Widening the Border:
The Impact of NAFTA on Female Labor Force Participation in Mexico

by

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The impact of the 1994 North American Free Trade Agreement (NAFTA) on relatively disadvantaged groups, including Mexican women, has provoked heated debate for over a decade and continues to divide opinions on NAFTA's merits. This study uses a differences-in-differences approach to examine how NAFTA affected the female labor participation rate (FLP) in different Mexican regions. NAFTA increased FLP only in central Mexico, through the creation of female employment opportunities. Specifically, NAFTA caused female intensive export production to expand in central Mexico, and reduced the ability of domestic firms to discriminate against women by increasing product market competition.

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1. Introduction

The impact of the 1994 North American Free Trade Agreement (NAFTA) on relatively disadvantaged groups, including Mexican women, has provoked heated debate for over a decade and continues to divide opinion on NAFTA's merits. Some activists and social scientists have called for a halt to the trade reform process, arguing that it has reduced the number of employment opportunities available to Mexican women (IWGGT, 2000). Because few studies have specifically investigated how NAFTA influenced the Mexican female labor force, most of these arguments have been based on cross-country evidence that may not apply to Mexico. This study aims to resolve some of the controversies about the impact of NAFTA on female employment by using a differences-in-differences approach to investigate whether a causal link exists between NAFTA and changes in the female labor participation rate (FLP) in Mexico.

While there are not studies that rigorously analyze the influence of NAFTA on FLP in Mexico, the impact of export orientation on female employment opportunities in developing countries has been widely examined.[i] Several studies find a positive relationship between exports and female employment.[ii] Others argue that trade liberalization masculinizes employment through the introduction of new technologies and the reorganization of production, forces that may favor high skilled men more than women, who are generally lower skilled.[iii] These contradictory findings suggest that initial conditions matter. Accounting for initial conditions, particularly regional differences in Mexico's industrial composition, is central to this study's methodology.

Did NAFTA increase FLP in Mexico, and if so, through what channels? In order to explore these questions, I divide Mexico into three trade-impacted regions based on export performance – the north, Mexico City/Guadalajara (Jalisco), and the central states – and one control region – the south (Figure 1). NAFTA should have increased FLP most in regions experiencing the greatest expansion in female intensive export production, and in those facing the largest rise in product

market competition, a force which theory suggests will reduce discrimination against women. My identification strategy, which uses a differences-in-differences (DD) estimator to measure the influence of NAFTA on the three trade-impacted regions, is critical to observing NAFTA's true effect on FLP. Results show that NAFTA increased FLP only in central Mexico, a region that experienced a significant expansion in export production following 1994. NAFTA did not affect FLP in the north, which already specialized in export production prior to 1994, or in Mexico City and Guadalajara – Mexico's two primary domestic markets – which faced a decline in import-competing production following NAFTA, Specifically, NAFTA affected female employment in central Mexico through two channels: the expansion of export-oriented employment through a Heckscher-Ohlin trade effect, and a reduction in the ability of domestic firms to discriminate because of increased product market competition.

The rest of this paper is organized as follows: Section 2 gives an overview of the female labor force and trade liberalization in Mexico, Section 3 discusses methodology, and Section 4 describes the data. Section 5 examines whether NAFTA affected FLP and then tests three channels through which it could have had an impact: a standard Heckscher-Ohlin trade effect, decreased discrimination due to increased product market competition, and foreign direct investment. Section 6 summarizes the findings and provides suggestions for future research.

2. The Female Labor Force and Trade Liberalization

Mexican female labor participation in manufacturing has been on the rise for over half a century, first increasing in the 1940's, with the growth rate accelerating during the 1970's (Cordourier and Gomez, 2004). Data on economy-wide FLP shows that it rose from 14% in 1979 to 32% in 1989 and 42% in 1999 (*Anuario de Estadisticas del Trabajo*, 1976-79, 1989-90;

Encuesta Nacional de Empleo Urbano, 1999).[iv] FLP fell during the late 1980's because of a severe and prolonged debt crisis, but the overall trend has clearly been upward.

One of the most interesting aspects of the rise in FLP in Mexico is its recent and dramatic increase in central states (Figure 2). Starting substantially below that in the rest of the country, FLP began to converge rapidly towards the national average during the 1990's. This indicates that some force altered female labor supply, demand, or both. This study is the first to investigate whether and how NAFTA contributed to this phenomenon observed in the raw data.

Before examining how NAFTA affected FLP, a basic knowledge of Mexican trade policy is required. In the decades following World War II, Mexico used high tariff and non-tariff barriers to trade and tight restrictions on foreign ownership in accordance with import substitution policy. During the 1980's, the Mexican government began a limited but significant liberalization process that led export industries near the Mexico-U.S. border to expand and import-competing industries in Mexico City to contract. As more firms were able to acquire special import and export privileges, the share of the Mexican manufacturing labor force located in Mexico City dropped from 46% in 1980, to 29% in 1993, and to 23% in 1998. The share located in the U.S. border states rose from 21% in 1980, to 30% in 1993, and to 34% in 1998 (Hanson, 1998).

Mexico signed the North American Free Trade Agreement in 1994. It liberalized trade with the United States and Canada – which accounted for 75% of Mexican trade in 1993 – eliminating all tariffs on industrial goods by 2003. NAFTA significantly affected commodity and capital flows. Total exports, manufacturing exports, *maquila* exports, and FDI all nearly tripled between 1993 and 1999 (Table 1).[v] Beginning in 1994, there was a large shift in FDI from Mexico City to the northern region and the central states (Table 2 and Figure 3).[vi] The allocation of FDI within regions also changed. Only 4% of FDI received by central states was directed towards the *maquila* sector in 1994, whereas 65% was in 1999.

Barriers to trade and foreign investment had important gender implications. The barriers that existed prior to NAFTA led import-competing production to become highly concentrated in Mexico City and to a lesser degree in Guadalajara, the largest domestic markets in Mexico. The few existing export industries located near the Mexico-U.S. border in order to minimize transport costs to the United States, the principal export market. To the extent that export production was female (low skill) intensive and import-competing production was male (high skill) intensive, female labor participation rates should have increased most in regions where NAFTA led to the largest expansion in export production.

The existing literature sheds little light on how NAFTA potentially affected female labor participation rates. Several studies examine the female labor force in Turkey, but primarily investigate how changes in the level and volatility of GDP following reform affect FLP.[vii] Two other unpublished studies focus on Mexico. These studies do not investigate female labor participation rates but do find either a statistically significant or weakly significant reduction of the gender wage gap as a result of increased product market competition (Artecona and Cunningham, 2002; Garcia-Cuellar, 2001). Garcia-Cuellar has conducted the most extensive investigation of NAFTA's impact on the Mexican female labor force. She examines the effect of NAFTA on the low skilled gender wage gap in two trade-impacted regions – northern cities and central cities – and finds that NAFTA led the gender gap to fall in central cities. However, she focuses exclusively on wages of those with less than six years of formal education. This study will concentrate instead on the industrial labor force and female labor participation rates by individuals of all skill levels, something that has not yet been done. By so doing, it aims to resolve some of the controversies about Mexican trade policy and the female labor force.[viii]

3. Theory and Empirical Methodology

Trade liberalization should cause female labor force participation in Mexico to increase for three reasons. First, Heckscher-Ohlin/Stolper-Samuelson logic offers a direct trade effect (Samuelson, 1948). Second, increased product market competition should decrease gender-based discrimination (Becker, 1957). Third, the augmented presence of foreign employers will increase FLP to the extent that they have less taste for gender discrimination than national firms (Garcia-Cuellar, 2001). Each of the three theories will be examined, but whatever the underlying mechanisms, they all predict that FLP will increase as Mexico becomes more open.

Heckscher-Ohlin (HO) argues that opening an economy to international trade will cause production to reallocate to sectors that intensively use the economy's relatively abundant factor. According to the Stolper-Samuelson (SS) corollary, the relative price of the abundant factor will increase. If Mexico is abundant in low skilled labor, compared with its main trading partners, then HO/SS predicts that trade liberalization will cause the low skill intensive export sector to expand and the high skill intensive import-competing sector to contract. If women are less skilled on average than men, then the export sector will be disproportionately female, whereas the import-competing sector will be disproportionately male.[ix] Trade liberalization will increase FLP and female wages as demand for low skilled labor booms. This prediction is tested in Section 5.2.

This basic 2X2 model – where the two factors of production are high skilled and low skilled labor and the two goods are import-competing (high skill intensive) and export (low skill intensive) goods – has important spatial implications for Mexican production. Since Mexico was a protected economy, import-competing production situated near Mexico City and Guadalajara (the principal domestic markets), and the few existing export industries located as close as possible to the United States (the main export market). HO/SS predicts that trade liberalization will lead male intensive industries in the import-competing center to contract, whereas female intensive export

industries will expand. Displaced labor in the center will emigrate to the border region to meet increased labor demand by export industries, or these industries will expand into the center to absorb labor formerly employed by the import-competing sector. The regional expansion of employment after NAFTA and its gender implications are examined in Section 5.1.

To closer approximate reality, this simple 2X2 model can be extended to include non-tradable goods. In the 2X3 model, the Heckscher-Ohlin predictions for the import-competing and export-producing sectors remain the same. The impact of liberalization on non-tradables will depend on which factor of production this sector utilizes most intensively. Assume that it uses primarily low skilled (female) labor. Trade liberalization will increase the demand for and therefore the wage of low skilled female labor. Non-tradable goods will subsequently become more expensive, the non-tradables sector will shrink, and female employment in the non-tradables sector will decline. How much female employment will fall depends on the elasticity of demand for non-tradable goods. In contrast, trade liberalization will decrease demand for high skilled (male) labor, thus lowering the male wage. If non-tradables primarily use high skilled (male) labor, trade liberalization will make non-tradable goods cheaper, the non-tradables sector will expand, and the relative number of low skilled female employees in the non-tradables sector will fall. If the non-tradables sector contains high skill and low skill segments, these effects will occur simultaneously. Male employment will increase and female employment will decrease in the non-tradables sector as a whole. The allocation of female employment between tradable and non-tradable industries is examined in Section 5.1.

Heckscher-Ohlin is not the only force that could have been at work; changes in discriminatory hiring practices may have played a role as well. Gender-based labor market discrimination will lead firms to hire less than the profit-maximizing number of women and to pay women less than equally productive men. Such employers are said to have a “taste for

discrimination" and are willing to forgo profits to indulge this taste. In his 1957 study on discrimination, Gary Becker made the startling assertion that increased competition in the product market would reduce or eliminate discrimination in the labor market, all else equal. Becker's theory predicts that gender discrimination will decrease as a market becomes increasingly competitive, leading female participation and wages to rise. Discrimination will disappear entirely in a perfectly competitive market with zero-profits in the long run, as market pressures force firms to change their discriminatory practices or as non-discriminating firms buy out discriminating ones. If trade liberalization increases product market competition and reduces excess rents, Becker's theory suggests that it will benefit women, at least relatively, by diminishing the ability of firms to discriminate. After liberalization, female participation should increase in trade-impacted, initially concentrated (non-competitive) industries relative to trade-impacted, competitive industries. Spatially, this force should have a larger impact on female employment in the import-competing center, which faced a significant increase in product market competition after NAFTA, than in the export-oriented north. Section 5.3 will test the Becker hypothesis.

Discrimination could also affect FLP through foreign direct investment (FDI), as outlined by Garcia-Cuellar (2001) in a study of low skilled gender wage differentials in Mexico. FDI in Mexico rose significantly after NAFTA (Table 1), especially in central and northern Mexico (Table 2). Furthermore, the average participation of foreign capital in Mexican firms increased from 68% in 1990 to 82% in 1995, giving foreign investors a greater voice in female wage determination. If foreigners had less of a taste for gender discrimination than national employers, an influx of FDI would reduce discrimination and increase FLP.[x] While it has been well documented that foreign firms pay higher wages relative to domestic firms, whether they hire more women or pay women higher wages relative to men has not been extensively examined. Section 5.4 tests whether increased FDI following NAFTA caused FLP to rise.

3.2 Empirical Methodology

My objective is to determine whether NAFTA increased FLP in trade-impacted regions in Mexico, and if so, to identify the channels through which it acted. Ideally I would measure the impact of NAFTA by comparing two regions, identical in every respect except that one was affected by NAFTA and the other was not. The resulting difference in FLP would be attributable to NAFTA. While no such social experiment has been performed, econometric techniques can be used to approximate it. If there are two regions in Mexico, one affected by NAFTA and the other not, if differential changes in FLP across regions would not have occurred in the absence of NAFTA, and if workers cannot move costlessly between regions to arbitrage away differences in FLP, then a differences-in-differences (DD) estimator can be used to make causal statements about the impact of NAFTA on FLP. Each of these assumptions will be examined in turn.

I divide Mexico into three trade-impacted regions based on export performance: the export-oriented north, the central states, and import-competing Mexico City/Guadalajara (Jalisco) (Figure 1). States in southern Mexico form the control region. The DD approach requires that NAFTA had no effect on FLP in the south, and the evidence strongly suggests that southern Mexico was in fact much less influenced by NAFTA than other regions.[xi] Combined, southern states produced less than 5% of total national non-*maquila* exports and less than 1% of *maquila* exports between 1994 and 1999. Furthermore, states in the south individually received less than 0.3% of national accumulated FDI during these years. Subsistence agriculture was prevalent, and a variety of barriers, such as distance, led the south to be poorly integrated into the Mexican economy and even less integrated into the world economy. Moreover, import-competing industries had little reason to locate there because the domestic market was small. Thus, the south was minimally impacted by trade liberalization.

The second assumption necessary for the DD estimator to be valid requires that differential changes in FLP across regions would not have occurred in the absence of NAFTA. To determine whether this assumption holds I first run a linear trend test, which indicates that the trend in FLP was the same across regions before NAFTA. These results, along with linear trend tests for each of the DD regressions in this text, are discussed in Appendix A. In addition, the second assumption demands that there was not another shock that also had a regionally distinct impact on FLP. I report mean educational attainment and fertility by region in Table 1.[xii] In an idealized experiment, these values (if they influenced FLP) would be identical across regions. Otherwise, the DD estimator could attribute a rise in FLP to NAFTA that in reality resulted from a shock to one of these characteristics. Education and fertility are relatively similar across regions. Nevertheless, to test whether the modest differences in educational attainment between regions could be biasing the DD estimator, I run a robustness check that controls for educational attainment and another that interacts my after-NAFTA dummy with mean level of education. If the DD assumptions hold, results should remain similar because any shock to the returns to education would be identical across regions and thus differenced away. Results of these robustness checks are discussed in Appendix A. It is not as simple to test whether differences in fertility are biasing the DD estimator, since fertility is clearly endogenous. Fortunately, the fixed effects I use control for fertility because it was fairly similar across regions. Even if the fixed effects do not completely control for fertility because of small regional differences, it is hard to imagine a shock that had a regionally distinct impact on fertility.[xiii]

In contrast, the currency (*tequila*) crisis that Mexico underwent in December 1994 may have had a regionally distinct impact on FLP. If the large devaluation associated with the crisis improved the competitive position of export firms while worsening that of import-competing firms, or if it affected FLP more in regions well integrated into the global economy, it could bias

the DD estimator. Economic theory does not necessarily provide an answer regarding the direction of potential biases. Increased income instability of male breadwinners could "push" women into the labor force (Beneria, 1995; Salaff, 1990). Alternatively, soaring unemployment could make it difficult for women to find limited work, reducing FLP (Kabeer, 1995; Wolf, 1992).

Evidence suggests that the impact of the *tequila* crisis was short-lived compared to that of NAFTA (Krueger and Tornell, 1999).[xiv] While real output fell during the first three quarters of 1995, the economy recovered rapidly thereafter. Thus, by omitting 1995 from the sample, I can isolate to what extent the DD estimator reflects the offsetting impact of the *tequila* crisis. I also omit both 1995 and 1996, in case rapid recovery in 1996 had a regionally distinct impact on FLP. These results are discussed in Appendix A. While it is not possible to completely disentangle the *tequila* crisis and NAFTA, especially if the *tequila* crisis had a long-run differential impact on regions or industries, similar results between these regressions and the baseline specification strongly suggest that the *tequila* crisis is not significantly biasing the DD estimator.

Finally, the DD approach assumes that workers cannot move costlessly between regions to arbitrage away differences in female employment opportunities resulting from NAFTA. Such migration seems unlikely. First, FLP is as high or higher in the south as in other regions of Mexico (Figure 2). Second, evidence suggests that in Mexico, internal migration is primarily driven by differentials in male income (Garcia-Cuellar, 2001). Finally, few people from southern states migrated to other regions of Mexico between 1995 and 2000 (Universidad Panamericana, 2005). Rather, most migration in southern Mexico was directed towards the southern state Quintana Roo, where relatively high-paying tourism jobs were available.[xv]

Throughout my analysis, the outcome varies at the state-year level, whereas in some cases my data are aggregated by state, year, and industry. In these regressions, regular heteroskedastic robust standard errors are biased because they are correlated within industry groups (Williams,

2000; Moulton, 1990; Froot, 1989). If there is positive intra-industry correlation, heteroskedastic robust standard errors will be too small, whereas if there is negative intra-industry correlation, they will be too large. Thus, in calculations where data are aggregated by state, year, and industry, I cluster my standard errors by state and year to correct for intra-industry correlation. I also report standard errors clustered by state, which corrects for serial correlation in addition to intra-cluster correlation. However, it does so at a high cost for the power of my regressions, reducing the number of independent observations to 32 (the number of Mexican states). Thus, while the results are similar, I prefer the errors that are unclustered (when data are aggregated by state and year) or clustered by state and year (when data are aggregated by state, year, and industry).

One final note: my data allow me to observe only equilibrium outcomes. If rising demand is pulling women into the labor market, theory suggests that this will lead female wages to increase, which will in turn cause female labor demand to diminish. To the extent that the labor supply is less than perfectly elastic, this second order influence will partially offset the effect of the initial increase in the derived demand for female labor. The size of the offsetting force will be determined by the elasticities of derived labor demand. In any case, it should be clear that my estimates are lower bounds of the impact of NAFTA on female labor demand.

4. The Data

The primary data source used for this analysis is the National Urban Employment Survey (ENEU – *Encuesta Nacional de Empleo Urbano*), collected by the National Institute of Statistics and Geography (INEGI – *Instituto Nacional de Estadistica y Geograhpia)*.[xvi] ENEU is a quarterly survey of rotating panels that is conducted in urban zones in Mexico, beginning in 1985 with 16 zones and expanding to the 44 zones covered today. I use data from the second trimester for 1987

through 1999.[xvii] A total of 2.8 million individual observations are aggregated by state, year, and/or industry, depending on the nature of the calculations.

Data on imports, exports, and foreign direct investment are from the Secretary of Commerce and Industrial Development (SECOFI – *Secretaria de Comercio y Fomento Industrial*) and the Bank of Mexico (*Banco de Mexico)*. Data from SECOFI attribute exports and FDI to the state where the associated firm is registered, not the state where the export was actually produced or the FDI received. This over represents the exports and FDI attributable to Mexico City and the north. Thus, I do not use regionally disaggregated export and FDI data for my main calculations.

The Monthly Industrial Survey (*Encuesta Industrial Mensual*), available from 1990 onward, provides data on production values that I use in calculating import penetration ratios. I classify industries as competitive or concentrated by using price-cost margin estimates calculated by Castañeda (1996) for the period from 1970 to 1990.[xviii] I calculate factor intensity using data from the 1994 Economic Census (*Censo Economico*) and the 1990 Census (*Censo de Poblacion y Vivienda)*. Finally, I use data on gender wage differentials for U.S. sewing machine operators, obtained from a dataset based on ILO compiled data, to compare the relative abundance of low skill female labor in Mexico and the United States just prior to NAFTA.

5. Results

This section first asks whether NAFTA augmented the female labor participation rate, and if so, whether the increase occurred by job creation or by women displacing men. It also explores how NAFTA influenced the general equilibrium allocation of female employment between the tradable and non-tradable sectors. The rest of the section then identifies the three channels through which NAFTA may have affected the female labor force: a direct trade effect, a reduction of gender discrimination through product market competition, and foreign direct investment.

5.1 The Impact of NAFTA on Female Employment

Did NAFTA increase the female labor participation rate? The differences-in-differences (DD) approach compares FLP in trade-impacted and non-trade-impacted states, before and after NAFTA. Columns (1) and (6) of Table 3 report the results of the following regression: [xix]

$$FLP_{st} = \beta_0 + \beta_1 not\_south_s \delta_t + \omega_0 S_s + \rho_0 T_t + \varepsilon \qquad (1)$$

where FLP_{st} is the female labor participation rate (in all sectors) in state *s* in year *t*, not_south_s is a dummy variable equal to 1 if state *s* is not in the southern (control) region, δ_t is a dummy variable equal to 1 if the observation occurred after NAFTA, S_s is a vector of state fixed effects, and T_t is a vector of time fixed effects. Column (1) uses unclustered robust standard errors, whereas column (6) clusters the errors by state to correct for potential serial correlation.[xx] Throughout this paper, errors clustered by state are presented on the right hand side of tables. Since the results are usually similar, I only discuss those where errors are unclustered (when data are aggregated by state and year) or clustered by state and year (when data are aggregated by state, year, and industry).

The coefficient on the DD term ($not\_south_s * \delta_t$) is positive, as predicted by theory, but it is not statistically significant. This result is hardly surprising, given that trade-impacted states were not affected by NAFTA in the same way. Since those states sharing a border with the United States (the north) already specialized in export production before NAFTA, it should have had a weaker effect on female employment there than in central Mexico, which experienced a significant increase in export production after 1994. Thus, it is necessary to include DD terms for the north, the central region, and Mexico City/Guadalajara (Jalisco), referred to as DF/Jalisco.

$$FLP_{st} = \beta_0 + \beta_1 central_s \delta_t + \beta_2 north_s \delta_t + \beta_3 DF/Jalisco_s \delta_t + \omega_0 S_s + \rho_0 T_t + \varepsilon \qquad (2)$$

where $central_s$ is a dummy variable equal to 1 if state *s* is in the central region, $north_s$ is a dummy variable equal to 1 if it is in the north, and $DF/Jalisco_s$ is a dummy variable equal to 1 if it is the

Federal District, Mexico State, or Jalisco. The other terms are as defined in regression (1). Column (2) of Table 3 reports that the coefficient on the interaction term between δ_t and $central_s$ is positive and significant at the 5% level, indicating that NAFTA caused FLP in the central states to increase by 1.8 percentage points. This was a significant change given that FLP there was 35% in 1993.

On the other hand, the interaction terms for the north and DF/Jalisco are not statistically significant. This at first seems surprising since the north specialized in export production prior to NAFTA, and thus one might expect trade liberalization to have had the biggest impact on northern employment. This contrary result suggests that export industries expanded in central Mexico, employing labor shed by import-competing firms and pulling individuals into the labor force, rather than labor migrating to the north where jobs might otherwise have been created. If this was the case, then much of the rise in female employment in central Mexico may have resulted from the creation of female-intensive export-oriented employment. In order to examine whether the rise in FLP in the central region occurred by job creation, by women displacing men, or both, I compare the change in regional employment after NAFTA to the change in female intensity (the percentage of employees in state *s* in year *t* that was female).

I first calculate the change in total employment after NAFTA in the trade-impacted regions, as compared to the control region, through regressing the right-hand side variables from regression (2) on log total employment in state s in year t. The results are presented in column (3) of Table 3. The coefficient on $central_s*\delta_t$ is positive and statistically significant at the 5% level, indicating that there was a 19.2% employment increase in central Mexico after NAFTA, relative to the control region. The coefficient on $DF/Jalisco_s*\delta_t$, on the other hand, is negative and statistically significant at the 10% level, implying that NAFTA led employment to decline by 14.8% in Mexico City and Guadalajara. The coefficient on $north_s*\delta_t$ is not statistically significant.

This suggests that NAFTA caused import-competing manufacturing in Mexico City and Guadalajara to contract, as predicted by Heckscher-Ohlin. Export production expanded in the central states, rather than labor migrating to the border states. This could have occurred because labor was immobile or because the central states had better infrastructure. Production expanded in smaller central cities, rather than in Mexico City and Guadalajara, probably to avoid congestion costs. Tax incentives also encouraged production outside of Mexico City (Hanson, 1998).

I then assess whether female employment growth outpaced total employment growth, by regressing the same right-hand side variables as used above on female intensity. The results are presented in column (4) of Table 3. None of the interactions between the after-NAFTA and region dummies are significant, implying that NAFTA did not cause a change in female relative to male employment. Thus, the augmentation of FLP in the central region did not occur by women displacing men but rather by job creation.

While NAFTA did not affect overall FLP in the north or Mexico City, did it affect the allocation of female employment between tradable and non-tradable industries? Since 55% of Mexicans in 1993 were employed in (mostly) non-tradable services, how liberalization affected the allocation of female employment between sectors is central to understanding the general equilibrium effects of NAFTA. Theory suggests that trade liberalization should cause female intensity to fall in the non-tradables relative to the tradables sector. Alternatively, a well-known study by the United Nations Development Fund for Women (UNIFEM) argues that NAFTA led to the masculinization of the *maquila* labor force in the north (UNIFEM, 1998) through the introduction of skill-biased technology favoring high skilled men. The following regression examines the allocation of female employment, using a triple differences (DDD) estimator:

$$FI_{sti} = \beta_0 + \beta_1 tradables_i \delta_t + \beta_2 R_s \delta_t + \beta_3 R_s tradables_i + \varphi_1 R_s tradables_i \delta_t + \omega_0 S_s + \rho_0 T_t + \phi_o I_i + \varepsilon \qquad (3)$$

where FI_{sti} is the percentage of the labor force in state *s* in year *t* in industry *i* that was female, $tradables_i$ is a dummy variable equal to 1 if the observation was in the tradables sector, defined as all manufacturing industries, R_s is a vector of region dummies (central, north, and DF/Jalisco), and I_i are industry fixed effects.[xxi] The results are presented in column 5 of Table 3.

The coefficients of central interest are on the triple interactions between the tradables, after NAFTA, and region dummies, and none of them are significant. Thus, there is little support for the view that the correlation observed in the raw data between NAFTA and the masculinization of the export-oriented labor force in the north is causal (UNIFEM, 1998). Still, why these terms are not significant is not immediately obvious. Perhaps the introduction of skill-biased (and hence gender-biased) technology mitigated the flow of low skilled women out of non-tradables into export production. A fuller understanding would require a comparison of the relative price structures within the tradables and non-tradables sectors. While this is an interesting topic for future research, it is not central to the results of this study and thus is not investigated here.

5.2 Heckscher-Ohlin/Stolper-Samuelson and the Female Labor Force

Heckscher-Ohlin/Stolper-Samuelson theory predicts that NAFTA should increase female labor force participation in Mexico if low skill females are the abundant factor. Did it? First, I examine whether low skill female (LSF) labor was the relatively abundant factor in Mexico by comparing the low skilled gender wage differentials of sewing machine operators in Mexico and the United States in 1993, the year before the implementation of NAFTA. Mexican female sewing machine operators earned 69% of what Mexican male sewing machine operators did, whereas in the United States the female wage was 88% of the male wage. This suggests that low skilled females were more abundant in Mexico, although it could also reflect less gender discrimination in

the United States. In any case, this result is consistent with existing studies of gender wage differentials (i.e. Garcia-Cuellar, 2001) that suggest that Mexico was abundant in LSF labor.

The next step in testing Heckscher-Ohlin is to calculate which industries were relatively intensive in LSF and LS labor. These calculations are made for four-digit industries for the year prior to the implementation of NAFTA (1993) and reported in columns (1) and (2) of Table 4.[xxii]

Did LSF intensive industries expand more rapidly after NAFTA than those that were not LSF intensive? The following regression examines this question:

$$LnX_{it} = \beta_0 + \varphi_1 LSF_i\, \delta_t + \rho_0 T_t + \phi_0 I_i + \varepsilon \qquad (4)$$

where LnX_{it} is log exports and LSF_i is the LSF value calculated in formula (4).[xxiii] Column (1) of Table 5 presents the results.[xxiv] The interaction between the LSF value and after-NAFTA dummy is positive and significant at the 5% level, providing evidence that exports of LSF intensive industries expanded more rapidly after NAFTA than exports of non-LSF intensive industries.

Next, I compare whether LSF intensive industries expanded more rapidly after NAFTA than those that were intensive in low skill (LS) labor in general, by repeating regression (4) using the LS values in place of the LSF values. The results are presented in the second column of Table 5. The coefficient on the interaction term between LS_i and the after-NAFTA dummy is positive and statistically significant at the 10% level, indicating that exports of LS intensive industries expanded more rapidly than exports in industries that were not LS intensive. However, the coefficient value of 1.74 on the interaction between LS_i and δ_t is smaller than the coefficient on the interaction between LSF_i and δ_t (equal to 2.22), indicating that after NAFTA, LSF intensive industries expanded even more rapidly than those intensive in LS labor in general.

In columns (3) and (4) of Table 5, I define LSF_i (LS_i) as dummy variables equal to 1 if the LSF (LS) value in industry *i* was greater than the median LSF (LS) values in my sample (.01 and .07 respectively). The results are consistent with those in columns (1) and (2). Log exports of industries with LSF values greater than the median expanded by 18.4% after NAFTA, relative to industries with LSF values below the median. Log exports of industries with LS values greater than the median expanded by 15.2% relative to industries with LS values below the median.

The expansion of LSF intensive industries should cause LSF labor to become less abundant, driving up the wage of low skilled females. Garcia-Cuellar (2001) finds that the gender wage gap decreased in industries that used LSF labor intensively, as compared to those that did not, by around 9%.[xxv] This is consistent with Stolper-Samuelson predictions. In summary, LSF intensive industries expanded relative to non-LSF intensive industries after NAFTA, leading to increased demand for LSF labor. This supports the hypothesis that FLP increased in Mexico after NAFTA at least in part because of a direct trade effect.

5.3 Competition, Discrimination, and the Female Labor Force

Part of the increase in FLP following NAFTA can be attributed to a direct trade effect, but this may not explain the whole story. The Becker model suggests that increased product market competition resulting from trade may have led firms to discriminate less against women. In order to test Becker's hypothesis, I use a triple differences (DDD) approach that examines the impact of NAFTA on female intensity in initially concentrated relative to competitive industries.[xxvi] Column (3) of Table 4 lists the price-cost margin estimates that I use to classify industries as concentrated or competitive, and column (1) of Table 6 displays the results of the following regression:

$$FI_{sti} = \beta_0 + \beta_1 concentrated_i \delta_t + \beta_2 R_s \delta_t + \beta_3 R_s concentrated_i + \varphi_1 R_s concentrated_i \delta_t + \rho_0 T_t + \omega_o S_s + \phi_o I_i + \varepsilon \qquad (5)$$

where FI_{sti} is the percentage of employees that was female and $concentrated_i$ is a dummy variable equal to 1 if industry *i*'s price-cost margin was significantly above 1.[xxvii] The coefficients of interest in Table 6 are the triple interaction terms between concentration, region, and the after-NAFTA dummy. These terms are all positive and highly significant, indicating that female intensity increased more in concentrated, trade-impacted industries than in competitive, trade-impacted industries as a result of NAFTA. This provides strong support for the Becker model. [xxviii]

The results above indicate that increased product market competition resulting from NAFTA led firms to discriminate less against women, causing female intensity to increase in initially concentrated industries. While this approach illuminates an increase in the percentage of employees that was female, it does not reveal whether the Becker effect increased the level of female employment. In order to investigate this question, I regress the right-hand side variables from equation (5) on the log number of employees in state *s* in year *t* in industry *i*. The results are displayed in Table 6. In column (2), the sample is restricted to females, and in column (3), to males. The triple interactions between region, concentration, and the after-NAFTA dummy tell how much either female (column (2)) or male (column (3)) employment changed in initially concentrated as compared to competitive industries, relative to the control region, after NAFTA.

In column (2) where the sample is restricted to females, none of the triple interaction terms are statistically significant. This indicates that while the Becker effect increased female intensity, it did not increase the level of female employment. In contrast, in column (3) where the sample contains only males, the triple interaction terms are negative and statistically significant at the 1% level for the central and Mexico City regions and at the 10% level for the north. In the central states, Mexico City, and Guadalajara (Jalisco), NAFTA led male employment to fall by 27.5% in concentrated industries. In the north, this decline was 19.7%. The coefficients on the central and DF/Jalisco regions are most likely larger than the one on the north because these regions

specialized in non-competitive, import-competing production prior to NAFTA. These results confirm the predictions of both Heckscher-Ohlin and the Becker model. NAFTA led the labor force in concentrated, import-competing industries to contract, as Heckscher-Ohlin predicts. Furthermore, in accordance with the Becker model, female intensity in concentrated relative to competitive industries increased. While female employment did not change in initially concentrated relative to competitive industries in any of the regions, NAFTA led overall female employment to expand in the central region through a Heckscher-Ohlin trade effect.

5.4 Foreign Direct Investment and the Female Labor Force

NAFTA could have reduced gender discrimination in Mexican labor markets not only through increasing product market competition but also by expanding foreign ownership and participation in Mexican firms. If foreign managers were less discriminatory against women than national employers, NAFTA should have increased female intensity in firms that experienced increased foreign participation relative to those that did not.

Mexican FDI is highly concentrated within certain regions and industries (Table 2). Thus, I examine whether NAFTA caused female intensity to increase in high FDI industries within high FDI regions. Table 8 reports the results of the following regression:

$$FI_{sti} = \beta_0 + \beta_1 high\_FDI_i\delta_t + \beta_2 R\_FDI_s high\_FDI_i + \beta_3 R\_FDI_s\delta_t + \varphi_1 R\_FDI_s high\_FDI_i\delta_t + \rho_0 T_t + \omega_0 S_s + \phi_0 I_i + \varepsilon \quad (6)$$

where R_FDI_s is a vector of region dummies (central, north, and DF/Jalisco), classified based on receipt of FDI (see Appendix B and Figure 3), and $high\_FDI_i$ is a dummy variable equal to 1 if industry *i* is a high FDI industry.[xxix]

The coefficients on the triple interaction terms – displayed in column 1 of Table 8 – indicate whether NAFTA caused female intensity to increase in high FDI industries located within high FDI regions. None of the coefficients are statistically significant. This could plausibly

indicate that foreign and domestic firms had an equal taste for gender discrimination, but it may also result from shortcomings of FDI data, which is attributed to the state in which the parent company is registered, not the state that contains the firm that actually received the FDI.

Another potential problem with the regression above is causality, since high FDI industries in high FDI regions may have been the same industries that were intensive in LSF labor or the same industries that were concentrated prior to NAFTA. I test this hypothesis by regressing the interactions between the high FDI region and the high FDI sector dummies on my LSF intensive values and on the concentration dummy. The results are presented in columns (2) and (3) of Table 7. The central and Mexico City interaction terms are not significant in either column, but the interaction term for the north is positive and significant in both columns, implying that in the north, high FDI industries were more LSF intensive than low FDI industries (probably because of the many *maquiladoras* located there) and were also more likely to be concentrated prior to NAFTA. Thus, it would be difficult to separate the role of FDI in the north from a direct trade effect or from product market competition, even if good FDI data were available.[xxx]

VI. Conclusion

NAFTA led the female labor participation rate to increase in central Mexico, where industries shifted from operating in a protected, import-competing environment to one that was export-oriented. The Heckscher-Ohlin (HO) theorem offers an explanation of why this occurred, which this paper's empirical analysis supports. As predicted by HO, industries intensive in low skill female (LSF) labor, Mexico's abundant factor, expanded more rapidly after NAFTA than non-LSF intensive industries, increasing demand for female labor in central Mexico. In addition, this study finds evidence that increased product market competition resulting from NAFTA reduced employer discrimination against women, increasing the percentage of employees who

were female in concentrated relative to competitive industries. This phenomenon is termed the Becker effect. There is little evidence that increased FDI affected female employment.

How much of the increase in FLP in central Mexico was due to the Heckscher-Ohlin trade effect and how much to the Becker effect? To answer this question, I decompose the impact of these forces on FLP (Appendix A). Consistent with Section 5.3, the decomposition shows that the Becker effect did not contribute to the increase in FLP. While it led concentrated industries to shed male labor, relative to female labor, thus preventing a female employment decline in contracting import-competing industries, it did not lead to a concomitant increase in absolute levels of female employment. Concentrated industries employed 86% of Mexican female manufacturing employees in 1993. On the other hand, the Heckscher-Ohlin trade effect caused FLP to increase by 1.73% in central Mexico, explaining an overwhelming 94% of the increase in FLP.

There are many questions that this study leaves to future research. Data limitations preclude an investigation of agriculture, which employed 24% of the Mexican labor force in 1993. Future investigations could also examine more carefully the general equilibrium spillover effect of NAFTA on FLP in non-tradable services, and the impact of NAFTA on tradable services. Finally, this study does not examine working conditions. Whether NAFTA was good for Mexican women depends not only on participation rates and relative wages, but also on the conditions in which women work on a daily basis. Yet even in the absence of further investigation, existing evidence provides a strong challenge to those who claim that NAFTA has been bad for Mexican women. This study, combined with that of Garcia-Cuellar (2001) on gender wage differentials, strongly suggests that NAFTA created more and relatively higher-paying employment for Mexican women than would have been available in the absence of trade liberalization.

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Appendix A: Trend and Robustness Checks and Decomposition

The results of all tests described below are available from the author upon request.

Trend Checks

I run the following common linear trend test for regression (2):

$$FLP_{st} = \beta_0 + \beta_i X_{st} + \gamma_1 Yr_t * \alpha_t + \gamma_{2i} Yr_t * R_s + \varphi_i Yr_t * R_s * \alpha_t \qquad (7)$$

where FLP_{st} is the female labor force participation rate, X_{st} are the right hand side variables in regression (2), Yr_t is a year variable, R_s is a vector of region dummy variables, and α_t is a dummy variable equal to 1 if the observation occurred before NAFTA (1987 – 1993). None of the interaction terms are statistically significant, implying that the common trend assumption holds.

For regression (3):

$$FI_{sti} = \beta_0 + \beta_i X_{sti} + \gamma_{1i} Yr_t * R_s + \gamma_2 Yr_t * \alpha_t + \gamma_3 Yr_t * tradables_i + \gamma_{4i} Yr_t * R_s * \alpha_t + \qquad (8)$$

$$\gamma_{5i} Yr_t * R_s * tradables_i + \gamma_6 Yr_t * \alpha_t * tradables_i + \varphi_i Yr_t * R_s * \alpha_t * tradables_i$$

where FI_{sti} is female intensity, X_{sti} are the right hand side variables in Regression (3), and $tradables_i$ is a dummy variable equal to 1 if industry i is in the tradables sector. The interaction terms for the central and north regions are insignificant, indicating that the assumption of a common linear trend in female intensity prior to NAFTA holds for these two regions. In contrast, the interaction for Mexico City/Guadalajara is statistically different from zero, suggesting that the results for this region should be interpreted with caution. The significant coefficient on Mexico City/Guadalajara is most likely the result of deindustrialization in Mexico City.

For regression (4):

$$LnX_{it} = \beta_i X_{it} + \gamma_1 Yr_t * LSF_i + \gamma_2 Yr_t * \alpha_t + \varphi_i Yr_t * LSF_i * \alpha_t \qquad (9)$$

where LnX_{it} is log exports, X_{it} are the regressors included in (4), and LSF_i (LS_i) is the LSF (LS) value. The triple interaction terms are not statistically significant, indicating that exports followed

the same linear trend in both LSF (LS) intensive and non-LSF (LS) intensive industries prior to NAFTA.

And for regression (5):

$$FI_{sti} = \beta_i X_{sti} + \gamma_{1i} Yr_t * R_s + \gamma_2 Yr_t * \alpha_t + \gamma_3 Yr_t * concentrated_i + \gamma_{4i} Yr_t * R_s * \alpha_t + \quad (10)$$

$$\gamma_{5i} Yr_t * R_s * concentrated_i + \gamma_6 Yr_t * \alpha_t * concentrated_i + \varphi_i Yr_t * R_s * \alpha_t * concentrated_i$$

Where FI_{sti} is female intensity, X_{sti} are the right hand side variables in regression (5), and $concentrated_i = 1$ if industry i had a price-cost margin ratio significantly above 1 prior to NAFTA. The coefficients on the interactions for the central and DF/Jalisco regions are insignificant, indicating that female intensity in concentrated relative to competitive industries followed a common linear trend in these regions. In contrast, the coefficient on the interaction for the north is statistically significant at the 5% level. This implies that the results for this region should be interpreted with caution.

Robustness Checks

In order to examine whether the change in FLP in the central region was the result of NAFTA or another exogenous shock, I run five robustness checks for regression (2). In the first regression, I change the cut-off date for the after-NAFTA dummy to 1996 (two years after the actual policy change).[xxxi] Because the pre- and post-NAFTA estimates are now a combination of true pre- and post-NAFTA observations, I expect the coefficients on the interaction terms between the after-NAFTA dummy (δ_t) and the region dummies to be of a much smaller magnitude. The $central_s * \delta_t$ term is no longer significant, as expected if the original specification was correct. The $north_s * \delta_t$ term remains statistically insignificant. However, the $DF/Jalisco_s * \delta_t$ term, which was not significant in the regression where δ_t was correctly specified, is now negative and statistically significant at the 10% level (although the point estimates and errors remain fairly similar). This

indicates that import-competing production in Mexico City declined into the late 1990's. Even if these jobs were male intensive, their loss reduced the total number of employment opportunities available for both men and women.

The second robustness check drops 1995, the year most affected by the *tequila* crisis, from the sample. Then, the third check drops both 1995 and 1996 to test whether the DD estimator could be picking up the quick recovery from the *tequila* crisis. The results remain nearly identical for the central states and the north. In contrast, the coefficient on $DF/Jalisco_s * \delta_t$, which was not significant before, becomes negative and significant at the 10% level. This reflects the general decline of import-competing production there. Although the impact of this decline on FLP was mitigated by some force at play in 1995, which may or may not have been related to NAFTA, the decline continued into the late 1990's. Finally, educational attainment and an interaction between the mean education in 1993 by state and the after-NAFTA dummy are added. [xxxii] The results remain the same. In summary, these tests strongly indicate that the DD assumptions hold for the regions examined, with the possible exception of Mexico City and Guadalajara (Jalisco).

I then repeat the same five robustness checks for regression (3). The results strongly indicate that the DDD assumptions hold for all regions. In order to test for the robustness of regression (4), 1995 and then both 1995 and 1996 are dropped from the sample. The results remain similar, indicating that regression (4) is detecting the lasting effect of NAFTA, not the temporary impact of the *tequila* crisis. Finally, I run the five robustness checks as described above for regression (5). Once again, the results strongly indicate that the required assumptions hold.

Decomposition

In order to decompose the forces that led FLP to increase in the central region, I run the following regression, limiting the sample to central states:

$$Female\_employment_{sti} = \beta_0 + \beta_1 LSF_i \delta_t + \beta_2 concentrated_i \delta_t + \rho_0 T_t + \omega_o S_s + \phi_o I_i + \varepsilon \qquad (11)$$

Where $Female\_employment_{sti}$ is the number of female employees in state *s*, in year *t*, in industry *i*, LSF_i is the low skill female intensiveness value of industry *i*, $concentrated_i$ is a dummy variable equal to 1 if industry *i's* price cost margin is significantly greater than 1, T_t are time fixed effects, S_s are state fixed effects, and I_i are industry fixed effects. Consistent with the results of Section 5.3, the coefficient on $concentrated_i$ is not significant. While the Becker effect led concentrated industries to shed male labor, relative to female labor, it did not cause a concomitant increase in absolute levels of female employment. On the other hand, the coefficient on LSF_i is significant at the 5% level, indicating that the Heckscher-Ohlin trade effect did contribute to the observed increase in female employment.

In order to decompose how much of the increase in FLP in the central region was due to the Heckscher-Ohlin trade effect, I first multiply β_1 (equal to 118.31) by the mean LSF value in my sample (0.020). The result, equal to 2.394, gives the average increase in female employment due to the trade effect within each state-year-industry cell. To compare this to the change in the female labor participation rate, I first multiply this result by the average number of industries within each state-year cell, restricting the sample to post-NAFTA observations from the central region. Then, I divide this result by the average female population within each-state year cell (once again restricting the sample to observations that occurred after NAFTA in the central region). The result indicates that the trade effect led FLP to increase by 1.74% in the central region. This explains an overwhelming 94% of the observed increase in FLP.

Appendix B: Variables

α_t	A dummy variable equal to 1 if the observation occurred before NAFTA (1987-1993).
$central_s$	A dummy variable equal to 1 if state s is in the central region, based on export performance. States in the central region are Aguascalientes, Baja California del Sur, Colima, Durango, Guanajuato, Hidalgo, Michoacan, Morelos, Nayarit, Puebla, Queretaro, San Luis Potosi, Sinaloa, Tlaxcala, Veracruz, Yucatán, and Zacatecas. All are located in central Mexico, besides Yucatan. Collectively, central states accounted for 20% of Mexico's accumulated exports between 1994 and 1999.
$central\_FDI_s$	A dummy variable equal to 1 if state s is in the central region, based on FDI receipt. All experienced a significant increase in FDI after NAFTA. States in the central region individually received between .3% and 3% of national accumulated FDI between 1994 and 1999. They are Baja California del Sur, Durango, Guanajuato, Morelos, Puebla, Queretaro, and San Luis Potosi.
$concentrated_i$	A dummy variable equal to 1 if industry i's price-cost margin estimate is significantly above 1.
δ_t	A dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999).
$DF/Jalisco_s$	A dummy variable equal to 1 if entity s is the Federal District, Mexico State, or Jalisco. The Federal District (surrounded by Mexico State, where many Mexico City employees live) and Guadalajara, Jalisco are the two largest cities in Mexico.
$DF/Jalisco\_FDI_s$	A dummy variable equal to 1 if state s is the Federal District, Mexico State, or Jalisco.
FLP_{st}	The overall female labor force participation rate (in all sectors) in state s in year t.
$high\_FDI_i$	A dummy variable equal to 1 if industry i is a high FDI industry, receiving more than 7% of a region's 1994 to 1999 accumulated FDI.
I_i	Industry fixed effects. This study uses 74 industry branches categorized according to the Classification of Economic Activities.
$LnEmployment_{sti}$	The log number of employees in state s, in year t, in industry i.
LnX_{it}	Log exports for industry i in year t.
LS_i	The low skilled intensiveness (of both genders) of industry i.
LF_i	The number of blue-collar female workers in industry i.
LSF_i	The low skilled female intensiveness of industry i.
LT_i	The total number of blue-collar workers in industry i.
not_south_s	A dummy variable equal to 1 if state s is not in the southern (control) region, based on export performance. States in the control region are Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, and Tabasco. Combined, the control states produced less than 5% of total national non-maquila exports and less than 1% of maquila exports, between 1994 and 1999.
$north_s$	A dummy variable equal to 1 if state s is in the north region, based on exports. States in the north are Baja California, Coahuila, Chihuahua, Nuevo Leon, Sonora, and Tamaulipas. All participated in the maquila program, focusing on export production prior to NAFTA.
$north\_FDI_s$	A dummy variable equal to 1 if state s is in the north region, based on FDI. All states in the north individually received more than 3% of total national FDI after NAFTA. They are Baja California, Coahuila, Chihuahua, Nuevo Leon, Sonora, and Tamaulipas.
R_s	A vector of region dummy variables (central, north, and DF/Jalisco).
S_s	A vector of state fixed effects.
T_t	A vector of time fixed effects.
$tradables_i$	A dummy variable equal to 1 if industry i is in the tradables sector, defined as all manufacturing industries.
W_i	Total blue-collar (obrero) wages in industry i.
Y_i	The total inputs used in industry i.
Yr_t	A year variable, which takes values from 1987 to 1999.

Appendix C: Explanation of Data Sources

1) National Urban Employment Survey (ENEU - *Encuesta Nacional de Empleo Urbano)*

ENEU is a quarterly survey of rotating panels that is conducted in urban zones in Mexico, beginning in 1987 with 16 zones and expanding to the 44 zones covered today. The primary expansion was in 1992. Because the sample expanded significantly, I test for a break by regressing a time trend and an interaction between the time trend and a dummy variable equal to 1 if the year was 1992 on female labor participation for each region. The interactions are not significant, indicating that additional municipalities entering the sample are not driving my results.

ENEU uses the Classification of Economic Activities *(*CAE - *Classificacion de Actividades Economicas)* to classify industries according to a four-digit code. CAE contains nine major groupings, 74 major branches, 213 groups, and 390 sub-groups. The unit of analysis in this study is the major branch. Although CAE was revised in 1994, the changes were primarily on the sub-group level. ENEU also contains information on educational attainment. While the classification system for education was changed in 1994, data collected before and after 1994 is easily comparable through a codebook. I convert ENEU's education code into a numerical variable equal to years of schooling.

Using one quarter of each year from 1987 through 1999, I have a total of approximately 2.8 million observations. Because my primary outcomes of interest, female labor force participation and female intensity, vary at the state-year level, I aggregate the data by state, year, and/or industry, depending on the nature of the calculations.

2) Secretary of Commerce and Industrial Development (SECOFI - *Secretaria de Comercio y Fomento Industrial)*

Data on imports used in the calculation of the import penetration ratio were collected by SECOFI. The data are disaggregated by four-digit industry code. Import data are available

beginning in 1990. Data on FDI were also collected by SECOFI. The data are disaggregated by four-digit industry code and by geographic region. This desegregation can create bias, because FDI is attributed to the state in which the parent company was registered, not the state where the FDI was received. For these reasons, FDI data are not disaggregated by state for main calculations.

3) Bank of Mexico (*Banco de Mexico)*

Data on exports were obtained from the Bank of Mexico's online database. The data are available from 1991 onward and are disaggregated by 6-digit industry code. I use export data from the Bank of Mexico, instead of from SECOFI, because SECOFI data are disaggregated in a way that would bias results. (SECOFI attributes exports to the state where the parent company was registered, not the state in which the export was produced.) Calculations in Section 5.2 do not use export data disaggregated by state, and oil exports are omitted from the sample to avoid bias.

4) Monthly Industrial Survey (*Encuesta Industrial Mensual)*

Data on production values by industry used in the calculation of the import penetration ratio were obtained from the Monthly Industrial Survey, and in turn used to calculate the import penetration ratio.

5) Economic Census (*Censo Economico)*

To calculate skill intensiveness, I use the 1994 Economic Census, which contains information from 1993 on each major industry's total inputs, number of blue- and white-collar workers, and total wages.

6) 1990 Census *(Censo de Poblacion y Vivienda)*

I glean information on the percentage of workers in each of the major industry branches that was female through 1990 Census data. While the 1990 Census was collected four years prior to the Economic Census and provides information on marginally fewer industries than could be

calculated using information on blue-collar female employment from ENEU, the population is much larger and broader than the ENEU sample.

7) Price-cost margin estimates

I use price-cost margin estimates developed by Castañeda (1996) to categorize industries as competitive or concentrated (non-competitive). Castañeda calculates these estimates for the period from 1970 to 1990 using an instrumental variables approach and assuming constant returns to scale. I classify an industry as concentrated if its price-cost margin is significantly greater than one.

8) International Labor Organization (ILO) data

I use ILO data compiled by Oostendorp (2004) to calculate the gender wage differential for sewing machine operators in the United States in 1993.

Tables and Figures

Table 1: Summary Statistics

	Exports, Imports, and FDI					Mean Education by Region				Mean Fertility by Region			
	Total Exports (X)	Manuf. X	Maquila X	Imports	FDI	Central	North	DF/ Jalisco	South	Central	North	DF/ Jalisco	South
1985	11758	10129	5164	19991	3072								
1986	15179	11874	5353	18700	3647								
1987	17502	15356	6716	16852	3861	4.8	5.4	5.5		2.58	2.42	2.37	
1988	21598	18886	8544	22466	4055	4.9	5.5	5.5		2.56	2.42	2.36	
1989	25685	24056	12037	32826	4267	5.1	5.6	5.6		2.53	2.38	2.35	
1990	29688	25829	13525	37034	3357	5.2	5.8	5.7		2.51	2.36	2.33	
1991	30984	27976	12870	46541	5824	5.4	5.9	5.9		2.41	2.31	2.33	
1992	33334	31428	15374	54882	5214	5.7	6.1	6.1	5.8	2.41	2.31	2.25	2.14
1993	39523	36707	19092	62077	5060	5.8	6.2	6.1	5.8	2.39	2.31	2.24	2.13
1994	48853	46694	23374	74017	12330	6.2	6.4	6.5	6.2	2.32	2.27	2.22	2.10
1995	68422	63703	31856	79591	10412	6.2	6.4	6.4	6.2	2.32	2.27	2.22	2.08
1996	79577	76993	34219	80201	9755	6.3	6.5	6.6	6.2	2.32	2.27	2.19	2.05
1997	92998	89466	42211	97976	13314	6.4	6.6	6.8	6.4	2.27	2.29	2.16	2.00
1998	105688	101206	49229	121998	10460	6.4	6.5	6.6	6.3	2.25	2.22	2.20	2.03
1999	114865	111000	57196	127169	13587	6.5	6.5	6.6	6.3	2.24	2.23	2.13	2.04
Average: Pre-NAFTA	25028	22471	10964	34597	4262	5.3	5.8	5.8	5.8	2.48	2.36	2.32	2.14
Average: Post-NAFTA	85067	81510	39681	96825	11643	6.3	6.5	6.6	6.3	2.29	2.26	2.19	2.05

Notes: Source – Exports, imports, and FDI: Bank of Mexico. Values are in millions of 1992 U.S. dollars. Education and fertility: National Urban Employment Survey (ENEU). Regions are classified by export performance. For more information about the definition of regions by exports, see Figure 1 and Appendix B.

Table 2: FDI by Region

	Central	North	DF/Jalisco	South
1994				
% Total National FDI	0.032	0.192	0.750	0.027
% Regional FDI to *Maquila*	0.039	0.406	0.006	0.024
1995				
% Total National FDI	0.061	0.292	0.616	0.031
% Regional FDI to *Maquila*	0.031	0.524	0.014	0.069
1996				
% Total National FDI	0.055	0.247	0.672	0.026
% Regional FDI to *Maquila*	0.049	0.693	0.017	0.053
1997				
% Total National FDI	0.059	0.351	0.575	0.015
% Regional FDI to *Maquila*	0.023	0.372	0.018	0.091
1998				
% Total National FDI	0.088	0.308	0.581	0.023
% Regional FDI to *Maquila*	0.303	0.796	0.047	0.111
1999				
% Total National FDI	0.116	0.368	0.495	0.022
% Regional FDI to *Maquila*	0.649	0.946	0.201	0.421

Notes: Source – Mexican Secretary of Commerce and Industrial Development. % Total National FDI is the share of total national FDI attributed to each region. % Regional FDI to *Maquila* is the percentage of each region's FDI that went to the *maquila* sector. Regions are classified by FDI. For more information on the definition of regions by FDI, see Appendix B and Figure 3.

Table 3: The Impact of NAFTA on the Female Labor Force

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Errors Unclustered Robust				Clus. By State & Year	Errors Clustered by State				
	FLP	FLP	Log Total Emp.	Female Intens.	Female Intens.	FLP	FLP	Log Total Emp.	Female Intens.	Female Intens.
DD Int.: region and time										
not_south*δ	0.008					0.008				
	(0.007)					(0.011)				
central*δ		0.018	0.192	0.002	-0.018		0.018	0.192	0.002	-0.018
		(0.008)**	(0.095)**	(0.004)	(0.010)*		(0.011)*	(0.205)	(0.006)	(0.011)
north*δ		-0.003	-0.046	0.000	0.001		-0.003	-0.046	0.000	0.001
		(0.008)	(0.087)	(0.004)	(0.013)		(0.010)	(0.162)	(0.005)	(0.011)
DF/Jalisco*δ		-0.013	-0.148	-0.004	-0.033		-0.013	-0.148	-0.004	-0.033
		(0.009)	(0.082)*	(0.004)	(0.013)***		(0.012)	(0.269)	(0.006)	(0.010)***
DD Inter.: sector and time										
tradables*δ					0.016					0.016
					(0.017)					(0.016)
DD Int.: region and sector										
central*tradables					-0.028					-0.028
					(0.015)*					(0.012)**
north*tradables					0.032					0.032
					(0.017)*					(0.019)*
DF/Jalisco*tradables					-0.029					-0.029
					(0.017)*					(0.009)***
DDD Inter: region, sector, time										
central*tradables*δ					0.004					0.004
					(0.019)					(0.019)
north*tradables*δ					-0.022					-0.022
					(0.022)					(0.017)
DF/Jalisco*tradables*δ					0.020					0.020
					(0.021)					(0.020)
Time Fixed Effects	included	included	included	included	included	included	included	included	included	included
State Fixed Effects	included	included	included	included	included	included	included	included	included	included
Industry Fixed Effects					included					included
R-squared	0.806	0.825	0.744	0.764	0.435	0.806	0.825	0.744	0.764	0.435
Observations	299	299	300	300	16700	299	299	300	300	16700

Notes: Source - National Urban Employment Survey (ENEU). Standard errors appear in parentheses below the coefficients. The dependent variable in columns (1), (2), (6), and (7) is female labor force participation (FLP), in columns (3) and (8) it is log total employment, and in columns (4), (5), (9), and (10), it is female intensity. δ is a dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999). Not_south, central, north, and DF/Jalisco are region dummy variables. The omitted region, the south, serves as the control. Tradables is a dummy variable equal to 1 if the observation is in the tradables sector. In columns (1) through (4) and (6) through (9), data are aggregated by state and year. In columns (5) and (10), data are aggregated by state, year, and industry. Standard errors in columns (1) through (4) are unclustered robust, in column (5) they are clustered by state and year, and in columns (6) through (10) by state. Coefficients that are significantly different from 0 are denoted by the following system: *10%, **5%, and ***1%.

Table 4: Low Skill Female (LSF) and Low Skill (LS) Intensive Values and Price-Cost Margins

			LSF	LS	Price-Cost Margin
Manufact.	Food	meat	0.0051	0.0320	2.19 (0.202)*
		fruit	0.0256	0.0560	2.11 (0.387)
		wheat-based	0.0143	0.0730	2.49 (0.050)*
		flour-based	0.0234	0.0450	1.52 (0.170)*
		oil-based	0.0015	0.0200	1.66 (0.034)*
		coffee		0.0320	3.06 (0.080)*
		sugar			0.68 (0.593)
		animal food			1.54 (0.173)*
		other food	0.0326	0.0650	1.12 (0.046)*
		alcohol	0.0015	0.0430	1.88 (0.119)*
		beer		0.0670	0.88 (3.940)
		soda		0.0540	1.95 (0.607)
		tobacco	0.0075	0.0380	1.62 (0.633)*
	Textiles	hard fibers	0.0165	0.1150	1.68 (0.119)*
		soft fibers			2.96 (1.250)
		other text.	0.0167	0.1030	2.96 (0.641)*
		clothing	0.0989	0.1310	1.67 (0.215)*
		leather	0.0522	0.1470	2.25 (0.517)*
	Wood/paper	triply	0.0056	0.1090	1.99 (0.014)*
		wood	0.0197	0.1230	1.63 (0.080)*
		paper	0.0065	0.0550	1.60 (0.497)
		printing	0.0210	0.0930	1.84 (0.052)*
	Chemicals	oil ind.	0.0022	0.0250	1.42 (0.197)*
		petrochemical.	0.0009	0.0310	2.31 (0.535)
		basic chemicals			1.57 (0.103)*
		fertilizer			2.55 (0.091)*
		synthetic			1.90 (0.064)*
		pharm.	0.0193	0.0380	1.52 (0.808)
		soap		0.0540	2.54 (0.351)*
		other chem.	0.0091	0.0410	2.23 (0.106)*
		rubber	0.0155	0.1150	2.98 (0.383)
		plastic	0.0337	0.0990	1.83 (0.385)
	Minerals	glass	0.0118	0.0940	1.86 (0.097)*
		cement			1.43 (0.108)*
		mineral	0.0082	0.1170	2.41 (0.590)
	Basic metal	steel	0.0004	0.0250	1.61 (0.090)*
		metal	0.0020	0.0330	2.14 (0.118)*
	Metal prod.,	furniture	0.0161	0.1300	1.77 (0.212)*
	Machinery &	metal struct.	0.0033	0.1140	2.01 (1.050)
	Equipment	other metal	0.0131	0.0920	1.79 (3.650)
		machinery	0.0146	0.0930	1.90 (0.108)*
		household elec.	0.0337	0.0730	1.18 (0.261)*
		electronic	0.1023	0.1500	1.79 (0.250)*
		elec. machinery	0.0720	0.1180	1.77 (0.076)*
		other machinery		0.1450	
		elec. equipment			1.73 (0.203)*
		autos			1.10 (0.124)*
		auto parts	0.0243	0.0680	1.92 (0.065)*
		transport. equip.	0.0287	0.1090	2.61 (0.399)*
		other manuf.	0.0448	0.1200	1.91 (0.155)*
		electricity	0.0016	0.0860	
Utilities &		commerce	0.0008	0.0060	
Commerce		restaurant/hotel	0.0341	0.0670	
		transportation	0.0015	0.1030	
Transportat.		financial	0.0042	0.0090	
Services		real estate	0.0069	0.0350	
		professional	0.0101	0.0470	
		education	0.0141	0.0290	
		entertainment	0.0096	0.0350	
		repair	0.0337	0.0780	

Notes: Sources - Inputs and Wages: 1994 Economic Census. Fraction of blue-collar workers that was female: 1990 Census. Price-cost margins: Castañeda (1996). For price cost-margin calculations, standard errors are in parentheses. Price-cost margins significantly above one at the 5% level are denoted by *.

Table 5: Skill Intensity, Exports, and Female Employment

	Unclustered Robust Errors				Errors Clustered by Industry			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable: Log Exports	Low Skill Female (LSF) Intensive	Low Skill (LS) Intensive	LSF Intensive LSF>.01	LS Intensive LS>.07	LSF Intensive	LS Intensive	LSF Intensive LSF>.01	LS Intensive LS>.07
LSF*δ	2.220		0.184		2.220		0.184	
	(1.167)**		(0.073)***		(2.026)		(0.155)	
LS*δ		1.743		0.152		1.743		0.152
		(1.047)*		(0.078)**		(2.141)		(0.160)
Time Fixed Effects	included	included	included	included	included	included	included	included
Industry Fixed Effects	included	included	included	included	included	included	included	included
R-Squared	0.982	0.978	0.163	0.068	0.982	0.978	0.163	0.068
Observations	243	297	243	297	243	297	243	297

Notes: Sources – Exports: Bank of Mexico. Inputs and Wages: 1994 Economic Census. Fraction of blue-collar workers who are female: 1990 Census. Standard errors appear in parentheses below the coefficients. The dependent variable in all columns is log exports. δ is a dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999). Data are aggregated by industry and year. In columns (1), (2), (5), and (6), LSF and LS are equal to the calculated LSF and LS values in Table 4. In columns (3) and (7), LSF is a dummy variable equal to 1 if the LSF value is greater than 0.01. In columns (4) and (8), LS is a dummy variable equal to 1 if the LS value is greater than 0.07. Standard errors in columns (1) through (4) are unclustered robust. Standard errors in columns (5) through (8) are clustered by industry. Coefficients that are significantly different from 0 are denoted by the following system: *10%, **5%, and ***1%.

Table 6: Product Market Competition

	Errors Clustered by State and Year				Errors Clustered by State			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Female Intensity: Price Cost Margin	Log Female Employ.	Log Male Employ.	Female Intensity: Import Pen. Ratio	Female Intensity: Price Cost Margin	Log Female Employ.	Log Male Employ.	Female Intensity: Import Pen. Ratio
DD Interactions: region and time								
central*δ	-0.089	0.022	0.406	-0.032	-0.089	0.022	0.406	-0.032
	(0.023)***	(0.114)	(0.104)***	(0.028)	(0.022)***	(0.134)	(0.164)**	(0.026)
north*δ	-0.091	0.049	0.247	-0.037	-0.091	0.049	0.247	-0.037
	(0.027)***	(0.135)	(0.113)**	(0.029)	(0.024)***	(0.158)	(0.145)*	(0.026)
DF/Jalisco*δ	-0.072	-0.129	0.137	-0.038	-0.072	-0.129	0.137	-0.038
	(0.026)***	(0.127)	(0.124)	(0.030)	(0.023)***	(0.205)	(0.240)	(0.026)
concentration and time								
concentration*δ	-0.100	0.006	0.258	-0.001	-0.100	0.006	0.258	-0.001
	(0.027)***	(0.128)	(0.077)***	(0.001)	(0.036)***	(0.142)	(0.063)***	(0.001)
region and concentration								
central*concentration	-0.088	-0.335	-0.257	0.000	-0.088	-0.335	-0.257	0.000
	(0.018)***	(0.117)***	(0.082)***	(0.001)	(0.022)***	(0.156)**	(0.126)**	(0.001)
north*concentration	-0.076	0.105	0.136	-0.001	-0.076	0.105	0.136	-0.001
	(0.022)***	(0.131)	(0.086)	(0.0004)**	(0.027)***	(0.216)	(0.144)	(0.0005)*
DF/Jalisco*concentration	-0.097	-0.334	-0.247	-0.001	-0.097	-0.334	-0.247	-0.001
	(0.021)***	(0.114)***	(0.080)***	(0.0004)**	(0.020)***	(0.160)**	(0.094)***	(0.0005)*
DDD Inter: region, concentration, time								
central*concentration*δ	0.098	0.090	-0.275	0.000	0.098	0.090	-0.275	0.000
	(0.030)***	(0.143)	(0.098)***	(0.001)	(0.038)**	(0.153)	(0.093)***	(0.001)
north*concentration*δ	0.093	0.000	-0.193	0.000	0.093	0.000	-0.193	0.000
	(0.033)***	(0.163)	(0.108)*	(0.001)	(0.038)**	(0.157)	(0.100)*	(0.001)
DF*concentration*δ	0.078	-0.080	-0.276	0.001	0.078	-0.080	-0.276	0.001
	(0.031)**	(0.143)	(0.096)***	(0.001)	(0.037)**	(0.159)	(0.073)***	(0.001)
Time Fixed Effects	included	included	included	included	included	included	included	included
State Fixed Effects	included	included	included	included	included	included	included	included
Industry Fixed Effects	included	included	included	included	included	included	included	included
R-Squared	0.349	0.518	0.518	0.349	0.349	0.518	0.518	0.349
Observations	10876	10410	10410	10876	10876	10410	10410	10876

Notes: Sources – Female intensity and employment data: National Urban Employment Survey (ENEU). Price-cost margin ratios: Castañeda (1996). Imports: Bank of Mexico. Production Values: Monthly Industrial Survey. The dependent variable in columns (1), (4), (5), and (8) is female intensity, equal to the percentage of workers that was female. The dependent variable in columns (2) and (6) is log female employment, and in columns (3) and (7) is log male employment. δ is a dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999). North, central, and DF/Jalisco are region dummies. Concentration is a measure of industry concentration. In columns (1) to (3) and (5) to (7), the measure of concentration used is the price-cost margin ratio, and in columns (4) and (8), the measure used is the import penetration ratio. In columns (1) to (3) and (5) to (7), concentration equals 1 if an industry's price-cost margin ratio prior to NAFTA was significantly greater than 1. In columns (4) and (8), concentration equals the import penetration ratio, calculated as imports divided by imports plus output, without taking into account *maquila* imports and output. Data are aggregated by state, year, and industry. Standard errors are clustered by state and year in columns (1) through (4), and by state in columns (5) and (8).

Table 7: Causality Test for 5.3 and 5.4

	(1)	(2)	(3)
	Low Skill Female (LSF)	LSF	Concentration
Concentrated	0.000		
	(0.0001)		
Constant	0.020		
	(0.002)***		
central_FDI*high_FDI		0.002	0.001
		(0.001)	(0.024)
north_FDI*high_FDI		0.009	0.106
		(0.001)***	(0.022)***
DF_FDI*high_FDI		0.000	0.032
		(0.001)	(0.021)
R-Squared	0.003	0.011	0.006
Observations	140	4412	4306

Notes: Source – Inputs and Wages: 1994 Economic Census. Fraction of blue-collar workers who were female: 1990 Census. Price-cost margin ratios: Castañeda (1996). Employment data: National Urban Employment Survey (ENEU). Standard errors are in parentheses below the coefficients. The dependent variable in columns (1) and (2) is low skill female (LSF) intensiveness. The dependent variable in column (3) is concentration, a dummy variable equal to 1 if the industry's price-cost margin ratio before NAFTA was significantly greater than 1. The sample is restricted to the years before NAFTA (1987-1993). Central_FDI, north_FDI, and DF_FDI are region dummy variables. The omitted region, the south, serves as the control. high_FDI is a dummy variable equal to 1 if the observation is from a high-FDI sector. δ is a dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999). Standard errors in Column (1) are unclustered robust and in Columns (2) and (3) are clustered by state and year. Coefficients that are significantly different from 0 are denoted by the following system: *10%, **5%, and ***1%.

Table 8: Foreign Direct Investment and Female Intensity

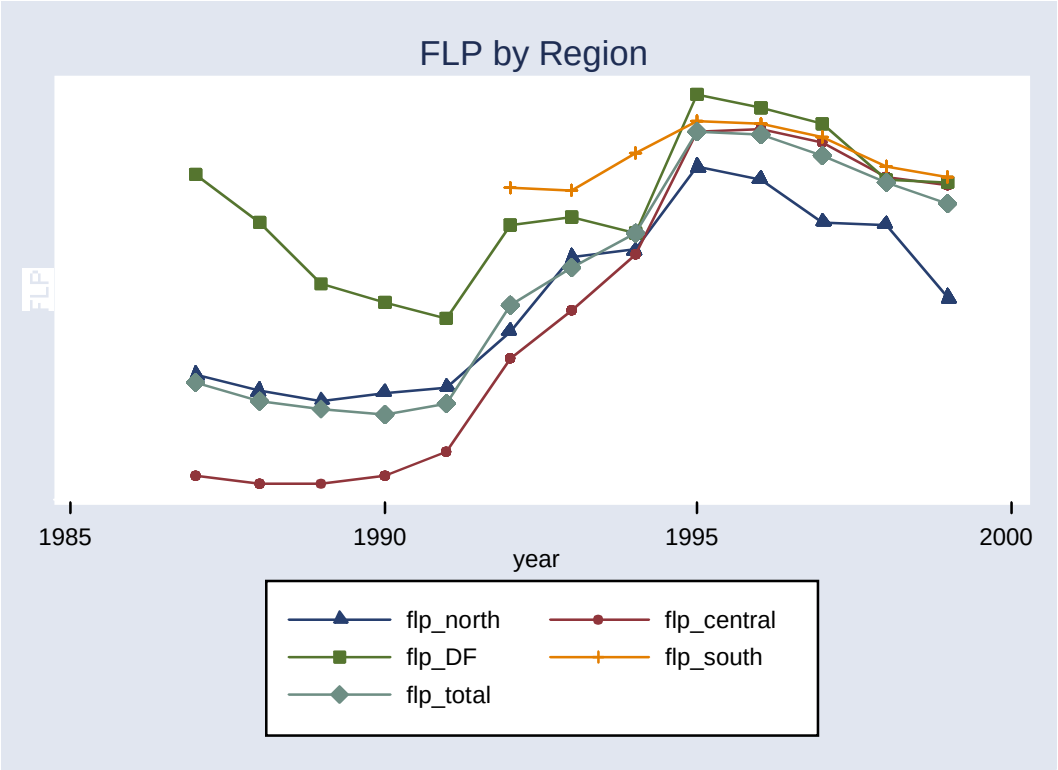
	errors clustered by state and year (1) Female Intensity	errors clustered by state (2) Female Intensity
DD Interactions: region and time		
central_FDI*δ	-0.012	-0.012
	(0.009)	(0.008)
north_FDI*δ	-0.009	-0.009
	(0.009)	(0.007)
DF/Jalisco_FDI*δ	-0.020	-0.020
	(0.011)*	(0.012)*
DD Interaction: sector and time		
high_FDI*δ	-0.009	-0.009
	(0.009)	(0.011)
DD Interactions: region and sector		
central_FDI*high_FDI	0.019	0.019
	(0.011)*	(0.016)
north_FDI*high_FDI	0.031	0.031
	(0.011)***	(0.015)**
DF/Jalisco_FDI*high_FDI	-0.013	-0.013
	(0.010)	(0.015)
DDD Inter: region, sector, time		
central_FDI*high_FDI*δ	-0.010	-0.010
	(0.015)	(0.013)
north_FDI*high_FDI*δ	0.020	0.020
	(0.016)	(0.017)
DF/Jalisco_FDI*high_FDI*δ	0.017	0.017
	(0.014)	(0.019)
Time Fixed Effects	included	included
State Fixed Effects	included	included
Industry Fixed Effects	included	included
R-Squared	0.434	0.434
Observations	16700	16700

Notes: Sources – Employment data: National Urban Employment Survey (ENEU). Standard errors are in parentheses below the coefficients. The dependent variable in both columns is female intensity, the percentage of employees in an industry that was female. δ is a dummy variable equal to 1 if the observation occurred after NAFTA (1994-1999). Central_FDI, north_FDI, and DF/Jalisco_FDI are region dummy variables. The omitted region, the south, serves as the control. high_FDI is a dummy variable equal to 1 if the observation is from a high FDI sector. Data are aggregated by state, year, and industry. Standard errors are clustered by state and year in column (1) and by state in column (2). Coefficients that are significantly different from 0 are denoted by the following system: *10%, **5%, and ***1%.

Figure 1: Map of Mexico (Exports)

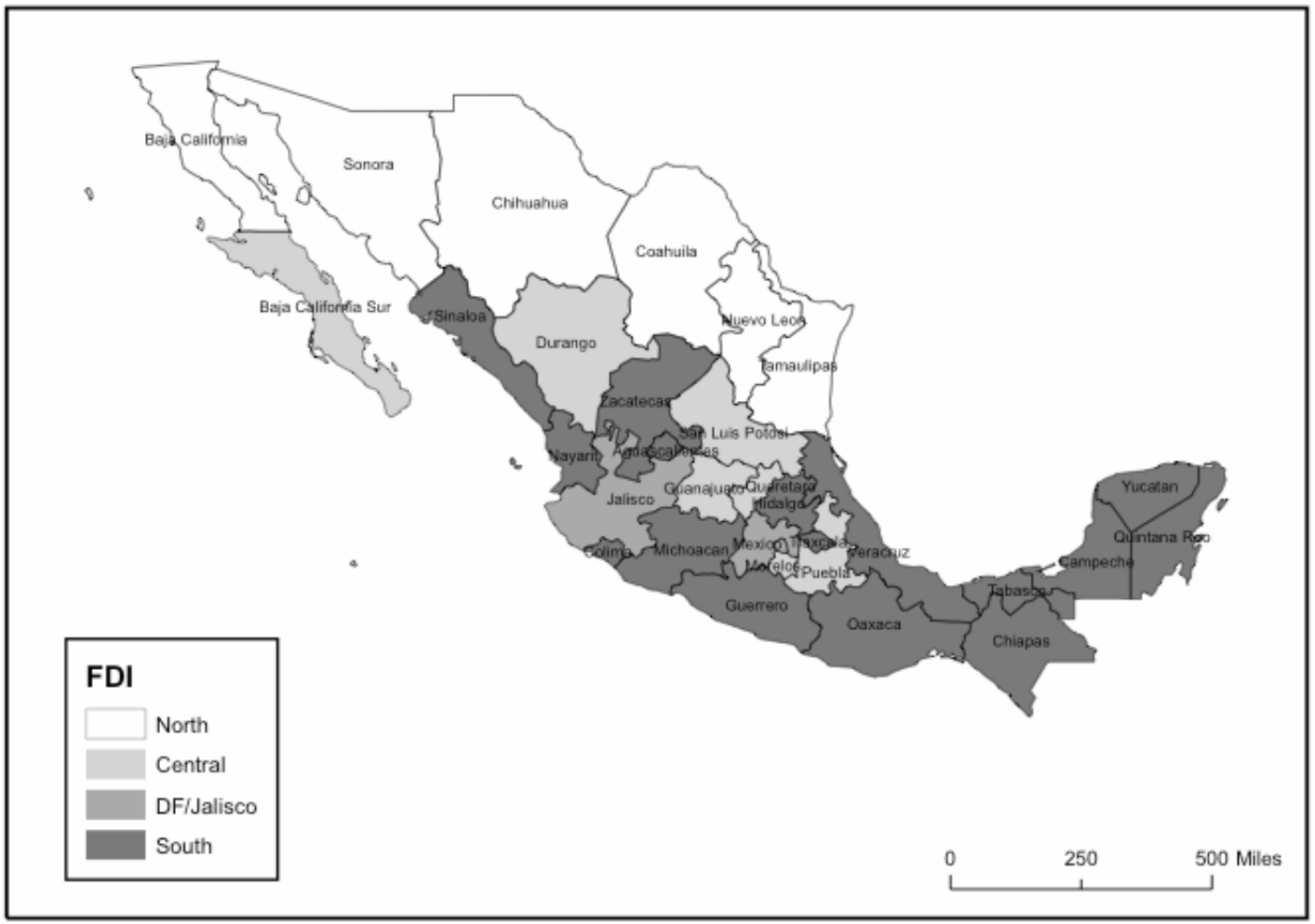
Notes: States are classified by export production. For more information on the definition of these regions, see Appendix B.

Figure 2: Evolution of Female Labor Force Participation



Notes: Source – National Urban Employment Survey (ENEU). FLP stands for female labor participation. FLP is given for four regions, classified by export performance: north, central, Mexico City/Jalisco (DF), and south. Average FLP for Mexico as a whole is also plotted (total_flp). For more information on the division of regions by export performance, see Figure 1 and Appendix B.

Figure 3: Map of Mexico (FDI)



Notes: States are classified by receipt of foreign direct investment (FDI). For more information on the definition of these regions, see Appendix B.

Endnotes

[i] Ozler, 2002; Beneria et. al., 2000; Standing, 1999; Catagay and Ozler, 1995; Collier et. al., 1994; and Cagatay and Berik, 1990.

[ii] Baslevent and Onaran, 2004; Ozler, 2002; Standing, 1999; Fontana et. al., 1998; Cagatay and Ozler, 1995; Wood, 1991, and Cagatay and Berik, 1990.

[iii] Pearson, 1999; Fontana et. al., 1998; UNIFEM, 1998; Beneria, 1995; and Joekes, 1995.

[iv] Where female labor force participation is defined as the percentage of the population between the ages of 16 and 65 that was employed, actively seeking employment, or awaiting recall from a layoff.

[v] *Maquiladoras* are factories located primarily near the Mexico-U.S. border that produce manufactured goods for export. *Maquiladoras* are exempt from foreign ownership caps and do not pay value-added tax on domestic inputs or import duties on imported inputs.

[vi] My definitions of central states by export performance and by FDI vary somewhat. See Figures 1 and 3.

[vii]See Baslevent and Onaran, 2004; Ozler, 2002; Cagatay and Ozler, 1995; Cagatay and Berik, 1990.

[viii] There have been cross-country studies, but the findings are contradictory and most have not been published in mainstream journals. See Standing, 1999; Pearson, 1999; Beneria, 1995; and Cagatay and Ozler, 1995.

[ix] In my sample of 31,963 observations from the second quarter of 1993, the average level of male schooling was 6.5 years, whereas the average level of female schooling was 6.0 years. While this does not seem like a large difference, formal education is just one indicator of skills.

Women, because they tend to exit the labor market for long periods of time to raise children, have significantly less experience and on-the-job training.

[x] Alternatively, if foreign companies invest heavily in areas with cheap labor, an influx of foreign investment may boost the demand for low skilled (female) labor, independent of discriminatory attitudes.

[xi] See Cordourier and Gomez, 2004; Aroca et. al., 2003; Garcia-Cuellar, 2001a; Morales, 1999; and Hanson, 1998.

[xii] Data on spousal income, another important determinant of FLP, is not available. A characteristic that is quite different between regions on which data is available is GDP per capita. When I include GDP per capita, the coefficient is small and the results of interest remain unchanged.

[xiii] When I control for the mean fertility rate, it is not significant and the coefficients of interest do not change.

[xiv] Krueger and Tornell (1999) show that after the *tequila* crisis, most economic variables recovered quickly. The principal long-run effect was a credit crunch that primarily affected small firms in the non-tradables sector. Because this analysis focuses on manufacturing, this should not bias my results. If anything, it would cause the DD estimator to underestimate the impact of NAFTA on FLP, as female intensive non-tradables businesses were forced to shut down.

[xv] While tourism in Quintana Roo could act as an export, this does not provide a serious bias for the time period under investigation (1987-1999). Indirect tourism employment in Mexico remained relatively constant at 8% between 1990 and 1999, before growing rapidly to reach 11% in 2005. This expansion was driven primarily by the growth of hotel resorts in Quintana Roo, which accelerated most rapidly after 1999 (World Travel and Tourism Council, 2004).

[xvi] See Appendix C for a detailed description of the data.

[xvii] ENEU permits panel analysis. However, the panel length is too short (one year and three months) to observe significant changes over time. For this reason, I consider one trimester from each year. The second trimester is chosen in order to avoid seasonal effects associated with winter holidays and summer vacation.

[xviii] Castañeda uses an instrumental variables approach and assumes constant returns to scale. His identifying supposition is that total factor productivity growth is not procyclical, and that the observation of procyclical productivity indicates market power.

[xix] For a detailed discussion of the variables in this and the other regressions, see Appendix B.

[xx] A test for autocorrelation in panel data on Regression (1) gives an F-statistic of 24.248, indicating that serial correlation of the errors is present.

[xxi] I also define tradables broadly to include agriculture and mining and narrowly to include only textiles, electronics, and precision instruments, the industries with the most exports. In all cases, the results remain nearly identical.

[xxii] I calculate the LSF values according to the following formula: $LSF_i = W_i/Y_i * LF_i/LT_i$.

where LSF_i is the low skilled female (LSF) intensiveness of industry i, W_i is total blue-collar wages, LF_i is the number of female blue-collar workers, LT_i is the total number of blue-collar workers, and Y_i is the value of total inputs.[xxii]

I then calculate low skill (LS) intensiveness using the following formula: $LS_i = W_i/Y_i$

where LS_i is the LS intensiveness of industry i.

[xxiii] I do not explore differences between trade-impacted regions in this section because exports are attributed to the state in which a firm has central offices, not to the state in which the export was actually produced. I use exports instead of production because the currency crisis that

occurred in Mexico in 1994, the same year as NAFTA was implemented, caused real output to fall sharply, precluding production growth in nearly all industries. However, because of devaluation exports continued to grow, making them a better indicator than total production of how NAFTA affected the relative expansion of LSF intensive industries.

[xxiv] Because I only have data for 26 major industry categories, clustering by industry in columns (5) through (8) reduces my number of independent observations to 26, significantly lowering the power of the regressions.

[xxv] I use census data to calculate the percentage of blue-collar workers who are female, whereas Garcia-Cuellar uses employment survey data. Garcia-Cuellar defines LSF intensive industries as those that have LSF values greater than 0.03. Her analysis is limited to individuals with fewer than six years of education.

[xxvi] Only manufacturing is examined, as price-cost margin estimates are available just for these industries. Since 85% of all imports in the 1990's were manufactured goods, this is the most logical sector in which to test Becker's hypothesis regardless of data availability.

[xxvii] An alternative measure of competition is the import penetration (mp) ratio. Although the mp ratio is commonly used, it is a poor approximation of competition because it fails to account for changes in domestic demand and supply. Demand and imports could increase simultaneously, with excess demand being met by an increase in imports. Alternatively, domestic supply could become constrained by some exogenous factor, in which case a rise in imports would compensate for domestic shortages. Nevertheless, I calculate regression 7 using the import penetration ratio (column (4), Table 6). As predicted, the results are not enlightening.

[xxviii] If concentrated industries prior to NAFTA were the same industries that intensively used LSF labor, regression (7) could be detecting the impact of the direct trade effect investigated in

Section 5.2, instead of the effect of increased product market competition. In order to test for this, I regress the concentration dummy variable on my LSF measure, restricting the sample to observations that took place before NAFTA. The results are presented in column 1 of Table 7. The coefficient on the concentration term gives the difference in LSF intensiveness between competitive and concentrated industries. Since this coefficient is not statistically different from zero, I cannot reject the hypothesis that LSF intensiveness was the same in competitive and concentrated industries prior to NAFTA. This provides strong evidence that regression (7) is detecting the effect of product market competition, not a direct trade effect.

[xxix] The definition of regions, while similar to that used in Sections 5.1 through 5.3, does vary slightly since classification is based exclusively on FDI, instead of on exports (Figure 3). See Appendix B for more information.

[xxx] To give this issue a rigorous treatment, one would need access to detailed, firm-level FDI data collected on a monthly basis. An immediate change in female intensity following increased FDI would provide evidence that foreign managers with less (or more) of a taste for gender discrimination changed hiring practices, effective immediately. On the other hand, a delayed response would provide relatively more support for the direct trade effect hypothesis.

[xxxi] I choose 1996 instead of 1992 (two years before NAFTA) because the states in my control group and some other states do not enter the sample until 1992. Because the pre- and post-NAFTA estimates are now a combination of true pre- and post-NAFTA observations, I expect the coefficients on the interaction terms between the after-NAFTA dummy (δ_t) and the region dummies to be of a much smaller magnitude.

[xxxii] Another option would be to interact the after-NAFTA dummy with mean education in 1987, the first year in my sample. However, since many of my states had not entered the sample in 1987, this would significantly reduce my sample size.