Impact of Trade Liberalisation on Female Wages in Mexico: An Econometric Analysis

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Introduction

During the past decade, the literature on women and development has focused on the growing share of female employment in manufacturing under trade liberalisation. Some writers have characterised it as female-led industrialisation and others as a process of marginalisation of women by inclusion and segregation into low-wage, low-skill sectors of the economy (Chhachhi and Pittin, 1996). This article examines the impact of trade liberalisation on female wages and employment in Mexico over the period 1987–93 in the light of these competing views.

Up to the early 1980s Mexico pursued a protectionist trade policy of import substitution. Much of the domestic market was protected by tariff and non-tariff barriers. During the 1980s the economy suffered a series of external shocks, and a change in its policies was marked by accession to full membership of the GATT in July 1986. As part of its obligations under GATT, Mexico reformed its tariff structure to bring it into line with practices in other countries. At the same time it has been dismantling its system of non-tariff barriers such as import licences and quotas. One of the most important consequences of this policy change has been the surge in trading activity. This article focuses on the impact of this dramatic change on female wages.

According to the Stolper Samuelson theorem, a reduction in trade barriers will adversely affect the scarcity factor in an economy relative to that of other countries and increase the real return to the abundant factor (in this case unskilled labour). With trade liberalisation therefore Mexico will tend to specialise in the production of goods in which it has a comparative advantage (Ricardian model), and firms in the United States may also relocate plants to Mexico to maintain their competitiveness in these goods. In most cases these will tend to be goods that are labour-intensive and with a low skill content. The volume of labour-intensive production will therefore increase and low-skilled workers in Mexico will gain in terms of higher wages and higher employment.

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Women tend to constitute a high proportion of the labour force in these industries (such as textiles, apparel, shoes, and leather products and in the *maquiladoras*) and studies identify the lower wage rates and skill requirements associated with female employment as the key to the growing proportion of women in export-oriented, labour-intensive industries.

There seems to be some agreement in the literature about the implicit connection between the export orientation of the economy and increased female employment. But at this point two divergent paths emerge. One school of thought argues that trade liberalisation results in fragmentation of the production process and the deskilling of the labour force. It defines the situation as one of female marginalisation by inclusion and segregation into low-paid jobs (Fernandez-Kelly, 1983), and sees it as the exploitation of women by the growing globalisation of the world economy. Disruptive world market forces result in a high turnover rate that adversely affects the lives of the women working in these industries. The only reason women are being recruited is because they can be paid a lower wage with fewer benefits, and because they are less likely to be unionised (Ong, 1983). According to this view, by entering the labour market women are subjected to employer discrimination (Elson and Pearson, 1981). The other school of thought thinks of it as female-led industrialisation in which women are included in the process and have much more input into decisions about working conditions than ever before (Safa, 1995). It argues that, with trade liberalisation, women in developing countries will benefit since they will be more likely to find employment, they will have access to a cash income and will have more control over their lives (Foo and Lim, 1987). In this article we hope to use econometric analysis to shed some light on this issue in the case of Mexico.

In the first section the claim that increased outward orientation of the economy results in increased female employment is examined by studying changes in the gender composition of the labour force in Mexico from 1987 to 1993. The following section focuses on the impact of trade liberalisation on the returns to human capital investment. It has been argued that the reduction in trade barriers will lead to an expansion in trade and that low-skilled workers will benefit more than highly skilled workers. This section of the article examines this hypothesis and, based on data from the National Survey of Urban Employment, shows that over the period in question wage differentials between skilled and unskilled labour either remained basically unchanged or increased rather than narrowing as the standard model predicts. These results are consistent with the results of studies of the male labour force, which have repeatedly shown (Feenstra and Hanson, 1995; Hanson and Harrison, 1995; Revenga, 1994; Robbins, 1996) that the predictions of the Stolper Samuelson theorem do not hold true in the case of Mexico where wage disparities between skilled and unskilled workers have increased over the last few years. Evidence from other developing countries (Robbins, 1994, 1995) suggests that the effects

of trade liberalisation on relative wages and income distribution are ambiguous or have run counter to the predictions from standard theory. The following section looks at shifts in relative demand for labour between export, import and non-tradeable industries and shifts in demand for labour of differing skills within industries. The final section examines gender differentials in wages and breaks down the differential into that part attributable to differences in productive endowments and that part attributable to discrimination with regard to the total labour force. The impact of trade liberalisation on the female labour force in two selected industries is then compared, with particular emphasis on the service sector.

The data

The study is based on the National Survey of Urban Employment (Encuesta Nacional de Empleo Urbano) (ENEU) of the Instituto de Estadistica, Geografia e Informatica (INEGI) for the years 1987 to 1993. The survey is conducted quarterly and provides detailed, nationally representative information on urban employment conditions at the levels of the individual and the household. Throughout the article, a subsample of the ENEU, comprising persons aged sixteen to sixty-four in wage employment, is analysed. On average, there are 30,000 observations in the subsample in each of the quarterly surveys. The wage variable is the log of monthly earnings. In order to obtain real wages the monthly income data were deflated using the Consumer Price Index appropriate for each city. The education variables are based on the highest educational qualification obtained by the respondent. There is no direct information on worker experience, so potential experience, approximated from the age and education of the worker, was used. A complete list of the education variables is as follows:

Variable	*Description*
Illit	No formal instruction
Prminc	Primary school not completed
Prmcom	Primary school completed
Sec	Less than 4 years of secondary or prevocational school
Subprof	Vocational and/or subprofessional qualification
Prof	University and /or professional qualification

The ENEU survey classifies each individual by the three digit SIC code. For the purpose of this article detailed industry-level information on export/import flows is used to reclassify the workers into three broad categories, namely, in export industries, import-competing industries and non-tradeables.

Gender composition of labour force

Using census data we find that, in 1970, 16% of Mexican women participated in the labour market; in 1979 the figure was 21% and by 1991 it had reached 31%. In the past it was young (20–24 year old) unmarried women who had the highest labour force participation, but in the 1980s and 1990s the average female participant was 30 years old and was usually married with children. Most (70%) of these women work in the services sector, with the majority working in administration, commerce, education and health, and domestic service. About 20% of the female labour force work in the manufacturing sector of the economy.

In this section we examine the claim that, with the lowering of trade barriers and greater export orientation of the economy, there will be greater demand for low skilled workers, especially women. According to the simplest version of the Heckscher-Ohlin model, under certain conditions a reduction in import barriers will cause a reallocation of labour out of the import-competing sector into the export sector. If the export sector is relatively intensive in low skilled labour, then one would expect that the relative demand for low skilled labour would increase. We find that in the case of Mexico this assumption and the prediction that flows from it do not hold. Looking at sectoral employment from 1987 to 1993 (Table 1) we find no evidence of reallocation of labour from other sectors to the export sector.

Table 1
Mexico's employment structure by trade sectors (%)

	Total		*Male*		*Female*		*% Female*	
Year	*Export*	*Non-tradeable*	*Export*	*Non-tradeable*	*Export*	*Non-tradeable*	*Export*	*Non-tradeable*
1987	10.8	66.6	12.5	62.9	7.5	73.7	31.2	61.0
1988	10.9	66.6	12.3	63.1	8.2	73.5	33.7	58.7
1989	11.5	65.0	12.7	61.3	9.2	72.3	37.3	61.0
1990	10.6	65.7	11.6	62.0	8.8	72.6	40.7	62.5
1991	9.6	67.7	10.4	64.3	8.3	73.8	45.0	64.9
1992	8.1	74.2	9.4	69.7	5.9	81.9	36.8	68.8
1993	7.5	75.8	9.0	70.9	5.2	84.0	35.4	72.4

From 1987 to 1990 the percentage of the total labour force employed in export industries remained the same. The percentage of the male labour force employed in export industries fell slightly and the percentage of the female labour force in the export sector increased, thereby increasing the share of female workers in the total labour force employed in export industries from 31% to 40%. From 1991 to 1993 the percentage of both male and female workers in

export industries dropped but the drop was more pronounced for female workers, resulting in a fall in the percentage of female workers in the total labour force working in export industries. The percentage of male and female workers in the non-tradeable sectors of the economy, primarily consisting of the service sectors, increased during this period and the percentage of female workers in the total labour force in the non-tradeable sector increased from 61% to 72%. Looking at more detailed industrial data (Table 2) we find that the share of male and female workers in almost every manufacturing industry fell during this period. In contrast, the share of male and female workers increased in almost every service industry.

Table 2
Mexico's employment structure by selected industries (%)

Industries	*Total*		*Male*		*Female*		*% Female*	
	1987	*1993*	*1987*	*1993*	*1987*	*1993*	*1987*	*1993*
Food	5.5	4.5	6.7	5.4	3.3	3.0	21.5	24.8
Textiles and apparel	3.5	2.3	3.1	1.8	4.3	3.0	43.3	50.0
Chemicals	3.8	2.9	4.7	3.7	2.2	1.8	20.1	22.5
Machinery	10.9	7.2	10.5	8.1	11.6	5.6	37.8	29.4
Trade	13.5	14.8	13.2	14.9	14.2	14.5	37.3	37.1
Rest. and hotels	4.3	5.3	3.8	4.5	5.2	6.7	42.6	47.2
Finance	5.2	5.5	4.3	4.7	6.6	6.7	45.6	46.1
Education and health	13.6	16.1	8.3	10.3	23.3	25.7	60.7	60.2
Other services	12.0	12.5	9.2	9.6	16.9	17.4	50.1	52.3
Total (all industries)	100.0	100.0	100.0	100.0	100.0	100.0	35.5	37.7

The evidence suggests that in the short run the lowering of trade barriers did not result in a sustained increase in female employment in the export sector. The total employment of male and female workers in the export sector did increase during this period but not at the same rate as the growth in total employment in the non-tradeable sector. This trend is counter to the predictions of the Stolper-Samuelson theorem.

Earnings differentials: returns to skills

The overall demand for female labour did not increase, but it is possible that the data are not specific enough and that we need to focus on the differential impact of trade liberalisation on different groups of women. Theory suggests that it will be low-skilled workers who will benefit from the lowering of trade barriers. In this section we measure the change in wage differentials between skilled and unskilled female labour over the period 1987–93 to determine whether the

demand for low-skilled female labour increased. Labour market skills can take the form of educational qualifications or experience in the labour market. We shall try to measure the changes in wage differentials due to education, while adjusting for experience. We measure the change in experience-adjusted returns to education by estimating identical human capital wage equations of the type pioneered by Mincer (1974) for each quarter from 1987 to 1993. The wage equations estimated were as follows:

$$\text{Ln(wages)}_i = \alpha + \beta_1 \text{Ed}_i + \beta_2 \text{Ex}_i + \beta_3 \text{R}_i + \beta_4 \text{H}_i + \varepsilon_I$$

Each equation explains the log of monthly wages as a function of Ed_i which is a vector of the five education dummy variables listed above, Ex_i which is a vector indicating years of experience as a fourth order polynomial, H_i which is the number of hours,[1] R_i which is a vector of regional dummies[2] and I_i which is a vector of industry dummies.[3] Fig. 1 shows the experience-adjusted estimated returns to education for the different educational categories over the period. We can observe that in the lower education categories there have been fluctuations in the returns to education but overall there does not seem to be any significant trend. In the case of workers with sub-professional and professional qualifications there has been an upward trend in the returns to skill, indicating that the wage differential between those having no qualifications and those having higher educational qualifications has increased, especially since 1990.

We recall that the Stolper Samuelson theorem had predicted that in Mexico the lowering of trade barriers could be expected to narrow the gap in wages between skilled and unskilled labour. There are several reasons why this prediction might not hold. Some people (Robbins, 1996) have looked to the shifts in the demand and supply of labour to explain movements in wages and have found that supply shifts alone do not explain the increased wage premium for skilled workers in Mexico, thus implying that demand shifts have also played a role. Others (Tan and Batra, 1997) have argued that it is skill-biased technological change that has increased the demand for skilled labour. Robbins (1995) argues that the two explanations do not have to be competing

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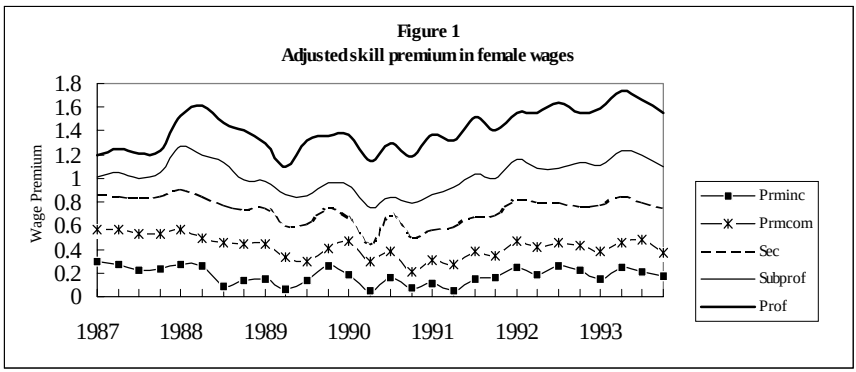
1. The wage variable is monthly earnings and since each person may have worked a different number of hours we use number of hours worked as an independent variable in the wage equation to control for the impact of the quantity of work on total monthly wages.

2. Mexico is a large country which is characterised by geographical disparities in income. The northern states along the border have had a stronger trade orientation, whereas the states in the central region have the strongest concentration of manufacturing industries. We use the regional dummy to control for changes in regional disparities in earnings.

3. There were 28 wage equations in all. All the variables had the expected signs and were significant at the 5% level. The adjusted R^2 ranged from about 0.35 to 0.50. The results are available on request.



ones, such that one could imagine skill-enhancing trade where the transfer of technology or foreign capital resulting from trade (Feenstra and Hanson, 1995) leads to a greater demand for skilled labour. This could imply either that skilled labour is a complementary input to capital or that skilled labour facilitates technological change (Pissarides, 1997).

Relative demand and supply for skills

To examine changes in relative demand we consider changes in relative labour demand that arise within industries and changes that arise between industries. The first kind refers to changes in relative factor intensities within industries arising from biased technological change, skill upgrading, and changes in industrial organisation. Inter-industry demand shifts arise, among other factors, from reallocation of labour between industries, as suggested by simple models of international trade. Following Blackburn, Bloom and Freeman (1991) we shall try to estimate the relative importance of intra-industry demand shifts and inter-industry demand shifts in explaining the rise in skill differentials, using two different methods.

One method is the shift-share decomposition[4] of the change in the returns to education between 1987 and 1993. Although detailed industrial classification yields more illuminating results, for the purposes of this article industries are classified into three broad categories, namely non-tradeables, export industries and import industries. Since we do want to focus on the sectoral shifts in relative labour demand due to reduction in trade barriers, detail has been sacrificed in order to be able to focus on the trade impact. The shift-share decomposition attributes changes in returns to education to three factors,

4. For a detailed description of both these methods see Freeman and Katz, 1995.

namely, inter-industry changes in the composition of employment, intra-industry changes and the interaction of the two effects. The difference between the total differentials, intra-industry differentials and inter-industry differentials for each educational category is presented in Table 3.

Table 3
Results of shift-share decomposition, 1987–93

	Change in Differential:	*Change in Differential due to:*	
Education	*Total*	*inter-industry*	*intra-industry*
Prminc	0.030	0.005	0.025
Prmcom	- 0.019	0.024	- 0.043
Sec	- 0.029	0.040	- 0.069
Subprof	- 0.026	0.018	- 0.044
Prof	0.161	-0.004	0.165

The total earnings differential increased significantly only for those with professional qualifications. In this category the shifts in composition of employment between industries made an insignificant contribution to the change in earnings differentials, so that most of the increase in wage differential came from intra-industry shifts in demand. This indicates that trade-driven reallocation of labour, suggested by theory, was not a strong factor in the Mexican economy over this timeframe. In fact, the export industries are not necessarily all intensive in low-skilled labour. It is also possible that the lowering of trade barriers creates an incentive for industries to use more skilled labour in an attempt to be internationally competitive.

Since the shift-share decomposition does not control for wage differentials due to experience or region, another method is used to confirm that the results of the shift-share decomposition were valid. The second method used to study the impact of shifts in relative demand for labour is a regression-based approach, in which a human capital earnings function is estimated pooling together the samples from the second quarter in 1987 and in 1993. The earnings function is of the form:

$$\text{Ln(earnings)}_i = \alpha + \beta_1 I_i + \beta_2 Ed_i + \beta_3 Ex_i + \beta_4 D_i Ed_i + \beta_5 R_i + \varepsilon_I$$

where I_i is a vector of three industry dummies (non-tradeables, exports and imports), Ed_i is a vector of the five education dummies, Ex_i is a vector indicating years of experience as a fourth order polynomial, and D_i is a dummy variable which equals 1 if observation belongs to 1993. We can compare the results of this regression with a regression that omits the industry dummies. The

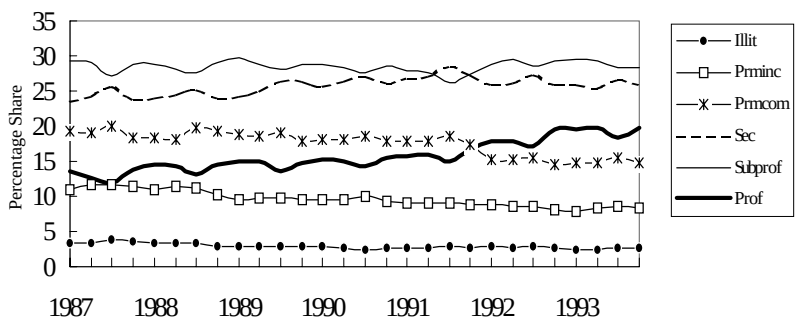
focus is on β_4 which captures the change in the returns to education between 1987 and 1993. If they are nearly identical in the two regressions, then most of the change in returns to education is captured by intra-industry shifts. The estimates of β_4 for each educational category for both regressions are given in Table 4.

Table 4
Results of regression-based decomposition

	β_4: industry dummies	*β_4: no industry dummies*	*Inter-industry effect*
Prminc	1.159	1.147	0.012
Prmcom	1.061	1.043	0.018
Sec	1.089	1.078	0.011
Subprof	1.101	1.096	0.005
Prof	1.290	1.287	0.003

The difference in the β_4 is the inter-industry effect. The results indicate that the inter-industry effect is negligible, confirming the results of the shift-share decomposition.

Figure 2
Relative supply of skills



To examine whether relative supply of the different education categories has shifted over the period 1987–93 in Mexico, let us look at a graphical representation of the relative supply of skills (Fig. 2). Since the timeframe is short, there should not be any dramatic shifts in this. The graph indicates that there has been a gentle increase in the relative supply of workers with professional qualifications and secondary schooling and a gentle decline in the relative supply of workers with lower educational qualifications. This, if anything, should have narrowed the gap between the wages of low-skilled and

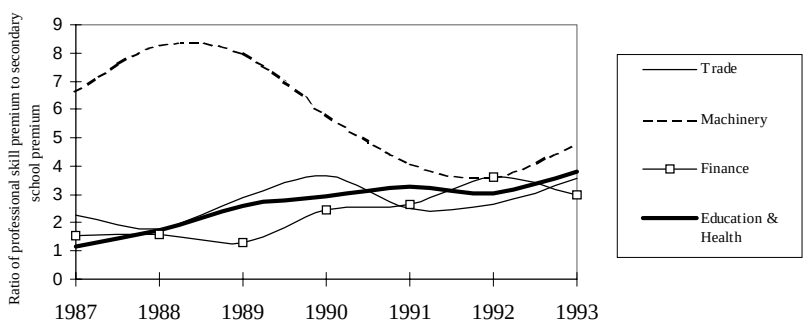
high-skilled workers instead of increasing it, implying that the changes have not been supply-driven.

Women in the services sector

Our results so far indicate that a majority of the female labour force is in the services sector and their numbers have been increasing. Employment share increased in all service industries from 1987 to 1993 for both male and female workers. Higher-skilled female workers, most of whom (over 75%) are in the services sector, have made significant gains as compared with lower-skilled workers, many of whom are in the manufacturing sector. In addition, most of the gain in wages has occurred because of intra-industry shifts in demand rather than inter-industry shifts. Therefore it might be useful to focus on female workers in the services sector and discuss the changes in women's employment and wages within these industries.

As indicated earlier, there was an increase in the female share of the total labour force in most service industries (Table 2) from 1987 to 1993. In terms of occupation, in retail trade 41% of the female labour force is classified as administrative/managerial. The corresponding number for the financial industry is 81% and for the education and health services industry 20%. About 20% of the female labour force in the services sector possess professional qualifications and 30% possess technical qualifications.

Figure 3
Adjusted skill premium in female wages for selected industries



Using the econometric methodology discussed earlier, the skill differential in wages was calculated for selected service industries. In Fig. 3 the ratio of adjusted skill premium for professional (as an education category) workers to adjusted skill premium for workers with secondary education is plotted for

selected industries from 1987 to 1993. In this case low skill is taken to be workers with secondary education, because there were not sufficient numbers of workers in the lower educational categories. We find that there was an increase in the adjusted skill premium for professionals as compared with workers with secondary education in the service industries. This analysis was repeated for manufacturing industries (see example of machinery in Fig. 3) as well, and although there was an increase in the first couple of years the skill premium fell thereafter. This suggests that much of the upward trend seen in the total labour force (Fig. 1) is due to the increase in skill premium in the service industries. Women with professional qualifications seem to do better in service industries, where the share of female workers in the total labour force is high.

Male-female wage differential

We shall now examine whether trade liberalisation has made women better-off relative to men in terms of the gender gap in wages. The female marginalisation thesis argues that there may be an increase in the demand for female labour, but not at the same wage as for men. In other words, women will be discriminated against and exploited in the labour market. On the other hand, the female-led industrialisation school argues that the increased demand for female labour would give women the opportunity to demand higher wages and better working conditions. We shall first measure the total gender differential in wages and then adopt the standard methodology used by Oaxaca (1973) to determine how much of the differential is attributable to differences in education, experience, industry and occupation, region, and number of hours worked and how much is left unexplained and is therefore roughly attributable to discrimination. There may be other relevant factors (union status, detailed industry classification) that have been omitted because of lack of data which will account for some of the unexplained differential, but the majority of it will still be attributable to discrimination. The extent of discrimination is measured in 1987 and in 1993 to see if there has been any change during this period. The estimated wage equations that serve as a basis for measuring discrimination are:

$$\text{Ln(Earnings)}_M = \Sigma\, \beta_M X_M \qquad \text{male wage equation}$$
$$\text{Ln(Earnings)}_F = \Sigma\, \beta_F X_F \qquad \text{female wage equation}$$

Each equation explains the log of monthly earnings as a function of education (prminc, prmcom, sec, subprof, prof), years of experience as a fourth order

polynomial, number of hours, regional variables and industry variables.[5] The total differential between male and female wages can be expressed as

$$\text{Total gender differential} = \Sigma \beta_M X_M - \Sigma \beta_F X_F$$

where the independent variables are measured at their mean values. The part of the total differential that is attributable to differences in the independent variables can be expressed as

$$\begin{aligned}\text{Differential due to productivity endowments} &= \Sigma \beta_M X_M - \Sigma \beta_M X_F \\ &= \Sigma \beta_M (X_M - X_F)\end{aligned}$$

where $\Sigma \beta_M X_F$ is the hypothetical expected earnings of females under the male earning structure.

This addresses the human capital model that states that wage differentials are attributable to productivity endowment differences. In other words, it is capturing that part of the wage differential that is due to women on average having lower educational qualifications and fewer years of experience, being hired in low-paid industries, working fewer hours, etc. It could be argued that women having lower productivity enhancing endowments is itself a result of societal discrimination. But in this measure of discrimination we are conceding that, even if we do not count that as discrimination, we still have a wage differential which indicates the existence of discriminatory labour market hiring and payment practices. To estimate the degree of discrimination, the differential due to productivity endowments is subtracted from the total gender differential giving us a measure of discrimination that is

$$\begin{aligned}\text{Differential due to discrimination} &= (\Sigma \beta_M X_M - \Sigma \beta_F X_F) - (\Sigma \beta_M X_M - \Sigma \beta_M X_F) \\ &= \Sigma (\beta_M - \beta_F) X_F\end{aligned}$$

The results of the estimation for the years 1988 and 1993 are presented in Table 5.

The results indicate that the total differential fell from 1987 to 1993 but not by a significant amount. The proportion of the differential attributable to endowment differences rose slightly and the proportion attributable to discrimination fell marginally. Looking at the differences in the endowments for males and females over this period (Table 6), we find that much of the differential attributable to endowment differences is due to differences in years of experience between male and female workers. Although both men and

5. Each of the variables is statistically significant at the 5% level. The adjusted R^2 for the male wage equation is 4.5 and for the female wage equation 4.2

women have gained in terms of education, women have gained more over this time period and since the return to education has increased over the period it would explain the small decrease in the wage differential between male and female labour. Much of the differential attributable to discrimination is probably due to the occupational segregation of women into low-paid jobs and discrimination in the workplace (Birdsall and Sabot, 1991).

Table 5
Results of Oaxaca decomposition, 1988, 1993

Component	*Equation*	*1988 (log)*	*1993 (log)*
Males, mean wages	$\Sigma \beta_M X_M$	5.499	6.226
Females, mean wages	$\Sigma \beta_F X_F$	5.273	6.010
Female, hypothetical mean wage	$\Sigma \beta_M X_F$	5.467	6.188
Total differential	$\Sigma \beta_M X_M - \Sigma \beta_F X_F$	0.226	0.216
Due to endowment differences	$\Sigma \beta_M (X_M - X_F)$	0.032	0.037
Due to discrimination	$\Sigma (\beta_M - \beta_F) X_F$	0.194	0.178

Table 6
Regression variable means for males and females

	Male		*Female*	
	1988	*1993*	*1988*	*1993*
Experience	17.3	16.9	13.59	9.36
Prminc	0.14	0.107	0.11	0.08
Prmcom	0.23	0.19	0.18	0.15
Sec	0.33	0.37	0.24	0.17
Subprf	0.09	0.09	0.28	0.33
Prof	0.17	0.21	0.14	0.21
Hours worked	44.98	45.97	40.78	40.05

This analysis does not allow us to capture the extent of the fall in the gender differential that can be attributed to changes in the demand for labour arising from trade liberalisation. We shall apply the shift-share decomposition, which is usually used to measure changes in relative demand for skills, to examine this question. We shall use it to explain how much of the male and female wage differentials can be explained by shifts in the relative demand for male and female labour across and within industries. We employ the same methodology described earlier but instead of using different skill categories gender categories are used. The results are given in Table 7.The results indicate that the gender differential in wages has fallen (negative sign), which confirms the results of the Oaxaca decomposition. Most of this decline in wage differential is attributable to intra-industry shifts in demand rather than inter-industry shifts in demand.

Table 7
Results of gender shift-share decomposition, 1987–93

Change in differential:	*Change in differential due to:*	
Total	*inter-industry*	*intra-industry*
- 0.152	- 0.003	- 0.149

The analysis suggests that the female-led industrialisation thesis is more relevant for skilled women, especially in the services sector. We find that there has been an increase in the employment of higher-skilled women and an increase in the returns to skill over this time period. The female marginalisation thesis is probably more relevant for lower-skilled women, especially in the manufacturing sector. These women did not see any increase in their employment or relative wages, despite the predictions made by trade theory.

A tale of two industries

In this section female wages and employment in two selected industries are compared over the years 1987 to 1993. The machinery industry, which includes electronic equipment, automobile parts, machinery parts, is selected as an example of a manufacturing tradeable industry (accounting for about 40% of total exports in 1992). The education and health services industry, which accounts for roughly 25% of the female labour force, is selected as an example of a service non-tradeable industry. This is perhaps the only industry, apart from domestic service, where female workers form a majority (60%) of the total labour force. In general, male and female workers have more years of experience and more education in the education and health industry as compared with the machinery industry. As can be seen in Fig. 3, the skill premium for professional workers as compared with secondary workers decreased in the machinery industry but rose in the service industry.

Let us look at the results of the male-female wage differential analysis,[6] using the Oaxaca decomposition as described in the previous section. In 1987 the mean female wage in the education and health industry was about the same as in the machinery industry. But in 1993 the mean female wage was higher in the service industry than in the machinery industry. The total differential in wages in 1987 was lower in the machinery industry than in the service industry.

6. All coefficients are significant at the 5% level. The adjusted R^2 ranged from 4.0 to 4.8 for the eight equations. Estimated coefficients are presented in the Appendix.

Table 8
Results of Oaxaca decomposition, 1987, 1993 in machinery industry

	Equation	*1987 (log)*	*1993 (log)*
Males, mean wages	$\Sigma \beta_M X_M$	4.841	6.241
Females, mean wages	$\Sigma \beta_F X_F$	4.783	5.991
Total differential	$\Sigma \beta_M X_M - \Sigma \beta_F X_F$	0.058	0.250
Due to endowment differences	$\Sigma \beta_M (X_M - X_F)$	- 0.014	0.116
Due to discrimination	$\Sigma (\beta_M - \beta_F) X_F$	1.248	0.134

Table 9
Results of Oaxaca decomposition, 1987, 1993 in education and health industry

Component	*Equation*	*1987 (log)*	*1993 (log)*
Males, mean wages	$\Sigma \beta_M X_M$	4.896	6.463
Females, mean wages	$\Sigma \beta_F X_F$	4.773	6.307
Total differential	$\Sigma \beta_M X_M - \Sigma \beta_F X_F$	0.122	0.156
Due to endowment differences	$\Sigma \beta_M (X_M - X_F)$	0.060	0.046
Due to discrimination	$\Sigma (\beta_M - \beta_F) X_F$	0.062	0.111

From 1987 to 1993 the total differential increased by a greater amount in the machinery industry than in the service industry such that in 1993 the differential was higher in the machinery industry as compared with the service industry. In 1987 the human capital characteristics of the female workers in the machinery industry were probably the same or better than those of the male workers (negative sign). The entire differential is therefore due to unexplained factors, such as labour market discrimination. In 1993 the human capital characteristics of the female workers in the machinery industry dropped as compared with the male workers, so that human capital now explained more of the total wage differential. This could happen if the industry was hiring more unskilled female workers and more skilled male workers, which would result in a deskilling of the female labour force as suggested by the female marginalisation thesis. In addition, the occupation structure within the machinery industry reveals that 42% of direct production workers but only 36% of supervisors are women. This suggests the existence of a kind of glass ceiling for female workers in this industry. In contrast, the human capital characteristics of female workers as compared with male workers in the service industry are much more equal; they therefore explain less of the total wage differential. But the total differential was fairly small to begin with, and there has been a very small increase in the wage differential from 1987 to 1993. This analysis confirms the hypothesis that the female-led industrialisation thesis is more applicable in the service sector and

the female marginalisation thesis is more applicable in the manufacturing sector. It also reveals the misleading nature of aggregate analysis and blanket statements about the impact of trade liberalisation on the total female labour force.

Conclusion

In this article we set out to study the impact of trade liberalisation on female wages and employment shifts in Mexico. Standard trade theory suggests that with the lowering of trade barriers the wage differential between skilled and unskilled labour should fall and women especially should gain from trade liberalisation. We estimated the experience-adjusted returns to education and found that in the higher education categories there has been an increase in the wage differential between skilled and unskilled labour. Female employment has increased slightly, but not for low-skilled women, and the male-female wage differential has fallen, but not necessarily as a result of trade liberalisation. Considering the small proportion of women in the trade sector, there has been a disproportionate amount of attention given to these women in the literature. This article calls for more focus on the female labour force in the services sector and directs research efforts towards examining the relationship between skill level, trade liberalisation and the non-tradeable sector of the economy. The evidence suggests that over the last two decades Mexico has been experiencing skill-biased technological change (indicated by the strong intra-industry shifts in demand), with increasing employment opportunities in the services sector, and this has benefited high-skilled women. This process has been accelerated by the changes in trade and domestic policies over the last few years, since increased domestic and international competition could induce technological change and could have spillover effects in the financial and other service sectors.

Going back to the question we started with, the analysis suggests that the female-led industrialisation thesis is more relevant for skilled women, especially in the services sector. We find that there has been an increase in the employment of higher-skilled women and an increase in the returns to skill over this period. The female marginalisation thesis is more relevant for lower-skilled women, who did not see any increase in their employment or relative wages despite the predictions made by trade theory.

Appendix

Results of wage equation for education and health industry, 1987

Variable	*N*	$Mean_{female}$	$Beta_{female}$	$Mean_{male}$	$Beta_{male}$
Intercept		1	3.208939	1	3.17485
Experience	2531	15.53062	0.078844	17.49851	0.068718
$Experience^2$	2531	361.981	-0.004399	468.8442	-0.00278
$Experience^3$	2531	10587.83	0.000104	15992.86	4.53E-05
$Experience^4$	2531	358601.1	-0.000000	644461.2	-2.7E-07
Prmcom	2531	0.066377	0.02464	0.124776	0.220571
Sec	2531	0.081391	0.141547	0.13194	0.309901
Tec1	2531	0.054919	0.233518	0.01194	0.386566
Tec2	2531	0.461478	0.423014	0.140299	0.511822
Prepa	2531	0.044251	0.435983	0.091343	0.382042
Prof	2531	0.258791	0.632434	0.436418	0.826435
Border Region	2531	0.13868	0.359014	0.14209	0.310257
Industrial Region	2531	0.299882	0.08741	0.286567	0.069324
Number of Hours	2531	32.20585	0.013189	35.60716	0.012362
Supervisor/Manager	2531	0.199526	-0.027249	0.122388	0.042128
Medium size firm	2531	0.019755	0.070453	0.02806	0.207131
Large size firm	2531	0.775583	0.172079	0.757015	0.132939
Government owned	2531	0.757408	0.115566	0.734328	0.120241
Foreign owned	2531	0.147373	0.102937	0.195224	0.127092

Results of wage equation for machinery industry, 1987

Variable	*N*	$Mean_{female}$	$Beta_{female}$	$Mean_{male}$	$Beta_{male}$
Intercept		1	3.909395	1	3.430758
Experience	1285	11.02568	0.018139	14.15033	0.072625
$Experience^2$	1285	195.0412	-0.000424	332.137	-0.00291
$Experience^3$	1285	4570.98	-0.000000	10176.86	4.99E-05
$Experience^4$	1285	132836.1	6.06E-08	364503	-3.1E-07
Prmcom	1285	0.293385	0.027974	0.25452	0.105828
Sec	1285	0.308949	0.09165	0.281637	0.219069
Tec1	1285	0.070817	0.084813	0.02236	0.24131
Tec2	1285	0.105058	0.217528	0.078497	0.360838
Prepa	1285	0.054475	0.206073	0.108944	0.424432
Prof	1285	0.051362	0.66421	0.126546	0.902938
Industrial Region	1285	0.135409	0.092754	0.309705	0.076107

Border Region	1285	0.677821	0.302105	0.32588	0.249067
Medium sized firm	1285	0.077821	0.063975	0.08373	0.005081
Large firms	1285	0.797665	0.085683	0.555661	0.097971
Government owned	1285	0.003891	0.179547	0.036156	-0.01181
Foreign owned	1285	0.947082	0.175354	0.715509	0.110226
Number of hours	1285	42.19689	0.002987	43.52093	0.009136
Supervisors	1285	0.105058	0.239532	0.112274	0.248098
Direct production	1285	0.024125	0.204412	0.052331	0.209194
Managerial	1285	0.133852	0.227062	0.075642	0.060042
Technical	1285	0.120623	-0.032389	0.18411	-0.04456

Results of wage equation for education and health industry, 1993

Variable	*N*	$Mean_{female}$	$Beta_{female}$	$Mean_{male}$	$Beta_{male}$
Intercept		1	4.638634	1	4.63585
Experience	6782	15.59835	0.060768	18.52786	0.079737
$Experience^2$	6782	355.4718	-0.00249	499.8417	-0.0027
$Experience^3$	6782	9992.77	4.78E-05	16634.72	4E-05
$Experience^4$	6782	327033.4	-3.4E-07	642763.4	-2.4E-07
Prmcom	6782	0.052934	0.078731	0.088721	0.142015
Sec	6782	0.091566	0.303144	0.147347	0.325949
Tec1	6782	0.025361	0.370866	0.011369	0.437346
Tec2	6782	0.372457	0.658392	0.123941	0.725959
Prepa	6782	0.06473	0.574395	0.093848	0.637266
Prof	6782	0.36995	1.027747	0.480829	1.136714
Border Region	6782	0.068859	0.243792	0.07646	0.148214
Industrial Region	6782	0.127838	-0.00202	0.118814	-0.04153
Number of Hours	6782	33.52949	0.008243	37.30094	0.008393
Supervisor/Manager	6782	0.228989	-0.02176	0.165181	0.114207
Medium size firm	6782	0.01445	0.169313	0.020508	0.080029
Large size firm	6782	0.786936	0.13413	0.801828	0.088879
Government owned	6782	0.748747	0.173928	0.756576	0.005794
Foreign owned	6782	0.139487	0.071878	0.164066	0.041028

Results of wage equation for machinery industry, 1993

Variable	*N*	$Mean_{female}$	$Beta_{female}$	$Mean_{male}$	$Beta_{male}$
Intercept		1	5.226895	1	4.82762
Experience	1483	11.47404	0.058359	14.05824	0.068919
$Experience^2$	1483	213.0883	-0.00362	318.9721	-0.00227
$Experience^3$	1483	5162.81	0.000102	9507.58	3.1E-05
$Experience^4$	1483	147400.1	-1E-06	336734.4	-1.4E-07
Prmcom	1483	0.249494	0.060784	0.204558	0.070092
Sec	1483	0.356709	0.159991	0.331739	0.231566
Tec1	1483	0.037761	0.269083	0.010974	0.367943
Tec2	1483	0.128793	0.238415	0.090321	0.40399
Prepa	1483	0.069454	0.398838	0.115644	0.445798
Prof	1483	0.0735	0.759908	0.161508	1.09803
Industrial Region	1483	0.136885	0.083615	0.193022	0.04717
Border Region	1483	0.561699	0.193332	0.259707	0.012322
Number of hours	1483	42.43965	-0.00355	44.87957	0.008153
Medium sized firm	1483	0.05327	0.064598	0.059088	-0.01944
Large firm	1483	0.809171	0.101208	0.593979	0.069354
Government owned	1483	0.00472	0.299004	0.005628	0.147234
Foreign owned	1483	0.920432	0.165285	0.750422	0.075852
Supervisor	1483	0.128793	0.218482	0.130557	0.292183
Direct production	1483	0.043156	0.393138	0.078785	0.255711
Manager	1483	0.144302	0.341555	0.101857	0.299974
Technical	1483	0.155091	-0.05221	0.2009	-0.02273

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