

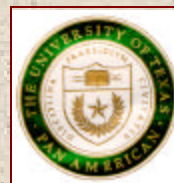
Gender in Mexico's Maquiladora Industry



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Abstract: Women's share of employment in Mexico's maquiladora manufacturing industry fell during a period of high growth during the 1990s, a period also characterized by a shift in the dominant industrial subsectors. This study addresses the question of why male workers displaced female workers and evaluates the economic impact on women in this industry. Using bivariate probit models to analyze the dual decision of employment and sectoral choice facing potential workers, we find that changes in labor market demand fueled the increase in male employment in the maquiladora industry to the detriment of women. The impact of this feminization of the workforce resulted in an increase in the gender wage gap as women appear to be segmented into the lesser dynamic sectors.

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I. INTRODUCTION

Mexico liberalized trade laws and opened its economy during the 1980s, creating an export industry that now contributes \$47.7 trillion to the economy each year (Banco de México, 2001). Multinational firms locate in Mexico (primarily in the northern border region) to take advantage of low labor costs and proximity to U.S. markets. The presence of these foreign firms has served to attract potential workers from rural Mexico with the lure of better paying jobs.

Mexico's labor markets have also undergone dramatic changes in the last twenty years, in particular as relates to both the explosive growth in the maquiladora industry¹ and increases in women's labor force participation. Nationwide, the female employment rate has increased, occupational segregation of women has decreased, and the male/female earnings gap has fallen (Brown, Pagán, and Rodríguez-Oreggia, 1999). Employment in the maquila industry has increased by over 1,000 percent during the past 20 years (INEGI, 2000). Furthermore, maquila employment traditionally held by females has been shifting to men.

This study evaluates the role of women workers in export-based manufacturing, specifically Mexico's maquiladora program, compared to women in non-maquila manufacturing jobs, taking into account individual skills levels as well as institutional and household constraints. The results indicate that although the female share of total maquila manufacturing fell, women increasingly opted to work in maquila manufacturing along Mexico's northern border between 1989 and 1999. Furthermore, the wage difference between maquila and non-maquila manufacturing increased between 1989 and 1999, the result of demand for sector-specific skills. Yet, female/male wage gap increased along the border, indicating that women are not benefiting at the same level as men from the pay structures offered by maquila manufacturers.

¹ An in-bond industrial program begun in 1965 for the northern border region, expanded to selected interior sites in 1989 and finally opened nationwide with the implementation of the Northern American Free Trade Agreement in 1994.

II. MEXICO'S MAQUILADORA INDUSTRY

Since the early 1980s, the Mexican government has focused on creating an environment conducive to large-scale industrial development to provide a source of foreign exchange as a bolster to the volatile domestic economy (Haddad and Harrison, 1993; Weintraub, 1996). Mexican workers moved to the border region in response to the large number of jobs created there (Dávila and Saenz, 1990; Rivera-Batiz, 1986). By the end of 2000, over 3,600 plants operated under the program, providing employment to more than 1,300,000 workers and generating a combined value-added from Mexican operations in excess of 15 billion pesos annually. Furthermore, the maquila industry remains heavily concentrated in the northern border region (location of 77.8 percent of maquila employment) (INEGI, 2000).

Although the maquila program originated to employ unskilled male workers, young, single females actually captured the largest share of the maquila jobs from the beginning. These women reportedly possess greater dexterity skills, enabling them to be more productive in the predominantly assembly-type work. However, with the explosive growth in the industry in recent years, maquilas have been employing an increasing proportion of men.

A. *Gender Recomposition*

The most prominent change in the maquila industry has been the defeminization of the maquila workforce. Women accounted for 77.4 percent of *obrero* (hourly worker) maquila employment in 1980 and for only 55.3 percent by 2000.² The gender shift in maquila employment can be attributed, in part, to the sectors with traditionally greater proportion of male workers experiencing high growth, especially the transportation equipment industry. Female workers accounted for 68 percent of transportation equipment employment in 1980 (compared to an industry-wide share of 77 percent) and for only 48 percent by 1998. Furthermore, women's share of employment fell in other industries that had been predominantly female in 1980 (such as the textile industry where the female share fell from 84 to 65 percent between 1980 and 1998) (Fleck, 2001).

² However, women's actual employment in maquilas increased six times during this period (from 78,800 to 600,531) (INEGI, 2000).

Presumably both supply factors (inability of female workers to meet the increasing demand generated by high growth in maquila employment) as well as demand factors (changing skill requirements owing to technological changes in the production process) led to the gender recomposition of the entire maquila workforce. Why do not an increasing proportion of women choose to seek maquila employment if it provides relatively better pay and benefits? Are there constraints that hinder their entry to this type of employment relative to other employment? Is there a gender difference in human capital that makes female workers relatively less attractive to maquila manufacturers?

B. Industrial Gender Recomposition

Mexico's maquila program has slowly evolved over the past 36 years characterized by relaxing of governmental regulations on location of production, type of production and ownership of plants. Thus, the profile of today's maquiladora industry bears little resemblance of that of the past (Fleck, 2001). A primary distinction is the composition of industrial sectors generating maquila production and employment. The leading industries, measured by employment share, in 1980 were electronics, appliance/machinery, textile and transportation equipment. Although these four sectors remained the leading industries in 2000, the relative share of three changed markedly. For example, the textile industry's share of maquila employment increased by almost 12 percentage points between 1991 and 2000 while the appliance/machinery assembly industry decreased its share of maquila employment throughout the period, from a high of 24.6 percent in 1980 to 8.2 percent in 2000.

The industrial recomposition has been coupled with the phenomena that women in Mexico are increasingly choosing to participate in the labor force, a trend seen throughout the world over the past two decades. In Mexico, by 1998 labor force participation rates had increased for both men (to 78.7 percent) and women (to 36.9 percent) (Fleck, 2001). Participation rates for Mexican women have particularly increased in urban communities as education levels and employment opportunities in these areas increased (Fleck and Sorrentino, 1994). This can be seen in the northern border urban areas where much of the maquila manufacturing occurs. Nevertheless, there is still a vast difference in labor market participation between men and women in Mexico that may result from gender differences in household responsibilities

(Pagán and Sanchez, 2000). In Mexico, and throughout Latin America, Mexican men are primarily responsible for income producing activity and women for domestic activity. However, this distinction appears to be diminishing as women increasingly opt to work.

III. RESEARCH QUESTIONS

Mexico's experience with the high growth in maquiladora production illustrates how one country integrates its economy into the global economy. Through the globalization process, patterns of production change in terms of both the goods produced and the organization of the production process. In Mexico, these changes can be seen in the gender and industrial recomposition of the maquiladora industry. As patterns of production change, the determination of who will "trade" their labor for money (i.e., work in the new jobs) also changes.

One criticism of the new patterns of trade is that they are detrimental to women's well-being (Fussell, 2000). International trade and gender watch groups claim that the burden of trade falls more heavily on women than men, but these assertions are based on limited evidence from a few countries. Furthermore, they do not examine if this claim results from women not having the skills that are demanded in the new economy or if institutional or other constraints prevent full integration. An analysis of changes in Mexico's maquiladora industry and the resulting impact on female workers may provide answers to these questions.

One of the most striking features of the growth in the maquila industry has been the shift in employment from women to men. Although this gender recomposition has been well documented, there is only limited evidence as to why it has occurred. Perhaps the industrial recomposition among maquila manufacturers has changed the nature of the jobs or the skills required such that they are less compatible with women's characteristics and gender roles (i.e., household responsibilities). An empirical evaluation of the employment as well as manufacturing employment decision may show why male maquila labor displaced female maquila labor.

It is also important to analyze the impact on women's earnings from changes in the maquila industry. Maquila wages appear to be increasing at a faster pace than manufacturing wages nationwide

(Fleck, 2001). However, wages of women and men maquila workers may not be increasing at a similar pace as gender employment patterns shift. Consider that Fleck found a decrease in the female/male wage ratio as the share of women workers in a particular maquila industry increased. Thus, empirical analysis of changes in wage differentials between maquila and non-maquila workers as well as changes in the male/female wage differential in both maquila and non-maquila manufacturing employment will give further insight into the why the gender wage gap has increased for border maquila workers but narrowed for interior manufacturing workers.

IV. DATA AND SUMMARY STATISTICS

The Mexican government's Instituto Nacional de Estadística, Geografía e Informática (INEGI) publishes statistical information about the maquiladora industry in a report entitled *Industria Maquiladora de Exportación (IME)*. Data includes employment statistics by region (border and interior) and gender as well as production-type information on maquila activities. The IME identifies maquila industrial sectors as food, textile, leather, furniture, chemical, transportation equipment, tools, appliance, electronics and other manufacturing (INEGI, 2000). These reports give a broad picture of changes that have occurred in the industry.

Data from Mexico's 1989 and 1999 *Encuesta nacional de empleo urbano (ENEU)* are employed to empirically analyze female labor market participation and the corresponding wage structures in the maquila industry. The period of study begins with 1989, the first year that the maquila industry was allowed to expand into selected cities in Mexico's interior. The study concludes with 1999, the last year for which there is complete data. The ENEU survey provides basic socio-economic information on the Mexican urban population as well as labor market outcomes such as wages, occupation and industry (INEGI, 1996:3). This study utilizes information from the 16 metropolitan areas surveyed in both 1989 and 1999. The border region (encompassing the largest share of maquiladora manufacturing activity) includes Tijuana, Ciudad Juárez, Nuevo Laredo and Matamoros. The interior areas include Mexico City, Guadalajara, Monterrey, Torreón, Chihuahua, San Luis Potosi, Leon, Tampico, Puebla, Veracruz, Orizaba

and Merida. The sample consists of all individuals surveyed between the ages of 16 and 65 during the months of April-June in 1989 and 1999 who reside in the selected metropolitan areas.

The IME data indicates that male employment levels grew by 187 percent along the border, while only 138 percent more women were employed in 1998 compared to 1990. The change seen in the interior is more dramatic with 279 percent growth in men's manufacturing employment compared to 147 percent for women. Of particular interest to this study is the performance of the individual maquila industrial sectors. Employment growth rates for male workers along the border were greater than those for females in each industry with the exception of chemical. However the maquila chemical industry accounts for less than two percent of the total employment for the region. A somewhat different pattern is observed for the interior maquilas. Here female employment growth outpaced that of males in four of the ten industries. Yet, the industries previously identified as being the most dynamic in terms of relative growth, textile and electronics, each shows male employment growing at a much faster rate than that for females. Clearly, male workers have displaced female workers in the maquila industry.

Table 1
Sample Labor Force Descriptive Statistics
(Standard deviation in parentheses)

	Border		Interior	
	1989	1999	1989	1999
<i>Female Share of Labor Force</i>	0.3066 (0.461)	0.3355 (0.472)	0.3144 (0.464)	0.3601 (0.480)
Female Share of Manufacturing Employment	0.4003 (0.490)	0.4129 (0.492)	0.2433 (0.429)	0.3010 (0.459)
Manufacturing Share of Total Employment	0.3201 (0.467)	0.3580 (0.479)	0.2678 (0.443)	0.2682 (0.443)
Female Share of Working Age Population	0.5366 (0.499)	0.5180 (0.500)	0.5343 (0.499)	0.5443 (0.498)
Share of Population Out of Work Force	0.4677 (0.499)	0.3909 (0.488)	0.4897 (0.500)	0.4483 (0.497)
Share "Ideal Maquila Worker**" of Working Age Population	0.14 (0.342)	0.10 (0.295)	0.15 (0.355)	0.13 (0.331)

*Single, female, childless and less than 30 years of age.

Table 1 reports selected labor force statistics of the sample. As can be seen, women increased their participation in the labor force at a faster pace in the interior than along the border between 1989 and 1999. Female share of border manufacturing employment only increased by 1.26 percentage points, yet

increased by almost six percentage points in the interior during this period. Also note that manufacturing's share of total employment remained the same in the interior. This is interesting in light of the high growth in maquila employment in this region after the change in regulations effective in 1989. Domestic manufacturing apparently declined during this time at a similar rate as maquiladora manufacturing increased, allowing maquilas to attract workers from other manufacturing firms to meet their employment needs.

Data from the sample also gives a picture of changes in the manufacturing industry wage structures. Table 2 shows the disaggregated wages for each maquila industrial sector by region for women and men workers. Real wages are measured as the natural log of hourly wages adjusted to 1999 prices, converted using the Mexican inflation rate. Real wages fell between 1989 and 1999 for workers in all industrial sectors, except for female leather workers along the border. Although real wages decreased for most workers, female workers appear to be particularly affected. As discussed previously, the textile manufacturing industry increased its share of all maquila-type manufacturing between 1989 and 1999. However, real wages for female workers in this industry fell by 46.1 percent (from 2.7602 to 2.3813 log-points). Real wages of comparable male workers fell by only 31.9 percent (from 2.8730 to 2.5963 log-points), leading to an increase in the male-female wage gap of 10.8 percent over the period (from 0.1128 to 0.2150 log-points). The real wage gap between men and women increased between 1989 and 1999 along the border for six of the ten industrial sectors, including each of the sectors with the highest total employment (textile, auto, appliance and electronics).

In general, interior manufacturing workers earn less than those along the border and women earn less than men. Real wages again decreased across the board for interior manufacturing workers with the exception of male workers in the tools industry. However, unlike the border region, real wages of female workers did not fall as much as those of males. Considering the sectors generating the most employment, the gender wage gap only increased in the textile industry, by 1.1 percent (increasing from 0.2590 to 0.2699 log-points). In each of the other industries (auto, appliance and electronics), the gender wage gap

narrowed for female workers. Female workers in the auto industry in the interior saw their gender wage differential fall by 12.1%, yet they still earned 28.6 percent less than men.

Table 2
Decomposition of 1989-1999 Changes in Employment Probabilities

	Border		Interior					
	Female	Male	Female	Male				
Employed/Otherwise								
E_{89}	0.3051	0.7935	0.3002	0.7514				
E_{99}	0.3945	0.8398	0.3649	0.7747				
$E_{99} - E_{89}$	0.0894	0.0463	0.0647	0.0233				
(1) Changes in Xs: $\Phi(X_{99}\beta_{89}) - \Phi(X_{89}\beta_{89})$	-0.0011	0.0007	-0.0007	0.0008				
(2) Changes in β s: $\Phi(X_{99}\beta_{99}) - \Phi(X_{99}\beta_{89})$	0.0905	0.0456	0.0654	0.0225				
Disaggregation: (1) and (2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Constant		-0.0317		-0.1585		0.1151		0.6685
AGE	0.0172	0.0200	0.0008	0.3856	-0.0132	-0.1601	0.0023	-1.5576
AGE2	-0.0153	0.0544	-0.0003	-0.1960	0.0112	0.0897	-0.0010	0.6697
SCHOOL	0.0009	0.0043	-0.0001	0.0238	-0.0010	-0.0046	-0.0010	0.3020
MARRIED	-0.0029	0.0466	0.0001	-0.0164	0.0022	0.0265	0.0003	0.0391
HEAD	0.0000	-0.0048	0.0001	0.0124	-0.0002	-0.0010	-0.0001	-0.1118
PRESCH	-0.0005	-0.0012	0.0000	-0.0146	0.0000	-0.0037	-0.0002	0.0029
ELEM	-0.0003	0.0011	0.0000	0.0087	0.0000	-0.0021	0.0001	0.0132
TEENDAU	0.0000	-0.0061	0.0000	0.0016	0.0000	0.0050	0.0001	0.0157
TEENSON	0.0000	0.0054	0.0001	-0.0064	0.0000	0.0026	0.0002	0.0027
ADULTF	0.0000	0.0005	0.0000	-0.0040	0.0001	-0.0014	0.0000	-0.0260
ADULTM	-0.0002	0.0020	0.0000	0.0095	0.0002	-0.0006	0.0000	0.0041

Complete descriptive statistics of the sample of workers in maquila-type manufacturing jobs³ by geographic region, border and interior are available upon request from the authors. To summarize, female maquila workers along the border were younger, more likely to be married, head of the household, and have children than female manufacturing workers in the non-maquila interior region. For example, the

³ Strictly domestic-type manufacturing activities, such as petroleum extraction, publishing, and production of alcoholic beverages, are excluded.

percentage of border female maquila workers with preschool children increased from 15.3 to 23.8 between 1989 and 1999. Also, women working in the manufacturing sector along the border were more apt to married than those in the interior in both years. They were also younger and had less formal education than men working in border maquila manufacturing. Women and men in maquila manufacturing along the border shifted into appliance manufacturing and their occupations were increasingly less likely to be in production-line type work. This change in occupation away from production was also reflected in female non-maquila manufacturing employment (the interior of Mexico). However, men employed in this sector remained as concentrated in production jobs as they had been in 1989.

V. EMPIRICAL ANALYSIS

Previous sections detailed the declining share of women workers in the maquila industry, which is in contrast to women's increasing presence in the country's labor markets. This leads one to speculate that the decreasing share of female maquila employment may be a function of labor demand resulting from industrial recomposition of the maquiladora industry, rather than a function of labor supply. However, this may not be the case if employment growth in maquilas has simply outpaced women's entry into the labor market (see Fleck, 2001). Empirical analysis that controls for specific skill levels and household constraints facing potential workers may provide a clearer picture of women's decreasing share of maquila employment as well as the observed increase in gender wage gap.

A. Manufacturing Employment Probabilities

To empirically analyze the factors that may affect women's changing role in the Mexican labor markets, a bivariate probability model of the likelihood of manufacturing employment is estimated for 1989 and 1999 for potential female and male workers in the maquila and non-maquila interior regions. Specifically, two basic labor outcomes are considered: first, the likelihood that an individual is employed in 1989 and 1999 and, second, whether the individual is employed by a manufacturing firm. To analyze these simultaneous decisions, a bivariate probit model with censoring (or selectivity) determines:

$$(1) \quad I_{li}^* = X_{li} \mathbf{b}_1 + \mathbf{e}_{li},$$

$$(2) \quad I_{2i}^* = X_{2i} \mathbf{b}_2 + \mathbf{e}_{2i},$$

$$\mathbf{e}_{1i}, \mathbf{e}_{2i} \sim BVN(0,0,1,1, \mathbf{r}),$$

where $I_{1i}^* > 0$ indicates employment and $I_{1i}^* \leq 0$ otherwise, and $I_{2i}^* > 0$ and $I_{2i}^* \leq 0$ indicate manufacturing employment or other. Note that the problem of sample selectivity arises in (2) owing to observing I_{2i}^* only when $I_{1i}^* > 0$, and that the bivariate probit system of equations may provide more consistent parameter estimates than those obtainable from independent equation models with dependent selection criteria. X_1 and X_2 represent the factors posited to affect the employment and manufacturing sector choices, \mathbf{b}_1 and \mathbf{b}_2 represent the vectors of coefficients for (1) and (2), and ρ is the correlation coefficient of the disturbances. The model is estimated by maximum likelihood (e.g., Wynand and van Praag, 1981; Maddala, 1983; and Greene, 2000).

To isolate possible underlying socio-economic factors that may lead to changes in employment and maquila employment rates, independent regressors include human capital factors such as age and education that may impact the employment decision as well as variables that capture household constraints facing potential workers, especially women. Household constraints include marital status, whether the person is the head of household, and dummy variables to capture the presence of children in various age groups in addition to the presence of other adults living in the household. Maquila-type manufacturing requires a structured work environment that may not be conducive to women with greater household responsibilities such as young children. Thus, these factors may lower the propensity of such women to choose manufacturing employment. However, the presence of other adults in the household may serve to offset these constraints as they provide substitute household labor.

Partial derivatives⁴ from the bivariate probit models for the manufacturing employment decision show that women increased their probability of maquila-type manufacturing employment in both the maquila and non-maquila regions. Women of each region appear to be equally likely to be employed in 1989. However, by 1999 women along the border were almost three percent more likely to be employed than those in the interior. Employment probabilities for men were higher along the border in 1989 and

1999 and as observed for women, men along the border increased their propensity to work by more than those in the interior (83.98 compared to 77.47 percent, respectively).

Household constraints appear to have a significant impact on the manufacturing employment decision of potential workers, particularly women. While head of household status increases the probability of entering the labor market for women along the border in 1989, by 1999 this served to significantly decrease the likelihood of manufacturing employment, unlike the impact on female workers in the interior and male workers in either region. There appears to be a similar pattern associated with marital status. Married women along the border seemingly are more likely to opt for manufacturing employment with there being no impact for the other groups of workers. Furthermore, the presence of children, especially preschool aged, had a stronger negative impact on the manufacturing employment decision of women along the border than those in the interior. Finally, the presence of other adults in the household does not tend to affect the probability of manufacturing employment for females in either region. Yet, other adult household members do have a positive influence on men's propensity to choose this type of employment. Perhaps the presence of other adults in the household does not substitute for women's household labor among those women likely to choose manufacturing employment while the presence of other adults increases men's likelihood as there are additional people to support.

The 1989-1999 changes in employment rates can be disaggregated so that the contribution of each individual factor can be weighed. To decompose the mean changes in overall employment and manufacturing employment rates, the ordered probit decomposition proposed by Jones and Makepeace (1996) is extended to the dichotomous choice case (e.g., Brown and Pagán, 1998). This technique is similar to the decomposition technique for linear regression models first proposed by Oaxaca (1973):

$$(3) \quad \bar{E}_j^{99} - \bar{E}_j^{89} = \left[\Phi(\bar{X}_j^{99} \hat{\mathbf{b}}_j^{89}) - \Phi(\bar{X}_j^{89} \hat{\mathbf{b}}_j^{89}) \right] + \left[\Phi(\bar{X}_j^{99} \hat{\mathbf{b}}_j^{99}) - \Phi(\bar{X}_j^{89} \hat{\mathbf{b}}_j^{99}) \right]$$

$$(4) \quad \bar{M}_j^{99} - \bar{M}_j^{89} = \left[\Phi(\bar{X}_j^{99} \hat{\mathbf{b}}_j^{89}) - \Phi(\bar{X}_j^{89} \hat{\mathbf{b}}_j^{89}) \right] + \left[\Phi(\bar{X}_j^{99} \hat{\mathbf{b}}_j^{99}) - \Phi(\bar{X}_j^{89} \hat{\mathbf{b}}_j^{99}) \right]$$

where \bar{E}_j represents the mean probability of employment for region j in either 1989 or 1999, \bar{M}_j

⁴ Available from authors upon request.

represents the mean probability of manufacturing employment relative to other employment for region j in either 1989 or 1999, \bar{X}_j contains the means of the control variables previously used in the bivariate probit models (Equations [1] and [2]), $\hat{\mathbf{b}}_j$ represents the estimated coefficients, and Φ represents the cumulative density function of a standard normal variable.

The first component on the right-hand side of (3) explains the changes in the probabilities of employment due to 1989-1999 changes in the mean characteristics of the group being studied. Similarly, the first component of the right-hand side of equation (4) explains the changes in the probability of working for a maquila-type manufacturing firm owing to changes in the mean characteristics of those employed. The second term in each equation captures the changes in the 1989-1999 average employment rates or manufacturing firm employment share because of changes in the estimated coefficients or demand for the studied characteristics. Thus, this term captures the changes solely arising from difference in the 1989 and 1999 labor market structures.

Tables 2 and 3 present the results of estimating equations (3) and (4), respectively, for our sample of potential workers. The increase in workers' propensity to choose to work between 1989 and 1999 appears to primarily result from an increase in demand for workers' characteristics (changes in β s). Decreases in the relative levels of these characteristics of potential female workers served to lower their likelihood of employment, yet potential male workers were more likely to work as a result of increases in these same characteristics.

The decision of workers to choose manufacturing employment, however, is influenced by different factors than the employment decision itself. Increased levels of characteristics between 1989 and 1999, improved the likelihood of women along the border choosing manufacturing employment by 10.87 percentage points. However, demand for these characteristics by maquila manufacturers in the region lowered the probability of women choosing this type of employment, resulting in only a 2.26 percent increase in manufacturing employment probability.

Table 3
Decomposition of 1989-1999 Manufacturing/Other Employment Probabilities

	Border		Interior					
	Female	Male	Female	Male				
Manufacturing/Other								
M_{89}	0.4179	0.2769	0.2072	0.2956				
M_{99}	0.4405	0.3163	0.2241	0.2929				
$M_{99} - M_{89}$	0.0226	0.0394	0.0169	-0.0027				
(1) Changes in Xs: $\Phi(X_{99} \beta_{89}) - \Phi(X_{89} \beta_{89})$	0.1086	-0.0477	-0.1645	-0.0600				
(2) Changes in β s: $\Phi(X_{99} \beta_{99}) - \Phi(X_{99} \beta_{89})$	-0.0860	0.0871	0.1814	0.0573				
Disaggregation: (1) and (2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Constant		-0.2313		0.9034		0.5490		0.2064
AGE	-0.0120	0.3101	-0.0617	-0.4022	-0.0077	-0.7851	-0.0718	-0.3491
AGE2	0.0312	-0.1484	0.0277	-0.1147	-0.1041	0.0848	0.0421	0.1542
SCHOOL	0.0105	0.0383	0.0026	-0.2029	-0.0984	0.1033	0.0025	-0.0020
MARRIED	0.0077	-0.0242	-0.0057	0.1167	-0.0841	-0.0730	-0.0025	-0.0066
HEAD	-0.0009	-0.0099	0.0005	0.1547	-0.0647	-0.0428	-0.0080	-0.0216
PTIME	-0.0116	0.0045	0.0010	0.0358	-0.0792	0.0736	-0.0055	0.0010
SELFEMP	-0.0198	0.0067	-0.0229	-0.1512	-0.0560	0.1735	-0.0307	0.0280
TECH	-0.0055	0.0017	-0.0001	-0.0080	-0.0682	0.1463	-0.0022	0.0038
SUPERVISE	0.0339	-0.0010	0.0114	0.0015	0.0839	0.0012	0.0103	0.0003
PROD	0.1084	-0.0462	0.0086	-0.1479	0.6114	-0.1695	0.0190	0.0205
ADMIN	-0.0196	-0.0018	-0.0090	-0.0834	-0.0566	-0.0040	-0.0063	0.0149
LABORER	-0.0156	0.0081	0.0010	-0.1135	-0.2192	0.0722	-0.0087	0.0035
PRESCH	0.0008	0.0035	-0.0009	-0.0109	-0.0200	0.0485	0.0008	0.0005
ELEM	0.0000	0.0029	0.0004	0.0095	-0.0002	0.0351	0.0006	0.0024
TEENDAU	0.0012	-0.0022	-0.0002	0.0105	0.0009	0.0041	-0.0001	-0.0004
TEENSON	0.0002	0.0015	-0.0007	0.0587	0.0031	-0.0403	-0.0001	0.0010
ADULTF	-0.0009	0.0005	-0.0001	-0.0115	-0.0023	0.0033	0.0001	-0.0005
ADULTM	0.0006	0.0012	0.0004	0.0425	-0.0031	0.0012	0.0005	0.0010

The lower portion of Table 3 disaggregates the changes in characteristics and changes in demand for the characteristics to show the influence of the individual variables. Changes in women's occupational structure into supervisory and production-type work appears to be the strongest factor contributing to the

increased probability of choosing manufacturing employment in 1999 relative to 1989, accounting for 0.03 and 10.8 percentage points of the change, respectively. Furthermore, increases in the household structure variables for female workers along the border served to enhance their probability of working for maquila manufacturing firms by 0.2 percentage points in the aggregate. However, changes in labor market demand for female production-type workers accounted for a 4.6 percentage point reduction in women's propensity to choose manufacturing employment along the border.

In contrast, decreased characteristics of women in 1999 (relative to 1989) in the interior of Mexico served to decrease their propensity to choose manufacturing employment although increased demand for these characteristics from interior manufacturing firms offset this impact. In particular, the disaggregation shows that the change in most factors served to lower the likelihood of choosing manufacturing employment. For example, the household structure factors aggregated decreased the propensity of female workers in the interior to choose manufacturing employed by 2.2 percentage points. If not for the large increase in probability of choosing manufacturing employment resulting from the change in labor market demand (18.14 percentage points), women in the interior would have been 16.45 percentage points less likely to choose manufacturing employment in 1999 than they had been in 1989.

Male workers along the border increased their likelihood of choosing manufacturing employment while interior male workers were less likely in 1999 to choose manufacturing employment than in 1989. The propensity to choose manufacturing employment was lowered by decreases in levels of characteristics in both regions (reducing the probability by 4.8 and 6.0 percentage points in the border and interior regions, respectively). The greater increase in demand for these characteristics from the border's maquila manufacturers more than offset the change in characteristics of male workers, which was not the case for the interior.

In sum, women working in the maquila-manufacturing sector along the border were the only group to improve their level of human capital characteristics between 1989 and 1999. Yet, they were also the only group that experienced a decrease in the demand for these characteristics. It appears that there is

relatively greater demand from border maquilas for the human capital possessed by male workers than that of females.

B. Wage Differentials

Women increased their probability of employment in the border maquila region by nine percentage points between 1989 and 1999. Also during this period, men have increasingly opted for work in maquila plants because of the relatively better pay and benefits (Catanzarite and Strober, 1993; Sargent and Matthews, 1999). Maquila hourly earnings have consistently been better than those for national manufacturing, in particular since 1994 with the liberalization of regulations under NAFTA and concurrent peso crisis (Fleck, 2001). Although women in the maquila region may be increasing their labor force participation, it is important to evaluate whether or not they are benefiting from the elevated wage structure offered by the maquila industry. Empirical analysis that controls for differences in levels of characteristics among groups of workers may provide answers to the relative decrease in wages for female manufacturing workers along Mexico's northern border.

To analyze the role that wages may play in the crowding out of women workers as well as the impact on women's returns, the Juhn, Murphy, and Pierce (1993) (JMP) earnings decomposition technique is employed. The JMP methodology allows for the consideration of the role of maquila versus non-maquila manufacturing sector in both the observed and unobserved characteristics of the sample, as well as the "prices" of these characteristics, in explaining the change in the large/small firm wage gap between 1989 and 1999. The male and female sample of workers is evaluated separately. In a similar fashion, the gender wage differential is analyzed, for maquila and non-maquila manufacturing workers, separately.

Let the log of hourly wage, Y_{itM} , for the i th worker employed in a maquila manufacturing firm in year t be given by:

$$(5) \quad Y_{itM} = X_{itM} \beta_{tM} + \theta_{itM} \sigma_{itM},$$

where X_{itM} and β_{tM} represent the worker's human capital characteristics (again refer to Table 1 for the definition of the variables), the returns to those characteristics, θ_{itM} , is a standardized residual (i.e., $\theta_{it} = e_{it}/\sigma_{it}$), and σ_{itL} is the standard deviation of residual earnings in year t .

The year t maquila/non-maquila sectoral log-wage differential, D_t , can be written as:

$$(6) \quad D_t \equiv Y_{tM} - Y_{tN} = \Delta X_t \beta_{tM} + \Delta \theta_t \sigma_{tM}$$

where Δ represents the average inter-sectoral difference for the following variable(s). Using equation (6), the 1989-1999 differences in the maquila/non-maquila manufacturing log-wage differential can be decomposed into:

$$(7) \quad D_{99} - D_{89} = (\Delta X_{99} - \Delta X_{89})\beta_{89M} + \Delta X_{99}(\beta_{99M} - \beta_{89M}) + (\Delta \theta_{99} - \Delta \theta_{89})\sigma_{89M} + \Delta \theta_{99}(\sigma_{99M} - \sigma_{89M}).$$

The first term on the right-hand side of (7) captures the 1989-1999 change in the inter-sectoral wage differential that can be explained by differences in observed mean personal characteristics. The second term measures the portion of the wage gap differential explained by changes in the returns to observed human capital, evaluated at the 1999 inter-sectoral differences in characteristics. The third term reflects the 1989-1999 change in the residual wage position of small firm workers relative to large firm workers, evaluated at the residual standard deviation of the large firms' log-wages in 1989. The last term captures the 1989-1999 changes in the returns to unobservable skills. Thus, it is possible to evaluate the regional difference in sectoral log-wages in terms of both observed (or measurable) and unobserved individual characteristics and the returns to these characteristics.

Recall from the sample descriptive statistics discussed in the previous section that in 1989 the female maquila workers along the border earned a 31 percent premium over manufacturing earnings in the interior while male maquila workers earned 17 percent more on average. By 1999, the premium for working in maquila relative to interior manufacturing had increased to 37.7 percent for women and 30.4 percent for men. Clearly, male maquila workers benefited the most over the period relative to interior manufacturing employment.

To understand the factors underlying these gender differences in the maquila and non-maquila manufacturing sectors, earnings functions are first estimated individually for female and male workers in both the maquila (border) and non-maquila (interior) sector for 1989 and 1999.⁵ The independent variables included controls for human capital (age and its square, schooling, part-time employment and self-

⁵ Parameter estimates available upon request from the authors.

employment), for specific manufacturing industry subsectors (food, textile, leather, furniture, chemical, transportation equipment, tools, appliance, electronic, and other manufacturing, relative to electronics manufacturing), for occupation (technical, supervisory, production-line, administration, laborer, relative to professional), and the household constraint variables (married, head of household, presence of preschool, elementary-aged or teenaged sons and daughters, and presence of other adults in the household).

As would be expected, in each regression wages are positively related to age (but at a decreasing rate) and increase with years of schooling. Each occupational control, relative to employed as professionals, decreased wages in each earnings function. Manufacturing industry subsector affected wages for women in the maquila region in 1989 with employment in seven of the nine subsectors resulting in significantly lower wages, relative to electronics manufacturing employment. By 1999, only two subsectors (textile and chemical) resulted in lower relative wages. There was no statistical impact on wages from manufacturing subsector for women in interior manufacturing during 1989, except for the decrease in earnings food manufacturing. Yet, in 1999, food, textile and furniture each significantly decreased wages relative to electronics manufacturing.

The pattern for male workers is different from that for women. In 1989, three maquila manufacturing subsectors (furniture, chemical and tools) increased male earnings relative to electronics while food subsector employment decreased relative wages. Impacts were similar in 1999 except that there was no longer a premium for chemical employment. The manufacturing subsector only somewhat affected male interior manufacturing wages, with leather manufacturing earning a premium in 1989, while in 999, tools manufacturing employment increased wages as food and furniture decreased wages.

Finally the household constraint variables do not appear to have the same impact on female's wages as they do on the propensity to choose to work in the manufacturing sector. Only in 1999, being married, head of household and presence of preschool-aged children impacted wages, serving to increase hourly earnings for women in maquila manufacturing. These factors did not significantly affect the wages of women manufacturing workers in the interior in either year. In contrast, male wages were more affected by marriage and head of household status than had been female wages. These factors positively

increased male wages in each group, except for 1989 maquila manufacturing. As expected, household constraint variables did not affect male wages other than the positive impact from the presence of preschool children for maquila workers in 1989.

Changes in Maquila/Interior Non-Maquila Manufacturing Wage Gap

The earnings functions clearly identify differences between female and male workers in maquila and non-maquila manufacturing. To analyze the change in women's position as a result of maquila industry changes, we begin with an empirical analysis of changes in the relative wage structure of maquila and non-maquila manufacturing over the 1989-1999 period, using the JMP earnings decomposition technique to evaluate changes in the maquila/non-maquila manufacturing wage gap between 1989 and 1999. The manufacturing sectoral log-wage differentials for female and male workers are decomposed separately (see Table 4).

First, note in Table 4 that the log-wage gap between maquila and non-maquila female manufacturing workers grew by five percent (0.2706 to 0.3201 log-points) between 1989 and 1999. This shows that over the period female maquila manufacturing workers increased their relative wage advantage over female non-maquila workers. On the other hand, the maquila/non-maquila manufacturing log-wage gap increased for male workers by over 11 percent (0.1582 to 0.2656 log-points). Relative wages of male maquila manufacturing workers increased twice as fast as they had for women.

Decomposition of the manufacturing sectoral wage differential indicates that 1989-1999 changes in observed characteristics accounted for 28.7 percent of the expansion in the female maquila/non-maquila manufacturing wage gap and 22.8 percent of the expansion in the male gap during the period. In other words, individual skills (represented by the explanatory variables: human capital, industry sector, occupation, and household structure) of maquila and non-maquila manufacturing workers were more heterogeneous in 1999 than in 1989. In contrast, the changes in observed prices worked to reduce the inter-sectoral wage differential for both groups. This indicates that returns to skills declined for maquila compared to non-maquila manufacturing workers and served to reduce the change in the inter-sectoral

Table 4
Decomposition of Maquila/Interior Manufacturing Wage Differential: 1989-1999

		Female	Male		
Log-Wage Differential	1989	0.2706	0.1582		
	1999	0.3201	0.2656		
Standardized Residual	1989	-0.9890	-0.5912		
	1999	-1.1764	-0.7883		
Standard Deviation of Error	σ_{89Maq}	0.2784	0.3888		
	σ_{99Maq}	0.3063	0.4009		
1999-1989 Differential		0.0495	0.1074		
(1) Observed Characteristics	$(\Delta X_{99} - \Delta X_{89})\beta_{89Maq}$	0.0142	0.0245		
(2) Observed Prices	$\Delta X_{99}(\beta_{99Maq} - \beta_{89Maq})$	-0.0497	-0.0033		
(3) Unobserved Characteristics	$(\Delta \theta_{99} - \Delta \theta_{89}) \sigma_{89Maq}$	0.0522	0.0767		
(4) Unobserved Prices	$\Delta \theta_{99} (\sigma_{99Maq} - \sigma_{89Maq})$	0.0328	0.0095		
Disaggregation of (1) and (2) into j		(1)	(2)	(1)	(2)
<i>HUMAN CAPITAL FACTORS TOTAL</i>		-	0.0269	-0.0147	-0.0161
		0.0276			
AGE		0.0547	0.0008	0.1066	0.0514
AGE2		-0.0428	-0.0025	-0.0732	-0.0520
SCHOOL		-0.0004	-0.0017	-0.0090	0.0049
MARRIED		0.0012	0.0020	0.0022	-0.0012
SELFEMP		-0.0309	0.0474	-0.0365	-0.0193
PTIME		-0.0093	-0.0191	-0.0050	0.0001
<i>MANUFACTURING SUBSECTOR FACTORS</i>		-	-0.0495	0.0002	0.0255
		0.0073			
FOOD		-0.0005	-0.0307	0.0032	0.0052
TEXTILE		0.0004	0.0032	0.0046	0.0101
LEATHER		-0.0097	-0.0519	-0.0031	-0.0103
FURNITURE		-0.0002	-0.0006	-0.0060	0.0028
CHEMICAL		0.0043	-0.0116	-0.0016	0.0092
AUTO		0.0058	0.0074	0.0000	0.0064
TOOLS		-0.0021	0.0001	-0.0002	0.0000
APPLIANC		-0.0038	0.0350	0.0019	0.0034
OTHERMFG		-0.0015	-0.0004	0.0014	-0.0010
OCCUPATION FACTORS		0.0528	-0.0316	0.0353	-0.0053
TECH		0.0038	-0.0023	-0.0052	0.0002
SUPERVIS		-0.0273	-0.0126	-0.0022	-0.0060
PROD		0.1672	0.0035	0.0521	-0.0003
ADMIN		-0.0746	-0.0200	0.0032	0.0013
LABORER		-0.0164	-0.0002	-0.0126	-0.0004
HOUSEHOLD STRUCTURE FACTORS		-	0.0045	0.0037	-0.0074
		0.0037			
HEAD		-0.0008	-0.0001	0.0017	-0.0003
PRESCH		0.0009	0.0036	0.0047	-0.0012
ELEM		-0.0008	-0.0011	-0.0007	-0.0001
TEENDAUGHTER		-0.0004	0.0004	-0.0014	-0.0033
TEENSON		-0.0011	0.0002	-0.0016	-0.0032
ADULTF		-0.0017	0.0016	-0.0002	-0.0002
ADULTM		-0.0001	-0.0001	0.0011	0.0010

wage gap by 104 percent for women (-0.0497 log-points) and by three percent for men (-0.0033 log-points). The 1989-1999 change in the female inter-sectoral wage gap would have been over twice as large without the observed price effect, demonstrating that the prices maquila manufacturers are willing to pay for the observed characteristics of women decreased between 1989 and 1999, relative to non-maquila manufacturers. Or, prices paid by non-maquila manufacturers for women's characteristics increased relative to maquila manufacturers. Nevertheless, the change in relative wage structure served to narrow the gap between the manufacturing sectoral groups.

Changes in unobserved characteristics and prices also served to widen the wage differential between both female and male manufacturing sector workers between 1989 and 1999. The unobserved characteristic component reflects changes in the model's residuals resulting from inter-sectoral (maquila compared to non-maquila) differences in the characteristics. *Ceteris paribus*, the female maquila/non-maquila manufacturing wage gap would have disappeared altogether by 1999 if not for the impact from unobserved characteristics. Unobserved characteristics may represent an individual's abilities or job skills not captured by the measured variables. Thus, maquilas may be attracting more capable workers or workers with better job-related skills than non-maquila manufacturers. The effect of unobserved prices was much larger on the change in the female inter-sectoral wage differential, accounting for 66.3 percent of the total increase in wage differential, compared to only 8.8 percent for males. The unobserved price effect represents the impact resulting from inter-sectoral differences in returns. This could mean that maquilas face pressure to pay consistently better and are able to attract better qualified workers as described by the increased level of unobserved characteristics.

To gain a better understanding of the role of the 1989-1999 changes in the sectoral differences in observed characteristics and prices, the sectoral wage gap attributed to these factors is disaggregated into the individual components (see the bottom of Table 4). Occupational characteristics were the largest portion of the change in observed characteristics between 1989 and 1999 for both women and men. In particular, production-line type occupation for both females and males served to increase the inter-sectoral

disparity in wages. Recall that the sample descriptive statistics revealed a shift away from production occupations in maquila manufacturing for men and women as well as a shift into production occupation for women in non-maquila manufacturing. This shows the increasing difference between the two sectors in occupational structure. Change in age between the sectors also led to a widening of the wage differential during the period for both women and men, a reflection of the aging of maquila workers compared to their non-maquila counterparts.

Of special interest is the role that observed prices in the manufacturing subsector played in the change in the inter-sectoral wage differential between 1989 and 1999. For women, changes in manufacturing sector served to close the wage gap for women (by a total of 0.0495 log-points) and to widen the wage gap for men (by a total of 0.0255 log-points). These factors almost totally account for the change in observed prices for the female sample. Evidently women's sorting into specific manufacturing subsectors has resulted in a lowering of returns (earnings) for women in the maquila sector relative to those in the non-maquila manufacturing sector. The opposite effect is true for men where we observe an increase in returns for the specific manufacturing subsectors in maquila manufacturing compared to non-maquila.

We can conclude that between 1989 and 1999 that the relative wage structure of maquila and non-maquila manufacturing changed differently for women workers than for men. Nevertheless, maquila wages remained better than those in the non-maquila manufacturing sector for all workers. Although the characteristics of both female and male workers in each sector became less similar creating a widening of the inter-sectoral wage differential, decreases in the returns to these characteristics served to narrow the gap, especially for women. Between 1989 and 1999, female employment in the manufacturing sector shifted towards textile, chemical and auto firms, relative to electronics manufacturing. The gender difference in the impact of observed prices in these manufacturing subsectors indicates that market returns for female maquila workers are not the same as for men. Thus, the maquila industry appears to have gender inequities in its wage structures related to particular subsectors and women workers may not be benefiting as much as men from the high growth in the industry.

Changes in Male/Female Wage Gap

The preceding empirical analysis of the 1989-1999 changes in the maquila/interior manufacturing wage differentials indicates that different factors affect the change in wages for female and male workers. We now turn our attention to an analysis of the change in the male/female wage gap to try to understand the factors leading to these gender differences.

The descriptive statistics show that in 1999 women maquila workers on average made 21.5 percent less than male workers, an increase of 1.4 percent from 1989. Although the gender wage gap is even greater in the non-maquila manufacturing sector where female workers make 28.4 percent less than males, the wage gap narrowed by 4.5 percent in this sector between 1989 and 1999. Table 5 presents the results from the decomposition change between 1989 and 1999 in the gender wage differential by manufacturing sector that may indicate the factors accounting for the sectoral differences. Changes in the observed characteristics show that female and male workers became more homogenous over the 1989-1999 period in both manufacturing sectors, working to close the gender wage gap. However, there is a difference in the impact of observed prices, which reflect the return the market is willing to pay for individual skills (as measured by the variables in the model). It appears that the maquila sector values more highly the skills possessed by male workers and this effect works to widen the gender wage gap by 0.0394 log-points. In contrast, it appears that changes in wage structure (observed prices) work to narrow the wage differential in the non-maquila sector.

We also note an inter-sectoral difference in the impact of unobserved characteristics on the gender wage gap. In the maquila sector it appears that male workers possess a greater level of unmeasured characteristics than do female workers and these perceived qualities work to increase the wage difference between women and men maquila workers. However, in the non-maquila manufacturing sector, these unobserved characteristics appear to accrue to the benefit of female workers

Table 5
Decomposition of Male/Female Wage Differential: 1989-1999

		Maquila	Interior Mfg	
Log-Wage Differential	1989	0.1814	0.2937	
	1999	0.1951	0.2496	
Standardized Residual	1989	-0.1261	-0.4077	
	1999	-0.1678	-0.3799	
Standard Deviation of Error	$\sigma_{89\text{Male}}$	0.3882	0.4540	
	$\sigma_{99\text{Male}}$	0.4009	0.4549	
1999-1989 Differential		0.0137	-0.0441	
(1) Observed Characteristics	$(\Delta X_{99} - \Delta X_{89})\beta_{89\text{Male}}$	-0.0431	-0.0116	
(2) Observed Prices	$\Delta X_{99}(\beta_{99\text{Male}} - \beta_{89\text{Male}})$	0.0394	-0.0202	
(3) Unobserved Characteristics	$(\Delta \theta_{99} - \Delta \theta_{89}) \sigma_{89\text{Male}}$	0.0154	-0.0126	
(4) Unobserved Prices	$\Delta \theta_{99} (\sigma_{99\text{Male}} - \sigma_{89\text{Male}})$	0.0020	0.0003	
Disaggregation of (1) and (2) into j		(1)	(2)	(1) (2)
<i>HUMAN CAPITAL FACTORS TOTAL</i>		-	0.0189	-0.0221 -0.0142
		0.0324		
AGE		-0.0687	-0.0174	-0.0890 -0.0200
AGE2		0.0499	0.0182	0.0654 0.0169
SCHOOL		0.0010	0.0114	0.0095 0.0022
MARRIED		-0.0022	0.0029	-0.0071 0.0100
SELFEMP		-0.0058	0.0038	0.0098 -0.0104
PTIME		-0.0067	0.0000	-0.0108 -0.0127
<i>MANUFACTURING SUBSECTOR FACTORS</i>		-	-0.0024	0.0098 -0.0066
		0.0050		
FOOD		0.0027	-0.0018	-0.0006 0.0069
TEXTILE		0.0041	0.0021	-0.0009 -0.0020
LEATHER		-0.0011	0.0000	0.0088 -0.0052
FURNITURE		-0.0056	-0.0070	-0.0003 -0.0072
CHEMICAL		-0.0011	0.0022	0.0000 -0.0014
AUTO		0.0000	0.0033	0.0013 0.0001
TOOLS		-0.0009	-0.0013	-0.0003 0.0027
APPLIANC		0.0002	-0.0020	-0.0003 -0.0005
OTHERMFG		-0.0032	0.0020	0.0022 0.0000
OCCUPATION FACTORS		-	-0.0008	0.0035 0.0043
		0.0044		
TECH		-0.0060	0.0002	0.0020 -0.0002
SUPERVIS		0.0181	0.0018	0.0062 -0.0024
PROD		-0.0130	-0.0005	0.0630 0.0006
ADMIN		-0.0097	-0.0006	-0.0750 0.0098
LABORER		0.0062	-0.0017	0.0074 -0.0036
HOUSEHOLD STRUCTURE FACTORS		-	0.0237	-0.0028 -0.0037
		0.0013		
HEAD		0.0015	0.0301	-0.0029 -0.0047
PRESCH		-0.0036	-0.0033	-0.0012 -0.0003
ELEM		0.0003	0.0000	0.0012 0.0013
TEENDAUGHTER		0.0002	-0.0010	0.0010 -0.0001
TEENSON		0.0005	-0.0014	-0.0005 -0.0005
ADULTF		0.0002	0.0000	0.0001 0.0002
ADULTM		-0.0003	-0.0006	-0.0004 0.0004

and decrease the wage differential. In both manufacturing sectors, unobserved prices work to increase the wage gap with the impact being much greater in the maquila sector (14.6 percent of the differential compared to less than one percent in the non-maquila manufacturing sector). This could mean that all manufacturers perceive men to possess increased skill levels that they are willing to pay for, in particular maquila manufacturers.

Again, we look at the disaggregated components of the portion of the 1989-1999 changes in wage differential attributed to observed characteristics and prices (see the bottom of Table 5). It appears that in the case of maquila workers, each group of factors showed that the profile (observed characteristics) for women and men were becoming increasingly similar, and served to narrow the change in wage gap. Market returns (observed prices) for the household structure measures (especially head of household) worked to widen the change in gender gap in the maquila sector, even though the two sectors become more similar over the 1989-1999 period. Also returns to schooling appear to favor male maquila workers more than female (and account for 46.2 percent of the observed price impact). Wage structure within maquila manufacturing subsectors worked to narrow the wage gap over time, however only account for 6.1 percent of the total observed price effect. Occupational factors in the maquila sector also served to narrow the inter-period change in gender wage gap but by only two percent.

The gender profile of human capital factors in the non-maquila manufacturing sector also became more similar between 1989 and 1999. The narrowing of the age differential between women and men non-maquila manufacturing workers (-0.089) alone accounts for more than the total amount of the decrease in the wage differential for the sector. Women workers in non-maquila manufacturing increased in age, on average, by 2.8 years while male workers remained the same age, on average. In the aggregate, the factors observed from the manufacturing subsectors served to widen the inter-period change in gender wage gap by 22 percent, yet the returns to these factors (observed prices) worked to narrow the gap by 15 percent, in the non-maquila sector. The level of household structure factors and their returns had little impact on the 1989-1999 change in the gender wage differential in the non-maquila manufacturing sector, together only accounting for only two percent.

The decomposition of the 1989-1999 change in gender wage differential gives us some important insight into the impact of the changes occurring in the maquila industry. The profile of women maquila workers became more similar to that of men maquila workers over the period, yet market returns for these skills favored the men workers, serving to widen the gender wage gap. Therefore, women working in maquila manufacturing did not appear to benefit from the increased wages paid by that sector, relative to men. The changes in the non-maquila manufacturing sector did not have this same gender impact. Here, both observed characteristics and prices served to narrow the gender wage differential between 1989 and 1999.

V. DISCUSSION AND CONCLUDING REMARKS

Labor participation increased for all potential workers in Mexico between 1989 and 1999 even as real wages fell. The probability of a worker opting for manufacturing employment also increased during this period, except for male workers in the interior of Mexico, with the effect stronger along the border. Maquila manufacturing firms along the border decreased their demand for characteristics held by women while increasing demand for the characteristics of male workers. Perhaps the border maquila manufacturers value more a steady workforce presumably supplied by men with families rather than women without families. Also as the maquila manufacturing process becomes more technologically advanced, workers with different skills levels may be needed. In the interior, manufacturers increased their demand for characteristics for both female and male workers, even as the level of these characteristics fell between 1989 and 1999.

Decomposition of the wage differentials between workers in the maquila and non-maquila interior manufacturing shows that both female and male workers increased their stock in unobserved (or unmeasured) characteristics over the period with the effect being more pronounced for male workers. Furthermore, these characteristics held by men appear to command a higher price (relative to women) in the border's maquila sector. Perhaps men obtain a different type of education (i.e., technically oriented) and this difference in education is not reflected in the number of years of schooling but is rather captured as an unobserved characteristic.

Segregation of women into particular maquila industries appears to have impacted their earning capacity. Changes in prices paid for work in specific manufacturing subsectors along the border between 1989 and 1999 served to lower the wage differential between maquila and interior manufacturing employment for female workers while increasing it for men. The decomposition of the gender wage differentials also reveals that maquila manufacturers pay a premium for workers characteristics and men having increased levels of these characteristics. This observation does not hold for the interior sample, partially accounting for the wage gap between maquila and interior manufacturing workers.

Finally, maquila manufacturers may value flexibility of workers (i.e., the willingness for shift work) more than interior manufacturers. Although changes in the levels of household structures variables served to narrow the gender wage differential along the border, changes in premiums paid by employers more than offset this, further increasing the gender wage gap between 1989 and 1999. Again, this is not observed in among interior manufacturing workers.

This study examines the impact of changes within the maquiladora industry on women workers. The industry has grown rapidly in recent years, with women capturing a decreasing share of employment. Household structure apparently plays a key role in the defeminization of the maquila workforce. Women in the border-maquila area are less likely to choose manufacturing employment when they have children, while the presence of children only lowers the propensity to choose manufacturing work for women in the non-maquila interior by one-third that of the border region. This finding has significant implications for both policymakers and maquila manufacturing firms. For example, perhaps increased options for childcare might increase women's propensity to work in maquila manufacturing in the border region. Also consider that maquila wages are relatively better (compared to those earned in interior manufacturing) and this disparity has grown wider between 1989 and 1999. However, those women who do work in maquila manufacturing experienced growing disparity between their hourly earnings and those of men. Apparently women are not benefiting at the same rate as men from the relative advantages offered by the maquila industry, which appears to be the result of job segregation for women that hampers their participation in the more dynamic maquila sectors.

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Appendix
Table A1
Manufacturing Employment Decision: Female Workers
Partial Derivatives from Bivariate Probit (standard error in parentheses)

Variable	<i>Border</i>		<i>Interior</i>	
	1989	1999	1989	1999
Probability Employed in Manufacturing (given that employed)	0.4179	0.4405	0.2072	0.2241
CONSTANT	0.1567 (0.375)	-0.187 (0.181)	-0.1270** (0.052)	-0.0279 (0.041)
AGE	-0.0037 (0.012)	-0.0095 (0.009)	0.0050** (0.002)	-0.0002 (0.002)
AGE2	-0.0073 (0.015)	-0.0016 (0.012)	-0.0081*** (0.003)	-0.0027 (0.003)
SCHOOL	-0.017*** (0.006)	0.0007 (0.004)	-0.0023** (0.001)	-0.0011 (0.001)
MARRIED	0.1179* (0.064)	0.0686* (0.036)	0.0096 (0.010)	-0.0095 (0.009)
HEAD	0.1439*** (0.055)	-0.0960** (0.043)	0.0004 (0.012)	0.0025 (0.010)
PTIME	-0.2620*** (0.071)	-0.2227*** (0.054)	-0.0637*** (0.009)	-0.0354*** (0.008)
SELFEMP	-0.3069*** (0.109)	-0.2238*** (0.055)	-0.1625*** (0.016)	-0.0460*** (0.009)
TECH	-0.2673*** (0.088)	-2439*** (0.064)	-0.1428*** (0.019)	-0.0788*** (0.014)
SUPERVIS	0.7093*** (0.152)	1.0770*** (0.087)	0.4262*** (0.043)	0.4414*** (0.030)
PROD	0.7623*** (0.151)	0.8694*** (0.056)	0.5162*** (0.032)	0.3736*** (0.020)
ADMIN	-0.2652*** (0.077)	-0.3177*** (0.054)	0.0083 (0.014)	-0.0217* (0.012)
LABORER	-0.4631*** (0.099)	-0.3584*** (0.069)	-0.1372*** (0.018)	-0.1617*** (0.018)
PRESCH	-0.1199** (0.052)	-0.0514 (0.035)	0.0061 (0.011)	0.0001 (0.009)
ELEM	-0.0701 (0.045)	-0.0150 (0.037)	-0.0329*** (0.010)	-0.0110 (0.008)
TEENDAU	0.0043 (0.056)	-0.0437 (0.040)	-0.0195 (0.012)	-0.0181* (0.009)
TEENSON	-0.0318 (0.056)	0.0443 (0.039)	0.0310*** (0.011)	-0.0035 (0.009)
ADULTF	0.0091 (0.055)	0.0380 (0.042)	-0.0360*** (0.012)	-0.0135 (0.010)
ADULTM	-0.0621 (0.065)	0.0185 (0.041)	0.0115 (0.013)	-0.0076 (0.011)

Table A2
Probability of Manufacturing Employment: Male
Bivariate Probit Results: Partial Derivatives (standard error in parentheses)

Variable	<i>Border</i>		<i>Interior</i>	
	1989	1999	1989	1999
Probability Employed in Manufacturing (given that employed)	0.2769	0.3163	0.2956	0.2929
CONSTANT	0.2148*** (0.080)	0.4670*** (0.081)	-0.0793 (0.056)	-0.0523 (0.038)
AGE	-0.0086** (0.003)	-0.0194*** (0.004)	-0.0022 (0.002)	0.0025 (0.002)
AGE2	0.0070* (0.004)	0.0182*** (0.005)	0.0018 (0.002)	-0.0028** (0.002)
SCHOOL	0.0007 (0.002)	-0.0009 (0.002)	0.0016** (0.001)	0.0003 (0.001)
MARRIED	-0.0118 (0.020)	0.0013 (0.017)	0.0021 (0.009)	0.0231*** (0.009)
HEAD	0.0408* (0.023)	0.0300 (0.020)	-0.0117 (0.011)	-0.0116 (0.011)
PTIME	-0.1798*** (0.023)	-0.1328*** (0.026)	-0.1195*** (0.010)	-0.0867*** (0.009)
SELFEMP	-0.2563*** (0.018)	-0.3499*** (0.016)	-0.2521*** (0.008)	-0.1887*** (0.007)
TECH	0.0217 (0.036)	-0.0323 (0.031)	-0.1123*** (0.014)	-0.0933*** (0.015)
SUPERVIS	0.4890*** (0.049)	0.5592*** (0.042)	0.3823*** (0.020)	0.3142*** (0.017)
PROD	0.2183*** (0.032)	0.1796*** (0.026)	0.2245*** (0.011)	0.2479*** (0.012)
ADMIN	-0.1413*** (0.032)	-0.2092*** (0.027)	-0.1020*** (0.011)	-0.0585*** (0.012)
LABORER	-0.1330*** (0.033)	-0.2410*** (0.029)	-0.1897*** (0.013)	-0.1885*** (0.014)
PRESCH	0.0126 (0.019)	0.0034 (0.017)	0.0233*** (0.008)	0.0399*** (0.009)
ELEM	-0.0153 (0.017)	-0.0238 (0.016)	0.0064 (0.008)	-0.0094 (0.008)
TEENDAU	0.0036 (0.019)	0.0363* (0.020)	0.0114 (0.009)	-0.0020 (0.009)
TEENSON	-0.0367* (0.019)	0.0700*** (0.018)	-0.0157* (0.008)	0.0012 (0.009)
ADULTF	0.0368* (0.020)	0.0143 (0.020)	0.0159* (0.009)	-0.0129 (0.009)
ADULTM	-0.0326* (0.020)	0.0199 (0.018)	0.0272*** (0.009)	0.0089 (0.009)

Table A3: Female Wage Function Estimates

Variable	Maquila		Interior Manufacturing	
	1989	1999	1989	1999
CONSTANT	2.9840*** (0.235)	2.5400*** (0.151)	2.1316*** (0.166)	2.1431*** (0.166)
AGE	0.0369*** (0.008)	0.0340*** (0.006)	0.0419*** (0.007)	0.0322*** (0.008)
AGE2	-0.0509*** (0.014)	-0.0447*** (0.009)	-0.0526*** (0.011)	-0.0424*** (0.012)
SCHOOL	0.0211*** (0.004)	0.0285*** (0.003)	0.0354*** (0.004)	0.0431*** (0.005)
MARRIED	0.0186 (0.025)	0.0391* (0.020)	0.0528 (0.042)	0.0489 (0.031)
HEAD	0.0430 (0.028)	0.0675** (0.030)	0.0152 (0.055)	0.0408 (0.045)
SELFEMP	0.3089* (0.160)	0.0222 (0.231)	0.2356*** (0.089)	-0.1380*** (0.043)
PTIME	0.3131*** (0.041)	0.5964*** (0.038)	0.2261*** (0.065)	0.3271*** (0.042)
FOOD	-0.0279*** (0.071)	-0.1312 (0.085)	-0.2453*** (0.051)	-0.1753*** (0.067)
TEXTILE	-0.0131 (0.035)	-0.1318*** (0.041)	-0.0532 (0.058)	-0.1429* (0.076)
LEATHER	-0.3610*** (0.044)	-0.0484 (0.057)	-0.0184 (0.047)	-0.0180 (0.064)
FURNITURE	-0.1199* (0.071)	-0.0865 (0.106)	-0.0838 (0.076)	-0.1466* (0.077)
CHEMICAL	-0.2296*** (0.044)	-0.0852** (0.034)	-0.0270 (0.057)	-0.1076 (0.067)
AUTO	-0.0996*** (0.030)	-0.0227 (0.028)	0.0284 (0.050)	0.0891 (0.064)
TOOLS	-0.2285 (0.147)	0.0700 (0.059)	0.0091 (0.093)	-0.0578 (0.086)
APPLIANCE	-0.0705** (0.028)	0.0318 (0.026)	-0.0267 (0.050)	0.0398 (0.065)
OTHERMFG	-0.1632*** (0.058)	-0.0138 (0.045)	0.0848 (0.078)	-0.1010 (0.076)
TECH	-0.6152*** (0.227)	-0.4394*** (0.128)	-0.4363*** (0.116)	-0.5048*** (0.097)
SUPERVIS	-0.6447*** (0.202)	-0.7794*** (0.103)	-0.5942*** (0.111)	-0.6658*** (0.089)
PROD	-1.0027*** (0.201)	-0.9389*** (0.104)	-0.7582*** (0.107)	-0.8975*** (0.084)
ADMIN	-0.6973*** (0.201)	-0.5237*** (0.105)	-0.6018*** (0.104)	-0.7386*** (0.085)
LABORER	-1.0565*** (0.206)	-1.0318*** (0.124)	-0.7185*** (0.126)	-0.8327*** (0.103)
PRESCH	0.0146 (0.031)	0.0559** (0.022)	-0.0748 (0.050)	-0.0169 (0.037)
ELEM	-0.0172 (0.032)	-0.0391 (0.024)	-0.0658 (0.049)	-0.0346 (0.040)
TEENDAU	0.0543 (0.039)	-0.0295 (0.025)	-0.0542 (0.061)	-0.0137 (0.044)
TEENSON	-0.4100 (0.037)	-0.0244 (0.029)	0.0021 (0.066)	0.0768* (0.045)
ADULTF	-0.0788* (0.040)	0.0189 (0.025)	-0.0283 (0.056)	0.0771 (0.054)

ADULTM	0.0035 (0.045)	-0.0005 (0.027)	0.0701 (0.065)	-0.0607 (0.055)
R ²	.4119	0.4633	0.2893	0.3367
N	1114	1609	1714	2168

Notes: (i) Reference manufacturing industry is ELECTRON and reference occupation is PROF.

(ii) ***, ** and * indicate significance at the 1, 5, 10 percent levels, respectively, using 2-tailed tests. Standard errors in parentheses.

Table A4: Male Wage Function Estimates

Variable	Maquila		Interior Manufacturing	
	1989	1999	1989	1999
CONSTANT	2.2737*** (0.157)	2.2144*** (0.120)	2.1185*** (0.094)	2.0029*** (0.105)
AGE	0.0489*** (0.007)	0.0303*** (0.006)	0.0423*** (0.004)	0.0364*** (0.004)
AGE2	-0.0556*** (0.010)	-0.0301*** (0.008)	-0.0476*** (0.005)	-0.0405*** (0.006)
SCHOOL	0.0324*** (0.004)	0.0479*** (0.003)	0.0329*** (0.002)	0.0441*** (0.003)
MARRIED	0.0296 (0.042)	0.0505** (0.025)	0.0873*** (0.020)	0.1208*** (0.020)
HEAD	0.0153 (0.043)	0.0794*** (0.028)	0.0784*** (0.025)	0.0685*** (0.025)
SELFEMP	0.2201*** (0.069)	0.3224*** (0.073)	0.2483*** (0.033)	0.0753*** (0.020)
PTIME	0.4170*** (0.065)	0.4138*** (0.058)	0.3177*** (0.036)	0.4469*** (0.030)
FOOD	-0.1076* (0.060)	-0.1532*** (0.058)	-0.0978 (0.059)	-0.2080*** (0.058)
TEXTILE	0.0962 (0.066)	-0.0755 (0.062)	0.0230* (0.058)	-0.0804 (0.059)
LEATHER	0.0664 (0.071)	0.1104 (0.074)	0.1529*** (0.058)	0.0766 (0.057)
FURNITURE	0.1841*** (0.067)	0.0886* (0.048)	-0.0842 (0.059)	-0.1731*** (0.058)
CHEMICAL	0.1852*** (0.068)	0.0549 (0.055)	0.0005 (0.059)	0.0553 (0.058)
AUTO	-0.0007 (0.049)	0.0292 (0.037)	0.0970 (0.059)	0.0866 (0.058)
TOOLS	0.2157*** (0.064)	0.1396*** (0.052)	-0.0500 (0.068)	0.1148* (0.065)
APPLIANCE	0.0297 (0.050)	0.0435 (0.037)	0.0649 (0.063)	0.0756 (0.062)
OTHERMFG	0.1206 (0.088)	0.0154 (0.050)	-0.0764 (0.068)	-0.0775 (0.070)
TECH	-0.4616*** (0.085)	-0.4558*** (0.059)	-0.4246*** (0.063)	-0.5275*** (0.061)
PROD	-0.3545*** (0.083)	-0.4599*** (0.057)	-0.4149*** (0.049)	-0.5388*** (0.051)
OPERATOR	-0.7972*** (0.081)	-0.7930*** (0.056)	-0.7400*** (0.045)	-0.8629*** (0.048)
SALES	-0.5207*** (0.092)	-0.5616*** (0.066)	-0.5689*** (0.048)	-0.7102*** (0.052)
LABORER	-0.7804*** (0.085)	-0.8097*** (0.062)	-0.8562*** (0.048)	-0.9532*** (0.054)
PRESCH	0.0739** (0.036)	0.0192 (0.027)	0.0239 (0.020)	0.0215 (0.021)

ELEM	-0.0106 (0.036)	-0.0070 (0.028)	-0.0243 (0.018)	-0.0110 (0.019)
TEENDAU	-0.0315 (0.044)	0.0413 (0.041)	-0.0169 (0.021)	-0.0225 (0.023)
TEENSON	-0.0292 (0.046)	0.0572 (0.040)	0.0111 (0.021)	-0.0035 (0.022)
ADULTF	-0.0069 (0.044)	-0.0006 (0.034)	-0.0027 (0.021)	0.0019 (0.025)
ADULTM	0.0242 (0.056)	-0.0258 (0.033)	0.0153 (0.023)	0.0227 (0.025)
R ²	0.4753	0.5204	0.4153	0.4579
N	1451	2075	5517	5139

Notes: (i) Reference manufacturing industry is ELECTRON and reference occupation is PROF.
(ii) ***, ** and * indicate significance at the 1, 5, and 10 percent levels, respectively, using 2-tailed tests.
Standard errors
in parentheses.
