

**Did Trade Liberalization Help Women?
The Case of Mexico in the 1990s**

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Abstract:

Using Mexican household surveys which span the 1990s, we examine relative wages and employment of women in Mexico during the period of trade liberalization and increased foreign direct investment. The gender wage gap remained stable over the liberalization period while the relative supply of women increased, suggesting that relative demand for women increased. Between-industry shifts, consistent with trade-based explanations, account for up to 40 percent of the growth in women's wage bill share between 1990 and 2000. Comparing across industries but excluding agriculture, we find that growth in women's predicted wage bill share is positively related to tariff cuts and increased trade flows. Trade variables, however, cannot explain the large decline in agricultural employment, suggesting the importance of other farm-related policies such as price supports and land reform. We also exploit data on industry-level FDI growth over the period 1994-1999 and find some evidence that FDI helps less educated women.

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I. Introduction

A large literature examines the impact of trade liberalization on wage structure in both developed and developing economies. The findings have been surprising. Contrary to the Heckscher-Ohlin model which predicts that wage inequality should rise in skilled labor abundant (developed) economies but fall in less skilled labor abundant (developing) economies, most researchers have found that trade liberalization increased wage inequality in both developed *and* developing economies.² A related literature also examines how trade liberalization impacts poverty rates and has found mixed results.³ Compared to the number of studies that examine the distributional impacts across skill and income groups, there is relatively little work examining consequences across gender.⁴ This is surprising given that gender equality, along with ending hunger and poverty, is one of the eight stated goals in the U.N. Millennium Development Goals Report (UN, 2009). Given that many developing countries have already or are now in the process of adopting liberalization policies, an important question is whether this will move them closer to the goal of gender equality without explicit policy interventions. Aside of equity concerns, the effect of liberalization policies on gender outcomes may also be of

² Among others, Robbins (1996), Wood (1997), Behrman, Birdsall, Szekely (2000) cover multiple countries. Cragg and Eppelbaum (1996), Revenga (1996), Hanson and Harrison (1999), Melendez (2001), Feliciano (2001), Airola and Juhn (2008) examine Mexico. Currie and Harrison (1997), Pavcnik (2002), and Attanasio, Goldberg, Pavcnik (2004) examine trade and wages in Morocco, Chile, and Colombia respectively.

³ While Goldberg and Pavnik (2007) find little systematic relationship between tariff changes and poverty in Colombia, Topalova (2007) finds a positive relationship between tariff reductions and poverty rates across Indian states. Using a measure called “globalization” which also includes FDI flows, Hanson (2007) finds that in Mexico, states more exposed to globalization had reductions in poverty rates relative to states that were less exposed.

⁴ Oostendorp (2004) presents cross-country analysis relating the gender gap to measures of trade and FDI. The paper finds that trade and FDI inflows reduce the gender gap among low skilled occupations while results are mixed for high skilled occupations.

interest from a long-run growth perspective since there is now growing evidence that empowering women promotes education and better children's outcomes (Thomas (1990), Duflo (2000), Qian (2008)).

In this paper we examine the distributional impact of liberalization policies across gender using data from Mexico. Using multiple household surveys which span the period from 1984 to 2004, we examine relative wages and employment of women in Mexico during the period of trade liberalization and other market-oriented reforms. Our first goal is to clearly delineate whether labor market outcomes for women improved during the period of liberalization. While most papers focus on the gender wage gap, we examine employment changes in conjunction with wage changes.⁵ Since employment rates are still low for women in Mexico (44 percent in 2004), we also examine whether changing selection may be biasing our story.

Our second goal is to link these changes to liberalization policies. We focus on two aspects of liberalization which have received much attention-- trade liberalization policies such as reduction of tariffs and capital market reform which encouraged FDI inflows. While exogenous policy changes which vary by industry would be ideal, such data are not available to us and we report reduced-form correlations in industry level

⁵ Papers which examine the gender wage gap include Brown, Pagan, and Rodriguez-Oreggia (1999) which decomposes the gap into the component due to differences in characteristics between men and women and the component due to discrimination. Pagan and Ullibarri (2000) find that the gender gap is larger for older workers, larger in smaller firms, large in the informal sector, and larger at the border. Sanchez and Pagan (2001) find a large earnings gap between female and male-owned micro-enterprises which is partly explained by lower levels of education and experience of female owners although surprisingly, not much is explained by differences in sectoral composition of female and male-owned businesses. An exception in this literature is Melendez (2001) which examines employment changes as well as wage changes and uses a labor demand framework similar to ours. Compared to his analysis, we use the larger Census samples and specifically focus on gender when assessing the role of trade and FDI.

changes in relative labor market outcomes of women and the industry level changes in tariffs, trade flows, and FDI.

Our use of household data along with industry level analysis follows closely the strategies of Attanasio, Goldberg and Pavcnik (2004), Goldberg and Pavcnik (2007), and Topalova (2007). An alternative strategy is to use firm-level data which is usually available only for the manufacturing sector. The two approaches have advantages and disadvantages. Household data are clearly better suited for our first goal which is to document relative labor market outcomes for women. The broad coverage allows us to examine how women are impacted in the whole economy, not just in manufacturing or in the tradeables sector. A disadvantage of the household surveys is that they typically report broad industry classifications and important between industry shifts in size and employment are missed by the aggregation. We are able to match approximately 70 industries across the 1990 and 2000 household surveys which is more than is typical in studies which follow our strategy.

What are the theoretical links that connect trade liberalization policies and gender outcomes? In this paper, we focus on how liberalization policies affect gender outcomes through the *labor market* by affecting relative wages and relative employment of women. Trade liberalization can impact relative wages and employment if men and women are imperfect substitutes in production. Qian (2008) discusses how the tenderness of the tea leaves requires careful plucking, giving women comparative advantage while men's height and stature give them comparative advantage in orchard crops. Similarly, women may have comparative advantage in light assembly manufacturing while men have advantage in heavy manufacturing that requires strength. Assuming men and women are

imperfect substitutes in production, the labor demand framework that has been used for skill demand can be applied to discuss and quantify relative demand for female workers.⁶ This framework is adopted by Acemoglu, Autor, and Lyle (2004) who examine the impact of WWII mobilization rates on female labor supply and consequently on their relative wage. Their estimates of the elasticity of substitution between men and women suggest that “men and women are close but far from perfect substitutes.” In this framework, factor intensities vary by industry, and trade liberalization, by affecting the growth of different industries, will generate relative demand shifts by gender.

Another channel through which liberalization policies can affect gender outcomes is through foreign direct investment. Foreign firms may be more capital-intensive and/or bring more advanced technologies which may be more complementary with female than male labor (Javorcik (2004), Arnold and Javorcik (2009)). Galor and Weil (1996) and Welch (2000) explore the notion that women have advantage in cognitive vs. physical skills and that advances in technology increase the relative demand for women over time. Using U.S. data, Weinberg (2000) shows that female employment growth is positively related to computer-use across industries and occupations.

A third channel through which trade liberalization can impact relative wages is through reduction of discrimination brought about by foreign competition. Consistent with the original insight of Becker (1957), Black and Brainerd (2002) report that U.S.

⁶ See for example, Katz and Murphy (1992), Bound and Johnson (1992), Berman, Bound, and Griliches (1994).

industries which were subject to more competition through trade experienced greater reductions in earnings and employment disparities between men and women.⁷

To summarize our findings, we find that the gender wage gap changed relatively little over the period, particularly when we focus attention on the period of reform, 1990 to 2000. At the same time, female share of the labor force increased, suggesting that relative demand for women increased over this period. Between-industry shifts arising from declining agriculture and the rise of services and light manufacturing account for up to 40 percent of the shift in wage bill share of women from 1990 and 2000. Our conclusion is that trade-based explanations can potentially explain a large amount of the total change—particularly when one compares to similar studies conducted in the U.S. Turning to industry level data we find that industries predicted to favor women most based on overall industrial change were indeed those most impacted by trade liberalization. Trade variables, however, are unable to explain the large decline in agricultural employment. This points to the importance of other agriculture-specific policies that took place concurrently, such as the elimination of price subsidies and land reform. We conduct a similar analysis relating within industry change in female wage bill share to industry level FDI stock in 1999. We find some preliminary evidence that FDI helps less educated women, particular when we control for the level of computer investment in the industry.

This paper is organized as follows. Section II documents the reforms and describes the macroeconomic background of the Mexican economy during this period. Section III describes the data sets. Section IV examines changes in the gender wage gap

⁷Artecona and Cunningham (2002) employ the same methods for Mexico but do not find a significant

and relative supply of female workers. Section V examines changes in industrial composition and presents the decomposition of demand-shifts within and between industries. Section VI presents the cross-industry analysis relating wage bill shares to tariff changes, trade flows, and FDI. Section VII concludes.

II. Trade Liberalization and Other Reforms in Mexico

During the late 1980s and the early 1990s, many countries in Latin America adopted trade liberalization policies and other market-oriented reforms. Mexico was one of the countries at the forefront of this movement. The collapse of the oil price during the mid-1980s brought about a severe recession, making it difficult to maintain a large public sector pursuing heavily protectionist policies. Figure 1 reports the timing of important reforms as well as the evolution of real per capita GDP in 2000 dollars. With respect to trade liberalization, Mexico began unilateral tariff reductions in the early 1980s and joined the GATT in 1986. By 1987, the highest tariff was reduced to 20% and the tariff structure was simplified to include only 5 different rates: 0%, 5%, 10%, 15%, 20%. Starting in 1990, Mexico's opening strategy switched to pursuing bilateral free trade agreements, with the most important being the North American Free Trade Agreement (NAFTA) with U.S. and Canada which took effect in 1994. NAFTA reduced tariff rates with the U.S. from a maximum of 20% to zero in 15 years and many of the reductions to zero took immediate effect (Zabludovsky, 2005). Figure 2a shows trends in effective

relationship between tariff changes and reductions in the gender wage gap across industries.

tariff rates separately for U.S. and other non-NAFTA countries.⁸ Since more than 80% of the trade occurs with the U.S., the decline in effective tariffs due to NAFTA was dramatic. Figure 2b shows the trends in exports and imports as fractions of GDP. The figure shows that while the unilateral tariff reductions had some impact in the 1980s, trade flows accelerated in the 1990s with the signing of NAFTA. Trade flows stagnated in the 2000s with a recession in the U.S. and China's entry into the WTO being likely contributing factors to the slowdown. Figure 2b illustrates that the 1990s is an ideal testing ground to examine the impact of trade liberalization policies.

During the 1990s Mexico also engaged in other important reforms such as capital market reform, privatization of state owned enterprises, and land reform. One of the most important changes was the easing of restrictions on foreign ownership of assets in 1989 with further consolidation and extension with the signing of NAFTA (Hanson (2007)). Figure 3 shows the growth in two types of foreign direct investment. First, the figure graphs the stock of foreign direct investment (in 1990 U.S. dollars adjusted for PPP) from Lane and Milesi-Feretti (2007) which makes adjustments for depreciation and changes in the real exchange rate. The figure shows a dramatic increase in foreign owned capital since the mid-1980s. Figure 3 also shows the growth of the maquiladora sector, the export assembly firms which are largely foreign-owned. The "maquiladoras" were created in the 1960s as an exception to the import-substitution policies that prevailed during the period. Firms were allowed to import duty-free inputs and machinery as long as the final output was exported abroad. The maquiladoras were allowed to be a hundred percent foreign-owned and thus became a vehicle for FDI (Hanson, 2004). The signing

⁸ To calculate effective tariff rates, we averaged nominal tariff rates of 34,000 products weighting by initial

of the North American Free Trade Agreement (NAFTA) should have eliminated the special tax advantages enjoyed by the maquiladoras. However, as Figure 3 shows, employment in this sector appears to have accelerated with NAFTA. In the following sections we analyze the impact of these changes on the gender wage gap and on the employment of women.

NAFTA impacted the agricultural sector by reducing tariffs on staples such as corn. While the tariff reductions were phased in gradually with the last of the tariffs being eliminated in 2008, other important reforms which impacted the agricultural sector took place in conjunction with the tariff reductions. Price supports were eliminated in favor of direct income transfers with the final programs being phased out by 2008. In addition, the constitution was amended in 1991 to allow the “ejidatarios,” peasants who had benefited from land reform, to gain property rights and be able to sell their land (McMillan, Zwane, Ashraf (2007)). While it is difficult to separate out the contribution of each policy change, the outcome was a steep decline in employment in the agricultural sector.

III. Data

We use data from 9 rounds of the Household Income and Expenditure Surveys (ENIGH), a nationally representative survey which spans the period 1984-2004. We also use data from the 10% samples of the Mexican Population Census of 1990 and 2000 available from the Census IPUMS for our industry and cross-state analysis. Unlike the

import share.

ENIGH, statistical inferences using the larger Census samples are significant at the two-digit industry level (92 categories) and at the state level (32 states). Appendix Table 1 provides summary statistics of the data.

For calculating wages we construct a wage sample consisting of men and women who are 15-64 years old, who worked at least 30 hours during the survey week and reported no self-employment income. Wages are reported wage and salary earnings last month converted to a weekly wage by dividing by 4.33. Earnings were deflated by the national consumer price index published by the Bank of Mexico with 2000 as the base year.

For reporting quantities of labor by education and by industry, we construct a sample of 15-64 year olds who report positive hours during the survey week, including the self-employed. We report hours-weighted employment shares and employment shares in efficiency units of labor. To calculate efficiency units of labor, we first calculate average wages (fixed across all years) by 2 gender, 10 age and 6 education categories. We weight hours by these average wages to calculate efficiency units of labor. All our calculations are weighted by the household weights to make the sample nationally representative.

We match industry classifications available in the 1990 and 2000 Census samples to the Sistema de Clasificacion Industrial de America del Norte 1997 (SCIAN97 and also called the NAICS in the U.S.). Tariff, export, and import data for 1993-2000 were obtained from the Ministry of the Economy (formerly SECOFI), international trade statistics (www.economia.gob.mx). Tariffs, exports and imports are reported in “facciones arancelarias” which is a classification system for products. There are more

than 34,000 products. For tariff schedules we used the book Fracciones Arancelarias y Plazos de Desgravación, Tratado de Libre Comercio de América del Norte (1994), published by the Ministry of Economy. The book publishes each product with the 1993 tariff rates (0,5,10,15,20%) along with a code, A, B, C, D or B6 which describes the rate at which the tariff is reduced to zero. For example, Code A corresponds to a tariff which is reduced to zero in 1994. We aggregated products and tariff schedules up to the SCIAN97 industry codes using the 1993 import shares as weights. Industry-level FDI flows for 1994-2000 were obtained from the Ministry of Economy. Data on value added, capital stock and computer stock are from the Economic Census of Firms 1999 and come directly in SCIAN97 industry codes and are available from the Instituto Nacional de Estadística y Geografía (INEGI) website (www.inegi.org.mx).

IV. Relative Wages and Employment of Women during the Liberalization Period

A. Relative Wage

Figure 4-7 document changes in relative wage of women during the period 1984-2004. We use the multiple rounds of the ENIGH to examine the time pattern and supplement with the larger samples of the Mexican Census for 1990 and 2000. Our wage sample consists of men and women who are 15-64 years old, who reported working full-time (30 hours or more), and who either did not have self-employment earnings or reported that they were not self-employed. Additionally since we are calculating means in figures 4-7, we are wary of outlier observations and proceed by deleting the top and

bottom 1 percent of observations by gender.⁹ Figure 4 graphs the mean female-male wage ratio. The figure shows that women's relative wage fell from 1984 to 1989, but there is no clear trend since that period. In the census data, the wage ratio rose slightly from .81 in 1990 to .84 in 2000. Figure 5 shows mean wage ratios holding fixed the composition of workers across age and education categories.¹⁰ Figure 5 illustrates that correcting for compositional changes makes little difference. In figure 6 we examine whether deleting self-employed workers substantially biases our results. We include self-employed workers in figure 6 and find similar trends. Finally, in figure 7 we examine the most inclusive sample by including self-employed workers and part-time workers. We report hourly wages by dividing weekly wage by hours worked per week. We find that women are paid slightly better than men on an hourly basis (the ratio is often greater than 1) and moreover, at least according to the Census samples, hourly wages of women increased relative to wages of men during the 1990s. This suggests that we may be slightly understating wage gains of women by focusing on full-time wage and salary workers. The basic message we take away from these figures is that the gender wage ratio was relatively constant during the period of reform, 1990 to 2000.

B. Employment and Female Share of the Labor Force

⁹ We experimented with various alternative cutoffs and other measures such as medians and log wage differences and found similar trends in relative wages.

¹⁰ In order to hold composition across education and age constant, we first calculated average wages by single-year age and education categories and aggregated over these groups using a fixed distribution across all years.

We next examine changes in employment to population ratios of women and changes in the female share of the labor force. Table 1 reports the employment to population ratios of all women who are 15-64 years old, as well as employment to population ratios disaggregated by education category. Employment rates are much lower in Mexico than that observed in developed countries—for example, the ratio for comparable women in the U.S. during this period would be .60 and higher. Over the 1990s, employment-population ratios increased between 12.3 (ENIGH) and 13.4 (Census) percentage points.

Table 2 describes the changes in female share of the labor force. Top panel reports shares based on the ENIGH while the bottom panel refers to data from the Census. Panel A reports female share of total hours worked. Panel B reports labor shares in efficiency units. Focusing on the Census-based results in the bottom panel, the table shows that both measures of female labor share increased by approximately 5 percentage points with the change in hours shares being slightly larger.

The decline in the female/male wage ratio from 1984 to 1989 is consistent with the increase in the relative supply of women where rapid entry of women led to a decline in own wage. Since 1989, however, relative wage of women have remained relatively constant while the relative supply of women have increased. Taken together, the evidence on the gender wage gap and relative supplies suggest that relative demand for women must have increased since 1989. In the special case of Cobb-Douglas production where the elasticity of substitution between male and female labor equals one, one can interpret changes in female wage bill share as an increase in relative demand for female labor (see Autor and Katz (1999)). Wage bill shares are reported in Panel C and the table

shows that wage bill shares of women also increased by approximately 5 percentage points.¹¹ Taking wage changes together with employment changes, the aggregate evidence suggests that women’s labor market outcomes improved over the period of liberalization.

One possible issue is that selection of working women may have changed during this period. For our purposes, if the selection of working women improved over time, we would be overstating their underlying wage gains. We addressed this issue somewhat by holding the composition of observable characteristics such as age and education fixed in figure 6. We extend these results further by looking at married women and their spouses’ characteristics in table 2 of the appendix. The top panel of table 2 refers to all women. The table shows that 21 percent were working in 1990 and 35 percent were working in 2000. The average difference in years of schooling between workers and non-workers decreased from 3.1 to 2.1 years. For the wage sample, 16 percent of women were in our wage sample in 1990 and 23 percent in 2000. The gap in schooling between women in the wage sample and not in the wage sample also declined from 3.1 to 2.4. The bottom panel examines married women with spouse which consists of approximately 60 percent of women in the 15-64 age range. Among married women the table shows that not only did own education gap fall between working and non-working women, the education and

¹¹ In calculating wage bill shares, we also allow group specific wages to vary by year. More specifically, we define 10 five-year age groups and 5 education groups. We use our wage sample to calculate average

wage of group j in year t in the following manner: $W_{jt} = \frac{\sum_{i \in j} Wage_{it}}{\sum_{i \in j} Hours_{it}}$ and use our quantity sample to sum

wage gap of their spouses also fell. Given the strong positive assortative mating patterns, husbands' characteristics can be viewed as another indication of wife's quality. The comparison of working and non-working women over time suggests that working women have become less positively selected over time and that we may in fact be understating the rise in return to female labor. In the following section, we examine whether relative demand shift favoring women occurred largely between industries, through shifts in industry composition, or occurred within industries.

V. Industrial Change and the Demand for Female Workers

Table 3 reports labor shares across broad industry classes using Census data. The most significant change reported in the table is the declining share of agricultural employment throughout the period. According to the Census, agriculture's share fell from 12.5 percent in 1990 to 7.7 percent in 2000. Since predominantly men work in agriculture in Mexico, we would expect this to negatively impact men relative to women. Somewhat surprisingly, the manufacturing sector also decreased modestly. Instead, several services sectors registered large growth, such as retail, professional services, education, hotel and restaurants, and other services.

Table 4 disaggregates the manufacturing sector further and shows that while manufacturing employment was flat overall, there have been winners and losers within

total hours by group j in year t as $H_{jt} = \sum_{i \in j} Hours_{it}$. Wage bill share of women in year t is calculated as

follows:

$$WB_t^f = \frac{\sum_j (W_{jt}^f * H_{jt}^f)}{\sum_j (W_{jt} * H_{jt})}$$

manufacturing. Female-intensive sectors such as “clothes” and “electronics and computers” grew while predominantly male-intensive sectors such as “oil and coal products,” “chemical products,” and “basic metals” declined. “Transport products” which includes car assembly, on the other hand, grew over this period.

One method of summarizing these changes is to calculate within and between-industry changes in employment and wage bill shares of female workers. Between-industry changes in women’s wage bill share would be consistent with trade based explanations. For example, tariff reductions in the advent of NAFTA may have increased the relative size of the manufacturing export sector which more intensively utilizes female labor. These types of changes would be captured by between-industry shifts and we view gauging the importance of between-industry shifts as the first step towards assessing the role of trade liberalization policies.

We decompose the change in the share of women into two components according to the following formula:

$$\Delta \text{Predicted } WB_{jt} = \sum_i \frac{N_{ijt-1}}{N_{it-1}} * \left(\Delta \frac{N_{it}}{N_t} \right) + \sum_i \left(\Delta \frac{N_{ijt}}{N_{it}} \right) * \frac{N_{it}}{N_t} \quad (1)$$

The term $\frac{N_{ijt-1}}{N_{it-1}}$ is the share of women in industry i and $\Delta \frac{N_{it}}{N_t}$ is total employment growth of industry i . The first term corresponds to the “between” component and captures the extent to which growth in share of women was due to differential growth across industries. The second term reflects within-industry changes in female share. This type of decomposition analysis is most commonly conducted using detailed

industry-level data from the manufacturing sector (Berman, Bound, and Griliches (1994), Berman, Bound, and Machin (1998)). We use household survey data similar to Autor, Katz, and Krueger (1998) and Weinberg (2000). The major advantage of using household data is that we can examine economy-wide changes, including agriculture and services. The disadvantage is that we lack detailed industry-level data and may misclassify between-industry movements as within-industry movements. We use 70 industry classifications which we can consistently match across the 1990 and 2000 Census.

Table 5 reports changes in employment shares (in efficiency units) relative to the total as well as changes in wage bill shares, again relative to the total. We distinguish 4 different groups, less educated (<12 years of schooling) males and females, and more educated (≥ 12 years of schooling) males and females. We also report all women's wage bill share in the last row. The table shows that the wage bill share of women increased 5.3 percentage points overall between 1990 and 2000. Between-industry shifts account for 40 percent (2.1/5.25) of the total change. Between-industry shifts account for a smaller (32 percent) but still substantial share of the change in employment share suggesting that employment shifts across industries were important. This is in contrast to Attanasio, Goldberg, and Pavcnik (2004) who find stable employment patterns across industries in Colombia and also Revenga (1997) and Hanson and Harrison (1999) who examine an earlier period in Mexico. These authors conclude that trade liberalization impacted industry wage premiums rather than reallocate labor across sectors. Our finding here is that labor reallocation is an important part of the story in Mexico during the 1990s. It is also important to keep in mind that our aggregate industry categories are

likely to under-estimate the true shift in employment across industries thus giving us a lower bound of the importance of between-industry shifts.

The disaggregation by education group also points to which type of women gained the most in a relative sense. Since the wage bill share of less educated men dropped so dramatically (14.5 percentage points), less educated women especially had large gains (in a relative sense) vis a vis their male counter-parts. The four groups are not equally sized and the less educated groups are much larger in number so that the aggregate change is largely driven by the relative outcomes of less educated women vs. less educated men.

In the following section we will systematically relate these between-industry shifts to trade-related policies such as tariff reductions and increases in imports and exports. This entails omitting the non-tradeables sector. What do the between and within decompositions look like when we delete these sectors from the analysis? Table 2 of the appendix shows the decompositions. The results for the tradeables sector looks similar to the overall decomposition with 40 percent of the rise in female wage bill share being due to between-industry shifts. The results for the non-tradeables sector, however, looks remarkably different and between-industry shifts account for less than 25 percent of the total change in wage bill share. This suggests that product demand changes unrelated to trade are not likely to be promising explanations.¹² We take away from these tables that between-industry shifts, such as the decline of agriculture, and the rise of export-oriented

¹² We also report results deleting agriculture from the analysis in table 3 of the appendix since the decline in agricultural employment may have been driven by other farm-related policies rather than tariff changes alone. Deleting agriculture from the analysis, we find that wage bill shares of women increased by a smaller amount, 4.3 percentage points. Between-industry shifts account for approximately 28 percent of the total change.

manufacturing industries can account for a substantial portion of the relative demand increase in favor of female workers over this period.

VI. Industry Level Analysis

A. Female Wage Bill Share and Trade Liberalization

The previous section established that a substantial portion of the rise in female wage bill share can be attributed to shifts in industry composition. In this section we go a step further and ask whether those industries which are predicted to have the largest increase in female share were those that experienced the largest changes in trade measured either as tariff reductions or trade flows.

We define the predicted “between-industry” wage bill share of group j in industry i as the following:

$$\Delta \text{Predicted WB}_{ijt} = \left(\frac{N_{ijt}}{N_{it}} - \frac{N_{jt}}{N_t} \right) * \Delta \frac{N_{it}}{N_t} * 100 \quad (2)$$

where i refers to industry and j refers to group and $\frac{N_{ijt}}{N_{it}}$ refers to the share of j -type

workers in total wage bill in industry i , $\frac{N_{jt}}{N_t}$ refers to share of j -type workers in total

wage bill in the economy, and $\Delta \frac{N_{it}}{N_t}$ represents the growth of industry i . The above

predicted wage bill share is positive if group j is over-represented (relative to aggregate share) in industry i and if industry i is growing over time. The predicted share is negative if either the group is under-represented in growing sectors or over-represented in

shrinking sectors. We regress the change in predicted wage bill share of all women on the change in effective tariff changes at the industry level as in the following:

$$\Delta \text{Predicted } WB_{it}^f = \alpha + \beta \Delta \text{Tariff}_{it} + \varepsilon_{it} \quad (3)$$

Tariff change is defined as the difference between 1993 and 2000 rates. We run weighted least squares regression on 28 industries in the tradeables sector that we are able to match both across Census years and also to the tariff data using the Sistema de Clasificacion Industrial de America del Norte 1997 (SCIAN97). We weight by total industry level wage bill shares. The results of the regression are displayed in figure 8. In the regression shown we delete agriculture. As the figure shows, agriculture is far off the regression line and since it is also a large sector in terms of wage bill share, the regressions which include agriculture are not significant. Figure 8 shows that industry level tariff changes range from minus 17 percentage points to zero. Change in female wage bill share is negatively related to tariff changes implying that those industries with larger tariff reductions had greater gains in female wage bill share. It is important to note, however, that these results are somewhat counter to the standard Stolper-Samuelson effects. For example both Revenga (1997) and Hanson and Harrison (1999) in analyzing the 1980s find that less skilled workers were located in industries which were the most protected. Tariff reductions lead to price reductions in sectors which adversely impacted workers who were over-represented in those sectors. We find that tariff reductions from 1993-2000 are actually positively related to industry growth. One important difference between the earlier and later periods of trade liberalization is the pursuit of bilateral trade

agreements as opposed to unilateral tariff reductions. This may indicate that within a broadly defined industry category, tariff reductions in Mexico are accompanied by tariff reductions in the U.S. For example, in the “clothing” industry which experienced both large tariff reduction and growth in female employment, intermediate inputs are imported into Mexico at a reduced tariff rate and the output goods are exported to the U.S. also at a reduced tariff rate. This process may describe a sizeable part of the export manufacturing sector and according to figure 8, women appear to have been beneficiaries.

While tariff changes are arguably more directly related to policy changes compared to trade flows, we also examine the impact of trade flows on female wage bill share in figure 9. The right hand side variable in figure 9 is trade as share of value added defined as $(\text{imports} + \text{exports}) / \text{value added}$. In figure 10, we use net exports share. Both total trade and net exports are positively related to female wage bill share. Net exports exhibit a stronger positive relationship, suggesting that exports are particularly important for increasing female wage bill share. The table version of the regressions is presented in table 6. The table also disaggregates into 4 groups, defined by education (less than high school and high school or more) as well as gender. The disaggregation shows that trade liberalization most adversely impacted less educated men and benefited both less educated and educated women.

B. Female Wage Bill Share and FDI

Along with trade liberalization, another important market reform was the easing of restrictions on foreign ownership of assets. This led to the increase in foreign direct investment documented in figure 3. Before rule changes took place in 1989, most FDI

consisted of maquiladoras—the off-shore assembly manufacturing plants for export. While maquiladora sector continued to grow in the 1990s, FDI also flowed to sectors other than the manufacturing export sector. Appendix table 5 shows FDI flows by industry. Our industry level FDI data come from the Ministry of the Economy (formerly SECOFI) and consist of annual FDI inflows from 1994-2000. We match industries to the SCIAN97 industry codes to correspond to our household data which results in 66 industry categories. We accumulate annual inflows from 1994-1999 and deflate the cumulative stock in 1999 by the industry-level capital stock in 1999.¹³ We run weighted OLS regressions of the following type:

$$\Delta WB_{it}^f = \alpha + \beta FDI_Stock / Capital_{it} + \varepsilon_{it} \quad (4)$$

The results are reported in table 7. In the bottom panel we report results using the wage bill share of all women as the dependent variable while the top two panels report results separately for less educated and more educated women. When we combine all women, we find no significant relationship between FDI and women’s wage bill share. Looking separately at less and more educated women, we find some evidence that FDI is positively related to wage bill growth of less educated women and negatively related to wage bill growth of more educated women. Computer capital stock is strongly negatively related to growth of wage bill share of less educated women at the industry level but strongly positively related to growth of wage bill share of more educated

¹³ Our capital stock variable comes from the Economic Census of Firms 1999 which is available from the INEGI website, www.inegi.org.mx. Because the agricultural sector is not covered by the census and capital stock measure is not available, we unfortunately lose agriculture in the regressions reported below.

women. When we control for this effect in column (2), the significance of coefficients on FDI increases.

VII. Conclusion

Some view rising wage and income inequality in Latin America as an unacceptable consequence of following more efficient market-oriented policies. The impact of trade liberalization and foreign direct investment on domestic wage structure, therefore, is of central policy concern. The evidence in this paper suggests that rather than immiserizing women, trade liberalization improved women's labor market outcomes. Particularly during the reform period, 1990 to 2000, the gender wage ratio remained stable while the relative supply of women increased. This suggests that the relative demand for women must have increased over this period. We find that employment changes across industries are consistent with this increase in relative demand. Industries such as agriculture and heavy manufacturing, where less educated men predominantly work, declined. Services and light assembly manufacturing industries, where women predominantly work, expanded. How do we know that these changes at the industry level are related to trade liberalization? We turn to industry level data on women's wage bill share and tariff changes and trade flows. We find that industries which grew and consequently benefited women were also those were the most impacted by trade liberalization, whether measured by tariff reductions or increased trade flows. We conduct a similar analysis relating within industry change in female wage bill share to industry level FDI stock in 1999. We find no systematic relationship for women

overall but find some evidence that FDI helps less educated women, particular when we control for computers.

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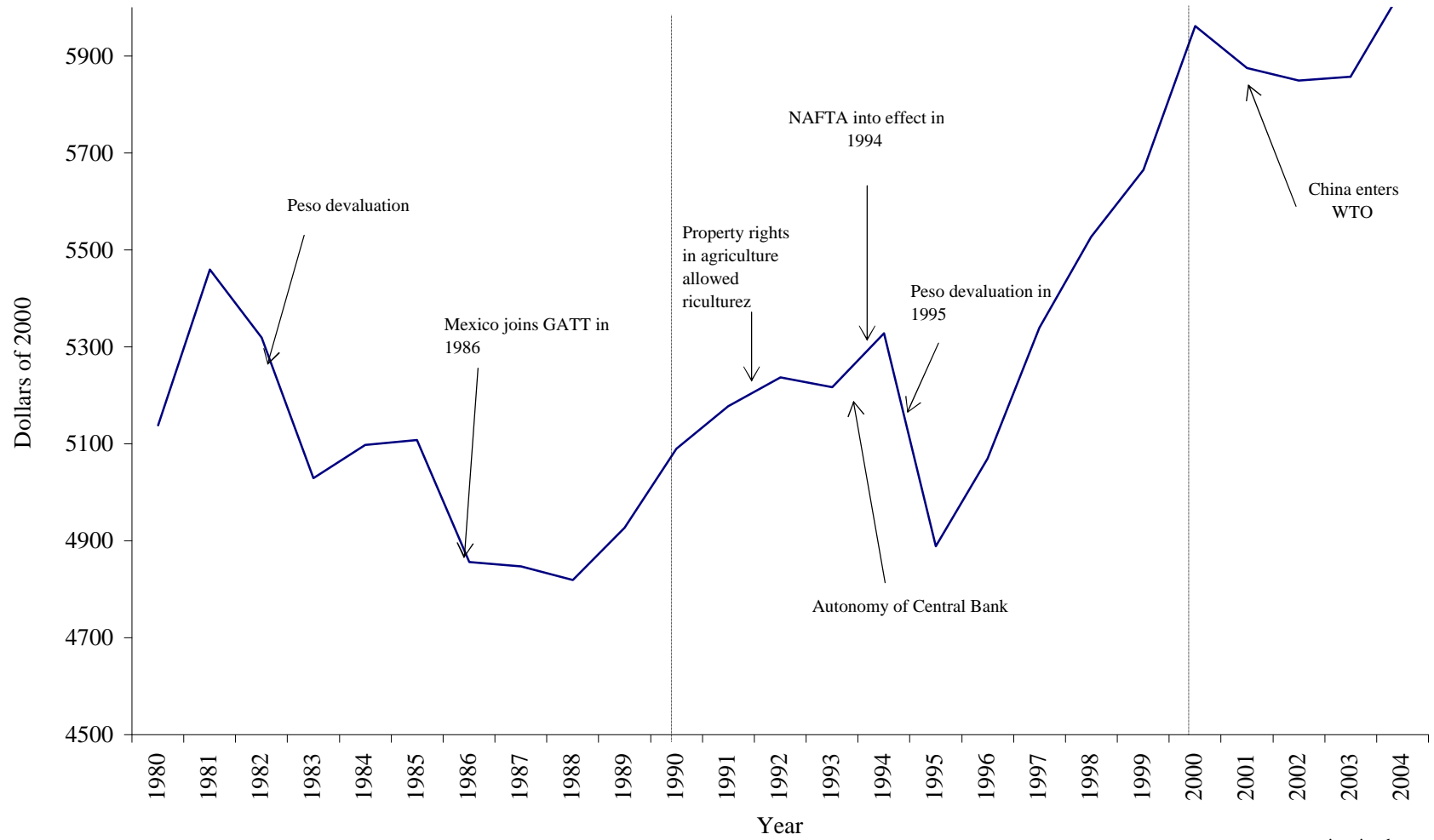
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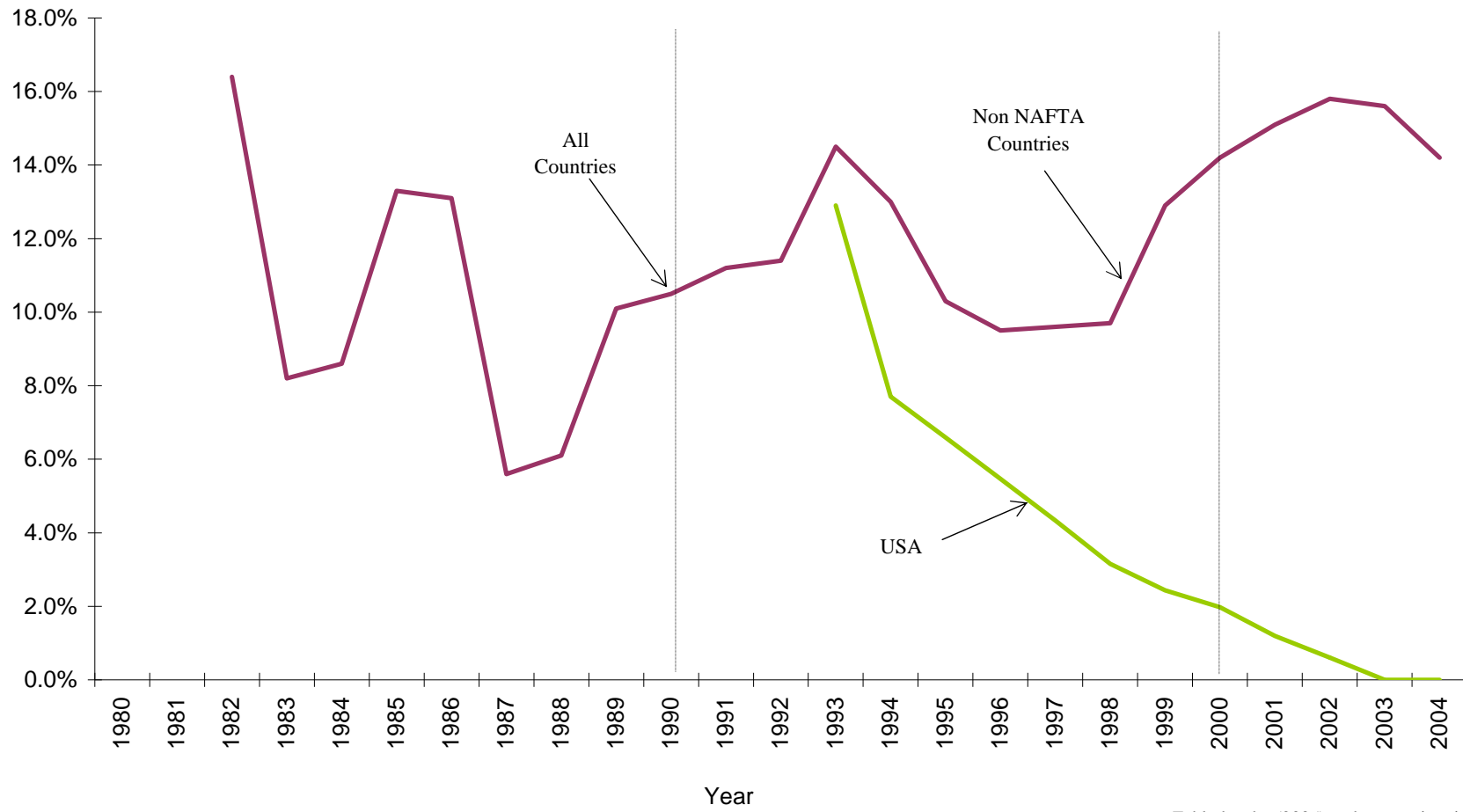
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Figure 1
Mexico. Real GDP per capita, 1980-2004



source: www.inegi.gob.mx

Figure 2A
Effective Tariffs, 1980-2004



source: Zabludovsky (2005) and own estimations.

Figure 2B
Non-oil Exports and Imports as share of GDP, 1980-2004

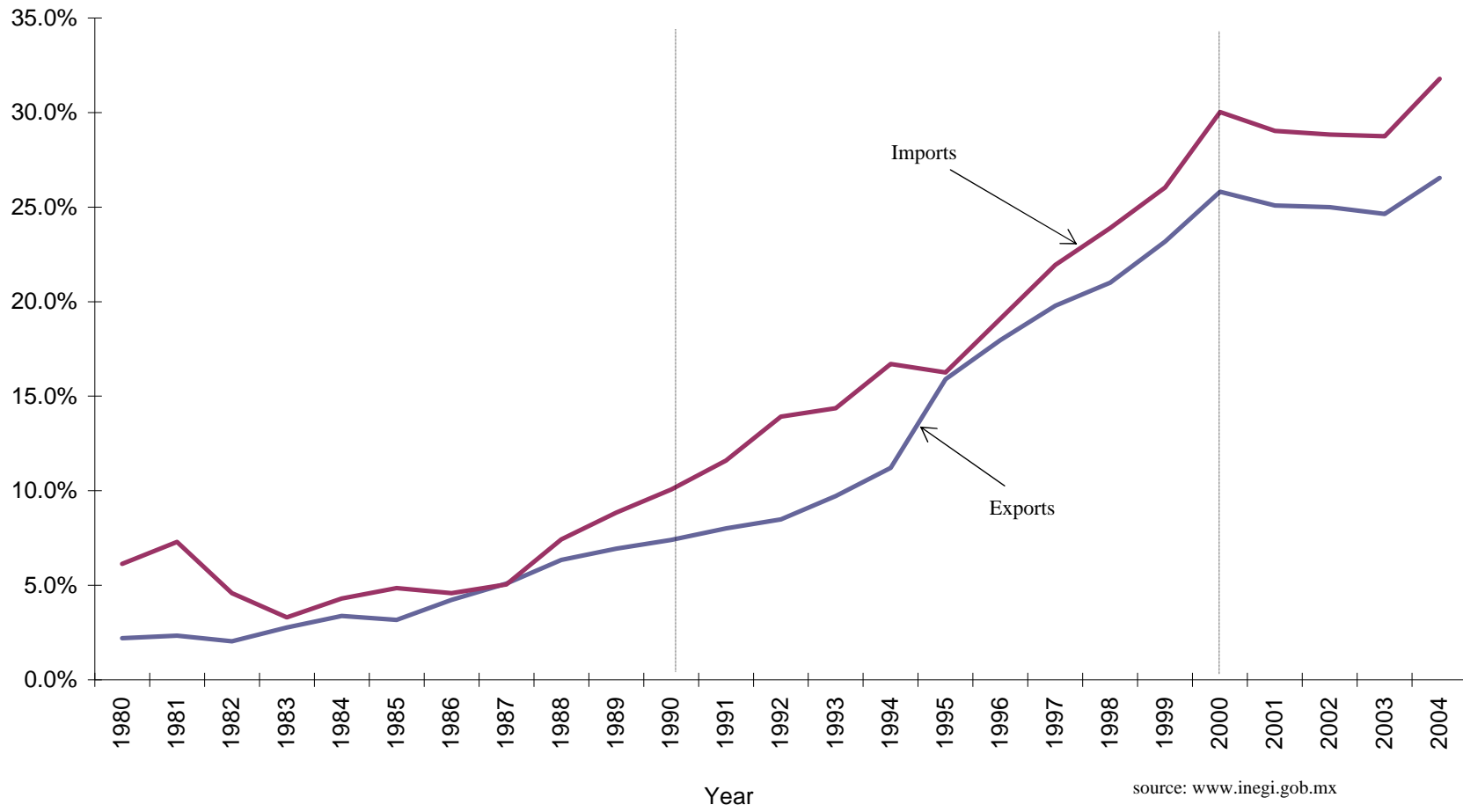
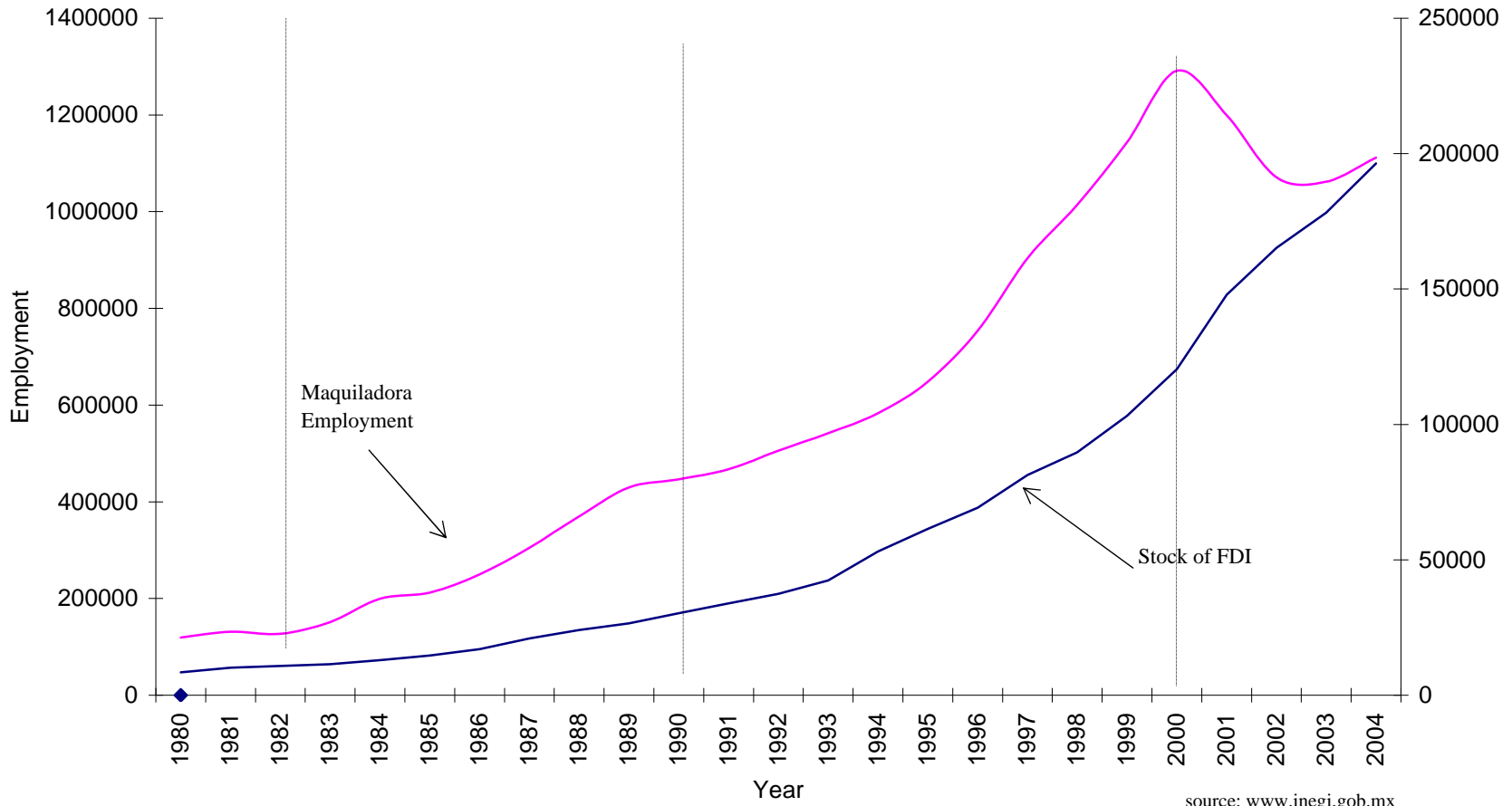
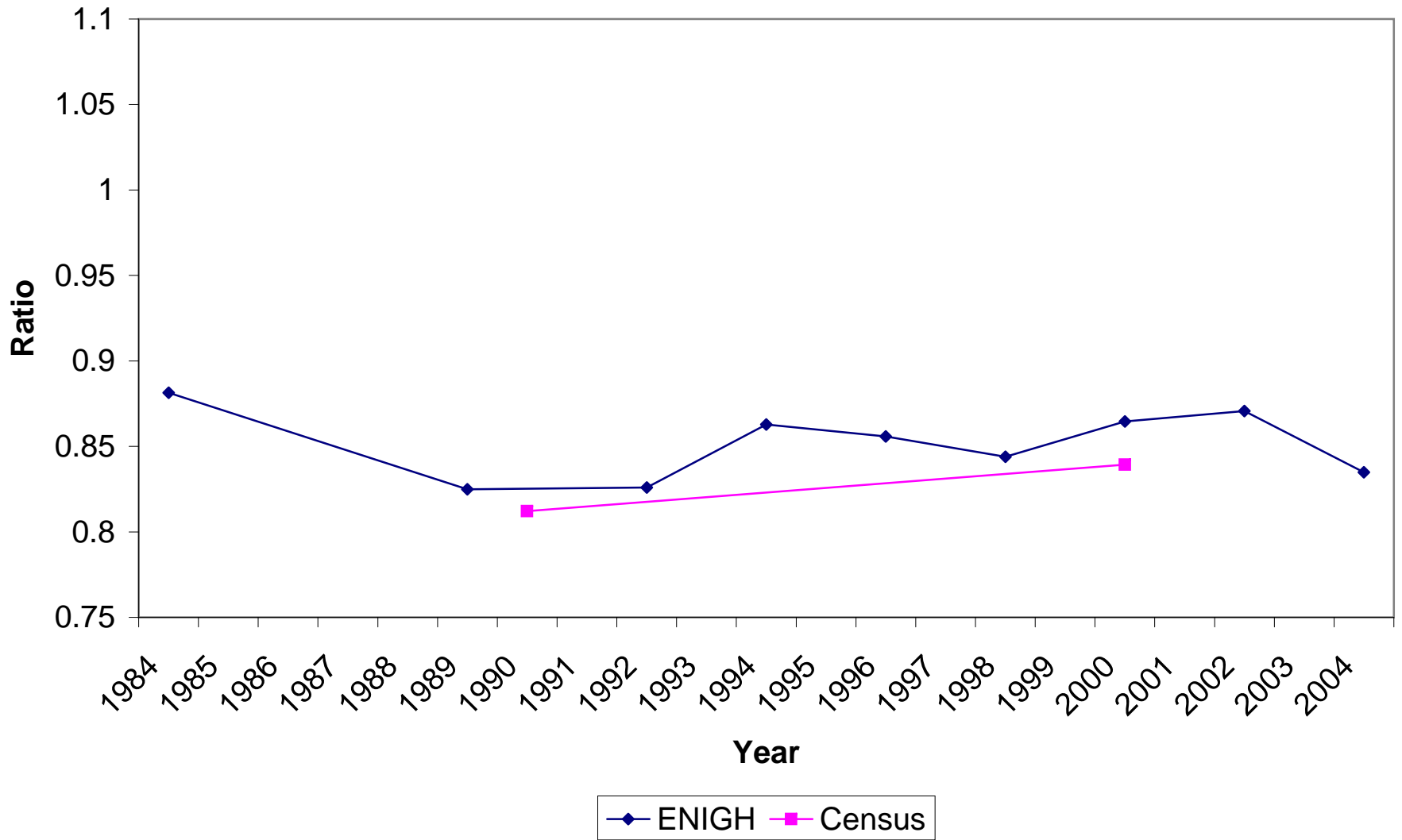


Figure 3
 Maquiladora Employment and Stock of FDI, 1980-2004



source: www.inegi.gob.mx

Figure 4. Female/Male Mean Weekly Wage Ratio



**Figure 5. Female/Male Mean Weekly Wage Ratio
Composition Fixed**

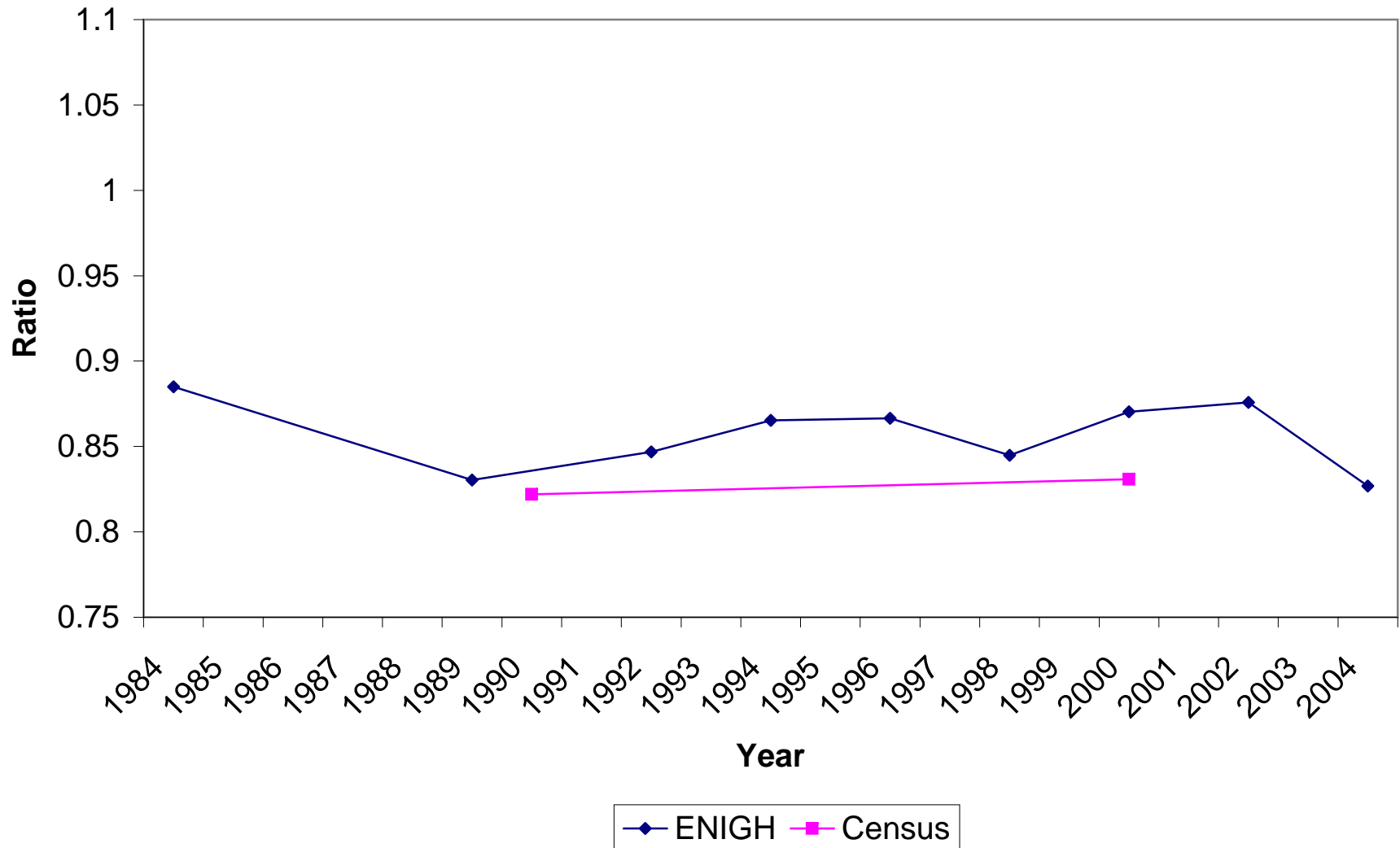


Figure 6. Female/Male Mean Weekly Wage Ratio Including Self-Employed

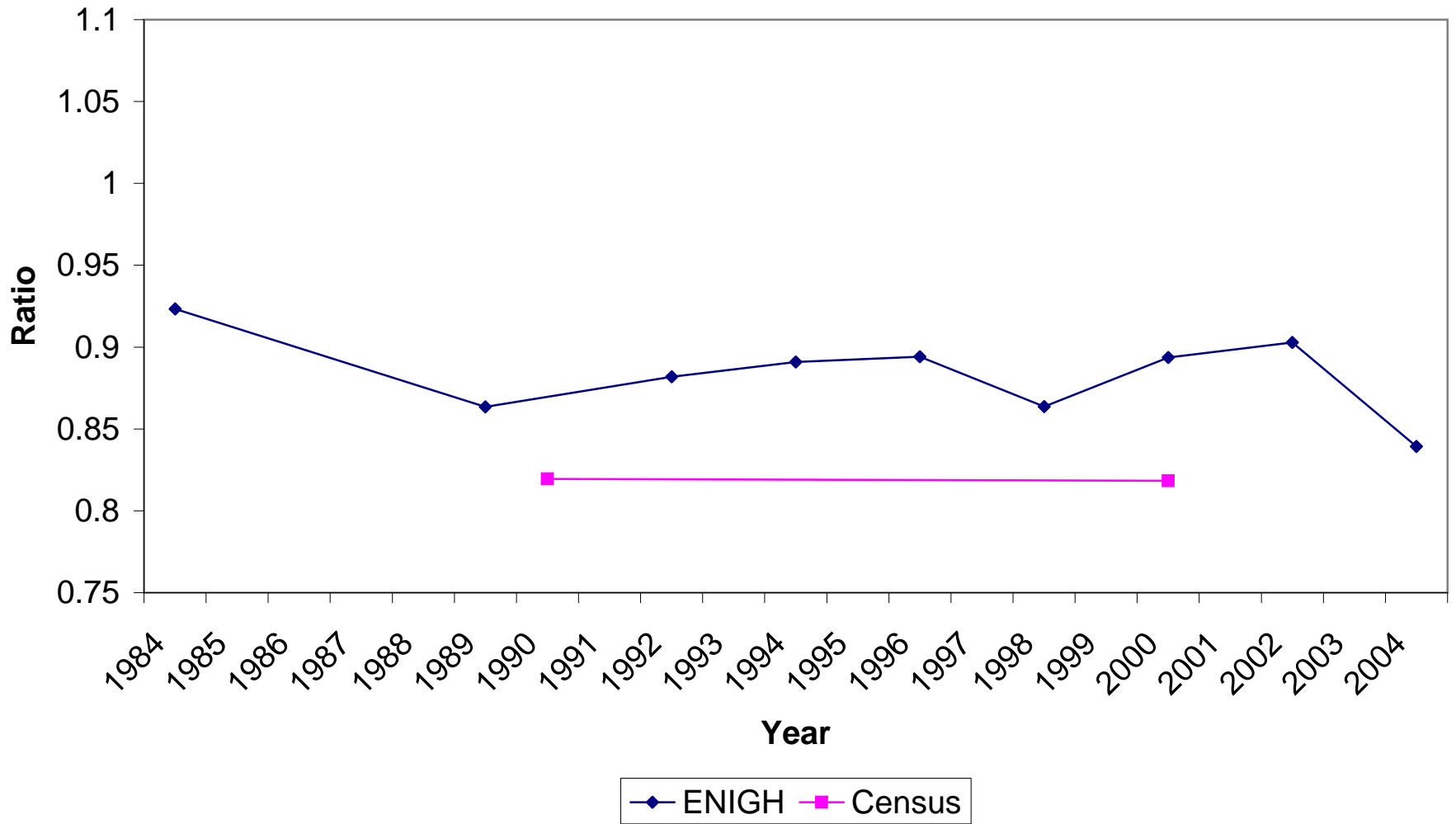


Figure 7. Female/Male Mean Hourly Wage Ratio Including Self-Employed

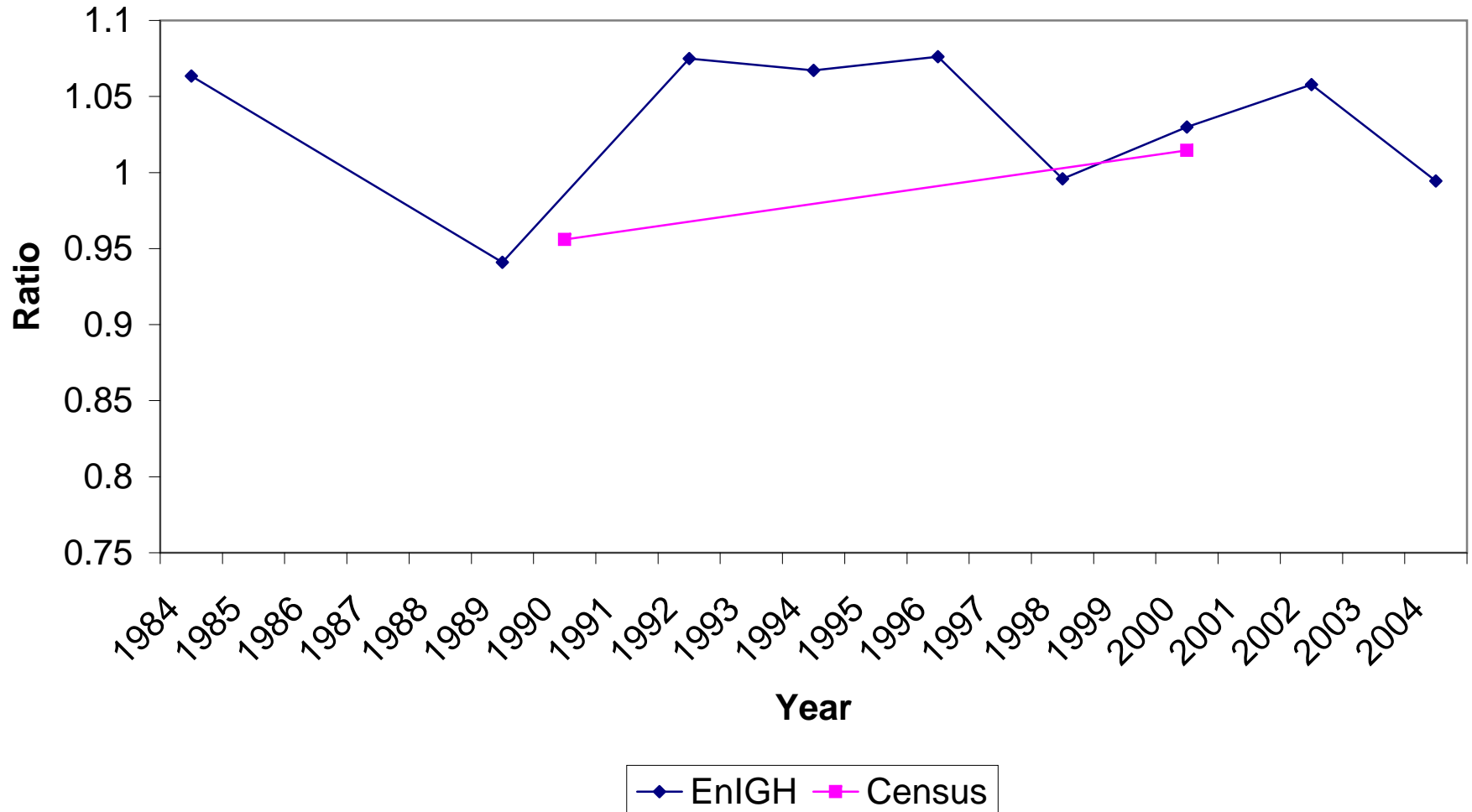


Table 1

ENIGH - Employment-Population Ratio of Women 15-64 Years Old

| Education | Year | | | | | | | | |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1984 | 1989 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
| 0 Years | 0.225 | 0.207 | 0.247 | 0.310 | 0.361 | 0.340 | 0.299 | 0.346 | 0.311 |
| 1-5 Years | 0.232 | 0.228 | 0.278 | 0.336 | 0.385 | 0.409 | 0.381 | 0.422 | 0.386 |
| 6-8 Years | 0.308 | 0.293 | 0.282 | 0.325 | 0.377 | 0.402 | 0.397 | 0.412 | 0.421 |
| 9-11 Years | 0.332 | 0.337 | 0.361 | 0.394 | 0.410 | 0.436 | 0.444 | 0.452 | 0.421 |
| 12-15 Years | 0.432 | 0.511 | 0.455 | 0.493 | 0.507 | 0.491 | 0.474 | 0.505 | 0.536 |
| 16+ Years | 0.577 | 0.696 | 0.698 | 0.754 | 0.756 | 0.745 | 0.746 | 0.722 | 0.746 |
| All | 0.267 | 0.289 | 0.315 | 0.363 | 0.402 | 0.419 | 0.412 | 0.440 | 0.441 |

Source: ENIGH 1984-2004. Sample includes 15-64 year old males and females. Employment is defined as those with positive hours of work during the survey week.

Census - Employment-Population Ratio of Women 15-64 Years Old

| Education | Year | |
|-------------|-------|-------|
| | 1990 | 2000 |
| 0 Years | 0.094 | 0.229 |
| 1-5 Years | 0.115 | 0.243 |
| 6-8 Years | 0.188 | 0.296 |
| 9-11 Years | 0.301 | 0.343 |
| 12-15 Years | 0.378 | 0.470 |
| 16+ Years | 0.601 | 0.700 |
| All | 0.214 | 0.348 |

Source: Census, 1990,1995,2000. Sample includes 15-64 year old males and females. Employment is defined as those with positive hours of work during the survey week.

Table 2

ENIGH - Female Labor as a Share of Total Labor

| A. Hours | Year | | | | | | | | |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1984 | 1989 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
| <12 Years | 0.215 | 0.238 | 0.247 | 0.269 | 0.293 | 0.300 | 0.303 | 0.310 | 0.312 |
| >=12 Years | 0.232 | 0.273 | 0.275 | 0.301 | 0.316 | 0.321 | 0.316 | 0.349 | 0.387 |
| All | 0.217 | 0.244 | 0.252 | 0.274 | 0.298 | 0.304 | 0.306 | 0.319 | 0.333 |
| B. Efficiency Units | Year | | | | | | | | |
| | 1984 | 1989 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
| <12 Years | 0.195 | 0.223 | 0.229 | 0.251 | 0.270 | 0.278 | 0.289 | 0.295 | 0.291 |
| >=12 Years | 0.177 | 0.211 | 0.219 | 0.240 | 0.262 | 0.261 | 0.247 | 0.285 | 0.321 |
| All | 0.190 | 0.219 | 0.225 | 0.246 | 0.266 | 0.271 | 0.270 | 0.290 | 0.306 |
| C. Wage Bill Shares | Year | | | | | | | | |
| | 1984 | 1989 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
| <12 Years | 0.209 | 0.221 | 0.230 | 0.249 | 0.266 | 0.282 | 0.285 | 0.292 | 0.279 |
| >=12 Years | 0.174 | 0.211 | 0.223 | 0.233 | 0.267 | 0.254 | 0.241 | 0.311 | 0.327 |
| All | 0.201 | 0.218 | 0.227 | 0.242 | 0.266 | 0.270 | 0.265 | 0.301 | 0.303 |

Sample includes 15-64 year old males and females. The table reports the female shares of total labor measured in hours, in efficiency units of labor, and in wage bill shares. To calculate shares in efficiency units, we weight hours by the group specific average wage, fixed over years. With wage bill shares, average wages by group vary by year.

Census - Female Labor as a Share of Total Labor

| | A. Hours | | B. Efficiency Units | | C. Wage Bill Shares | |
|------------|----------|-------|---------------------|-------|---------------------|-------|
| | 1990 | 2000 | 1990 | 2000 | 1990 | 2000 |
| <12 Years | 0.215 | 0.254 | 0.207 | 0.238 | 0.212 | 0.232 |
| >=12 Years | 0.280 | 0.356 | 0.230 | 0.301 | 0.228 | 0.309 |
| All | 0.226 | 0.281 | 0.215 | 0.267 | 0.217 | 0.270 |

Sample includes 15-64 year old males and females. The table reports the female shares of total labor measured in hours, in efficiency units of labor, and in wage bill shares. To calculate shares in efficiency units, we weight hours by the group specific average wage, fixed over years. With wage bill shares, average wages by group vary by year.

Table 3

Industrial Distribution (Census)

| Industry (SCIAN97) | Year | |
|---|------------|------------|
| | 1990 | 2000 |
| Agriculture (111) | 12.5 | 7.7 |
| Catering, Fishing, Hunting and Forest (112-115) | 2.5 | 1.8 |
| Mining, Oil and Gas (211-213) | 1.3 | 0.8 |
| Electricity and Water (221,222) | 1.0 | 0.7 |
| Construction (236-238) | 5.8 | 7.9 |
| Light Manufacturing (311-316) | 7.2 | 7.0 |
| Medium Manufacturing (321-327) | 4.9 | 4.1 |
| Heavy Manufacturing (331-339) | 6.6 | 7.1 |
| Wholesale (431-436) | 2.2 | 1.6 |
| Retail (461-469) | 13.8 | 14.6 |
| Transportation and Storage (481-493) | 9.1 | 8.9 |
| Communications (512,513) | 1.2 | 1.2 |
| Financial Services (522-524) | 2.2 | 1.5 |
| Real State Services (531-533) | 0.4 | 0.6 |
| Professional Services (541-561) | 3.3 | 4.8 |
| Education (611) | 7.7 | 8.1 |
| Health Services (621-624) | 5.3 | 5.1 |
| Recreation Services (711-713) | 0.7 | 0.8 |
| Hotels and Restaurants (721,722) | 3.6 | 4.5 |
| Other Services (812-814) | 3.3 | 5.2 |
| Government (931-932) | 5.5 | 6.1 |
| Total | 100 | 100 |

The table reports shares of labor in efficiency units.

Table 4

Industrial Distribution: Manufacturing (Census)

| Industry | Year | |
|---------------------------------|------|------|
| | 1990 | 2000 |
| Food | 16.4 | 15.3 |
| Beverages and Tobacco | 4.8 | 3.8 |
| Textiles | 3.5 | 2.5 |
| Textile Products except Clothes | 0.9 | 1.4 |
| Clothes | 8.2 | 11.9 |
| Leather | 5.1 | 3.8 |
| Wood | 1.4 | 1.6 |
| Paper | 1.8 | 1.9 |
| Printing | 4.7 | 2.6 |
| Oil and Coal Products | 2.8 | 1.7 |
| Chemical products | 5.7 | 4.6 |
| Plastic and Rubber | 2.6 | 2.5 |
| Not Metallic Mineral Products | 6.8 | 7.4 |
| Basic Metallurgy | 3.7 | 2.6 |
| Metallic Products | 7.0 | 7.1 |
| Machinery | 2.7 | 2.1 |
| Electronic and Computers | 2.7 | 4.5 |
| Electric Products | 4.1 | 3.4 |
| Transport Products | 5.9 | 8.4 |
| Furniture | 6.3 | 6.9 |
| Other Manufacturing | 2.7 | 4.0 |
| Total | 100 | 100 |

The table reports shares of labor in efficiency units.

Table 5

Change in Share of Workers by Education and Gender, 1990-2000

| Group | Employment Share | | | Wage Bill Share | | |
|------------|------------------|--------|--------|-----------------|--------|--------|
| | Between | Within | Total | Between | Within | Total |
| Men <12 | -2.39 | -8.59 | -10.98 | -4.15 | -10.38 | -14.53 |
| Women <12 | 1.42 | -2.22 | -0.80 | 1.05 | -3.68 | -2.63 |
| Men >=12 | 0.73 | 5.04 | 5.77 | 2.04 | 7.23 | 9.28 |
| Women >=12 | 0.24 | 5.78 | 6.01 | 1.05 | 6.83 | 7.88 |
| Men | -1.66 | -3.55 | -5.21 | -2.10 | -3.15 | -5.25 |
| Women | 1.66 | 3.55 | 5.21 | 2.10 | 3.15 | 5.25 |

Decompositions are based on 96 industry categories.
Wages of self-employed workers are imputed using wages of wage and salary workers.
Employment shares are reported in efficiency unit

Figure 8. Female Wage Bill Share and Tariff Changes

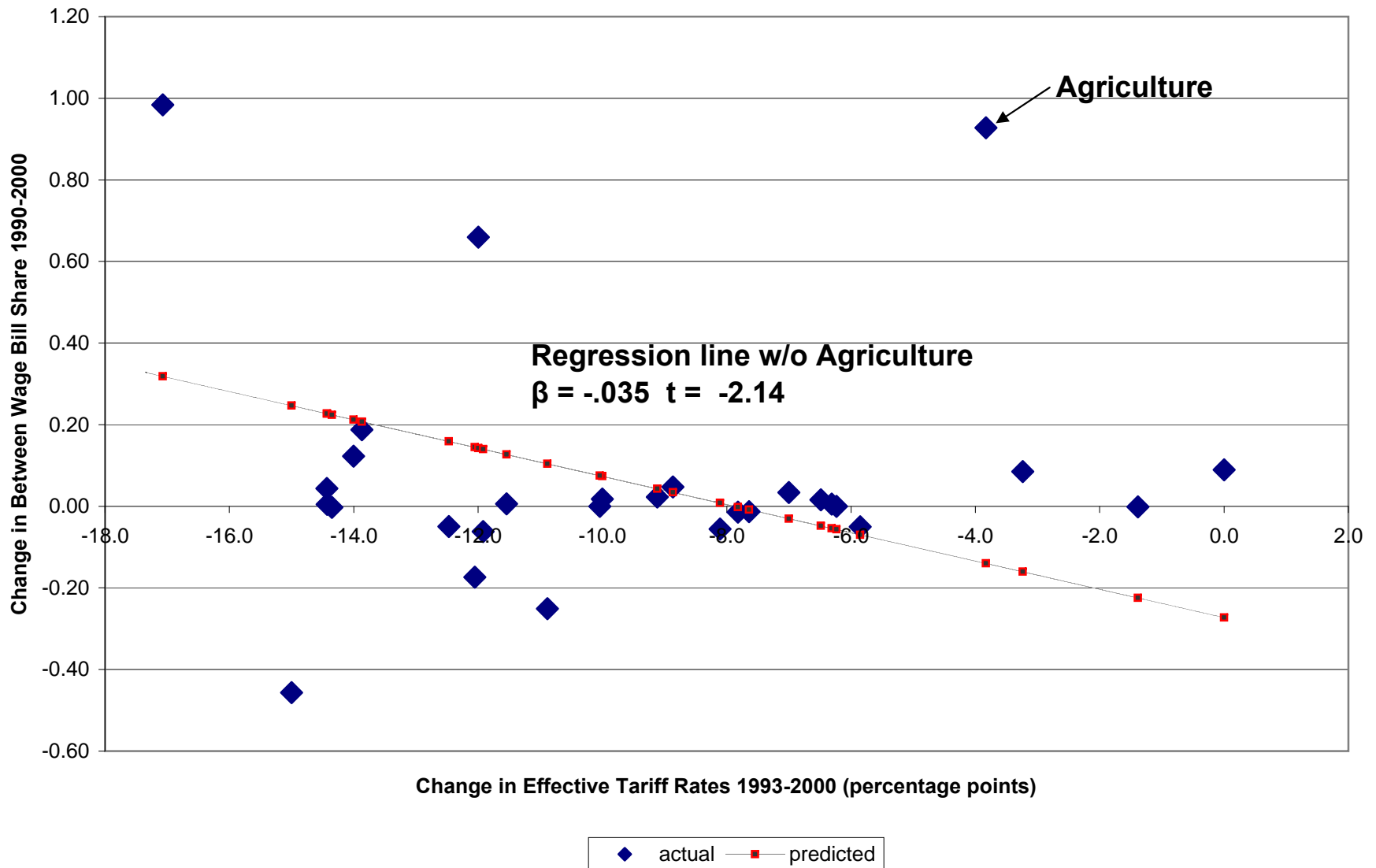


Figure 9. Female Wage Bill Share and Trade (Imp+Exp/Value-Added)

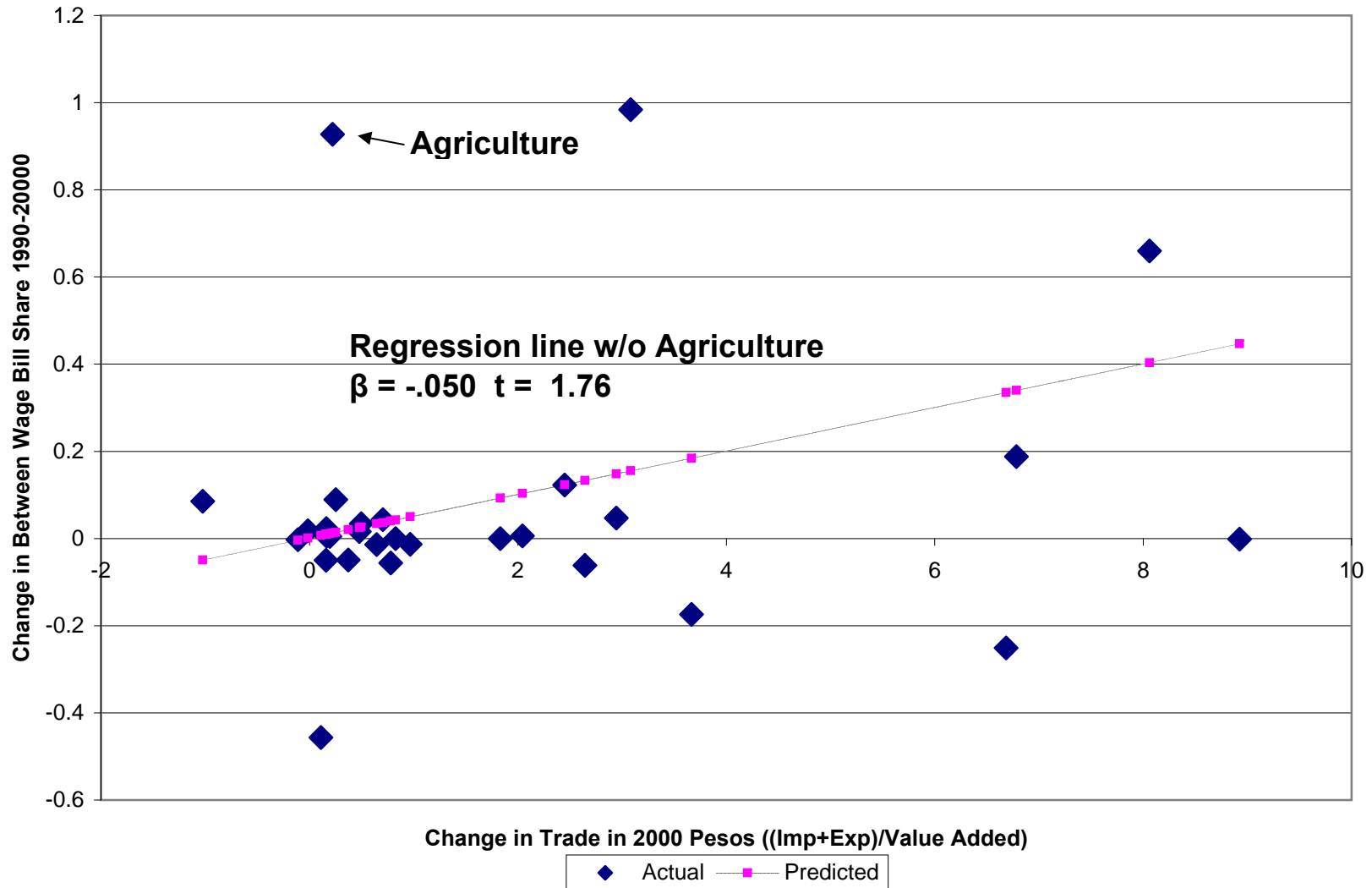


Figure 10. Female Wage Bill Share and Net Export Growth

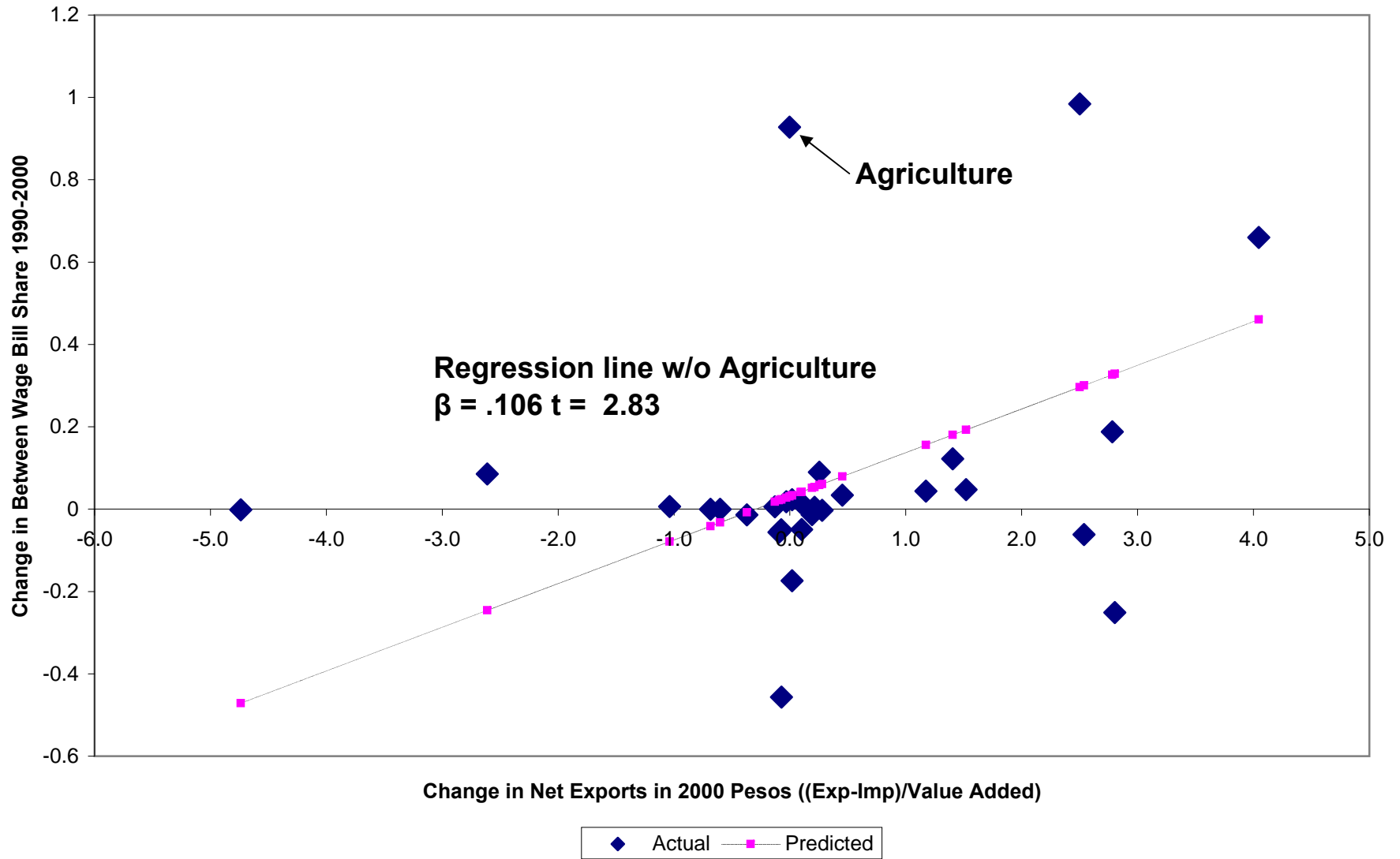


Table 6

Predicted Female Wage Bill Share and Trade - Industry Level

| Between-Industry Component of Wage Bill Share | Δ Tariffs 1993-2000 | | Δ Total Trade 1993-2000 | | Δ Net Exports 1993-2000 | |
|--|----------------------------|------------|--------------------------------|------------|--------------------------------|------------|
| Men <12 | 0.028 | (0.020) | -- | | -- | |
| | -- | | -0.081 | (0.031) ** | -- | |
| Women <12 | -- | | -- | | -0.129 | (0.043) ** |
| | -0.032 | (0.014) ** | -- | | -- | |
| Men >=12 | -- | | 0.035 | (0.025) | -- | |
| | 0.010 | (0.011) | -- | | 0.084 | (0.033) ** |
| Women >=12 | -- | | 0.027 | (0.019) | -- | |
| | -0.003 | (0.004) | -- | | 0.016 | (0.028) |
| All Women | -- | | 0.015 | (0.005) ** | -- | |
| | -0.035 | (0.017) ** | -- | | 0.022 | (0.008) ** |
| Number of Obs. | -- | | 0.050 | (0.028) | -- | |
| | 28 | | -- | | 0.106 | (0.038) ** |
| | 28 | | 28 | | 28 | |

Standard errors in parentheses. ** 95% significant. The dependent variable is defined as $(N_{ijt}/N_{it} - N_{jt}/N_t) * \Delta N_{it}$ where i refers to industry and j refers to group and t refers to year. Tariff changes are effective tariff changes based on initial imports and total trade change refers to $(\text{imports} + \text{exports}) / \text{value added}$. Net export changes are $(\text{imports} - \text{exports}) / \text{value added}$. All values are in 2000 pesos.

Table 7

Female Wage Bill Share and FDI - Industry Level

| | Dependent Variable = Change in Wage Bill Share 1990-2000 | |
|---|--|----------------------|
| Women <12 | | |
| Cumulative FDI flows 1994-1999 as share of capital stock in 1999 | 0.0312 (0.017) | 0.040 ** (0.016) |
| Computers as share of capital stock in 1999 | -- | -0.732 ** (0.170) |
| Women >=12 | | |
| Cumulative FDI flows 1994-1999 as share of capital stock in 1999 | -0.025 (0.015) | -0.034 ** (0.013) |
| Computers as share of capital stock in 1999 | -- | 0.680 ** (0.148) |
| All Women | | |
| Cumulative FDI flows 1994-1999 as share of capital stock in 1999 | 0.006 (0.009) | 0.006 (0.009) |
| Computers as share of capital stock in 1999 | -- | -0.052 (0.101) |
| Number of Obs. | 66 | 66 |

Standard errors in parentheses; ** 95% significant. The dependent variable is defined as $\Delta N_{ijt}/N_{it}$ where N refers to the wage bill and I refers to industry and j refers to group. FDI variable is defined as the cumulative flows over 1994-1999 and is deflated by the capital stock in 1999. All values are deflated to 2000 pesos.

Appendix Table 1

Summary Statistics (ENIGH)

| individuals ages 15 and over | Year | | | | | | | | |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1984 | 1989 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
| Number of Observations | 12,841 | 32,491 | 28,483 | 34,623 | 37,677 | 28,140 | 25,471 | 43,617 | 57,077 |
| % workers | 51.24 | 52.87 | 55.07 | 58.05 | 59.74 | 61.53 | 61.34 | 61.89 | 61.73 |
| men | 77.37 | 78.96 | 80.89 | 82.15 | 81.45 | 83.32 | 83.99 | 81.94 | 81.69 |
| women | 26.72 | 28.88 | 31.48 | 36.29 | 40.19 | 41.94 | 41.22 | 44.03 | 44.14 |
| % fulltime | 80.47 | 82.63 | 80.32 | 78.09 | 77.08 | 76.55 | 78.98 | 77.10 | 81.98 |
| Education | 5.40 | 6.25 | 6.44 | 6.61 | 6.96 | 7.07 | 7.53 | 7.68 | 8.07 |
| men | 5.90 | 6.73 | 6.84 | 6.97 | 7.39 | 7.48 | 7.95 | 8.07 | 8.32 |
| women | 4.93 | 5.81 | 6.06 | 6.28 | 6.58 | 6.70 | 7.16 | 7.33 | 7.84 |
| Average hourly wage | 17.98 | 17.52 | 18.42 | 20.52 | 14.15 | 15.01 | 17.35 | 17.88 | 17.56 |
| men | 18.37 | 18.23 | 19.10 | 21.41 | 14.65 | 15.62 | 18.26 | 18.21 | 18.07 |
| women | 16.80 | 15.51 | 16.64 | 18.27 | 12.99 | 13.57 | 15.28 | 17.19 | 16.48 |

Summary Statistics (Census)

| Individuals aged 15 to 64 | Year | |
|---------------------------|---------|---------|
| | 1990 | 2000 |
| Number of observations | 458,411 | 590,898 |
| Urban share (%) | 74.20 | 77.25 |
| % workers | 47.54 | 55.61 |
| men | 74.74 | 78.07 |
| women | 22.28 | 34.99 |
| % fulltime | 86.01 | 83.53 |
| Education | 6.69 | 7.90 |
| men | 7.01 | 8.14 |
| working men | 6.88 | 8.16 |
| women | 6.40 | 7.68 |
| working women | 8.76 | 9.02 |
| Average hourly wage | 21.44 | 18.25 |
| men | 22.26 | 18.75 |
| women | 19.16 | 17.14 |

Appendix Table 2

Characteristics of Workers and Non-workers - All Women

| | 1990 Census | | | 2000 Census | | | 1990 Census | | | 2000 Census | | |
|--------------------|-------------|---------|------|-------------|---------|------|-------------|-----------|------|-------------|-----------|------|
| | Work | No work | Diff | Work | No Work | Diff | Sample | No Sample | Diff | Sample | No Sample | Diff |
| Relative Frequency | 0.21 | 0.79 | - | 0.35 | 0.66 | - | 0.16 | 0.84 | - | 0.23 | 0.77 | - |
| Avg Education | 8.83 | 5.75 | 3.08 | 8.99 | 6.93 | 2.07 | 9.01 | 5.92 | 3.09 | 9.47 | 7.12 | 2.35 |

Characteristics of Workers and Non-workers - Married Women

| | 1990 Census | | | 2000 Census | | | 1990 Census | | | 2000 Census | | |
|------------------------|-------------|---------|-------|-------------|---------|-------|-------------|-----------|-------|-------------|-----------|-------|
| | Work | No work | Diff | Work | No Work | Diff | Sample | No Sample | Diff | Sample | No Sample | Diff |
| Relative Frequency | 0.12 | 0.88 | - | 0.27 | 0.73 | - | 0.08 | 0.92 | - | 0.15 | 0.85 | - |
| Avg Education | 9.58 | 5.13 | 4.45 | 9.05 | 6.49 | 2.56 | 9.83 | 5.31 | 4.52 | 9.80 | 6.72 | 3.08 |
| Avg Education - Spouse | 9.84 | 5.85 | 3.99 | 9.28 | 7.16 | 2.12 | 10.14 | 6.00 | 4.14 | 9.89 | 7.36 | 2.53 |
| Avg Log Wage - Spouse | 6.76 | 6.35 | 0.41 | 6.63 | 6.37 | 0.26 | 6.77 | 6.37 | 0.40 | 6.69 | 6.39 | 0.30 |
| Number of Children <6 | 0.76 | 1.02 | -0.26 | 0.62 | 0.79 | -0.18 | 0.74 | 1.02 | -0.28 | 0.59 | 0.77 | -0.18 |

Sample includes wives aged 15 to 64

"Work" is defined as those with positive hours worked in the reference week.

"Wage Sample" are workers with positive hours who worked full-time and who were not self-employed.

Appendix Table 3

Change in Share of Workers by Education and Gender, 1990-2000, Tradeable Sector

| Group | Employment Share | | | Wage Bill Share | | |
|------------|------------------|--------|--------|-----------------|--------|--------|
| | Between | Within | Total | Between | Within | Total |
| Men <12 | -4.02 | -7.07 | -11.09 | -4.85 | -8.44 | -13.29 |
| Women <12 | 2.18 | 0.92 | 3.10 | 1.63 | 0.27 | 1.90 |
| Men >=12 | 1.53 | 3.85 | 5.38 | 2.76 | 5.44 | 8.20 |
| Women >=12 | 0.31 | 2.31 | 2.62 | 0.46 | 2.73 | 3.19 |
| Men | -2.49 | -3.22 | -5.71 | -2.09 | -2.60 | -5.09 |
| Women | 2.49 | 3.22 | 5.71 | 2.09 | 2.60 | 5.09 |

Change in Share of Workers by Education and Gender, 1990-2000, Non-Tradeable Sector

| Group | Employment Share | | | Wage Bill Share | | |
|------------|------------------|--------|-------|-----------------|--------|--------|
| | Between | Within | Total | Between | Within | Total |
| Men <12 | 0.51 | -9.23 | -8.73 | -1.94 | -11.19 | -13.13 |
| Women <12 | 0.59 | -3.55 | -2.96 | 0.29 | -5.32 | -5.03 |
| Men >=12 | -0.59 | 5.54 | 4.95 | 0.99 | 7.98 | 8.97 |
| Women >=12 | -0.50 | 7.25 | 6.74 | 0.66 | 8.53 | 9.19 |
| Men | -0.09 | -3.69 | -3.78 | -0.94 | -4.07 | -4.16 |
| Women | 0.09 | 3.69 | 3.78 | 0.95 | 4.07 | 4.16 |

Decompositions are based on 96 industry categories.
Wages of self-employed workers are imputed using wages of wage and salary workers.
Employment shares are reported in efficiency unit

Appendix Table 4

Change in Share of Workers by Education and Gender, 1990-2000, Excluding Agriculture

| Group | Employment Share | | | Wage Bill Share | | |
|------------|------------------|--------|-------|-----------------|--------|--------|
| | Between | Within | Total | Between | Within | Total |
| Men <12 | -0.20 | -8.81 | -9.01 | -2.22 | -10.53 | -12.75 |
| Women <12 | 0.91 | -2.60 | -1.70 | 0.49 | -4.12 | -3.63 |
| Men >=12 | -0.50 | 5.20 | 4.70 | 1.01 | 7.45 | 8.45 |
| Women >=12 | -0.20 | 6.21 | 6.01 | 0.72 | 7.21 | 7.93 |
| Men | -0.70 | -3.61 | -4.31 | -1.21 | -3.09 | -4.30 |
| Women | 0.70 | 3.61 | 4.31 | 1.21 | 3.09 | 4.30 |

Decompositions are based on 96 industry categories.
Wages of self-employed workers are imputed using wages of wage and salary workers.
Employment shares are reported in efficiency unit