

Calónico, Sebastián; Ñopo, Hugo

Working Paper

Gender segregation in the workplace and wage gaps: Evidence from urban Mexico 1994 - 2004

Working paper // Inter-American Development Bank, Research Department, No. 636

Provided in Cooperation with:

Inter-American Development Bank, Washington, DC

Suggested Citation: Calónico, Sebastián; Ñopo, Hugo (2008) : Gender segregation in the workplace and wage gaps: Evidence from urban Mexico 1994 - 2004, Working paper // Inter-American Development Bank, Research Department, No. 636

This Version is available at:

<http://hdl.handle.net/10419/51443>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



*INTER-AMERICAN DEVELOPMENT BANK
BANCO INTERAMERICANO DE DESARROLLO (BID)
RESEARCH DEPARTMENT
DEPARTAMENTO DE INVESTIGACIÓN
WORKING PAPER #636*

**GENDER SEGREGATION IN THE WORKPLACE
AND WAGE GAPS: EVIDENCE FROM URBAN MEXICO
1994-2004**

BY

SEBASTIÁN CALÓNICO*
HUGO ÑOPO**

***UNIVERSITY OF MICHIGAN**
****INTER-AMERICAN DEVELOPMENT BANK**

MAY 2008

**Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library**

Calónico, Sebastián.

Gender segregation in the workplace and wage gaps : evidence from urban Mexico 1994-2004 / by Sebastián Calónico, Hugo Ñopo.

p. cm.
(Research Department Working paper series ; 636)
Includes bibliographical references.

1. Sexual division of labor—Mexico. 2. Equal pay for equal work—Mexico. 3. Discrimination in employment—Mexico. I. Ñopo, Hugo. II. Inter-American Development Bank. Research Dept. III. Title. IV. Series.

HD6060.65.M6 C623 2008
306.36150972 C623-----dc22

©2008
Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, DC 20577

The views and interpretations in this document are those of the authors and should not be attributed to the Inter-American Development Bank, or to any individual acting on its behalf.

This paper may be freely reproduced provided credit is given to the Research Department, Inter-American Development Bank.

The Research Department (RES) produces a quarterly newsletter, *IDEA (Ideas for Development in the Americas)*, as well as working papers and books on diverse economic issues. To obtain a complete list of RES publications, and read or download them please visit our web site at: <http://www.iadb.org/res>.

Abstract*

This paper analyzes the evolution of gender segregation in the workplace in Mexico between 1994 and 2004, using a matching comparisons technique to explore the role of individual and family characteristics in determining gender segregation and wage gaps. The results suggest that the complete elimination of hierarchical segregation would reduce the observed gender wage gaps by 5 percentage points, while the elimination of occupational segregation would have increased gender wage gaps by approximately 6 percentage points. The results also indicate that the role of occupational segregation in wage gaps has been increasing in magnitude during the period of analysis, while the role of hierarchical segregation in the determination of wage gaps has been decreasing

JEL Classification: J16, J7

Keywords: Mexico, gender, labor markets, occupational segregation

* University of Michigan and Inter-American Development Bank, respectively. The usual disclaimer applies: Our views are neither those of the Bank nor those of the Board of Directors. Corresponding author: Hugo Ñopo (hugon@iadb.org). Andrew Morrison provided insightful feedback at different stages of this project, and Lucas Higuera provided valuable research assistance.

1. Introduction

Occupational segregation by sex, the clustering of the labor force in male-dominated and female-dominated occupations, is particularly high in Latin America (Blau et al., 2002). Similarly, hierarchical segregation, the fact that managers tend to be males and subordinates females, is commonly accepted as the norm in the region's labor markets. To an important extent, there are reasons to believe that these phenomena correspond to the existence of traditional gender roles and not necessarily to an efficient allocation of the human resources. A reduction of gender-based segregation in the workplace therefore represents an area in which policy interventions can have an interesting role in improving the overall efficiency of the labor markets. Determining the appropriate type of intervention, however, is crucial. Is it more effective to design interventions aimed at the reduction of occupational rather than hierarchical segregation, or the other way around? This paper attempts to contribute to the discussion of those issues.

The particularly low female labor force participation rates seen in Mexico make this an interesting country to analyze from a gender perspective. Mexico is the country with the lowest female participation rate in the Latin American region, at 36 percent, only after Chile and Paraguay, at 39 percent. At the other extreme, Uruguay (46 percent), Colombia and Peru (both 43 percent) exhibit the highest female participation rates.¹

Although the literature on gender and labor markets in Mexico has included many interesting pieces, most of them have focused on wage differentials. We outline here some of those that have attempted a segregation perspective. Brown, Pagan and Rodriguez-Oreggia (1999) study the effect of occupational attainment on the increase in gender wage differentials observed between 1987 and 1993. Using data from the National Survey of Urban Employment (ENEU for its acronym in Spanish), they found that the decline in gender differences in occupational attainment somewhat alleviated the increase in male-females earnings differential. They also found important roles for labor supply decisions (hours of work per week) and changes in the regional structure of wages. This somehow contrasts with the results of Parker (1999) who examines the gender wage gap in rural areas of Mexico between 1986 and 1992, considering different skill levels within groups of occupations. She finds that wage differentials among wage earners are low, and they remained roughly constant throughout the period, although they vary greatly among occupations. She finds the largest wage gaps in managerial positions (both in the

¹ These statistics were extracted from the corresponding national household surveys circa 2002.

private and public sectors) and the smallest among public service workers and administrative positions.

Rendón (2003) analyzes the gender differences in employment, segregation and wages. She documents that, in spite of the large increase in the female labor force participation in recent decades, there is still a large concentration of women in certain activities. As a matter of fact, she documents an increase in segregation by production sectors from 1990 to 2000. However, she suggests that there are reasons to believe that such segregation should decrease in the future, as it has been seen that first women enter activities more populated by other women but then start to enter other activities with more gender neutrality. She also provides estimators for the high degree of hierarchical (vertical) segregation, where men hold higher-ranking positions. When analyzing the evolution of the gender wage gap, she argues that the observed reduction of that gap can be explained by an increase in women's working hours.

In a related study, Rendón and Maldonado (2004) study the relationship among domestic work, occupational segregation, and the gender wage gap in Mexico. Their motivation is the large increase observed in female labor force participation, in part due to cultural factors, but also because of changes in the country's occupational and productive structure (by an increase in the relative importance of occupations such as professionals, office workers and salespersons). However, this increase in participation did not imply that conditions faced by men and women equalized. The occupational segregation and wage gaps are still notable, partly due to the number of hours worked, and they vary substantially among different sectors and occupations. Colmenares (2006) also analyzes occupational segregation by sex and its relation with the wage difference in the industry sector. By comparing different Mexican cities, she finds an interesting variability across regions in gender occupational segregation.

This paper complements the literature previously outlined by exploring the linkages among gender differences in human capital observable characteristics, (occupational and hierarchical) segregation and wages. Using a non-parametric matching technique, the paper tries to provide answers to questions such as i) "How much would segregation change if males and females had the same distribution of observable characteristics?"; ii) "How much would the gender wage gap change if males and females had the same distribution of observable characteristics?"; and iii) "How much would the gender wage gap change if segregation were eliminated?"

The rest of the paper proceeds as follows. In Section 2 we present the patterns of occupational and hierarchical segregation in urban Mexico in the period 1994-2004. In Section 3 we introduce the matching comparisons technique to explore the role of gender differences in human capital characteristics on segregation and wages, respectively. In Section 4 we present an exploration of the linkages between segregation and wages, and in Section 5 we conclude.

2. Assessing Occupational and Hierarchical Segregation in Mexico

The data for this study are drawn from the Encuesta Nacional de Empleo Urbano (ENEU), Mexico's national urban employment survey. The data are collected quarterly, using dwellings or housing structures as sampling units. Each individual aged 12 and above is asked about occupation, labor hours, labor earnings and employment conditions. The survey is designed as a rotating panel, with households interviewed for five consecutive quarters, but we are not exploiting the panel structure for this work. The analysis of this paper covers the period from the third quarter of 1994 to the fourth quarter of 2004. At the beginning of the period under consideration, the cities covered in our sample represented about 40 percent of the population of Mexican working individuals, and during the 10-year span used in this study that coverage has increased to 60 percent (48 cities). It is also important to note that by the end of 2001 the Encuesta Nacional de Empleo (ENE) replaced the ENEU, extending the urban coverage of the latter to national coverage. For the later years of this study we restrict our attention to the urban sub-sample of the ENE, which is comparable to the ENEU sample.

The working population has aged slightly during the 10-year span considered. On average, the working individuals were 34 years old in 1994 and 36 years old in 2004. Also, average schooling has increased from 9 years in 1994 to 10 years in 2004. However, this increase in average schooling of the population was not accompanied by a reduction in gender differences. Males exhibit, on average, one more year of schooling than females during the whole period. The number of children per household has remained roughly constant at 2.6. Another trend to highlight relates to marital status. In 1994, 34 percent of the sampled population was single, a figure that declined to 30 percent by 2004. In a parallel trend, the percentage of individuals in formal and informal unions increased from 58 percent to 61 percent during the same time span. To complete the figure, the prevalence of divorced individuals increased from 7 percent to 9 percent. These trends are not related to the expansion of the sampling framework of

the survey, as restricting the attention to the cities that were part of the sampling framework of 1994 delivers the same tendencies.

In this paper we measure occupational and hierarchical (vertical) segregation by gender using the Duncan Index (Duncan and Duncan, 1955). Introducing some notation will make clear how the indicator works. Let us begin by focusing on segregation by occupation. Let K denote the number of occupations in the economy, and f_i the fraction of females working in occupation i ($f_1+f_2+\dots+f_K=1$). Analogously, let m_i be the fraction of males working in occupation i ($m_1+m_2+\dots+m_K=1$). Then the Duncan index, D , is computed as one-half of the sum of the absolute values of the differences between males' and females' fractions in each occupation

($D = \frac{1}{2} \sum_{i=1}^K |f_i - m_i|$). The index ranges from zero to one, a higher index representing higher

segregation. It can be interpreted as the percentage of the working male (female) population that would need to switch jobs, from those that are male-dominated (female-dominated) to others female-dominated (male-dominated) in order to achieve a labor force with no segregation. In this paper we computed the Duncan index using disaggregated information on seven occupations at the 1-digit level (Professionals and Technicians, Managers, Administrative Personnel, Salespersons, Workers in the Service Sector, Workers in Agricultural Activities, and Workers in Industrial Activities).² The computation of the Duncan index of hierarchical segregation follows the same approach but uses hierarchical categories instead of occupations; the ENEU survey provided five categories (Managers, Independent Workers, Piece-rate or Commission Workers, Fixed-Salary Workers and Members of a Cooperative). Table 1 reports average measures of occupational and hierarchical segregation, for different segments of the market, for the whole period under analysis.

Occupational segregation by gender in Mexico, as in most of the labor markets, is less pronounced among those with more years of schooling. But interestingly, hierarchical segregation is notoriously more pronounced among those with more years of schooling. While the younger workers display lower levels of occupational segregation, hierarchical segregation appears to remain constant over the life cycle. Occupational segregation is lower among single individuals (including both never-married and separated persons) than among married

² Computations at the 2-digit level, comprising 18 occupations, deliver results that are qualitatively similar (although somewhat higher). These computations are available from the authors upon request. See Anker (1998) for a discussion of the influence of the number of categories on the computation of the Duncan index.

individuals, and the opposite is true for hierarchical segregation. Both types of segregation are significantly more pronounced in smaller firms. Although the Mexican public sector exhibits almost no hierarchical segregation, it displays levels of occupational segregation similar to those in the private sector. The ENEU records eight firm activities (Agricultural, Extractive and Electricity, Manufacture, Construction, Commerce, Communications and Transport, Services, and Public Administration and Defense), and the overall rankings of sectors according to occupational and hierarchical segregation show some differences. The highest occupational segregation by gender is found in Construction firms, followed by Communications and Transport; the lowest segregation is found in Manufacture. On the other hand, the highest hierarchical segregation by gender is among those who work in Communications and Transport; the lowest in Public Administration and Defense.

Overall, occupational segregation is substantially greater than hierarchical segregation, and both have been decreasing, albeit slightly, in the Mexican labor markets. During the 10-year span that we analyze, occupational segregation dropped 2 percentage points (from 0.35 to 0.33), while hierarchical segregation has dropped 3 points (from 0.11 to 0.08). All in all, the patterns observed for these two measures of segregation within different segments of the labor markets show interesting differences. A parallel exploration of both occupational and hierarchical segregation, especially in regard to their link to wage gaps, deserves further attention and is the purpose of this paper.

3. How Can We Explain Gender Segregation in Mexico? The Role of Individual Characteristics

To some extent, the existence of gender differences in occupations and hierarchies could be explained by the gender differences in individual characteristics that are important for the labor markets. It could be the case that the gender disparities in education, which are still prevalent in Mexican labor markets, somehow determine the occupational and hierarchical sorting by gender previously shown. In this section we address questions under the heading of “How would (occupational or hierarchical) gender segregation in Mexico change if individual characteristics of females and males equalized?” Additionally, to explore the linkages between the two types of segregation we provide answers to the counterfactual question “How would occupational (hierarchical) segregation change if hierarchical (occupational) segregation were eliminated?”

Our approach to answering these questions consists of generating counterfactual situations that can be estimated with the available data. Such situations can be generated with a range of different techniques. In this case we follow a non-parametric matching-on-characteristics approach that consists of creating synthetic samples of males or females, extracted from the original ENEU samples such that the resulting distribution of observable characteristics of females is exactly the same as the distribution for males. These synthetic samples are created through re-sampling the individual observations of males with replacement and of females without replacement and matching them. In such re-sampling, females and males are matched such that their observable characteristics (age, schooling, marital status) are exactly the same. As a result, the created dataset of females and males reflects a synthetic labor market in which males and females do not differ in the characteristics that were used for the matching. Then, the segregation observed in the matched data can be considered as the segregation that remains after controlling for individual observable characteristics.

This way of generating counterfactual situations has strong linkages with the one implicit in the Blinder-Oaxaca wage gap decomposition (Blinder, 1973 and Oaxaca, 1973). In that regard, it is important to note that with this matching algorithm it is not only the case that the average observable characteristics of males and females get equalized, but also that the distributions of those characteristics are the same for females and males. After matching, males and females show not only the same average characteristics, but also the same distributions of (matched) characteristics. It is important to note as well that the counterfactual situations constructed in this way are stronger than those obtained with traditional propensity score matching.

As a result, what we employ here is an extension of the Blinder-Oaxaca decomposition in two dimensions. On the one hand, as already stated, the counterfactual situation is generated on the distribution of individuals' characteristics (hence the counterfactual on the average characteristics is granted). On the other hand, as this is a non-linear and non-parametric matching, it can be applied beyond wage gap decompositions—in this case, especially for the analysis of non-linear indicators such as the Duncan Index of segregation. See Ñopo (2008) for additional details on the matching algorithm and a proof of the consistency of the estimators obtained from this method.

The first three counterfactual exercises correspond to situations in which (i) there are no gender differences in observable characteristics, namely age, schooling and marital status

(Counterfactual Situation 1); (ii) there are no gender differences in hierarchies (Counterfactual Situation 2a); and (iii) the combination of the previous two; i.e., there are no gender differences in age, schooling, marital status and hierarchies (Counterfactual Situation 3a). For the three counterfactual situations we explore the evolution of the occupational segregation, comparing the original Duncan index with the one that would prevail in each hypothetical counterfactual situation (Figure 1).

The results suggest that a complete elimination of the gender differences in age, schooling and marital status in the labor markets would have an impact of between 2 and 3 percentage points on the occupational segregation for the period 1994-2004. The elimination of gender differences in hierarchies would have a smaller impact than the other characteristics, about 1 percentage point in the period 1994-2004. The combination of both counterfactuals yields a situation for which the Duncan index would have been around 4 percent points less during 1994-2004. The differences between the counterfactual Duncan index and the actual index are roughly constant over the period.

The next three counterfactual exercises are analogous to those from the previous set. The only differences are that now the Counterfactual Situation 2b corresponds to one in which the gender differences in occupations are eliminated. Then, correspondingly, the Counterfactual Situation 3b combines Counterfactuals 1 and 2b. For these three counterfactuals we explore the evolution of the hierarchical segregation, comparing the original Duncan index with the corresponding counterfactuals (Figure 2).

Overall, the results suggest impacts of the observable characteristics on the reduction of hierarchical segregation that are greater than those on occupational segregation (especially when taking into account that the original levels of hierarchical segregation are smaller than those of occupational segregation). There are also interesting differences across time, as the role of occupations decreases in importance during the later portion of the period under analysis. The hypothetical situation in which working males and females have the same age, schooling and education leads us to a hierarchical segregation that is smaller than the one actually observed by 1 percentage point between 1994 and 2004. The elimination of occupational segregation in Mexico would yield a situation in which hierarchical segregation is reduced by as much as 6 to 7 percent points in the mid-1990s and around 3 percent for the year 2004, with a tendency towards the reduction of such impact. The combined effect of eliminating occupational segregation and

gender differences in individual characteristics (age, schooling and marital status) would have an impact of 7 to 8 percent points for the mid-1990s and 4 percentage points around 2004.

So far, the results show that individuals' characteristics in the Mexican labor markets play a (somewhat small) role in the determination of gender segregation. Also, the two types of segregation explored here are linked in the sense that a reduction in one would lead to a reduction in the other. Next, we turn to exploring the linkages between these two types of segregation and wage gaps.

4. What Role Does Segregation Play in the Determination of Gender Wage Gaps?

In this section we explore the role of individual characteristics and (occupational and hierarchical) segregation on the determination of gender wage gaps in Mexico. We start with the same methodological approach as in the previous section, using use matching comparisons to craft counterfactual situations. Then, we move to a theoretical exploration of the linkages between segregation and wage gaps, estimating the predicted linkages with the data.

Regarding the counterfactual analysis, the inquiries are: “By how much would the gender wage gap change if the (occupational or hierarchical) segregation were reduced to zero?” or “By how much would the gender wage gap change if the gender differences in observable characteristics were reduced to zero?” For that purpose, we match females and males based on the same combinations of observable characteristics that we used in the previous section. In particular, we report the counterfactual situations that were previously labeled as (1), (2a) and (2b) in Figure 3. That is, we match on age, schooling and marital status in the first counterfactual, we match on hierarchies in the second, and we match on occupation in the third.

The gender wage gap shows a decreasing trend during most of the period under analysis, only interrupted by two years of increase between 1999 and 2001. By the mid-1990s, on average males earned around 18 percent more than females per hour worked, and this gap declined to almost 12 percent by 2004. The role of age, schooling and marital status in explaining the gender differences in wages have changed as well. During the mid-1990s these characteristics explained almost half of the wage gap, but after 2002 these characteristics seem to play almost no role in determining gender differences in pay.

A hypothetical world in which there is no hierarchical segregation, but everything else remains equal, would show gender wage gaps similar to those in a hypothetical world in which there are no gender differences in age, schooling and marital status inside the labor markets during the late 1990s. Later, the hypothetical gender wage gap without hierarchical segregation becomes somewhat smaller than the hypothetical gender wage without age, gender and marital status differences. For the period comprised between 2000 and 2004 the average gender wage gap has been around 14 percent in Mexico, but in the hypothetical world with no hierarchical segregation that gap would have reached only 10.

The hypothetical world for which there is no occupational segregation shows results that are somewhat surprising. The wage gap that would be observed in the hypothetical world exceeds the one that is actually observed in the Mexican labor markets. Even more, the difference between the hypothetical gap and the actual gap increases as over, mainly during the 1990s, so that by 2004 the wage gap would be 3 percentage points higher than the one seen at the beginning of the period.

Why is it that a reduction in hierarchical segregation would lead to a reduction of wage gaps but a reduction in occupational segregation would not? What forces have been behind this development, and how have they evolved during the period of analysis? Next, we provide a simple theoretical framework to understand the linkages between segregation and wage gaps (and below we will estimate the implication of the model). Assume there are two occupations in the economy, one of them being male dominated and the other female dominated. The fraction of females working in the economy is denoted by a . The fraction of males in the male-dominated occupation is m and the fraction of females in the female-dominated occupation is f (the assumptions about the occupations converts into $m > 1-f$). Wages in the male-dominated occupation are denoted by W_{MM} for males and W_{FM} for females. Analogously, in the female-dominated occupation, wages are denoted by W_{MF} and W_{FF} for males and females, respectively. The table below summarizes the notation.

	Males (=1-a)	Females (=a)
Occupation 1 (Male dominated)	Wage= W_{MM} Males= m	Wage= W_{FM} Females= $1-f$
Occupation 2 (Female dominated)	Wage= W_{MF} Males= $1-m$	Wage= W_{FF} Females= f
	Average Male Wages= $m \times W_{MM} + (1-m) \times W_{MF}$	Average Female Wages= $(1-f) \times W_{FM} + f \times W_{FF}$

The wage gap is the difference between the average wages for males and females:

$$G = m \times W_{MM} + (1-m) \times W_{MF} - (1-f) \times W_{FM} - f \times W_{FF} \quad (1)$$

The Duncan Index is:

$$D = \frac{1}{2} [|1-f-m| + |f-1+m|] = \frac{1}{2} [|m+f-1| + |m+f-1|] = m+f-1 \quad (2)$$

Note that both expressions are independent of the fraction of females in the economy (a). From (1), it can be obtained that:

$$\frac{\partial G}{\partial m} = W_{MM} - W_{MF} \qquad \frac{\partial G}{\partial f} = W_{FM} - W_{FF}$$

The element of interest is $\frac{\partial G}{\partial D}$, the rate at which the wage gap (G) varies for infinitesimal changes in occupational segregation (D):

$$\frac{\partial G}{\partial D} = \frac{\partial G}{\partial m} \times \frac{\partial m}{\partial D} + \frac{\partial G}{\partial f} \times \frac{\partial f}{\partial D} = (W_{MM} - W_{MF}) + (W_{FM} - W_{FF}) \quad (3)$$

The result stated in (3) reveals that the way in which the wage gap would change for a change in occupational segregation depends on two gaps: one for males (average wages for males in male-dominated occupations minus average wages for males in female-dominated occupations) and another for females (average wages for females in male-dominated occupations minus average wages for females in female-dominated occupations).

Next, we turn to estimating these implications with the available data. Empirically, the definition of male and female dominance was implemented on the basis of the gender composition in each occupation over the period under analysis. Three out of seven occupations at the 1-digit level were considered male-dominated (Managers, Workers in Agricultural Activities and Workers in Industrial Activities) and the other four were labeled as female-dominated (Professionals and Technicians, Administrative Personnel, Salespersons and Workers in the Service Sector).

The upper panel of Figure 4 shows the estimation of $\frac{\partial G}{\partial D}$ and its constitutive components $(W_{MM} - W_{MF})$ and $(W_{FM} - W_{FF})$.³ Both components, and hence, $\frac{\partial G}{\partial D}$ are negative for the whole period under analysis. That is, average male and female wages in female-dominated occupations are higher than those in male-dominated occupations. Hence, it is not surprising to observe that a reduction in gender occupational segregation would lead to an increase in gender wage gaps in Mexico. As noted above, the difference between the actual wage gap and the hypothetical wage gap without occupational segregation increased during the period of analysis. This result is observed in the estimation of $\frac{\partial G}{\partial D}$, which has been more negative in the later years of our analysis. A more-than-proportional decrease in wages in male-dominated occupations guides such increasing difference.⁴

The analogous exercise performed with hierarchies instead of occupations follows. For that purpose we labeled three of the five hierarchical categories as male-dominated (Managers, Piece-rate or by Commission Workers and Members of a Cooperative), and two of them as female-dominated (Independent workers and Fixed-salaried workers). The results, as opposed to those found with occupations, indicate that $\frac{\partial G}{\partial D}$ and its two components have positive signs. Reductions in hierarchical segregation are expected to be linked to reductions in the wage gap, in line with the results reported earlier in this section.

³ These elements are computed as percentages of average female wages for each year.

⁴ The estimations related to this last claim are available upon request.

5. Conclusions

In this paper we have shown that hierarchical segregation by gender (the fact that managers tend to be males and subordinates females) has been substantially smaller than occupational segregation (the fact that males and females tend to cluster in different occupations) during the last two decades in Mexico. However, these two types of segregation have had highly dissimilar impacts on wages. While a complete reduction of the hierarchical segregation would reduce the observed gender wage gaps by approximately 5 percentage points, a complete reduction of occupational segregation would actually push the gender wage gap towards an increase of around 6 percentage points. Also, a reduction of gender differences in personal or human capital characteristics (age, schooling and marital status) would have a greater impact on the reduction of observed occupational segregation as opposed to hierarchical segregation. To complete the picture, a reduction in occupational segregation would have a significant impact on the reduction of hierarchical segregation, although the reverse may not necessarily be true.

These results call for an interesting set of policy recommendations. The first of them, on a very general level, involves the central role of combating hierarchical rather than occupational segregation. More specifically, policies intended to facilitate female labor market participation may be of use in this regard. Possible strategies include childcare programs, incentives for micro-entrepreneurship, policies for flexible working hours, anti-discriminatory and affirmative action regulations (in light of our results, particularly at the promotion rather than the promotion stage) and last but not least, policies that act upon the incentives within households (e.g., lower payroll taxes for a second worker in the household).

Another set of policy interventions that may help to reduce both types of segregation involves attitudes, stereotypes and social norms. Change in these areas is neither an easy nor an immediate task. The necessary changes may take more than one generation to materialize, and they require active participation by different type of agents: current and future employers and job seekers, both females and males. From this perspective, there is a great deal of scope for interventions in the schools and, also, within households (generating the appropriate incentives to change the incentive structures to work, stay at home and perform certain activities or assume certain roles).

The results also suggest that a gender equalization of human capital characteristics would help towards the reduction of not only gender wage gaps but also both hierarchical and

occupational segregation. Along those lines, it is important to remind that Mexico is one of the few Latin American countries that is still yet to close the gender disparities in schooling for its population (see Duryea et al., 2007). Also, training programs, both at the school and at the job promise to be fruitful, as well as policies intended to facilitate the functioning of labor markets, reducing frictions and search costs for women.

References

- Anker, R. 1998. *Gender and Jobs: Sex Segregation of Occupations in the World*. Geneva: International Labor Organization.
- Blau, F., and L. Kahn. 2003. "Understanding International Differences in the Gender Pay Gap." *Journal of Labor Economics* 21(1): 106-144.
- Blinder, A. 1973. "Wage Discrimination: Reduced Form and Structural Estimates." *Journal of Human Resources* 7(4): 436-55.
- Brown, C., J. Pagan and E. Rodriguez-Oreggia. 1999. "Occupational Attainment and Gender Earnings Differentials in Mexico." *Industrial and Labor Relations Review* 53(1): 123-135.
- Carrington, W., and K. Troske. 1998. "Sex Segregation in U.S. Manufacturing." *Industrial and Labor Relations Review* 51(3): 445-464.
- Chinhui, J., and J. Airola. 2005. "Wage Inequality in Post-Reform Mexico." Working Paper 2005-01. Houston, United States: University of Houston, Department of Economics.
- Colmenares, G. 2006. "Segregación en el Empleo por Sexo. Salario y Ocupación en los Modelos de Industrialización de las Regiones Centro-Occidente y Fronteriza." *Frontera Norte* 18(35): 87-110.
- Duncan, O.D., and B. Duncan. 1955. "A Methodological Analysis of Segregation Indexes." *American Sociological Review* 20: 210-217.
- Duryea, S. et al. 2007. "The Educational Gender Gap in Latin America and the Caribbean." Research Department Working Paper 600. Washington, DC, United States: Inter-American Development Bank.
- López Acevedo, G. 2003. "Wages and Productivity in Mexican Manufacturing." Policy Research Working Paper 2964. Washington, DC, United States: World Bank.
- Macpherson, D., and B. Hirsch. 1995. "Wages and Gender Composition: Why Do Women's Jobs Pay Less?" *Journal of Labor Economics* 13(3): 426-471.
- Ñopo, H. 2008. "Matching as a Tool to Decompose Wage Gaps." *Review of Economics and Statistics* 90(2).
- Oaxaca, R. 1973. "Male-Female Wage Differentials in Urban Labor Markets." *International Economic Review* 14(3): 693-709.
- Pagan, J., and S. Sánchez. 2000. "Gender Differences in Labor Market Decisions: Evidence from Rural Mexico." *Economic Development and Cultural Change* 48(3): 619-37.

- Parker, S. 1999. "Niveles Salariales de Hombres y Mujeres: Diferencias por Ocupación en las Áreas Urbanas de México." In: Beatriz Figueroa Campos, coordinator. *México diverso y desigual: enfoques sociodemográficos*. (Serie Investigación Demográfica en México 4. Mexico City, Mexico: Colegio de México/Sociedad Mexicana de Demografía
- Rendón, T. 2003. "Empleo, segregación y salarios por género." In: E. de la Garza and C. Salas, editors. *La Situación del Trabajo en México*. Mexico City, Mexico: Plaza y Valdés.
- Rendón, T., and V.M. Maldonado. 2004. *Vínculos entre trabajo doméstico, segregación ocupacional y diferencias de ingreso por sexo, en el México actual*. Mexico City, Mexico: Instituto de Estudios del Trabajo.
- Sánchez, S. 1998. "Gender Earnings Differentials in the Microenterprise Sector: Evidence from Rural and Urban Mexico." Washington, DC, United States: World Bank, Latin America and the Caribbean Region, Finance, Private Sector, and Infrastructure Sector Unit.

Table 1. Mexico 1994-2004. Average Duncan Indexes of Segregation for Different Segments of the Labor Markets

	Segregation	
	Occupational	Hierarchical
Schooling		
0 Years	0.405	0.107
1 to 6 Years	0.393	0.098
7 to 12 Years	0.330	0.097
13 Years and more	0.238	0.143
Age Group		
15 to 24	0.305	0.095
25 to 49	0.338	0.098
50 a 64	0.335	0.094
Marital Status		
Single (Never Married)	0.295	0.105
Married	0.343	0.092
Separated	0.304	0.116
Firm Size		
[1-5]	0.493	0.192
(5-50]	0.297	0.086
(50+)	0.279	0.009
Management		
Non-Public	0.336	0.101
Public	0.329	0.003
Firm Activity		
Agricultural	0.311	0.251
Extractive and Electricity	0.572	0.025
Manufacture	0.049	0.071
Construction	0.808	0.289
Commerce	0.184	0.107
Communications and Transports	0.703	0.502
Services	0.310	0.194
Public Administration and Defense	0.402	0.003
All	0.326	0.095
In 1994:III	0.349	0.107
In 2004:IV	0.325	0.080

Figure 1. Counterfactuals for the Analysis of Occupational Segregation

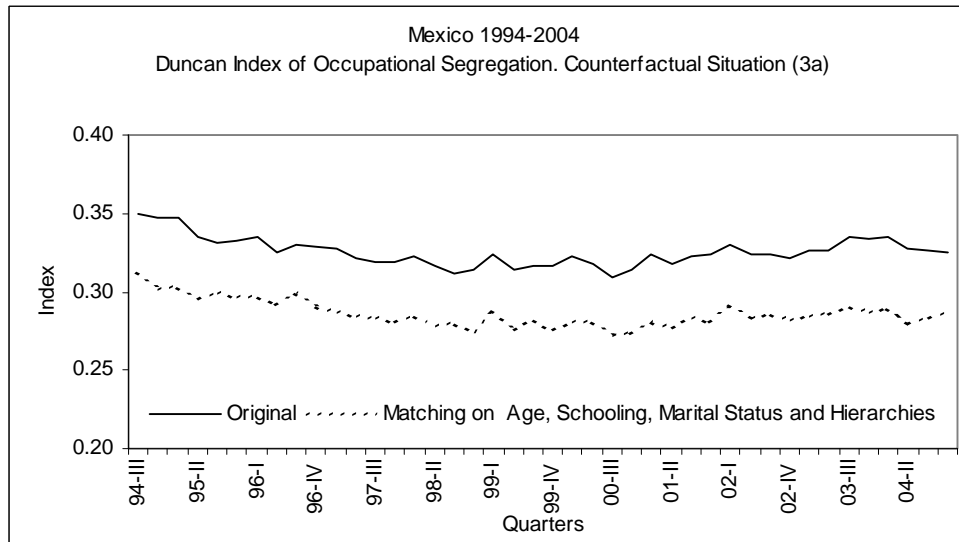
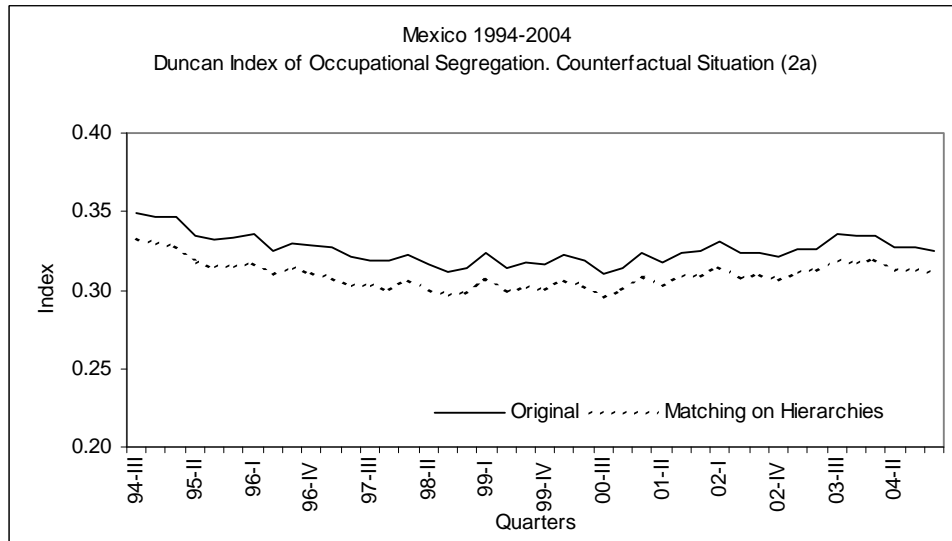
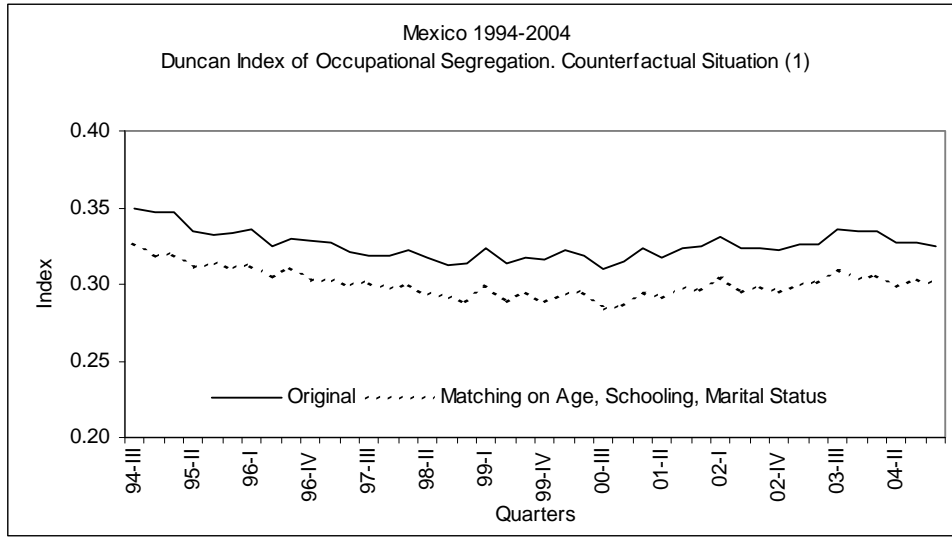


Figure 2. Counterfactuals for the Analysis of Hierarchical Segregation

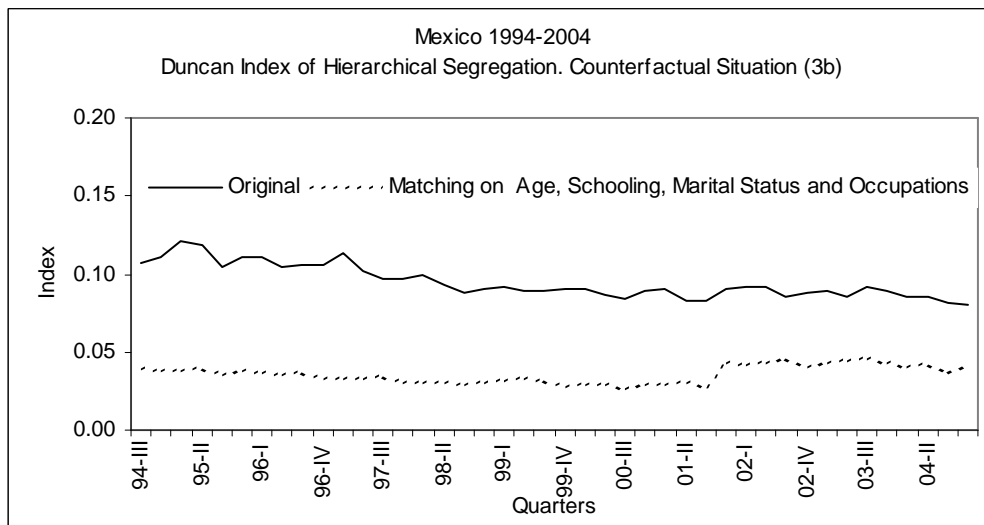
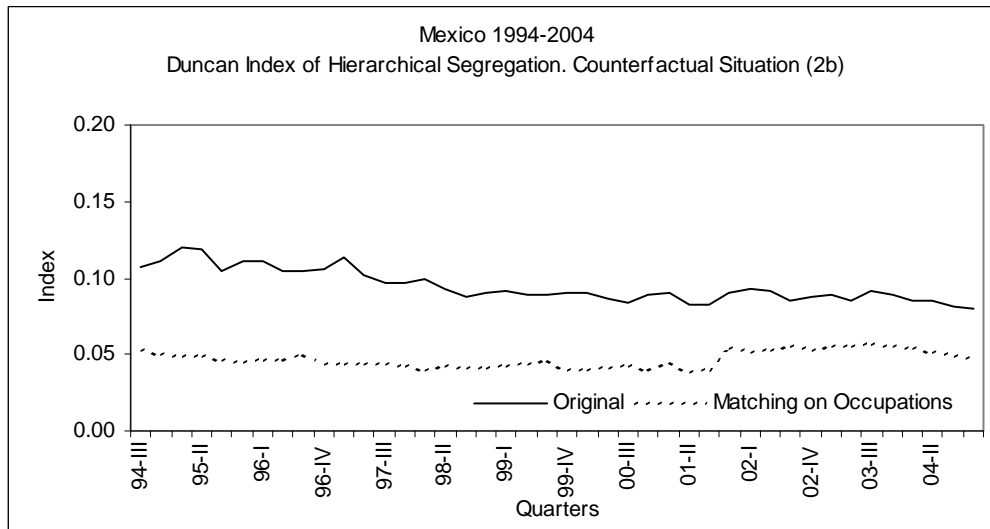
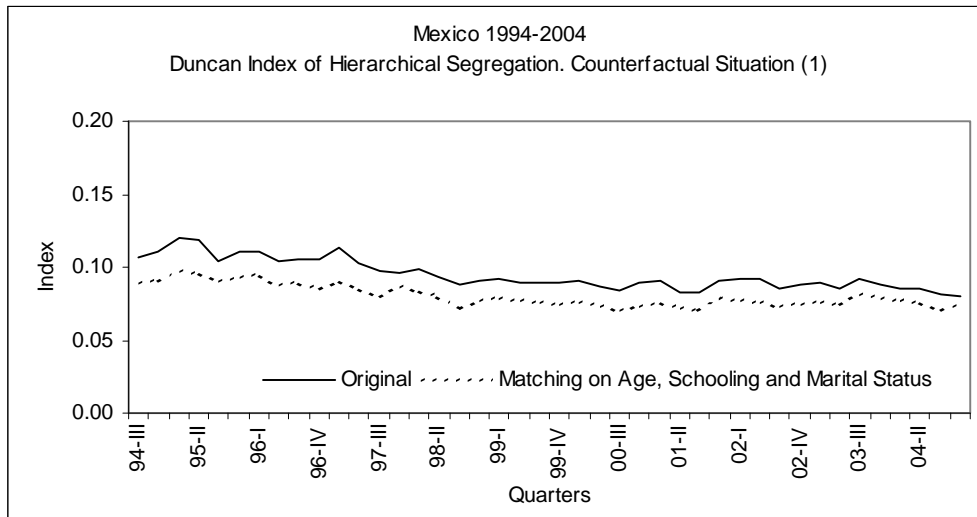


Figure 3. Counterfactuals for the Analysis of Wage Gaps

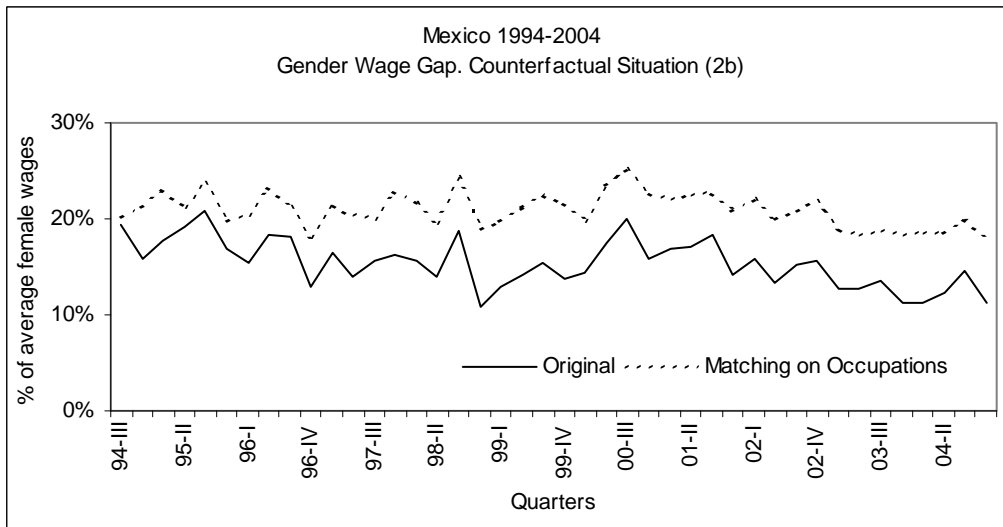
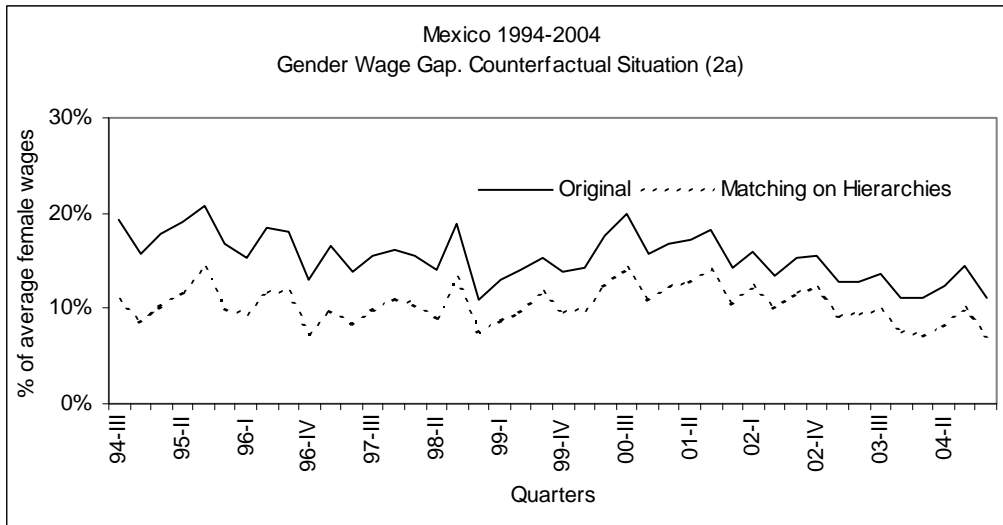
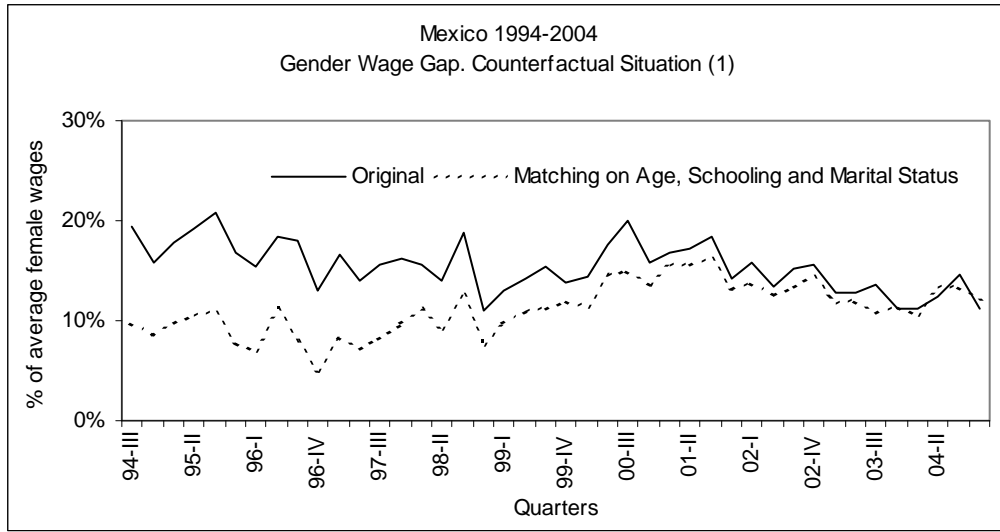


Figure 4. Estimation of $\frac{\partial G}{\partial D}$ for Occupations and Hierarchical Categories

