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DOCUMENTO DE TRABAJO

Núm. XV - 2010

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Why did wage inequality decrease in Mexico after NAFTA?

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First Draft: October 2008
Current Draft: October 2010

Abstract

Contrary to what happened before NAFTA, wage inequality in Mexico decreased after 1994. This paper investigates the forces behind the post NAFTA decrease in wage inequality. Using a quantile decomposition, I show that the decline in wage inequality is driven by a decline in the returns to education and potential experience, especially at the top of the wage distribution. Supply and demand are the main contributors for this change. On the supply side, there were substantial increases in college enrollment rates after 1994, which translated into an increase in the proportion of workers with a college degree. However, this increase in supply was not met by an increase in demand for the highly educated: the proportion of the workforce in top qualified occupations and close to the top occupations did not increase as much as the increase in supply. As a result, college educated workers put wage pressures in top and less than top qualified occupations. A Bound and Johnson (1992) decomposition confirms that changes in relative supply are the main determinant behind the decrease in wage inequality.

JEL codes: J20, J31, O15, O54.
Keywords: Wage Inequality; Mexico; Education; Employment.

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1 Introduction

Inequality, either measured by income or wages, is an important topic that has been continuously debated among academics and the media. Since the 1980s, most countries in the world experienced an increase in wage inequality and for some countries this trend continued during the 1990s. Mexico was no exception and went trough a period of increasing inequality by the end of the 1980s. However, wage inequality in Mexico started to decline after 1994, the period after NAFTA was enacted. This could be surprising given the relatively large literature explaining the causes of the increase in inequality at the end of the 1980s and beginning of the 1990s.[1] Figure 1 documents the patterns of wage inequality in Mexico. Even though the decline has been taking place since 1994-1996, there are few references for this episode in the literature.[2] In this paper I try to fill this gap and I give an explanation for the potential causes of this episode.

Wage inequality has continuously increased during the last 20 years in the United States and other developed countries.[3] There is a debate about the causes of this increase. On one hand, David Autor, Lawrence Katz and Daron Acemoglu among others[4] argue that skill biased technical change is the leading explanation for the increase in wage inequality. Since the supply of college educated increased during the period, the only possible explanation is that demand increased by more than the supply and that the growth in demand is biased towards skilled workers. On the other hand, Thomas Lemieux, David Card and John Dinardo among others[5] criticize the view of skill biased technical change as the main source for changes in wage inequality. Instead, they argue that the increase in wage inequality at the end of the 1980s and beginning of 1990s can be seen as episodic rather than driven by skill biased technical change. According to their estimates, most of the increase in wage inequality, especially at the bottom of the wage distribution, in that period can be explained by the fall in the real minimum wage and a decline in unionization rates. More recently, Autor et al. (2008) recognize changes in the real value of the minimum wage and the fall of unionization rates as plausible explanations for changes in lower tail inequality. However, they point

[1] For example see the papers by Airola and Juhn (2005), Cragg and Epelbaum (1996), Esquivel and Rodríguez-López (2003), Fairris (2003), Feliciano (2001), Hanson (2003), Revenga (1997), López-Acevedo (2006), Meza (2005), Robertson (2004).

[2] As explained below, I use the Expenditure Survey (ENIGH) for the analysis. The peak of wage inequality differs from the one calculated using the Labor Force Survey. Wage inequality in the Labor Survey peaks in 1996, but the downward trend is very similar to the trend using the Expenditure Survey. Some recent papers like Airola and Juhn (2005) and López-Acevedo (2006) acknowledge either that wage inequality has not grown or has decreased slightly. The view in this paper is that wage inequality has decreased substantially after 1994. Similar discussions can also be found in Chiquiar (2008), Esquivel (2009) and Robertson (2007).

[3] Katz and Autor (1999), Table 10.

[4] Acemoglu (2002), Autor et al. (2003), Autor et al. (2005, 2007, 2008).

[5] Card and DiNardo (2002), DiNardo et al. (1996), Lemieux (2006, 2008).

out that institutional aspects cannot explain the continuous rise in upper tail inequality. They conclude the increase in upper tail inequality cannot be explained by quantities but by returns, justifying the view of skill biased technical change as an important source for changes in wage inequality.

In some developed countries the wage structure has been changing favoring the high and low skilled workers. This process increases upper tail wage inequality but reduces lower tail inequality. For the U.S., Autor et al. (2007) show how high skilled jobs (occupations) in 1980 were the ones with the highest increase in demand, measured by the increase in the proportion of workers in those occupations. They also find that occupations in the lower tail increased their participation, but at the expense of middle-tier jobs. Furthermore, in the U.K., Goos and Manning (2007) find a similar pattern to that in the U.S. case, and call this U-shaped pattern "job polarization." They conclude that skill biased technical change and job polarization are likely explanations for the increase in wage inequality. In another study on Germany, Dustmann et al. (2007) and Spitz-Oener (2006) find that job polarization is present and the increase in wage inequality can be explained in part by that process.

As explained above, inequality has continuously increased in developed countries since the 1980s. In contrast, Mexico exhibits a decrease in inequality after 1994, and in this paper I explore the causes of such a decline. This is important for at least three reasons. First, societies generally value a more egalitarian distribution of resources. Hence the example of Mexico may be useful to other similar countries that desire to attain lower inequality levels. Second, it is also interesting to investigate whether Mexico has "job polarized" as other countries and analyze how this process modifies the wage distribution. Finally, other Latin American countries have seen a decline in wage inequality recently, hence the Mexican experience could help in building a consensus on why wage inequality has fallen in the region.[6]

In order to analyze the sources of the fall in wage inequality, I follow Mata and Machado (2005) decomposition. In particular, I estimate quantile regressions and build counterfactuals of the wage distribution holding constant observable characteristics or returns in schooling and potential labor experience. This decomposition is similar to DiNardo et al. (1996) non-parametric decomposition. The goal is to estimate the level of inequality using the endowments from one specific year but assuming returns values for a different year and vice versa. The results of the decomposition show that the returns to education and labor experience are the most important factor explaining the decrease in wage inequality. The decline in returns is explained by a substantial increase in college graduates in the last 10 years, but it is also due to slower growth in labor demand, especially for the top paid jobs.

[6]For example, see the cases in Argentina (Gasparini et al. (2009)), Brazil (Ferreira et al. (2008)) and Chile (Eberhard and Engel (2009)). A nice summary can be found in Lopez-Calva and Lustig (2009).

I divide jobs by "quality" using the occupation median wage in 1992 and show that top quality jobs did not grow as much as the increase in supply of high-skilled workers. Instead, low wage jobs increased their participation substantially at the expense of above the median wage jobs. In order to present further evidence on my findings, I decompose the relative wage changes as in Bound and Johnson (1992). These results confirm that changes in relative supply are the main determinant behind the decrease in wage inequality.

A few recent papers have discussed the issue on why inequality in Mexico has fallen since NAFTA. Esquivel (2009) describes the patterns of total income inequality and concludes that the fall in income inequality since NAFTA is mainly driven by earnings of workers. Esquivel (2009) argues that the fall in inequality could be explained by a change in the composition of workers and a late outcome of trade liberalization.[7] Robertson (2004, 2007) argues that the fall in wage inequality is driven by traditional trade channels. Moreover, workers in Mexico since NAFTA appeared to be complements to U.S. workers, not substitutes. López-Acevedo (2006) using data from 1996 to 2002 shows how a different education composition structure affects earnings inequality. The current paper differentiates from the previous papers in distinct ways. First, the paper explores different competing explanations of changes in wage inequality. Second, it provides empirical evidence on the job polarization hypothesis, a theory that has not been tested previously in Mexico. Finally, it formally decomposes the effect of returns and endowments of the labor force on the wage structure in Mexico. These decompositions achieve the goal of creating counterfactuals of what would have happened to the wage distribution had the returns or endowments been constant through the period. The previous papers do not attempt in constructing counterfactuals.

The paper is structured as follows. In the next section I describe the basic facts and trends of wage inequality in Mexico for different groups. Then I question and contrast different hypotheses of the decline of wage inequality in the last years. The next section carries the Mata and Machado (2005) methodology to decompose wage inequality, I present results for this decomposition and then analyze whether job polarization has occurred in Mexico and relate this process to the change in wage inequality. I then calculate the percent effect driven by supply and the percent effect driven by demand factors following the Bound and Johnson (1992) decomposition. The last section offers some concluding remarks.

[7] It is important to mention that Esquivel (2009) uses the summary statistics and results in this paper to draw some of his main conclusions.

2 Facts

There are three sources of data in Mexico that can be used to calculate wage inequality: Expenditure Survey, Labor Survey and the Census. Census data is not used given that there are only two points in time (1990 and 2000) and most of the decline in wage inequality is for the period 1998-2006. The labor survey has two drawbacks: it is not nationally representative given that it only has data for urban areas, and, more importantly, its methodology changed after 2004 rendering it useless for my purposes. For those reasons, my analysis will be based on the Expenditure survey (ENIGH, for its Spanish acronym). The ENIGH is nationally representative and it includes relevant variables such as income sources, expenditures and demographic characteristics. ENIGH surveys can be compared across years. ENIGH is available for years 1989, 1992 and very two years since then plus year 2005. [8]

In what follows I restrict the sample to all workers 18-65 year old with positive hours of work and valid wage. When calculating hourly wage I follow Airola and Juhn (2005) and calculate monthly wage over 4.33 times hours of work, and when calculating descriptive statistics I use as a weight the person weight from the data times hours of work as is commonly used in the wage inequality literature. Wages are in constant 2006 Mexican Pesos. I drop observations with real hourly wage less than $1 MXP.[9] I do not restrict the sample to full-time workers, but in the Appendix I show some of the results presented below including just full-time workers as well as using other definitions of income.[10]

Figure 1 plots the trends of wage inequality in Mexico since 1989 using the log difference between the 90th and 10th percentile. As has been documented in the literature, Mexico experienced a large increase in wage inequality in the period before 1994. What has not been documented as widely is the substantial decrease in wage inequality after 1994. This decline in wage inequality applies to both males and females, although the decline is more consistent for males. Wage inequality has decreased by more than 20 log points during this

[8] Wage income and the definition of occupations are comparable throughout the period. These are two key variables in my analysis. The Labor Survey (ENEU) can be compared for urban areas from 1989 until 2003-2004 depending on the number of cities included in the analysis. As wage inequality still decreased for the period 2003-2006, I use the Expenditure survey to take into account this latter period. It is important to clarify that the pattern of wage inequality in the Expenditure Survey is similar to the pattern in the Labor Survey, the difference that the peak in wage inequality is in 1996 instead of 1994. Moreover, even though ENIGH 2008 is available I decide not to use it given the effect of the macroeconomic crisis on employment outcomes.

[9] I experimented with different trimming regions and the trends of wage inequality were not affected. In order to keep as many observations as possible, I only drop observations with real hourly wage less than $1 MXP because the log transformation affects these values substantially. This censoring is innocuous given that less than 0.5% of the observations are affected across years on average.

[10] In the ENIGH, I define wage income consistently across surveys as "Wages" only coming from Labor Income. This term represents most of total labor income and total income. I calculated results (not reported) using total labor income and the results were similar to those obtained in the Appendix.

period. Figure 2 and Figure 3 decompose wage inequality using the log difference between the 90th and 50th and the 50th and 10th percentile respectively. Figure 2 shows a decline in top wage inequality while Figure 3 shows a decline in bottom wage inequality but not as strong as the decline in top wage inequality.

Figure 1 and Figure 2 exhibit a decline in wage inequality mainly driven by top wage inequality. In the Appendix, Table A1 presents different calculations of wage inequality using the standard deviation of log wages and the Gini coefficient as well as using different definitions of income. As we can see in this table, inequality has gone down since 1994 independently how it is measured. For example, the Gini coefficient has decreased 0.06 units and when measured by the standard deviation of log wages it has decreased by 0.04 units. These are substantial decreases considering the increase in wage inequality during 1989-1994. For example the Gini coefficient increased by 0.08 and the standard deviation measure by 0.09 units. The Gini coefficient and the standard deviation measure show a decline in wage inequality, but cannot distinguish the decline in wage inequality in the lower or upper part of the wage distribution. For this reason, I focus mainly in the difference between percentiles 90th and 50th and 50th and 10th as measures of lower and upper tail inequality.

In order to analyze more carefully the change in wage inequality during 1994-2006, Figure 4 presents the change in the log wage by centiles of the wage distribution using years 1994 and 2006.[11] For example, the first decile (up to quantile 10) experienced an increase in real wages close to 5 percent between 1994 and 2006. This graph indicates that there was an increase in the real wage for workers at the bottom half of the wage distribution. In fact, percentiles in the top half experienced a decrease in real wages and this decline was even larger for top percentiles (although again for women this is not the case). The real wage of the top decile decreased on average 30 percent.

The Mexican Peso crisis at the end of 1994 cannot explain the full decline in wage inequality during this period.[12] For example, Figure 5 exhibits a similar plot to Figure 4 but using years 1996 and 2006 instead of 1994 and 2006. Real wages at the top are still declining in comparison to different wages across the wage distribution, especially those at the very top. Deciles 2-4 had the highest wage increases during the whole period.

Finally, Figure 6 plots the change in wage inequality for years 1989-2006. Wages for the bottom half of the distribution (males and females) were more or less constant, with substantial increases for the very poor. The real losers in this period were the "middle-class"

[11] Given the small sample size of ENIGH, the use of centiles causes missing wages for some centiles, especially for women. For this reason, I aggregate the information every two centiles.

[12] Mexico experienced a deep contraction in economic activity in 1995. GDP fell by 7 percent in 1995 and inflation increased by 50 percent in 1995. As shown in figures, nominal wages did not adjust completely to the increase in inflation resulting in lower real wages.

and some high earners. Wages for workers between the 50th and 80th percentile decreased by close to 5 percent on average. Wages for workers between the 80th and 90th percentile decreased by close to 3 percent on average. The top decile increased their wages by close to 6 percent on average. On the other hand, females substantially improved their wages at the top of the distribution. The message in figures (4)-(6) is that the evolution of wage inequality in Mexico needs to be separated before and after NAFTA.

In sum, Figure 1 demonstrates that something affected the Mexican economy during the period 1994-2006 causing a decline in wage inequality. Table 1 analyzes this issue more carefully and presents information on how real wages have evolved for different groups of workers. I follow Autor et al. (2008), and analyze subgroups of workers divided by gender, education (less than Secondary, Secondary, High School and College), and potential experience (1-20 years of experience and more than 20 years of experience) for a total of 16 groups.[13] Then I calculate mean wages for each group and the proportion of workers in that group.

Table 1 shows the decline in real hourly wages after the Mexican Peso crisis of 1994. However, in general there was a strong recovery for the period 1996-2000. After year 2000, wages have been stagnant. This is also true for other measures of income as presented in the Appendix. The wages of workers with less than a high school degree increased the most for the period after NAFTA (1996-2006), especially for males. Looking at the education groups, it is surprising that wages of workers with a high school degree and a college degree have gone down after 2000 for both experience groups. At the same time, we can notice there was an increase in the proportion of workers with high school and college degrees during the period 1989-2006, especially for women. For example, the proportion of female college workers with less than 20 years of experience increased 2 percentage points, and in high school the increase is 3 percentage points.

Table 1 presents evidence that there is a striking difference in terms of the proportion of workers with different educational levels. Female workers with secondary education increased their proportion in the workforce by 1 percentage point between 1989 and 1996, but their proportion decreased between 1996 and 2006 for both experience groups. In contrast, male and female workers with high school increased their participation close to 1 percentage point respectively between 1989 and 1996, but in the period 1996-2006 their participation in the workforce increased 3 percentage points respectively. A similar pattern can be depicted for college workers. In sum, the main message in Table 1 refers to a difference in the proportion of workers in different education groups between the 1989-1996 and 1996-2006 periods.

[13] Less than secondary refers to less than 9 years of schooling, secondary refers to more or equal than 9 years of schooling but less than 12, high school refers to more or equal than12 years of schooling but less than 16, and college refers to more than 16 years of schooling.

3 Hypothesis

Following the seminal work by Bound and Johnson (1992) and the literature reviewed in Machin (2008), there are two distinctive forces that affect the wage structure. First, competitive factors like the change in supply and demand of workers affect directly the wages of workers. Second, non-competitive factors like changes in minimum wages and unionization rates may explain changes in the wage structure. The main hypothesis in the current paper is that changes in the wage structure in Mexico for the post-NAFTA period are driven primarily by supply and demand forces.

There are many papers analyzing the role of unions and minimum wage on inequality in Mexico for the period before 1996. Fairris (2003) and Fairris and Levine (2003) conclude that the falling unionization rate between 1984 and 1996 explains 11 percent of the increase in wage inequality.Kaplan and Novaro (2006) and Bosch and Manacorda (2008) analyze the effect of the minimum wage on the wage structure and wage inequality during the 1989-1994 period and later periods. In particular, Kaplan and Novaro (2006) argue that although the minimum wage is not binding in Mexico it affects other wages in the distribution. Bosch and Manacorda (2008) argue that the increase in wage inequality for the period 1989-2000 can be explained by a falling real minimum wage, especially for years 1989-1996.

If institutional factors are fundamentally altered during the period post NAFTA, then those changes could explain changes in the wage structure. However, unionization rates and the real minimum wage have been constant throughout the period in Mexico and, as a consequence, they are unable to explain the decline in wage inequality, even more so for the decline in top wage inequality. Figure 7 depicts the trend of unionization rates and real minimum wage for the period 1989-2006. Before 1994 there is a sharp decline in both unionization rates and the minimum wage. Unionization rates fell almost 6 percentage points during 1989-2006, and the minimum wage lost 30 percent of its real value. However, for the period 1996-2006 both unionization rates and real minimum wage were fairly constant. The real value of the minimum wage practically did not suffer any changes while unionization rates fell by 2 percentage points, although this fall was mainly driven for the year 2006.

Since institutional factors were not significantly altered during the period 1996-2006, the causes of the decline in wage inequality, especially at the top, need to be found elsewhere. It is possible that a constant minimum wage helped to keep constant lower tail inequality, but it is hard to argue that a constant minimum wage caused a decline in top wage inequality.

As for the competitive factors on the demand side, there have been raised two leading (and confounding) forces driving wage inequality: trade and skill biased technical change.[14]

[14]There are many papers analyzing the effect of trade liberalization on the wage structure for the period

Cragg and Epelbaum (1996) and Esquivel and Rodríguez-López (2003) argue that most of the increase in wage inequality before NAFTA is driven by skill biased technical change. Given that trade liberalization in Mexico occurred in the mid 1980s, the Stolper-Samuelson theorem would have predicted a decrease in wage inequality not an increase. In particular, Cragg and Epelbaum (1996) concludes that the traded sector in the economy became more skill-intensive suggesting a decline in demand for less skilled workers. Robertson (2004, 2007) analyzes the role of trade for the period after NAFTA. He mentions that trade caused a reorientation in Mexican manufacturing benefiting less skilled workers.[15]

However, empirical applications face a serious challenge in separating the effects of trade, skill biased technical change and other changes in demand when using samples for the full population. For example, Esquivel (2009) finds that wage inequality has decreased among all industries (not only manufacturing) and regions.[16] Hence, trade theories need to explain why trade affects all industries in a similar way. Moreover, some studies restrict their analysis to the manufacturing industry to identify the trade effect, but the proportion of workers in manufacturing is low, around 20 percent, and not representative of all workers. Given these criticisms, instead of separating each demand effect on wages, I calculate changes in total demand as in Bound and Johnson (1992) and Goos and Manning (2007).

Following Bound and Johnson (1992) decomposition, I argue there are two main reasons for the decline in wage inequality. The first reason is the substantial increase in schooling after 1990, especially in the second half of the 1990s after the 1992 reform which imposed mandatory schooling for secondary education. The second reason involves an absence of top quality jobs creation or lack of growth in labor demand for skilled workers.

Figure 8 plots total school enrollment and Figure 9 shows enrollment rates adjusting for population since 1980.[17] Before 1994 there is no substantial increase in enrollment rates. High School education increased slightly but this increase is mainly driven by the increase

before NAFTA. See for example the references cited in the Introduction of the paper. A nice review can be found in Esquivel (2009). This section does not attempt to summarize all the evidence of trade on wage inequality before NAFTA.

[15] This is consistent with the findings in Chiquiar (2008). However, Chiquiar (2008) only uses data up to year 2000 and cannot explore wage disparities across regions or industries for more recent years.

[16] See for example Figures 11 and 12 in Esquivel (2009).

[17] Enrollment data is available online through Secretaria de Educacion Publica website http://www.sep.gob.mx. Population data is obtained through the Statistical Office http://www.inegi.com.mx using Census data. I adjust for population in the following way. There are different age groups in the Census as reported by the Statitiscal Office: 0-4, 5-9, 10-14, 15-19, 20-24. I use this age structure to calculate population growth rates by age and population stocks. There is no information for Census year 1980 so I assume the same population in 1980 depending on the age structure of 1970. In particular I assume zero mortality rate for this period for each age group. The age group for Secondary is 10-14, High School 15-19 and College 20-24. To calculate population growth rates I just assume a linear growth rate between two Census years. I use also the Conteo de Poblacion (similar to the Census) for years 1995 and 2005 to get more accurate population estimates.

during 1980-1985, and after 1985 enrollment did not increase. College enrollment was fairly constant during the period 1980-1994. Supply of skilled workers did not change for the period before 1994. As enrollment rates for college and high school increased substantially after 1994, and as college usually requires 4 years of education, we expect college enrollment to have an effect on wages for year 2000 and afterwards.

Figure 10 plots the relative wage and relative supply of male workers with Secondary education and College education in logs levels. The first y-axis includes the log of the ratio of wage between secondary and college educated workers. The second y-axis includes the proportion of workers in the same education categories. Both wages and proportion of workers are obtained from the estimates provided in Table 1. The trend in the proportion of workers has been smoothed using a simple moving average, I multiply the previous and post period by 0.25 respectively and add the current period times 0.50. Before 1994, the trends cannot be related with each other. After 1996 and especially after year 2000 inclusive, the trends between wages and proportion of workers are negatively correlated. The timing of the decline in relative wages coincides with the expansion of enrollment rates for college education shown in Figures 8 and 9 (adding the 4 years of college education).

Assuming that other factors like demand and skill biased technical change are negligible, Figure 10 implies that the elasticity of substitution between secondary and college workers is slightly above unity.[18] This elasticity implies that, holding constant other factors, a decrease in the proportion of workers with secondary education relative to college education by one percent raises the relative wage by slightly less than one percent. Section 5 below analyzes changes in relative supply and their effect on changes in relative wages for different elasticities of substitution.

Although the change in educational levels is an important factor to explain the decrease in wage inequality, it cannot be the only explanation. If college education increases and the returns to college are unchanged, then inequality has to increase given the small proportion of workers with college education. Hence, returns to college education are lower now than they were in 1994. A decrease in demand for college educated workers explains also part of the decline in the returns to college. Even though the decline in wage inequality can be seen as something positive for society, the decline is not an entirely good thing given that recent college graduates have not been able to find high quality jobs. In particular, college

[18] Assuming a simple Constant Elasticity Substitution production function with only two inputs Secondary and College workers $Y = [S^{\rho} + C^{\rho}]^{1/\rho}$ and the elasticity of substitution is defined as $\sigma = \frac{1}{1-\rho}$, using the first order conditions we get $\ln\left(\frac{w^S}{w^C}\right) = -\frac{1}{\sigma}\ln\left(\frac{S}{C}\right)$. Hence, the elasticity of substitution can be calculated as the change in relative wages over the change in relative proportions assuming everything else is constant, assuming other factors like demand and skill biased technical change were not altered. In Section 5 I augment this formula to account for changes in demand as well.

educated workers have been downgraded in occupational terms and are putting pressure to lower occupational skills. Labor demand and job creation have not been able to absorb all the increase in the supply of skilled workers. The next section analyzes more carefully both claims.

4 Results

4.1 Quantile Decomposition

In this subsection, I analyze the effects of the increase of educational levels on wage inequality using the Mata and Machado (2005) decomposition. This decomposition analyzes whether changes in wage inequality are driven mainly by quantities (endowments) or by prices (returns) as in the Oaxaca-Blinder decomposition or in the non-parametric decomposition suggested by DiNardo et al. (1996). The only difference here is that instead of using the means only, the decomposition uses quantiles of the full wage distribution. The conditions for this procedure to work are that the characterization of the quantile regressions needs to be correctly specified, that quantile regression estimates are accurate predictors of the true wage distribution and finally the assumption of partial equilibrium. The last assumption means that if returns are increasing, individuals do not increase their levels of schooling because of the increase in returns.

The implementation is straightforward. First, I estimate quantile regressions separately for each year and gender, I estimate regressions for quantiles $\theta = 0.01, 0.02, ..., 0.99$. I follow Autor et al. (2005) and estimate a flexible functional form based on education and potential experience.[19] Second, I keep the coefficients for each quantile and year. Third, I calculate counterfactuals based on the endowment distribution for one year using the returns for a different year. For example, to calculate the change in inequality in quantile θ caused by the effect of quantities between year t and τ using the returns as in year τ, we calculate:

$$Q_\theta(X_\tau \beta_\tau) - Q_\theta(X_t \beta_\tau)$$

where $Q_\theta()$ is the result of multiplying the vector of parameters to each observation in the data and θ represents the quantile of the resulting distribution.[20] Notice that the decompo-

[19] Each regression includes dummy variables for the four educational groups described above (except workers with less than secondary) each interacted with a cubic in potential experience. Each regression also includes a Rural locality dummy variable. I restrict the counterfactual calculations to urban households, i.e. setting the dummy variable of rural equal to zero. In sum, I run the following regression for each quantile/gender/year $\log w_i = \alpha + \sum_{j=2}^{4} \beta_j Ed_{ij} + \sum_{j=1}^{3} \gamma_j Exp_i^j + \sum_{j=2}^{4} \sum_{k=1}^{3} \rho_{j_k} Ed_{ij} Exp_i^k + \theta Rural_i$ where Ed are three education dummy variables (secondary, high school and college) and Exp potential experience.

[20] Mata and Machado (2005) use bootstrap samples to calculate counterfactuals. I follow Autor et al.

sition assumes returns as in year τ, but it is possible to fix the returns as in year t. Hence, $Q_\theta(X_\tau\beta_\tau) - Q_\theta(X_t\beta_\tau)$ is the change in wage inequality explained by the change in endowments assuming prices are as in year τ. Like the Oaxaca-Blinder decomposition, the total observed change in inequality can be decomposed as

$$(Q_\theta(X_\tau\beta_\tau) - Q_\theta(X_t\beta_\tau)) + (Q_\theta(X_t\beta_\tau) - Q_\theta(X_t\beta_t)) + \varepsilon$$

where the first term is the estimated effect of quantities or endowments, the second term is the effect of prices or returns and the last term is the residual. Obviously the effects of quantities and prices are determined by what factor is taken into account first. In the calculations below I change the order of the decomposition to check the robustness of the results. Also, we expect the residual to be close to zero, that is we expect the quantile estimation to be very close to the actual distribution otherwise it is possible that decomposing wage inequality with quantiles is not valid.[21]

Table 2 shows the main results of this decomposition. The table includes the quantile decomposition for three different periods: 1996-2006, 1994-2006 and 1989-2006. Each period includes the observed change in wage inequality, the effect due to quantities and prices, and the residual. The first row for each group does the decomposition using quantities first and then prices. The second row for each group (in italics) does the decomposition in the reverse order: prices first and then quantities. For the male wage differential 90-10 and period 1996-2006, the observed change in wage inequality was -0.10. Had returns been constant, wage inequality would have increased 0.17-0.23. On the other hand, had endowments been constant wage inequality would have fallen close to 0.3.

The change in wage inequality in the top half of the wage distribution can be mostly explained by a change of returns for periods 1994-2006 and 1996-2006. The order of the decomposition does not matter suggesting that prices are an important determinant of the fall in wage inequality. Given the 1994 economic crisis, the decomposition works better for period 1996-2006 than for period 1994-2006. The residual is larger for the latter case. On the other hand, the decomposition for the period 1989-2006 works poorly as the sign of the estimates changes according to the order of the decomposition. This suggests that the economic crisis is an important factor and that there are non-competitive factors affecting the wage distribution. Factors like unionization, real minimum wages, industry rents are

(2005) instead, and multiply the full vector of parameters to each observation in the data. In this way, if for example year 2000 includes 1,000 observations and we have 100 quantiles, the new dataset will contain 100,000 observations. If quantile regression is correctly specified we can recover the full wage distribution as $f(\widehat{w}) = \int_X \int_\theta \widehat{Q}_\theta(w|X)g(X)\partial X\partial\theta$.

[21] In other words, when decomposing wage inequality with returns before than quantities we have the following decomposition $(Q_\theta(X_\tau\beta_\tau) - Q_\theta(X_\tau\beta_t)) + (Q_\theta(X_\tau\beta_t) - Q_\theta(X_t\beta_t)) + \varepsilon$

important factors that affected the wage distribution during the period 1989-1994.[22] Bosch and Manacorda (2008) argue that most part of the increase in wage inequality between 1989 and 2001, especially at the bottom of the distribution, can be explained by a declining real minimum wage. This is consistent with the quantile decomposition given the large residuals found for the period 1989-1994 and the inability to predict correctly the change in inequality at the bottom of the distribution.

Results in the table show that the decrease in wage inequality is mainly driven by a fall in the returns to schooling. Given the low levels of schooling in Mexico, if returns to education had been constant then an increase in schooling would have increased wage inequality not decreased. This is true for males and females except the case of top wage inequality for females. For the period 1996-2006, it does not matter the order of the decomposition, the results are closely similar. The decomposition works better for the wage differential 90-10 and 90-50 than for the 50-10. Inequality at the bottom almost did not change so the decomposition does not do a very good job. The effect of prices is concentrated in the top-half of the distribution. This is consistent with Figure 10 showing relative wages between secondary and college workers.

4.2 Job Polarization and Demand of High Quality Jobs

The second reason why inequality has fallen is the lack of job creation of high quality jobs. In the last 20 years, developed countries have experienced a process known as "job polarization." Studies for the U.S., England and Germany provide evidence that the increase in wage inequality in these countries is driven by an increase in top wage inequality.[23] In particular, these studies find that labor demand for top qualified occupations (ranked by wage paid in a previous year) has increased. At the same time, as low qualified occupations are likely complements to top qualified occupations, demand for low paid occupations has increased and demand for middle paid occupations has decreased. This process leads to a decrease in bottom wage inequality but an increase in top wage inequality.

If demand in Mexico for top qualified jobs is growing, we expect the supply of college workers to be absorbed by those jobs. If the labor demand growth rate is constant or increasing for the period 1996-2006, the proportion of workers in top qualified occupations should increase. Following Goos and Manning (2007), a simple way to show this is creating a graph in which the x-axis reflects the rankings of the occupations (measured by the median wage) and the y-axis reflects the change in the proportion of workers in those occupations

[22] Examples for the U.S. are Bound and Johnson (1992), DiNardo et al. (1996), and for Mexico Fairris (2003) and Bosch and Manacorda (2008)

[23] Autor et al. (2007), Goos and Manning (2007) and Dustmann et al. (2007).

during the specified period.

I rank occupations based on the median wage of 1992 and then collapse them according to deciles.[24] Then I calculate the proportion of workers (hours adjusted) in each decile and the change in the proportion of workers for different periods. Figure 11 presents the plot for periods 1994-2006, 1996-2006 and 2000-2006. Demand for the lowest paid occupation (agricultural workers) fell the most during this period. However, low paid occupations in deciles 2-4 increased their participation in the workforce and at the same time high paid occupations did not increase their participation as much.

The increase in the proportion of workers for the top qualified jobs was less than 1 percentage point between 1996-2006 or 2000-2006. Moreover, the period 2000-2006 shows a clear process of slower demand for top qualified jobs. The largest decline in this period is not in agriculture but in close to top qualified occupations, like secretaries, some workers in manufacturing and some technicians in social sciences and medicine. As shown above, the period 1998-2006 experienced large increases in high school and college education but these workers were not absorbed by the top qualified jobs.

Among the highest increase in demand for low paid occupations are the following: in decile 2, construction workers and domestic service workers; decile 3, food, drinks and tobacco manufacturing workers and waiters; decile 4, employees in retail trade and textile workers. For the top two deciles the main occupations that experienced demand growth are professionals in the social sciences, however many professional occupations did not experience an increase in demand. Tables 3 and 4 analyze the occupations in the bottom and top half of the wage distribution of 1992 and include the mean wage for some occupations as well as the proportion of workers in that occupation for different years. The largest increase in employment was given by employees in retail trade.

Autor et al. (2003) argue that computers are the causal mechanism of job polarization. As prices of computers decline, demand for occupations that are complements to computers increase causing an increase in the wage paid to those occupations. However, at the same time the demand for other occupations that are substitutes to computers declines. Since computers substitute for occupations that are in the middle of the distribution, the decrease in the demand for middle-tier jobs causes an increase in wage inequality at the top of the distribution. In Mexico, some job polarization process is observed. Demand for occupations that are close substitutes to computers declined: secretaries, some workers in manufacturing, technicians. However, demand for occupations that are complements to computers did not

[24] I use year 1992 because it is the first year with the same coding in occupations as future years. Year 1989 uses a different occupational code. For example, if the poorest occupation (agriculture) represents 10 percent of the population in 1992, then this occupation is the only one in the first decile. Then I calculate the change in the proportion of workers between different periods according to this ranking.

increase. In the last row of table (4) I include the mean wage for all professional workers and business managers and directors as well as the proportion of workers in those occupations. It is striking that the proportion of workers in these occupations did not increase substantially. Between 1996-2006 the proportion of workers increased by 0.72 percentage points.

As the share of workers with college education increased 5 percentage points in 1996-2006 (Table 1), we would expect similar increases in professional occupations. But the main professional occupations (social sciences, economics, accounting and engineering) increased their participation in less than one percentage point as Table 4 suggests. College educated workers needed to downgrade to work for lower paid occupations. Figure 12 shows a similar graph to Figure 11. The only difference between these graphs is that Figure 12 calculates the change in the share with college within each decile. In this way, decile 10 increased less than 5 percentage points its participation of college educated workers between 2000 and 2006. This graph shows that deciles 8-10 had the largest increases in college educated workers. Since the demand in top decile occupations could not absorb the supply of college graduates, college workers had to downgrade to lower paid occupations, especially for the period 2000-2006.

The results shown in this section depict a story where demand has not been growing enough to keep up with the substantial increase in supply, especially for the college-educated. Job polarization seems to be present in the bottom half of the occupations but there is no substantial increase in demand in the top paid occupations. The excess supply in college workers creates wage pressures not only in top quality jobs but also in less than top quality jobs. As the enrollment rates for college individuals continue to increase this process will likely put more pressure on wages at the top of the distribution.

5 Bound and Johnson (1992) Decomposition

In order to determine the effect of supply and demand on relative wages, I follow Bound and Johnson (1992) decomposition and apply it to the case of Mexico for the period 1996-2006. I further assume that non-competitive sources are not important during this period and then determine the relative importance of supply and demand factors. Assuming a simple CES production function with elasticity of substitution σ constant across skills, it is possible to determine the effect of supply and demand on relative wages. In particular, it is possible to show that the relative wage of college workers in terms of secondary workers can be expressed in terms of its increase in demand and supply:

$$\Delta\% \left(\frac{\overline{w}^C}{\overline{w}^S} \right) = \frac{1}{\sigma} \Delta\% (Demand) - \frac{1}{\sigma} \Delta\% \left(Supply \right) + \xi$$

The residual term ξ contains the effect of Skill Biased Technical Change and other non-competitive factors. As unionization rates and the real minimum wage were fairly constant during 1996-2006, I assume non-competitive factors are negligible. The supply component is easily calculated from Table 1 and refers to the relative increase of college educated workers over secondary educated workers.[25] I follow Bound and Johnson (1992) to calculate the increase in relative demand. I construct the index as:

$$Demand_i = \sum_j (\Delta \ln \phi_j) \cdot \phi_{ij} \tag{1}$$

where ϕ_j is the proportion of workers in industry j and ϕ_{ij} is the proportion of workers of group i in industry j.[26] In order to calculate the percent change of demand for college educated workers over secondary educated workers, I take the difference between the predicted increase in demand for college workers and secondary educated workers, $Demand_{College} - Demand_{Secondary}$.

Table 5 includes the calculations for the explanations of relative wage changes between college educated workers and secondary educated workers. Figure 10 and Table 1 show that men's relative wages between college and secondary educated workers declined 20 log points between 1996 and 2006. Relative supply, on the other hand, increased 27 log points during the same period. If the elasticity of substitution is assumed to be equal to 2, then relative supply changes explained 100 percent of decline in wages for all workers and 63 percent of the decline in wages for males. Demand components calculated from formula (1) are small in magnitude but negative, suggesting that relative demand between college and secondary educated workers actually declined. This result is consistent with the previous section and Figure 11. After NAFTA, labor demand did not increase for high skilled workers. The residuals for the full sample and men in Table 5 are relatively small. The small residual suggests that skill biased technical change was not important during this period.

Autor et al. (2003) argue that the causal mechanism for skill biased technical change is the price of computers. As the price of computers declines, demand for jobs that are complements to computers increases. Previous research on wage inequality in Mexico before NAFTA has argued that skill biased technical change is one of the main reasons why wage inequality increased during this period.[27] However, Table 5 implies that skill biased technical

[25] $\Delta\%Supply = d\ln\left(\frac{College}{Secondary}\right)$ between the two periods of reference.

[26] I use 14 aggregated codes for industry from the Consumption Expenditure Survey. The appendix includes a table with employment across these industries over time. The industries are: Agriculture, Mining, Manufactures, Construction, Retail Trade, Transportation, Hotels and Restaurants, Finance and Professional Services, Government , Health and Medical Services, Education, Domestic services, and Other services.

[27] See for example Esquivel and Rodríguez-López (2003), López-Acevedo (2006) and Meza (2005).

change is relatively unimportant given the small residual after NAFTA. If there has been no changes in the effect of skill biased technical change, then the fact that computer prices have been decreasing during the last 20 years implies that skill biased technical change may have a smaller role before NAFTA than previously thought.

6 Conclusions

As opposed to many developed countries, wage inequality in Mexico has been falling for the period after 1994. Although the macroeconomic crisis is partially responsible for the decrease in wage inequality immediately after 1994, the main reasons why inequality has fallen are primarily driven by supply and demand forces. Institutional factors like unionization rates and the real value of the minimum wage did not adjust significantly during this period and hence they cannot explain the substantial decrease in wage inequality at the top of the wage distribution. Enrollment rates in Mexico were fairly constant for the period 1980-1994. Only after 1994 did Mexico substantially increase its enrollment rates of college and high school. This increase in educational qualifications caused a substantial decrease in wage inequality after 1998 through a decrease in returns to education. The second reason of the fall in inequality is given by slower demand growth. In particular, the increase in supply of college workers was not matched by an increase in top qualified jobs.

Job polarization in Mexico is different to the one experienced in other countries. Although the proportion of workers in "lousy jobs", as defined by Goos and Manning (2007), is increasing, the "lovely jobs" do not show a corresponding increase in the proportion of workers. The slow growth in top paid occupations is surprising considering the increase in demand for top paid occupations in the U.S. and the U.K. More research is needed not only to know how computers increase labor demand for top paid occupations, but more importantly for developing economies is to check whether there are fixed costs in the adoption of new technologies or what institutional factors are impeding an increase in labor demand through the use of computers.

The Bound and Johnson (1992) decomposition suggests that increases in the supply of college educated workers are the main source for the decrease in wage inequality, but also suggest that an absence in job creation and labor demand shifts are also responsible for the lower wage inequality that Mexico experienced after NAFTA. These two mechanisms imply that skill biased technical change did not play a substantial role for the modification of the wage distribution. Moreover, if the price of computers decreased more in the period after NAFTA than before its enactment, and computers are the causal mechanism for skill biased technical change, the results in this paper cast caution on the explanation that skill biased

technical change was the reason why wage inequality increased before NAFTA. Moreover, results in this paper are consistent with other findings in Latin America as reviewed in Lopez-Calva and Lustig (2009). The increase in the relative supply of skilled workers has altered the relative returns of those workers. Moreover, changes in demand have not offset the increase in the supply of skilled workers.

Lower wage inequality can be a desirable goal for any society. However, Mexico has experienced lower wage inequality partially for not being able to create enough top quality jobs. As the supply of college workers increased, demand did not increase as much. This process caused wage pressures for top quality jobs and for less than top quality jobs resulting in lower wage inequality.

The experience of Mexico can be interesting for other developing countries. On one side, it is possible to decrease wage inequality with substantial increases in educational levels. However, if these increases are not accompanied with labor market reforms or an environment that facilitates job creation, the newly qualified workforce will not be used at its maximum return.[28]

Policymakers in Mexico need to focus in mechanisms that create an environment to boost job creation. As the supply of college educated workers continues to increase, wage pressures will remain in the next years. Future research should try to measure and follow labor demand for qualified workers in the next years using the same survey as used here or different ones. We also need to understand what institutional factors are impeding an expansion of top quality jobs in Mexico.

[28] Although an environment that creates more jobs than the increase in supply will likely increase inequality, society may be better off in the latter case.

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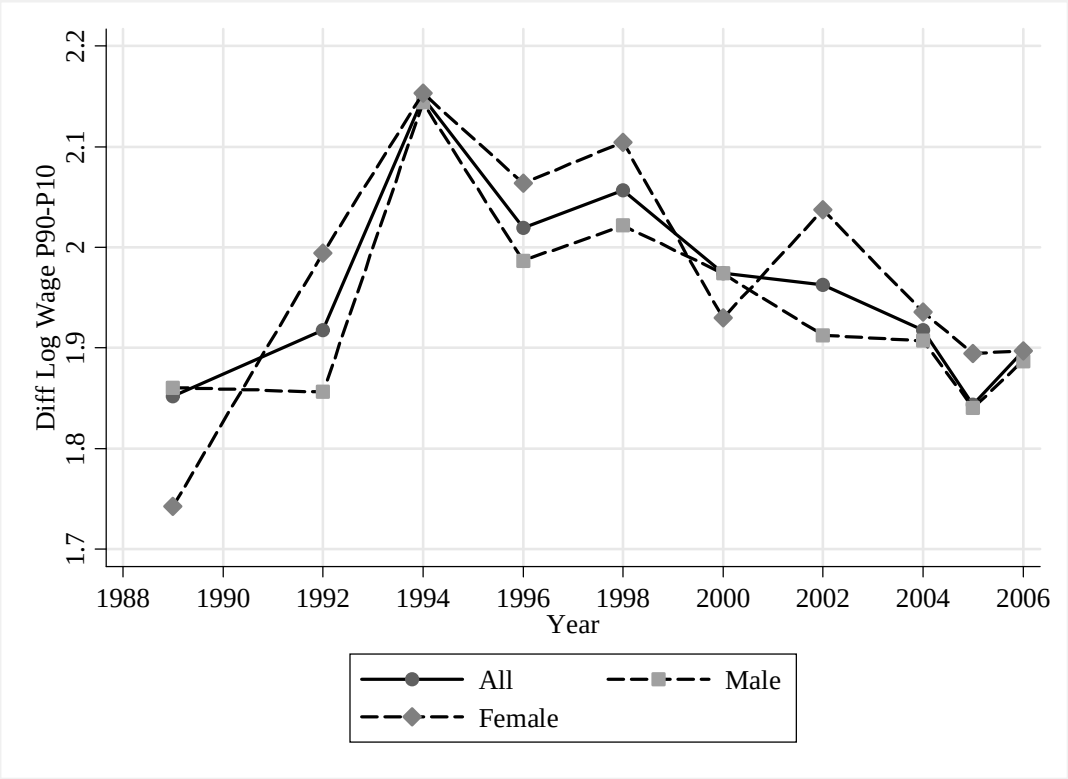
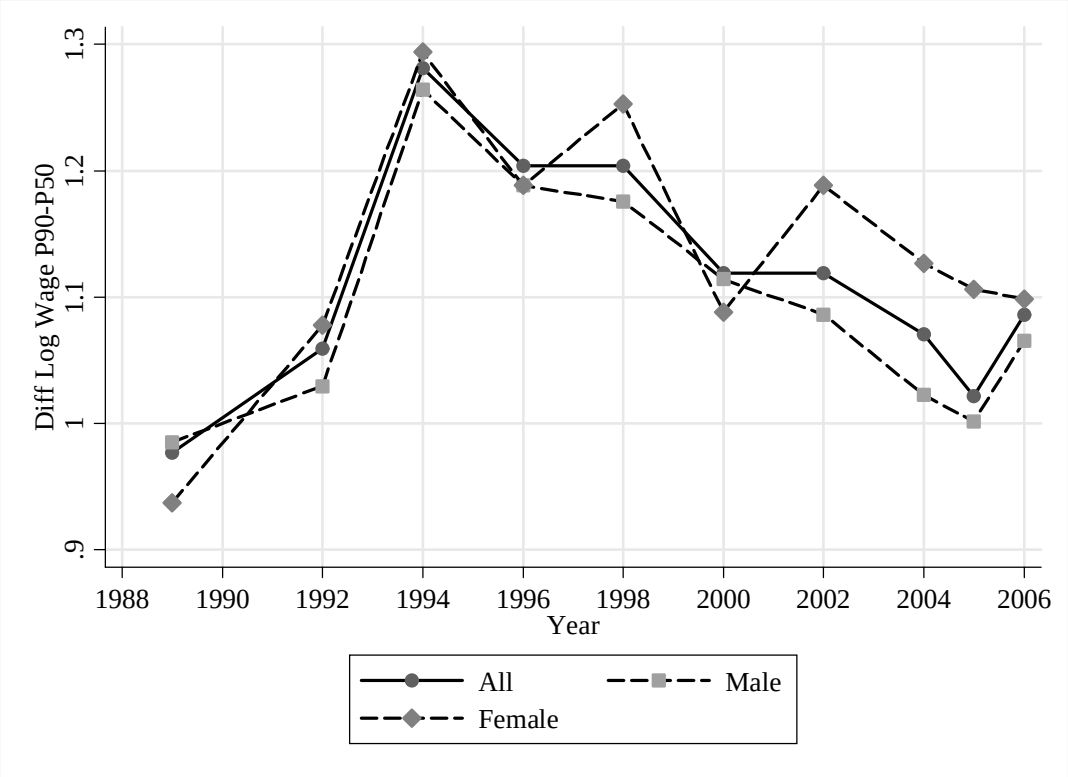
Figure 1: Wage Inequality. 90-10.



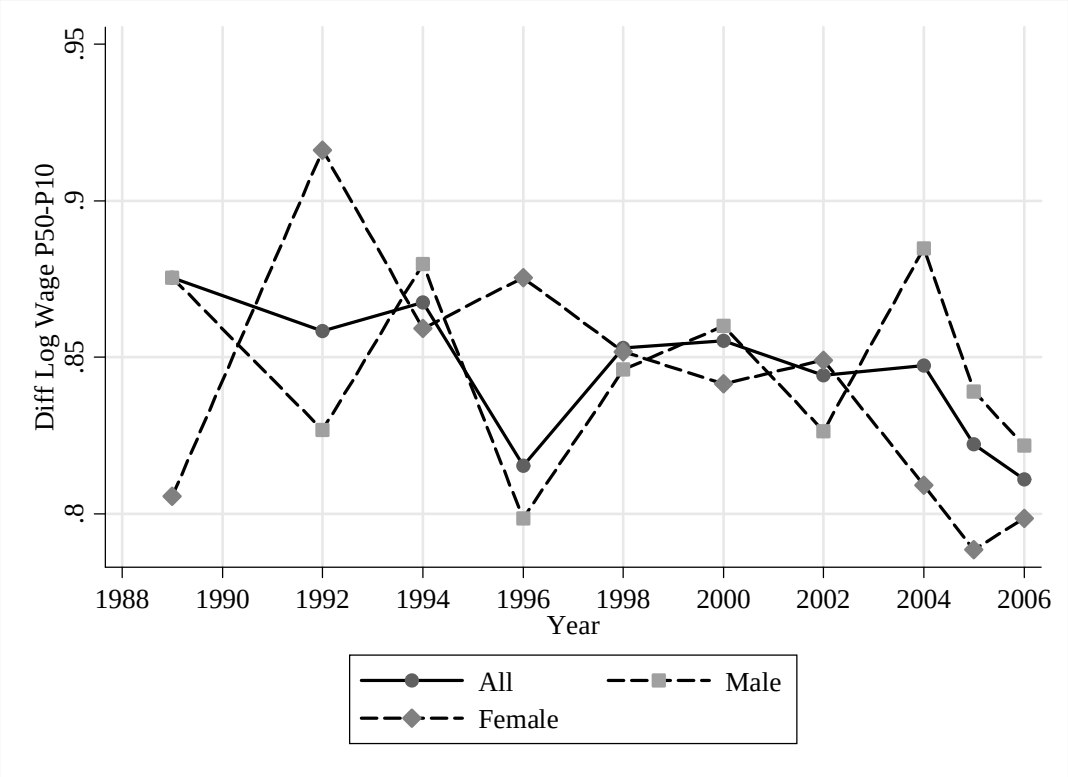
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure 2: Wage Inequality 90-50



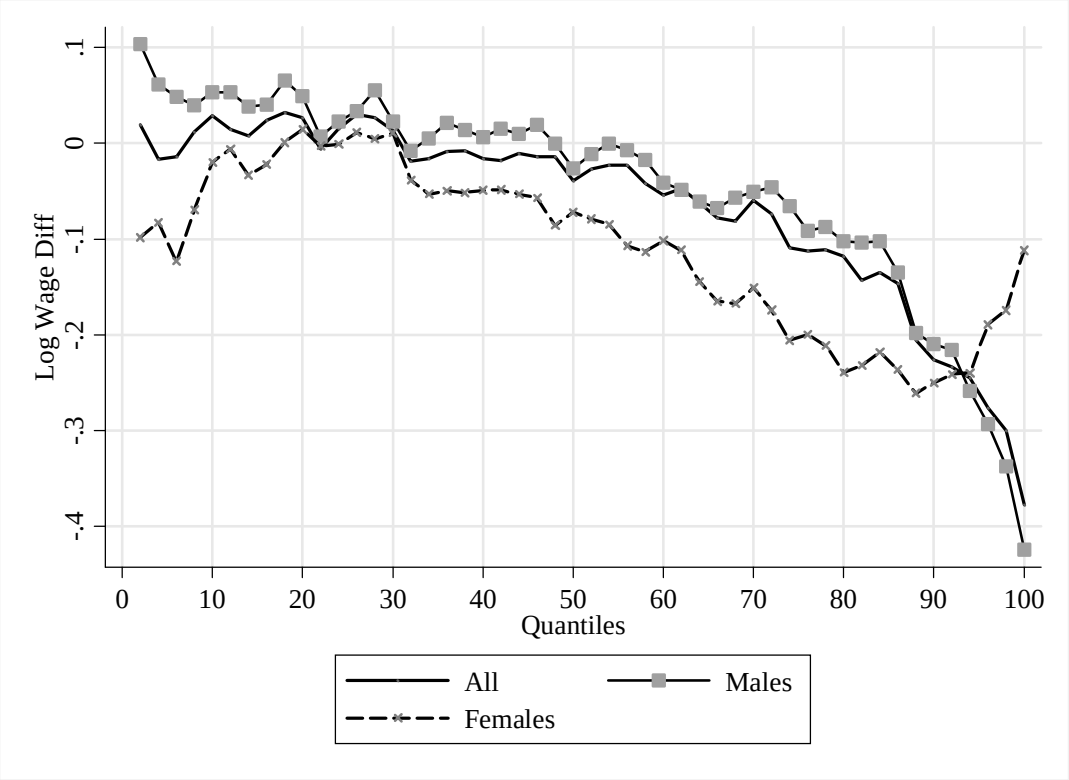
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure 3: Wage Inequality 50-10



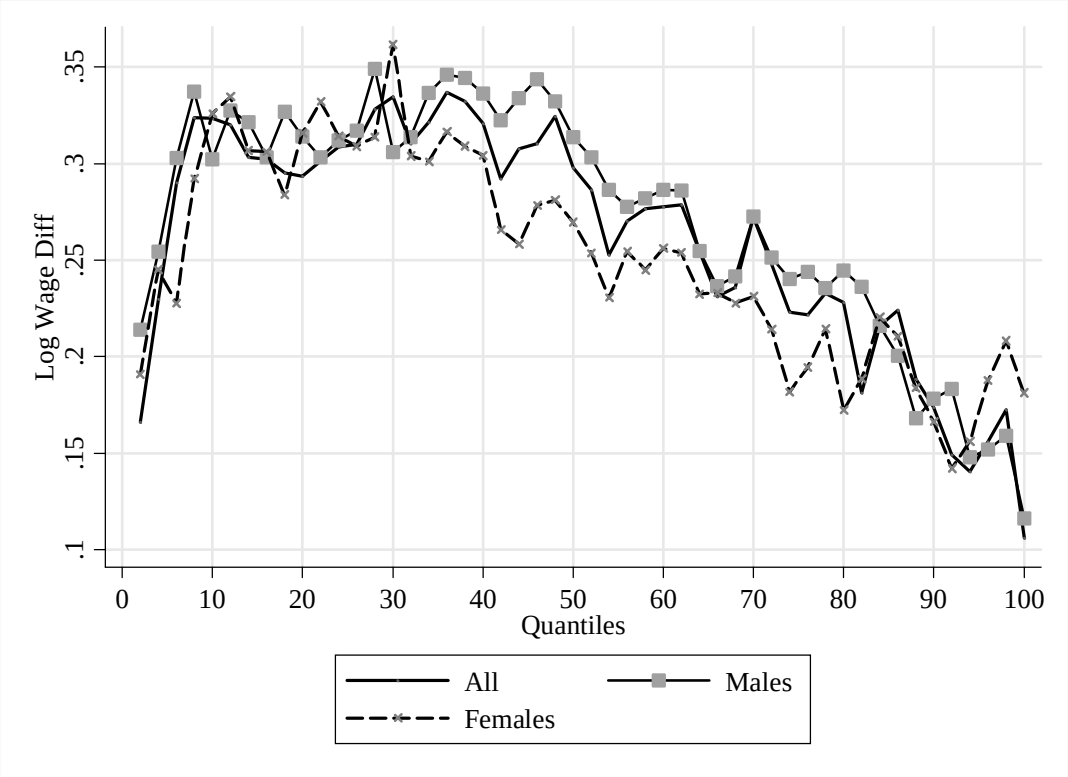
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure 4: Log Wage Difference by Percentile: 1994-2006



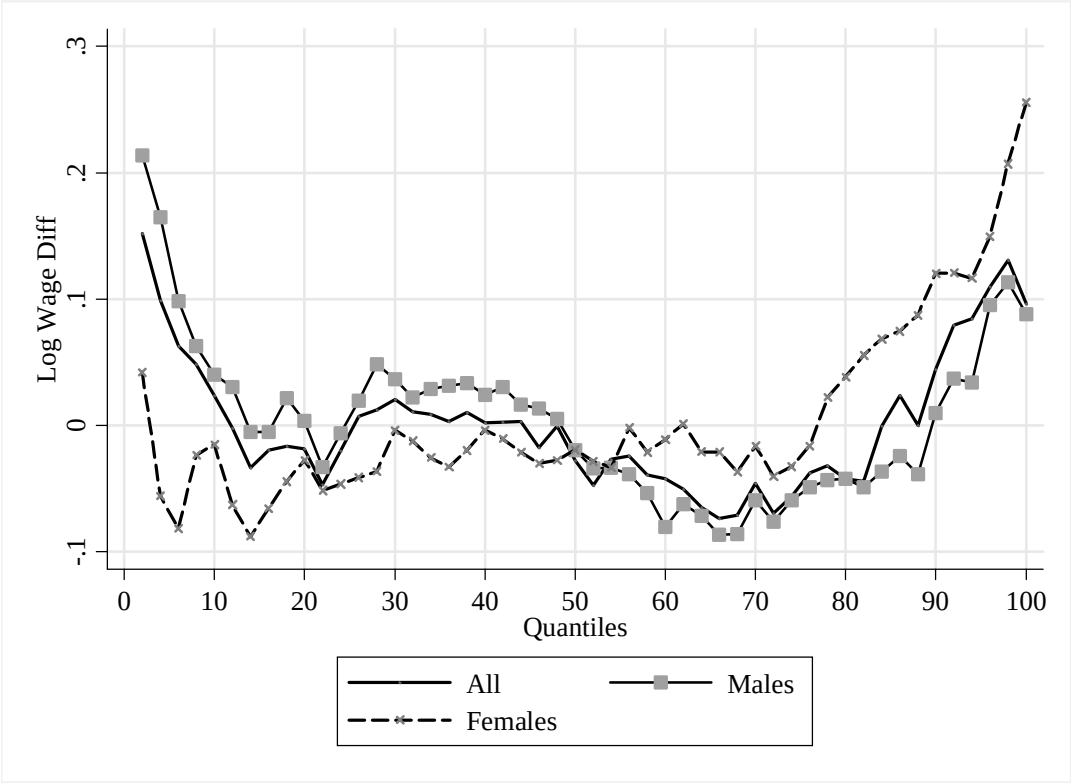
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years.

Figure 5: Log Wage Difference by Percentile: 1996-2006



Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years.

Figure 6: Log Wage Difference by Percentile: 1989-2006

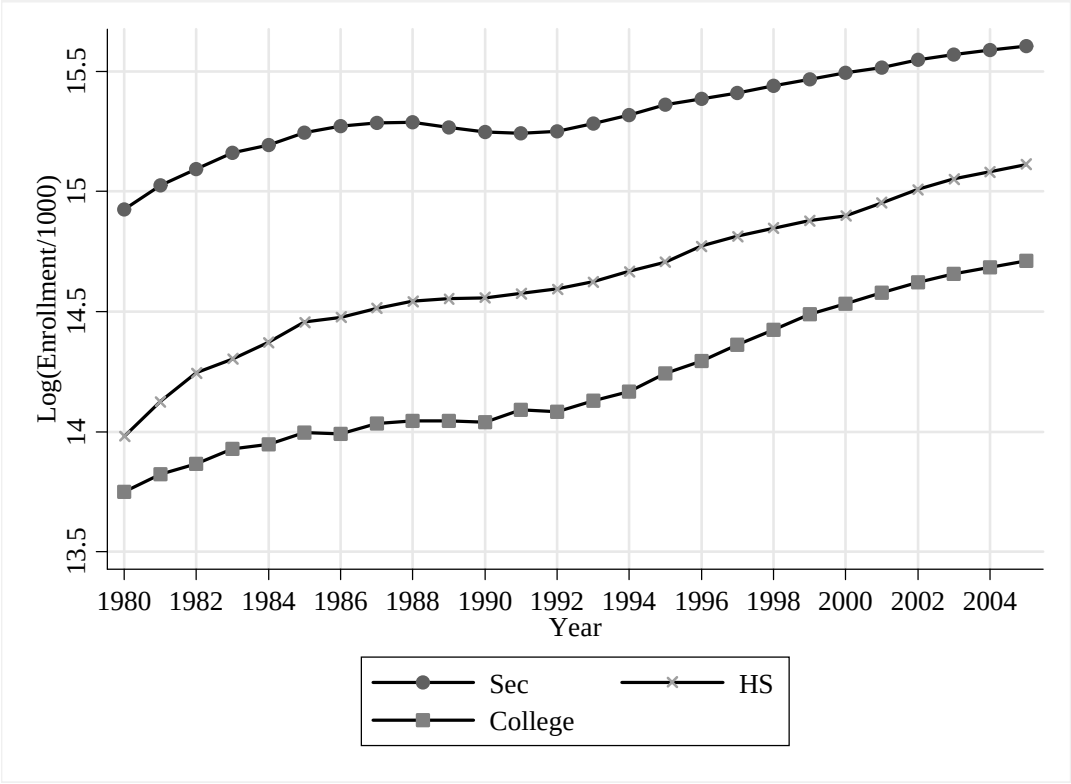


Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years.

Figure 7: Unionization Rates and Real Minimum Wage: 1989-2006

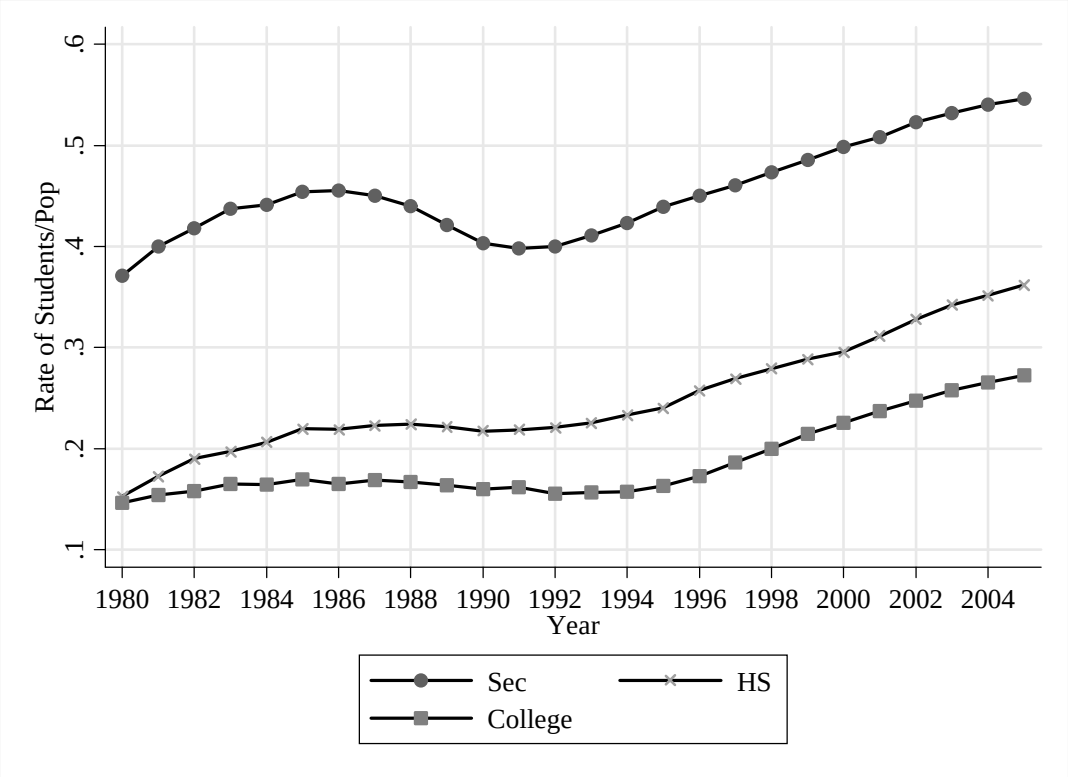
Note: Unionization rates based on all workers from Expenditure Survey (ENIGH) according to the sample restrictions descibed in text: Workers 18-65 years old with a valid wage. Real Minimum Wage using data from Banco de Mexico.

Figure 8: Enrollment by Educational Group. 1980-2006



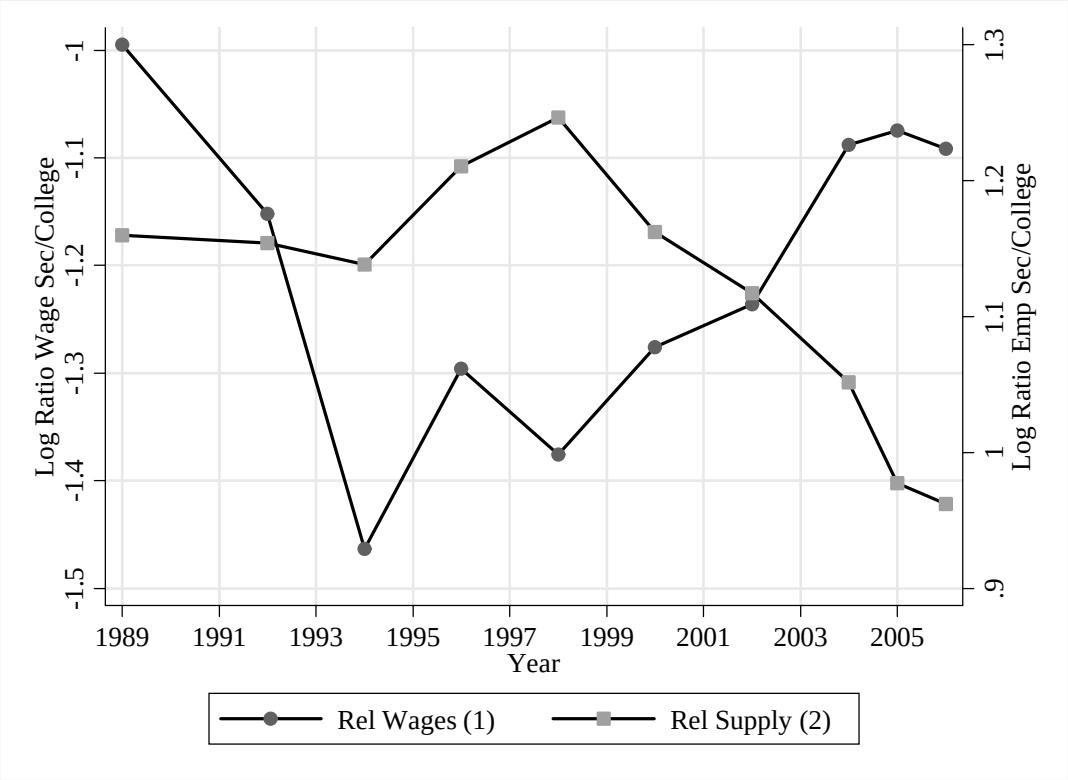
Note: Data available from Secretaria de Educacion Publica http://www.sep.gob.mx

Figure 9: Enrollment Rates by Education Group 1980-2006



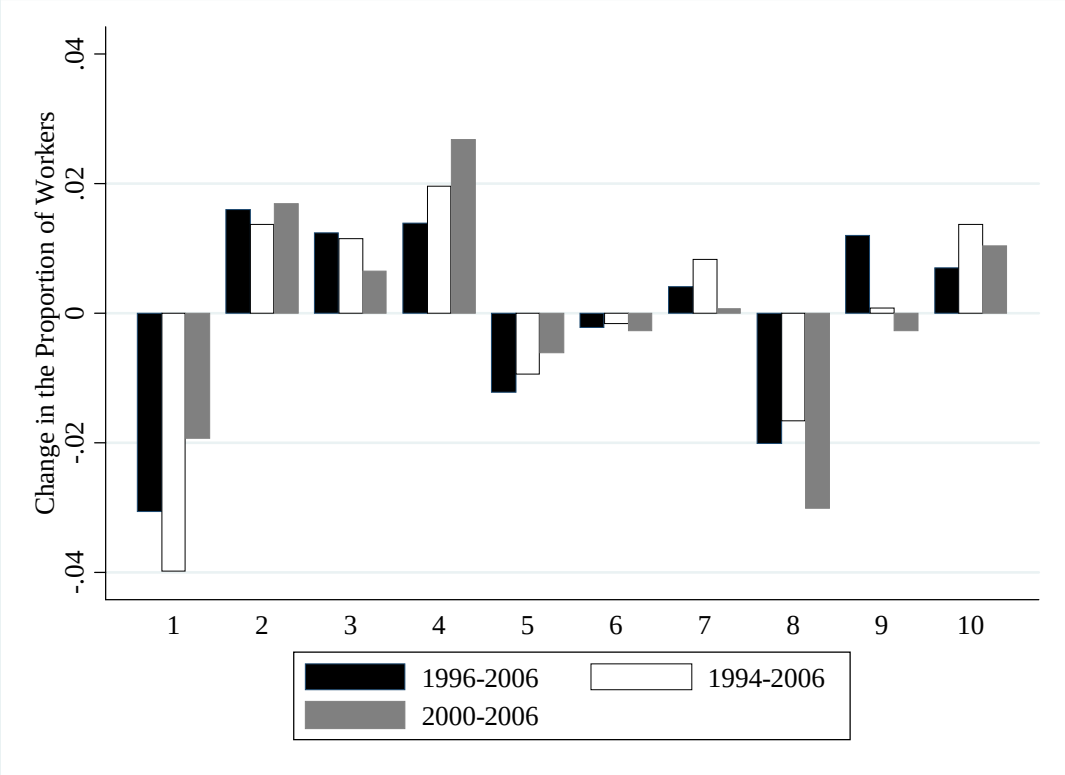
Note: Enrollment from Secretaria de Educacion Publica. Enrollment rates are equal to total enrollment over population. Secondary Enrollment rates defined over population age 10-14, High School Enrollment rates defined over population age 15-19, and College enrollment rates over population age 20-24. Population by age group obtained from the Statistical Office INEGI http://www.inegi.com.mx. Population stocks available only for years 1970, 1990, 1995, 2000, 2005. I assume constant population growth according to population stocks for the years described. In this way I obtain population stocks for every year between Census year, then I divide actual enrollment over the predicted age-group population.

Figure 10: Relative Wage and Relative Supply of Male Workers with Secondary and College: 1989-2006.



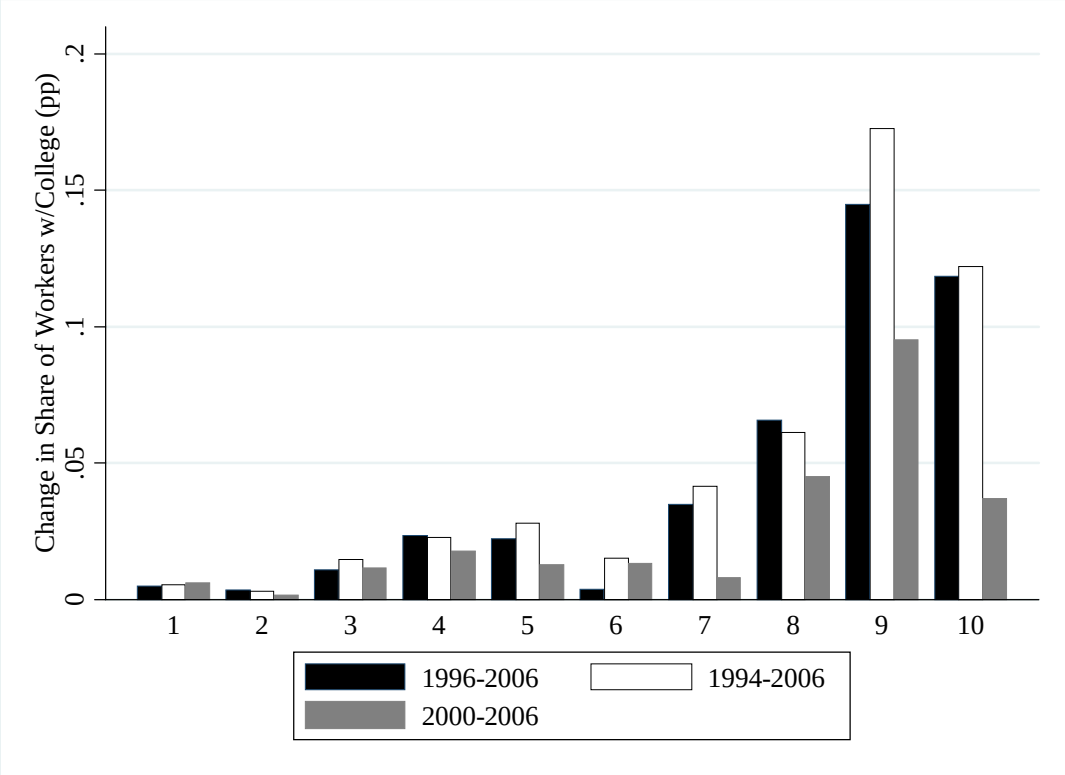
Note: Data obtained from Table 1. The line of proportion of workers has been smoothed using a simple moving average with weights equal to 0.25 for the previous and post period and 0.50 for the current period. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. Sample restricted to men.

Figure 11: Job Polarization. Different Periods.



Note: The x-axis represents deciles of workers according to the median wage by occupations in 1992. THe y-axis is the change in the proportion of workers in those occupations between specified periods. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure 12: Increase in Share of Workers with College Degree. Different Periods.



Note: The x-axis represents deciles of workers according to the median wage by occupations in 1992. The y-axis is the change in the proportion of workers with college degree between specified periods. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Table 1: Mean Log Wage of Workers by Gender, Education and Experience: 1989-2006.

Group		1989	1994	1996	2000	2006
A. Males						
Education	Experience					
<Secondary	<20	2.496	2.446	2.104	2.342	2.424
% Male Workers		0.177	0.174	0.139	0.119	0.090
<Secondary	>20	2.603	2.582	2.273	2.455	2.497
% Male Workers		0.267	0.235	0.211	0.201	0.161
Secondary	<20	2.777	2.766	2.442	2.595	2.660
% Male Workers		0.125	0.141	0.158	0.157	0.141
Secondary	>20	3.208	3.219	2.836	2.985	2.907
% Male Workers		0.037	0.034	0.043	0.056	0.074
High School	<20	3.275	3.283	2.943	2.935	2.873
% Male Workers		0.076	0.067	0.083	0.072	0.084
High School	>20	3.617	4.050	3.461	3.336	3.239
% Male Workers		0.014	0.020	0.018	0.025	0.038
College	<20	3.783	4.230	3.735	3.865	3.729
% Male Workers		0.043	0.043	0.043	0.049	0.052
College	>20	4.108	4.604	4.071	4.208	4.000
% Male Workers		0.013	0.018	0.017	0.027	0.031
B. Females						
<Secondary	<20	2.330	2.293	1.977	2.223	2.236
% Female Workers		0.048	0.044	0.046	0.035	0.031
<Secondary	>20	2.499	2.422	2.167	2.284	2.352
% Female Workers		0.063	0.053	0.061	0.058	0.058
Secondary	<20	2.815	2.737	2.376	2.562	2.526
% Female Workers		0.065	0.079	0.079	0.074	0.062
Secondary	>20	3.208	3.437	2.810	2.973	2.722
% Female Workers		0.013	0.019	0.023	0.037	0.034
High School	<20	3.167	3.368	2.951	2.945	2.864
% Female Workers		0.035	0.038	0.039	0.042	0.062
High School	>20	3.540	3.972	3.328	3.443	3.321
% Female Workers		0.007	0.008	0.010	0.010	0.027
College	<20	3.654	3.975	3.512	3.644	3.527
% Female Workers		0.016	0.024	0.026	0.029	0.042
College	>20	3.709	4.319	4.001	3.891	3.866
% Female Workers		0.003	0.004	0.006	0.008	0.013
Sample Size		10981	11612	12796	9107	20637

Note: There are 16 Groups by gender, education (4) and experience (2). I calculate weighted mean log wages using as weights the sampling weights times usual hours of work. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Table 2: Quantile Decomposition. Different Periods.

	1996-2006				1994-2006				1989-2006			
	Obs	Quant	Prices	Resid	Obs	Quant	Prices	Resid	Obs	Quant	Prices	Resid
A. P90-P10												
ALL	-0.122	0.180	-0.294	-0.008	-0.251	0.198	-0.378	-0.071	0.045	0.201	-0.147	-0.009
		0.182	-0.296			0.245	-0.425			0.087	-0.034	
MALES	-0.100	0.167	-0.264	-0.003	-0.257	0.188	-0.339	-0.105	0.026	0.176	-0.175	0.026
		0.232	-0.329			0.341	-0.493			0.115	-0.114	
FEMALES	-0.167	0.141	-0.296	-0.012	-0.256	0.181	-0.405	-0.032	0.154	0.214	-0.066	0.006
		0.101	-0.255			0.120	-0.345			0.066	0.082	
B. P90-P50												
ALL	-0.118	0.167	-0.274	-0.010	-0.195	0.188	-0.325	-0.057	0.109	0.190	-0.109	0.029
		0.102	-0.209			0.154	-0.292			0.030	0.051	
MALES	-0.123	0.164	-0.271	-0.016	-0.199	0.187	-0.297	-0.089	0.080	0.170	-0.133	-0.036
		0.175	-0.282			0.284	-0.394			0.088	-0.051	
FEMALES	-0.090	0.116	-0.214	0.009	-0.195	0.146	-0.301	-0.040	0.161	0.187	-0.043	-0.064
		-0.008	-0.091			-0.032	-0.124			-0.059	0.203	
C. P50-P10												
ALL	-0.005	0.013	-0.020	0.002	-0.057	0.010	-0.053	-0.014	-0.065	0.011	-0.037	-0.038
		0.080	-0.086			0.091	-0.133			0.058	-0.084	
MALES	0.023	0.003	0.007	0.013	-0.058	0.001	-0.042	-0.017	-0.054	0.006	-0.042	0.036
		0.057	-0.047			0.057	-0.098			0.027	-0.063	
FEMALES	-0.077	0.026	-0.082	-0.021	-0.061	0.035	-0.104	0.008	-0.007	0.028	-0.023	-0.058
		0.109	-0.165			0.152	-0.221			0.125	-0.120	

Note: Quantile Decomposition according to Mata and Machado (2005). The order of the decomposition is quantities and then prices for the first row of each group, and the second row reverses the order and decomposes wage inequality for prices first and then quantities. The column Obs is the observed change in wage inequality for the specified period, Quant is the effect of quantities, Prices reflect the effect of returns and Resid is the unexplained part. The procedure is the following: I run quantile regressions for each gender-year and 99 different quantiles. Quantile regressions use as a dependent variable log wage, right hand side variables include dummy variables for educational groups, a cubic polynomial in potential experience, the interaction of each dummy variable with the cubic polynomial, and finally a rural dummy variable. Assigning a coefficient of zero to the rural dummy variable and using the coefficients of each quantile regression, it is possible to simulate counterfactual distributions holding constant quantities or prices. See text for more details.

Table 3: Proportion and wage of workers in occupations in the bottom half of the wage distribution. Different years

Occupation	Definition	1994	1996	2000	2006
Agricultural	Share	9.11%	8.37%	6.47%	5.56%
	Wage	8.08	6.21	7.56	7.70
Construction	Share	5.02%	4.51%	5.17%	6.00%
	Wage	12.12	7.73	10.79	12.99
Domestic Services	Share	3.84%	4.56%	3.58%	4.31%
	Wage	11.54	7.82	8.81	11.55
Food, Drinks and Tobbacco	Share	1.64%	1.84%	1.79%	2.76%
	Wage	12.55	9.32	11.04	12.93
Waiters	Share	2.04%	2.12%	1.55%	2.06%
	Wage	10.91	7.82	9.17	10.78
Employees in Retail trade	Share	5.86%	5.74%	5.93%	7.13%
	Wage	12.31	8.69	9.59	12.32
Cleaning, gardeners, etc	Share	3.73%	3.98%	3.08%	4.46%
	Wage	14.55	10.04	12.09	13.47

Note: Share represents the proportion of workers in that occupation, Wage represents the mean wage in that occupation for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Table 4: Proportion and wage of workers in occupations in the top half of the wage distribution. Different years.

Occupation	Definition	1994	1996	2000	2006
Construction (Installers)	Share	3.87%	3.04%	3.51%	3.23%
	Wage	16.97	11.18	15.11	18.48
Machine Operators	Share	1.68%	2.38%	2.92%	2.43%
	Wage	15.79	12.48	15.11	15.40
Car and Truck Drivers	Share	5.07%	4.84%	4.41%	5.35%
	Wage	17.90	12.31	14.10	16.36
Cashiers	Share	1.24%	1.55%	2.05%	1.63%
	Wage	16.16	11.95	13.98	16.41
Manufacturing (Car, Machines, Instruments)	Share	3.98%	3.67%	4.36%	2.94%
	Wage	19.39	13.04	17.63	20.53
Secretaries	Share	3.71%	4.09%	3.61%	2.37%
	Wage	24.24	17.74	19.34	21.97
Technicians (Engineering)	Share	1.43%	1.67%	2.04%	1.51%
	Wage	29.09	21.43	25.18	23.09
Technicians (Medicine)	Share	1.05%	0.85%	0.92%	0.95%
	Wage	26.67	20.87	26.95	29.59
Technicians (Social Sciences)	Share	2.25%	1.66%	1.70%	1.58%
	Wage	31.03	19.56	22.67	26.94
Social Sciences	Share	0.29%	0.42%	0.50%	0.53%
	Wage	49.50	34.15	37.78	38.49
Economists, Business Management.	Share	0.53%	0.65%	0.91%	1.03%
	Wage	61.33	33.30	37.78	34.64
Primary Teachers	Share	1.56%	1.46%	1.33%	1.42%
	Wage	66.22	48.38	48.35	50.67
All Professions and Managers*	Share	5.56%	5.72%	5.57%	6.44%
	Wage	59.60	53.47	42.88	44.05

Note: Share represents the proportion of workers in that occupation, Wage represents the mean wage in that occupation for different years. Hourly wage in 2006 Mexican Pesos. * refers to all professions and business and government managers and directors. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Table 5: Predicted Effects of Supply and Demand on Relative Wages

	1996-2006			
	Obs	Supply	Demand	Resid
A. σ=2				
ALL	-0.200	-0.195	-0.029	0.024
MALES	-0.218	-0.136	-0.038	-0.044
FEMALES	-0.120	-0.303	-0.012	0.194
B. σ=3				
ALL	-0.200	-0.130	-0.020	-0.051
MALES	-0.218	-0.090	-0.026	-0.102
FEMALES	-0.120	-0.202	-0.008	0.089

Note: Observed change in the relative wage and changes in relative supply calculated from Table (1). Demand component calculated according to formula described in the text. Sigma refers to the elasticity of substitution between factors.

A Additional Tables and Figures

Table A1: Different Wage Inequality measures for different definitions of Income.

	Hourly Wage			Monthly Wage: Fulltime			Monthly Income: Fulltime			Monthly Wage: All			Monthly Income: All		
	All	Female	Male	All	Female	Male	All	Male	Female	All	Female	Male	All	Female	Male
A. Gini															
1989	0.425	0.390	0.436	0.403	0.349	0.416	0.455	0.400	0.466	0.405	0.354	0.416	0.457	0.404	0.468
1992	0.452	0.439	0.456	0.422	0.385	0.431	0.451	0.401	0.463	0.429	0.397	0.437	0.457	0.410	0.468
1994	0.505	0.464	0.518	0.486	0.418	0.504	0.516	0.438	0.535	0.490	0.425	0.507	0.519	0.446	0.537
1996	0.475	0.460	0.480	0.447	0.413	0.458	0.486	0.431	0.501	0.455	0.424	0.464	0.492	0.444	0.504
1998	0.483	0.458	0.493	0.450	0.408	0.463	0.487	0.431	0.502	0.452	0.414	0.463	0.493	0.440	0.507
2000	0.471	0.431	0.485	0.446	0.385	0.465	0.487	0.444	0.500	0.448	0.398	0.463	0.488	0.451	0.499
2002	0.460	0.456	0.462	0.434	0.419	0.438	0.470	0.448	0.478	0.439	0.428	0.442	0.478	0.455	0.485
2004	0.441	0.439	0.441	0.421	0.408	0.425	0.468	0.436	0.478	0.425	0.415	0.426	0.473	0.443	0.482
2005	0.438	0.418	0.447	0.418	0.385	0.430	0.456	0.425	0.467	0.421	0.394	0.429	0.460	0.432	0.468
2006	0.441	0.431	0.446	0.424	0.407	0.429	0.470	0.453	0.475	0.430	0.417	0.432	0.474	0.458	0.479
B. Standard Deviation															
1989	0.776	0.725	0.792	0.738	0.638	0.767	0.774	0.693	0.796	0.752	0.674	0.773	0.788	0.722	0.805
1992	0.796	0.801	0.794	0.743	0.683	0.761	0.758	0.703	0.772	0.771	0.721	0.785	0.779	0.734	0.790
1994	0.865	0.839	0.874	0.814	0.729	0.842	0.849	0.760	0.877	0.836	0.761	0.860	0.866	0.786	0.891
1996	0.818	0.815	0.819	0.770	0.716	0.790	0.811	0.746	0.832	0.796	0.756	0.808	0.833	0.785	0.847
1998	0.829	0.825	0.831	0.775	0.724	0.792	0.804	0.759	0.818	0.791	0.759	0.799	0.820	0.789	0.828
2000	0.802	0.774	0.813	0.754	0.683	0.780	0.797	0.739	0.818	0.771	0.723	0.787	0.811	0.773	0.824
2002	0.799	0.808	0.795	0.752	0.733	0.758	0.787	0.763	0.796	0.779	0.771	0.778	0.812	0.798	0.815
2004	0.780	0.786	0.776	0.748	0.724	0.755	0.790	0.761	0.799	0.760	0.750	0.759	0.803	0.784	0.807
2005	0.770	0.754	0.777	0.732	0.689	0.749	0.766	0.723	0.784	0.749	0.724	0.756	0.783	0.753	0.793
2006	0.775	0.777	0.773	0.739	0.719	0.745	0.785	0.767	0.791	0.762	0.763	0.755	0.804	0.799	0.802
C. P90-P50															
1989	0.977	0.937	0.985	0.936	0.844	0.916	1.081	0.968	1.003	0.925	0.856	0.916	1.085	0.985	1.003
1992	1.059	1.078	1.030	0.964	0.916	1.022	0.923	0.916	1.012	0.944	0.981	1.022	0.968	0.888	1.012
1994	1.281	1.294	1.264	1.139	1.056	1.204	1.204	1.192	1.307	1.139	1.012	1.175	1.204	1.188	1.283
1996	1.204	1.188	1.188	0.981	1.099	1.070	1.178	0.981	1.167	0.981	1.099	1.070	1.204	0.981	1.173
1998	1.204	1.253	1.176	1.078	0.994	1.139	1.160	1.125	1.166	1.056	1.050	1.123	1.170	1.139	1.171
2000	1.119	1.088	1.114	0.981	0.899	1.070	1.066	0.996	1.070	0.933	0.934	1.070	1.068	0.996	1.086
2002	1.119	1.188	1.086	1.050	1.099	0.981	1.153	1.168	1.139	1.050	1.070	1.050	1.131	1.196	1.178
2004	1.070	1.127	1.022	0.916	0.999	0.989	1.050	1.115	1.108	0.916	0.944	0.965	1.050	1.099	1.101
2005	1.022	1.106	1.001	0.965	0.981	0.944	1.022	1.056	0.968	0.916	0.981	0.922	1.022	1.034	0.968
2006	1.086	1.099	1.065	1.022	1.002	0.968	1.099	1.117	1.125	0.970	0.996	0.968	1.099	1.061	1.115
D. P50-P10															
1989	0.875	0.806	0.875	0.778	0.542	0.799	0.711	0.642	0.788	0.838	0.705	0.868	0.732	0.676	0.814
1992	0.858	0.916	0.827	0.811	0.731	0.811	0.792	0.783	0.790	0.847	0.693	0.875	0.834	0.847	0.799
1994	0.868	0.859	0.880	0.758	0.693	0.847	0.811	0.718	0.833	0.799	0.799	0.847	0.811	0.693	0.833
1996	0.815	0.875	0.799	0.875	0.693	0.836	0.719	0.799	0.773	0.916	0.734	0.916	0.780	0.875	0.773
1998	0.853	0.852	0.846	0.799	0.721	0.799	0.811	0.708	0.849	0.799	0.847	0.799	0.811	0.799	0.844
2000	0.855	0.841	0.860	0.747	0.747	0.693	0.773	0.693	0.827	0.875	0.788	0.762	0.773	0.875	0.811
2002	0.844	0.849	0.826	0.847	0.734	0.916	0.762	0.744	0.827	0.847	0.780	0.847	0.916	0.773	0.825
2004	0.847	0.809	0.885	0.827	0.693	0.799	0.783	0.698	0.811	0.863	0.847	0.827	0.847	0.762	0.811
2005	0.822	0.788	0.839	0.758	0.693	0.847	0.811	0.693	0.816	0.808	0.836	0.847	0.811	0.758	0.865
2006	0.811	0.799	0.822	0.811	0.693	0.758	0.777	0.736	0.713	0.811	0.762	0.816	0.799	0.811	0.744

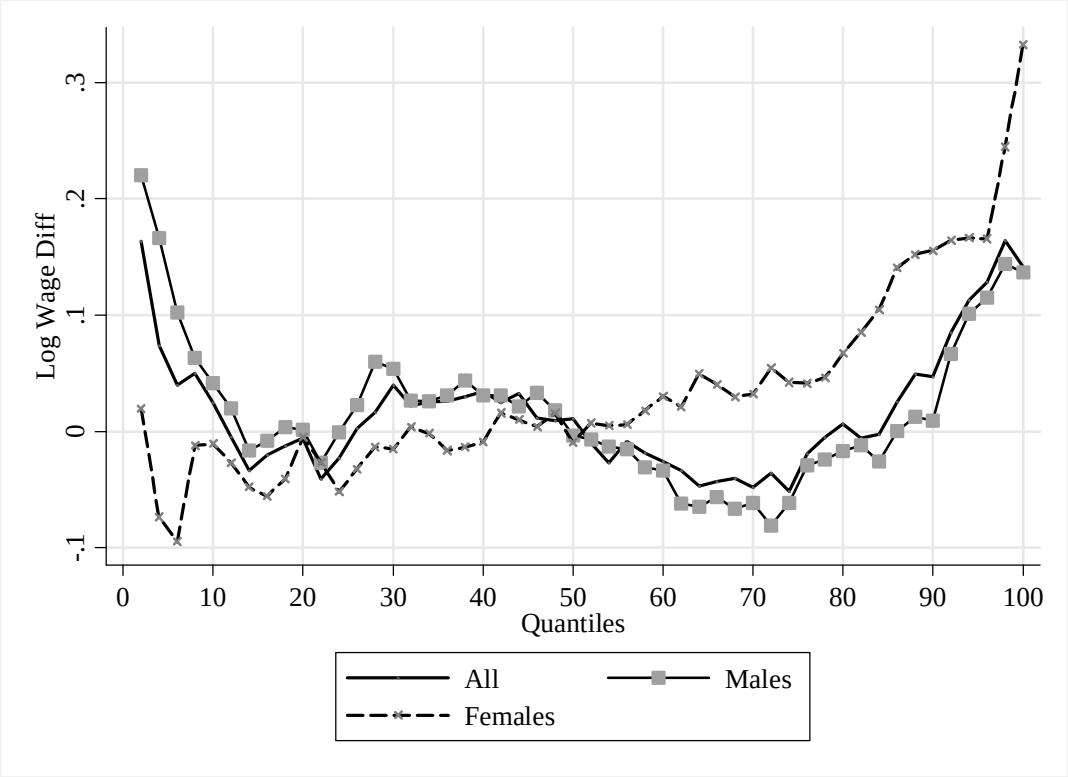
Note: (a) Hourly Wage defined as Monthly wage divided by hours per week times 4.33, weights defined as hour per week times the person weight. Std deviation and percentiles calculated using logs while Gini is calculated using Hourly wage. (b) Monthly income is defined as income from all sources. Fulltime defined as individuals who work more than 35 hours per week, weights defined as the person weight. Std deviation and percentiles are calculated using logs while Gini is calculated using Monthly Wage or Monthly Total Income. (c) Weights are defined as hours per week times the person weight, calculation for all individuals

Table A2: Employment across industries

Industries	1989	1994	1996	2000	2006
Agriculture	15.6	12.7	11.7	10.3	8.1
Mining, Utilities	2.8	1.7	1.9	1.4	1.4
Construction	9.2	9.6	8.1	9.4	10.8
Manufactures	19.7	20.2	21.8	22.9	19.5
Trade	12.5	12.4	11.8	12.6	13.7
Restaurants, Hotels	3.8	4.0	4.6	3.7	5.8
Transportation	5.0	4.9	4.7	5.2	6.9
Government	5.9	6.1	6.7	7.2	6.7
Finance/Professional Services	4.5	5.0	5.3	4.8	4.1
Education	7.8	9.2	8.9	8.1	7.7
Medical and Social Services	4.5	4.7	4.5	3.9	4.0
Domestic Services	3.6	4.7	5.1	4.1	5.6
Other Services	5.0	4.9	5.0	6.4	5.7

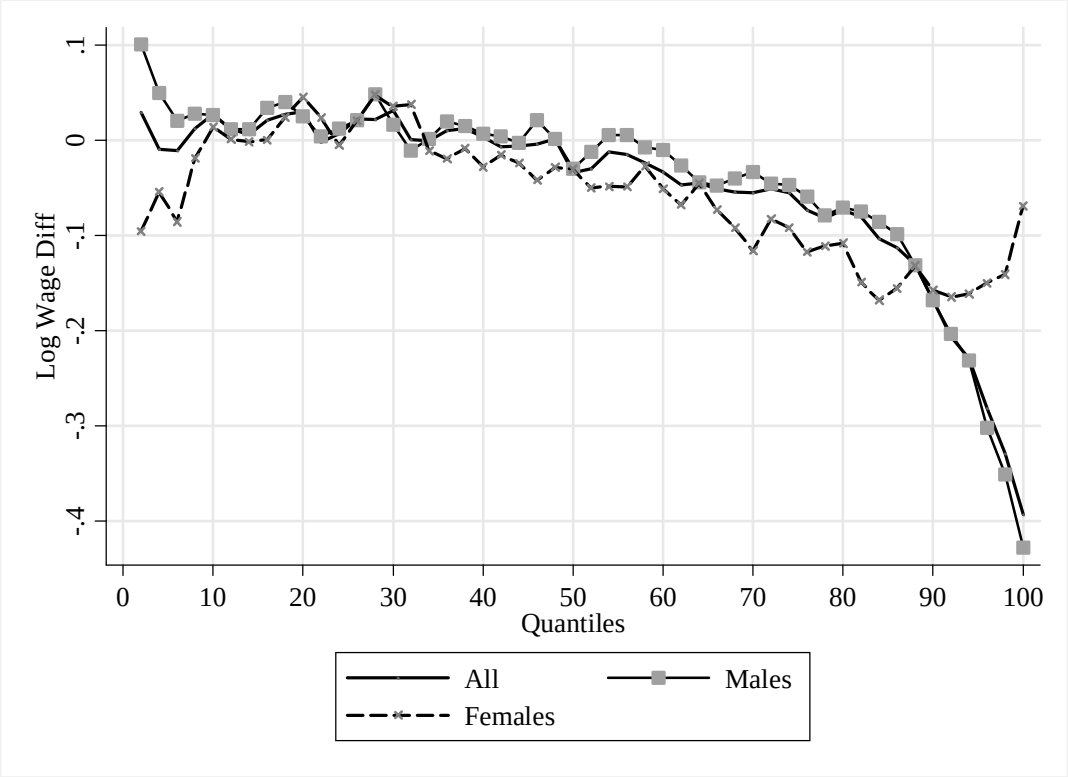
Note: Numbers represent proportion of employed workers in specific industry over total employment in the year. Sample weights are used in the calculation.

Figure A1: Log Wage Difference by Percentile: 1989-2006. Sample restricted to fulltime workers.



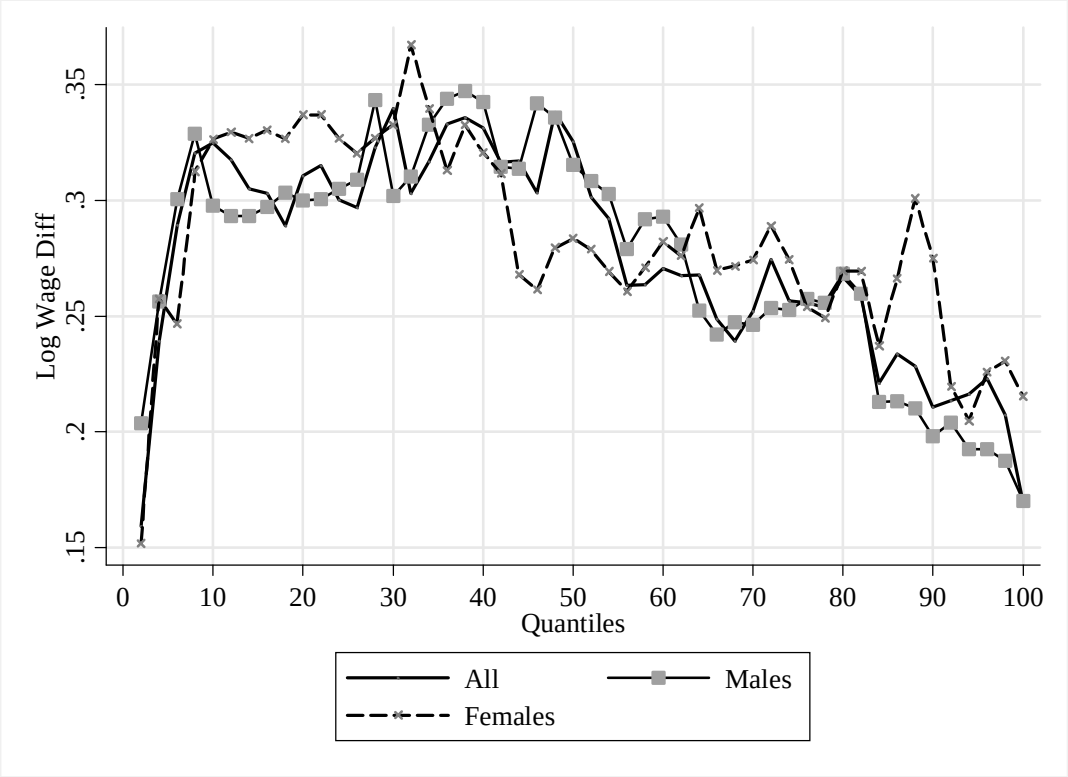
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years. Sample restricted to fulltime workers.

Figure A2: Log Wage Difference by Percentile: 1994-2006. Sample restricted to fulltime workers.



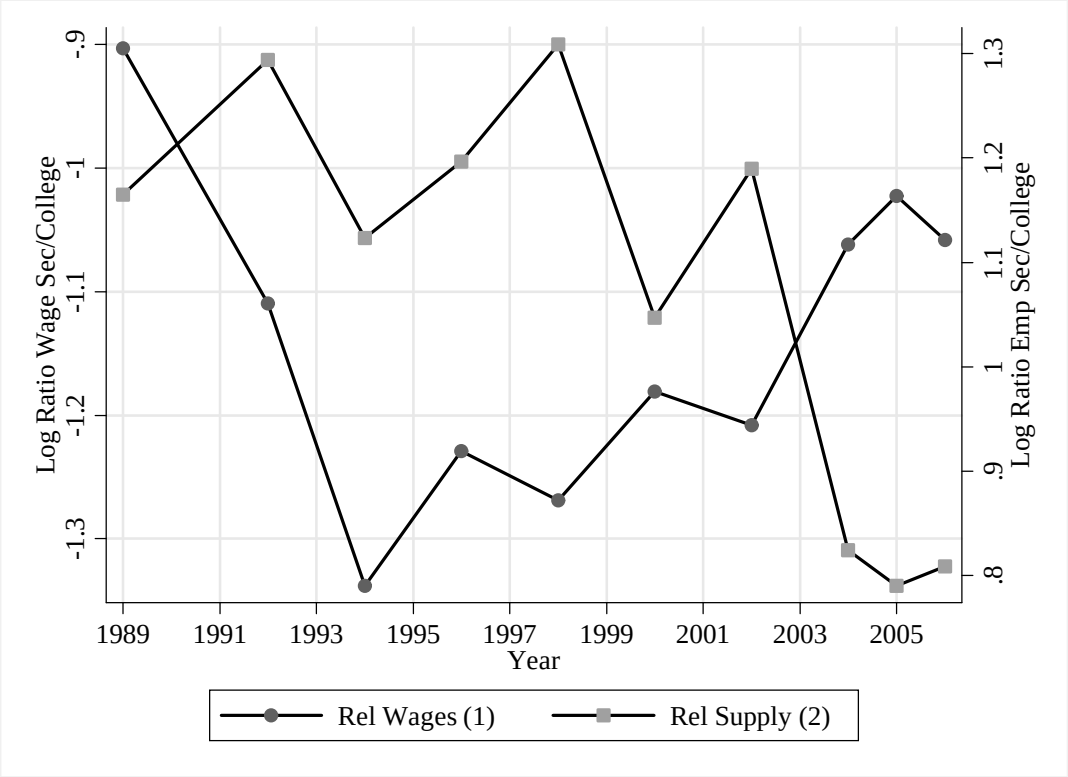
Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years. Sample restricted to fulltime workers.

Figure A3: Log Wage Difference by Percentile: 1996-2006. Sample restricted to fulltime workers.



Note: Calculations by the author using Expenditure Survey (ENIGH) for different years. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. The graph shows the difference between percentiles between the specified years. Sample restricted to fulltime workers.

Figure A4: Relative Wage and Relative Supply of Workers with Secondary and College: 1989-2006. No smoothing. Full sample.

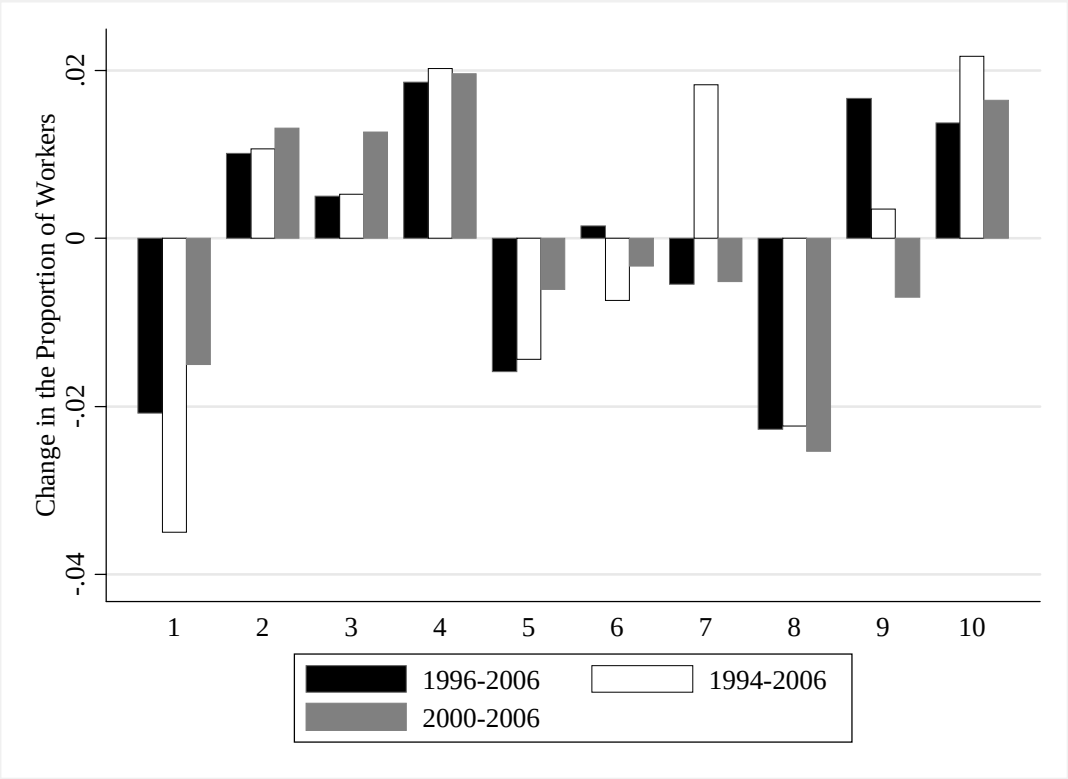


Note: Data obtained from Table 1. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure A5: Relative Wage and Relative Supply of Workers with Secondary and College: 1989-2006. Smoothing. Full sample.

Note: Data obtained from Table 1. The line of proportion of workers has been smoothed using a simple moving average with weights equal to 0.25 for the previous and post period and 0.50 for the current period. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped.

Figure A6: Job Polarization. Sample restricted to fulltime workers.



Note: The x-axis represents deciles of workers according to the median wage by occupations in 1992. THe y-axis is the change in the proportion of workers in those occupations between specified periods. Hourly wage in 2006 Mexican Pesos. Sample restricted to workers 18-65 years old with a valid wage. Real wage is calculated as monthly wage over 4.33 times usual hours of work. Workers with wages less than one MXP are dropped. Sample restricted to fulltime workers