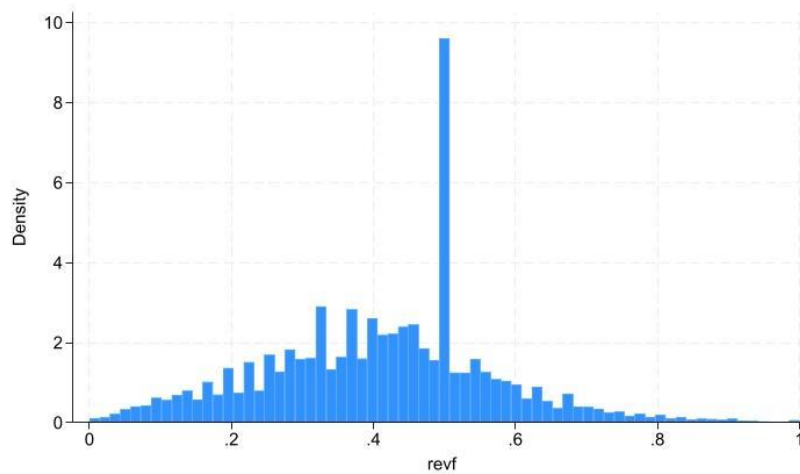


Figure 1 illustrates the distribution of income contributions within married couples in Mexico, comparing the relative earnings of spouses. The histogram reveals a tendency towards lower relative income values, indicating that the man is often the primary earner in many couples. The distribution shows a significant peak slightly below the midpoint, suggesting a substantial number of couples where men contribute somewhat more to the household income than women. There is a massive concentration of records when relative income is 0.5, signifying a notable concentration of couples where the woman contributes equally with the man. This peak is our

point of interest, reflecting an economic pattern among Mexican married couples, and it will be addressed in the next section.

After filtering for age and earned income, we have 9,396,371 couple-level records. Tables A1 and A2 report the descriptive statistics respectively on the household and divided by gender.

For our purposes, we follow a geographical grouping of regions: North, Center, and South². This classification allows for analyzing regional disparities and similarities in gender norms and economic participation. A considerable concentration (47%) of the households is in the Central region (where Mexico City is), followed by a similar percentage of Northern and Southern families, around 25% of records.

Households with one or two children are the most common, as these categories show the highest densities. There is a notable decrease in density for families with three children, which continues to decline as the number of children increases. Households with more than six children are relatively rare.

Figure 2 - Age Distribution per Gender

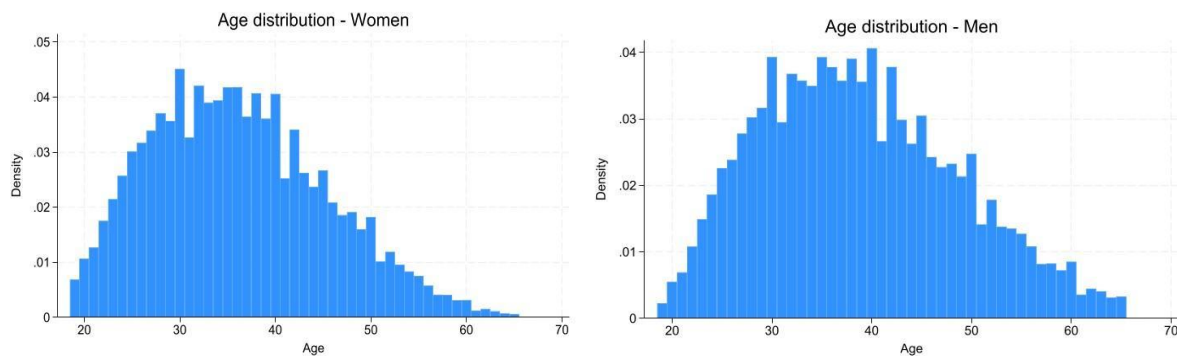


Figure 2 shows the age distributions per gender. There is a noticeable concentration of active working married women in their late 20s to early 30s, with a significant peak around age 30. This peak is a crucial visual cue, suggesting that this is the age at which the largest segment of these women is actively engaged in the workforce. The distribution gradually decreases as age increases, which is expected as people approach retirement age. The histogram's shape indicates

² This is how the areas are composed of: North: Baja California; Baja California Sur; Chihuahua; Coahuila de Zaragoza; Durango; Nayarit; Sinaloa; Sonora; Tamaulipas. Center: Aguascalientes; Guanajuato; Jalisco; México; Michoacán de Ocampo; Querétaro; San Luis Potosí; Colima; Distrito Federal; Zacatecas. South: Campeche; Chiapas; Guerrero; Hidalgo; Morelos; Oaxaca; Puebla; Quintana Roo; Tabasco; Tlaxcala; Veracruz de Ignacio de la Llave; Yucatán

fewer active workers as age progresses, with very few women working beyond sixty. The men's histogram shows a similar trend, but the peak in density shifts slightly to the right, indicating that the most common age for active working married men is in their early to mid-30s, with the highest point around age 30. This suggests that, in married couples, men might enter or peak in the workforce slightly later than women. The distribution has a gradual decline past the peak, showing that, much like for women, there are fewer active workers among older age groups. The men's histogram also indicates a drop-off in the number of working individuals as they age, with a noticeable thinning past the age of fifty-five.

The data shows that most men, comprising 45.59%, have attained primary education. Those with less than primary education represent 12.27% of the male population. A significant chunk of men, at 21.97%, have completed secondary education, while 20.17% have earned a university degree. Conversely, women exhibit a comparable trend, with the most substantial group being those who have completed primary education, accounting for 44.94%. Women having less than primary education comprise a slightly smaller percentage than their male counterparts, at 11.94%. However, it is worth noting that a higher percentage of women have completed secondary education (25.62%) than men, whereas a smaller proportion of women have obtained university degrees (17.50%). These visuals provide a snapshot of the educational landscape, highlighting a substantial base of primary education among both genders, with men being slightly more likely to have university-level education.

Considering the labor market's sectoral composition is crucial in understanding the economic behaviors of married couples, as different sectors may exhibit varying gender norms and financial opportunities. A 'sector' variable was built, including the observations into primary, secondary, and tertiary³. This classification enables the analysis to explore how employment in different sectors influences the economic behavior of couples.

Women's largest employment segment is in the tertiary sector, making up 81.16% of their total employment. This includes jobs in services such as education, healthcare, and retail. The secondary sector, which covers manufacturing and construction jobs, accounts for 16.72%. The smallest slice belongs to the primary sector, at 2.12%, which comprises agriculture and mining.

³ We had an industry variable from the initial dataset, and we categorized it in the three sectors in this way: Primary Industries: Agriculture, fishing, and forestry; Mining and extraction. Secondary Industries: Manufacturing; Electricity, gas, water and waste management; Construction. Tertiary Industries: Wholesale and retail trade; Hotels and restaurants; Transportation; storage, and communications; Financial services and insurance; Public administration and defense; Business services and real estate; Education; Health and social work; Other services; Private household services

Turning to men's employment distribution, the picture shifts. The tertiary sector remains the largest but with a smaller proportion than women, accounting for 63.14% of employment. Men have a higher representation in the secondary sector at 29.93%, nearly double that of women. Though still the smallest, the primary sector has a more substantial presence for men, at 6.92%.

These charts reflect the economic landscapes where men are more prevalent in primary and secondary sectors, whereas women are predominantly engaged in the tertiary sector. A gender-based division of labor is present, with women significantly leading in service-based roles and men more involved in industrial and agricultural work.

For men, the majority are wage/salary workers, accounting for 73.58% of the total employment type. Self-employment is less common, making up 26.42%. While there is a significant number of self-employed men, the predominant mode of employment is through wages or salaries. There is a similar distribution in women's employment types, with wage/salary workers forming the majority at 72.22%. Self-employed women make up a slightly higher percentage than men at 27.78%. This suggests that, although women engage in self-employment at a marginally higher rate than men, the wage/salary work arrangement remains the dominant form of employment for both genders.

The distribution of housework alongside employment in the dataset shows a substantial difference between men and women. For women, 11.48% of those employed also allocate time to housework. This dual role is a significant factor to consider, as it suggests that a notable portion of working women manage responsibilities in both their professional and domestic spheres. In contrast, the proportion of men who report handling employment and housework is tiny, at 0.03%.

These numbers illustrate the gender disparity in the distribution of domestic labor. Many working women also dedicate time to housework, a dual responsibility not commonly done or reported by men.

McCrary Density Test

The econometric model of this analysis is based on the McCrary density test (McCrary, 2008), a pivotal statistical tool for detecting discontinuities in the density of a running variable at a specific threshold within regression discontinuity designs (RDD). This test is crucial for validating RDD assumptions by checking for any manipulation around the cutoff point.

The McCrary test compares the log densities immediately before and after the cutoff to identify significant drops, suggesting potential manipulation or non-random sorting at the threshold. The resulting discontinuity measure is then tested for statistical significance.

The choice of this test is motivated by the hypothesis that gender norms might influence households to adjust their reported incomes, especially around the point where the wife's income equals or surpasses her husband's income (the 0.5 relative income cutoff). This behavior suggests that due to societal aversion to wives earning more than their husbands, households might intentionally or unintentionally manipulate their income reporting to conform to these norms. Such manipulation could distort causal inferences regarding the impact of crossing this income threshold on gender roles and identities.

By applying the McCrary test, we aim to detect any discontinuity at this juncture, indicating deviations from the expected normative distribution. This provides critical insights into the authenticity and reliability of the observed patterns in our data, grounding our subsequent analysis in a robust empirical foundation.

These are the four steps conducted:

1. Histogram Construction

A histogram of the running variable is constructed as a foundational step in estimating its density function. The bin size is determined by a default calculation that balances detail and smoothness. Precisely, the default bin size is calculated using the formula:

$$b = 2 * SD * N^{-\frac{1}{2}}$$

where SD is the standard deviation of the running variable, and N is the sample size.

2. Local Linear Regression (LLR) Smoothing

LLR is applied to the histogram to smooth the density function estimation. LLR weights are calculated based on the distance of each data point from the evaluation point and adjusted by the bandwidth, which is chosen to optimize the fit of the LLR model. The smoothing is performed separately on either side of the cutoff, allowing for independent density estimation. The optimal bandwidth is calculated by minimizing the mean integrated squared error.

3. Discontinuity Estimation

The discontinuity is quantified by comparing the estimated densities immediately to the left (f^+) and right (f^-) of the cutoff:

$$\theta = \ln(f^+) - \ln(f^-)$$

This logarithmic difference captures the relative change in density, forming the basis for statistical testing.

4. Statistical Inference

To assess the significance of the observed discontinuity θ its standard error is calculated, considering the number of observations, bandwidth, and estimated densities. A Wald test determines whether the discontinuity significantly differs from zero, indicating potential manipulation at the cutoff.

One of the limitations of the McCrary test is that a large cluster of observations at the cutoff point can influence the results. If there is a significant mass of data points right at the threshold - like a high concentration of couples where both partners earn the same amount - it might create an artificial drop in the density to the right of the cutoff (Binder & Lam, 2020; Hederos & Stenberg, 2019). This could lead to an overestimation of the discontinuity. Therefore, when a big cluster is present, it can affect the reliability of the test's outcomes, making it challenging to distinguish between a true discontinuity and one simply due to a high volume of observations at the cutoff. For this reason, all the results shown in the next section will be run excluding the 0.5 group.

Following Doumbia and Goussè (2019), by running the test both with and without the couples at the 0.5 threshold, it would be possible to compare results to assess how this cluster affects the estimated discontinuity. If removing these couples (that, as seen before, account for almost 10% of the observations) changes the result, it would indicate that the cluster at 0.5 impacts the test outcome. On the other hand, if the results are consistent regardless of the inclusion of the couples, there will be greater confidence in the presence of a true discontinuity in the data.

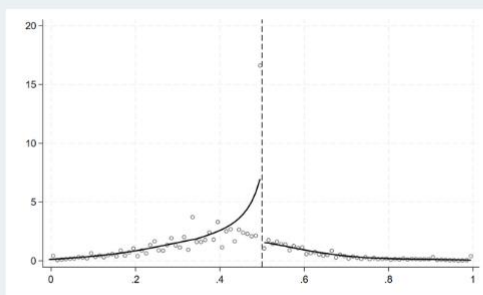
Figure 3 illustrates the density functions of relative income within married couples in Mexico in 1990, 2000, 2010, and on the whole sample. It presents two scenarios: including couples where both spouses have equal incomes and excluding these couples.

The graphs including same-income couples show a significant peak at the 0.5 relative income threshold. This peak indicates a substantial number of couples where the wife's income equals her husband's. When couples with a relative income of 0.5 are excluded, the peak at 0.5 drops. However, the discontinuity is still present, indicating that other factors influence the density distribution around this threshold. For all three years, there has been a noticeable drop in density function just beyond the 0.5 threshold, even after excluding couples with equal incomes. This discontinuity suggests an aversion to the wife earning more than the husband, consistent with traditional gender norms. The pattern remains relatively consistent across the years. Although the magnitude of the peak at 0.5 and the subsequent drop varies slightly, the overall trend of discontinuity at the 0.5 threshold persists, highlighting the enduring influence of gender norms on income distribution within households over the decades.

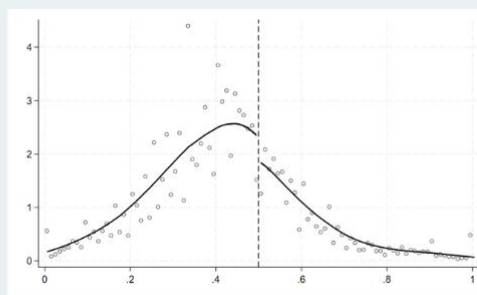
Another limitation is the bandwidth choice. Previous studies by Binder and Lam (2020) and Hederos and Stenberg (2019) indicate that the McCrary test results are sensitive to the bandwidth used for density estimation. If the bandwidth is not appropriately chosen, it can lead to erroneous conclusions about the presence or absence of a discontinuity at the interest threshold. So, all the test results in this paper will be presented with the optimal bandwidth and a narrow bandwidth equal to 50% of the optimal.

Other potential limitations include the possibility of measurement errors in income reporting, which could affect the accuracy of our density estimates. Additionally, external factors such as policy changes or economic shocks during the studied periods may influence income distribution independently of gender norms. Future research should consider these factors and attempt to isolate their effects to strengthen the causal inference of the observed discontinuities.

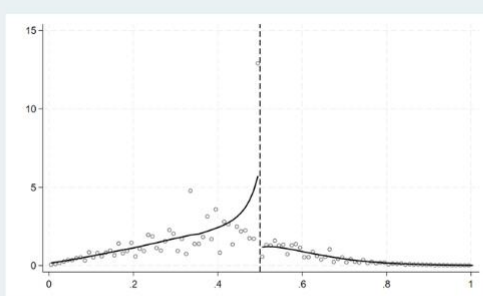
Figure 3: Relative Income Density functions per year



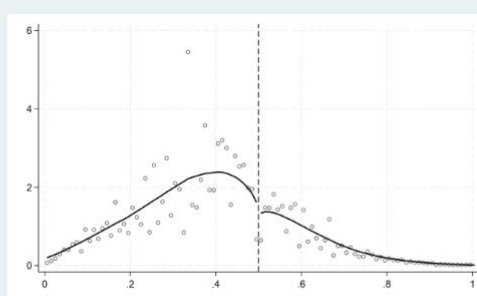
A. 1990 with same income couples



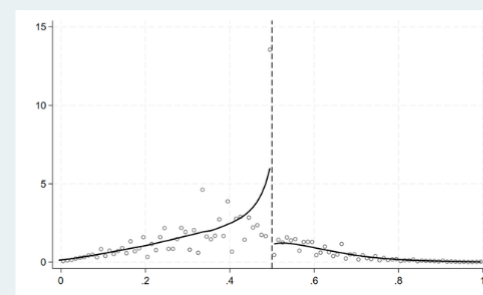
B. 1990 without same income couples



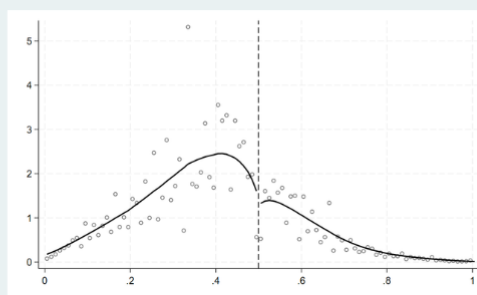
C. 2000 with same income couples



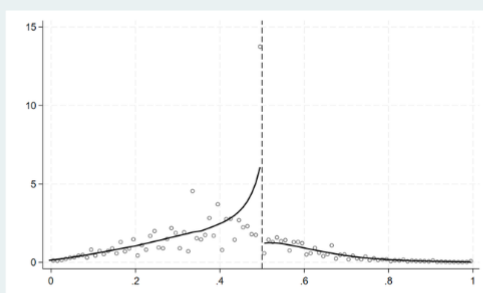
D. 2000 without same income couples



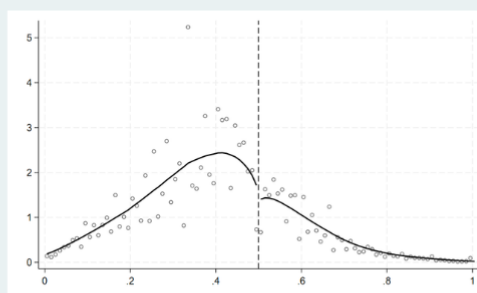
E. 2010 with same income couples



F. 2010 without same income couples



G. sample with same income couples



H. sample without same income couples

4. Results

Table 1 presents the McCrary density test's results to check the discontinuity at 0.5 relative income within Mexican households on more than 8 million couple-level observations. The optimal bandwidth shows a significant drop (-0.199) in the density function at the cutoff point, suggesting, as expected, the existence of a prevailing gender norm against the woman surpassing the man's income. Even when using the narrow bandwidth, the tests reveal a persistent but smaller significant drop (-0.025), showing that the aversion keeps showing at more precise scrutiny. The large sample size makes the results reliable, and the significance of the estimates highlights the robust influence of gender norms on the families' income distribution in the country.

Analyzing the data by year, with the optimal bandwidth in 1990 is observed a significant negative drop of -0.244 that reduces to -0.185 in 2000 and then stays almost invariant in 2010 (-0.188). These results suggest a general trend of avoiding surpassing the relative income 0.5 value. From 1990 to 2000 and from 1990 to 2010, significant differences between the discontinuity estimates are present. However, there is no significance in the difference between 2000 and 2010, suggesting a stabilization of the magnitude of the discontinuity in the last two census years. With the narrow bandwidth in 1990, the negative discontinuity was still significant but with a lower value (-0.129). In 2000, it continued to decrease at -0.055. Unexpectedly, in 2010, there was a change in trend, with a positive discontinuity of 0.059, which is statistically significant.

The results indicate a shift in the economic behavior of married couples in Mexico over the years. The significant negative discontinuities in 1990 and 2000 align with the hypothesis that traditional gender norms can influence women to avoid earning more than their men. The constant finding across both bandwidth sizes encourages the idea that these norms influenced economic participation during this period. The positive discontinuity found in 2010, coming from a negative estimate with optimal bandwidth, is counterintuitive and indicates a considerable sensitivity of the discontinuity measure to the choice of bandwidth and, therefore, a need for more robustness.

Regional differences are also examined. With the optimal bandwidth, the estimate for the north area is -0.248, significantly negative, showing a sharp drop in the density function at the cutoff point. Also, the Center and South show negative significant estimates but are less accentuated than the North (-0.169 and -0.198, respectively). The three estimates are also statistically

different from each other. Using the narrow bandwidth, the lower negative discontinuity for North decreases (-0.083) but is still significant, while the other two areas are not.

Table1

	Optimal	Narrow	N
Sample	-0.199*** (0.002)	-0.025*** (0.004)	8,163,466
1990	-0.244*** (0.004)	-0.129*** (0.007)	1,120,630
2000	-0.185*** (0.004)	-0.055*** (0.006)	2,902,978
2010	-0.188*** (0.003)	0.059*** (0.006)	4,139,858
North	-0.248*** (0.004)	-0.083*** (0.006)	2,126,269
Center	-0.169*** (0.003)	-0.010 (0.005)	3,893,185
South	-0.198*** (0.004)	-0.008 (0.007)	2,144,012
Rural	-0.229*** (0.008)	-0.076*** (0.014)	656,288
Urban	-0.189*** (0.002)	-0.016*** (0.004)	7,507,178
Speaks Indigenous	-0.372*** (0.011)	-0.208*** (0.020)	301,280
Does not Speaks Indigenous	-0.193*** (0.002)	-0.020*** (0.004)	7,850,852

Table 1 presents McCrary density test's estimates with both bandwidths' sizes optimal and narrow for temporal and territorial variables. The sample includes married couples where both spouses earn positive income and are between 18 and 64 years of age. Standard errors are reported in parenthesis. ***significance at 1% level, **at 5%, *at 10%. The statistical differences between the estimates are provided in the appendix.

The results suggest that in the northern regions, traditional gender norms may have a more substantial influence in shaping the economic behaviors of Mexican couples. The findings fail to account for the economic disparities across regions. The North exhibits more pronounced gender norms than the other areas across all bandwidth choices, and it is the only significant estimate observed using the smallest bandwidth. This outcome could be attributed to the North's history of Machismo and Marianismo and its proximity to the US border compared to the other regions, resulting in its strong gender norms legacy. The Center has the least impact, possibly influenced by Mexico City, while the South exhibits a moderate effect. The outcomes resemble those found in Germany's research (Sprengholz et al., 2022), where the Western region, despite being more prosperous and having a higher GDP per capita, displays stronger gender norms among its residents. This could be attributed to the residual influence of traditional gender roles during Germany's division and the disparities in decades of policies.

Tables 2 shows the McCrary test results for the area-year combinations with optimal and narrow bandwidths. At the optimal bandwidth, there is a consistent negative discontinuity in all three years, which is always more prominent for the Northern area. All differences between same-year estimates are statistically significant; the only exception is in 1990, with the difference between the North and the South. With the narrow bandwidth, in 1990, the North was the only area to show a significant negative estimate. Center and South, in 2010, showed a significant positive discontinuity estimate.

The comparison of rural and urban areas completes the view on geographical differences in gender norms in the country. When applying the optimal bandwidth, the results reveal a notable drop in the density function for rural (-0,229) and urban (-0,189) areas, with urban areas showing a higher magnitude. Reducing the bandwidth to 50% of the optimal value, the discontinuity estimates remain significant and negative.

Table 1 shows the McCrary density test results comparing groups based on whether the woman speaks an Indigenous language. Using the optimal bandwidth for households where the woman speaks the Indigenous language, the estimate is -0.372, suggesting a sharp, significant drop in the density function at the cutoff point. The other group has a smaller negative estimate of -0.193, which is still significant. When reducing the bandwidth, both estimates decrease but remain negative and highly significant. The statistical difference between the groups is significant for both bandwidth choices.

Table 2

		Optimal	Narrow	N
1990	North	-0.254*** (0.009)	-0.161*** (0.014)	283,250
	Center	-0.239*** (0.006)	-0.116 (0.010)	569,760
	South	-0.229*** (0.009)	-0.116 (0.014)	267,62
2000	North	-0.230*** (0.006)	-0.122*** (0.010)	776,903
	Center	-0.153*** (0.005)	-0.043*** (0.010)	1,371,846
	South	-0.183*** (0.007)	0.003 (0.013)	754,229
2010	North	-0.257*** (0.005)	-0.015 (0.010)	1,066,116
	Center	-0.161*** (0.004)	0.066*** (0.008)	1,951,579
	South	-0.208*** (0.006)	0.058*** (0.011)	1,122,163

Table 2 presents McCrary density test's estimates with both bandwidths' sizes optimal and narrow for all the combinations of variables year and area. The sample includes married couples where both spouses earn positive income and are between 18 and 64 years of age. Standard errors are reported in parenthesis. ***significance at 1% level, **at 5%, *at 10%. The statistical differences between the estimates are provided in the appendix.

Table 3 shows the drops in density functions of relative income within households where women work in primary, secondary, or tertiary economic sectors.

The substantial drop in the primary sector, indicated by the optimal bandwidth at -0.535, suggests pronounced income inequalities specific to this sector. In contrast, the secondary industry exhibits a significant but comparatively more minor discontinuity at -0.285, indicating a less pronounced income gap. The tertiary sector also displays a significant drop at -0.170. When considering the narrow bandwidth, the drop for the primary industry is smaller in magnitude but still significant (-0.079, p-value < 0.05). Interestingly, the estimate for the

secondary sector appears to be 0. The tertiary sector stays highly significant with -0.035. At the optimal bandwidth, all the differences between estimates are significant.

Table3

	Optimal	Narrow	N
Sample	-0.199*** (0.002)	-0.025*** (0.004)	8,163,466
Primary sector (only woman)	-0.535*** (0.015)	-0.079* (0.025)	132,791
Secondary sector (only woman)	-0.285*** (0.005)	0.000 (0.008)	1,339,254
Tertiary sector (only woman)	-0.170*** (0.002)	-0.035*** (0.004)	6,571,697
Primary sector (both spouses)	-0.752*** (0.018)	-0.244* (0.031)	83,465
Secondary sector (both spouses)	-0.385*** (0.006)	-0.037*** (0.011)	686,371
Tertiary sector (both spouses)	-0.174*** (0.003)	-0.057*** (0.005)	4,358,956
Same industry	-0.327*** (0.004)	-0.084*** (0.024)	1,989,655
Different industry	-0.142*** (0.002)	-0.003 (0.004)	6,173,811
Housework	0.078*** (0.012)	0.536*** (0.024)	1,021,034
No Housework	-0.198*** (0.002)	-0.032*** (0.008)	7,142,432

Table 3 presents McCrary density test's estimates with both bandwidths' sizes optimal and narrow for job-related variables.. The sample includes married couples where both spouses earn positive income and are between 18 and 64 years of age. Standard errors are reported in parenthesis. ***significance at 1% level, **at 5%, *at 10%. The statistical differences between the estimates are provided in the appendix.

Continuing to explore sector effects, we followed the idea from Hederos and Stenberg (2022) that co-working couples can influence the 0.5 peak. Therefore, we tried to see how the situation changes when both spouses work in the same sector. All the estimates, with both bandwidth

choices, present a higher discontinuity magnitude at the cutoff point (except for the tertiary sector with optimal bandwidth, which shows a similar value). The statistical differences between the three sectors also increased using the narrow bandwidth.

Additionally, the McCrary test results for couples working in the same industry versus different industries show a negative significant discontinuity estimate for both categories. Same-industry working couples have around twice the magnitude (-0.327) than different-industry working couples (-0.142). The statistical difference is highly significant.

An interesting result is observed in households where women are both employed and do housework. We filtered for working spouses with positive income, so houseworking means employed but also doing housework ('At work, and housework' according to the variable description). Using optimal bandwidth, households where the woman does housework show a surprising positive density jump at the cutoff point (0.078). However, the estimate for households without housework is significant and negative (-0.198). Reducing the bandwidth shows that the estimate is a big positive jump on the relative income density function (0.536). While with no housework, the effect is still negative and significant but lower in magnitude. For both bandwidths, the difference between the estimates is highly significant. It could be the case that the pressure or expectation for women to not out-earn men is relaxed when their traditional role is being fulfilled by also doing housework, as some similar situations in the US and Germany (Bertrand et al., 2013; Wieber & Holst, 2015).

5. Conclusion

In this study, we examined the influence of gender norms on the distribution of income within married households in Mexico, employing the McCrary density test to identify discontinuities at the 0.5 relative income threshold on more than 8 million couple observation census data. The results indicate a significant and persistent influence of gender norms across various dimensions, including time, geography, economic sectors, and cultural settings.

We find that despite progress toward gender equality, traditional norms strongly influence economic behaviors within households, particularly discouraging women from surpassing their husbands in earnings. This is evidenced by the consistent negative discontinuities observed across the sample in 1990 and 2000.

The regional analysis shows that these norms are not uniformly distributed across Mexico. The Northern regions, with historical ties to stronger gender norms, possibly due to their proximity to the US border and past cultural influences, exhibit the most pronounced effects. This result is similar to findings in Germany, where the Eastern part, influenced by its socialist past, had less pronounced gender norms related to the male breadwinner model than West Germany (Sprengholz et al., 2022). It is interesting to note how Northern Mexico and Western Germany are the wealthiest parts of the respective countries, but the cultural heritage still seems to affect them strongly. On the other hand, urban areas and regions influenced by Mexico City's more progressive socio-economic environment show moderated impacts, suggesting that economic opportunities and urbanization still play essential roles in reshaping gender norms.

Sectoral analyses indicate that the primary economic sector shows the most extensive estimates in magnitude. Moreover, households where spouses work in the same sector exhibit more significant discontinuities, possibly due to reinforced sector-specific norms. Also, same-industry working couples show around twice the discontinuity concerning non-same-industry ones. These results are indirectly coherent with Zinovyeva and Tverdostup (2021), who tried to explain the discontinuity found in Finland with the alternative hypothesis of earnings equalization in co-working couples rather than a gender identity norm. Still, we keep finding a negative significance discontinuity for all groups, indicating that same-sector and same-industry can affect the behavior of couples at 0.5, but does not explain it fully.

Interestingly, our results concerning households where women engage in housework suggest an unexpected dynamic. The adherence to traditional roles appears to mitigate for this group, as indicated by the positive discontinuities observed under both bandwidth conditions. A possible explanation could be that women with a higher income than their husbands mitigate the reversal of gender roles by increasing their contribution to home production activities (Bertrand et al., 2013; Wieber & Holst, 2015).

Future research should further investigate the interplay between economic policies and gender norms. Specifically, exploring how targeted fiscal and social policies can influence gender dynamics in income distribution, such as tax incentives for dual-earner households or subsidies for child care. Additionally, examining the long-term impact of educational reforms and gender equality campaigns in various regions of Mexico could provide deeper insights into the evolution of gender norms and their economic implications.

Furthermore, the role of technology in shaping gender norms and economic opportunities needs more exploration, not only in the Mexican context. Future studies could assess how digital literacy and access to technology impact women's economic participation and household income dynamics. Investigating the effects of remote work availability, digital economy integration, and tech-based educational programs on gender equality in the labor market would be particularly interesting. Understanding these dynamics could guide policymakers in designing interventions that leverage technology to promote economic inclusion and gender parity in Mexico's evolving economic landscape.

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A. Summary Statistics

Table A1: Summary Statistics

	Household
Average relative income	0.41
Year:	
1990	14.09 %
2000	35.24 %
2010	50.68 %
Urban-rural status:	
Urban	8.27 %
Rural	91.73 %
Area:	
North	25.87 %
Center	47.76 %
South	26.37 %
Number of own children in household:	
0	14.49 %
1	23.38 %
2	31.90 %
3	19.50 %
4	6.86 %
5	2.26 %
6+	1.61 %
Observations	9,396,371

Table A2: Summary Statistics

	Women	Men
Average Earned income	97,028	139,892
Average Age	36.16	38.73
Speaks indigenous language:		
Yes	3.90 %	4.44 %
No	96.10 %	95.56 %
Literate:		
Yes	96.96 %	97.70 %
No	3.04 %	2.30 %
Educational attainment:		
Less than primary completed	11.94 %	12.27 %
Primary completed	44.94 %	45.59 %
Secondary completed	25.62 %	21.97 %
University completed	17.50 %	20.17 %
Activity status:		
At work	88.52 %	99.97 %
At work, and 'housework'	11.48 %	0.03 %
Employment status:		
Self-employed	27.78 %	26.42 %
Wage/salary worker	72.22 %	73.58 %
Sector:		
Primary	2.12 %	6.92 %
Secondary	16.72 %	29.93 %
Tertiary	81.16 %	63.14 %
Observations	9,396,371	9,396,371

Table A3: Summary Statistics - Comparison at the Cutoff

		Household		
Relative income		> 0.495	0.5	< 0.505
Year:				
	1990	36.17 %	16.46 %	32.18 %
	2000	31.56 %	33.10 %	34.31 %
	2010	32.27 %	50.44 %	33.51 %
Urban-rural status:				
	Urban	6.84 %	9.80 %	7.81 %
	Rural	93.16 %	90.20 %	92.19 %
Area:				
	North	32.03 %	24.70 %	32.04 %
	Center	44.14 %	48.21 %	45.02 %
	South	23.83 %	27.09 %	22.94 %
Number of own children in household:				
	0	16.65 %	17.39 %	16.54 %
	1	24.31 %	23.13 %	24.89 %
	2	32.06 %	30.34 %	28.65 %
	3	16.63 %	18.46 %	20.22 %
	4	6.78 %	6.39 %	6.35 %
	5	2.21 %	2.34 %	2.09 %
	6+	1.36 %	1.95 %	1.26 %
Observations		19,215	1,232,905	18,832

Table A4: Summary Statistics - Comparison at the Cutoff

		Men	
Relative income	> 0.495	0.5	< 0.505
Average Age	35.97	39.25	36.17
Speaks indigenous language:			
Yes	3.36 %	6.13 %	4.36 %
No	96.64 %	93.87 %	95.64 %
Literate:			
Yes	98.04 %	96.90 %	99.0 %
No	1.96 %	3.10 %	1.0 %
Educational attainment:			
Less than primary completed	9.21 %	14.08 %	7.41 %
Primary completed	54.84 %	43.76 %	55.79 %
Secondary completed	24.13 %	22.26 %	22.05 %
University completed	11.82 %	19.91 %	14.75 %
Activity status:			
At work	100 %	99.93 %	100 %
At work, and 'housework'	0 %	0.07 %	0 %
Employment status:			
Self-employed	12.92 %	35.33 %	10.77 %
Wage/salary worker	87.08 %	64.67 %	89.23 %
Sector:			
Primary	4.34 %	7.62 %	4.21 %
Secondary	30.20 %	21.75 %	29.04 %
Tertiary	65.46 %	70.63 %	66.75 %
Observations	18,832	1,232,905	19,215

Table A5: Summary Statistics - Comparison at the Cutoff

		Women	
Relative income	> 0.495	0.5	< 0.505
Average Age	33.73	36.73	33.73
Speaks indigenous language:			
Yes	3.82 %	5.23 %	3.05 %
No	96.18 %	94.77 %	96.95 %
Literate:			
Yes	98.81 %	95.86 %	98.58 %
No	1.19 %	4.14 %	1.42 %
Educational attainment:			
Less than primary completed	7.48 %	13.82 %	7.33 %
Primary completed	48.04 %	43.76 %	47.37 %
Secondary completed	27.98 %	23.73 %	28.63 %
University completed	16.51 %	18.69 %	16.67 %
Activity status:			
At work	97.49 %	95.30 %	98.30 %
At work, and 'housework'	2.51 %	4.70 %	1.70 %
Employment status:			
Self-employed	9.80 %	33.45 %	8.04 %
Wage/salary worker	90.20 %	66.55 %	91.96 %
Sector:			
Primary	1.22 %	5.25 %	1.77 %
Secondary	22.37 %	17.16 %	19.25 %
Tertiary	76.41 %	77.60 %	78.98 %
Observations	19,215	1,232,905	18,832

B. Appendix

Table B1: Statistical Differences from estimates in Table 1

	Optimal	Narrow
1990 vs 2000	Yes***	Yes***
1990 vs 2010	Yes***	Yes***
2000 vs 2010	No	Yes***
North vs Center	Yes***	
North vs South	Yes***	
Center vs South	Yes***	
Rural vs Urban	Yes***	Yes***
Speak Indigenous vs Does not speak Indigenous	Yes***	Yes***

Table B2: Statistical Differences from estimates in Table 2

		Optimal	Narrow
	North vs Center	No	
1990	North vs South	Yes***	
	Center vs South	No	
	North vs Center	Yes***	Yes***
2000	North vs South	Yes***	
	Center vs South	Yes***	
	North vs Center	Yes***	
2010	North vs South	Yes***	
	Center vs South	Yes***	No

Table B3: Statistical Differences from estimates in Table 3

		Optimal	Narrow
	North vs Center	No	
1990	North vs South	Yes***	
	Center vs South	No	
	North vs Center	Yes***	Yes***
2000	North vs South	Yes***	
	Center vs South	Yes***	
	North vs Center	Yes***	
2010	North vs South	Yes***	
	Center vs South	Yes***	No