Did Trade Liberalization Benefit Female Workers? Evidence on Wage and Employment Effects from Egypt*

By

Shireen AlAzzawi[†]

Abstract

Egypt has gone through a period of dramatic, albeit slow, economic reform and trade liberalization process, with average tariff rates being reduced by more than 50% over a period of 15 years. This study investigates the extent of gender discrimination in the Egyptian manufacturing sector, and the impact of trade reform on the gender wage gap and on female employment. Results indicate that the gender wage gap, most of which is "unexplained" by worker characteristics, is high and has increased dramatically over time. Increasing trade liberalization has largely had a negative impact on women's relative wages and on their employment, even after controlling for the public-private distinction as well as the occupational distinction. There is, however, some evidence supporting a favorable impact of increased export intensity on females in the labor market. This has important implications for policy makers attempting to create more equitable labor market conditions in post-revolutionary Egypt.

Keywords: gender discrimination, inter-industry gender wage gaps, female employment, trade liberalization, Egypt

---

* I am grateful to Mouna Cherkaoui, Ragui Assaad, Moustafa Nabli and participants at the Middle East and North Africa Gender and Economic Symposium II at The University of Chicago for helpful comments and suggestions. Yomna Sabry helped with the data collection. This research was funded by The Gender Economic Research and Policy Analysis (GERPA) in the context of its Second Research Competition.

[†] Shireen AlAzzawi, Department of Economics, Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053, USA. salazzawi@scu.edu.

1. Introduction

Despite decades of anti-discrimination legislation and labor laws that purport to support "equal pay for equal work", significant gender pay gaps still exist today in almost all countries regardless of the level of development.[1] Since the 1950s, Egyptian Laws have attempted to create a more equal work environment for all workers, including women. In fact, the Egyptian public sector has been known to discriminate favorably with regards to female workers, by, for example, allowing them generous maternity and child care leaves. Despite this long history, a significant gender pay gap and widespread occupational segregation exist in Egypt today. [2]

In the last several years many countries have undertaken economic reform and trade liberalization programs, and there has been growing research interest in the gender impacts of these reforms, and in particular the impact of increased globalization. Such market- based reforms and increased international openness may reduce discrimination against all workers, including women, as well as provide new job opportunities in export-oriented industries especially to low-skilled female workers. However, they may also bring about a deterioration of women's relative position in the labor market since women tend to be concentrated in a few sectors of economic activity, have limited geographic mobility and have both labor market and household responsibilities that limit their labor market experience and hence their ability to accept many demanding, high paying job opportunities.

Since 1991 Egypt has implemented a structural adjustment and economic reform program aimed at transforming the state led industrialization economic model that was popular in the 50s and 60s into a more market-based economy with greater openness. These reforms have included a number of fiscal and monetary policies aimed at balancing the government budget and curtailing inflation. An integral part of the program involved opening up domestic markets to foreign goods, combined with widespread privatization of state owned enterprises. This trade liberalization program has been dramatic, albeit slow, with average tariff rates being reduced from 42% in 1991 to 20% in 2005 (WTO 1999, 2005), while non-tariff barriers have been largely removed.

Unfortunately, the fruits of this reform program have been concentrated in a small minority of those at the top of the socio-economic ladder, while the majority of the working-class population was completely left out, and their socio-economic conditions had actually deteriorated as evidenced by rising poverty rates and increasing levels of inequality.[3] The claims of the previous government that the economy was growing well, and that the economic reform and trade liberalization programs were successful[4], were met with skepticism. The extent of the discontent felt by the majority of the population surfaced very clearly during the January 25th revolution, where demands for "bread" and "social justice" were combined with those for "freedom".

This study contributes to a better understanding of the impact of trade reform on gender discrimination, one of the many aspects of social injustice in Egypt, by addressing several important questions. Did trade reform have an impact on the gender wage gap in the manufacturing sector? Did the female share in employment, hours of work or total number of female workers change in industries that lost protection? What is the estimated magnitude of the impact of tariff reductions and increased trade volume on the gender wage gap and on female employment in manufacturing industries?

In the first part of the paper I discuss conditions in the Egyptian labor market with an emphasis on the gender dimension and briefly summarize the key aspects of the trade liberalization and economic reform program that started in the early 1990s. I present summary statistics on the characteristics of male versus female workers in industries that experienced different degrees of trade reform over time. Next, I measure the gender wage gap and determine the importance of 'explained' versus 'unexplained' components. I then use a two stage regression technique to examine the impact of trade liberalization on gender wage discrimination. First, inter-industry gender wage differentials are estimated for 1998 and 2006, controlling for worker characteristics. In the second stage, the estimated industry gender wage differentials are regressed on measures of trade policy and trade volume. The effect of trade reform on female employment is examined by regressing three different measures of female employment on measures of trade reform. Robustness checks are then conducted to account for the impacts of skill-biased technological change and industry concentration levels.

2. **Literature on Gender Discrimination and Trade**

Many perceive trade liberalization as one of the main engines of growth in today's development rhetoric (Frankel and Romer 1999, Cagatay 2005 among others), bringing about the benefits of specialization, enjoyment of a wider variety of products at cheaper prices and in some cases lifting millions of people out of poverty (Dollar and Kraay 2002, Kraay 2006). Others have argued that trade liberalization has brought more losers than winners, especially among the poor and vulnerable in developing countries (Rodriguez and Rodrik (2000), Topalova (2005), Edmonds et al. (2005), Berik et al. (2004) among others).

Trade openness is also an important channel for increased competition. The work of Gary Becker (1971) suggests that employers with market power are able to engage in discriminatory practices over longer periods of time than those in competitive markets earning zero economic profits since discrimination is costly. If trade openness is a channel for increased competition it would thus increase the relative wages and improve the quality of employment opportunities available to all, including women. At the same time, the Hecksher-Ohlin-Samuelson (H-O-S) theory predicts that trade expansion should increase demand for the country's abundant factor which is employed intensively in the production of goods in which the country has comparative advantage. If women are relatively less skilled than men then females should gain from trade in developing countries (that are relatively more abundant in less skilled workers) through increased employment opportunities, while they should lose in developed countries (where skilled labor is the abundant factor).

Others have argued that it could also bring about a deterioration of women's relative position in the labor market. Non-neoclassical theory, as developed in Darity and Williams (1985) and Williams (1987), implies that an increase in trade can actually increase gender wage gaps in countries where female workers may have lower bargaining power and where women are segregated into lower-paying, lower-status jobs. More recently, Menon and Rodgers (2009) developed a model that introduced discriminatory firm behavior into a competitive market framework, and showed that the gender wage gap may not necessarily fall as a result of increased trade openness. They tested their model using data for Indian

manufacturing and found that pressures to cut costs due to international competition actually hurt women's relative pay.

Previous literature on the effect of trade reform on gender discrimination has had mixed results. Black and Brainerd (2004) examined the effect of increasing trade on the change in the wage gap in the USA. They found that increased competition through trade improved women's relative pay in previously highly concentrated industries, yet increased it in industries that were already competitive. Artecona and Cunningham (2002) used Mexican manufacturing data between 1987 and 1993 and found that trade reform is associated with higher wage gaps, largely because women tend to also be concentrated in low-skilled jobs. Berik, Rodgers and Zveglich (2004) used data for Taiwan and South Korea and found that competition from foreign trade is positively associated with wage discrimination against female workers. Reilly and Dutta (2005) investigated the effect of trade liberalization in India on the gender pay gap and find weak evidence that trade liberalization as measured by tariff rates and export shares is associated with higher gender pay gaps, while a higher import share is associated with a lower gap. Cross country studies (Oostendorp 2004 and Meyer 2007) have found that trade affects the gender pay gap in different ways, depending on the income level of the country. As far as I know, El-Hamidi (2006) is the only study that examines the relationship between trade reform and gender discrimination in Egypt. She differentiates between the extent of the unexplained portion of the gender pay gap in sectors classified as tradable vs. non-tradable, without using any direct measures of trade liberalization, and finds that discrimination exists in both sectors even after liberalization, but that it is greater in the tradable sector.

There is some evidence of the so-called "feminization of employment" in developing countries following trade reforms, especially increased export orientation. Studies by Cagaty and Berik (1994), Joekes and Weston (1994), Ozler (2000) and Aguayo, Airola and Juhn (2010) and others suggest that trade liberalization in developing countries has been associated with an increase in women's share in employment. Studies that have looked at female employment directly for developed countries have had mixed results. Wood (1991, 1994) found little impact of trade expansion on female employment while evidence in Kucera (2001) and Kongar (2005) suggests that female employment was adversely affected.

In the case of Egypt, there are additional dimensions of the economic reform program that may hurt women's relative position in the labor market. Traditionally, many women opted for public sector and government jobs that may have paid less, but were more stable, less demanding and provided benefits such as extended child-bearing and rearing leaves, retirement benefits, shorter hours, etc. As many of these jobs disappeared starting the late 1990s as a result of the speeding up of the privatization program and the downsizing of the government sector, many women found themselves in a worse situation, especially new entrants into the labor market. It is thus very important to try to sort out the impact of trade reform from that of other changes in the economy on female relative wages and employment using direct measures as I attempt to do in this study. [5]

3. Stylised Facts: Labor Market Conditions and the Gender Dimension

The labor force in Egypt almost doubled between 1980 and 2006, however the female labor force has only increased by about 60% over that period (see Table 1). This is so despite the fact that females continued to constitute roughly 50% of the total population. Contrary to many developing countries, female labor force participation rates have been declining over this period in Egypt, falling from a peak of 30% in 1980 to 24% in 2006. In terms of unemployment, women have continued to face much higher rates over the whole period. The female unemployment rate has been 3 to 4 times higher than that of males, with one out of every four females interested in, and actively searching for, a job, not being able to find one. Among young women (ages 15 to 24) the rate was more than 60%, compared with 20% for young males in the most recent year. These figures of course exclude all those who have stopped looking for a job out of despair, or have turned to the informal sector for a temporary source of income while they wait for a formal sector job.

[Table 1 about here]

To examine the gender dimension of the labor market impacts of trade policy reforms, I use data from two nationally representative labor force sample surveys: the 1998 Egypt Labor market Survey (ELMS 98) and the 2006 Egypt Labor Market Panel Survey (ELMPS 06). This allows me to track labor market conditions at important milestones during the reform process. Although the reform process

officially started in 1991, a relatively small number of reforms, especially with respect to trade and privatization, had taken place by 1998. By 2006 however, a much broader and more aggressive set of reforms had been implemented, especially after a more free-market oriented cabinet took office in 2004.

The ELMS 98 was carried out on a nationally-representative sample of 4,816 households. The ELMPS 06 is the second round of what is intended to be a periodic longitudinal survey that tracks the labor market and demographic characteristics of the households and individuals interviewed in 1998, and any new households that might have formed as a result of splits from the original households. The ELMPS 06 sample consists of a total of 8,349 households distributed as follows: (i) 3,684 households from the original ELMS 98 survey, (ii) 2,167 new households that emerged from these households as a result of splits, and (iii) a refresher sample of 2,498 households. Of the 23,997 individuals interviewed in 1998, 22,987 were still alive or in the country in 2006 and 17,357 of those (75.5%) were successfully re-interviewed in 2006, forming a panel that can be used for longitudinal analysis. The 2006 sample contains an additional 19,743 "new" individuals. Of these 2,663 individuals joined the original 1998 households, 4,880 joined the split households, and 12,200 were part of the refresher sample of households. These data sets contain a wealth of information on individual characteristics and job characteristics.

The working sample includes all male and female workers, between the ages of 15 and 65, in wage employment in the manufacturing sector. [6] Hourly real wages are calculated as the sum of wages earned in the reference month from primary jobs, adjusted for average number of work days per month and average hours per day. For comparability purposes, wages of 1998 are inflated to 2006 Egyptian pounds using the consumer price index. Table 2 reports sample statistics for male and female workers separately for each year. The median real hourly wage was 1.78 LE for males in the manufacturing sector in 1998, and 1.37 for females, giving rise to a raw (unadjusted for worker characteristics) male-female wage gap of approximately 30% (see Figure 1). By 2006, this wage gap had increased dramatically to a whopping 100%. This implies that the median male earned 30% more than the median female in the manufacturing sector in 1998, and ***twice*** more by 2006. By contrast, the figures for other African

countries' manufacturing sectors range between a 20% gap *in favor* of females in Senegal, and a 50% gap in favor of men in Mauritius at the median of the distribution (Nordman and Wolff 2010).

[Figure 1 and Table 2 about here]

The table also provides sample statistics showing differences between males and females in individual characteristics, education, region of residence and sector of employment. Some of the key male-female differences are that females tend to be younger than males, especially in 2006,have fewer children under 6(this fell from one third in 1998 to only one quarter of the sample by 2006) and to have markedly lower work experience (almost half of that of their male counter parts by 2006). Females in manufacturing tend to have higher education levels on average, with a lower share of females with a primary degree or lower in both years, and a higher share of females with a university degree and above. This is expected given that women tend to be "over selected" in the labor market based on educational credentials. The majority of female manufacturing workers resided in Greater Cairo and Alexandria combined in both years, although rural lower Egypt saw a significant jump by 2006.

There was a 50% decline in female employment in the manufacturing public sector over this period (from 42% in 1998 to only 21%). Conversely, the share of male workers in the manufacturing public sector only declined by 28% over the same period. Privatization of many state owned enterprises took place during this period. This involved early retirement programs as well as layoffs of redundant workers. At the same time, a policy of government downsizing was in place with an effective freeze on new hires in the government sector. The data indicates that females in manufacturing were disproportionately affected by these changes. At the same time, the share of female workers in overall manufacturing employment increased by about 30% between 1998 and 2006. Thus, by 2006, there was a larger number of females in the manufacturing sector, most of whom were younger, less experienced, and worked in the private sector, yet they were also relatively more educated that their male counterparts.

Table 3 provides data on the distribution of females by industry, the proportion of females in each industry out of total workers and on the industry relative wage gap. Food and Beverages, Textiles, and

Garments manufacturing employed the bulk of the female labor force in both 1998 and 2006. Chemical Products saw the largest increase (9-fold) in employment of females over the period (recall that the gender wage gap increased by more than 5 fold in this industry), and the female share in that industry also rose substantially from 3% to 15%. Garment manufacturing's share of all female workers also increased substantially from 23% to 38%, and the share of females in that sector almost doubled. Other industries that witnessed large increases in female shares are Textiles, Office Equipment and Computers, and Radio, TV and Communications Equipment Manufacturing. The largest decline by far was in the electrical equipment industry where women used to constitute more than 60% of all employees in 1998, but that fell to only 11% by 2006.

[Table 3 about here]

These figures can be put in perspective by looking at the gender wage gaps at the industry level, which are provided in the last column of Table 3. Clearly, there are wide variations in the gender wage gap by industry. For ten out of the seventeen manufacturing industries in the sample, the wage gap was at or above 50% in one or both of the years under consideration. The wage gap is also quite high in the three largest female employers, ranging between 1.46 in Food and Beverages, to 2.0 in Garments in 2006.The gender wage gap widened over time in industries such as Chemical Products (increased by more than 5 fold-this is the same industry that witnessed a nine-fold increase in its share of female employment), Electrical Equipment, Machinery and Equipment, Textiles and Wood Products, while it declined or was reversed to favor females in others such as Tobacco, Garments, Coke and Petroleum and Motorized Vehicles manufacturing.

4. Trade Reforms in Egypt

Like many developing countries Egypt followed a policy of import substitution industrialization in the 1960s and early 1970s. Faced with a debt crisis in 1982, Egypt was one of the first countries in the region to shift towards a more outward oriented trade policy. Egypt has taken a gradual approach to trade liberalization. The once highly restrictive trade regime has been reversed with the initiation of reforms in

1986. These reforms simplified a range of import tariffs and reduced non-tariff barriers (NTBs). Manufacturing had been the largest beneficiary of protection in general while tariffs on agricultural products had been kept low (Minot et al. 2010) to ensure the cheap supply of food imports to domestic markets. In 1991, the multiple exchange rates of the previous two decades were unified into one. This was an important measure designed to boost international trade through greater transparency.

Egypt signed several multi and bilateral trade agreements in the mid-1990s. These include the Common Market for Eastern and Southern Africa (COMESA), the Trade and Investment Framework Agreement (TIFA), and the Pan-Arab Free Trade Area (PAFTA). The maximum tariff fell from 160% in 1986 to 70% by the mid-1990s. It then continued to fall, reaching 40% in 1998. The most highly protected industries were textiles, clothing, leather products, cars, transportation, furniture, glass and pottery and beverages, while cotton ginning was consistently negatively protected (Refaat 2003).

Following WTO accession in 1995, Egypt bound tariff rates at levels that in many cases have exceeded existing levels. While 98% of Egypt's tariff lines are bound, the average bound rate fell from 45% in 1998 to 38.6% in 2005 (WTO, 2005). Pledged to be in full compliance with WTO commitments, Egypt has had a policy of "tariffication": removing quotas and other NTBs and replacing them with tariffs. In 2003 the Egyptian pound was allowed to float.

To further open the Egyptian economy, the cabinet that took office in 2004 reduced the number of tariff bands, eliminated all customs service fees and charges on imports, and cut tariff rates resulting in a decline in the (simple)average applied MFN tariff rate from 26.8% in 1998 to 20.0% in 2005 (WTO 2005). The number of products subject to non-tariff barriers was also substantially reduced. According to the World Bank, by 2005, Egypt's simple average tariff rate was low by world standards, lower than the rates in 60 percent of the countries in the world. Furthermore, Egypt's progress in trade liberalization between 2000 and 2004 was among the strongest in the world (World Bank 2005).

To investigate the impact of trade policy interventions on the gender wage gaps and on employment, trade policy data is linked to the labor market data at the two-digit industry level. This

ensures that there are enough observations in each industry. Tariff data is obtained from the World Trade Organization Tariffs Profile based on Egyptian Customs Authority data. I use applied *ad-valorem* tariff rates. To ensure that tariff rates for subcategories that are relatively more important in terms of total imports receive a greater weight in the constructed average industry-level tariff, a weighted average tariff was constructed using imports as the weight. The applied ad-valorem tariff rate at the HS-6 digit was merged with import value data at the same level. The import-weighted tariffs were then converted to ISIC Review 3 classification using the international concordance between HS-6 and ISIC Review 3 classifications at the disaggregated 4-digit level to ensure a high degree of accuracy in matching industrial subcategories. Finally the average of the import weighted tariff rates was calculated at the 2 digit industry level.

Exports and imports data are from the World Integrated Trade Solution (WITS) database. They are based on the national accounts constructed by the Central Agency for Public Mobilization and Statistics (CAPMAS). Output figures are from the Industrial Census produced annually by CAPMAS. These variables are used to construct the indices of import penetration and export intensity. Import penetration in industry k is calculated as imports in industry k as a proportion of domestic consumption in that industry, (imports/(output + imports –exports).[7] Export intensity is calculated as exports in industry k as a proportion of output in that industry, (exports/output).

Table 4 shows data on measures of trade reform over the period 1997–2005, reflecting changes in tariff rates as well as import penetration and export intensity. The import weighted average tariff declined by 34% on average, from 18.6% to 12.3%, over this period. The biggest declines were in motorized vehicle manufacturing, rubber products and coke and petroleum manufacturing. On average the import penetration index rose by 3.65 percentage points and the export intensity index rose by 5.94 percentage points over this period, reflecting the increased overall trade volume. The largest increases in import penetration were in coke and petroleum, office equipment and computer manufacturing and furniture. Some sectors such as basic metal witnessed a decline in import penetration. The largest increases in export intensity were in coke and petroleum (it seems this sector both increased its exports and imports

over this period substantially) metallic products and non-metallic mineral products. Textiles, garments, leather and rubber manufacturing on the other hand saw decreases in export intensity over this period.[8]

[Table 4 about here]

5. Trade Reform and Gender Discrimination: Empirical Methodology

A two step process is used to study the impact of increased international competition on the gender wage gap in Egypt. First, Mincer earnings equations are estimated to explain the log wages of men and women. The difference between the average male and female log wages in each industry is then decomposed into a portion due to observable characteristics and a residual commonly referred to as the unexplained or discrimination component of the gender wage gap. Second, this residual wage gap is used as the dependent variable in regressions that control for exposure to trade openness as well as other changes that took place over this time in the Egyptian Economy.

Industry Specific Gender Wage Differentials

The standard Oaxaca-Blinder procedure can help us to understand the extent to which the overall wage gap between men and women can be explained by differences in observed productivity characteristics such as education and experience (Oaxaca 1973; Blinder 1973). I will report the results of this decomposition first, to help us understand how the gender pay gap's decomposition into explained and unexplained parts has evolved over time. However, for the purpose of identifying the relationship between the unexplained gap and other industry specific measures, in particular those of increased trade openness, I will calculate *industry specific* gender pay gaps following the methodology originally suggested by Fields and Wolff (1995) and later modified by Horrace and Oaxaca (2001). The latter's modification was introduced to ensure that the estimated industry gender pay gaps were invariant to the selection of the omitted reference group for binary variables in the wage model (such as region of residence, education level, sector of employment, etc.).

I estimate separate male and female wage equations of the form:

$$\ln w_{mi} = \alpha_m + \boldsymbol{x}'_{\boldsymbol{mi}}\beta_m + \boldsymbol{d}'_{\boldsymbol{mi}}\delta_m + \theta_m\lambda_{mi} + u_{mi} \quad (1)$$

$$\ln w_{fi} = \alpha_f + \boldsymbol{x}'_{\boldsymbol{fi}}\beta_f + \boldsymbol{d}'_{\boldsymbol{fi}}\delta_f + \theta_f\lambda_{fi} + u_{fi} \quad (2)$$

where the subscripts *m* and *f* denote male and female respectively, *i* denotes individual *i*, *w* is the hourly wage, $\boldsymbol{x}$ is an nx1 vector of observable characteristics of individual *i* and includes experience and its square, as well as binary variables for highest level of education attained, sector of employment, and region of residence. $\boldsymbol{d}$ is a (k-1)x1 vector of industry dummies, where d_{ik} equals 1 if the i^{th} worker is employed in the k^{th} of *K* industries, and zero otherwise. λ is the standard selection parameter calculated for each group as the inverse of the Mills ratio term using estimates from gender specific probit models following Heckman (1979)[9]. u_i is the usual *i.i.d* , zero mean regression error with constant variance. β is an *n*x1 vector of unknown wage equation parameters to be estimated, δ is a (k-1)x1 vector of industry effects and θ is the unknown selection parameter.

The predicted log wages for a representative male and female worker in industry k is then given by:

$$\widehat{\ln w_{mk}} = \widehat{\alpha_m} + \overline{x_{mk}}' \widehat{\beta_m} + \widehat{\delta_{mk}} + \hat{\theta}_m \overline{\lambda_m} \tag{3}$$

$$\widehat{\ln w_{fk}} = \widehat{\alpha_f} + \overline{x_{fk}}' \widehat{\beta_f} + \widehat{\delta_{fk}} + \hat{\theta}_f \overline{\lambda_f} \tag{4}$$

where $\overline{x_{mk}}'$ are the mean characteristics of a male worker in industry *k* and $\overline{x_{fk}}'$ are the mean characteristics of a female worker in industry *k.* The industry specific gender wage gap is given by the difference between equations (3) and (4). By adding and subtracting the term $\overline{x_{fk}}' \widehat{\beta_m}$ this gender wage gap can be decomposed into explained and unexplained components as follows:

$$\widehat{\ln w_{mk}} - \widehat{\ln w_{fk}} = \left(\widehat{\alpha_m} - \widehat{\alpha_f}\right) + \left(\widehat{\delta_{mk}} - \widehat{\delta_{fk}}\right) + \overline{x_{fk}}' \left(\widehat{\beta_m} - \widehat{\beta_f}\right) + \left(\overline{x_{mk}}' - \overline{x_{fk}}'\right) \widehat{\beta_m} \tag{5}$$

The left hand side of equation (5) is the total log-wage differential between males and females in industry k. The last term on the right hand side of equation (5) is the part of the wage gap that can be explained by differences in observable characteristics between male and female workers in that industry, while the first three terms give the unexplained or the residual wage gap (the part attributed to gender differences in market returns to those observable characteristics). [10]

The Impact of Trade on the Industry Specific Gender Wage Differentials

The next step is to relate the residual or unexplained gender wage gap to industry specific measures, in particular those of increased trade openness. First, following Horrace and Oaxaca (2001), the k^{th} industry residual wage gap is calculated as:

$$\ln \widehat{w_{mk}} - \ln \widehat{w_{fk}} = \left(\widehat{\alpha_m} - \widehat{\alpha_f}\right) + \left(\widehat{\delta_{mk}} - \widehat{\delta_{fk}}\right) + \overline{x_f}' \left(\widehat{\beta}_m - \widehat{\beta}_f\right) \quad (6)$$

The industry specific gender wage gap for the omitted industry is obtained by setting $\widehat{\delta_{m1}} = \widehat{\delta_{f1}} = 0$. $\overline{x_f}'$ is the vector of the mean characteristics of all women in the sample. The first two terms of the industry gender wage gap are the difference between the estimated industry coefficients between men and women plus the difference between the male and female intercepts. The third term ensures that these industry wage differentials are invariant to the choice of omitted reference group for binary variables in the wage regressions, since changes in the intercept $\left(\widehat{\alpha_m} - \widehat{\alpha_f}\right)$ are offset by changes in the slope parameters$\left(\widehat{\beta}_m - \widehat{\beta}_f\right)$.

This industry specific wage gap variable is then related to various measures of trade reforms and other time varying industry characteristics that took place over this period to investigate both the static and dynamic effect of the reform and liberalization processes on the gender wage gap. I estimate models of the form

$$\ln \widehat{w_{mk}} - \ln \widehat{w_{fk}} = \alpha_k + \beta_k T_k + \gamma_k N_k + \mu_k \quad (7)$$

$$\Delta_t(\ln \widehat{w_{mk}} - \ln \widehat{w_{fk}}) = \alpha_k + \beta_k \Delta_t T_k + \gamma_k \Delta_t N_k + \mu_k \quad (8)$$

T_k is a variable that reflects the increased trade openness over this period, and will be measured by both the import weighted average tariff as a trade policy variable and by measures of trade volume. N_k is a vector of other time varying industry characteristics that are likely to have an impact on the gender wage gap, regardless of the level of trade liberalization in that industry. Policy questions are often coined in terms of changes in these variables rather than levels. Δ_t in equation (8) denotes changes over time in these variables. The differenced model in equation (8) will provide insight into the impact of changes in the trade variables and other industry characteristics over time on the change in the industry wage gap.

I use several trade volume measures that are common in the literature. Import penetration, measured as the share of total imports out of domestic consumption (imports/(output + imports –exports); export intensity, measured as export share of domestic output (exports/output) and trade openness measured as the sum of imports and exports divided by total output ((imports +exports)/output).

Much of trade today is two-way trade, where a country exports and imports the same goods. Egypt, for example, is both an exporter and an importer of products such as textiles, garments and leather goods. Relying on the import or export shares alone to determine whether an industry is a net importer or a net exporter might therefore be misleading. The established measure of the degree of intra-industry trade is the Grubel and Lloyd trade overlap index. This index is of relatively limited use for my analysis since it only provides information about the degree to which industries are "balanced" in their interactions with the rest of the world.[11] A simple adaptation of the Grubel-Lloyd index that uses net imports (or net exports) provides information about whether an industry is relatively more import oriented or export oriented, not only about whether its trade is balanced. It is measured as (imports-exports)/(output + imports –exports) and will be referred to as the industry penetration index. A positive number indicates that this industry faces a high degree of international competition from imports. A negative number indicates that this industry's products are able to compete successfully in international markets.

These trade-based measures could be considered endogenous, although this argument is much stronger in analyses looking at the impact on inter-industry *wages*. I circumvent this problem by using trade-based measures that are lagged by one year (1997 and 2005 data). I also perform a number of additional robustness checks in section six to ensure the validity of the results. To account for other important industry-wide characteristics that might affect the gender wage gap, I include a number of other industry characteristics in the regressions. One of the most important events taking place in the Egyptian economy since the reform program began in 1991, and more intensely in the late 1990s and early 2000s is the privatization of state owned enterprises and the downsizing of the government sector. As mentioned earlier, the impact of this is already evident in the descriptive statistics where we saw that manufacturing employment in the public sector declined from 35% to 24% of the sample, with females being especially

hard hit (their share in public sector employment fell by 50% from 42% in 1998 to 21% in 2006). Public sector jobs tended to offer females more equitable working conditions in general, since pay scales are set strictly according to education level and years on the job and hence females are less likely to be discriminated against. Such a large decline in the share of females in public sector employment also meant that many female labor market entrants in 2006 who would have ended up in these public sector jobs did not have the same opportunities as their counterparts who entered the market in 1998. This is likely to have a strong influence on the inter-industry gender wage gap. To ensure that this important change is accounted for in the analysis, I include the share of workers who are in the private sector as an explanatory variable in the regressions.

Another important industry characteristic that could affect the results is the occupational distinction. Blue collar workers might be disproportionately hurt by trade liberalization regardless of the gender discrimination issue. I therefore include the share of blue collar relative to white collar workers at the industry level as an additional explanatory variable.[12] The degree of unionization could also have an impact on the gender wage gap. Dickens (1986) argues that firms may be willing to pay higher wages if there is a viable threat of collective action. Industries where it is easier to form unions (for example, where large plants are prevalent) are thus likely to have higher wages for all workers, including women, and by extension less discrimination. The share of workers who are union members is also included as an industry level explanatory variable. [13] I also include a dummy for 2006 to capture any other changes due to the time element. To account for general forms of heteroskedasticity and serial correlation in the error term, in particular intra-group correlation for workers within the same industry, I compute robust (Huber-White) standard errors clustered by industry.

6. Results

6.1 Wage Equation Estimates

Results of the gender specific wage equations estimated by the Heckman two step method for two separate years (correcting for selectivity bias) and the probit estimates of selection into wage employment, are reported in Table 5. These regressions are weighted using sample weights provided in the data for the relevant years; the weights correct for the fact that the proportion of individuals and households in each sample differs from the proportion in the true population. Use of these weights thus adjusts the coefficients to make them nationally representative. Estimated coefficients in the participation equation have the expected signs and for brevity will not be subject to further discussion here.

[Table 5 about here]

The natural logarithms of the real wage rates are used as the dependent variable in the augmented Mincerian wage equations, which control for actual experience (calculated as survey year minus year entered the labor force), experience squared, human capital, sector of employment, region of residence and industry affiliation. I use a set of 8 educational dummy variables to capture the human capital effect. Ideally, a years-in-education variable is used in the standard human capital model, however this data is not available.[14] The omitted education variable is illiterate, the omitted sector is the private sector, Cairo is the omitted region of residence and agriculture, forestry and fishing is the omitted industry.

The wage regression estimates are relatively typical for Egypt and other countries. The experience-wage profile takes a typical shape, and suggests that experience tends to be highly rewarded for both males and females, although slightly higher for females, especially in 2006. Females working in the public or government sector earned about 25% more than those in private employment in 2006, and this difference is significant. As expected, for both males and females, higher levels of education have an increasing positive impact on both participation and wages, that seems to jump somewhat after a General Secondary school degree (note that a Vocational Secondary degree is an *alternative* to a General one). University degrees tend to be highly rewarded irrespective of gender, although this reward declined somewhat for both males and females in 2006 relative to 1998.

Living in rural lower Egypt and Alexandria had the largest significant negative impact on women's wages in 1998 compared to those residing in Cairo, while living in urban lower Egypt and again

in Alexandria had the largest negative impacts on women's wages in 2006. Male wages on the other hand were most negatively affected by living in rural areas in general in both years. The estimated coefficients for the selection terms (lambda) are relatively large and statistically significant at conventional levels, except for females in 2006. The positive inverse mills ratio suggests that unobserved factors, that make participation into wage employment more likely, tend to be associated with higher wages.

6.2 Decomposing the Gender Pay Gap

Results from the Oaxaca-Blinder decomposition are reported in Table 6 for 21 manufacturing industries. Table 6 first reports the raw gender wage gaps (in logs) and then the results of decomposing the gap as in equation (5) after correcting for the employment selection effects. The raw male-female wage gap was 0.283 log points in 1998, and increased to 0.37 log points in 2006. Once we adjust for worker characteristics and employment selection effects this difference changes to an insignificant -.034 (the gap slightly favored females) in 1998 and a very large and significant 0.923 in 2006. The wage gap can be converted to a ratio of geometric means by exponentiating its negative, giving a female to male wage ratio of 103 percent in 1998 and only 40 percent in 2006, which is extremely low by international standards.

[Table 6 about here]

Decomposing this difference into an explained and unexplained portion, the results indicate that in 1998, the difference was mainly due to differences in worker characteristics, which rendered female wages slightly higher; while in 2006 the large significant difference in favor of males was mainly accounted for by unexplained factors (discrimination). The unexplained portion accounted for more than 77% of the wage gap. This term quantifies the change in women's wages when applying the men's coefficients to the women's characteristics, and indicates that women would in fact have seen their wages rise considerably if they were treated the same way as men.

6.3 Inter-Industry Gender Pay Gap and Trade Liberalization

The main focus of this study is to investigate the impact of trade liberalization on the industry specific gender pay gaps that were constructed following the Horrace-Oaxaca procedure as detailed in the methodology section. The analysis is restricted to manufacturing industries as mentioned earlier, since it is not clear that trade policy variables for which we have data adequately capture measures of protection/liberalization in other tradable sectors such as agriculture[15]. I estimate equation (7) using Ordinary Least Squares applied to the panel dataset of industry level observations over time. I use the various indicators of trade policy reform and trade volume, as well as the controls for industry characteristics that were described in detail in section 4.

The results are reported in Table 7. The models differ according to the measure of the trade variable. Model (1) uses the import-weighted average tariff as the trade policy variable, model (2) uses the import penetration rate as the trade volume measure, model (3) uses export intensity, model (4) uses the trade openness index, and model (5) uses the industry penetration index. Tariffs have a large negative impact on inter-industry gender wage gaps; however it is insignificant at conventional levels. Import penetration, trade openness and industry penetration all have a positive and significant impact on the industry gender wage gap. Export intensity has negative but insignificant impact at conventional levels. These results imply that increasing imports are associated with higher wage gaps between men and women. However, recall that the industry penetration index is negative for industries whose exports exceed their imports as a share of domestic consumption. Hence these results also suggest that export oriented industries may also have lower pay gaps between men and women.

[Table 7 about here]

Other industry controls also proved to be important determinants of the gender wage gap as expected. The higher the share of private sector workers in an industry, the higher the wage gap between men and women in that industry. On the other hand, industries with a higher ratio of blue to white collar workers have lower wage gaps. This implies that privatization was associated with higher wage discrimination for women over this period, while there was less gender discrimination in industries with a

higher share of blue collar workers. The latter finding is also a reflection of the lower share of females in blue collar occupations. [16]

This result is against the theoretical predictions that increased openness increases competition and reduces employer's ability to discriminate (Becker). What we see in the case of Egypt is a marked increase in the gender pay gap that is significantly associated with higher import volumes, and weak evidence that export industries may have lower such gaps, even after controlling for the public-private distinction as well as the occupational distinction. The observed increase in gender wage differentials over this period has clearly been associated with rising import volumes and is likely a reflection of increased competitive pressures from trade that force firms to cut costs at the expense of workers who have low bargaining power such as females.

For some policy questions, it is also relevant to ask how *changes* in these trade variables affected the difference in the gender pay gap between 2006 and 1998. To investigate this question I estimated differenced models using the first differences of the same trade variables and industry controls as above as explanatory variables, and the first difference of the inter-industry gender wage gap as the dependent variable. The results are in Table 8.[17] The change in export intensity and the industry penetration index were the only two trade variables that had a significant impact on the industry wage gap first difference. The results imply that industries that witnessed a rise in their level of export intensity also saw their gender wage gaps decline over time, while those that had large industry penetration indices (their imports were far larger than their exports when compared to domestic consumption) saw the largest increases in wage gaps over this period.[18] These results again point to the harmful impact of import competition on the gender wage gap, while women seem to fare relatively better in those industries that managed to raise their export intensity significantly.

[Table 8 about here]

Thus the main conclusion from this section is that increased import competition is associated with a worsening of the gender wage gap, while increased export intensity (as reflected in the industry

penetration index, and the first difference model) is associated with lower wage gaps between men and women in Egypt over this period.

6.4 Female Employment and Trade Liberalization

The impact of trade liberalization on the gender wage gap might, in general, be less of a social concern if at the same time it opened up wider job opportunities for females who would otherwise have had to resort to informal employment or not work at all. In this case, the prediction of the Hecksher-Olin theory, that the abundant factor gains from trade, might be just taking a few more years to be realized while more and more females (generally lower skill due to shorter labor market experiences as a result of household responsibilities) are being absorbed into the labor market. Eventually these females should see their wages rise as a result of liberalization.

To investigate this issue, in this section I examine the impact of trade liberalization on the share of females in full time employment.[19] If there is a positive association between lower tariffs or higher trade volumes and the share of females in employment then there might in fact be a silver lining for females associated with liberalization, as many might consider some job as better than no job at all. The results are in Table 9. Tariffs exerted a positive and significant effect on the share of females in full time employment over this period. This implies that trade liberalization as embodied in lower tariffs was actually associated with a smaller share of female employees. This result is confirmed if we use alternative measures of trade. The coefficients on import penetration and on trade openness are both negative and significant, indicating that increasing imports as a share of domestic consumption, and overall trade, are associated with lower female employment share.

[Table 9 about here]

Trade may have affected hours of work as well as full time employment. To test this hypothesis, the log of average hours per week of female full time employees was used as the dependent variable, and all independent variables were the same as in the wage and employment regressions. The results are in Table 10. The only trade variable that has a significant impact on female weekly hours is the tariffs

variable. The coefficient on tariffs is positive and significant, indicating that lower tariffs are associated with lower female working hours and vice versa. Using logs reduced the sample size slightly since some industries did not have any female employees and hence their average working hours would have been undefined when using logs. Additionally, Ordinary Least Squares could lead to biased estimates since count data do not satisfy its assumptions, especially normality.

[Table 10 about here]

To avoid this problem, and since the weekly hours data is count data, I also estimated a count data model for the impact of trade liberalization on weekly female working hours. The results are in the Appendix, Table A1. I used the Negative Binomial estimation model, to avoid the strong assumption of equality of the conditional mean and the conditional variance that are required for the Poisson model. The results again point to the detrimental impact of trade liberalization on female working hours. The coefficients on import penetration and the trade openness index are both negative and significant, implying that rising trade volumes are associated with lower female working hours. Taking the coefficient on import penetration as an example, the results imply that the expected change in log count of average female working hours for a one-unit increase in import penetration was –2.202 The coefficient on tariffs is again positive, but only significant at the 11% rate, again implying lower female working hours as tariffs declined.

The share of females in full time employment variable will only capture higher female employment if it comes at the expense of their male counterparts. If employment for both males and females increased in an industry, the share of females could have remained the same, or declined. In that case the negative association between higher trade volume or lower tariffs and share of female employees that was found in the previous section might not reflect the actual employment gains for women as a result of trade liberalization. To test this hypothesis, I used the log of number of female full time employees as the dependent variable, and the results are in Table 11. The coefficients on all trade variables are highly significant and again imply that lower tariffs and higher imports had a detrimental effect on female employment. The main difference that stands out from this table is the coefficient on

export intensity, which is positive and highly significant. This suggests that females did have greater access to job opportunities in the export sector as a result of trade liberalization. To deal with the count data issue mentioned before, Table A2 in Appendix reports the Negative Binomial Estimation results for this model. Similar conclusions can be drawn for all trade variables, however export intensity, although still positive, is no longer significant at conventional levels.[20]

[Table 11 about here]

7. Robustness Checks

The estimation approach followed in this paper implicitly assumes that reductions in industry protection levels and increases in trade volume levels were randomly distributed and exogenous to the inter-industry gender wage gap. This assumption is probably stronger than if I was using industry wage rates rather than the gender wage gaps. Black and Brainard (2004) cite evidence to support this assumption and also suggest a simple test of exogeneity. They argue that if exogeneity does not hold we would expect industries with a higher gender wage gap at the beginning of the period to be more vulnerable to trade, all else equal. I performed a similar test for the relationship between the residual inter-industry gender wage gap in 1998 and the change in tariff levels, import penetration index and export shares over the period 1998 to 2006. The correlation coefficients were -0.19, 0.08 and 0.10, respectively, suggesting little correlation between the residual wage gaps and the trade measures. This test is by no means definitive, and that is why I have used five different measures of trade in this paper, as well as a specification in first differences. All results were consistent, pointing to trade liberalization being associated with a wider gender wage gap, except possibly for the more export oriented industries where results were slightly weaker. In the next sections, I also perform two additional robustness checks that take into consideration the role of skill-biased technological change, and industry concentration ratios, in affecting these results.

7.1 Skill-Biased Technological Change and Gender Wage Inequality

One factor that may affect the results is technological change. Evidence suggests that technological change in many countries has been primarily skill-biased.[21]This has provided one of the most popular explanations in the literature for the observed trend of rising wage inequality in general and especially in racial and gender inequality. Technological changes are believed to have caused a sharp decline in the demand for low-skill workers and hence to have been a major factor in worsening their economic plight. Since women are disproportionately low-skilled, I need to account for skill level in the analysis to ensure that it is not driving the results. There may also be some evidence that more import oriented industries are more skill intensive[22], and hence this could explain the result in the previous section related to the worsening impact of import competition on the gender wage gap.

To test this theory, I constructed several measures of skill intensity: the share of workers with a secondary degree or above, the share of workers with a university degree or above, the ratio of skilled to unskilled, defining skilled as a worker with a secondary degree or above; and also the ratio of skilled to unskilled, defining skilled as a worker with a university degree or above. These measures of skill biased technological change were included in the regression models (interchangeably). The results are in Table 12. The only measure that had a consistently significant coefficient was the share of workers with a secondary degree or above, and I will concentrate on these results here.[23] The skill variable does have a positive and significant impact on the inter-industry gender wage gap as expected. However, including the share of skilled workers variable did not change our main result regarding the impact of trade on the wage gap between men and women. Thus there is some evidence in favor of the skill-biased technological change hypothesis as one of the reasons behind rising gender wage inequality, yet the role of trade in this respect is also very important.

[Table 12 about here]

7.2 Industry Concentration and Gender Wage Inequality

International trade acts as a channel for industry competitiveness. This could have a direct impact on the ability of employers to discriminate between different groups, including men and women. Becker's(1971) theory suggests that trade liberalization should reduce employers ability to engage in discrimination (which is assumed to be costly) since it drives down profit margins. On the other hand, non-neoclassical theory views discrimination as consistent with exposure to a higher degree of industry competitiveness form international trade if women (or other minorities) are segregated into low paying jobs and have low bargaining power. The analysis thus far suggests that there are two opposing forces in the case of Egypt. Women face increased discrimination if they work in industries that face extreme competition from imports, while they seem to fare better overall if they are employed in the more export oriented industries.

To explicitly sort out the relationship between trade, industry concentration, and the gender pay differential, I directly test Becker's theory that discrimination is contrary to higher competitiveness. I use a methodology that conceptually divides observations by industry based on whether that industry was, first, affected by changes in trade policy or volume over the period, and second, whether it was a concentrated industry or competitive industry. This methodology still fully accounts for observable differences in characteristics between men and women, such as education and experience, by using the inter-industry gender wage gaps calculated according to the Horrace and Oaxaca (2001) methodology as above, and will add to that the concentration dimension. In particular I will conceptually estimate the difference in inter-industry gender wage gap between (1) trade affected and non-trade affected concentrated industries, minus that between (2) trade affected and non-trade affected competitive industries[24]:

$$\begin{bmatrix} \text{trade} - \text{affected} \\ \text{concentrated} \end{bmatrix} \_\_ \begin{bmatrix} \text{non - trade affected} \\ \text{concentrated} \end{bmatrix} - \begin{bmatrix} \text{trade} - \text{affected} \\ \text{competitive} \end{bmatrix} \_\_ \begin{bmatrix} \text{non - trade affected} \\ \text{competitive} \end{bmatrix} \quad (9)$$

This allows us to differentiate the impact of trade on the gender wage gap in concentrated industries relative to that in competitive industries after accounting for any factors that have affected the gender

wage gap in manufacturing industries in general, whether they are trade affected or not, and whether they are concentrated or not. This amounts to estimating the following equation:

$$\Delta_t\left(\ln\widehat{w_{mk}} - \ln\widehat{w_{fk}}\right) = \propto + \beta\Delta_t Trade_k + \gamma Conc_k + \varphi(\Delta_t Trade_k * Conc_k) \quad (10)$$

where $\Delta_t\left(\ln\widehat{w_{mk}} - \ln\widehat{w_{fk}}\right)$ is the first difference of the industry specific wage gap, measured as in equation (5); $\Delta_t Trade_k$ is the change in the trade variable as measured by the tariff rate or by the various trade volume measures used in the previous sections, and $Conc_k$ is the initial industry concentration ratio. I use the initial concentration ratio rather than the time varying ratio since trade competition itself might have altered the concentration ratio. Using this specification allows me to address the question of how trade affected gender discrimination across the sample period in industries that were initially concentrated.

There are various ways to measure industry concentration. The two most common measures in the literature are the four-firm concentration ratio and the Herfindahl Index. These measures require data on the output or sales of every firm in each of the 21 manufacturing industries under consideration for both 1998 and 2006. This data was not available and I therefore used a common proxy for concentration that is based on the number of establishments in an industry divided by its output. The measure of industry concentration used in the regressions is constructed as $(1 - \text{no. of establishments/output})$. A smaller number of establishments implies that the industry was more concentrated, and will thus give rise to a higher value of the index.

Data on number of establishments and total output by industry were obtained from the Annual Survey of Establishments published by CAPMAS. Table 13 shows the concentration ratios by industry over the period. Ranking the industries from more to less concentrated according to the value of the concentration ratio (in 1997), the coke and petroleum industry is the most concentrated (this is also true for 2005), followed closely by the office equipment and computer manufacturing industry, the motorized vehicle manufacturing industry and the tobacco industry. [25]

[Table 13 about here]

Results of estimating the model accounting for industry concentration as in equation (10) are in Table 14. The main coefficient of interest is that on the interaction term Conc. X Change in Trade, combined with the coefficient on the change in trade variable. These were only significant in models (3) and (4) where trade is measured by export share and the trade openness index, respectively. In model (3), the negative and significant coefficient on the change in trade variable indicates that the more competitive industries that managed to raise their export shares the most over the period also lowered their gender wage gaps the most (this is similar to the conclusion from Table 8 above). At the same time, those export oriented industries that were more concentrated saw their gender wage gaps rise. This implies that greater production for export in general has a beneficial impact on the relative wages of women in manufacturing, however, in the more concentrated of these export oriented industries women faced relatively higher pay discrimination (in other words women in concentrated industries gained less from export orientation than their counterparts in the more competitive industries).

[Table 14 about here]

In model (4), where trade is measured by the trade openness index, the coefficient on the change in trade openness is positive and significant indicating that higher trade volume worsened the wage gap between men and women. The negative and significant coefficient on the interaction term suggests that higher trade volume raised the industry gender wage gap by less in the more concentrated industries than in competitive industries that were also affected by trade. Thus, increased trade volume in general worsens the gender wage gap, but it does so by *less* in the more concentrated industries.[26] I continued to control for the share of workers in the private sector in all specifications as it proved to be highly significant.

The analysis in this section has attempted to directly test Becker's theory of the impact of international trade on discrimination by testing the relationship between the change in industry gender pay gap and the change in trade, after explicitly accounting for the industry concentration ratio. The results

seem to be consistent with Becker's theory when it comes to total trade volume. Greater trade volume in general, in the more concentrated industries has a beneficial impact on the relative pay for women, as employer's ability to discriminate declines with greater international competition. This finding is consistent with that of Black and Brainard (2004) for the USA, who also find that increasing import competition lowered gender pay gaps. However, the opposite conclusion arises for the export oriented sectors. Even though there is evidence that the higher the change in export share the lower the gender wage gap for all industries, employers with more market power in the domestically more concentrated export oriented industries actually forced worse conditions on female workers. These female workers likely have lower skills and experience, and hence bargaining power, and may just be happy that they are able to secure a job at all. In attempting to cut costs to alleviate pressure from international competition in export markets, employers in the more concentrated exporting industries have resorted to favoring male over female workers. This finding is consistent with the theoretical model of Menon and Rodgers (2009) and their empirical findings for India. [27]

8. Conclusion and Policy Implications

This study used two nationally representative labor market sample surveys to investigate the size of the gender pay gap in Egypt during a period of intense economic reforms, structural adjustment and trade liberalization. Additionally, the study used data that directly captures changes in trade policy and trade volumes, to investigate how the gender wage gap and how female employment were affected by trade liberalization.

The decomposition of the gender wage gap showed that most of the gap in the manufacturing sector was due to the 'unexplained' component, especially in 2006. Using the methodology suggested by Horrace and Oaxaca (2001) to compute industry specific gender wage gaps, I investigated the relationship between trade measures and these wage gaps. Increased trade liberalization, as measured directly by import penetration, trade openness and industry penetration, were associated with higher gender pay gaps in the manufacturing sector. In the differenced model, there is also evidence that industries that witnessed

the greatest increase in their export shares saw their gender wage gaps decline more. These results are robust to the inclusion of variables that capture the public-private distinction, and the occupational distinction, as well as investigations that account for the extent of skill-biased technological change over this period and industry concentration levels.

Lower tariffs and higher trade volumes were also associated with lower female employment, whether it was measured by the female share in full time employment, by average weekly hours of female full time employment or by the number of female full time workers. When the latter is used as the measure of female employment, there is some evidence of a positive and significant impact of export intensity on female employment.

This study has found that increasing trade liberalization has largely had a negative impact on women's relative wages and on their employment, except for some weak evidence supporting a favorable impact of increasing export intensity. It appears that where profits were falling as a result of severe competition from imports, employers chose to cut costs by favoring males over females, both with regard to wages and to employment. Industries that were able to successfully compete internationally by raising their exports, however, were more likely to pass these higher gains onto their workers, including females, and to expand their hiring of female workers, to meet higher product demand.

A number of important policy recommendations emerge from this investigation. Since women seem to be bearing a disproportionately large share of the negative impacts of trade liberalization on wages and employment, policies that directly raise women's human capital, skills and improve the social safety net could mitigate the female disadvantage in the labor market. However, as the decomposition analysis has shown the majority of this disadvantage is due to discrimination in the labor market not to lower education levels or less experience. In fact, women's average educational attainment is very close to that of males. The issue here is largely a quality issue rather than quantity and improvements in the education system that raise the quality of graduates and their job-related skills should improve the conditions of all workers, including females. Policies to encourage firms to provide on the job training for

females as well as males should also go a long way in raising the skill level and employability of female workers. Additionally, stronger enforcement of Egypt's Unified Labor Law passed in 2003, which prohibits wage discrimination based on gender, is warranted. Some have even called for stronger versions of anti-discrimination legislation, such as an equal pay act, which also prohibits discrimination at entry points into the labor market, in job titles and ranks, and in pay scales, and where the judicial system is the main enforcer of any complaints in this regard.

The analysis also suggests the need for a broader social effort to change society's view of female workers as less dependable given their household/child rearing duties and to encourage females themselves to stop reinforcing this image by seeking higher paying jobs and demanding to be treated equally. Improved social-safety nets that provide good quality affordable child-care services for young children as well as after school services for school age children could help ease the double burden faced by the majority of women in Egypt, and help free up their time and minds for pursuing careers earlier and with higher dedication without having to sacrifice their family's well-being.

Finally, another important policy recommendation that emerges from this analysis points to the importance of policies that encourage and support exporting. Results in this paper have pointed to a weak positive influence of export intensity on relative wages and employment of females. This suggests the need for better policies that help promote Egyptian exports overseas. Policies such as production subsidies, tax exceptions and special credit lines, as well as government provision of trade facilitation services and help with marketing of products overseas, especially for small and medium enterprises that lack the knowledge and networking of the large multinational corporations, could go a long way in easing the impact of liberalization on gender discrimination and on the labor market as a whole.

The persistent inequality between males and females in the Egyptian labor market at the turn of the new millennium is disturbing from a social equity viewpoint, but is also inefficient economically. It prevents the equalization of marginal rates of substitution in production, and hence lowers output both directly, due to women working fewer hours, and indirectly due to an increase in fertility. Cavalcanti and Tavares (2007) found that gender discrimination explains about 65% of the difference in output per capita

between Egypt and the US. Policies that advocate a more equitable wage structure and programs that make females more desirable employees are of the utmost importance for a move towards the goal of shared economic growth and greater social justice in post-revolutionary Egypt.

References

Aguayo-Tellez, Ernesto, Jim Airola, and Chinhui Juhn. 2010 "Did Trade Liberalization Help Women? The Case of Mexico in the 1990s." NBER Working Paper No. 16195, July.

Angrist, Joshua D., and Alan B. Krueger. 1999. "Empirical Strategies in Labor Economics." In Orley C. Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3A., pp. 1277- 1366. Amsterdam: Elsevier.

Artecona, Raquel, and Wendy Cunningham. 2002. "Effects of Trade Liberalization on the Gender Gap in Mexico," Policy Research Report on Gender and Development, Working Paper 21, World Bank, Washington D.C.

Attanasio, Orazio, Penelopi Goldberg, and Nina Pavcnik. 2004. "Trade Reforms and Wage Inequality in Colombia." *Journal of Development Economics,* Vol.74, No.2, pp. 331–66.

Becker, Gary (1971). *The Economics of Discrimination.* Chicago: University of Chicago Press.

Berik, Gunseli, Yana Rodgers, and Joseph Zveglich. 2004. "International Trade and Gender Wage Discrimination: Evidence from East Asia." *Review of Development Economics,* Vol. 8, No. 2, pp. 237-254.

Berman. Eli, John Bound and Stephen Machin. 1998. "Implications Of Skill-Biased Technological Change: International Evidence." *The Quarterly Journal of Economics*, Vol. 113, No.4, pp. 1245-1279.

Black, Sandra E., and Elizabeth Brainerd. 2004, "Importing Equality? The Impact of Globalization on Gender Discrimination." *Industrial and Labor Relations Review*, Vol.57, No.4, pp. 540-559.

Blinder, Alan S. 1973. "Wage Discrimination: Reduced Form and Structural Elements." *Journal of Human Resources*, Vol. 8, No. 4, pp. 436-55.

Bound, John, et al. 1994. "Evidence on the Validity of Cross-Sectional and Longitudinal Labor Market Data." *Journal of Labor Economics*, Vol. 12, No. 3, pp. 345-68.

Cagatay, Nilufer. 2005. "Gender Inequalities and International Trade: A Theoretical Reconsideration." Centro Interdisciplinario de Estudios sobre el Desarrollo Working Paper No. 136.

Cagatay, Nilufer, and Gunseli Berik. 1990. "Transition to Export-led Growth in Turkey: Is There Feminization of Employment?" *Review of Radical Political Economics,* Vol.22, No. 1, pp.115-134.

Cavalcanti, Tiago, and Jose Tavares. 2007. "The Output Cost of Gender Discrimination: A Model-Based Macroeconomic Estimate." CEPR Working Paper DP6477.

Currie, Janet, and Ann Harrison. 1997. "Sharing the Costs: The Impact of Trade Reform on Capital and Labor in Morocco." *Journal of Labor Economics* Vol.15, No.3, pp.S44–S71.

Darity, William, and Rhonda Williams. 1985. "Peddlers Forever? Culture, Competition, and Discrimination." *American Economic Review,* Vol.75, No.2, pp. 256-261.

Dollar, David and Aart Kraay. 2002. "Trade is Good for the Poor." *Journal of Economic Growth*, Vol. 7, No. 3, pp. 195-225.

Economist. June 23rd 2011. "Egypt's Economy: Light, dark and muddle." *The Economist*. Retrieved from http://www.economist.com/node/18864693.

Edmonds, Eric, Nina Pavcnik, and Petia Topalova. 2005. "Trade Liberalization, Child Labor, and Schooling: Evidence from India." Unpublished paper, Dartmouth University.

El-Hamidi, Fatma. 2008. "Trade Liberalization, Gender Segmentation, and Wage Discrimination: Evidence from Egypt." Economic Research Forum Working Paper No. 414.

El-Hamidi, Fatma and Mona Said. 2008. "Have Economic Reforms Paid Off? Gender Occupational Inequality in the New Millennium in Egypt". Egyptian Center for Economic Studies Working Paper No. 128.

Fields, Judith, and Edward N.Wolff. 1995. "Interindustry Wage Differentials and the Gender Wage Gap." *Industrial and Labor Relations Review*, Vol. 49, No.1: pp.105-20.

Feliciano, Zadia M. 2001. "Workers and Trade Liberalization: The Impact of Trade Reforms in Mexico on Wages and Employment." *Industrial and Labor Relations Review*, Vol.55, No.1, pp 95-115.

Frankel, Jeffrey A. and David Romer. 1999. "Does Trade Cause Growth?" *The American Economic Review* Vol. 89, No. 3, pp. 379-399.

Gaston, Noel and Daniel Trefler. 1994. "Protection, Trade, and Wages: Evidence from U.S. Manufacturing," *Industrial and Labor Relations Review,* Vol. 47, No. 4, pp. 574–93.

Goldberg, Penelopi, and Nina Pavcnik. 2003. "The Response of the Informal Sector to Trade Liberalization." *Journal of Development Economics* Vol. 72, pp. 463–96.

Goldberg, Penelopi, and Nina Pavcnik. 2005. "Trade, Wages, and the Political Economy of Trade Protection: Evidence from the Colombian Trade Reforms." *Journal of International Economics* Vol. 66, pp. 75–105.

Hanson, Gordon and Ann Harrison. 1999 "Trade Liberalization and Wage Inequality in Mexico*" Industrial and Labor Relations Review,* Vol. 52, No. 2, pp. 271-287.

Heckman, James. 1979. "Sample Selection Bias as a Specification Error." *Econometrica*, Vol. 47, pp.153-161.

Horrace, William C., and Ronald L. Oaxaca. 2001. "Inter-industry Wage Differentials and the Gender Wage Gap: An Identification Problem." *Industrial and Labor Relations Review* Vol. 54, No. 3,pp. 611-618.

Institute for Women's Policy Research (IWPR). 2010, "Factsheet: The Gender Wage Gap: 2009." Retrieved from http://www.iwpr.org/pdf/C350.pdf

International Trade Union Confederation (ITUC). 2008. "The Global Gender Pay Gap." Retrieved from http://www.ituc-csi.org/IMG/pdf/gap-1.pdf

Joekes, Susan, and Ann Weston. 1994. *Women and the New Trade Agenda.* New York: UNIFEM.

Kletzer, Lori (2001). *Job Loss from imports: Measuring the Costs*. Washington, D.C.: Institute for International Economics.

Kongar, Ebru. 2005. "Importing Equality or Exporting Jobs?: Competition and Gender Wage and Employment Differentials in U.S. Manufacturing." Department of Economics, University of Utah Working Paper No. 2005-13.

Kraay, Aart. 2006, "When is Growth Pro-poor? Evidence from a Panel of Countries." *Journal of Development Economics*, Vol. 80, No.1, pp. 198-227.

Kucera, David. 2001. "Foreign Trade of Manufactures and Men and Women's Employment and Earnings in Germany and Japan." *International Review of Applied Economics* Vol.15, No. 2, pp. 129-49.

Lopez-Claros, Augusto, and Saadia Zahidi (2005). "Women's Empowerment: Measuring the Global Gender Gap" Geneva, Switzerland: World Economic Forum.

Menon, Nidhiya and Rodgers, Yana. 2009. "International Trade and the Gender Wage Gap: New Evidence from India's Manufacturing Sector." *World Development* Vol. 37, No. 5, pp. 965-981.

Meyer, Lisa. 2007. "International Trade Liberalization and Gender Wage Inequality: A Cross-National Analysis 1975–1998" Women and International Development, Center for Gender in Global Context Working Paper No. 289.

Minot, Nicholas, Mohamed Chemingui, Marcelle Thomas, Reno Dewina, and David Orden. 2010. "Trade Liberalization and Poverty in the Middle East and North Africa" IFPRI Research Monograph.

Nordman, Christophe J., and François-Charles Wolff. 2010. "Gender Differences in Pay in African Manufacturing Firms." In Jorge Saba Arbache, Alexandre Kolev, and Ewa Filipiak, eds. *Gender Disparities in Africa's Labor Market,* pp.155-192. Washington D.C.: World Bank.

Oostendorp, Remco H. 2004. "Globalization and the Gender Wage Gap," Policy Research Working Paper 3256, Washington, D.C.: World Bank,

Oaxaca, Ronald. 1973. "Male-female wage differentials in urban labor markets." *International Economic Review,* Vol.14, No. 3, pp. 693-709.

Ozler, Sule. 2000. "Export Orientation and Female Share of Employment: Evidence from Turkey." *World Development* Vol. 28, No.7, pp 1239-48.

Refaat, Amal. 2003. "Trade-Induced Protectionism in Egypt's Manufacturing Sector." The Egyptian Center for Economic Studies Working Paper No. 85.

Reilly, Barry and Puja Vasudeva Dutta. 2005. "The Gender Pay Gap and Trade Liberalization: Evidence for India," PRUS Working Paper No. 32.

Revenga, Ana. 1992. "Exporting jobs? The impact of import competition on employment and wages in U.S. manufacturing." *Quarterly Journal of Economics,* Vol. 107, No. 1, pp. 255–84.

Revenga, Ana. 1997. "Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing." *Journal of Labor Economics*, Vol.15, No.3, pp. S20-S43.

Rodríguez, Francisco, and Danny Rodrik. 2000. "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence." In. B. Bernanke and Kenneth Rogoff, eds, *NBER Macroeconomics Annual 2000.* Vol. 15, pp. 261-338. Cambridge, MA: National Bureau of Economic Research, 2001.

Topalova, Petia. 2005. "Trade Liberalization, Poverty and Inequality: Evidence from Indian Districts." NBER Working Paper No. 11614.

Violante, Giovanni L. 2008. "Skill-biased technical change." In Steven N. Durlauf and Lawrence E. Blume, eds, *The New Palgrave Dictionary of Economics*. Second Edition. Palgrave Macmillan.

Williams, Rhonda. (1987). "Capital, Competition, and Discrimination: A Reconsideration of Racial Earnings Inequality." *Review of Radical Political Economics,* Vol. 19, No.2, pp. 1-15.

Wood, Adrian. 1991. "North-South Trade and Female Labour in Manufacturing: An Asymmetry." *The Journal of Development Studies* Vol. 27, No. 2, pp. 168-89.

_____. 1994. *North-South Trade, Employment, and Inequality.* Oxford: Oxford University Press.

World Bank. 2005. *Economic Development and Prospects: Oil Booms and Revenue Management*. Washington, DC: World Bank.

World Bank . 2007. Arab Republic of Egypt: A Poverty Assessment Update. Report No. 39885-EGT.

World Trade Organization. 1999. Trade Policy Review: Egypt. Report by the WTO Secretariat, Document WT/TPR/S/55.

World Trade Organization. 2005. Trade Policy Review: Egypt. Report by the WTO Secretariat, Document WT/TPR/G/150.

Table 1: Labor Force Dynamics and Gender Statistics, 1980 to 2006.

Variable	1980	1985	1990	1995	1998	2000	2005	2006
Labor Force (millions)	13.2	14.8	16.8	19.1	20.5	21.7	24.7	25.4
Female Labor Force (millions)	3.7	4.1	4.5	4.8	5.1	5.3	5.9	6.0
Labor force participation rate (% of population ages 15-64)								
Female	30	29	28	26	26	25	24	24
Male	76	76	77	77	77	77	77	77
Share of women employed in the nonagricultural sector (% of total nonagricultural employment)	..	..	21	19	20	19	18	18
Unemployment by sex and age (%)								
Female	19	..	18	24	20	23	25	24
Male	4	..	5	8	5	5	7	7
Total	5	..	9	11	8	9	11	11
Female, youth (ages 15 to 24)	..	..	..	..	43	..	62	..
Male, youth (ages 15 to 24)	..	..	..	..	16	..	23	..
Wage and Salary workers (% of those employed)								
Female	..	..	..	53	61	57	51	54
Male	..	..	..	58	60	61	62	64

Source: World Bank Databank, databank.worldbank.org

Table 2: Summary Statistics, Manufacturing Sector Wage Workers (2006 prices)

Variable	1998			2006		
	Males	Females	Total	Males	Females	Total
Median Real Hourly Wage	1.78	1.37	1.78	2.08	1.04	1.98
Individual Characteristics(means)						
Age	33.96	31.92	33.77	33.37	27.95	32.69
Married	0.61	0.45	0.60	0.66	0.31	0.61
Number of children under 6	0.44	0.33	0.43	0.49	0.25	0.46
Number of children 6 to 14	0.87	0.85	0.87	0.46	0.61	0.48
Household Size	5.99	5.33	5.93	4.94	5.19	4.97
Work Experience	17.68	12.47	17.18	16.47	8.93	15.54
Education (share of workers)						
Illiterate	0.16	0.16	0.16	0.15	0.14	0.15
Read and Write	0.17	0.02	0.15	0.07	0.06	0.07
Primary Degree	0.17	0.20	0.17	0.14	0.10	0.13
Preparatory Degree	0.08	0.08	0.08	0.08	0.04	0.07
General Secondary Degree	0.01	0.01	0.01	0.01	0.01	0.01
Vocational Secondary Degree	0.28	0.35	0.29	0.38	0.45	0.39
Post Secondary Degree	0.05	0.07	0.05	0.06	0.04	0.06
University Degree and Above	0.08	0.12	0.08	0.12	0.15	0.13
Region of Residence (share of workers)						
Greater Cairo	0.27	0.44	0.29	0.28	0.32	0.28
Alexandria	0.12	0.16	0.13	0.13	0.23	0.14
Rural Upper Egypt	0.16	0.07	0.15	0.14	0.05	0.13
Urban Upper Egypt	0.05	0.03	0.04	0.04	0.02	0.04
Rural Lower Egypt	0.28	0.16	0.27	0.28	0.27	0.28
Urban Lower Egypt	0.12	0.15	0.12	0.13	0.11	0.13
Sector (share of workers)						
Public and Government	0.35	0.42	0.35	0.25	0.21	0.24
Private	0.65	0.58	0.65	0.75	0.79	0.76
Observations						
Number of Observations	758	86	844	1049	150	1199
% of Workers	90.49	9.51		87.61	12.39	

Notes: Author's calculations based on data in ELMS 1998 and ELMPS 2006.

Table 3: Distribution of Females by Industry, Share of Workers who are Female in Each Industry and the Wage Gap, Manufacturing Sector Wage Workers

	Industry Share of Total Female Employment		Share of Workers in Industry who are Female		Wage Gap (Male Wage/Female Wage)	
Industry	1998	2006	1998	2006	1998	2006
Food and Beverages	23.57	20	12.64	13.29	1.51	1.46
Tobacco	3.49	0.52	30.87	8.49	2.43	0.41
Textiles	10.91	14.84	8.25	16.54	1.58	1.79
Garments	23.41	37.81	29.47	47.45	2.5	2
Leather Goods	0	2.86	0	17.93	--	1.6
Wood Products (exc. Furniture)	1.77	0.65	3.17	2.63	1.71	1.97
Paper	0	0.98	0	6.36	--	3.56
Publishing and Printing	4.48	1.76	13.55	6.42	0.54	0.41
Coke and Petroleum Prod.	8.83	3.99	10.91	11.47	1.69	0.39
Chemical Prod.	1	9.25	3.1	15.16	0.5	2.89
Rubber Prod.	0	0	0	0	--	--
Non-metallic Mineral	0	1.58	0	2.16	--	2.67
Basic Metal	0	0.48	0	2.51	--	0.79
Metallic Prod. (exc. mach.&\ equip.)	0	0	0	0	--	--
Mach. and Equip.	10.21	1.18	18.5	3.03	0.62	0.7
Office Equip. and Computer	1.08	1.39	4.18	25.06	1.17	0.65
Electrical Equip. (Others)	9.67	0.68	64.22	10.94	0.42	0.89
Radio, TV and Com. Equip.	1.08	1.71	24.11	47.4	2.92	2.48
Medical Equip.	0	0	0	0	--	--
Motorized Vehicle	0.51	0.31	3.71	7.38	0.79	0.34
Other Transport Equip.	0	0	0	0	--	--
Total	100%	100%	9.51%	12.39%	1.3	1.99

Notes: Author's calculations based on data in ELMS 1998 and ELMPS 2006.

Table 4: Measures of Trade Reform in Egypt 1997-2005

	1997			2005			Change 1997-2005		
Industry	Weighted Average Tariff	Import Penetration	Export Intensity	Weighted Average Tariff	Import Penetration	Export Intensity	Weighted Average Tariff	Import Penetration	Export Intensity
Food and Beverages	21.89	24.74	3.23	12.62	25.02	11.48	-9.27	0.28	8.25
Tobacco	19.92	5.44	0.01	21.72	3.96	0.04	1.8	-1.48	0.04
Textiles	24.03	12.26	27.81	13.87	10.54	19.74	-10.16	-1.72	-8.07
Garments	39.71	1.03	20.44	37.00	2.76	19.96	-2.71	1.73	-0.48
Leather Goods	37.15	16.41	27.39	30.76	33.19	26.18	-6.39	16.79	-1.20
Wood Products (exc.Furniture)	11.1	90.15	4.98	5.85	92.40	9.27	-5.25	2.25	4.28
Paper	16.94	50.69	2.22	5.11	34.63	6.53	-11.83	-16.06	4.31
Publishing and Printing	8.94	5.79	1.56	7.62	17.15	2.59	-1.32	11.36	1.03
Coke and Petroleum Prod.	16.3	1.72	1.31	2.52	33.03	49.25	-13.78	31.31	47.94
Chemical Prod.	11.02	40.10	8.86	9.44	47.41	16.14	-1.58	7.31	7.28
Rubber Prod.	26.49	38.38	10.76	11.46	31.44	8.58	-15.03	-6.94	-2.19
Non-metallic Mineral	19.11	13.15	7.72	15.93	9.45	22.05	-3.18	-3.70	14.32
Basic Metal	10.64	43.95	14.98	3.03	27.34	15.55	-7.61	-16.62	0.57
Metallic Prod. (exc. mach.& equip.)	23.36	34.08	8.31	13.48	41.16	24.58	-9.88	7.08	16.27
Mach. and Equip. (Others)	10.48	62.74	1.19	7.81	58.34	4.69	-2.67	-4.40	3.49
Office Equip. and Computer	4.73	77.64	0.37	0.22	95.27	7.53	-4.51	17.63	7.53
Electrical Equip. (Others)	18.36	43.37	1.40	8.20	39.28	5.02	-10.16	-4.09	3.62
Radio, TV and Com. Equip.	8.32	59.47	0.37	1.30	60.87	3.00	-7.02	1.40	2.63
Medical Equip.	7.67	80.43	1.97	4.98	81.02	3.48	-2.69	0.59	1.51
Motorized Vehicle	39.8	43.15	3.11	23.38	59.43	6.16	-16.42	16.28	3.05
Other Transport Equip.	12.28	36.04	0.28	13.55	40.12	5.96	1.27	4.08	5.68
Furniture	20.91	57.66	37.57	20.47	74.99	48.41	-0.44	17.33	10.84
Average	18.60	38.11	8.45	12.29	41.76	14.37	-6.31	3.65	5.94

Source: Constructed by author as explained in the text.

Table 5: Estimates of Male and Female Wage Equations, Heckman Two Step estimates with correction for selection bias

	1998				2006			
	Males		Females		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent Variables	Log Real Hourly Wage	Participation	Log Real Hourly Wage	Participation	Log Real Hourly Wage	Participation	Log Real Hourly Wage	Participation
Experience	0.053***		0.059***		0.050***		0.075***	
	(0.003)		(0.006)		(0.003)		(0.009)	
Experience Squared	-0.001***		-0.001***		-0.001***		-0.001***	
	(0.000)		(0.000)		(0.000)		(0.000)	
Public or Govt.	-0.112***		-0.027		0.075***		0.257***	
	(0.028)		(0.061)		(0.028)		(0.071)	
Read &Write	0.096***	0.115	0.056	0.122	0.076*	0.183	-0.432**	0.482
	(0.036)	(0.061	(0.146)	(0.127	(0.040)	(0.055	(0.194)	(0.109
Primary	0.216***	0.251	0.201	0.435	0.115***	0.329	0.164	0.527
	(0.035)	(0.057	(0.130)	(0.107	(0.036)	(0.047	(0.169)	(0.091
Preparatory	0.183***	-	0.313**	0.476	0.160***	-0.058	0.367*	0.528
	(0.044)	(0.061	(0.143)	(0.120	(0.044)	(0.053	(0.197)	(0.107
General Secondary	0.598***	-	0.973***	0.414	0.291***	-	0.549**	0.504
	(0.085)	0.896 (0.089	(0.175)	*** (0.151	(0.103)	0.889 (0.087	(0.274)	*** (0.138
Vocational	0.439***	0.316	0.640***	1.711	0.319***	0.372	0.501***	1.592
	(0.036)	(0.051	(0.131)	(0.072	(0.033)	(0.038	(0.147)	(0.059
Post Secondary	0.612***	0.392	0.882***	2.201	0.539***	0.508	0.650***	1.877
	(0.048)	(0.079	(0.155)	(0.095	(0.049)	(0.067	(0.169)	(0.081
Univ. & above	0.928***	0.501	1.154***	2.325	0.828***	0.531	0.774***	2.187
	(0.041)	(0.060	(0.160)	(0.081	(0.042)	(0.045	(0.177)	(0.064
Alexandria	0.033		-0.164***		-0.019		-0.170**	
	(0.032)		(0.054)		(0.032)		(0.072)	
Rural upper Egypt	-0.163***		-0.127		-0.191***		-0.019	
	(0.034)		(0.086)		(0.030)		(0.105)	
Urban upper Egypt	-0.089***		-0.153***		-0.143***		-0.062	
	(0.030)		(0.048)		(0.030)		(0.068)	
Rural lower Egypt	-0.100***		-0.201***		-0.191***		0.181**	
	(0.030)		(0.060)		(0.028)		(0.071)	
Urban lower Egypt	-0.071**		-0.108**		-0.118***		-0.184***	
	(0.031)		(0.050)		(0.032)		(0.070)	
Mining and Quarrying	0.143				0.613***			
	(0.126)				(0.125)			
Food and Beverages	-0.003		0.246		-0.008		0.432**	
	(0.057)		(0.162)		(0.055)		(0.206)	
Tobacco	-0.078		0.146		-0.018		0.653	

	(0.180)	(0.377)	(0.248)	(0.883)
Textiles	0.003	0.319*	-0.086	0.061
	(0.066)	(0.179)	(0.072)	(0.225)
Garments	-0.097	0.170	-0.067	0.278
	(0.093)	(0.147)	(0.085)	(0.174)
Leather Goods	0.111		-0.203	0.283
	(0.120)		(0.145)	(0.367)
Wood Products (exc. Furniture)	0.130	0.279	0.087	0.443
	(0.088)	(0.516)	(0.120)	(0.848)
Paper	-0.130		-0.068	1.501**
	(0.190)		(0.156)	(0.612)
Publishing and Printing	0.106	1.520***	0.007	0.556
	(0.116)	(0.277)	(0.114)	(0.502)
Coke and Petroleum	0.458***	0.362*	0.589***	1.475***
	(0.079)	(0.204)	(0.102)	(0.368)
Chemical Prod.	0.250**	0.580	0.079	-0.183
	(0.107)	(0.514)	(0.082)	(0.270)
Rubber Prod.	-0.096		-0.147	
	(0.269)		(0.189)	
Non-metallic Minerals	0.177**		0.049	0.419
	(0.078)		(0.071)	(0.605)
Basic Metal	0.280***		0.419***	0.158
	(0.106)		(0.129)	(0.843)
Metallic Prod. (exc. mach. & equip.)	-0.014		0.004	
	(0.082)		(0.079)	
Mach. and Equip.	0.080	0.447**	0.012	-0.145
	(0.094)	(0.223)	(0.096)	(0.604)
Office Equip. and Computer	1.232**			
	(0.530)			
Electrical Equip.	0.165	0.003	-0.104	0.103
	(0.137)	(0.521)	(0.291)	(0.605)
Radio, TV and Com. Equip.	-0.069	0.460*	0.209	-0.233
	(0.240)	(0.278)	(0.218)	(0.844)
Medical Equip.	0.307	0.082	0.144	0.173
	(0.267)	(0.518)	(0.376)	(0.608)
Motorized Vehicles	0.214		0.058	
	(0.172)		(0.183)	
Other Transport Equip.	0.143	0.793	-0.056	0.556
	(0.147)	(0.521)	(0.267)	(0.847)
Furniture	0.297***		0.240***	

	(0.066)				(0.063)			
Other Manufacturing	0.056							
	(0.239)							
Electricity/Gas/Water	0.112		0.685***		0.169**		0.886***	
	(0.076)		(0.196)		(0.072)		(0.262)	
Construction	0.244***		0.471**		0.241***		0.986***	
	(0.042)		(0.205)		(0.038)		(0.299)	
Wholesale& Retail Trade	-0.036		0.038		-0.130***		-0.067	
	(0.046)		(0.130)		(0.040)		(0.160)	
Hotels and Restaurants	0.054		0.064		0.004		0.508	
	(0.065)		(0.313)		(0.052)		(0.345)	
Transp., Storage &Comm.	0.187***		0.321**		0.195***		0.548***	
	(0.044)		(0.152)		(0.040)		(0.185)	
Finance/ Real Estate	0.148**		0.493***		0.324***		0.471***	
	(0.069)		(0.135)		(0.058)		(0.169)	
Public Admin. & Defense	-0.106**		0.214*		-0.122***		0.276*	
	(0.045)		(0.119)		(0.044)		(0.150)	
Education	-0.023		0.267**		-0.040		0.256*	
	(0.048)		(0.115)		(0.046)		(0.144)	
Health	-0.127*		0.151		-0.147**		0.254*	
	(0.068)		(0.119)		(0.063)		(0.148)	
Other Services	-0.112**		0.482***		-0.431***		0.534***	
	(0.047)		(0.135)		(0.052)		(0.187)	
Age		0.179		0.200		0.191		0.218
		(0.009		(0.014		(0.007		(0.011
Age squared		-		-		-		-
		0.002		0.002		0.002		0.002
		(0.000		(0.000		(0.000		(0.000
Married		0.245		-		0.270		-
		***		0.503		***		0.546
		(0.057		(0.061		(0.042		(0.045
No. of children		0.041		-0.025		-		-
		(0.024		(0.034		(0.019		(0.028
Household Size		-		-		-		-
		(0.006		(0.010		(0.005		(0.008
lambda	0.162***		0.189**		0.133***		0.047	
	(0.050)		(0.080)		(0.050)		(0.083)	
Constant	-0.751***	-	-1.479***	-	-0.104	-	-0.932***	-
	(0.080)	(0.160	(0.242)	(0.268	(0.081)	(0.128	(0.279)	(0.195

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Decomposition of the Gender Wage Gaps for the Manufacturing Sector

	1998		2006	
Description	(1) Differential	(2) Decomposition	(3) Differential	(4) Decomposition
Actual mean male log wage	.293		.763	
	(.65)		(.73)	
Actual mean female log wage	.01		.393	
	(.87)		(.99)	
Raw Difference	0.283		0.37	
Prediction of male log wage	0.297***		0.792***	
	(0.028)		(0.027)	
Prediction of female log wage	0.331*		-0.131	
	(0.172)		(0.211)	
Difference	-0.034		0.923***	
	(0.174)		(0.212)	
Explained		0.129*		0.209***
		(0.067)		(0.054)
Unexplained		-0.163		0.715***
		(0.167)		(0.211)
Observations	577	577	950	950

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Effect of Trade Liberalization on the Inter Industry Gender Wage Gap

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	-1.130	0.763**	-0.673	0.033***	0.569**
	(0.919)	(0.275)	(0.588)	(0.010)	(0.204)
Share of private sector workers	1.049**	0.974***	0.987***	1.036**	0.960***
	(0.349)	(0.290)	(0.324)	(0.363)	(0.307)
Blue Collar/ White Collar	-0.015	-0.024**	-0.017	-0.026*	-0.021
	(0.012)	(0.011)	(0.014)	(0.014)	(0.012)
2006	0.844***	0.834***	0.931***	0.828***	0.879***
	(0.161)	(0.146)	(0.127)	(0.157)	(0.139)
Constant	-0.522***	-0.913***	-0.618***	-0.702***	-0.811***
	(0.142)	(0.177)	(0.120)	(0.105)	(0.154)
Observations	28	28	28	28	28
R-squared	0.607	0.704	0.596	0.622	0.689

Notes: The dependent variable for all models is the residual inter industry gender wage gap. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Share of private sector workers reflects the share of workers in the industry who work in private sector companies; Blue Collar/White collar is the ratio of blue collar to white collar workers in the industry; 2006 is a dummy variable for the year 2006. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table 8: Effect of Trade Liberalization on the Inter Industry Gender Wage Gap: First Differences

Independent Variables	(1)	(2)	(3)	(4)	(5)
Change in Trade	3.486	-1.086	-1.415***	-0.010	1.578**
	(2.249)	(1.135)	(0.407)	(0.033)	(0.723)
Change in share of private sector workers	1.635***	1.498***	1.534***	1.522***	1.690***
	(0.233)	(0.247)	(0.232)	(0.493)	(0.283)
Change in Blue Collar/ White Collar Ratio	-0.011	-0.010	-0.010	-0.012	-0.009
	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Constant	1.132***	1.002***	1.040***	0.963***	0.978***
	(0.175)	(0.141)	(0.149)	(0.151)	(0.137)
Observations	14	14	14	14	14
R-squared	0.711	0.678	0.722	0.661	0.722

Notes: The dependent variable for all models is the change in the residual inter industry gender wage gap. In Model (1)change in trade is the change in tariff level; in Model(2) change in trade is the change in import share of domestic consumption M/(Q+M-X); in Model (3) change in trade is the change in export share of domestic output X/Q; in Model(4) change in trade is the change in trade openness index (M+X)/Q; in Model (5) change in trade is the change in industry penetration index (M-X)/(Q+M-X). The change in share of private sector workers reflects the difference between 2006 and 1998 in the share of workers in the industry who worked in private sector companies; the change in Blue Collar/White collar ratio is the difference between 2006 and 1998 in the ratio of blue collar to white collar workers. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table 9: Effect of Trade Liberalization on the Female Share of Full Time Employment

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	0.914***	-0.191*	0.178	-0.018**	-0.148
	(0.226)	(0.101)	(0.292)	(0.007)	(0.086)
Share of private sector workers	0.002	0.024	0.028	-0.048	0.025
	(0.051)	(0.078)	(0.090)	(0.073)	(0.073)
Blue Collar/ White Collar	-0.001	0.002	0.001	0.003	0.002
	(0.001)	(0.003)	(0.004)	(0.004)	(0.003)
Unionization Rate	0.084	-0.020	0.009	-0.212	-0.033
	(0.122)	(0.159)	(0.196)	(0.206)	(0.170)
2006	0.066	0.046	0.020	0.066	0.035
	(0.046)	(0.046)	(0.045)	(0.048)	(0.045)
Constant	-0.041	0.175**	0.088	0.218**	0.157*
	(0.069)	(0.076)	(0.096)	(0.086)	(0.077)
Observations	28	28	28	28	28
R-squared	0.490	0.265	0.048	0.284	0.251

Notes: The dependent variable for all models is the female share in full time employment. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Unionization is the share of workers who are members of a union. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table10: Effect of Trade Liberalization on Average Weekly Hours of Female Full Time Workers

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	0.461*	0.029	-0.040	0.028	0.025
	(0.240)	(0.134)	(0.210)	(0.039)	(0.093)
Share of private sector workers	0.124	0.142	0.139	0.136	0.141
	(0.144)	(0.149)	(0.147)	(0.120)	(0.147)
Blue Collar/ White Collar	-0.002	-0.004	-0.003	-0.013	-0.004
	(0.003)	(0.004)	(0.003)	(0.013)	(0.003)
Unionization Rate	-0.105	-0.288	-0.262	-0.415***	-0.283
	(0.305)	(0.197)	(0.301)	(0.105)	(0.227)
2006	0.100**	0.083**	0.087**	0.078**	0.085**
	(0.036)	(0.035)	(0.038)	(0.035)	(0.037)
Constant	3.744***	3.864***	3.866***	3.913***	3.866***
	(0.164)	(0.147)	(0.145)	(0.067)	(0.143)
Observations	24	24	24	24	24
R-squared	0.425	0.348	0.346	0.390	0.349

Notes: The dependent variable for all models is the log of average weekly hours of female full time employees. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table11: Effect of Trade Liberalization on Number of Female Full Time Workers

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	8.596***	-2.238*	5.233***	-0.538***	-1.992***
	(1.726)	(1.272)	(1.715)	(0.163)	(0.629)
Share of private sector workers	1.420	1.311	1.463	1.500	1.357
	(1.247)	(1.395)	(0.932)	(1.340)	(1.205)
Blue Collar/ White Collar	-0.036	0.016	-0.065	0.124**	0.003
	(0.030)	(0.046)	(0.038)	(0.057)	(0.034)
Unionization Rate	1.764	0.843	-0.982	2.094	0.658
	(1.592)	(1.738)	(1.263)	(1.738)	(1.248)
2006	0.312	0.071	-0.446	-0.006	-0.098
	(0.421)	(0.402)	(0.381)	(0.397)	(0.402)
Constant	-1.417	0.843	0.583	-0.103	0.727
	(0.856)	(1.026)	(0.658)	(0.931)	(0.837)
Observations	28	28	28	28	28
R-squared	0.411	0.252	0.325	0.280	0.340

Notes: The dependent variable for all models is the log number of female full time employees. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table 12: Effect of Trade Liberalization on the Inter Industry Gender Wage Gap: Accounting for Skill-Biased Technological Change

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	-0.739	0.653**	-0.596	0.053***	0.505**
	(1.199)	(0.295)	(0.791)	(0.017)	(0.214)
Share of skilled workers	0.467*	0.430**	0.526***	0.926***	0.445***
	(0.235)	(0.166)	(0.161)	(0.289)	(0.139)
Share of private sector workers	0.919***	0.821***	0.873***	0.852***	0.824***
	(0.271)	(0.208)	(0.228)	(0.210)	(0.215)
2006	0.864***	0.862***	0.928***	0.797***	0.895***
	(0.138)	(0.131)	(0.115)	(0.134)	(0.120)
Constant	-0.839**	-1.125***	-0.929***	-1.272***	-1.052***
	(0.308)	(0.221)	(0.191)	(0.258)	(0.196)
Observations	28	28	28	28	28
R-squared	0.625	0.702	0.625	0.698	0.697

Notes: The dependent variable for all models is the log number of female full time employees. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Skilled workers are those with a secondary degree or above. Share of private sector workers reflects the share of workers in the industry who work in private sector companies; 2006 is a dummy variable for the year 2006. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table 13: Industry Concentration Ratios, 1997 and 2005

ISIC R3 Code	Industry	Concentration Ratio 1997	Concentration Ratio 2005
More Concentrated (based on 1997 ranking)			
23	Coke and Petroleum Products Manufacturing	0.999	0.999
30	Office Equipment and Computer Manufacturing	0.989	0.956
34	Motorized Vehicle Manufacturing	0.984	0.983
16	Tobacco Manufacturing	0.981	0.993
27	Basic Metal Manufacturing	0.973	0.996
24	Chemical Product Manufacturing	0.972	0.982
32	Radio, Television and Communication Equipment Manufacturing	0.969	0.992
35	Other Transport Equipment Manufacturing	0.967	0.957
31	Electrical Equipment (Others) Manufacturing	0.961	0.975
29	Machinery and Equipment (Others) Manufacturing	0.942	0.976
	Less Concentrated (based on 1997 ranking)		
21	Paper Manufacturing	0.908	0.968
33	Medical Equipment Manufacturing	0.884	0.909
22	Publishing and Printing Manufacturing	0.880	0.885
26	Non-metallic Mineral Manufacturing	0.868	0.942
17	Textiles Manufacturing	0.863	0.920
25	Rubber Product Manufacturing	0.826	0.936
18	Garment Manufacturing	0.805	0.882
28	Metallic Product (Except Machinery and Equipment) Manufacturing	0.769	0.886
15	Food and Beverage Manufacturing	0.738	0.846
20	Wood Product (except Furniture) Manufacturing	0.514	0.648
36	Furniture Manufacturing	0.499	0.626
19	Leather Goods Manufacturing	0.378	0.753

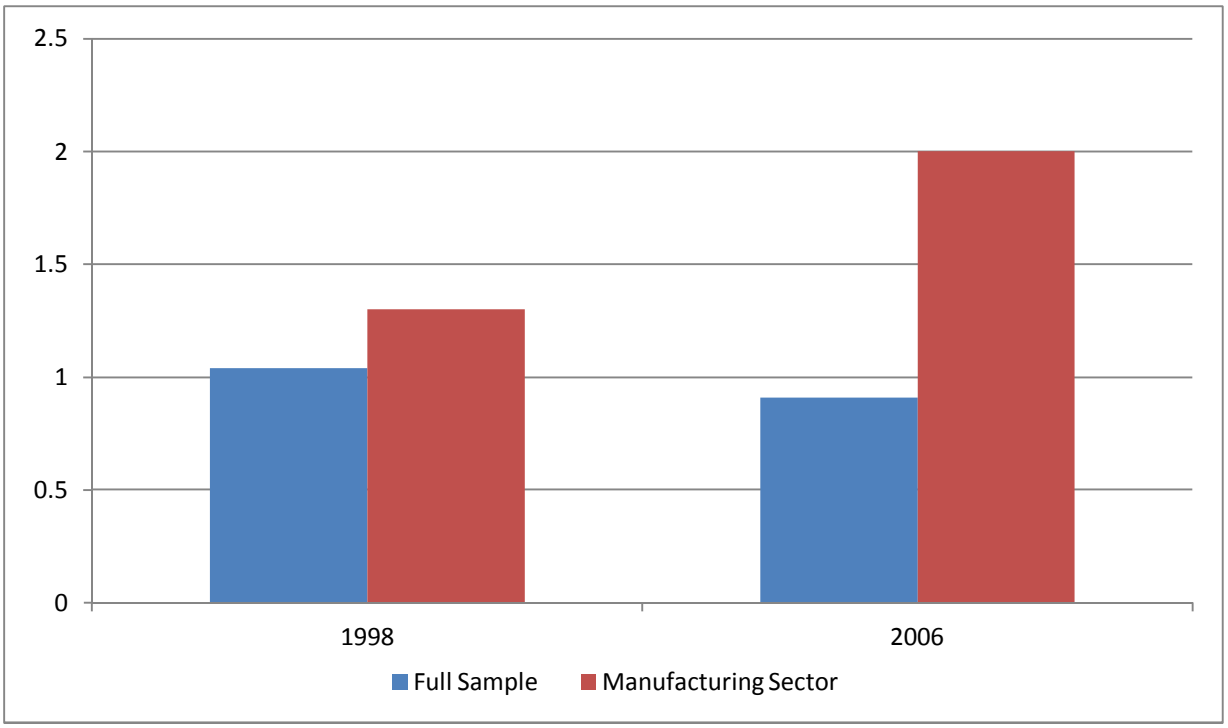
Notes: The industry concentration ratio is calculated as $(1 - \text{no. of establishments/output})$. The more/less concentrated designation is based on the ranking of the 1997 concentration ratio and choosing a break point that maximizes the marginal size of decreases in the concentration numbers in moving from more- to less-concentrated industries. Source: Author's calculations based on data sources described in the text.

Table 14: Effect of Trade Liberalization on the Inter Industry Gender Wage Gap: Accounting for Domestic Industry Concentration in First Differences

Independent Variables	(1)	(2)	(3)	(4)	(5)
Conc. X Change in Trade	-29.853	-0.018	0.090***	-1.147*	-22.486[a]
	(43.645)	(0.018)	(0.029)	(0.575)	(14.547)
Change in Trade	31.745	0.550	-10.739***	1.120*	23.512[b]
	(41.834)	(2.430)	(2.891)	(0.566)	(14.486)
Conc. Ratio	-1.670	0.129	-0.178	2.306	0.515
	(2.601)	(1.088)	(0.983)	(1.631)	(0.777)
Change in share of private sector workers	1.710***	1.690***	1.723***	1.651***	1.757***
	(0.250)	(0.361)	(0.202)	(0.444)	(0.293)
Constant	2.749	0.849	1.402	-1.137	0.514
	(2.545)	(1.003)	(0.961)	(1.490)	(0.680)
Observations	14	14	14	14	14
R-squared	0.716	0.681	0.763	0.717	0.766

Notes: The dependent variable for all models is the change in the residual inter industry gender wage gap. In Model (1)change in trade is the change in tariff level; in Model(2) change in trade is the change in import share of domestic consumption M/(Q+M-X); in Model (3) change in trade is the change in export share of domestic output X/Q; in Model(4) change in trade is the change in trade openness index (M+X)/Q; in Model (5) change in trade is the change in industry penetration index (M-X)/(Q+M-X). Conc. Ratio is the concentration ratio defined in the text. The change in share of private sector workers reflects the difference between 2006 and 1998 in the share of workers in the industry who worked in private sector companies. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries. [a] Significant at the 14 % level [b] significant at the 12 % level.

Figure 1: Male-Female Wage Gap (Male Wage/Female Wage) 1998-2006, Wage Workers



Notes: Author's calculations based on data in ELMS 1998 and ELMPS 2006.

Appendix

Further Robustness Checks: Industry Concentration and Gender Wage Inequality

One valid criticism of the analysis carried out in section 6.2 to explicitly test the relationship between industry concentration, trade openness and the gender pay gap is that I relied on a first differences specification. This undoubtedly led to a loss of information embodied in the panel data. Additionally, the dependent variable, which was calculated as the difference in log wages, could suffer from measurement error. Angrist and Krueger (1998) and Bound et al. (1994) discuss the decline in the reliability of earnings data when they are expressed as year to year differences rather than levels. They argue that the coefficient estimates may not be biased, however their standard errors may be too large, rendering coefficients insignificant. They also argue that these problems are further exacerbated the shorter the time period analyzed.

Since the data available for this analysis spans a relatively short period (8 years between 1998 and 2006), I have also tested these findings using a specification in levels. The dependent variable is the inter industry gender wage gap as calculated from expression (5), and the explanatory variables include the various measures of trade used in the text, the time varying concentration ratio and an interaction term of trade X concentration X time. The time variable is a dummy variable that equals one for 2006. The use of the time variable in the interaction term may be interpreted as reflecting the time path of the interaction of the trade shares with the concentration ratio. The last term is similar to the main coefficient of interest in Menon and Rodgers (2009), and represents the impact of international trade competition in more-concentrated industries over time.

The results are in Table A3. The trade variable has similar signs as found in Table 7: lower tariffs increase the inter-industry gender wage gap (this is now significant) while higher export share lowers the wage gap for the more competitive industries. The coefficients on import penetration, trade openness and industry penetration are insignificant. The time varying industry concentration ratio has a positive and significant coefficient in four specifications. This implies that industries with higher concentration ratios were more likely to discriminate in pay between men and women, regardless of the impact of trade. The

interaction term of trade X conc. X time is positive and highly significant in all specifications (except in column (4) where trade is measured by total trade volume). This implies that increasing trade openness in more-concentrated industries after trade liberalization is associated with higher wage gaps between men and women. Thus the gender wage gap rose by more in concentrated industries than in competitive industries also affected by trade. These findings are also consistent with the theoretical model of Menon and Rodgers (2009) and their empirical findings for India.

Table A1: Effect of Trade Liberalization on Average Weekly Hours of Female Full Time Workers, Negative Binomial Regressions

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade	5.310	-2.202*	0.451	-0.327***	-1.469
	(3.361)	(1.171)	(1.063)	(0.097)	(1.029)
Share of private sector workers	-0.414	-0.275	-0.108	-0.297	-0.294
	(0.687)	(0.460)	(0.638)	(0.303)	(0.484)
Blue Collar/ White Collar	0.053*	0.094*	0.048	0.130***	0.077
	(0.032)	(0.050)	(0.031)	(0.050)	(0.049)
Unionization Rate	2.899	3.255	1.724	2.057	2.816
	(2.112)	(2.221)	(1.711)	(1.420)	(2.301)
2006	0.281	0.219	0.041	0.337	0.097
	(0.281)	(0.206)	(0.177)	(0.242)	(0.187)
Constant	2.085	3.373***	3.101***	3.220***	3.233***
	(1.274)	(0.527)	(0.867)	(0.523)	(0.616)
Observations	28	28	28	28	28

Notes: The dependent variable for all models is the average weekly hours of female full time employees. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Share of private sector workers reflects the share of workers in the industry who work in private sector companies; Blue Collar/White collar is the ratio of blue collar to white collar workers in the industry; unionization is the share of workers who are members of a union. 2006 is a dummy variable for the year 2006. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for14 clusters in the manufacturing industries.

Table A2: Effect of Trade Liberalization on Number of Female Full Time Workers, Negative Binomial Regressions

Independent Variables	(1)	(3)	(5)	(7)	(9)
Trade	9.992***	-4.591***	4.234	-0.601**	-3.288***
	(2.894)	(1.065)	(3.233)	(0.238)	(0.733)
Share of private sector workers	0.828	1.190	2.337	1.497	1.221
	(1.433)	(1.495)	(1.563)	(1.569)	(1.289)
Blue Collar/ White Collar	-0.036	0.043	-0.076	0.097	-0.001
	(0.075)	(0.058)	(0.064)	(0.116)	(0.072)
Unionization Rate	3.979**	3.990*	1.432	2.676	3.092
	(1.902)	(2.180)	(2.305)	(2.143)	(1.908)
2006	1.124***	0.559	0.029	0.565*	0.303
	(0.434)	(0.355)	(0.265)	(0.330)	(0.341)
Constant	-2.325**	0.616	-0.645	-0.282	0.316
	(1.078)	(1.220)	(1.222)	(1.275)	(0.972)
Observations	44	44	44	44	44

Notes: The dependent variable for all models is the number of female full time employees. In Model (1) trade is the tariff level; in Model(2) Trade is the import share of domestic consumption M/(Q+M-X); in Model (3)Trade is the export share of domestic output X/Q; in Model(4) Trade is the trade openness index (M+X)/Q; in Model (5) Trade is industry penetration index (M-X)/(Q+M-X). Share of private sector workers reflects the share of workers in the industry who work in private sector companies; Blue Collar/White collar is the ratio of blue collar to white collar workers in the industry; unionization is the share of workers who are members of a union. 2006 is a dummy variable for the year 2006. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

Table A3: Effect of Trade Liberalization on the Inter Industry Gender Wage Gap: Accounting for Domestic Industry Concentration in Levels

Independent Variables	(1)	(2)	(3)	(4)	(5)
Trade X Conc. X Time	4.330***	1.522***	3.310**	0.049	1.359***
	(1.333)	(0.341)	(1.241)	(0.064)	(0.372)
Trade	-3.702***	0.261	-2.018*	0.031	-0.003
	(1.220)	(0.323)	(1.000)	(0.054)	(0.263)
Concentration Ratio	0.921*	1.962***	1.097	2.641***	1.960**
	(0.442)	(0.600)	(0.716)	(0.757)	(0.685)
Share of private sector workers	1.079**	1.345***	0.989**	1.342***	1.260***
	(0.361)	(0.335)	(0.348)	(0.389)	(0.366)
Constant	-0.865*	-2.632***	-1.251	-2.973***	-2.376***
	(0.445)	(0.730)	(0.716)	(0.770)	(0.764)
Observations	28	28	28	28	28
R-squared	0.445	0.599	0.219	0.308	0.479

Notes: The dependent variable for all models is the residual inter industry gender wage gap. In Model (1)change in trade is the change in tariff level; in Model(2) change in trade is the change in import share of domestic consumption M/(Q+M-X); in Model (3) change in trade is the change in export share of domestic output X/Q; in Model(4) change in trade is the change in trade openness index (M+X)/Q; in Model (5) change in trade is the change in industry penetration index (M-X)/(Q+M-X). Conc. Ratio is the time varying concentration ratio defined in the text. Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard Errors adjusted for 14 clusters in the manufacturing industries.

[1] According to a recent study that investigates the gender pay gap for a sample of sixty three countries, the "average" world gender pay gap is estimated at 16% (ITUC 2008). In 2009, the gender pay gap for the USA was as high as 23% (IWPR Factsheet 2010).

[2] In a recent Report a World Economic Forum study ranked Egypt at the bottom of the list of the 58 countries surveyed (Lopez-Claros and Zahidi 2005). It is interesting to note that Egypt was given the lowest mark in all five areas of the analysis, namely: economic participation, economic opportunity, political, health and well-being. Additionally, a recent study by El-Hamidi and Said (2008) has found that it is particularly difficult for Egyptian women to find jobs in the higher paying private sector and in certain managerial and decision-making positions.

[3] See results of the Poverty Assessment Update published by the World Bank (2007).

[4] Claims that were often backed by IMF and World Bank Reports. Even on the first day of demonstrations-January 25th- an IMF mission left Cairo applauding the solid 5% growth and the overall economic performance (Economist 2011)

[5] There is also a large body of literature that investigates the effect of trade liberalization on wage inequality in general, not gender specific. See for example Revenga (1992, 1997), Currie and Harrison (1997), Hanson and Harrison (1999), Feliciano (2001), Goldberg and Pavcnik (2003, 2005), Attanasio, Goldberg and Pavcnik (2004) to name a few.

[6] It is not clear that policy variables for which we have data adequately capture measures of protection/liberalization in other tradable sectors such as agriculture. Liberalization in the agricultural sector in particular involved a much broader set of policies aimed at eliminating government intervention in the domestic markets, such as elimination of domestic price controls, state monopolies on procurement and sales, subsides for inputs, etc and these likely had a significant impact on workers in that sector possibly more important than that of reducing tariffs (Minot et al. 2010).

[7] I also constructed another measure of import penetration: imports as a share of output in industry k. Regression results using both versions of the import penetration measure were almost identical and therefore I only report those based on the first one.

[8] Note that garments employed the largest share of females of all manufacturing as mentioned above, and the fact that it saw such a large increase in female share without a significant improvement in export performance is likely to be an important explanation for my results on the impact of trade later on.

[9] The probability of selection into wage employment (whether regular or casual) versus non-wage employment, (which includes those who are employers, self employed or unpaid family workers) is determined by the individual's age and its square, household size, number of children under six and binary variables for whether the individual is married or not and for highest education level attained.

[10] An additional term reflecting the gender differences in selection given by $(\widehat{\theta_m}\,\overline{\lambda_{mk}} - \widehat{\theta_f}\,\overline{\lambda_{fk}})$ can also be included in equation (5), but is ignored here to allow a straight forward description of the various components of the wage gap.

[11] See Kletzer (2001) for a discussion.

[12] Blue collar occupations include agriculture and fishing; craft and related trade; plant and machine operation and assembly; as well as elementary occupations.

[13] Female unionization rates are roughly similar to those of males, with the average for the sample being 20.8% for females and 21.7% for males.

[14] The schooling years could have been computed from the information on the highest educational level attained as reported in the labor market surveys. However, one would need to make assumptions about years of schooling for each degree, something which has changed several times over the period under consideration especially for primary degrees. To avoid introducing noise into the model, I rely on educational dummy variables instead.

[15] There are 21 manufacturing industries in the dataset. Seven of those industries did not have any female employees in 1998, and four had no female employees in 2006. (See Table 3 for female employee distribution by industry.) These industries are therefore eliminated from the analysis altogether.

[16] In specifications where the unionization rate was included in this model, it was always negative but insignificant at conventional levels. It was only significant when the share of private sector workers was excluded from the model. Given the higher theoretical importance and very high significance of the private share variable, I chose to report results that did not include the unionization variable to save on space. However, all coefficients on trade variables were almost identical in size and significance whether unionization rate was included or not. I also tried the share of casual workers as an additional explanatory industry level variable, but it was insignificant in all specifications.

[17] Note that the dependent variable is the change in the inter-industry gender wage gap from 2006 to 1998 so a negative value indicates that females fared better in 2006 than in 1998.
[18] Note that these two results are fully compatible. For industries where the industry penetration index is negative-i.e. those where exports exceed imports as a percentage of domestic output, exactly what would be considered as export intensive industries-the positive coefficient on the industry penetration index would still mean a decline in the wage gap associated with a rise in export intensity.
[19] A full time worker is defined as someone who works 40 hours a week or more.
[20] The fact that sectors that employed the bulk of females in manufacturing, namely textiles and garments, actually saw a slight decrease in their export intensity measures, as well as relatively large decreases in protection over this period could explain the week impact of export intensity on the employment variables. This is a reflection of the changing international conditions in these markets with the end of the Multi-Fiber Agreement that has put an end to the quota system which benefited small exporters such as Egypt and shielded them from the more competitive exports of East Asia in International markets. Additionally, in 2004 import prohibitions were lifted on most textile and clothing products, through the ministerial decree 161/2004 resulting in more intense competition from international producers for these industries.
[21] See Violante (2008) and Berman, Bound and Machin (1998) for a discussion and international evidence.
[22] See Menon and Rodgers (2009).
[23] The coefficients on the other measures of skill-biased technological change were insignificant and did not change any of the results for the impact of the trade and other industry level variables. I have not reported them to save on space. These results are available from the author upon request.
[24]This methodology closely follows Black and Brainard (2004), however the inter-industry wage gaps are calculated following the methodology of Horrace and Oaxaca (2001) which explicitly deals with an identification problem that made the industry gender pay gaps not invariant to what was taken to be the base group for binary variables in the wage equation (such as region, education level, sector, etc.).
[25] Rankings based on 2005 do not change the more/less concentrated designation except for the paper manufacturing industry which is more concentrated in 2005.
[26] Note that the results in column (5), which are barely significant, also imply the same conclusion regarding export oriented industries since a negative value for the industry penetration index implies the industry is relatively more export oriented as discussed above.
[27] I explore an additional robustness check in the appendix where I rely on a specification in levels and time-varying concentration ratios to test the role of industry concentration in affecting these results.