

NAFTA and Female Labor Market Outcomes in Mexico

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Economics Department Undergraduate Honors Thesis

May 2011

Abstract : This paper discusses the impact of the North American Free Trade Agreement (NAFTA) on the feminization of labor in Mexico. Using data collected from the World Bank, Mexican Government, and the OECD, this thesis runs regressions using female employment and labor force participation as dependent variables. However, with a time trend included the independent variables of interest lose most significance, and causation remains uncertain. A variety of academic literature is reviewed as to the source of this large-scale demographic transition of the Mexican workforce.

Acknowledgement: I would like to recognize the incredible support and knowledge of my faculty advisor, Professor Harley Shaiken. In addition, this thesis would not have been possible without the advice and guidance of my GSI Dan Buch. Special thanks also to Sepehr Sadighpour for his invaluable and patient assistance with Excel and Itzel Barrera-Rodríguez for hours of assistance in translation of Mexican statistical documents.

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Table of Contents

| | |
|--------------------------------------|----|
| Introduction..... | 3 |
| Mexico Post-NAFTA..... | 7 |
| Female Labor Outcomes in Mexico..... | 17 |
| Data and Methodology..... | 25 |
| Literature Review..... | 29 |
| Conclusion..... | 36 |
| Bibliography..... | 38 |

Introduction

When the United States brokers free trade agreements with other nations, the inevitable process of world economic integration accelerates. Such integration with developing countries presents a bit of a puzzle, as the vast differences in standards of living between the two countries complicate the relationship and potential benefits of trade. Because of the heterogeneity in each society, their demographic aspects are particularly sensitive to change resulting from trade. In recent decades, economists have attempted with varying degrees of success to model this demographic transformation using very little empirical data, since the magnitude of globalization has and continues to outpace academia.

Even more challenging for economic modeling is the impact of accelerating world trade on women's welfare. Traditionally, economists think of labor as a simple input and households as independent, static economic units, interacting with the generic "firm," with both entities responding to the "government." However, the role of gender in the structure of households and society at large has transformed rapidly in the past few decades, and nowhere is this trend more evident than in developing nations. At the same time as nations enact massive trade policies, women enter the labor and workforce at marathon paces, switching their daily activities from primarily household production to market-based activities. Is this change a mere coincidence? That is to say: can trade agreements improve women's positions more than men's?

The North American Free Trade Agreement (NAFTA) was historic in both scope and magnitude, and undoubtedly changed the economic structure and social fabric of all countries involved: Mexico, Canada, and the United States. The consequences were particularly large for the country of Mexico, who had for decades embraced a regime of economic protectionism through import-substitution-industrialization strategies.²

However, in the 1980s, the technocratic presidency of Carlos Salinas de Gortari brought about a new neoliberal approach to economic development. Neoliberalism was certainly the economic mantra of the time and Mexico was eager to join the world ranks of economic giants by attracting foreign investment and increasing exports. Proximity to the United States, the most powerful and wealthiest nation in the world, seemed to be a strong comparative advantage. Gortari's sentiment towards trade complemented well US president Bill Clinton's desire to boost economic development in Mexico as a means to decrease social tension and immigration pressures by improving economic opportunities. The three countries agreed on NAFTA in 1992 and implemented it in 1994, but only after a tense and polarizing debate in the US.³

NAFTA represented the culmination of a series of tariff reductions and industrial reform that began in the mid-1980s in Mexico, but capital and goods flows between the three countries skyrocketed in the mid-1990s as a result. The World

²See Hirschman (1968) "The Political Economy of Import-Substitution-Industrialization in Latin America"

³ See 11 hours Congressional debate Nov 17th, 1993 <http://www.c-spanvideo.org/program/NorthAmericanFreeTradeAgreement176>

Bank estimates that NAFTA boosted the Mexican economy significantly, with Mexico's Gross Domestic Product (GDP) 4-5% higher, exports 50% higher, and foreign direct investment 40% higher by 2002 than it would have been without NAFTA.⁴ However, isolating the effects of NAFTA on macro variables like GDP is difficult, because Mexico suffered several economic and political shocks during the same period that negatively affected output, such as the debilitating peso crisis of 1994, the murder of presidential candidate Luis Donaldo Colosio, and the Zapatista rebellion in the southern region. In fact, some argue that the violent, destabilizing Zapatista rebellion was partially a response to NAFTA.⁵ If this is the case, certainly the economic and social cost of the unrest should be taken into account when assessing the effects of NAFTA.

Nonetheless, the enormous restructuring of the economy and the dramatic increase in exports begs the question as to the impacts of this change on the labor outcomes for Mexicans. Specifically, the uncertainty as to new labor outcomes for Mexican women is particularly interesting given the potential consequences of increased female economic status in a developing nation. Given that Mexico is a developing country, and according to mainstream theories about female labor supply, the female labor force participation rate (FLFP) should react differently to this sudden spur of growth than perhaps a more developed and industrialized

⁴ See Pastor (2008) "The Future of North America"

⁵ See Gutierrez (1996) "Codifying the Past, Erasing the Future: NAFTA and the Zapatista Uprising of 1994"

country with already high levels of FLFP.⁶ Thus, the sensitivity of the FLFP in Mexico should be higher than Canada and the United States, suggesting a convergence of gender roles in all three nations. The subsequent transformation of bargaining power in Mexican households may indeed have significant implications for society, as some recent literature suggests (NBER paper). FLFP may affect marriage, fertility, and educational decisions of households, which would change the demographic makeup of the country at large. Furthermore, do the changes in the FLFP affect the wage structure and employment levels of women in the aggregate Mexican economy? This paper seeks to explore these outcomes through limited econometric analysis and a literature review.

Even though the topic of labor outcomes and trade is largely economic, the nature of the issue of women's status transcends traditional economic modeling. Gender roles and related demographic topics are largely socio-cultural and very much outside the scope of the field of economics. However, it is useful to incorporate some trade and labor supply/demand models that provide a framework and vocabulary with which to construct arguments. I begin with a qualitative narration of some key variables in the Mexican economy.

⁶ See Goldin (1994) "The U-Shaped Female Labor Force Function in Economic Development and Economic History"

Mexico Post-NAFTA

Table 1 shows the pre-NAFTA tariff rates and subsequent decrease for the US and Mexico. Mexico's tariffs were significantly higher than the US's for most products, even after the first round of tariff reductions in 1985 as Mexico joined the GATT⁷. Such protections were the legacy of ISI as discussed in the introduction. It is also notable that some of the higher tariffs occurred in the textile and clothing industry, an industry that would become more globalized in later years due to the rapid rise of China as an exporter of low-skilled manufacturing. It may seem curious that the Mexican government initiated NAFTA because a preliminary glance at the relative tariff rates suggests that US producers would have the most to gain from free trade.

Even though the Mexican import restrictions were much tighter, the US consumer market is a powerful force as the strong growth of the US economy in the 1990s increased consumption of all goods. Therefore, the sheer volume of exports to the United States has trumped any losses to protected Mexican firms.

For decades, the US manufacturing industry had been in substantial decline prior to the signing of NAFTA, especially in labor-intensive production. That combined with the respective concentrations of capital and labor in the US and Mexico would suggest benefits from the tariff reductions for both countries.

⁷ See Artecona et al. (2002)

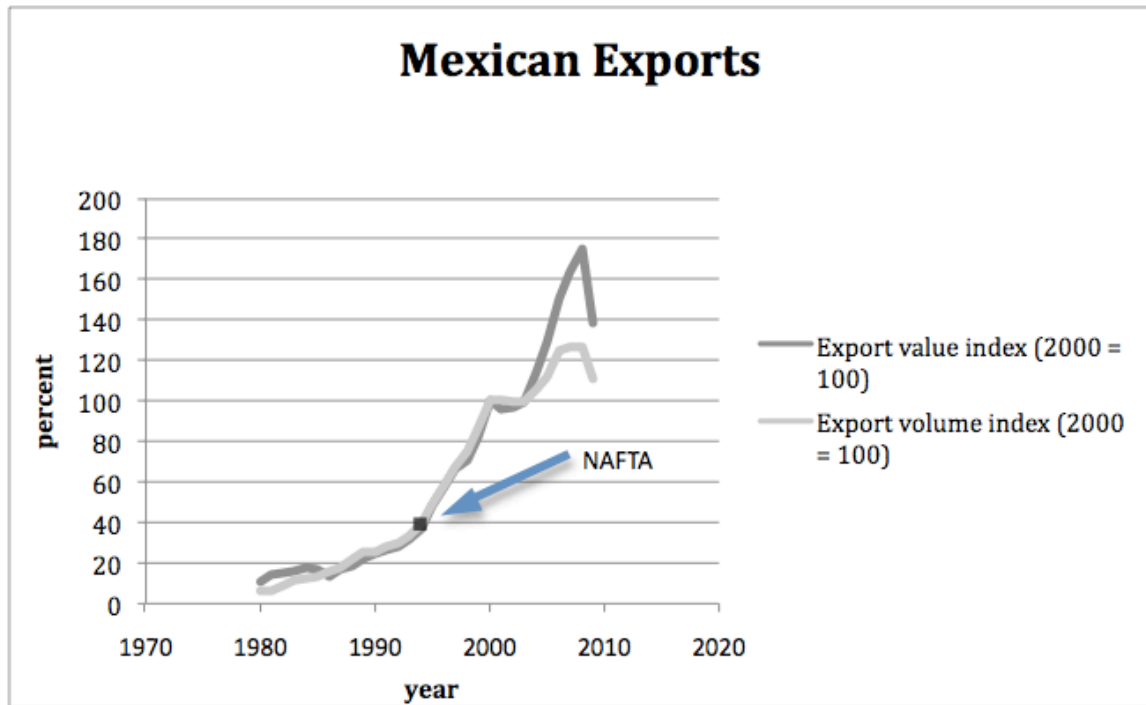
Table 1: Tariff Rates in Mexico and the US pre- and post-NAFTA

| Industry | Mexico | | U.S. | |
|----------------------------------|----------------|-----------------|----------------|-----------------|
| | 1993 Rate % | Change 93-00 | 1993 Rate % | Change 93-00 |
| | (1) | (2) | (3) | (4) |
| Agriculture | 4.5 | -3.8 | 4.1 | -3.6 |
| Livestock | 4.5 | -3.2 | 0.0 | 0.0 |
| Fish | 0.0 | 0.0 | 0.0 | 0.0 |
| Oil and Gas | 10.0 | -7.0 | 0.5 | -0.5 |
| Minerals | 6.1 | -5.9 | 0.3 | -0.3 |
| Food | 12.4 | -9.1 | 3.6 | -2.0 |
| Beverage and Tobacco | 18.9 | -14.4 | 3.7 | -3.2 |
| Textiles and Fabrics | 12.9 | -10.0 | 13.2 | -13.1 |
| Textile Mill Products | 19.3 | -14.4 | 6.1 | -6.0 |
| Clothing | 20.0 | -17.1 | 13.2 | -12.9 |
| Leather | 9.3 | -7.6 | 11.6 | -8.8 |
| Wood | 17.5 | -14.4 | 1.2 | -1.1 |
| Paper | 8.3 | -6.2 | 0.0 | 0.0 |
| Printed Matters | 9.0 | -8.1 | 0.0 | 0.0 |
| Petroleum and Coal Products | 1.9 | -1.4 | 1.5 | -1.1 |
| Chemicals | 9.4 | -7.8 | 1.8 | -1.6 |
| Plastics and Rubber | 15.2 | -11.5 | 1.2 | -1.0 |
| Nonmetallic Mineral Products | 14.9 | -12.5 | 4.7 | -1.8 |
| Primary Metal | 8.8 | -6.5 | 3.2 | -2.6 |
| Fabricated Metal | 13.8 | -12.1 | 0.5 | -0.5 |
| Machinery, Except Electrical | 14.6 | -13.9 | 0.0 | 0.0 |
| Computers and Electronics | 12.8 | -12.0 | 1.7 | -1.7 |
| Electrical Equip & Appliances | 14.0 | -10.9 | 0.2 | -0.2 |
| Transportation Equip | 11.4 | -8.9 | 1.3 | -1.3 |
| Furniture | 16.1 | -11.9 | 0.0 | 0.0 |
| Miscellaneous | 15.3 | -14.0 | 0.8 | -0.8 |

Source: Aguayo-Tellez et al. (2010)

Even though the reductions of these tariffs were gradual and occurred over a schedule of several years, Mexican exports spiked in 1994. Chart 1 shows Mexican exports from 1980 to 2009. The slope of the trend line of exports prior to NAFTA visibly increases upwards in 1994.

Chart 1



Source: World Bank

Chart 1 also shows the relationship of export value to export volume, and it is interesting that value outpaces volume post 2000. This suggests that in the past decade, Mexico has been exporting high-value-added items such as high-tech gadgets. It might also be indicative of the large amount of intra-industry trade that has occurred, especially in the auto industry.⁸

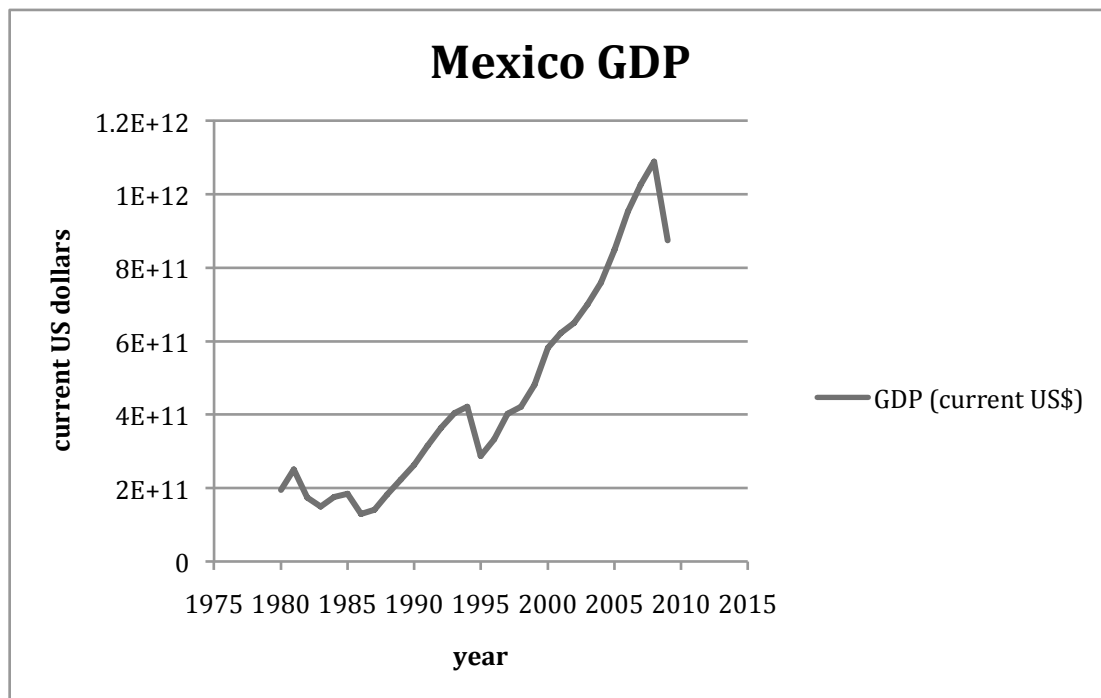
The sharp decline in exports in 2008 reflects the worldwide financial crisis and recession, which originated in the US but transmitted to the world via financial panic and trade. It remains to be seen if the export market will return to its pre-recession trend once a full global recovery has been realized. However, without this

⁸ See Shaiken (2001) "The New Global Economy: Trade and Production Under NAFTA"

negative shock to Mexico's export market, it seems plausible that the trend would have continued to be positive and significant.

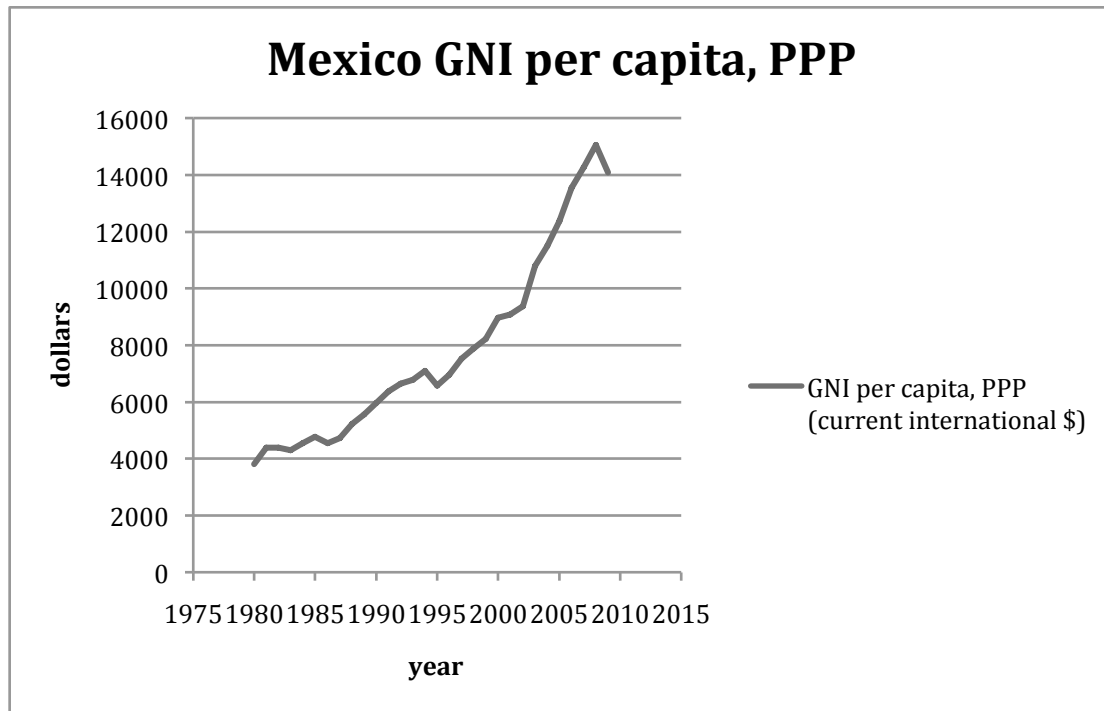
Did this increase in exports translate into higher GDP growth? Chart 2 shows Mexico's GDP over the extended period of trade liberalization. Chart 3 shows an alternate measure of output and welfare, Gross National Income (GNI) per capita, measured in Purchasing Power Parity (PPP) terms. GNI per capita in PPP terms will capture some of the currency, price level, and population fluctuations that the cruder measure of GDP might overlook.

Chart 2



Source: World Bank

Chart 3

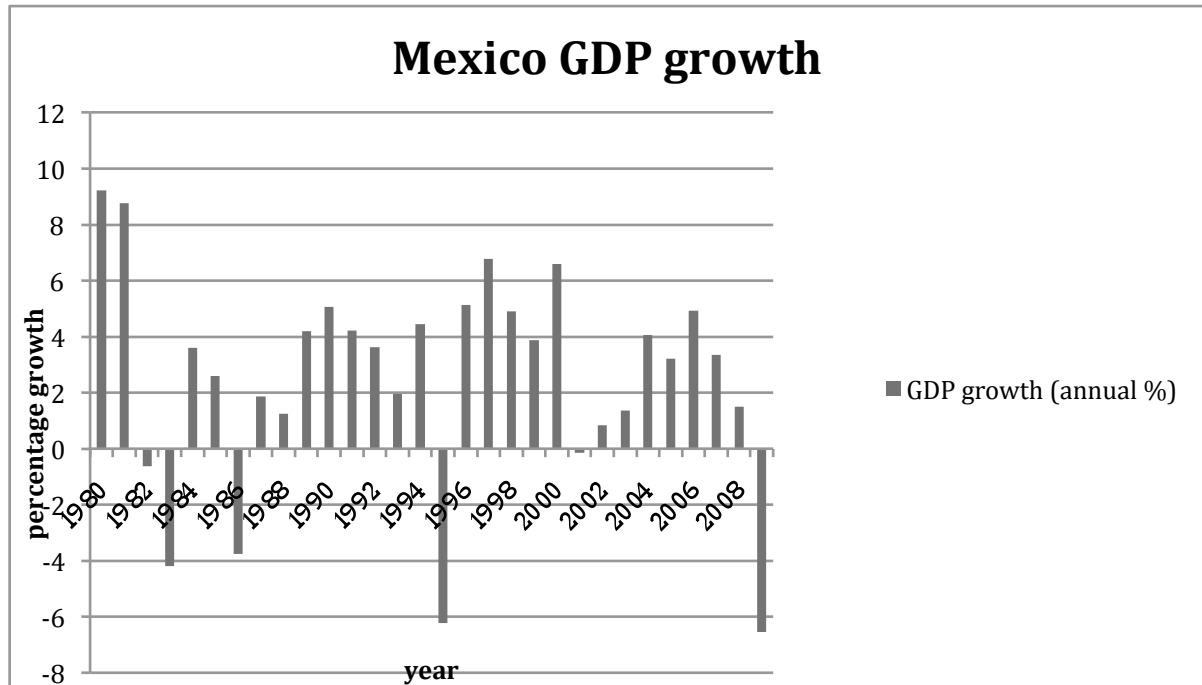


Source: World Bank

Both the GDP and GNP measure of growth indicate a steady upward trend that appears to accelerate in the mid-1990s. This is what we would expect because GDP is fundamentally defined as a combination of consumption, investment, government spending, and net exports. Therefore, it is no surprise that the GDP trend line would follow the export path, all other factors held constant. However, macroeconomic shocks that occurred during this same period were severe and need to be mentioned because of their possible adverse affects on the labor outcomes for Mexicans in the aggregate, and could alter the already-sensitive FLFP measures.

Chart 4 provides yet another perspective on output by highlighting the severe fluctuations of the business cycle during the period.

Chart 4



Source: World Bank

It is apparent from these graphs that exports are a large portion of the story of the changes in the Mexican economy, especially in the 1990s and early 2000s. However, as mentioned previously, the restrictions on FDI and foreign ownership of firms were a key component of the NAFTA negotiations. This may be an important aspect to female labor as well, because ownership and management of firms could affect hiring decisions. It is possible that different owners could have different preferences for male vs. female labor inputs. Foreign influence in domestic

production operations will also increase the competitiveness of various industries, and would potentially arbitrage away any wage premiums paid to men or below-market wages paid to women.

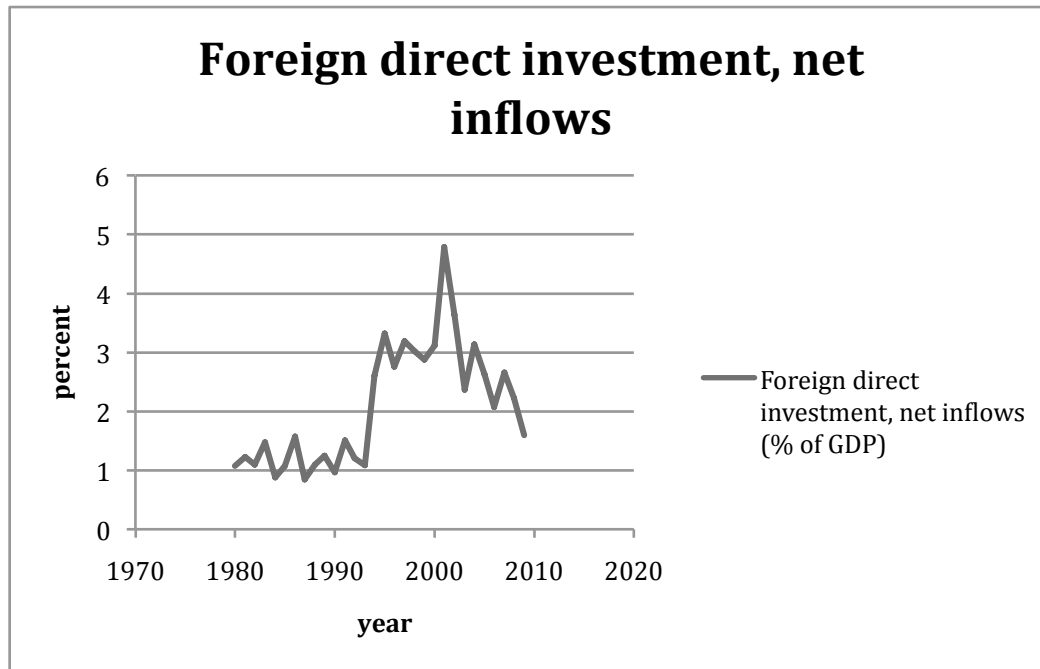
However, FDI as measured both in crude levels and as a percentage of GDP is significantly more volatile than exports. Chart 5 shows the level of FDI over the reform period, and Chart 6 shows a likely more descriptive measure of FDI as a percentage of GDP. There is a notable spike in the mid-1990s that would seem consistent with the export component of NAFTA, but the subsequent decade of the 2000s is precarious in both measures. Both measures also reflect the recent world recession as they tailspin rapidly to nearly their pre-NAFTA levels.

Chart 5



Source: World Bank

Chart 6



Source: World Bank

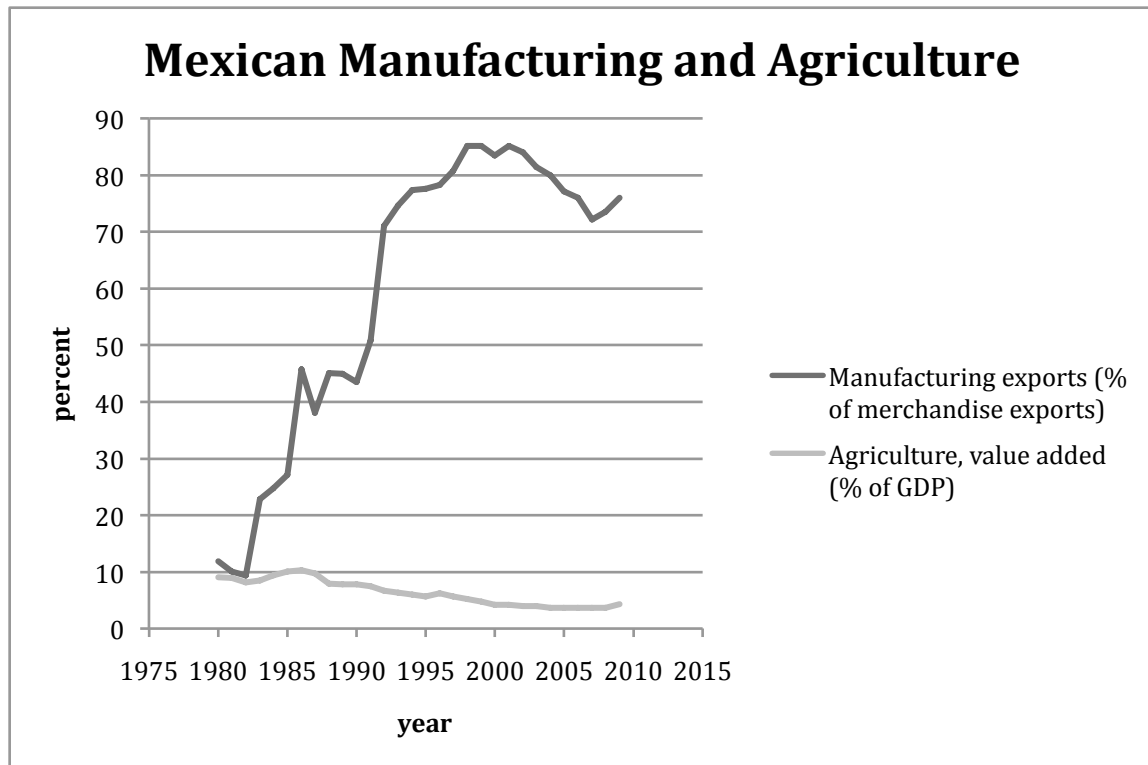
A likely explanation for the wild fluctuations in FDI in the 2000s is the rise of China and other emerging markets as havens for American financial enterprises.⁹ However, the dramatic inflow of foreign capital into Mexico in the mid-1990s is an important aspect of this story, especially considering the transition of ownership for many Mexican firms who had for decades been shielded from international competition and thus likely captured excess profits.

⁹ See Brad DeLong "Afta Thoughts on NAFTA" (2006)

To conclude this section, I take a closer look at the composition of exports to frame the narrative of female labor. Chart 7 shows manufacturing as a percentage of exports, and a clear upward trend can be seen over the reform period. Chart 7 also shows the production of value-added agriculture over the same period. Trade theory explains this trend, as Mexico's abundant low-to-medium skilled labor supply is a presumed comparative advantage with regard to Canada and the US. At the same time as the entry of US-subsidized corn entered the Mexican market, Mexico removed state protections and price supports for its agricultural industry, furthering the downward pressure of agricultural production created by freer trade.¹⁰

¹⁰ See Aguayo-Tellez et al.

Chart 7



Source: World Bank

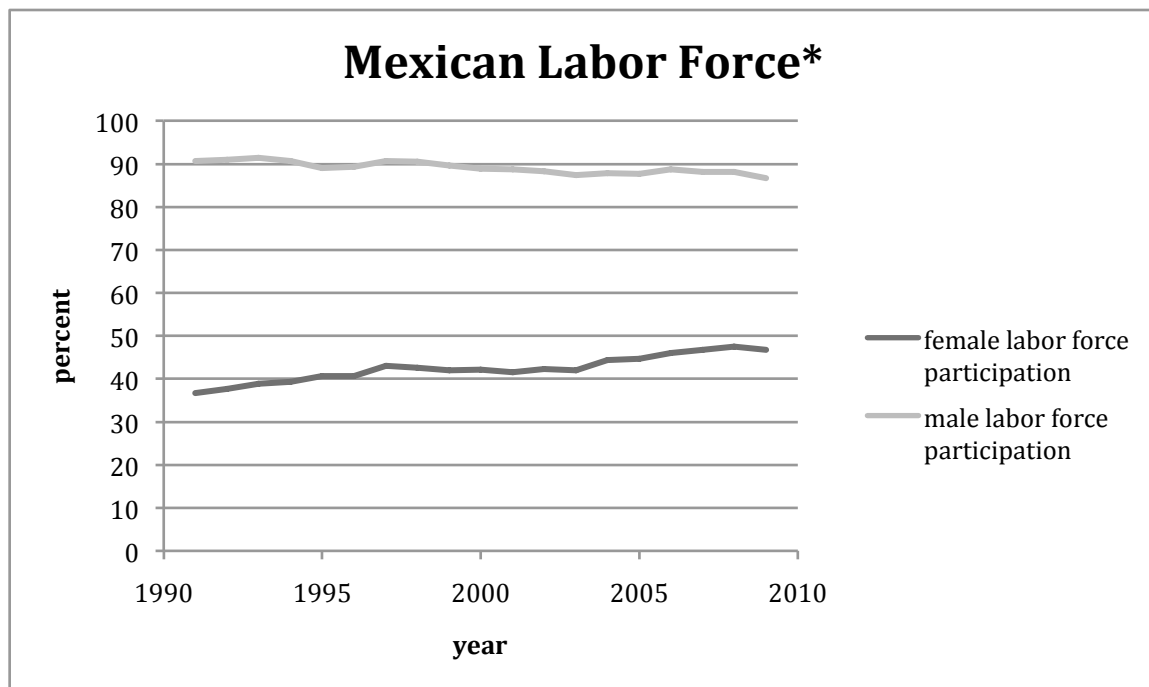
Over the entire reform period, the component of manufacturing exports grew from around 20% of the export bundle to its peak in the 1990s of nearly 90%. The decline in the 2000s, however, reflects the rise of China as an exporting giant, and complicates the long-term trend.

This section has described and illustrated some of the key factors in the transformation of the Mexican economy, particularly in the 1990s. The following section examines the labor market during the same period with respect to female outcomes.

Female Labor Outcomes in Mexico

Given the economic restructuring described in the previous sections, it is useful now to juxtapose the economic macro variables with some indicators of female labor outcomes during the same period. Chart 8 shows the apparent *eventual* convergence in FLFP and male labor force participation.

Chart 8

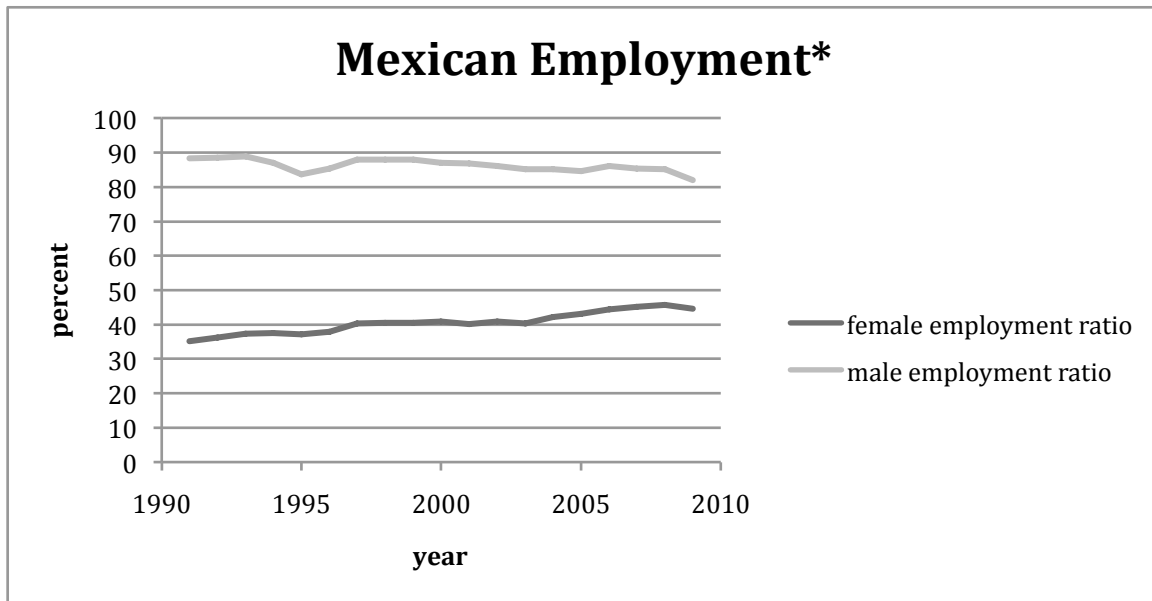


Source: OECD *some years extrapolated by OECD

It is unfortunate that the data does not go back before 1991 – one of the limitations of this topic. However, the seemingly correlated upward movement of exports, GDP, and FLFP in Mexico are consistent with several theories about female labor supply, including that of Claudia Goldin (1994). The basic premise is that as

GDP and wages increase, so does the opportunity cost of household production, traditionally undertaken by women. At very early stages of development, FLFP actually decreases until the cost of not working becomes prohibitively high and induces female labor supply. However, Goldin's theories extend over much longer periods of GDP growth, so they may not be applicable to such a short-run period as a couple of decades.¹¹ Therefore, it is important to examine employment levels and wage differentials in addition to FLFP during the same brief period in order to extrapolate further. Chart 9 shows the employment levels of men and women in Mexico, which also tend towards convergence at some future date.

Chart 9



Source: OECD *some years extrapolated by OECD

¹¹ Explanation of timeframe employed by Goldin and U-shaped FLFP rate

In a working paper recently published by the National Bureau of Economic Research (NBER), researchers analyzed Mexican Census data to get a better sense of the hours worked and compensation earned by Mexican women during the reform years (NBER paper 2010). Chart 10 summarizes some of their findings that are relevant to this analysis.

Chart 10



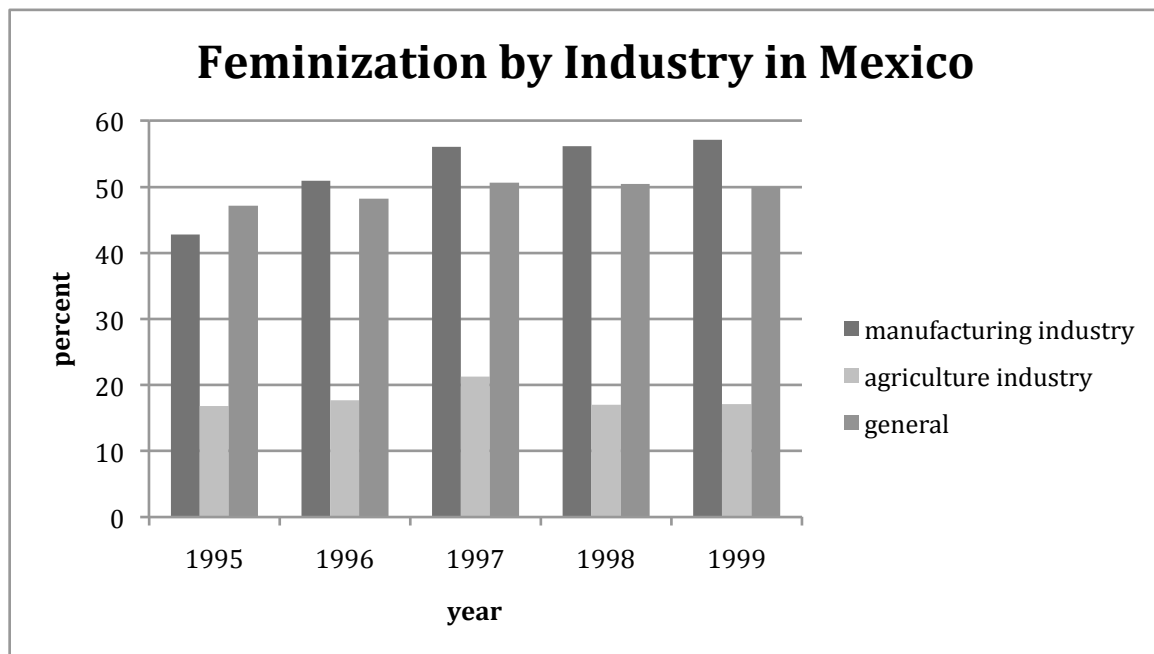
Source: Aguayo-Tellez et al.

Chart 10 may be a little tricky to interpret at first glance, but it is very illustrative as to the trending in female hours supplied and hours worked over the past couple of decades. It is also notable that hours worked has outpaced wages earned. This may appear to be indicative of an aggravation of previously instituted

gender wage inequity, but it may also be explained by lower skill sets (either real or perceived) or less formal work experience of female workers.

As the previous section showed, the decrease in agriculture production and rise in manufacturing exports was concurrent with trade liberalization. Chart 11 shows the concentration of women in these industries in the years immediately following NAFTA.

Chart 11



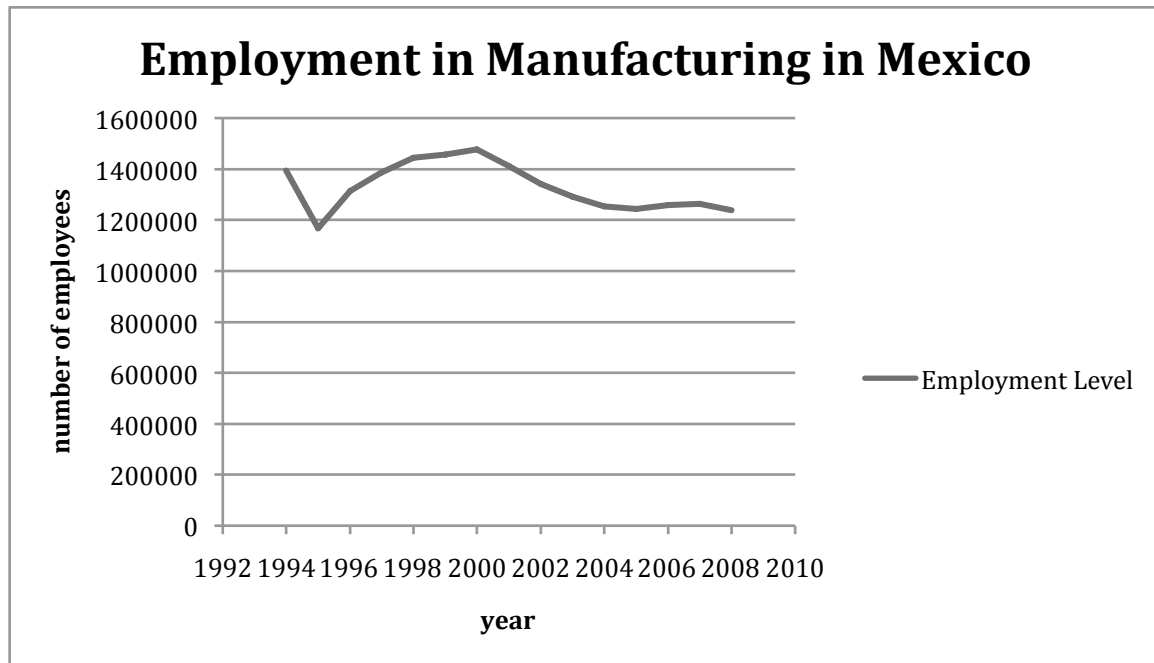
Source: Sistema de Indicadores para el Seguimiento de la Situación de la Mujer en México

Even though these data are only available for 5 years, the years from 1995 to 1999 were the most significant in terms of NAFTA's impact, as discussed in the previous section. Chart 11 shows the relative levels of female employment in the

agricultural sector, manufacturing industry, and aggregate economy. The percentage of women working in the agricultural sector remains low throughout the period, even as the general employment of women rises and nears 50% in 1999. However, the manufacturing industry employs women at a rate of well over 50%, suggesting that women are increasingly hired disproportionately more in this industry than their representation in all sectors of the economy. The converse is true in the agricultural industry, though it is important to keep in mind that much of the employment in the agricultural sector is informal and thus not subject to accurate data collection. Regardless, the relative employment levels evident in Chart 11 indicate that the rise and decline in manufacturing and agriculture, respectively, correlate to the same trend in female employment in such industries. This window of time portrayed in Chart 11 is significant but limited. It would be more telling to have this level of data before 1995 so true causation could be derived.

It makes sense that the absolute levels of employment in the manufacturing industry increased steadily along with their increased contribution to Mexican exports. Chart 12 shows the employment levels during the same time. Such numerical increases multiplied by the concentration of women in this industry magnifies the relative female employment that occurred during the immediate post-NAFTA period.

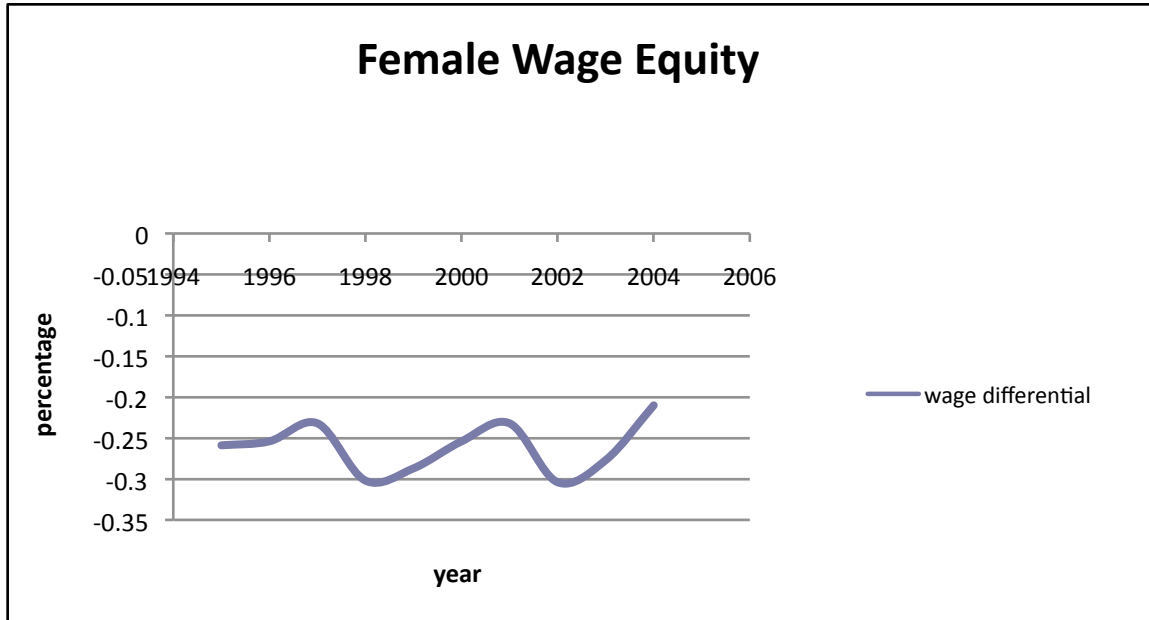
Chart 12



Source: Instituto Nacional de Estadística y Geografía

It is useful to compare these statistics with the data presented in Chart 13 regarding female wage differentials in manufacturing from 1994 to 2004. These differentials are telling, but they are not central to my overall analysis because they are not weighted by the disproportionately high representation of female workers in this industry. It is interesting to note that even though overall the differential has decreased in magnitude, it remains negative as late as 2004. The large fluctuations during the period are also curious and could reflect a number of factors such as microeconomic shocks and subsequent market adjustments

Chart 13



Source: Sistema de Indicadores para el Seguimiento de la Situación de la Mujer en México

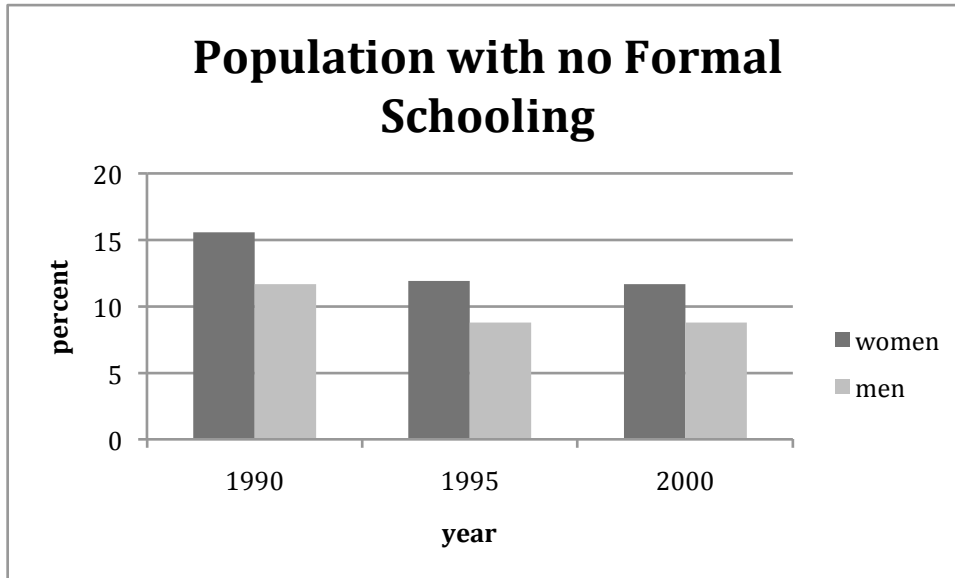
It is also important to note that wage differentials do not necessarily imply wage discrimination, especially if the education and skill levels of women are historically that of men. It may also simply reflect the historically lower unionization rates of women vs. men, and the preference for firms to hire non-union labor.¹²

I therefore conclude this section with a crude but measurable indicator of relative female educational attainment. Chart 14 gives a sense of the population without formal schooling, likely mostly indigenous and rural. It can be seen that during the decade of the 1990s, the total population with a total lack of formal

¹² Current unionization rates for employed Mexican women are currently actually slightly higher than those of men, but this reflects the relatively high density of women in traditionally unionized manufacturing industries rather than the membership status of all women in the economy. This is an example of a statistical Simpson's Paradox. See Johnson 2004.

education decreased, but that also the gender gap decreased. Throughout the decade, women still appear to be more likely to have no formal schooling than men, an important fact when considering wage differentials.

Chart 13



Source: SISESIM

Data and Methodology

A major limitation of this project is the scarcity of demographic data in Mexico prior to 1991. Unfortunately for this thesis, before 1991 Mexican government did not collect female-to-male employment ratios and labor force participation rates. Therefore, regressions using the aforementioned variables are limited in their degrees of freedom and ability to test significance. Regardless, I formulated two basic models of export-based demographic shifts:

$$1) \text{ FemEmp}_t = \beta_0 + \beta_1 \text{LogExports}_t + \varepsilon_t$$

$$2) \text{ FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \varepsilon_t$$

The World Bank measure of Mexican exports is converted to logarithm per general economic protocol. The use of logarithm allows the coefficient of this variable to indicate the effect of a percentage change in exports on the difference in female vs. male labor outcomes. For both dependent variables, I began with the simple regressions shown above and one-by-one added explanators (NAFTA indicator and female-to-male education ratios) to attempt to eliminate omitted variable bias. Finally, I added a time trend to the model to allow for potential upward movement of all variables that may otherwise be taken for causation.

$$\text{Model 1: } \text{FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \varepsilon_t$$

$$\text{Model 2: } \text{FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \varepsilon_t$$

$$\text{Model 2: } \text{FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \beta_3 \text{EducationRatio}_t + \varepsilon_t$$

$$\text{Model 3: } \text{FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \beta_3 \text{EducationRatio}_t + \varepsilon_t$$

$$\text{Model 4: } \text{FemLFP}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \beta_3 \text{EducationRatio}_t + \beta_4 \text{Year}_t + \varepsilon_t$$

Model 1: $FemLFP_t = \beta_0 + \beta_1 LogExports_t + \varepsilon_t$

Model 2: $FemLFP_t = \beta_0 + \beta_1 LogExports_t + \beta_2 NAFTA_t + \varepsilon_t$

Model 3: $FemLFP_t = \beta_0 + \beta_1 LogExports_t + \beta_2 NAFTA_t + \beta_3 EducationRatio_t + \varepsilon_t$

Model 4: $FemLFP_t = \beta_0 + \beta_1 LogExports_t + \beta_2 NAFTA_t + \beta_3 EducationRatio_t + \beta_4 Year_t + \varepsilon_t$

| | Model 1 | Model 2 | Model 3 | Model 4 |
|-----------|-----------------|-----------------|----------------|-----------------|
| β_0 | -1.018 (0.093)* | -0.964 (0.221)* | -1.45 (0.227)* | -18.44 (2.410)* |
| β_1 | 0.058 (0.004)* | 0.056 (0.009)* | 0.095 (0.020)* | 0.005 (0.16) |
| β_2 | | 0.004 (0.014) | -0.013 (0.014) | 0.004 (0.007) |
| β_3 | | | -0.004 (0.004) | -0.011 (0.002)* |
| β_4 | | | | 0.009 (0.001)* |
| | $R^2 = 0.8988$ | $R^2 = 0.8991$ | $R^2 = 0.9261$ | $R^2 = 0.9847$ |
| | F = 248.69 | F = 120.29 | F = 58.48 | F = 209.14 |

*significant at the 5% level

As the table shows, the significance for the LogExports variable, while remaining positive, decreases in absolute value as other regressors are added to the model. In Model 4, the time trend takes all the significance away from the LogExports point estimate. The NAFTA indicator variable, which is 0 before 1994 and 1 after 1994, remains small and statistically different from zero at the 5% level in all the models. Interestingly, the same pattern for significance occurs in the models in which the ratio of female-to-male employment is used as the independent variable:

$$\text{Model 1: FemEmp}_t = \beta_0 + \beta_1 \text{LogExports}_t + \varepsilon_t$$

$$\text{Model 2: FemEmp}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \varepsilon_t$$

$$\text{Model 3: FemEmp}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \beta_3 \text{EducationRatio}_t + \varepsilon_t$$

$$\text{Model 4: FemEmp}_t = \beta_0 + \beta_1 \text{LogExports}_t + \beta_2 \text{NAFTA}_t + \beta_3 \text{EducationRatio}_t + \beta_4 \text{Year}_t + \varepsilon_t$$

Model 1: FemEmp_t = β₀ + β₁LogExports_t + ε_t

Model 2: FemEmp_t = β₀ + β₁LogExports_t + β₂NAFTA_t + ε_t

Model 3: FemEmp_t = β₀ + β₁LogExports_t + β₂NAFTA_t + β₃ EducationRatio_t + ε_t

Model 4: FemEmp_t = β₀ + β₁LogExports_t + β₂NAFTA_t + β₃ EducationRatio_t + β₄ Year_t + ε_t

| | Model 1 | Model 2 | Model 3 | Model 4 |
|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| β₀ | -1.061 (0.102)* | -1.107 (0.242)* | -1.592 (0.238)* | -20.428 (1.888)* |
| β₁ | 0.00598 (0.004)* | 0.062 (0.009)* | 0.093 (0.021)* | 0.006 (0.12) |
| β₂ | | 0.003 (0.015) | -0.018 (0.014) | 0.002 (0.005) |
| β₃ | | | -0.003 (0.004) | -0.009 (0.002)* |
| β₄ | | | | 0.011 (0.001)* |
| | R ² = 0.8863 | R ² = 0.8865 | R ² = 0.9232 | R ² = 0.9911 |
| | F = 218.24 | F = 105.41 | F = 56.11 | F = 363.78 |

*significant at the 5% level

The high significance of the time trend does not necessarily imply that exports have no effect on the dependent variables, rather, it shows that there are not enough data points (degrees of freedom) to econometric causation. In addition, these results must be interpreted with caution because the source of the dependent

variables, the OECD database, extrapolated several data points due to inconsistent census data from the Mexican government.

Additionally, the education ratio may have some endogeneity bias associated with it because it could potentially be responsive to the dependent variables' movements. That is to say, if returns to education increase, the educational attainment may increase and thus reverse causation may plague these regression results. To eliminate this problem, one would need to perform a vector autoregression with time lags. Unfortunately, the lack of segregated female and male labor data negates this possibility.

Although the results found in these regressions are inconclusive, the literature review that follows this section describes several studies that have attempted to explore these issues through both quantitative and qualitative methods.

Literature Review

The two narrative sections of this paper and the econometric results indicate the possibility of trade-based explanations of women's economic welfare in Mexico, at least in the past couple of decades. However, it remains a mystery as to why this shift is occurring. As this trend has been observed in a multitude of developing economies besides Mexico, sociologists and economists alike have been theorizing about these outcomes. I find three compelling explanations:

1) The introduction of competitive pressures by foreign firms arbitrated away excess profits of formerly protected firms, and eliminated any discrimination premiums paid to males (per Becker's economic theory of discrimination).

2) The shift in demand for specific skills amongst workers tended to favor women for a variety of reasons: relative lack of work experience, lower rates of unionization, less educational attainment, and less perceived skills.

3) The simultaneous agricultural reform and disappearance of price supports compelled women to enter the workforce to replace income from agriculture and other state social protections (Arcetona et al. 2010).

The most recent econometric work on trade liberalization and Mexican women's economic welfare is the working National Bureau of Economic Research (NBER) paper titled *Did Trade Liberalization Help Women? The Case of Mexico in the 1990s* (Arcetona et al., 2010). In this compelling project, the authors use industry-level data to estimate the changes in women's wage bill share in the 1990s. They

attribute approximately 40% of the increase to trade-based explanations and the remaining 60% to a general shifting of gender equilibrium in the labor force as a whole. However, the authors are careful to note that data from the agricultural sector is difficult to collect, and the agricultural reforms taking place at the same time as trade liberalization may have contributed greatly to the entry of women into the paid workforce.

Regardless of the source of gender convergence in economic outcomes, the resulting consumption patterns of households have clearly shifted. The authors show that not only has the wage distribution changed, but household allocation of resources has shifted as well in favor of women's' economic preferences. They show that spending on female-specific goods such as education, health-care, and children's provisions has vastly increased while consumption spending on tobacco and alcohol has diminished (such consumption is typically associated with a more traditional male preference). While this last finding is controversial, it suggests an important implication of women's wage earnings: an increase in the economic bargaining power of women in households.

A less recent but equally-relevant paper explored the gender-wage-gap in the manufacturing sector in Mexico during the liberalization period 1987-1993, *Effects of Trade Liberalization on the Gender Wage Gap in Mexico* (Artecona and Cunningham, 2002). Before presenting their empirical findings, the authors discuss the consequences of trade on returns to different types of labor vis-à-vis the Hecksher-Ohlin/Stolper-Samuelson (HO/SS) theory. According to the HO/SS model,

production will tend toward sectors that are more intensive in the relatively abundant factor, and the price ratio of that factor (in this case, less-skilled labor) will increase. Artecona and Cunningham note “This may result in a decrease in the gender wage gap since women tend to have fewer observable job skills than men.”

However, my findings indicate that the ratio of women to men in primary and secondary schools increased rapidly, so this theory may not hold in practice. The reason is that “observable job skills” is not a fully exogenous variable, so the true outcomes predicted by the HO/SS model may not come to fruition.

The paper then goes on to present an alternative view of the correlation between trade volume and gender wage gaps: Becker’s theory of discrimination. The possible existing patterns of discrimination in the workplace can be thought of as an additional cost that is paid for by excess profits of protected industries. Empirical evidence in the US supports this theory (Hellerstein et al, 1997, Black and Strahan, 1999).

Artecona and Cunningham’s paper found some surprising results: that the gender-wage gap actually increased during the study period. However, the study did not control for education or experience, and thus an apples-to-apples comparison was either not feasible (due to a lack of data points) or not undertaken. The paper concludes by saying:

Trade liberalization was found to be associated with higher gender wage gaps in the Mexican manufacturing sector, but this is likely due to an increased premium to men’s higher (experience) skills; the discrimination component of wage differentials seems to fall with competition that is brought about by international competition. A comparison of men’s and women’s wages before

and after Mexico's trade liberalization period shows that the wage gap in the manufacturing industry increased. However, the increase in the wage gap appeared to be due to general movements in the economy over the period and an increased premium to skills, as found by Hanson and Harrison (1999)... When purging the sample of these two effects, we find suggestive evidence (significant at the 20 percent level) that trade liberalization leads to a decrease in wage discrimination.

In a paper published in 1999, *Occupational Attainment and Gender Earnings Differentials In Mexico*, authors Brown, Pagan, and Rodríguez-Oreggia re-examine this pre-NAFTA period of trade reform in Mexico with respect to gender earnings differentials. Their findings were similar to the previous study mentioned, although they specify explicitly that real earnings for women did increase at the same time. To explain the increasing wage differential in the aggregate, they explain that low-wage women worked longer hours and men increased educational status faster than women. However, as I mentioned previously, my findings indicate that the educational attainment of women relative to men increased rapidly in the 1990s and 2000s. This suggests that men may respond more quickly to relatively higher returns to human capital, but that women will close the education gap with time lag.

In a paper published in 1999 examining the HO/SS effects of trade liberalization on various skilled labor groups, *Trade Liberalization and Wage Inequality in Mexico*, authors Hanson and Harrison ignore gender distribution amongst high-skilled and low-skilled workers. In doing so, they present evidence of the price mechanism of the HO/SS model at work, which allows us to compare their results to our knowledge of gender skill differentials to draw conclusions about trade and gender. They explain:

This story is consistent with either of two hypotheses. The first is that Mexico has a wealth of skilled labor and a dearth of unskilled labor relative to the rest of the world. In its reserves of skilled labor, Mexico is far behind the United States, of course, but it may have a decisive edge over low income countries, such as China. The second hypothesis is that under import substitution Mexico extended trade protection preferentially to industries that make relatively intensive use of unskilled labor. Trade liberalization would then have a disproportionately large impact on non-skill-intensive sectors. Although such a policy would seem at odds with Mexico's presumed comparative advantage in low-skill activities, political considerations may have led the government to protect these industries. In either case, the Stolper-Samuelson explanation for the observed wage changes implies that (1) the relative prices of skill intensive goods have increased, and (2) there has been a shift in employment toward skill-intensive sectors.

Of course, our 20/20 hindsight vision in 2011 tells us that indeed the rise of China as a manufacturing powerhouse did crowd out Mexican exports somewhat, and so the theories presented in the above paper may not hold through the 2000s. Regardless, it is clear that the mystery of Mexican wages in the trade reform period is challenging for even the most gifted and resourced economic studies.

The sociology behind globalization and gender is more qualitative and anecdotal in nature. Literature on this topic is certainly worth a brief examination as part of this review because of its interdisciplinary nature. In the book *Gender, Globalization, and Democratization*, (2001) editors Bayes, Hawkesworth, Kelly, and Young compile and/or write essays about different aspects of the global feminization of work that has accompanied rapidly expanding trade. The authors note that: "Gender regimes have changed as foreign investment has disrupted traditional subsistence agricultural communities and encouraged large-scale migration patterns (p 3). The book chronicles several implications of trade around the world, ranging from the feminization of assembly-type work in China to female political organizing in India.

An important aspect of trade and gender is the potential of exploitation, a topic that is largely outside the scope of economics. Due to the controversial nature of the word itself, “exploitation” of female labor remains a confusing and vague concept. The book describes this possibility in great length, noting that:

Other studies show that often young women working in factories are carefully kept under the control of male plant managers and supervisors at work, are forced to work long hours for wages that are below the subsistence level, are sexually harassed at work, and in other ways are demeaned and marginalized, making political resistance almost impossible. For women in these circumstances the workplace is but an extension of the patriarchal authority that these women experience in the home. (p152)

Most importantly, the authors and editors of *Gender, Globalization, and Democratization* raise the concern that the rapid entry of women into the paid workforce may be more of a “push” factor due to the structural adjustment programs imposed upon developing countries in the early 1980s. During this time, the World Bank and other international authorities required neoliberal reform of many countries in order to access critical financial support from such organizations. Because of this structural adjustment, many rural families were displaced from their protected industries and pushed into even deeper poverty. Social and economic protections were rolled back, and thus women were compelled to seek market-based work to replace what was originally provided by the state. This view is consistent with the standard consumption vs. leisure labor supply model, and is complementary (rather than contradictory) to the traditional economic theories presented in this thesis.

The motivation and drive to enter the labor force is impossible to measure, and thus the econometrics used in this paper and others fail to capture the full story of trade liberalization and women's welfare. The best we can do is gather clues from a wide variety of academic perspectives, both qualitative and quantitative. The key is to do all of this while setting aside personal biases and assumptions about gender and globalization.

Conclusion

Mexico is a country with a rich and tumultuous history, economic and otherwise. Because of its unique proximity and shared border with the United States, its relationship to the developing and developed world is abstract and constantly evolving. In the past couple of decades, NAFTA has changed the economic landscape and socioeconomic opportunities for Mexican citizens, both for the better and the worse. This paper does not attempt to make the case for or against free trade, but it does address one potential consequence of trade: economic gender equity. Of course, the unique mixture of culture, geography, and economic conditions in Mexico may mean this analysis is not necessarily a model for the rest of the developing world. However, it is a good starting point for a general conversation about globalization and gender.

This paper also highlights the limitations of economic research on globalization. Econometric modeling is subject to consistent and thorough data collection, something that is often unavailable in developing countries. This can make sophisticated modeling techniques such as vector-autoregressions with lags difficult if not altogether impossible. In addition, econometric modeling depends on creative qualitative thinking in order to minimize or eliminate any potential omitted-variable bias present in regressions. Furthermore, employment and wages are an incomplete measure of well being, and it takes a plethora of diverse perspectives for alternative ways of gauging women's welfare.

For too long, the effects of NAFTA on the female labor force in Mexico have been either overlooked or given at best marginal attention in the academic conversation about what has been the most significant trade agreement in the Americas, and potentially the world. As this thesis and other literature shows, the effects of free trade can have profound consequences not only the life of women, but on society in general. It is my hope that the light this discussion sheds on this topic will be the basis for including issues of wage and working conditions for women in future international trade negotiations.

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