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Family Income Inequality and the Role of Wives' Earnings in Mexico: 1988-2010[*]

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Abstract

We study family income inequality in Mexico from 1988 to 2010. Female labor supply increased during this period, especially for married women. The share of wives' income among married couples grew from 13 percent in 1988 to 23 percent in 2010. However, the correlation of husbands' and wives' earnings has been fairly stable with a value close to 0.28, one of the highest correlations recorded across countries. We follow Cancian and Reed's (1999) methodology in order to analyze whether wives' income equalizes total family income distribution. We investigate several counterfactuals and conclude that the recent increment in female employment has contributed to a decrease in family income inequality mainly through a rise in wives' labor supply in poor families.

JEL Codes: J12; J21; J31; O15; O54.

Keywords: Income Inequality; Female Employment; Female Earnings; Latin America; Mexico.

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1   Introduction

Latin America is characterized by being a region highly unequal in terms of income (Ferreira et al. 2003; Lopez and Perry 2008). Mexico is also characterized by large income inequality: Gini coefficient computations yield a figure around 0.52 in 2005, the 15th highest of 24 countries in Latin America with comparable data (Lopez and Perry 2008; Lopez-Calva and Lustig 2010).[1] However, since the mid 1980s Mexico has seen two different trends of inequality. From the mid 1980s to the mid 1990s inequality in Mexico increased (Cragg and Epelbaum 1996; Esquivel and Rodríguez-López 2003). But since the mid to late 1990s there has been a decline in labor income inequality (Esquivel 2009; Esquivel, Lustig and Scott 2010; Robertson 2007). At the same time, female labor force supply has increased substantially, especially for low skilled female workers. For example, from 1996-2010 female labor supply increased 11 percentage points.[2] Among females, wives increased their labor supply the most. We investigate the effects of this recent increase in female labor supply among wives and their earnings on the distribution of family income. The goal of the paper is to analyze whether wives' earnings in married-couple households and the change in marriage rates have an equalizing effect on the family income distribution.

There are two commonly used methods to deconstruct changes in family income distribution and assess the effect of an increase in wives' earnings on family income inequality. A semi parametric method has been used to analyze changes in observable characteristics of the family (DiNardo et. al. 1996; Machado and Mata 2005). The other, which we employ here, is based on decomposing the coefficient of variation in a fashion that separates the contribution to variation of each income source (Cancian and Reed 1998, 1999; Del Boca and Pasqua 2003; Amin and DaVanzo 2004).

Using these two methods, previous literature has not reached a consensus whether wives'

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[1] The Gini coefficient in Mexico for 2008 is 0.506 according to the Mexican institute in charge of measuring official poverty. See National Council for the Evaluation of Social Development Policy (CONEVAL), http://www.coneval.gob.mx.

[2] Results shown in Table 1. Female individuals age 18-65 years old.

earnings have an equalizing effect on the family income distribution. Furthermore, as shown in section 2, most of the results are from developed countries. Although there is substantial evidence explaining why income inequality has fallen in Latin America (see the report by Lopez-Calva and Lustig 2009), little is known about changes in family income distributions and their determinants. Moreover, during the 1988-2010 period marriage rates, family structure and the structure of wages changed in Mexico. For Latin American countries, little is known about the correlation of earnings among married couples or how the share of income among family members has changed over time. Hence, this paper makes an important contribution in closing that gap.

We follow the methodology proposed by Cancian and Reed (1999) to analyze the role of wives' earnings on the family income distribution for all families. We use repeated cross-section datasets from urban Mexico during the period 1988-2010. We consider two broad groups in the analysis: married-couple households and all other households. We study the effects of wives' earnings on family income for married-couple households and for the whole population. We estimate family income inequality using equivalence scales under different scenarios for the two broad groups mentioned above. First, we use a counterfactual assuming wives' earnings are zero across the population. The second counterfactual assumes a constant mean of wives' earnings among married-couple households. The third counterfactual assumes mean and dispersion of wives' earnings constant through the period. The fourth counterfactual adds the assumption that correlation of wives' and other-sources' earnings is constant over time. The final counterfactual considers changes in marriage rates.

We consistently find that wives' earnings contribute to equalizing the income distribution. Counterfactuals related to the wives' income distribution suggest that inequality would have been larger had different characteristics of married females (including mean income, standard deviation, and the correlation between husbands' and wives' income) stayed constant at its initial level. On the other hand, had marriage rates kept constant at the 1988 level, inequality would have been lower. We notice an increase in female labor supply for all groups but the

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increase in labor supply is higher for wives, low-skilled females and especially for wives in poor families. We also find that the correlation between husbands' and wives' earnings has been fairly stable over time. Furthermore, its value, about 0.28, is among the highest correlations recorded across developed countries (Pasqua 2008). Hence, family income inequality did not fall because of a reduction in assortative mating, its decrease is driven by the increase in wives' labor supply for poor households and also by changes in the wage structure (reduction in inequality within wives).

The paper is structured as follows. In section 2, we review previous findings on whether females contribute to equalize the income distribution. Section 3 discusses the methodology proposed by Cancian and Reed (1999) and explains the counterfactuals we use. Section 4 introduces the data as well as some descriptive results. Section 5 presents the main results of the paper. In section 6 we briefly explore possible channels of transmission between female labor supply and family income inequality. Finally, we conclude in section 7.

2 Literature Review

Social sciences academics have been widely interested in the dynamics of income inequality and its potential causes. Particularly, the study of wage inequality has been of special interest among labor economists.[3] For the period 1988-2010 in Mexico, income and wage inequality follow an inverted-U shape pattern (Lopez-Calva and Lustig 2010, and Esquivel, Lustig and Scott 2010). There has been a substantial number of studies that analyze the potential causes of change in inequality at the *individual level*.[4] However, little is known about the

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[3]Katz and Autor (1999) and Machin (2008) present a general review of the findings regarding the sources of change in wage inequality. For the U.S. the consensus is that both competitive and non-competitive sources are responsible for changes in the wage distribution. For example, relative wages can change due to supply and demand (competitive factors) but also through changes in the minimum wages and unionization rates.

[4]For the period of increase in inequality (previous to the mid to late 1990s), Cragg and Epelbaum (1996) and Esquivel and Rodríguez-López (2003) argue that most of the increase in inequality was due to skill biased technical change. However, Fairris (2003) and Bosch and Manacorda (2008) argue that unions and the real value of the minimum wage are responsible for changes in the wage distribution. From the late 1990s, wage inequality has decreased (Esquivel 2009; Esquivel, Lustig and Scott 2010). For this period, researchers

role of wives' earnings on the distribution of *family income* in Mexico.

The distribution of family income is also an important topic to study. In general, we observe an increase in female labor force participation across countries over time. The rise in family earnings due to wives labor supply decision may increase or decrease family income inequality depending on the evolution of husbands' income and also depending on whether wives in poor or rich families augmented their participation the most. While inequality at the individual level may decrease, the effects on family income inequality may not be of the same magnitude or even move in the opposite way. For instance, Juhn and Murphy (1997) study the period 1969-1989 in the US and find that female employment and earnings have increased the most for females married to high income males. This change suggests a process of assortative mating and an increase in family income inequality due to this process. Nevertheless, Juhn and Murphy (1997) do not analyze the consequences on family income inequality. Gottschalk and Danziger (2005) document changes in inequality for the period 1975-2002 in the US showing that male wage inequality and family income inequality move in general in the same way. They argue that inequality would have increased by more than it did had other members in the household not increased their hours of work. This suggests that the increase in female labor force participation offsets the effect of increasing male wage inequality in the U.S. However, Gottschalk and Danziger (2005) do not use any decomposition method to further investigate their claims.

There are two commonly used methods to decompose changes in family income distribution. While in the first one an inequality index is decomposed, a semi-parametric procedure is used to analyze changes in observable characteristics in the second method (DiNardo et. al. 1996; Machado and Mata 2005). Cancian and Reed (1998, 1999) decompose the coefficient of variation to investigate the effects of wives' earnings on the distribution of family income. They use the Current Population Surveys (CPS) in the US for the period 1968-1995 and conclude that changes in wives' labor supply and wives' earnings have caused a decline in family

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argue that the decline in inequality is due to competitive sources: effects of trade (Robertson 2007), effects of education (Lopez-Acevedo 2006) and effects of supply and demand of labor (Campos-Vazquez 2010).

income inequality. Following a similar methodology, but using a longitudinal dataset, Lehrer (2000) confirms the findings in Cancian and Reed (1998, 1999). Following DiNardo, Fortin, and Lemieux (1996), Daly and Valleta (2006) find that, on the one hand, family income inequality has decreased due to female earnings but, on the other, it has increased due to changes in family structure such as marital status and number of children.[5] In sum, different studies for the US case conclude that wives' earnings reduce family income inequality.

Similar result have been found for the case of Italy and the United Kingdom. Del Boca and Pasqua (2003), using a coefficient-of-variation decomposition for the period 1977-1998 in Italy, conclude that wives' earnings have an equalizing effect on the family income distribution. For the period 1968-1990 in the UK, Davies and Joshi (1998) show that female labor force participation had a small equalizing effect but created a gap between employed- and not-employed-wife households. Using cross-country analysis for developed countries, Pasqua (2008) and Harkness (2010) show that, in general, female earnings reduce family income inequality.

However, in studies for other countries, researchers have found different results. For example, Johnson and Wilkins (2004) analyze the case of Australia in the period 1982-1998 using a semi-parametric decomposition. Although they conclude that changes in the labor force status of the households' members increased family income inequality, they do not differentiate between wife labor force status and other-household-members status. Aslaksen, Wennemo, and Aaberge (2005) analyze the case of Norway for the period 1973-1997 and find a disequalizing effect of female labor income among married couples. They conclude that this process is due to a *flocking together* effect, or an increase in assortative mating. For the case of Brazil 1977-2007, Sotomayor (2009) finds that female earnings do not affect the distribution of income in general terms, but they do play an important role in decreasing poverty rates. Evidence of the role of female earnings on family income inequality is limited

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[5]Martin (2006) assesses the increasing inequality in the United States in the period $1976 - 2000$ accounting for changes in family structure. She finds that family structure shifts explain 41% of the increase in family income inequality.

for developing countries. In particular, little is known about the role of wives' earnings in the distribution of family income in Mexico.[6]

Given the lack of evidence for developing countries and especially for Mexico, the analysis of the role of wives' earnings in family income inequality is particularly relevant. Our paper contributes to the literature in at least two different ways. First, we provide descriptive analysis on the patterns of marriage rates, family income inequality and female labor supply patterns. Second, we formally analyze the role of wives' earnings on inequality using the methods described by Cancian and Reed (1998, 1999) and compare the results to other studies in different countries.

3 Implementation

We follow Cancian and Reed (1998, 1999) in order to estimate the effect of wives' earnings on family income inequality. We divide families into two broad groups according to the household head status: married- or cohabitating-couple families (group A); and all the other families, including married individuals whose partner does not currently live in the household, single, divorced and widowed individuals (group B). We include the second group in order to analyze the effect of changing marriage rates on the family income distribution. Married-couple family income can be decomposed into three sources: husband income, wife income, and residual income. For group B, we only aggregate income at the family level.

Different indexes of inequality are employed in the literature. Among those, we use the coefficient of variation (CV) to analyze the role of wives' earnings on family income inequality. As pointed out by Cancian and Reed (1998, 1999), the CV can be decomposed into different sources. A useful decomposition for married-couple families is the following:

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[6]See Wong and Levine (1992) for an analysis of the factors affecting women's participation, García (2001) for an assessment of the occupational structure of women, Rendón (2003) for an analysis of the wage gap of households heads; and McKenzie (2003) for the response of labor force participation at the household level to the 1995 Peso crisis.

$$CV_A^2 = S_m^2 CV_m^2 + S_w^2 CV_w^2 + S_o^2 CV_o^2 + 2\rho_{mw} S_m S_w CV_m CV_w$$
$$+2\rho_{mo} S_m S_o CV_m CV_o + 2\rho_{wo} S_o S_w CV_o CV_w \qquad (1)$$

where $S_i = \frac{Y_{hi}}{Y_{hm}+Y_{hw}+Y_{ho}}$ is the share of income (Y_h) in household h for husbands (m), wives (w) and other sources (o), and $i = m, w, o$. CV_i is the coefficient of variation for each group and ρ_{ij} is the correlation coefficient between income source i and j. CV_A denotes the coefficient of variation for married couples.

On the other hand, even though the Gini coefficient may be decomposed into different sources as well, it has two main disadvantages (Cancian and Reed 1998, 1999). First, the coefficient itself is problematic when one source is added or omitted. For example, the Gini coefficient using family income minus wives' income is different to the Gini coefficient obtained from the Gini decomposition that dismisses the wives' income component. Second, and more important, the contribution of a single income source to income inequality cannot be meaningfully assessed using the Gini decomposition largely because the terms in the decomposition are not independent of the whole family income distribution.[7] In other words, the Gini coefficient lacks a reference distribution.[8] We employ the CV to analyze inequality trends and the dynamics of wives' income, because it allows us to compare our results against a reference distribution. We can also interpret the effects of changes in one of the income sources with respect to the reference distribution.

Equation (1) refers to only married-couple households. We use an additional decomposi-

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[7]The Gini decomposition can be written as $G = S_m R_m G_m + S_w R_w G_w + S_o R_o G_o$, where $k = m, w, o$ refer to the income source, S to the share of income, R_k is the Gini correlation between income source k and total income, and G_k is just the Gini coefficient for the income source k. R is the total correlation which includes wives' income in the definition of total income. Moreover, if we assume wives' earnings equal to zero $(S_w R_w G_w = 0)$, and calculate the Gini coefficient as $S_m R_m G_m + S_w R_w G_w + S_o R_o G_o$, the result is different to the Gini coefficient obtained from total income minus wives' income.

[8]Cancian and Reed (1998) provide an excellent example to clarify the point: "Consider the hypothetical situation in which wives' earnings are equal across all married couples. In the absence of wives' earnings, the distribution of family income would become less equal... However, the Gini contribution of wives' earnings to family income inequality is zero." (page 74).

tion for the CV in order to include all families in the sample. If we have two broad groups (married-couple families and other families), the CV in the sample is given by

$$CV^2 = \mu_A \left(\frac{\overline{Y}_A}{\overline{Y}} \right)^2 CV_A^2 + \mu_B \left(\frac{\overline{Y}_B}{\overline{Y}} \right)^2 CV_B^2 +$$
$$\left[\mu_A \left(\frac{\overline{Y}_A}{\overline{Y}} \right)^2 + \mu_B \left(\frac{\overline{Y}_B}{\overline{Y}} \right)^2 \right] / \overline{Y} \qquad (2)$$

where μ is the proportion of families in each group, and $\overline{Y}$ is the group's average income. Hence, it is possible to calculate the contribution of each component and create counterfactual trends of what would have happened had one component behaved differently. For example, parameter μ_B measures the percentage of all families but married-couple families.[9] In the last 20 years, the percent of married-couple families has decreased in Mexico. We can ask, then, what would have happened to family income inequality had marriage rate kept constant at its 1988 level. This counterfactual is easily created by keeping constant μ_B for every year in the calculation.

The main insight in Cancian and Reed (1998, 1999) is that we can create many counterfactuals and analyze the role of wives' earnings. In this paper, we evaluate five different counterfactuals for married-couple households as well as for all households:

1. Counterfactual 1. Wives' income is constant, wives show no earnings.

2. Counterfactual 2. Wives' income is constant, their income is equal to the mean value of a reference distribution.

3. Counterfactual 3. Mean and dispersion of wives do not change over time.

4. Counterfactual 4. Mean, dispersion and correlation of wives' with other sources' earnings do not change over time.

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[9] All families but married-couple families include married individuals whose partner does not currently live in the household, single, divorced and widowed individuals

5. Counterfactual 5. The percent of married-couple households does not change over time.[10]

All counterfactuals are easily calculated plugging-in specific values in equations (1)-(2). For example, in order to obtain counterfactual 1 we can either replace wives' earnings with zero in our micro data and re-calculate the CV or we can set $S_w = CV_w = 0$. The fact that both ways give the same answer gives the CV a great advantage over other inequality indexes. Counterfactual 1 is different from counterfactual 2 because the dispersion of income changes. In counterfactual 1, dispersion is equal to zero by definition, while in the second case dispersion is fixed at some positive value. Counterfactual 3 is important because it allows us to determine whether dispersion among wives equalizes family income distribution. Similar interpretations follow for the rest of the counterfactuals.

The interpretation of the counterfactuals is straightforward. Using the initial year as the base year, if inequality in counterfactuals 1 to 4 is higher than observed inequality, then it is possible to conclude that wives' earnings have an equalizing effect on the family income distribution. Counterfactual 5 implies the calculation of inequality holding the marriage rate constant to a base year. If the percent of married-couple families declined over time and the counterfactual suggests a lower level of inequality using the initial year as the base year, then it is possible to conclude that the reduction in marriage rates is a disequalizing force affecting the family income distribution. We analyze the results for both married-couple and all families. Finally, it is worth noting that the main limitation of our analysis is that we cannot account for a family member's labor supply response to changes in the labor supply of another member.

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[10]We define a married-couple family as that in which either both the husband and wife live together, or male and female partners cohabit.

4 Data and Descriptive Statistics

We use data from the households surveys provided by the Mexican statistical office (IN-EGI).[11] In particular, we use the following labor force surveys: the *Encuesta Nacional de Empleo Urbano*, 1987-1994; *Encuesta Nacional de Empleo*, 1995-2004; and *Encuesta Nacional de Ocupación y Empleo*, 2005-2010.[12] Although some questions of the survey change from one survey to other, socioeconomic variables, such as age, education, marital status, monthly labor income and weekly working hours are always comparable. In each survey, information regarding all household members is recorded. We refer to all surveys as the *labor force surveys*.[13,14]

According to INEGI, a household is a group of one or more people living in a house sharing expenses (individuals in the household may or may not be relatives). Following Cancian and Reed (1999), the unit of analysis is the family, not the household that is interviewed. Hence, we employ a different definition of household in order to isolate household members who are not relatives of the household head. We define a new household code to account for those individuals and consider them as an individual household.[15]

In order to derive some descriptive statistics, we focus on four main samples of families. First, we consider married couples, their children, and other relatives living in the same household. This group is comparable with the sample of married couples in Cancian and Reed (1998, 1999). For each household, we compute the family income as the sum of all

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[11]Data available at http://www.inegi.org.mx

[12]Surveys contain registers for over 100,000 households, which is especially useful given the number of different categories we use in the paper. We use only the second quarter because ENE is national representative only for that quarter. We use only the urban sector (defined as municipalities with more than 100,000 inhabitants) because ENEU is by definition an urban survey. So, in order to cover the longest period in the analysis, our sample limits to the urban segment (between 40 and 50 percent of the whole population) in the second quarter of each year. These surveys are comparable in general to the ones carried out by the CPS.

[13]Another survey traditionally used for Mexico is the Household Expenditure-Income Survey (ENIGH). However, ENIGH is not available every year since 1988, and the sample sizes are considerably lower. A larger sample size is useful because we divide the population by type of household as specified in the text.

[14]Although we present the main results for the urban sample starting in 1988, we also estimate the results (not reported) using the national sample starting in 1995. Results are similar for both samples.

[15]In practice, this change is innocuous given that individuals who are not relatives of the household head in married-couple families represent approximately one percent of individuals in those households. From now on, we use family and household as exchangeable words.

family members' labor income. We identify husbands' income, wives' income and other sources' income.

Instead of analyzing the rest of the population as one single group, we define three groups of families in order to understand which of them are non-married-couple families. Firstly, we broaden the definition of household of the original survey to include single headed households, their children and relatives living in the household. Secondly, we define a group that consists of those heads who declare to be married or cohabitating but whose spouses do not live in the household (plus their children and relatives). The final group consists of those people living alone (singles, divorced, separated and widows) or that are not relatives of the household head. We consider each of those groups a single family. For these households, we only compute the total family income since there is no spouse present. In order to avoid outliers with the income measure, we follow the standard literature on wages and trim labor income to the 0.05 and 99.5 percentiles respectively.

We drop those individuals whose relationship with the household head is not specified and those with missing information about their education, age, marital status, and household head status. We also drop all households (and their members) that declare more than one head or more than one spouse.[16] Additionally, we only keep households in which the head is at least 18 years old and less than 65 years old. Finally, we only use information on households that declare positive labor income.

Comparing total income across all families may be inadequate due to family size scale effects. Most of the studies that deal with family income use a general equivalence scale to adjust for family size. Since the equivalence scale used in studies for other countries may not be suited for a developing country like Mexico, we use the equivalence scale published by the National Council for the Evaluation of Social Development Policy (CONEVAL).[17] The equivalence scale gives a weight of 0.70 to individuals 0-5 years old, 0.74 to individuals 6-12

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[16]Dropped observations represent less than 3 percent of each year's survey.

[17]This government office is in charge of measuring and reporting official statistics about poverty rates in Mexico. http://www.coneval.gob.mx/

years old, 0.71 to individuals 13-17 years old, and 0.99 to the rest.

[Table 1 here]

Table 1 includes the number of observations at the individual and family level and descriptive statistics for year 1988, 1996, 2004 and 2010. Panel A shows information at the individual level for the age group 18-65. Mean age has continuously increased over time from 33 to 36 years, the proportion of married individuals has decreased over time, although the decline in marriage rates is sharper in the last decade. The proportion of women working increased from 0.4 in 1988 to 0.57 in 2010. As in previous findings (Esquivel 2009; Lopez-Acevedo 2006), we can see that inequality follows an inverted-U-shaped pattern. This pattern is similar both when we calculate inequality at the individual level and at the family level. Panel B shows that the proportion of married-couple families has not declined as much as the proportion of married individuals. The number of individuals less than 18 years old declined substantially in the last 20 years due to a decrease in fertility rates. Mean income (adjusted by equivalence scales) decreased for the period 1988-1996 (due to the 1995 macroeconomic crisis) and then it increased.

[Figure 1 here]

Figure 1 depicts the percent of families in each of the four types previously described. The proportion of married-couple families decreased 7 percentage points in the last 20 years. The percent of households in which one spouse is not present, which represents only a small fraction (less than 2 percent) of the total, barely changed. On the other hand, the number of families conformed by one individual, headed by divorced, separated, or widowed individuals increased (driven mainly by single families).

Figure 2 shows the family size for different types of families. For married-couple families, it decreased approximately by one member in the last 20 years. This is mainly driven by decreases in fertility as we can observe for the number of members less than 18 years old.

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On the other hand, family size for all other families has kept fairly constant at around 2 members per family.

[Figure 2 here]

[Figure 3 here]

Figure 3 portrays the patterns of female labor supply for different groups. Panel A shows that female labor supply increased relatively more for wives than for non-married females. For example, wives increased their labor supply by more than 20 percentage points while for non-married females the rise was close to 10 percentage points. Panel B shows the patterns of female labor supply for wives with children (less than 6 years old) and other wives, as well as for non-married females with no children. The increase in female labor supply is more pronounced among wives with no children. When we calculate labor supply by education group (panel C), we find a rapid increase in female labor supply for females with low education. Females with completed primary (less than 9 years of schooling) or completed secondary school (greater than 8 and less than 12 years of schooling) increased their labor supply more rapidly than females with high school or college degrees.

[Figure 4 here]

Figure 4 shows the proportion of women working and mean wives' income ranked by household's income. The x-axis in both panels corresponds to the quintile of family equivalent income distribution once we take out wives' income. Panel A suggests that families with low family income have a higher proportion of wives working. However, as family income increases (quintile 2 and above), the percent of working wives remains almost the same. There are some important differences across time. From 1988 to 1996, there is a higher increase in the percent of working wives in high income households than wives in middle income households. After 1996, wives in quintiles 1 to 4 increased their labor force participation more than those in quintile 5.

Panel B shows the mean wife income for each quintile of the family income distribution. It shows that mean income in quintile 1 is higher than in quintile 2 due to the high attachment of wives to the labor market. Wives in rich families earn relatively more than in families in quintile 2 to 4. In general, Figure 4 shows that women married to men in quintile 5 have not increased their labor supply as other wives after 1996. Moreover, from 1988 to 1996 there was a marked increased in earnings for wives in high income households. Also, in the period 1996-2010 there was a higher relative increase in income for wives in quintiles 1-4 than that for wives in quintile 5.

In sum, previous results show that female labor supply increased in the last 20 years. This rise is particularly relevant for wives and for females with low education. Additionally, wives in high income families increased their labor force participation and earnings relatively more during the period 1988-1996 than in 1996-2010. The next sections show the formal calculations investigating the effect of wives income on family income inequality.

5 Results

In this section, we show the calculations of the counterfactual analysis described in section 3. The key parts of those decompositions are the share of income for wives and husbands and the correlation between income sources. Figure 5 shows these key elements among married families. The income share of husbands in 1988 is 73 percent while in 2010 it is 64 percent. At the same time, the income share of wives increased 10 percentage points (from 13 percent in 1988 to 23 percent in 2010). The income share of other members in the household did not changed in the last 20 years. Although the income share for wives in the 2000s is similar to previous findings in other countries such as Spain, Greece and Italy (Pasqua 2008; Harkness 2010), it is still substantially lower than in countries such as Denmark and Sweden.[18]

Panel B in Figure 5 shows that the correlation among income sources have barely changed

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[18]Pasqua (2008) reports a female income share among married couples of 34.5 percent in Denmark and 30.8 percent in Sweden.

in the last 20 years. Although the correlations fluctuate every year, the long-run relationships are stable. The correlation between husbands' and wives' income is positive and, on average across time, equal to 0.28 (in 1988 it is equal to 0.27 and in 2010 to 0.28). This number is high in comparison to the results of studies for other countries. For the US, Cancian and Reed (1999) find that the correlation between husbands' and wives' income is close to 0.22 in 1994, and they also show an increase in the correlation equal to 0.10 from 1967 to 1994. Moreover, Del Boca and Pasqua (2003) find that the correlation in Italy in 1998 is 0.21, although they show a correlation of 0.26 for North Italy. Also, Pasqua (2008) shows that the correlation between husbands' and wives' income across OECD countries is fairly low and close to zero, only Portugal has a correlation close to 0.30. Amin and DaVanzo (2004) find a correlation value equal to 0.13 in 1988 in Malaysia. Hence, a correlation of 0.28 is larger than those in the U.S., Italy, Malaysia and most OECD countries. As far as we are concerned, this result for Mexico was not previously known. On the other hand, both the correlation of husbands' and other sources' income and the correlation of wives' and others sources' income are close to -0.08.

[Figure 5 here]

[Figure 6 here]

Figure 6 shows the evolution of family income inequality using the coefficient of variation for each source of income among married-couple families and for all families. Panel A shows inequality for husbands, wives, other sources and families formed of not-married individuals. Inequality decreased the most for husbands and wives. Inequality for other sources barely changed and inequality for not-married individuals slightly decreased for the period 1996-2010. Panel B shows the pattern of inequality for both married-couple and non-married-couple families. Inequality for married-couple families decreases substantially after 1996. This suggests that the fall in family income inequality is mainly driven by the fall in inequality for husbands and wives income. However, we need formal counterfactuals in order to account for the role of wives' earnings. In general, Figure 6 shows an inverted-U-shaped pattern in

family income inequality during the period 1988-2010. This pattern is robust to changes in the inequality index or by calculations at the individual level.[19]

[Figure 7 here]

Now we present the results of the counterfactual computations described in Section 3. Each counterfactual facilitates our understanding of the role of wives' earnings in inequality. For example, we say that wives' earnings contribute to equalize the income distribution if observed inequality is less than what it would have been had we set wives' income to be zero or to be the mean value of a reference distribution.

Figure 7 shows the evolution of family income inequality for both married-couple families and all families in urban areas of Mexico using the observed and counterfactual distributions. Under this counterfactual, all wives' earnings are equal to zero. The coefficient of variation is transformed into an index such that 1988 is the base year. If wives had zero earnings across time, family income inequality would have been larger than observed inequality. Hence, wives' earnings have an equalizing effect on the income distribution.

[Table 2 here]

Table 2 shows the main results of the paper for all the counterfactuals previously discussed. We use 1988 as the base year in our calculations.[20] The table presents the results for years 1988, 1996 and 2010 for the observed coefficient of variation (squared) and the respective counterfactual. The table includes results for both married-couple families and all families. Counterfactual 1 assumes earnings of all wives equal to zero. Under this scenario, inequality for married and all families would have been larger than observed inequality in 1996 and 2010. The last two columns show the difference between observed inequality and its

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[19] See the results by Esquivel (2009), Esquivel, Lustig, and Scott (2010), Lopez-Calva and Lustig (2010), López-Acevedo (2006) and Campos-Vazquez (2010).

[20] Using the initial year as the base year is more intuitive than using others. However, our results are robust to using other years as the base year. We re-calculated (unreported) all statistics using base years 1996 and 2010. The interpretation of the results does not change. Tables are available upon request.

counterfactual. For both years 1996 and 2010, counterfactual 1 implies that wives' earnings equalize the income distribution. Under this counterfactual, inequality for married females would have been 0.055 points higher in 1996 and 0.027 points higher in 2010. This means that in 2010, inequality for married-couple families would have been approximately 3 percent larger, and around 15 percent larger for all families. The table includes standard errors in parenthesis for each difference using 500 bootstrap simulations. For counterfactual 1, results are significant only for the group of all families and not for the group of married-couple families.

The next rows in Table 2 show the rest of the counterfactuals. Counterfactuals 2-4 show that wives' earnings have an equalizing effect on the income distribution of married-couple families and all families. The contribution of wives' earnings is more pronounced in 2010 than it was in 1996. This is consistent with the increase in female labor supply, especially for wives, shown in Figure 3. Counterfactual 2 keeps constant wives' earnings at its 1988 mean value. In this case, inequality would have been larger than its actual value. By 2010, inequality would have been 30 percent larger among married-couple families and 18 percent larger among all families. The results are statistically significant.

Counterfactuals 3 and 4 keep the standard deviation of wives' earnings and the correlation between husbands' and wives' income constant to their 1988 values. Our series of inequality from both counterfactuals are very similar, which is consistent with the result in Figure 5 showing a fairly stable correlation of earnings between husbands and wives over time. Under these scenarios, although wives contribute to equalizing the income distribution, they do it by a less margin than they do under counterfactual 2. This difference is due to a fall in inequality among wives' earnings over time (Figure 6).

The last counterfactual implies changing the marriage rates among the population. In this case, we can simulate what would have happened to total family income inequality had the marriage rate been constant at its 1988 level. We can also simulate what would have happened to family income inequality had marriage rates, mean and standard deviation of

wives' earnings, and the correlation of earnings between husbands and wives been constant at their 1988 level. Both results are presented in the last rows of Table 2. Had marriage rates been constant at their 1988 level, family income inequality for all families would have been lower in 2010. This is due to a fall in inequality among married-couple families. On the other hand, if we also keep constant the mean and standard deviation of wives' earnings and also the correlation of earnings among husbands and wives at their 1988 level, inequality for all families would have decreased only marginally. This means that the change in inequality generated for the change in wage structure (mean, standard deviation, and correlation) for wives is cancelled out by the one generated for the change in the marriage rates in the last 20 years.

6   How do females affect the income distribution?

The previous section showed that married female earnings contribute to equalize the income distribution, especially in the period 1996-2010. In Section 4 we showed that female labor supply has increased over time, especially for wives (Figures 3 and 4). We also showed that female labor supply increased relatively more for low-skilled groups. In this section, we briefly analyze how married females affect the income distribution.

[Table 3 here]

Table 3 shows how different characteristics have evolved over time. As previously shown, married females have increased their labor supply over time. However, this could be due to an increase in non-working husbands. The first three rows in the table present the percent of families according to husband and wife working status. Indeed, the percent of families in which both husband and wife work has been growing in the last 20 years. The percent of families in which both husband and wife worked in 1988 was 23 percent, but by 2010 this figure increased up to 43 percent. The next three rows show that the increase in female labor supply is mainly through full-time jobs, especially for wives.

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Is this increase in female labor supply related to changes in husbands' income or husbands' working hours? Results presented in Table 3 show that this is not the case. Both correlations (rows 8 and 9) are close to zero. Hence, the increase in female labor supply does not seem to be related to changes in husbands' employment conditions. It is also possible that the increase in wives' labor supply is due to new cohorts. If this is the case, we should observe a decrease or a differentiated pattern in age between wives that work and do not work. However, Table 3 shows that changes in average age over time for wives that work and do not work are very similar. This suggests that the increase in female labor supply is not restricted to younger cohorts.

Table 3 also shows the percent of families in which both husband and wife work, relative to a specified quartile of the income distribution (excluding wives' income). This percentage increased more for richer families during the period 1988-1996. However, the gap diminished in the period 1996-2010. The percent of families in which both husband and wife work in the first quartile increased 15 percentage points during 1996-2010, while for the fourth quartile it only increased 11 points. Moreover, the last two rows in the table show a marked increase in the share of income for wives in poor families (first quartile), it goes from 13 percent in 1988 to 41 percent in 2010.[21] Based on these findings and also those in Figures 3 and 4, we consider that the increase in wives' labor supply, especially from low income families, contributed to the decrease in family income inequality.

7 Conclusions

Income inequality in Mexico has followed an inverted-U-shaped pattern in the last 25 years. At the same time, female labor force participation increased substantially, especially for low

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[21]The increase in the share of income may be due to a higher proportion of non-working husbands. When dropping all families with zero income excluding wives' income, we get similar results. In this case, wives' income share in 1988 is 8.8 percent and 8.2 percent in the first and fourth quartile respectively, while in 2010 we get 16.1 percent and 12.9 percent in the first and fourth quartile respectively. Hence, even when we drop families with zero income (excluding wives' income) we observe a higher increase in income among poorer families.

skilled female workers. We analyze whether changes in wives' earnings in married-couple families and marriage rate changes had an equalizing effect on the family income distribution. Using data from urban zones in Mexico for the period 1988-2010, we compare observed family income inequality (using equivalence scales) with counterfactual distributions under a number of different assumptions. Our four counterfactuals on income distribution include assumptions such as zero wive's income, wive's income equal to the mean value of a reference distribution, constant mean and dispersion of wives's income, and constant correlation of wives' with other sources' earnings. Additionally, the marriage rate is assumed to be constant in the fifth counterfactual.

We consistently find that wives' earnings equalize the family income distribution. Counterfactuals related to the wives' income distribution suggest that inequality would have been larger had different characteristics (such as mean income, standard deviation, and the correlation between husbands' and wives' income) remain constant at their initial level. On the other hand, had marriage rates kept constant at the 1988 level, inequality would have been lower.

Although female labor supply augmented for all groups, the rise was higher for wives, low-skilled females, and wives in poor families. We also find that the correlation between husbands' and wives' earnings has been fairly stable at around 0.28 which is one of the highest values recorded in similar studies. Hence, we consider that family income inequality did not fall because of a reduction in assortative mating, its decrease is driven by the increment in wives' labor supply for poor households and also by changes in the wage structure (reduction of inequality among wives).

One final caution has to be noted. We only consider the effect of market female labor supply but we neglect the importance of housework. Our data does not allow us to check whether total hours of work for wives (market plus housework) has changed over time. Hence, we are unable to point out possible welfare effects at the family level. Although the welfare effects on families are beyond the scope of our paper, it might be the case that the increasing

participation of wives in the labor market occurs at the expense of their leisure time if wives remain the principal responsible for housework and childcare. Future research is needed in order to address this issue.

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Table 1: Descriptive Statistics

	1988	1996	2004	2010
A. Individuals (18-65)				
Age	33.9	34.4	35.9	36.8
Married	0.59	0.58	0.55	0.48
% Women Working	0.40	0.46	0.51	0.57
Hourly Wage	31.5	29.5	36.9	34.1
Monthly Income	3375	3238	4319	3970
CV^2 (Hr Wage)	0.87	1.09	0.96	0.92
Gini (Hr Wage)	0.40	0.46	0.43	0.41
N	77757	163113	120990	104503
B. Family				
% Married	0.71	0.72	0.68	0.64
# Kids (<18)	1.71	1.41	1.15	0.97
Equivalent Income	2803	2685	3622	3420
CV^2 (Equiv. Income)	1.13	1.26	1.12	1.03
Gini (Equiv. Income)	0.44	0.49	0.45	0.43
N	32477	68216	52684	46438

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Panel A uses information at the individual level, while Panel B uses information at the family level. Married in Panel B refers to families in which both husband and wife are currently cohabitating. Income and hourly wages are in constant pesos of January 2010. Panel B equivalent income uses the equivalence scale provided by CONEVAL.

Table 2: Main Results under different Counterfactuals

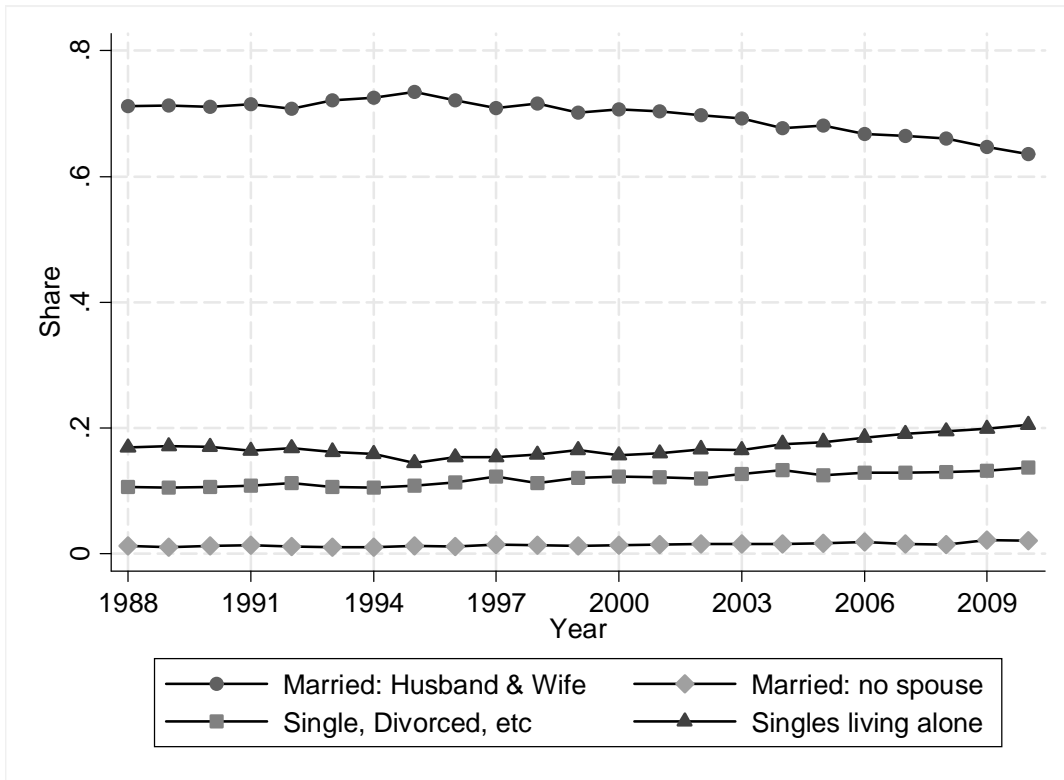|	CV^2			Change in Inequality Due to Counterfactual			
	1988	1996	2010	1996		2010	
Observed							
Married Families	1.041	1.360	0.946				
All Families	1.135	1.584	1.031				
1. All wives zero earnings							
Married Families	1.016	1.415	0.973	-0.055	*(0.021)*	-0.027	*(0.024)*
All Families	1.215	1.757	1.184	-0.173	*(0.022)*	-0.153	*(0.015)*
2. All wives mean earnings **as in 1988**							
Married Families	1.041	1.45	1.236	-0.090	*(0.017)*	-0.290	*(0.021)*
All Families	1.134	1.654	1.214	-0.070	*(0.013)*	-0.183	*(0.011)*
3. Mean and standard deviation **of wives earnings as in 1988**							
Married Families	1.041	1.356	0.992	0.004	*(0.013)*	-0.046	*(0.014)*
All Families	1.135	1.604	1.114	-0.020	*(0.001)*	-0.083	*(0.001)*
4. 3 plus correlation between **husband and wives as in 1988**							
Married Families	1.041	1.371	0.989	-0.011	*(0.035)*	-0.043	*(0.031)*
All Families	1.135	1.612	1.112	-0.028	*(0.018)*	-0.081	*(0.014)*
5. Marriage rates constant **as in 1988**							
All Families (Observed)	1.135	1.602	0.970	-0.018	*(0.001)*	0.061	*(0.001)*
All Families (Counterfactual 4)	1.135	1.633	1.021	-0.049	*(0.021)*	0.010	*(0.015)*

Notes: Calculations using urban sample. Sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Columns 2 to 4 calculate the squared coefficient of variation for years 1988, 1996 and 2010 according to the rows in the first column. The last four columns calculate the change in inequality due to a specified counterfactual. In other words, the difference of inequality according to a specified counterfactual and observed inequality in that year. Standard errors in parenthesis are obtained from 500 bootstrap simulations.

Table 3: Female statistics

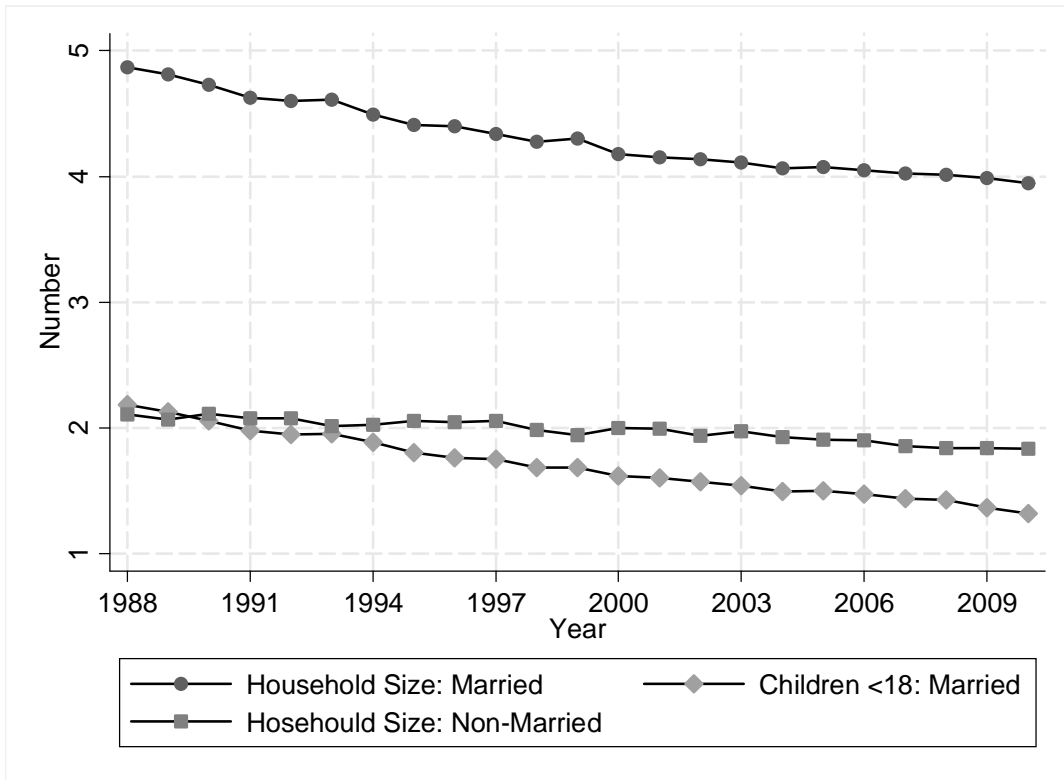|	1988	1996	2004	2010
% Families: Husband & Wive Work	0.232	0.300	0.369	0.431
% Families: Husband Works only	0.678	0.625	0.566	0.486
% Families: Wive works only	0.020	0.032	0.035	0.054
% Wives with Full-time job	0.123	0.172	0.233	0.275
% Wives with Part-time job	0.116	0.143	0.152	0.193
% Non-married with Full-time job	0.408	0.434	0.469	0.471
% Non-married with Part-time job	0.153	0.173	0.173	0.193
Correlation of Husbands' hours				
& wive' hours of work	0.029	-0.003	-0.014	-0.011
Correlation of Husbands' income				
& wives' hours of work	-0.007	-0.003	-0.006	-0.030
Age of Husband (restricted				
to working husbands)	38.9	39.2	40.7	42.3
Age of wive if she is working	35.2	36.5	38.3	39.8
Age of wive if she is not working	36.2	36.2	37.9	39.6
% of families w/ both husband & wive				
working (first quartile)	0.212	0.273	0.356	0.425
% of families w/ both husband & wive				
working (fourth quartile)	0.242	0.351	0.411	0.464
Wives' income share				
First Quartile	0.155	0.243	0.282	0.414
Wives' income share				
Fourth Quartile	0.082	0.096	0.112	0.131

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Work in all rows is defined as positive hours of work. Full-time is defined as individuals working longer than 35 hours per week, part-time as those individuals working positive hours but less than 35 hours per week. The last four rows in the table are obtained by sorting the data according to family equivalent income minus wife equivalent income.

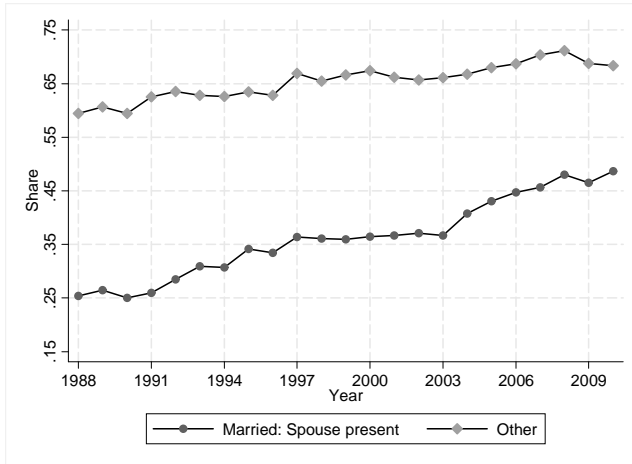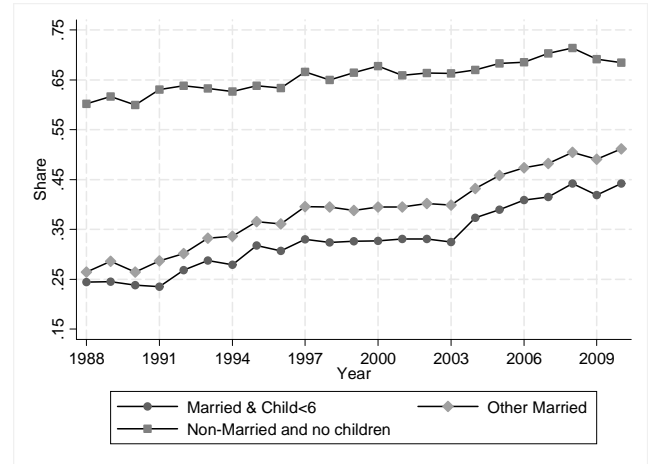Figure 1: Type of Households. Urban 1988-2010

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. "Married: Husbands & Wife" refers to both spouses living together in the household. "Married: no spouse" refers to families in which the household head declares to be married but the spouse does not live in the household. "Singles, Divorced, etc" refers to families declaring as civil status to be separated, divorced, or widowed with no cohabitation. "Singles living alone" refers to singles either because they live alone, or have no relationship with the household head.

Figure 2: Household Size: Urban 1988-2010

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Figure shows household size for urban households. "Children<18" refers to the number of individuals less than 18 years old living in married households.
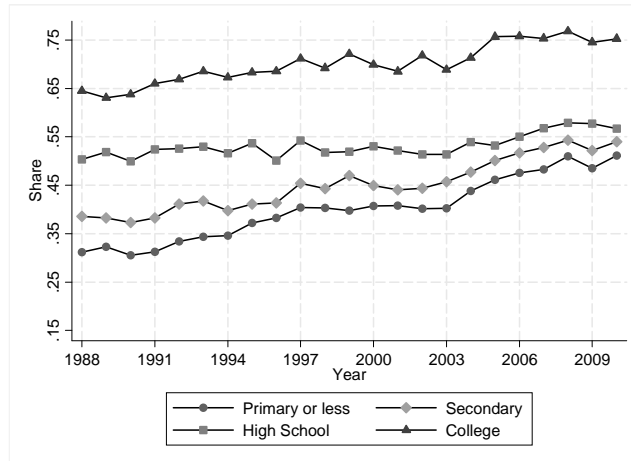
Figure 3: Female Labor Supply. Urban 1988-2010
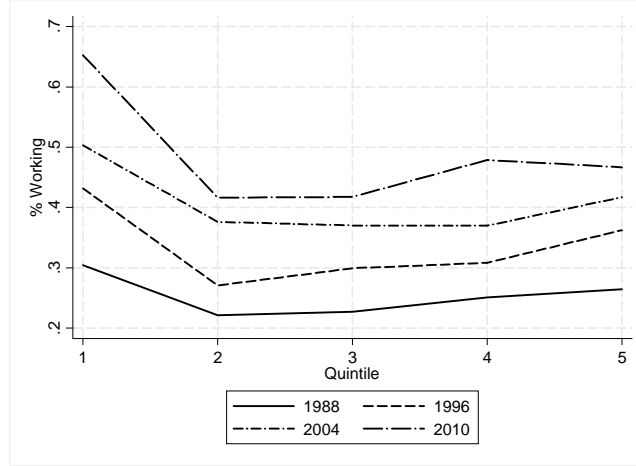
A. Total

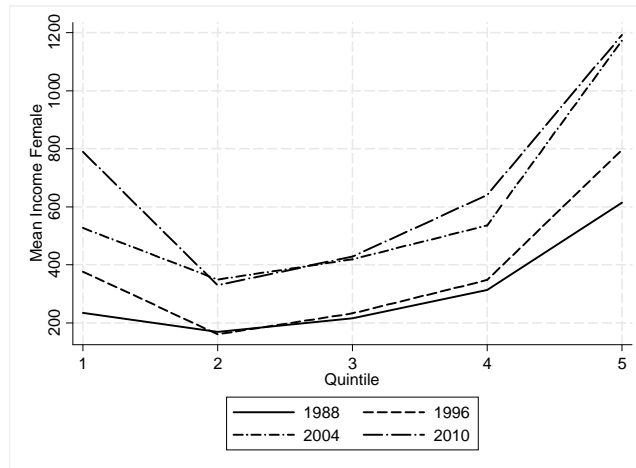B. Type of Household

C. Education groups

Notes: Sample restricted to urban households. Labor supply defined as individuals with positive hours of work. Panel A refers to female labor supply of married and non married groups. Panel B is the same as Panel A but divides married females into females with children less than 6 years old and the rest. Panel C refers to female labor supply for both married and non-married by education groups.

Figure 4: Female Labor Supply and Female Income by Household Income. Married & Urban households 1988-2010.

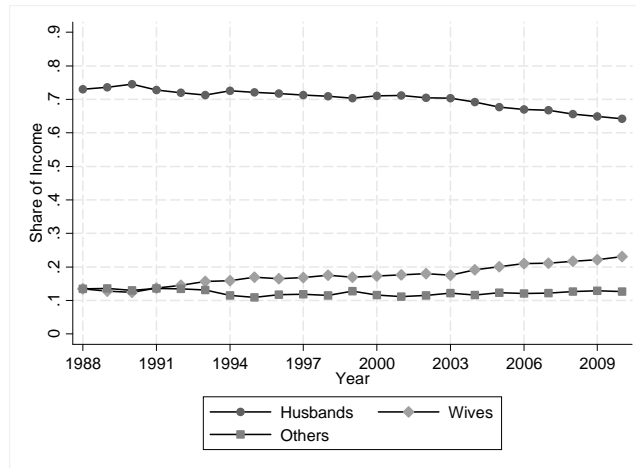A. Female Labor Supply by household's income
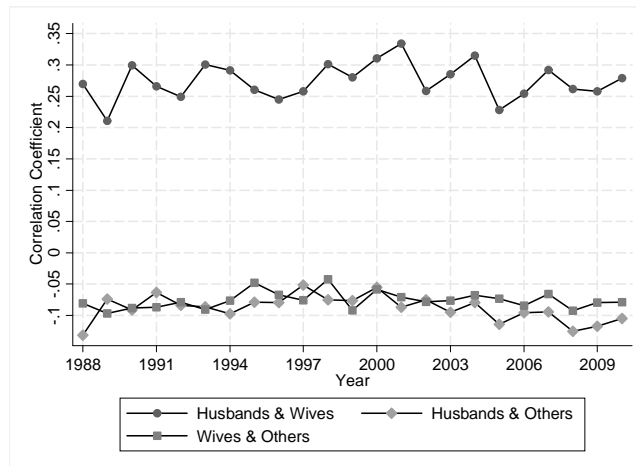

B. Female Income by household's income

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Furthermore, sample is restricted to married households (both husband and wife living together) with positive income. Panel A refers to female labor supply according to the quantile of the income distribution for the rest of the household (total family income less wife's income). Income is adjusted using equivalence scales as described in the text. Panel B refers to female labor force supply according to the quantile income distribution for the rest of household's income.

Figure 5: Share of Income and correlations among Married Families. Urban 1988-2010
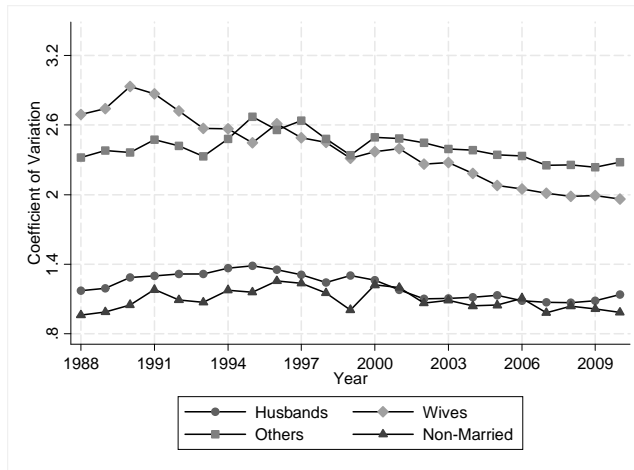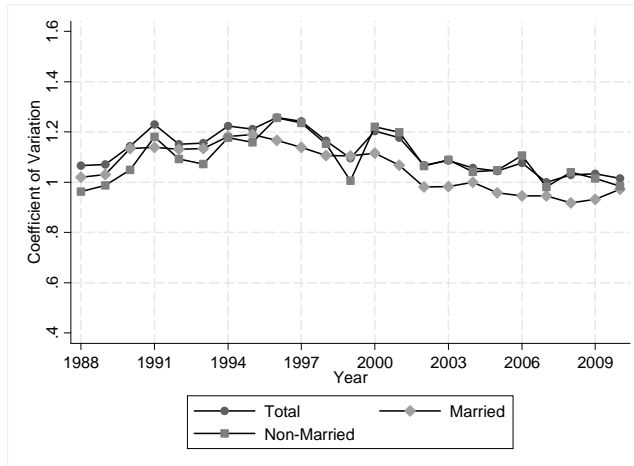
A. Share of Income

B. Correlations

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the household head age is outside the range 18-65. Furthermore, sample is restricted to married households. Panel A measures the share of income of each source and Panel B the correlation among income sources.

Figure 6: Coefficient of Variation by type of family. Urban 1988-2010

A. Married Households

B. All Households

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Panel A calculates the coefficient of variation of each income source for married households. Panel B calculates the coefficient of variation by type of household.

Figure 7: Counterfactual: All wives Zero Earnings. Urban 1988-2010
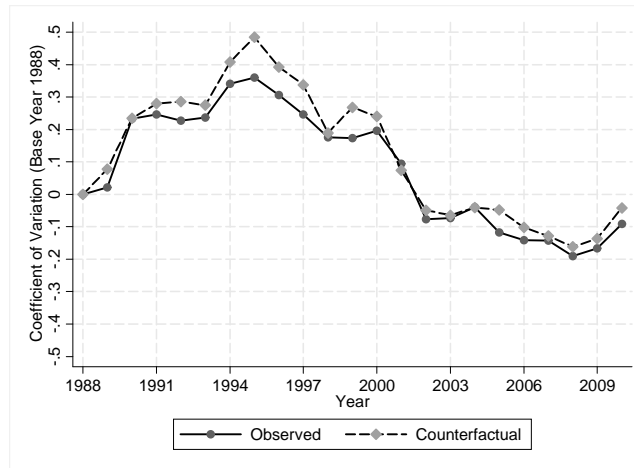
A. Married Households
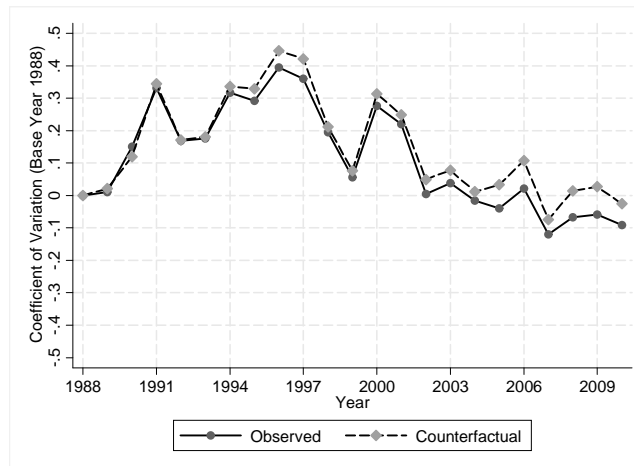

B. All Households

Notes: Sample restricted to urban households. Final sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Calculations based in formulas 1 (Panel A) and 2 (Panel B) in the text under the assumption that all wives' earnings are equal to zero. Results are presented using year 1988 as the base year (both observed and counterfactual inequality start in zero in 1988).

A   Appendix not to be published

Table A1: Results using different Base Years

	Base Year 1996			Base Year 2010		
	1988	1996	2010	1988	1996	2010
Observed						
Married Families	1.041	1.360	0.946	1.041	1.360	0.946
All Families	1.135	1.584	1.031	1.135	1.584	1.031
1. All wives zero earnings						
Married Families	1.016	1.415	0.973	1.016	1.415	0.973
All Families	1.215	1.757	1.184	1.215	1.757	1.184
2. All wives mean earnings						
as in base year						
Married Families	0.975	1.360	1.168	0.774	1.072	0.946
All Families	1.088	1.584	1.174	0.925	1.344	1.031
3. Mean and standard deviation						
of wives earnings as in base year						
Married Families	1.060	1.360	1.008	0.990	1.231	0.946
All Families	1.128	1.584	1.106	1.041	1.438	1.031
4. 3 plus correlation between						
husband and wives as in base year						
Married Families	1.046	1.360	0.990	0.997	1.258	0.946
All Families	1.121	1.584	1.099	1.045	1.454	1.031
5. Marriage rates constant						
as in base year						
All Families (Observed)	1.123	1.584	0.962	1.226	1.741	1.031
All Families (Counterfactual 4)	1.109	1.584	1.003	1.117	1.583	1.031

Notes: Calculations using urban sample. Sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Table shows calculations of counterfactual inequality using base years 1996 and 2010 as opposed to year 1988. Columns calculate the squared coefficient of variation for years 1988, 1996 and 2010 according to the rows in the first column.

Table A2: Results at the National Level

	CV^2			Change in Inequality Due to Counterfactual	
	1995	1996	2010	2010	
Observed					
Married Families	1.824	1.608	1.077		
All Families	1.834	1.822	1.184		
1. All wives zero earnings					
Married Families	1.922	1.640	1.063	0.014	*(0.021)*
All Families	1.992	1.993	1.336	-0.152	*(0.019)*
2. All wives mean earnings					
as in 1988					
Married Families	1.874	1.608	1.304	-0.227	*(0.014)*
All Families	1.870	1.822	1.338	-0.154	*(0.008)*
3. Mean and standard deviation					
of wives earnings as in 1988					
Married Families	1.821	1.608	1.126	-0.049	*(0.013)*
All Families	1.840	1.822	1.261	-0.077	*(0.006)*
4. 3 plus correlation between					
husband and wives as in 1988					
Married Families	1.822	1.608	1.107	-0.030	*(0.024)*
All Families	1.840	1.822	1.252	-0.068	*(0.011)*
5. Marriage rates constant					
as in 1988					
All Families (Observed)	1.860	1.822	1.101	0.083	*(0.008)*
All Families (Counterfactual 4)	1.867	1.822	1.149	0.035	*(0.012)*

Notes: Calculations using national sample. Sample excludes households with zero income and households in which the age of the household head is outside the range 18-65. Columns 2 to 4 calculate the squared Coefficient of Variation for years 1988, 1996 and 2010 according to the rows in the first column. The last four columns calculate the change in inequality due to a specified counterfactual. In other words, the difference of inequality according to a specified counterfactual and observed inequality in that year. Standard errors in parenthesis are obtained from 500 bootstrap simulations.