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Importing Equality or Exporting Jobs? Competition and Gender Wage and Employment Differentials in U.S. Manufacturing

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ABSTRACT

This study investigates the impact of increased import competition on gender wage and employment differentials in U.S. manufacturing over the period from 1976 to 1993. Increased import competition is expected to decrease the relative demand for workers in low-wage production occupations and the relative demand for women workers, given the high female share in these occupations. The findings support this hypothesis. Disproportionate job losses for women in low-wage production occupations was associated with rising imports in U.S. manufacturing over this period, and as low-wage women lost their jobs, the average wage of the remaining women in the study increased, thereby narrowing the gender wage gap.

JEL: F14, J31, J71

Keywords: gender wage gap, discrimination, international trade, U.S. manufacturing

INTRODUCTION

Despite intense interest in the impact of trade expansion on men and women workers in U.S. manufacturing sector, there are surprisingly few empirical studies, and available studies indicate contradictory findings. Focusing on the pre-NAFTA period, a few studies have found benign or positive effects of trade expansion on female share of manufacturing employment or decline in the gender wage gap (Wood 1991; Black and Brainerd 2004). These results are inconsistent with predictions of standard trade theory and other empirical studies. The widely accepted version of comparative advantage trade theory predicts relative losses for less skilled workers in industrialized economies compared to skilled workers when trade expands. This prediction is supported by studies that show widening wage inequality between skilled and less skilled workers in the U.S (Katz and Murphy 1992; Borjas and Ramey 1994, 1995). To the extent that women are the less skilled workers in the U.S., they are expected to experience disproportionate job losses and wage declines as a result of the changing trade patterns. A number of empirical studies find evidence for the adverse effect of trade on relative employment opportunities of women in the traded (manufacturing) sector (Katz and Murphy 1992; Kucera 2001; Kucera and Milberg 2000; Schumacher 1984).

This study examines these contradictory findings by pursuing a gender- and class-(occupation) differentiated analysis of wage and employment effects of increased import competition in U.S. manufacturing over the 1976-1993 period. The specific objective of this paper is to investigate whether the findings that trade expansion caused a decline in female share of U.S. manufacturing employment can be reconciled with the finding that increased import competition reduced the gender wage discrimination in U.S. manufacturing over the same period. Contrary to Black and Brainerd's importing equality argument (Black and Brainerd 2004), which interprets import expansion as an instrument of increased domestic competition among firms that has reduced the discriminatory wage differential enjoyed by male workers in concentrated industries, this study develops an alternative account of the decline in the gender wage gap. The decline in the gender wage inequality in import impacted, concentrated sectors is unlikely to indicate a decline in discrimination against women workers. Rather, the fall in gender wage inequality is most likely the outcome of job losses and wage adjustments in response to increasing imports in concentrated industries that have led to an increase in women's wages, without an increase in relative demand for female labor.

INTERNATIONAL TRADE, WAGES, AND EMPLOYMENT

The Hecksher-Ohlin-Samuelson (H-O-S) theory of international trade predicts that trade expansion will increase relative demand for the factor of production that is intensively used in the production of goods in which the country has comparative advantage. Accordingly, in industrialized countries, trade expansion will increase demand for more skilled workers compared to less-skilled workers. The opposite will hold in developing countries. Given that women comprise a disproportionate share of less-skilled workers both in industrialized and developing countries, trade expansion will reduce the relative demand for women in industrialized countries and increase it in developing countries.

There has indeed been an increase in women's share in employment in developing economies associated with trade liberalization, in particular, the shift to export orientation (Çagatay and Berik 1990, 1994; Çagatay and Ozler 1995; Çagatay 1996; Joekes and Weston 1994; Joekes 1995; Mehra and Gammage 1999; Ozler 2000; Standing 1989, 1999; Tzannatos 1999; Wood 1991). However, the so-called feminization of employment was not accompanied by an improvement in gender pay differentials. On the contrary, export-orientation in developing countries has been linked to persistent wage gaps (Berik 2000; Seguino 1997), even increases in the discriminatory wage differentials between men and women (Berik et. al 2004; Maurer-Faizo and Hughes 2002; Packard 2004).

The literature on the trade impact in industrialized countries, in general, and the U.S. in particular, is gender-blind for the most part. Studies that tested the predictions of H-O-S theory found evidence of increasing skill differentials in wages and employment levels in the U.S. Specifically, although there is no consensus over its magnitude, there is now enough evidence to suggest that increasing trade expansion over the past several decades caused declines in relative demand for less educated and experienced workers in the U.S. economy (Berman, Bound and Griliches 1994; Bertola and Ichino 1995; Bluestone and Harrison 1988; Bound and Johnson 1992; Katz and Murphy 1992; Murphy and Welch 1992). There is also evidence to suggest that relative demand for production workers declined compared to non-production workers (Borjas, Freeman and Katz 1991; Borjas and Ramey 1994, 1995; Katz and Murphy 1992). The evidence on the impact of trade on relative demand for women, however, is mixed. In terms of the employment effects of trade, Wood (1991, 1994) found that trade expansion did not have the predicted reduction in the female share in manufacturing employment in industrialized

countries. Wood's results were later challenged by several studies that showed that trade had more adverse effects on female employment compared to male employment in industrial countries (Kucera 2001; Kucera and Milberg 2000; Schumacher 1984). The segregated nature of manufacturing employment, specifically, concentration of women in import-competing industries and low-wage production occupations seems to have played a significant role in explaining the gender-differentiated effects of trade expansion. While trade-related job losses came disproportionately in female-intensive industries of textiles, apparel, leather goods, and footwear, male-intensive industries of machinery and chemicals have been identified as trade winners. Less-skilled women who predominate in the production occupations in textiles, apparel, leather goods, and footwear industries were identified as the group most adversely affected by import expansion in the U.S. (Katz and Murphy 1992; Kucera 2001; Wood 1991).

For the most part, the focus of studies on the impact of trade on the wage structure of the U.S. economy has been on skill differentials, rather than gender differentials in wages. While most of these studies tested whether H-O-S type linkages have been observed, some analyzed the impact of trade on wages within the framework of the rent sharing hypothesis (Borjas and Ramey 1994, 1995), where market structure plays a significant role in determining the impact of trade on relative wages. Using this framework, Borjas and Ramey (1994) found that, in concentrated industries, increased import competition reduced excess profits (rents) hence the wage premium associated with employment in these industries. In competitive industries, wages declined *indirectly* when less-skilled workers who lost their jobs in concentrated industries spilled over into the competitive industries.

A recent study by Black and Brainerd (2004), which has been highlighted by Bhagwati (2004) for showing the benefits of globalization, combined the rent sharing hypothesis with Becker's taste for discrimination theory and investigated the impact of increased import competition on discriminatory gender wage differentials in U.S. manufacturing. According to this study, in concentrated industries, discriminatory wage differentials between men and women arise as rents are disproportionately shared by men as employers use excess profits to indulge in their "taste for discrimination" against women.[1] Extending Becker's definition of competition to include import competition, Black and Brainerd hypothesized that, as imports expand, rents will decline, reducing men's and women's wages. Men's wages will decline more than women's as men, in addition to the industry premium, will also lose the male premium in

their wages. The gender gap will narrow. As increasing number of employers prefer cheaper female labor, women's share in employment will increase.

After controlling for gender differences in skill, Black and Brainerd test their hypothesis and find that increased import competition narrowed the residual gender wage gap in concentrated industries.[2] They interpret this finding as having support for the thesis that import competition reduced costly discrimination against women in concentrated manufacturing industries. However, they find no evidence for an increase in female share in employment as a result of increased competition, nor do they investigate whether the narrowing of the gender wage gap was driven by a larger decline in male wages, as predicted. Moreover, their results indicate that increased import competition led to an increase in the residual gender wage gap in competitive industries—a finding that contradicts their analytical framework where more competition is expected to erode discriminatory wage differentials, not exacerbate it. They attribute this finding to the impact of imports on unobservable skill differentials between men and women. Specifically, they argue that given the predominance of women among less-skilled workers, this finding is consistent with the prediction of H-O-S theorem that import expansion reduces relative wages of less-skilled workers compared to high-skilled workers. It is not clear why the residual gender wage gap captures gender differences in unobservable skills in competitive industries, and discriminatory wage differentials in concentrated industries.

Black and Brainerd's interpretation of the decline in gender wage also contradicts the findings of several other studies that trade expansion led to an increase in discriminatory wage differentials between men and women (Berik et. al 2004; Maurer-Faizo and Hughes 2002, Packard 2004), and inconsistent with the findings that trade expansion led to disproportionate job losses for women, in general (Kucera 2001; Kucera and Milberg 2000; Schumacher 1984), and low-wage women in production jobs, in particular (Katz and Murphy 1992).

The above mentioned problems aside, even within the Beckerian framework, there is reason to doubt that discrimination against women declined in U.S. manufacturing over the 1980s. The 1976-1993 was a period of historically high unemployment rates in U.S. manufacturing, where the unemployment rate did not fall below 5.1 percent and was an average of 7.4 percent.[3] Discrimination in hiring against women (and minorities) is more likely to decline if the labor market is tight enough (i.e., there is full employment), so that women (and minorities) can move up the hiring queue and discriminatory employers can thus be penalized, and not when there is substantial unemployment in the labor market (Shulman 1987).

Substantial unemployment rates lead to an increase in the supply of (white) men in the hiring queue, women (and minorities) fall behind as more experienced (white) men are preferred by employers (Shulman 1987, 365). This effect would be even stronger in an economic environment where there is a large increase in relative demand for more experienced workers—a characteristic of the U.S. labor market in the 1980s. Within this labor market context, women are not likely to have moved up the hiring queue.

TRENDS IN WAGES AND EMPLOYMENT IN U.S. MANUFACTURING

Since the late 1970s, there has been an increase in relative demand for skilled workers (Bartel and Sicherman 1999; Berman, Bound, and Griliches 1994). These shifts were due to increased import competition, automation of production processes and skill-biased technological change (Bound and Johnson 1992; Katz and Murphy 1992). These factors affected production and nonproduction workers differently, favoring nonproduction workers. Increasing import competition is likely to reduce demand primarily for production workers since activities of nonproduction workers such as marketing, sales, and accounting may be complementary with production workers overseas (Katz and Murphy 1992), especially when increasing imports reflects an increase in outsourcing activities where production moves offshore leaving the shell of the company. Automation of production processes, commonly known as labor-saving technological change, also reduces demand primarily for production workers.

The trends in employment presented in Table 1 are consistent with declines in demand for less-skilled and production workers compared to their counterparts. Over the 1976-1993 period, while manufacturing employment declined by 7 percent, high-wage workers increased their share in this shrinking sector.[4] The increase reflected a combination of absolute declines in employment in low-wage occupations and absolute increases in employment in high-wage occupations.

There are also significant differences in the experiences of production workers compared to their counterparts. In the low-wage category, while employment declined both in production and nonproduction occupations, the declines were larger in production occupations (Table 1). Similarly, in the high-wage category, employment increased in significantly larger in white-collar occupations (Table 1). These trends are consistent with the shifts in labor demand.

The shifts in labor demand seem to have affected men and women differently. Between 1976 and 1993, both men's and women's employment declined in low-wage occupations (Table 1). The declines, however, were significantly larger for women. Employment in low-wage production occupations declined by 42 percent for women, and 19 percent for men. Similarly, employment in low-wage nonproduction occupations declined by 9 percent for women, and 3 percent for men. Women's employment in high-wage occupations—both production and nonproduction—increased dramatically, whereas men's employment in high-wage production employment declined by 11 percent.

Between 1976 and 1993, female share in manufacturing employment stayed nearly constant (Table 2), but the occupational composition of the female workforce changed significantly. In 1976, women were underrepresented in high-wage occupations (Table 3).[5] Between 1976 and 1993, occupational segregation by gender declined primarily as women moved out of low-wage production occupations and into traditionally male, high-wage nonproduction occupations, men in high-wage production occupations lost jobs (Table 1). The net result was not only a more integrated workforce but possibly also a narrower gender wage gap as suggested by several other studies (Blau and Kahn 1997; Katz and Murphy 1992).

Table 1 Change in manufacturing employment by occupation, 1976-1993

	Percent change (1976-1993)		
	Total	Men	Women
Total	-6.7	-3.0	-9.0
Production	-21.2	-15.4	-31.2
High-wage	0.3	-10.9	118.8
Low-wage	-30.4	-18.8	-42.6
Nonproduction	17.6	10.5	31.0
High-wage	37.1	15.5	177.8
Low-wage	-6.7	-3.0	-9.0

Notes: High-wage production (blue-collar) occupations are precision production, craft, and repair. Machine operators, assemblers, inspectors are categorized as low-wage production occupations. High-wage nonproduction (white-collar) occupations are executive, administrative, managerial, professional specialty, technical and related support occupations. Low-wage nonproduction occupations are: sales and administrative support, including clerical.

Source: Author's calculations from March CPS data files.

Women's entry into traditionally male high-wage occupations is also likely to have contributed to the narrowing of the gender pay gap in the U.S.[6] Whether this was at least in part due to a trade-related decline in gender discrimination which increased employment opportunities in traditionally male occupations for women, as argued by Black and Brainerd (2004) is unknown.

IMPORTING EQUALITY OR EXPORTING JOBS

This section utilizes the methodology of Borjas and Ramey (1994) and Black and Brainerd (2004) and analyzes the trade-related trends in the residual gender wage gap.

Table 2 Female share in manufacturing employment by occupation, 1976-1993

	1 Female share in employment		*2* Change in female share in employment (1976-1993)
	A	*B*	
	1976	**1993**	
Total	35.8%	34.6%	-0.01
Production	36.6%	31.9%	-0.05
High-wage	8.6%	18.8%	0.10
Low-wage	48.5%	40.0%	-0.09
Nonproduction	34.4%	38.3%	0.04
High-wage	13.3%	27.0%	0.14
Low-wage	60.6%	59.0%	-0.02

Source: Author's calculations from March CPS data files.

Table 3 Distribution of women and men across occupations 1976, 1993

	Women			Men		
	1976	1993	change	1976	1993	change
Production	68.1%	52.9%	-0.15	66.0%	59.8%	-0.06
High-wage	4.8%	11.9%	0.07	28.4%	27.1%	-0.01
Low-wage	63.3%	41.0%	-0.22	37.6%	32.6%	-0.05
Nonproduction	31.9%	47.1%	0.15	34.0%	40.2%	0.06
High-wage	6.8%	21.4%	0.15	24.9%	30.8%	0.06
Low-wage	25.1%	25.7%	0.01	9.1%	9.5%	0.00

Source: Author's calculations from March CPS data files.

The analysis aims to reconcile the finding that increased import competition led to a decline in the residual gender wage gap in concentrated industries (Black and Brainerd 2004), with the findings that in import-competing industries of U.S. manufacturing, there has been a disproportionate decline in women's employment (Katz and Murphy 1992; Kucera 2001; Kucera and Milberg 2000). The analysis explores the underlying mechanisms that explain the trade-related changes in gender wage differentials, and searches for an alternative interpretation of these changes that would be consistent across both concentrated and competitive industries of U.S. manufacturing.

Methodology

The empirical models presented here test the hypotheses that increased import competition caused declines in the share of low-wage production workers among women, raised the average wages of women who remained and thus narrowed the gender wage gap. To test these hypotheses, following Black and Brainerd (2004), a difference-in-differences methodology that conceptually groups the observations along the lines of market structure of an industry (i.e., noncompetitive versus competitive) and also import-intensity in an industry (i.e., import-impacted versus not import-impacted) is used.[7] In testing the effect of change in imports on the change in the residual gender wage gap, this conceptual grouping of industries is formalized by the following equation:[8]

$$\Delta_t(Gap_i) = \alpha + \beta_1 \Delta_t trade_i + \beta_2 m\_power_i + \beta_3 (\Delta_t trade * m\_power)_i + \beta_4 \Delta_t tech_i \qquad (1)$$

where $\Delta_t trade_i$ is the change in the import share in industry *i*, m_power_i is the price-cost margin in industry *i* in 1976, $(\Delta_t trade * m\_power)_i$ is the interaction term between $\Delta_t trade_i$ and m_power_i, and $\Delta_t tech_i$ is the change in real investment per labor in industry *i*.[9]

The dependent variable is the change in the residual gender wage gap over the 1976-1993 period. Residual wages are calculated as follows: Log earnings is first regressed on four categorical education variables, potential experience, potential experience squared, and indicator variables for nonwhite, marital status, region and metropolitan status.[10] The average industry residual wage gap is then calculated as the difference between average industry residual wages

of men and women for 1976 and 1993. In the estimation, following Black and Brainerd (2004), observations are weighted by the inverse of the 1993 sampling variance.

The change in import share variable measures the impact of trade on the residual gender wage gap in competitive (nonconcentrated) industries. The focus variable is the interaction term between the market power variable and the trade variable. This variable measures the marginal impact of trade on the residual gender wage gap in concentrated industries is given by the interaction term between the market power variable and the change in import share variable. A negative coefficient on this variable may be interpreted in two ways. According to Black and Brainerd (2004), it would lend support to the hypothesis that increased import competition led to a decline in gender wage discrimination in noncompetitive industries compared to competitive industries. Alternatively, it may be interpreted as the effect of disproportionate loss of employment for low-wage women which increased the average wages of women who remained and thus narrowed the gender wage gap. The following two equations are estimated to see which mechanism is supported by the data:

$$\Delta_t(Wage_i^s) = \alpha + \beta_1 \Delta_t trade_i + \beta_2 m\_power_i + \beta_3(\Delta_t trade * m\_power)_i + \beta_4 \Delta_t tech_i \qquad (2)$$

where the dependent variable is the change in the residual wages of men and women in industry *i* over the 1976-1993 period, and all the right-hand side variables are as defined in equation 1. The focus variable is again the interaction term between the market power variable and the change in import share variable. A positive coefficient in the female wage equation would not only indicate that increased exposure to import competition in noncompetitive industries might have led to a decline in the female share in employment in low-wage occupations but would also be inconsistent with the declining discrimination hypothesis. Similarly, a positive coefficient in the male wage equation would also be inconsistent with the declining discrimination hypothesis.

Finally, the following equation is estimated to investigate the impact of imports on the female share in employment and in low wage production occupations in concentrated and competitive industries:

$$\Delta_t(\%\,Female_i) = \alpha + \beta_1 \Delta_t trade_i + \beta_2 m\_power_i + \beta_3(\Delta_t trade * m\_power)_i + \beta_4 \Delta_t tech_i \qquad (3)$$

where the dependent variable is change in the female share in employment in industry *i* over the 1976-1993 period and all the right-hand side variables are as defined in equation 1. While increase in the female share in employment in concentrated industries would be consistent with the importing equality hypothesis, a decline in the female share would support the argument of this paper.

The Data

Earnings and employment data come from the Current Population Survey (CPS), March Annual Demographic Files for the survey years between 1977 and 1994.[11]

The trade data are from the National Bureau of Economic Research (NBER) Trade Database compiled by Robert Feenstra (1998). The impact of trade on an industry is measured using import shares that are calculated as the ratio of imports to domestic shipments. Imports are measured as the cost in freight value of imports. The market power variable is the price-cost margin in an industry in 1976. It is calculated as "value added-labor costs/total sales." The interaction term between this variable and the trade variable measures the marginal impact of imports in noncompetitive industries.

The technological change variable is real investment per labor, which is calculated as real investment divided by employment.[12] The data on investment and employment are from the NBER Manufacturing Productivity database (1996). Technological change is expected to widen the gender wage gap for three reasons. First, several studies have found that skill-upgrading leads to a relative decline in demand for women compared to men as some production jobs disappear, while others are redefined as technical jobs and become men's jobs (Acevedo 1990; Cockburn 1985; Pearson 1995). Second, employer discrimination in hiring against women may also be exacerbated if technological performance of industries is a source of monopoly power (Galbraith and Calmon 1994), and hence excess profits that finance discrimination (Becker 1971). Third, women might be excluded from the training for such technologically sophisticated jobs due to the employers' prejudices of women's role as caretakers (Seguino 2005).

The data on domestic shipments, investment, employment, value added, labor costs, and total sales are from the NBER Manufacturing Productivity database (1996). The four-digit SIC coded industry-level trade, investment, and market power data are aggregated at the three-digit (CIC) level based on the 1980 Census definition. Industries in which female or male share in

employment is less than 10 percent are excluded from the sample. These refinements to the data lead to 61 industries in the sample, which are listed in Appendix A.

The 1976-1993 period is chosen by Black and Brainerd because 1977 was the first year in which a relatively large number of metropolitan areas are identified in the CPS. Although the trade data are available through 1994, in their study, Black and Brainerd use 1993 as the end point after finding that their results were sensitive to the choice of 1994 earnings data as an endpoint, whereas results using 1991 and 1992 earnings data as endpoints were consistent with the results using 1993 earnings data as an endpoint. In this study, I also use 1993 as the endpoint both because it allows results to be comparable to those of Black and Brainerd and also because the post-NAFTA period represents a substantially different trade regime.

Estimation Results

Table 4 reports the estimation results. Focusing on the interaction term, the negative and statistically significant coefficient indicates that, increased import competition reduced the gender wage gap concentrated industries relative to competitive industries (Column 1). Consistent with the exporting jobs hypothesis, the gender wage gap closed due to the increase in women's wages (Column 2), rather than a decline in male wages (Column 3). The coefficient on the interaction term in the female share in employment equation is negative, but statistically significant indicating that the increase in women's wages was not coupled by an increase in female share in employment (Column 4). This result is consistent with the prediction that the increase in women's wages reflects changes in the occupational composition of the female workforce rather than an increase in relative demand for women due to declining gender discrimination. Moreover, increased import competition decreased the female share in low-wage production employment in concentrated industries (Column 5). This result is consistent with the prediction that increased import competition in concentrated industries reduced the gender wage gap. But, this reflects a decline in the female share in low-wage production employment rather than a decline in gender discrimination in these industries.

Table 4 Regression results

Dependent variable	*Change (1976-1993)*				
	1 Residual Gender Wage Gap	*2 Residual Female Wages*	*3 Residual Male Wages*	*4 Female share in employment*	*5 Female share in low-wage production employment*
Constant	-0.228**	0.112	-0.116*	0.060	0.035
	(0.101)	(0.093)	(0.061)	(0.053)	(0.093)
Market power[a]	0.084	0.085	0.168	-0.156	-0.052
	(0.371)	(0.341)	(0.222)	(0.196)	(0.342)
Change in import share	2.211***	-2.417***	-0.206	0.008	1.410**
	(0.624)	(0.573)	(0.374)	(0.329)	(0.575)
Market power Change in import share*	-7.624***	8.950***	1.326	-0.399	-5.798***
	(2.377)	(2.183)	(1.425)	(1.253)	(2.188)
Change in real investment per labor	0.017***	-0.014**	0.003	0.002	-0.004
	(0.006)	(0.005)	(0.004)	(0.003)	(0.006)
Adj. R^2	0.262	0.303	0.127	0.059	0.139
N	61	61	61	61	61

Notes: Standard errors are reported in parentheses. ***, **, * denote that the value is significant at the 99, 95, 90 percent probability levels. Standard errors in parentheses. All observations are weighted by the inverse of the sampling variance.

[a] Market power is the price-cost margin in an industry in 1976.

In competitive industries, the opposite results hold: the positive and statistically significant coefficient on the trade variable indicates widening of the gender wage gap as a result of increased import competition in competitive industries (Column 1). This is because increased import competition led to a decline in female wages in these industries (Column 2). Similar to concentrated industries, increased import competition in competitive industries does not seem to have had a significant impact on male wages (Column 3). The coefficient on the female share in employment is statistically insignificant (Column 4). Increased import competition increased the female share in employment in low-wage production occupations (Column 5).

Technological change, proxied by real investment per labor, is associated with a wider gender wage gap, as predicted (Column 1). Women earn less in sectors with higher real investment per labor (Column 2), but technological change does not have a significant impact on male earnings (Column 3). Neither the female share in employment nor the share of women among low-wage production workers seems to be affected by technological change (Columns 4

and 5). Lower wages for women might reflect exclusion of women from training for technologically sophisticated jobs.

Overall, these results suggest that employers in concentrated and competitive industries reacted differently to increased import competition. A plausible explanation for this difference is as follows: Employers in both groups of industries attempted to reduce the wage bill in the face of increased international competition. In concentrated industries, the reduction in the wage bill was achieved through disproportionate lay-offs of low-wage women. Outsourcing, specifically in the final assembly of re-imported, outsourced production, may have preserved some jobs for men, which in turn may explain why men in these industries were hurt less than women in terms of job losses.[13] Concentrated and trade impacted industries of computer/electronic products, electrical products, motor vehicles and parts, primary metal and miscellaneous manufacturing industries, which are concentrated and import-impacted industries, heavily outsourced their operations in the 1980s (Burke, Epstein, and Choi 2004; USITC 1999). In the beginning of the 1976-1993 period, these five industries employed more than two-thirds (74 percent) of the workforce in concentrated and trade-impacted industries in the sample. Moreover, the female share in low-wage production employment declined four times more in these industries compared to the remaining import-impacted concentrated industries. Consequently, the decline in the female share in low-wage production occupations in these industries accounted for 80 percent of the 6 percentage point decline in import-impacted concentrated industries.

Employers in competitive industries who could not (or did not) outsource their operations reacted to increased international competition by substituting lower-waged women for men in an attempt to reduce labor costs.[14]

Robustness Checks

In 1976, unionization rates were higher in noncompetitive industries and among men, compared to their counterparts.[15] Hence, de-unionization of the manufacturing workforce over the 1976-1993 period might have reduced the gender wage gap more in concentrated industries.[16] It is also possible that since unions reduce gender wage gaps (Hartmann et. al 1994), if unionization rates fell more in either competitive or noncompetitive industries, the gender wage gap would have increased more (or narrowed less) in those industries. To eliminate the possibility that, changes in the gender wage gap that were previously attributed to imports in fact reflect unionization effects, change in unionization rate in U.S. manufacturing over the 1976-1993

period is included in equation 1.[17] The results are presented in Table 5 and show that the earlier results still hold.

The coefficient on the unionization rate variable is negative and statistically significant indicating that decline in unionization rates in U.S. manufacturing over the 1976-1993 period is associated with a rise in the gender wage gap. This is consistent with the findings in the literature that, central wage setting institutions in general (Blau and Kahn 1995, 1996) and unions in particular reduce gender wage gaps (Hartmann et. al 1994).

Table 5 Robustness checks

	Change (1976-1993)		
Dependent variable	*Residual Gender Wage Gap*	*Female share in employment in high-wage occupations (1976-1993)*	
		production	*nonproduction*
Constant	-0.352***	0.159	0.127*
	(0.115)	(0.115)	(0.066)
Market power	0.131	-0.324	-0.082
	(0.361)	(0.423)	(0.223)
Change in import share	2.078***	-0.110	0.036
	(0.610)	(0.711)	(0.428)
Market power Change in import share*	-6.980***	0.112	0.281
	(2.331)	(2.708)	(1.518)
Change in real investment per labor	0.017***	0.001	-0.001
	(0.006)	(0.007)	(0.003)
Change in unionization rate	-0.665*		
	(0.321)		
Adj. R^2	0.303	-0.041	- 0.014
N	61	60	47

Notes: Standard errors are reported in parentheses. ***, **, * denote that the value is significant at the 99, 95, 90 percent probability levels. Standard errors in parentheses. All observations are weighted by the inverse of the sampling variance.

There is no evidence of an increase in female share in concentrated industries that were exposed to international competition, as predicted by Becker's theory of discrimination. On the contrary, the findings show that, in these industries, increased import competition led to the defeminization of low-wage production occupations. It, however, is possible that while increased import competition reduced the female share in low-wage production occupations, it increased it in high-wage occupations, which in turn led to the absence of any impact of import

expansion on the female share in concentrated industries.[18] If this is the case, then it would be hard to refute the importing equality thesis. To test this hypothesis, equation 3 is estimated separately for high-wage production and nonproduction workers. The results reported in Table 5 do not support the hypothesis that increased import competition helped women enter high-wage occupations.[19] In fact, the model is a very poor fit to explain the variations in the female share in employment in these occupations.

CONCLUSIONS AND FUTURE RESEARCH

The results of this study show that, over the 1976-1993 period faced with rising imports employers in import-impacted, concentrated sectors of U.S. manufacturing were able to achieve cost reductions (i.e. reduce the wage bill) without increasing the relative demand for female labor. Quite the contrary, women low-wage production workers seem to have been disproportionately laid off in these industries without an offsetting increase in the proportion of women in high wage occupations. The decrease in the female share in low-wage production employment brought up the average wages of women workers who remained in these sectors. It is likely that women's production jobs were lost to overseas workers, possibly contributing to a feminization of production workers beyond U.S. borders. Outsourcing, specifically in the final assembly of re-imported, outsourced production, may have preserved some jobs for men, which in turn may explain why men in these industries were hurt less than women in terms of job losses.

In competitive industries, on the other hand, employers seem to have reacted to increased international competition by substituting men with lower-waged women in an attempt to reduce labor costs. This can be inferred from the increase in the female share of low-wage production workers, which was associated with a significant decline in residual wages of women that led to a widening of the gender wage gap.

The findings suggest that, in neither competitive nor concentrated sectors the average female share of employment changed as the import share rose. Instead, there has been a trade-induced defeminization among low-wage production workers in concentrated industries, which was associated with the closing of the gender wage gap. Rather than being an indication of reduced discrimination against women as claimed by Black and Brainerd, discrimination may have increased during this period. Disproportionate job losses are a likely indicator of a decline

in cost of discrimination in a weak labor market, which enabled employers to continue and even intensify their discriminatory hiring (and firing) practices during this period. While rising import share may provide an incentive for employers to reduce costly discrimination, it is also a source of job destruction and therefore intensified job competition among workers which enables discrimination. Our findings support this interpretation of the mechanism for the decline in gender wage gap in concentrated, import-impacted industries. Hence, the findings of this study suggest that it is better to interpret increased international competition as a factor that increases job competition among and decreases the relative demand for low-wage production workers, rather than a competition stick that forces employers to reduce discrimination.

The policies that address the consequences of increased trade and relocation of U.S. companies offshore target retraining trade displaced workers for employment in the growing sectors of the U.S. economy, mainly the service sector.[20] However, while high-paying jobs were being lost in the manufacturing sector, new employment opportunities came in relatively low-wage categories in the growing service sector (Levy and Murnane 1992). There is an increasing concern regarding the effects of this increase in low-wage employment in the U.S. economy. The shift in employment away from a male-dominated sector to a sector that provides employment opportunities primarily for women has been linked to narrowing of the gender wage gap in the U.S. economy (Greene and Hoffnar 1995). However, recent findings show that, in the 1990s, the gender earnings gap within manufacturing declined and that, within services, it stayed nearly constant (Kongar 2005). The inter-sector difference in gaps closed in 1997, and by 1999, the gap was smaller in the manufacturing sector compared to the service sector. Hence, if these trends continue, deindustrialization is not likely to reduce the gender earnings gap in the U.S. economy, in the future.

The findings of this study suggest that the differential impact of increased import competition on gender inequalities seems to arise from heavy outsourcing rather than the competitive structure of an industry. Future research that focuses on outsourcing activities rather than market structure is likely to shed more light into the gendered outcomes of increased international competition. Also, feminist research on the trade impact on gender inequalities in developing economies finds that existing gender inequalities played a significant role in shaping trade patterns in these economies (Çagatay 1996; Seguino 2000; United Nations 1999). Hence, the empirical framework presented here needs to be broadened to take into account both the

gender-segregated nature of employment and the gender earnings differentials within manufacturing.

While there is no evidence for a significant impact on male wages of increased import competition, extending the analysis to include the post-NAFTA period might change this result. NAFTA exacerbated the trends in outsourcing of production jobs, causing significant job losses in male-dominated industries, such as the auto industry. Even when production stayed in the U.S., increasing unemployment among production workers in combination with employers' threats to locate offshore reduced the bargaining power of unions during wage negotiations (Bronfenbrenner 2000). If, in the post-NAFTA period, men's wages declined more than women's, the gender wage gap would have narrowed. Just like a decline in the gender wage gap due to disproportionate job losses for low-wage women, the narrowing of the gender wage gap through this mechanism would indicate illusory gains toward gender equality.

ENDNOTES

[1] Similar to Borjas and Ramey (1994), Black and Brainerd (2004) also hypothesize that, in competitive industries, increased import competition will have less of an impact on both male and female wages since wages (and the gender wage gap) in these industries are already at the competitive level.

[2] The residual gender wage gap is the portion of the gender wage gap that remains unexplained by differences in men's and women's productivity-related characteristics such as education and experience.

[3] Author's calculations from Bureau of Labor Statistics data.

[4] Due to changes in the definitions of occupations between 1976 and 1993, in the March CPS data, the 2-digit blue- and white-collar occupations were categorized into more aggregated categories of high-wage blue-collar, low-wage blue-collar, high-wage white-collar and low-wage white-collar occupations.

[5] While the lingering stereotype of a blue-collar (production) worker is a male, a closer examination of the gender composition of the U.S. manufacturing workforce in 1976 reveals that women were underrepresented not in production occupations but rather in high-wage occupations (Table 2).

[6] Between 1976 and 1993, the ratio of women's to men's median weekly earnings increased from 65 percent to 71 percent in the U.S, and from 54 percent to 63 percent in manufacturing. Within manufacturing, when gender differences in productivity-related characteristics are taken into account, the ratio increases in both years to 55 and 72 percent, respectively.

[7] Industries in the sample are listed in Appendix A.

[8] Focusing on the residual gender wage gap allows the results presented in this paper to be comparable to Black and Brainerd's (2004) findings. Controlling for education and experience differentials by gender also allows us to isolate trade from the well documented improvements in women's relative education and experience over the same period. (Blau and Kahn 1995, 1996, 1997; Levy and Murnane 1992; O'Neill 1985; O'Neill and Polachek 1993).

[9] Black and Brainerd's model utilizes the concentrated versus nonconcentrated distinction to capture the non-competitive versus competitive industries. In one specification they utilize "price-cost margin" which is defined as "value added-labor costs/total sales" as an alternative measure of market power. In this study, this alternative measure is utilized since being able to put a mark-up on the final price is a better measure of market power that would enable the industries to finance discrimination.

[10] Following Katz and Murphy (1992), Greene and Hoffnar (1995), and Black and Brainerd (2004), four education categories are: less than high school, high school, some college, and college or more. The March CPS data do not report actual labor market experience. Therefore, following Katz and Murphy (1992) potential experience is defined as either "age-years of schooling-7" or "age – 17," whichever is minimum. This residual wage calculation controls for a greater number of variables than does the calculation of Black and Brainerd (2004), who did not control for marital status, regional, or city or suburb residence.

[11] See Appendix B for the data refinements and sources.

[12] Studies that investigate the impact of technological advances on labor demand do so utilizing various proxies for technological advances. The most commonly utilized variables are research and development

(R&D), the share of capital in value added (Berman, Bound, and Griliches 1994; Mincer 1993; Sachs and Shatz 1994), investment in computers (Berman, Bound, and Griliches 1994), and sectoral productivity growth (Mincer 1993). In this paper, real investment per labor is used as a proxy for technological change, since the above mentioned variables are either not available in a more detailed format beyond the 2-digit level for all manufacturing industries (R&D expenditure), and/or lose their precision when they are aggregated into 3-digit level (total factor productivity growth).

[13] The list of industries in Appendix A indicates those that outsource by italics. Outsourcing is inferred from increasing export as well as import shares.

[14] Production processes were also outsourced in apparel, leather goods, and footwear industries leading to a decline in the female share in low-wage production employment in these industries. This decline, however, seems to have been offset by the trends in other competitive industries that were exposed to increased import competition. This is likely because apparel, leather goods, and footwear industries employed less than half (42 percent) of the workers in competitive industries that were exposed to international competition. Job losses in these industries further reduced the significance of these industries in the industry mix to 34 percent. Trends in other competitive industries that were exposed to import competition, therefore, were able to offset the declines in female share in production due to outsourcing and drive the results.

[15] In 1976, 40 percent of workers in noncompetitive industries and 30 percent of workers in competitive industries were unionized. In both concentrated and competitive industries, unionization rates were higher for men. In concentrated industries, 43 percent of men and 31 percent of women were unionized. These numbers were 33 percent and 22 percent in competitive industries. (Author's calculations from March CPS data files).

[16] Between 1976 and 1993, in concentrated industries, total, male, and female unionization rates declined to 24, 26, and 16 percent, respectively. In competitive industries, these numbers were 15, 16, and 11 percent (Author's calculations from March CPS data files).

[17] The inclusion of this variable does not necessarily help isolate the impact of deunionization from that of increased import competition since they are likely to be closely linked. There is evidence to suggest that, over the past few decades, employers reacted to increased international competition by relocating in the nonunionized Southern states, and also outsourcing their operations to Third World countries. Both of these would have led to declines in the unionization rates. Moreover, especially, after the passage of NAFTA, the threat of locating offshore alone was enough to reduce the bargaining power of unions (Bronfenbrenner 2000).

[18] Black and Brainerd (2004) test whether increased import competition led to an increase in the female share in employment among managers, rather than high-wage white-collar workers. They find a positive and statistically positive coefficient on the interaction term between the concentrated industry dummy variable and the trade variable (p. 554). For comparison purposes, equation 3 was also estimated for the managerial sample. Contrary to Black and Brainerd, we found no support for a trade-related increase in the share of women among managers in concentrated industries. Different sample sizes may account for the contradictory results.

[19] A decline in gender discrimination must reflect either an increase in the female share in employment in traditionally male dominated high-wage occupations or a decline in the gender wage gap among at least one of the four occupational categories (high-wage production, low-wage production, high-wage nonproduction, and low-wage nonproduction). There is no support for the former. Estimating equation 1

separately for four occupational categories shows no support for a decline in the residual gender wage differentials among any of the four groups of workers. It should be mentioned that given the previous finding that there is no evidence to suggest that increased import competition did not help women enter traditionally male occupations, a decline in the gender wage gap among workers in these occupations would be a rather weak support. Whether import expansion had a significant impact on female share in low-wage nonproduction occupations was also tested. The results were insignificant. These results are not reported here for brevity and are available from the author.

[20] The Federal Trade Act of 1974, established the "Trade Adjustment Assistance" (TAA) program to assist individuals who have become unemployed as a result of increased imports. The passage of NAFTA, "The North American Free Trade Agreement Implementation Act of 1993," established the NAFTA Transitional Adjustment Assistance Program (NAFTA-TAA) to provide adjustment assistance to workers who have become unemployed as a result of imports specifically from Canada/and or Mexico, or as a result of a shift of production to Canada and/or Mexico. The adjustment assistance programs provide benefits to trade-displaced workers in the form of training, job placement, and wage insurance.

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APPENDIX A

NONCOMPETITIVE/COMPETITIVE AND IMPORT IMPACTED/ NOT IMPORT IMPACTED INDUSTRIES

Noncompetitive Industries [a]		**Competitive Industries**	
CIC Code	**Industry: Not Import Impacted** [b]	**CIC Code**	**Industry: Not Import Impacted**
110	Grain mill products	100	Meat products
130	Tobacco manufacturers	101	Dairy products
140	Dyeing & finishing textiles, exc. wool & knit	102	Canned & preserved fruits, vegetables
171	Newspaper publishing & printing	111	Bakery products
182	Soaps, cosmetics	121-12	Misc. food prep. & kindred products
250	Glass & glass products	141	Floor coverings, except hard surfaces
262	Misc. nonmetallic mineral & stone products	142	Yarn, thread & fabric mills
280	Other primary metal industries	150	Misc. textile mill products
291	Metal forgings & stampings	161	Misc. paper & pulp products
292	Ordnance	162	Paperboard containers & boxes
310	Engines & turbines	172	Print., publish., allied, exc. newspapers
311	Farm & machinery equipment	180	Plastics, synthetics, resins
352	Aircraft & parts	181	Drugs
361	Railroad & locomotive equipment	190	Paints, varnishes, related products
		191	Agricultural chemicals
		192	Industrial and miscellaneous chemicals
		201	Misc. petroleum & coal products
		212	Misc. plastic products
		241	Misc. wood products
		242	Furniture & fixtures
		282	Fabricated structural metal products
		290	Screw machine products
		300	Misc. fabricated metal products
		341	Radio, T.V., communications equip.
		370	Cycles & misc. transportation equip.
		372	Optical & health services supplies
CIC Code	**Industry: Import Impacted** [c]	**CIC Code**	**Industry: Import Impacted**
210-1	*Tires and inner tubes & other rubber products*	132	Knitting mills
252	Structural clay products	*151*	*Apparel & accessories, except knit*
261	*Pottery & related products*	152	Misc. fabricated textile products
272	*Primary alimunum industries*	*221*	*Footwear, except leather & plastic*
312	Construct., material handling machine	*222*	*Leather products, except footwear*
321	*Office & accounting machines*	281	Cutlery, hand tools, other hardware
322	*Electronic computing equipment*	320	Metalworking machinery
340	*Household appliances*	331	Machinery, except electrical
342	*Electrical machinery, equipment, supplies*	*371*	*Scientific & controlling instruments*
351	Motor vehicles, motor vehicle equip.		
380	*Photographic supplies & equipment*		
390-1	*Miscel. mfg. & toys, amusement, sport. goods*		

Notes: [a] Following Black and Brainerd (2004), a competitive (noncompetitive) industry is defined as one where the four-firm concentration ratio was less (greater) than 40 percent in 1977.

[b] Following Black and Brainerd (2004), an import impacted industry is defined as one in which the import share increased by at least 10 percentage points between 1976 and 1993.

[c] Industries that outsource are indicated by italics. Outsourcing is inferred from increasing export as well as import shares. An import-impacted industry is identified as outsourcing if, within that industry, export share increased by at least the manufacturing average of 5 percentage points, between 1976 and 1993.

APPENDIX B

VARIABLES AND DATA SOURCES

Data	*Years*	*Sources*
Earnings[a]	1973-1993	Current Population Surveys, March 1977-1994 Conducted by the Bureau of the Census for the Bureau of Labor Statistics. Washington: Bureau of the Census [producer and distributor]. Santa Monica, CA: Unicon Research Corporation. [producer and distributor of CPS Utilities], 2001.
Imports[b] Exports	1976-1993	U.S. World IM & X: National Bureau of Economic Research (NBER) Trade Database compiled by Robert Feenstra (1996) (1972 4-digit SIC version) Robert C. Feenstra, "NBER Trade Database, Disk 1: U.S. Imports, 1972-1994: Data and Concordances," NBER Working Paper no. 5515, March 1996.
Value of industry shipments Investment[c]	1976-1993	Bartelsman, Eric J., Randy A. Becker and Wayne B. Gray. 2000. "NBER-CES Manufacturing Industry Database (1958-1996)." Database on-line. Available at http://www.nber.org/nberces/nbprod96.htm
Unionization rate	1976-1993[d]	1976-1981 May and 1983-1994 Outgoing Rotations of the Current Population Surveys. Conducted by the Bureau of the Census for the Bureau of Labor Statistics. Washington: Bureau of the Census [producer and distributor]. Santa Monica, CA: Unicon Research Corporation. [producer and distributor of CPS Utilities], 2001.
Rate of unemployment	1976-1993	Bureau of Labor Statistics

Notes: [a] The sample includes individuals aged 18 to 64 who worked full-time in the civilian sector in the year prior to the survey. A "full-time" worker is defined as one who worked at least thirty hours in their usual work week and worked more than 48 weeks in the previous year. Self-employed individuals and individuals working without pay are excluded from the analysis. The wage data refers to real weekly earnings. Wages are deflated by the Consumer Price Index. Workers earning less than $67 in weekly wages in 1982 dollars are excluded from the analysis, and the wages of workers whose earnings are topcoded are multiplied by 1.45. These data refinements are similar to those of Katz and Murphy (1992), Borjas and Ramey (1994), and same with those of Black and Brainerd (2004).

[b] The four-digit SIC coded industry-level trade data are aggregated at the three-digit (CIC) level based on the 1980 Census definition.

[c] Real investment per labor is calculated as follows: The four-digit SIC coded industry-level investment data are aggregated at the three-digit (CIC) level based on the 1980 Census definition, deflated by the Consumer Price Index, and then divided by the number of workers in industry *i* at year *t*.

[d] Missing values for the years 1982-3, 1985-9, and 1993 are computed by linear interpolation.