DISCUSSION PAPERS IN ECONOMICS

Working Paper No. 14-09

Female Labor Market Opportunities, Household Decision-Making Power, and Domestic Violence: Evidence from the Bangladesh Garment Industry

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October 2014
Revised November 2014

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Female Labor Market Opportunities, Household Decision-Making Power, and Domestic Violence: Evidence from the Bangladesh Garment Industry

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November 10, 2014

Abstract

Rapid growth in Bangladesh's garment industry, brought about by trade policy liberalization, gave Bangladeshi women new opportunities to enter the formal labor market. While it is frequently believed that access to labor market opportunities improves the lives of women, causal evidence on the comprehensive impact on women's lives is sparse. This paper examines the effects of increased employment opportunities on women's decision-making power, the likelihood that women experience domestic violence, and investments in children's education. Using four waves of the Bangladesh Demographic and Health Survey (DHS), I estimate the impact of increased employment opportunities for women using a difference-in-difference specification that exploits spatial variation in factory location and the timing of trade liberalization. After trade liberalization, areas with high factory density experienced increases in female labor force participation, specifically in factory positions. Compared to areas with low factory density, these high density areas experience increased female decision-making power in the household and an increased probability that children age 6 - 12 are currently enrolled in school. However, these increases in female empowerment are met with an increased likelihood of domestic violence. Heterogeneity analysis reveals effects are concentrated among lower socio-economic status women and recent migrants are not driving results. These results are supported by fieldwork I conducted in Bangladesh.

Keywords: labor market opportunities, decision-making power, trade liberalization, Bangladesh

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1 Introduction

More women are working outside of the home than ever before, as female labor force participation has increased at all income levels since 1980 (World Bank, 2011). Much of the increase in female labor force participation has occurred in developing countries. Low skill, export-oriented manufacturing has been a key driver of industrialization in developing countries and a key characteristic of this industry is the extensive employment of women who previously did not have formal labor market opportunities available to them (World Bank, 2011). While there is an emerging literature estimating the effects of female labor market opportunities in developing countries on marriage and childbearing decisions (Heath and Mobarak 2014; Jensen 2012), children's health and education (Atkin 2009; Anukriti and Kumler 2014; Qian 2008), and say in household decisions (Majlesi, 2014), there is little causal evidence on how an increase in a woman's economic position effects both household decision-making power and the likelihood of domestic violence.

Household bargaining models predict that as a woman's outside option - i.e. employment opportunities outside of the home - improve, her bargaining power within the household should improve (Manser and Brown 1980; McElroy and Horney 1981). Importantly, this improvement in bargaining power is not contingent on the woman actually working, but is rather a function of the woman's potential to work. Moreover, female labor market opportunities may improve children's education by increasing the returns to education, and the mother may now allocate more resources towards the children with her increased bargaining power (Lundberg *et al.* 1997; Duflo 2000). However, theoretical predictions regarding the relationship between labor market conditions for women, household bargaining power, and domestic violence produce mixed results. In the context

where a woman's initial level of bargaining power is high, and she can easily leave a marriage, theory and empirical evidence finds increasing a woman's relative wage increases bargaining power and decreases domestic violence (Aizer, 2010). In a context where a woman cannot easily leave a marriage and initial bargaining power is low, the theory of "male backlash" predicts that increased autonomy due to an improvement in the woman's reservation utility is accompanied by an increase in spousal violence (Eswaran and Malhotra 2011; Macmillan and Gartner 1999; Tauchen *et al.* 1991). In theory, the husband is using domestic violence as a tool to restore the household bargaining structure to what it was before the woman increased her bargaining power. In a developing country context, the causal link between increased female labor market opportunities and domestic violence has received very little empirical attention.[1]

To address this gap in the literature, I analyze the impact of female labor market opportunities on women's household decision-making power, a measure of women's bargaining power, in conjunction with the likelihood that women experience domestic violence against the backdrop of trade liberalization in Bangladesh. Specifically, I evaluate the garment industry in Bangladesh during a period of worldwide export quota elimination for garments that greatly increased Bangladesh's role in the global garment market and significantly increased the number of jobs in the formal labor market available for women. To gain a more comprehensive understanding of the effect of increased labor market opportunities on women, I look at woman's decision-making power within the household as a measure of intra-household bargaining power concurrently with whether the woman

[1]Vyas and Watts (2009) summarizes the correlational evidence between whether a woman works and domestic violence. In Bangladesh in particular, Heath (2014) finds a positive correlation between work and domestic violence for women with low education or young age at marriage. In Naved and Persson (2005), women participating in savings and credit groups faced increased risk of abuse, as did women earning an income in rural areas.

experienced domestic violence in the last twelve months, as there may be unintended consequences of increased labor market opportunities if husbands respond to changes in household dynamics with increased domestic violence. I also analyze children's education to explore the possibility of changes in resource allocation and changes in the returns to education.

To estimate the causal effects of female labor market opportunities, this paper takes advantage of an exogenous increase in the number of garment factories and employment in existing garment factories brought about by a liberalization of trade policy. The Agreement on Textiles and Clothing (ATC) ended on January 1^{st} 2005, and subsequently ended preferential trade quotas for developing countries. Following this policy change, trade was exclusively governed by standard World Trade Organization rules. The end of preferential trade quotas created a more competitive environment, and Bangladesh benefited due to its low labor costs. However, during the years leading up to the end of the quotas and directly after their elimination it was unclear how well the Bangladesh garment industry would fare and many thought the industry would suffer (Joarder *et al.* 2010; Mlachila *et al.* 2004; Paul-Majumder and Sen 2001). In spite of the uncertainty, between 2005 and 2010 the number of garment factories in Bangladesh increased by 15 percent, and the number of women employed in the Bangladesh garment industry increased by 63 percent. The industry now employs over 3.5 million workers, of which 80 percent are female (BGMEA, 2013). This abrupt increase in the scale of garment manufacturing provides an exogenous increase in demand for female labor which provides an excellent environment to study the affect of increased employment opportunity on women's household decision-making power, the likelihood of domestic violence, and educational outcomes of their children.

Using pooled individual level-data on women for the years 1999 - 2011, from the Bangladesh Demographic and Health Surveys, I estimate a difference-in-difference model using district, age of woman, and year fixed effects to measure the impact of the garment industry on women's household decision-making power, incidence of domestic violence, and children's education. This empirical strategy exploits temporal variation before and after the elimination of quotas and spatial variation induced by differences in the number of garment factories in 2004 within a 10 kilometer catchment area of a woman's home.[2] I categorize the number of factories in 2004 within a 10 kilometer catchment area of a woman's home into high and low factory density groups. I use the number of garment factories surrounding a woman's home in 2004 as a proxy for both employment increases within existing factories and new factories after 2004 in the catchment area. A key component to the analysis is that all women are included, not only those who are working in a garment factory, as theory predicts all women should be affected because everyone's outside option is changing. Also, a woman's decision to work in a garment factory is likely endogenous and would introduce selection bias. In order to make appropriate comparisons, the sample is restricted to areas that had at least one garment factory prior to quota elimination.[3] My analysis is supplemented by two surveys I fielded in June 2014 with individuals who work in garment factories and garment factory owners.

Results indicate women who lived in high factory density areas after the elimination of quotas were 39 percent more likely to be working, and 33 percent more likely to have input on decisions regarding their own health, than women in low factory density areas after the elimination of quotas.

[2]One key assumption in this analysis is the exogeneity of factory placement with respect to individual women's characteristics. My field work indicates factory location is highly constrained by access to a suitable building or utilities and is not influenced by the characteristics of individuals in the surrounding area. This is discussed more in section 2.

[3]The garment industry in Bangladesh is geographically localized in two main cities, Dhaka and Chittagong and Export Processing Zones.

Increases in women's labor market participation and measures of household-decision making are combined with a statistically significant increased likelihood of domestic violence for women after the elimination of quotas in areas with a high density of garment factories. While these results appear to be contradictory, they are likely explained by a "male backlash" or instrumental theory of domestic violence where the husband is compensating for the increased empowerment of his wife with increased domestic violence (Heath, 2014). Importantly, there is no statistically significant effect on the husbands attitudes towards domestic violence, suggesting cultural norms towards domestic violence are not changing but rather domestic violence is being used as a tool within the household. Lastly, this paper considers how changing women's labor market opportunities affects children's education. Qualitative data with garment factory workers suggests women primarily spend their earnings on housing, food, and sending their children to school. The probability that a child age 6 - 12 is currently enrolled in school increases by 9.6 percent after the elimination of quotas in high factory density areas.

To alleviate concerns that garment factories are endogenously located, I show that increases in the number of factories for a given area is not correlated with characteristics of individuals in that area prior to the expansion in number of factories. In addition, falsification tests show women's height and years of completed education are not affected by the surrounding intensity of the garment industry suggesting that results are not spuriously correlated with an omitted variable that affects overall development. Importantly, robustness checks confirm the results are not biased by migrants moving into high factory density areas after the elimination of quotas in 2005. This is an important contribution as rural to urban migration is common in Bangladesh.

Studying the Bangladesh garment industry in conjunction with women's empowerment is salient as the country is an integral part of the world apparel economy, and much of this low-skill manufacturing is done by females. Bangladesh exports over 19.9 billion (USD) in ready-made garments each year and is the fourth largest exporter of ready-made garments in the world, trailing only China, the European Union, and Hong Kong (WTO, 2012). Due to the high female to male sex ratio of employees in garment factories, the rise of the garment industry in Bangladesh represents a structural shift in the labor market for Bangladeshi women. Jobs created by growth in the garment sector give women of lower socio-economic status, who previously had limited employment opportunities other than household or informal sector jobs, an opportunity to enter the formal labor market (Nordas, 2004).

This paper has a number of advantages and makes several important contributions. Using a unique research design that incorporates spatial variation in the intensity of the garment industry surrounding a woman's home due to the elimination of trade quotas, I highlight that trade policy can have substantial implications for less traditional outcomes such as women's decision making-power and incidence of domestic violence.[4] I use a unique natural experiment that allows me to circumvent endogeneity concerns regarding why demand for female labor is changing, thereby obtaining causal estimates. This paper is the first to my knowledge to consider the causal effect of increased female labor market opportunities on the likelihood of domestic violence in a developing country, and the first to consider the effect on women's household decision-making power in Bangladesh. I complement the literature by confirming that increased labor market opportunities for women

[4]There is also a literature on the relationship between globalization and child labor, and educational attainment. See Edmonds and Pavcnik (2005); Edmonds and Pavcnik (2006); Edmonds *et al.* (2010); Findlay and Kierzkowski (1983); Dinopoulos and Zhao (2007); Atkin (2010).

positively affects women's household decision-making ability in a setting outside of Mexico (Majlesi 2014; Atkin 2009). Second, by considering all of the dense urban areas in Bangladesh that have garment factories, the geographic scope of this paper is larger than previous literature. Third, I am able to address how migration selection is affecting results by using information on if, and how recently, women migrated. This paper provides insight into how countries with similar levels of development as Bangladesh were affected with the expansion of their garment industry.

The rest of the paper proceeds as follows. Section 2 provides background on the garment industry in Bangladesh and the mechanisms through which a rise in the garment industry may affect women and children; section 3 describes the data; section 4 explains the estimation strategy; results and robustness analysis are described in section 5 and 6; and section 7 concludes.

2 Background

2.1 The Garment Industry in Bangladesh

Over the last thirty years Bangladesh has experienced rapid industrialization, and economic development driven in part by growth in manufacturing exports, 75 percent of which are from the garment industry (Berg *et al.*, 2011). According to the World Trade Organization, Bangladesh is currently the fourth leading exporter of clothing in the world with 19.9 billion (USD) in export value (WTO, 2012). The vast majority (94 percent) of these products are exported to the U.S. and EU markets (ILO, 2006). In 2013 there were over 5,000 factories employing 3.5 million workers, of which 80 percent are female (BGMEA, 2013). The strong performance of the garment industry in Bangladesh has helped the country transform from a predominately aid-dependent nation to a

trade-dependent one (Rahman, 2002).

From 1974 - 2004 the global apparel and textiles industry was governed by quota restrictions that caused dispersion in the location where products were made. These quota restrictions were negotiated under the Multi-fibre Arrangement (MFA) between importing and exporting countries. Under the quota restrictions, exporting countries were allowed to supply a set volume of a product, and the exporting country allocated quota allowances among its domestic producers. One intention of the MFA was to protect the domestic production of importing countries, and as a result of the quota restrictions some export oriented countries were restrained in their exports. Consequently, this gave countries that did not have well established export oriented garment industries the chance to develop their production and compete in the global market as domestic production in import countries could often not meet domestic demands.

On January 1, 1995 the MFA was replaced by the WTO Agreement on Textiles and Clothing (ATC). The ATC governed garment trade for a period of ten years between 1995 and 2004, at the end of which the quota restrictions for textiles and clothing ended and trade was regulated by normal World Trade Organization rules (Nordas, 2004). After January 1, 2005 all WTO members had unrestricted access to the US, EU, and Canadian markets. The phase out of quotas occurred in three stages (details are given in the Annex of WTO agreement). At each stage of the quota phase out, importing countries decided which products would go from being quota restricted to having no quotas. For Bangladesh's garment industry the last phase of the ATC, which took effect January 1, 2005, was the most significant as 29 of the 30 three digit product codes exported by Bangladesh were transitioned to be quota free (ILO, 2006). The quota restrictions put in place by

the MFA were binding for exports to the US. In 2004, more than 80 percent of export items to the US were constrained under quota restrictions (ILO, 2006). Bangladesh's exports to the EU were not subject to quotas during the MFA or ATC as Bangladesh benefits from the EU's "Anything but Arms" arrangement.[5] However, the phase out of quotas stood to impact the EU market for Bangladesh as many competing production countries would now have unrestricted access to the EU, creating intense competition.

It was uncertain how the Bangladesh garment industry would fare after the end of the ATC on January 1, 2005 (Joarder *et al.* 2010; Mlachila *et al.* 2004; Paul-Majumder and Sen 2001). There was concern over how the industry would perform for three main reasons. First, at the time, the garment industry in Bangladesh had low worker productivity and poor backward linkages. The lead-time for exports was more than four months, which was significantly longer than other major exporting countries and unattractive to foreign buyers (Paul-Majumder and Sen, 2001).[6] Second, political instability created an uncertain investment environment and did not allow workers and goods to move about freely at all times. Third, garment factories in Bangladesh would now face more competition for customers. Under the quota system, quotas were assigned to certain factories in Bangladesh guaranteeing their exports for that year. Without quotas to assign, foreign buyers could source product from any factory which could create intense competition within Bangladesh factories.

Even though there was uncertainty about the Bangladesh garment industry after the phase out

[5]The EU's "Anything but Arms" arrangement grants duty free, quota free access for all exports except arms to the EU. This arrangement is granted to the 48 least developed countries.

[6]In Bangladesh the lead time for garment exports varied between 120 - 150 days, while it was only 19 - 45 days for Sri Lanka and 12 days for India (Paul-Majumder and Sen, 2001)

of quotas, distributors looking to purchase apparel were drawn to Bangladesh for its comparative advantage in labor costs. Bangladesh's hourly wage rate was 0.23 USD, compared to 0.35 USD for China.[7] After 2004 the Bangladesh garment industry experienced massive growth, with the number of factories growing from 4,107 to 5,150 between 2005 and 2011 and employment growing between 2 million people and 3.6 million people during the same time period. Surveys carried out with garment factories in the middle of 2005 suggested that over half of the firms surveyed had increased employment since the elimination of quotas at the beginning of 2005 (Majid and Hussain, 2005). Figure 1 plots the number of garment factories and number of garment factory employees between 2004 and 2012 using Bangladesh Garment Manufacturing and Exporters Association (BGMEA) data. Starting in 2006, there is an increase in the trajectory of the number of garment factories. The one year delay in the increase in number of factories is likely due to the time it takes to establish a factory, procure equipment and hire workers. In 2005, there is an increase in the number of employees working in garment factories. Between 2005 and 2011 the garment industry gained 1.6 million workers, while the industry only gained half a million workers in the six years prior to 2005.

The volume of garments exported from Bangladesh increased dramatically after the elimination of quotas in January 2005, while at the same time the unit price of garment exports declined. Figure 2 presents the volume of trade and the unit price of garments for 2002 through 2007 for Bangladesh.[8] The volume for garments shows an upward trend with a sharp change in slope in

[7]For comparison, other countries hourly wage rates were: 0.39 USD for Sri Lanka, 0.49 USD for Pakistan, 0.56 USD for India, 0.78 USD for Philippines and 1.04 USD for Thailand (Paul-Majumder and Sen, 2001).

[8]The graph is shown for woven garments. The Bangladesh garment industry is composed of two-thirds woven garments and one third knitwear garments (ILO, 2006).

2005 when the ATC ended. From 2005 to 2007 the volume of garment trade increased by 44 percent to over 130 million dozen exports for 2007. At the same time, the price per dozen for garments decreased over this same time period due to an increasingly competitive global market for garments after the end of the ATC. To demonstrate that the changes in the garment industry are not a result of another macroeconomic shock I look at the export volume and unit price of two other export oriented industries in Bangladesh. Figures 3 and 4 plot the volume and unit price of Fresh and Frozen Fish and Jute Goods for 2002 through 2007. There is no clear change in the trajectory of either volume or unit price in 2005 for either good, which suggests there is not another macro economic shock to the economy that is causing the rapid growth in the garment industry.

2.2 Placement of Garment Factories

Garment factory location within Bangladesh is not random. Since the industry is export oriented, the goods must be easily transported out of the country. The two main cities, Dhaka and Chittagong provide the best means of transport in terms of air, river, and road infrastructure. A survey of garment factory owners I fielded in 2014 indicates the two most important determinations of factory location within Dhaka and Chittagong has historically been and continues to be access to roads and buildings.[9] I found that 100 percent of the factories surveyed thought good quality roads were very important when thinking about why they located their factory where the did. Where factories choose to locate depends primarily on these concerns and not on the characteristics of the surrounding population. For example, 76 percent of factories surveyed thought an educated workforce living nearby was not important when thinking about why they located their factory in

[9]This finding is also verified by Heath and Mobarak (2014).

its current location.[10]

2.3 Labor Characteristics in the Garment Industry

While employment opportunities for men and women have increased due to the garment industry, they have increased substantially more for women relative to men. Preference for female labor in the manufacturing industry is often attributed to women having greater agility and better fine motor skills (Vivian and Miller, 2002). These skills are highly valued since most garment workers engage in sewing. Women are also preferred because they are believed to be more patient and compliant (Paul-Majumder and Begum (2000), Siddiqi (2000)). A survey of garment factory workers I fielded in 2014 indicates slightly more than half of garment workers are married. Of the firms surveyed, on average 61 percent of the female employees were married. Several factory owners commented that married women are preferred in the industry because they are seen as more reliable.

Factories hire both educated and non-educated workers. Female employees working in non-managerial positions within the garment industry typically come from lower socio-economic backgrounds, and opportunities for advancement are limited for non-educated and illiterate workers (Paul-Majumder and Begum, 2000). For factories located in an Export Processing Zone (EPZ), all jobs are highly coveted as they typically have better working conditions and pay (Zohir, 2009).[11] Consequently, women who work at a factory inside an EPZ are required to have some formal education (Zohir, 2009). However, there are only 8 EPZs in Bangladesh, and 90 percent of factories

[10] Surveys and summary statistics are described in Section 3 and Appendix A.

[11] EPZs are intended to create a favorable business environment in order to attract foreign investors. Garments made and exported from these zones do not have to go through Bangladesh customs. In addition, new factories do not pay any taxes for 5 years and labor unions are banned inside EPZs.

are not inside of these zones.[12] To account for the correlation between EPZs and the quality of worker that would choose to live near an EPZ, in the analysis I control for whether or not a factory is inside an EPZ.

2.4 Mechanisms Linking Employment Opportunities, Household-Decision Making, Domestic Violence and Educational Investments

Increased female employment opportunities may change a woman's household decision-making power by affecting the bargaining structure in a household. When considering women's empowerment, non-unitary household bargaining theory suggests a woman's utility at an option outside of the household - or her threat point - is a key determinant of her bargaining power within the household (Manser and Brown 1980; McElroy and Horney 1981). A number of factors can affect a woman's utility at her outside option (and thus her bargaining power), including divorce laws, the relative wage rate, her education, and her age at marriage (Jensen and Thornton 2003; Aizer 2010; Mocan and Cannonier 2012). A strong component of a woman's threat point should be the number of jobs available to her outside of the home. By increasing the number of employment opportunities for women, theory suggests that her bargaining power, and therefore her decision-making power, will also be increased (Aizer 2010; Cherchye *et al.* 2012; Majlesi 2012).

For domestic violence, theory predicts that changing the household bargaining structure could lead to increases or decreases in the likelihood of domestic violence depending on the initial level of bargaining power of the woman (Heath 2014; Tauchen *et al.* 1991). For women with low initial

[12]The 8 EPZs and the number of factories located within each are as follows: Adamjee, Narayanganj (61); Cittagong, Chittagong (167); Comilla, Comila (32); Dhaka, Savar Dhaka (103); Ishwardi, Pabna (28); Karnaphuli, Chittagong (53); Mongla, Bagerhat (31); Uttara, Nilphamari (22) (Authority).

levels of bargaining power, increasing bargaining power could lead to increased domestic violence as they now have more of a say in household decisions which can ultimately lead to conflict. On the other hand, if a woman has high initial levels of bargaining power, increasing this further could lead to decreased domestic violence as the woman can more easily leave the relationship (Aizer, 2010). The increase in domestic violence seen in this context as a result of increased female employment opportunity is likely the result of the husband seeking to offset the increased bargaining power the women experiences because of increased economic opportunity. This is consistent with a "male backlash" or instrumental violence theory, where the husband uses domestic violence as a tool to restore balance to the household (Heath, 2014).

Educational investments in children may be affected by increased female employment opportunities through two channels. First, if a woman gains employment there is a positive income shock leading to expanded resources that all household members can benefit from. If children's education is a normal good, then educational spending or resource allocation should increase. Prior literature also finds women have a greater preference for expenditures on children than men (Lundberg *et al.* 1997; Duflo 2000), so if a woman gains employment in the garment industry she may be able to divert more resources to her children when compared to a similar income shock experienced by her husband. Second, both women and their husbands may have updated expectations about their children's future earnings because of the expanded garment industry, which may lead to increased investment in children's education (Strauss and Thomas 2008; Foster and Rosenzweig 1996).

3 Data

3.1 Data Sources

This paper benefits from rich individual level data from a nationally representative sample of women in Bangladesh and garment factory location information. Two main data sources are used to construct the dataset for analysis. First, I use the 1999, 2004, 2007, and 2011 Bangladesh Demographic and Health Surveys (DHS) for individual-level data on women's labor market participation, household decision-making power, likelihood of domestic violence and children's education. The Bangladesh DHS is a survey for women age 10 - 49 who have ever been married. In addition to the survey modules for women there is a household roster that includes current school enrollment status for each household member, and a men's survey that was given to a random subsample of men age 15 - 54 who lived in the same household as the sampled woman.[13,14]

Using the Bangladesh DHS data I create three pooled cross-sectional datasets for 1999 - 2011. First, an individual-level dataset on women includes information on her employment, household decision-making, education, and the employment status of her husband. Second, I create a child-level dataset that has the current school enrollment status of a woman's children. Third, using the men's survey I construct a dataset of the husbands of women included in the first dataset, which contains information about domestic violence. Each dataset is a pooled cross-sectional dataset from 1999, 2004, 2007, and 2011. The Bangladesh DHS does not follow the same individuals, or households across survey years.

[13] For example this includes husbands, brothers, sons, son-in-laws etc.

[14] For more information on sampling see final reports for Bangladesh DHS (Mitra *et al.* (2001), Mitra *et al.* (2005), Mitra *et al.* (2009), Mitra *et al.* (2013).

In conjunction with the DHS survey modules, I use the restricted access geographic files to obtain approximate location information of each household. The DHS does not provide geographic information for exact households for confidentiality reasons. Each household is assigned to a DHS cluster and from the geographic files I obtained the latitude and longitude of each DHS cluster. Households are reported to be within 2 kilometers of the GPS coordinates of the DHS cluster. There are over 300 DHS clusters for each wave of the survey. The DHS clusters are not in the same location year to year. Starting in 2004, for each DHS cluster, information was collected on the quality and presence of infrastructure, type of health care services provided nearby, and distance to schools. I use this data to account for differences across DHS clusters in distance to schools, piped water and electricity access.

The second data source, a list of all Bangladesh Garment Manufacturers and Exporters Association (BGMEA) members, provides the factory name, address, year of establishment, and number of current employees for each member.[15] I determined the latitude and longitude of all BGMEA factories in Bangladesh using the factory address. Due to limitations in geocoding exact addresses in Bangladesh, each factory is matched to the centroid of their neighborhood. There are 325 neighborhoods that have a garment factory. For each neighborhood, I know the number of garment factories operating at different points in time based upon the factory's year of establishment.

3.2 Defining Exposure to the Garment Industry

To determine an individual's exposure to increased employment opportunities through the garment industry, brought about by the elimination of quotas, I use location information for both households

[15] I obtained this list from the BGMEA in September 2013.

and garment factories to create a measure of factory density surrounding an individual's home. The variable I use to measure the impact of the policy change is the number of garment factories in 2004 (prior to the elimination of quotas) within a 10 kilometer catchment area of each DHS cluster. I construct this variable for each DHS cluster in each year using a factory's year of establishment. The DHS cluster point is the centroid of the 10 kilometer catchment area. I use a 10 kilometer catchment area as my survey with garment factory workers suggests workers usually walk or take the bus to work for upwards of an hour. Results are robust to 5 and 15 kilometer catchment areas.

I use the 2004 number of factories as a measure of factory density as it captures potential new factories in the 10 kilometer area and increased employment opportunities in existing factories after the elimination of quotas. There is a strong correlation (0.75) between the number of factories in 2004 for a catchment area of a DHS cluster and the increase in the number of factories for that catchment area between 2004 and 2007. Using the 2004 number of factories in a catchment area also captures expansion in employment opportunities after 2004 as current factories expanded their workforce. Data from the survey I conducted with garment factory owners finds factories increased their number of employees by 68 percent between 2005 and 2014.

For the analysis, I categorize the 10 kilometer catchment areas for each DHS cluster into high and low factory density categories. I classify high factory density areas as those above the 25th percentile in the 2004 factory density distribution as there is a distinct break in the distribution of factories at this point. Each individual within a DHS cluster for a given year is assigned either the high or low category based on their cluster's 10 kilometer catchment area.

Since DHS clusters are not in the same location for different years of the survey, one concern is

that DHS cluster location is not representative across the four survey years I use. To alleviate this concern I look at the distribution of the number of 2004 factories for each DHS survey wave that I use. Figure 5, shows the distribution of the number of 2004 factories for DHS survey years before the elimination of quotas (1999 and 2004), and after the elimination of quotas (2007 and 2011). The DHS communities in the two time periods have a similar distribution in the number of 2004 factories, indicating that DHS cluster location is representative from 1999 to 2011.

One potential concern with the factory data is that not all garment factories are captured in the BGMEA list. There are likely a few factories that are not registered members of the BGMEA.[16] These factories are likely to be smaller and their exclusion is unlikely to significantly impact results. There are also factories that closed prior to September 2013, when I obtained the list of factories. I do not observe these factories in the data. It is possible that factory survival is correlated with worker quality, which would bias my estimates away from zero. However, field survey results with garment factory owners and managers indicate only 2 percent of factories viewed worker quality as very important for viability.

3.3 Dependent Variables

My primary outcomes of interest are labor market measures for a woman and her husband, measures of the woman's decision-making power within the household, and measures of domestic violence. For labor market measures, I use an indicator for whether or not a woman is currently working and the occupation of both women and their husbands. To measure occupation in a consistent

[16] All woven garment factories are members of the BGMEA and 90 percent of knitwear factories are (BGMEA, 2013).

way for both women and their husbands across all survey years, I combine factory and semi-skilled occupations into one occupation category. This is done since prior to 2011 the DHS Women's Survey pooled together these occupations.[17]

Women's household decision making power is measured using the question "Who usually makes decisions about...", where the options include (1) the respondent (i.e. the woman), (2) husband, (3) respondent and husband jointly, (4) someone else, (5) respondent and someone else jointly. The question is asked about four topics: large household purchases, the woman's own health care, their children's health care, and decisions about family visits. I construct a binary measure for each of the topics that equals one if the woman responded with (1), (3), or (5) indicating that she had some say in the decision.

To measure the incidence of domestic violence and the husband's attitudes towards domestic violence I use the domestic violence module from the 2004 and 2007 DHS Men's survey.[18] I construct a binary measure that equals one if the husband thinks it is appropriate to physically harm his wife for any reason and a binary measure to indicate if the husband reports being the instigator of domestic violence in the last 12 months.[19] To assess the impact on children's education, I use an indicator for whether the child is currently enrolled in school.

[17] In the woman's employment module it also asks for the reported occupation of her husband. This is the variable that I use, not the one from the Men's Survey. Which is why there are 4,253 observations.

[18] The DHS did not include this module in 1999 or 2011.

[19] Reasons for harming his wife include if the wife goes out without permission, neglecting the children and arguing with the husband. Indicators of domestic violence are if the man pushed, slapped, punched, kicked, choked, threatened, or raped his wife.

3.4 Sample Age Restrictions

I restrict the sample to women age 18 - 40 in order to focus on women who are most likely to be affected by the garment industry. This gives a final sample of 4,339 women who have ever been married. Similarly, I restrict the sample of husbands to those aged 18 - 50, which leaves a sample of 670 men. When considering educational investments I consider only children age 6 - 18 whose mother was also surveyed in the household. There are 3,783 children age 6 - 18.

3.5 Summary Statistics

Descriptive statistics of key variables are presented in panel A of table 1. Means are presented for the time period before the elimination of quotas (1999 and 2004), by the high and low density groups. All differences in means between high and low density areas for women's characteristics and outcomes are small and statistically insignificant, showing that the areas are similar before the elimination of quotas. On average women are 28 years old, currently married (92 percent), muslim (92 percent) and have 4.7 to 5.1 years of education. These women are short by international standards with a height-for-age z score ranging from -2.2 to -2.3. Less than a third of the women are currently working at the time of the survey and less than 10 percent are working in a factory or semi-skilled occupation. Roughly 60 to 70 percent of the women have some input on the four measures of household decision-making. The community characteristics, specifically access to piped water, are different between high and low density areas prior to the elimination of quotas. This highlights the infrastructure differences between the two groups, suggesting the importance of controlling for these characteristics in the estimation strategy.

3.6 Qualitative Data

My analysis is supplemented by two surveys I fielded in June 2014. The first was conducted with individuals who work in garment factories to gain their perspective on ways in which garment factory job opportunities have affected their life, their commute patterns, their childcare practices, and how they utilize their wages. Workers were randomly sampled from 5 areas in, or close to, Dhaka: Mirpur, Gazipur, Mohammadpur, Mohakhali, and Narayanganj. The second survey was conducted over the phone with garment factory owners (or managers), to learn why factories locate where they do, the demographic composition of their employees, as well as which international (and national) business practices affect them most. A stratified sampling plan that was based on factory size, location, year of establishment, and location inside an EPZ was used to sample factories. Summary statistics of key variables are described in Appendix A.[20]

4 Estimation Strategy

I seek to determine the overall effect of increased garment factory job opportunities on women's labor market outcomes, their decision-making power, likelihood of domestic violence and investments in their children. I take advantage of spatial variation in the number of factories within commuting distance of a woman's household and temporal variation before and after the elimination of quotas to estimate a difference-in-difference specification. The double difference model for individual i, in DHS cluster c, in district d, at year t is estimated with the following linear regression:

[20] Survey instruments available upon request.

$$
\begin{aligned}
Y_{icdt} &= \beta_0 + \beta_1 HighDensity_c + \beta_2 HighDensity_c * After_t + \gamma_t + \mu_d + \\
&\quad AgeFE + X_c^{'}\sigma + V_i^{'}\theta + \epsilon_{icdt} \qquad (1)
\end{aligned}
$$

Where Y_{icdt} is measures of employment, women's household-decision making power, domestic violence, and school enrollment for children. $HighDensity_c$ is a binary variable that takes on the value 1 if DHS cluster c, is above the 25th percentile in 2004 factory density. $After_t$ is a binary variable indicating if the year is after 2005, when the quotas were eliminated. γ_t is a vector of year fixed-effects that account for any national changes correlated with the number of factories within commuting distance of a woman's household and the outcomes. District fixed effects, μ_d, control for time-invariant district-level characteristics. Districts average 250 square km in size and have on average over 200 DHS communities. The inclusion of age fixed-effects control for differences in the outcomes due to age as well as other events that may be correlated with age. In addition to the fixed-effects, I include a vector of DHS community specific controls, $X_c^{'}$, that contain electricity access, piped water access, distance to local boys schools, and whether or not factories within the 10 kilometer radius of the DHS community are located in an EPZ zone. These controls help account for infrastructure differences between communities and differences between factories located in an EPZ. The vector of individual level controls, $V_i^{'}$, includes current marital status and religion. The vectors $X_c^{'}$ and $V_i^{'}$ differ over time because the sample is a repeated cross section of individuals. Standard errors are clustered at the DHS cluster level to allow the error terms of individuals within a community be correlated with each other.

The variable $HighDensity_c$ is similar to an intent-to-treat treatment variable in that, when

interacted with $After_t$, it measures the average impact of exposure to increased labor market opportunities in high factory density areas after the elimination of quotas. The coefficient β_1 represents the difference in the mean of the outcome between high and low factory density areas before 2005. If the high and low factory density areas are similar prior to the policy change β_1 will be close to zero. β_2, gives the double-difference estimate and is the difference in the mean of the outcome between high and low factory areas after 2005, subtracting out the differences in the two areas prior to 2005. In order to make appropriate comparisons, I limit the sample to communities that have at least one garment factory in 1999. This effectively restricts the analysis to dense urban areas in Dhaka and Chittagong.[21]

This model assumes that high and low factory density areas would have had the same trend in outcomes if the elimination of quotas did not occur. The identifying assumption specifies that high density areas would have grown the same way as the low density areas in the absence of the elimination of quotas. This is not a testable assumption, but seems likely to hold given that the trends between 1999 and 2004 are similar between high and low density groups. For example, panel B of table 1 shows the difference in women's characteristics and outcomes between 1999 and 2004 for both factory density groups, and the subsequent difference in means. All differences are small and statistical insignificant except for two characteristics. A woman's completed years of education significantly decreases in 2004 in low density areas compared to low density areas in 1999, causing the difference in means to be large, 2.2 years, but not statistically significant. This abnormal dip in the raw data disappears by 2007 as average levels of education rise to above their

[21] All regressions are similar in magnitude, sign and significance if I limit the sample to clusters that have at least one garment factory in 2004.

1999 levels in the low density areas. The difference in means for whether a woman is currently working is statistically different from zero. Women in low density areas were 11 percent more likely to be currently working in 2004 when compared to 1999. The likelihood of currently working in high density areas was essentially unchanged between 1999 and 2004. This summary statistic suggests the trend in low-density areas is too large which may negatively bias the results in my main empirical specification.

5 Results

5.1 Labor Market Outcomes

The effects of the elimination of quotas on labor market characteristics are presented in Table 2. In order for an increase in labor market opportunities for women to affect women's decision-making power, it must be true that some women's labor market outcomes are affected. When considering this in a household bargaining model, it implies that the threat point must be binding for some women. Table 2 presents results for the probability that a woman is currently working, the probability that she is currently working in a factory/semi-skilled occupation, and the probability that her husband is working in a factory/semi-skilled occupation. For each outcome, results are shown with and without DHS cluster characteristics. Results including 1999, where there are no DHS cluster characteristics, are shown in appendix table 3. The results do not differ in sign, magnitude or significance with the inclusion of 1999.

Table 2 highlights there are important treatment effects on employment for women but not for men. Specifically, column 1 shows that women who live in high density areas after the elimination

of quotas are 12 percentage points more likely to be working than women in low density areas after the elimination of quotas. This corresponds to a 39 percent increase at the mean.[22] It is important to note that the point estimate is close to zero for the variable $HighDensity$, showing that high and low density areas were similar prior to the elimination of quotas. The addition of DHS cluster characteristics in column 2 leaves the point estimate on whether or not a woman is currently working essentially unchanged, providing some evidence that differences in access to utilities are not biasing the results. The probability that a woman is currently working in a factory/semi-skill occupation is statistically different between the high and low density areas after 2005, columns 3 and 4 of table 2. Women who live in high density areas after the elimination of quotas are 7 percentage points, or 64 percent, more likely to have a factory/semi-skill job than women in low density areas after the elimination of quotas.

There are no statistically significant effects of the elimination of quotas on the likelihood that men are working in a factory/semi-skilled occupation, column 5 and 6 of table 2. The results for men's employment are noisy and negative. In column 6, men who live in high density areas after the elimination of quotas are 20 percent less likely to work in a factory/semi-skill job than men in low density areas after the elimination of quotas. This result also serves as a falsification test, as one would not expect men's employment to increase because women fill most garment factory jobs. It also helps shed light on potential mechanisms behind the results. It is not likely that men have changed their attitudes towards women's decision-making power through more interaction with women. Specifically, I can rule out the story that men living in high density areas have updated

[22]Going from the mean number of factories in a low density area to the mean number of factories in a high density area is a 1.7 standard deviation increase in the number of factories.

their expectations about women's decision-making power because they themselves are working more in factories and are thus exposed to more women.

5.2 Household Decision Making

Household decision-making results for all women are presented in Table 3. I only present the most restrictive model where DHS cluster characteristics are included. All four measures of household decision-making power show a statistically significant positive effect of being in high density areas after the elimination of quotas at the one percent level. Column 1 indicates women who live in high density areas after the elimination of quotas are 19 percentage points more likely to have input in final decisions regarding their own health than women in low density areas after the elimination of quotas. This corresponds to a 33 percent increase at the mean. Importantly, the point estimate on $HighDensity$ is close to zero for all measures of household decision-making, indicating that the level differences between the high and low factory density groups were similar prior to the elimination of quotas.

Most employment opportunities in the Bangladesh garment industry pay low wages and are not sought out by women of higher socio-economic status. Table 4 examines the hypothesis that effects on household decision-making should be concentrated among those in the lowest wealth quartile. Using the DHS household wealth index, I split households into wealth quartiles and look at household decision-making power for women in the lowest and highest wealth quartile. Panel A of Table 4 shows, for women in the lowest wealth quartile, there are significant positive effects of increased exposure to the garment industry after the elimination of quotas on all of the household decision-making outcomes and on the probability that a woman is currently working

in a factory/semi-skilled occupation. There are no significant effects of the garment industry on decision-making power or likelihood of working in a factory/semi-skilled occupation for women in the highest wealth quartile, as shown in panel B of table 4.

5.3 Domestic Violence

Table 5 presents results for whether a significant presence of the garment industry after the elimination of quotas impacted the likelihood that a woman's husband reports being the instigator of domestic violence in the last 12 months, and their attitudes towards physically harming their wives. In column 1, husbands who live in high factory density areas after the elimination of quotas are 16.6 percentage points more likely to report having engaged in domestic violence in the last 12 months than husbands in low density areas after the elimination of quotas. This corresponds to a 50 percent increase at the mean. This negative consequence of increased job opportunities for women is likely due to the husband responding to the wife's increased decision making ability. This result is consistent with theories of "male backlash". There is no statistically significant effect on whether the husband thinks it is okay to physically harm his wife. This suggests the increases in violence are not due to a change in beliefs but rather are in response to the wife's attempts to assert herself.

5.4 Children's Enrollment Status in School

Increased exposure to the garment industry may impact whether or not a child is in school through an income effect, or through increased expectations about the returns to education. Table 6 shows results of equation (1) for the current enrollment status of children age 6 - 18 of the ever married

women age 18 - 40. Results are presented separately for 6 - 12 and 13 - 18 year olds because there may be differential effects for primary and secondary school age children. Children age 6 - 12 in high density areas are 8 percentage points, or 9.6 percent, more likely to be currently enrolled in school after the elimination of quotas than children age 6 - 12 in low density areas after the elimination of quotas. This effect size is similar to the effects of increased job opportunities due to call centers in India (Oster and Millett, 2013). There is no effect on the 13 - 18 age group.

6 Robustness

6.1 Falsification Tests

It is possible there are time varying omitted variables that are correlated with high and low factory density areas that are affecting the overall level of development in an area, which would lead to biased estimates. To help eliminate this concern I consider two falsification variables, a woman's height-for-age z-score and her years of completed education.[23] Since these are adult women, I expect the intensity of the garment industry to not affect these outcomes. Results are presented in Table 7. Neither variable shows a statistically meaningful relationship, suggesting that factory density in the garment industry is not spuriously correlated with other indicators of development. It also suggests there are not selection differences in the quality of individuals between high and low density areas.

[23] I use an internationally weighted DHS reference population to anthropometric measures into z-scores.

6.2 Migration Status

Since rural to urban migration is prevalent in Bangladesh, another concern is the results could be driven by a selection effect of migrants who moved into high density areas after the elimination of quotas. It is possible that women who migrated after the elimination of quotas were more empowered to begin with and are positively biasing the results. To explore this possibility I create an indicator, $NewMigrant_i$, for whether a woman migrated within the last two years. I use migration status within the last two years, because I want to isolate women in 2007 who moved after the policy change on January 1, 2005. To investigate if the results are driven by recent migrants, I fully interact equation 1 with $NewMigrant_i$ in the following specification:

$$\begin{aligned} Y_{icdt} = \; & \beta_0 + \beta_1 HighDensity_c + \beta_2 NewMigrant_i + \beta_3 HighDensity_c * NewMigrant_i \\ & + \beta_4 HighDensity_c * After_t + \beta_5 NewMigrant_i * After_t \\ & + \beta_6 HighDensity_c * NewMigrant_i * After_t + \gamma_t + \mu_d + AgeFE + X_c^{'}\sigma + V_i^{'}\theta + \epsilon_{icdt} \end{aligned} \tag{2}$$

All other variables are defined as in equation 1. The year fixed effects γ_t, age fixed-effects, district fixed effects μ_d, individual and community controls $X_c^{'}$ and $V_i^{'}$ are fully interacted with $NewMigrant_i$. The sample is restricted to 2004 and 2007 data, since 1999 does not have DHS cluster characteristics and 2011 does not have individual migration information. Standard errors are clustered at the DHS cluster level. β_6 is the triple difference estimator for how the outcome variable is different for new migrants in high density areas after the elimination of quotas compared to migrants in high density areas after the elimination of quotas. If new migrants were driving the results β_6 would be positive and statistically significant.

In Table 8, the coefficient on $HighDensity_c * NewMigrant_i * After_t$, for all four measures of women's household decision-making power, is positive but statistically insignificant indicating new migrants are not driving the results seen in household decision-making power. The coefficient on $HighDensity_c * After_t$ is positive for all measures of household decision-making power and statistically significant at the five or one percent level for three of the four measures. This demonstrates that non-migrants are driving the results. The negative coefficient on, $NewMigrant_i * After_t$ suggests there is some negative selection of migrants after 2005. This coefficient is statistically significant for only one measure of household decision-making.

6.3 Endogenous Factory Placement

Since I am using the 2004 number of factories to capture both increases in employment in already established factories and potential new factory employment opportunities, one concern is that new garment factories consciously choose to locate in places where women's decision-making power is already increasing. While this is unlikely given the discussion in section 2.2, I empirically explore this concern. To do this, I consider only the 1999 DHS to estimate whether women's outcomes in 1999 predict the change in the number of factories in that location between 1999 and 2004. To do this I use Equation (3):

$$(Factories2004 - Factories1999)_{cd} = \beta_0 + WomensOutcomes'_{icd}\delta + \mu_d + AgeFE + \epsilon_{icd} \quad (3)$$

Where $WomensOutcomes'_{icd}$ is a vector of women's characteristics including her decision-decision making ability, marital status, height, religion and education. All other variables are

the same as defined in equation 1. Standard errors are clustered at the DHS cluster level.

Results are presented in Table 9 for all of the women's outcomes of interest. There is no evidence that new factories are choosing to locate based on the characteristics of the surrounding population in 1999, as none of the coefficients are statistically significant or meaningful in magnitude. This fact is supported by my survey data, which suggests that the number one reason factories locate where they do is because of access to roads and suitable buildings.

7 Conclusion

This paper examines the effects of increased labor market opportunities on women's household decision-making power, likelihood of domestic violence, and school enrollment for children. I use evidence from the explosive growth in the Bangladesh garment industry after the liberalization of trade policy in 2005. The garment industry in Bangladesh primarily hires women, and gives poor women who had limited options in the formal labor market an opportunity to work outside of the home. The findings show household decision-making power increased for women in areas that had high levels of factory density after the liberalization of trade policy. Results are concentrated among women in the lowest wealth quartile, indicating that garment factory jobs provide realistic options for women of lower socio-economic status. In a household bargaining model, the threat point for women of lower socio-economic status is changed by the increase in garment factory employment opportunities.

In addition to the increased household decision-making power, increased labor market oppor-

tunities for women had the negative consequence of increased domestic violence. Women living in high factory density areas after trade liberalization were 50 percent more likely to experience domestic violence from their husbands in the last 12 months than women in low factory density areas after trade liberalization. This result is particularly important as it highlights the potential for unintended consequences of policies aimed at increasing women's bargaining power. An important avenue for continuing research is to empirically understand the non-monotonic relationship between domestic violence and women's empowerment.

This paper adds to an important literature on the effects increased opportunities for women in the formal labor market. It is salient to other settings as the phenomenon of increased female participation in the formal labor market, due specifically to growth in the garment industry, is not unique to Bangladesh as many countries in South East Asia have transformed in a similar way (Nordas, 2004).

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Figure 1: Garment Factories and Employment by Year

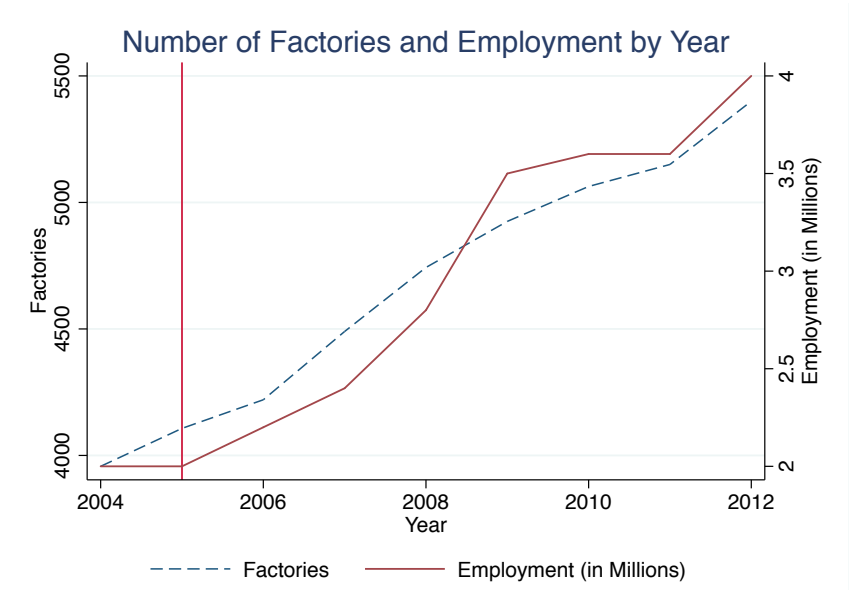

Figure 2: Export Price and Volume: Garments

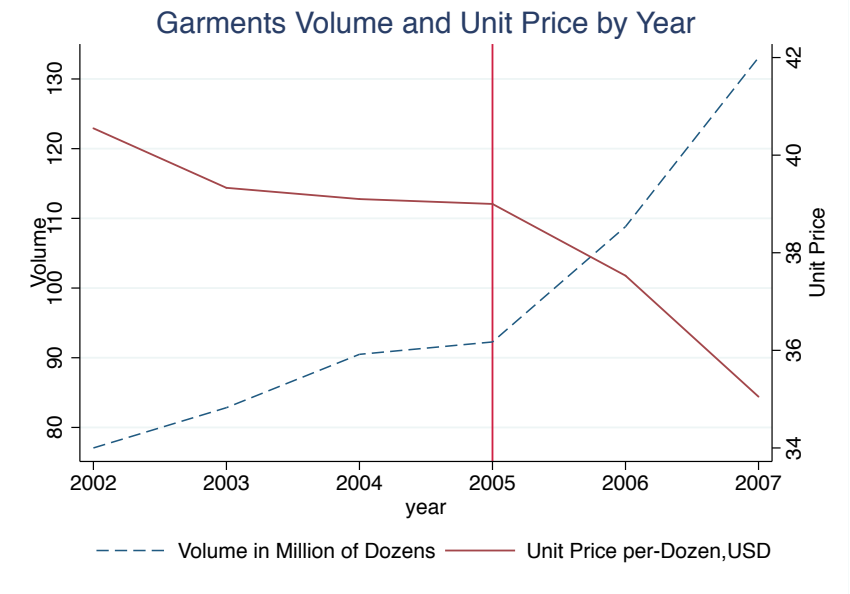

Figure 3: Export Price and Volume: Fresh and Frozen Fish

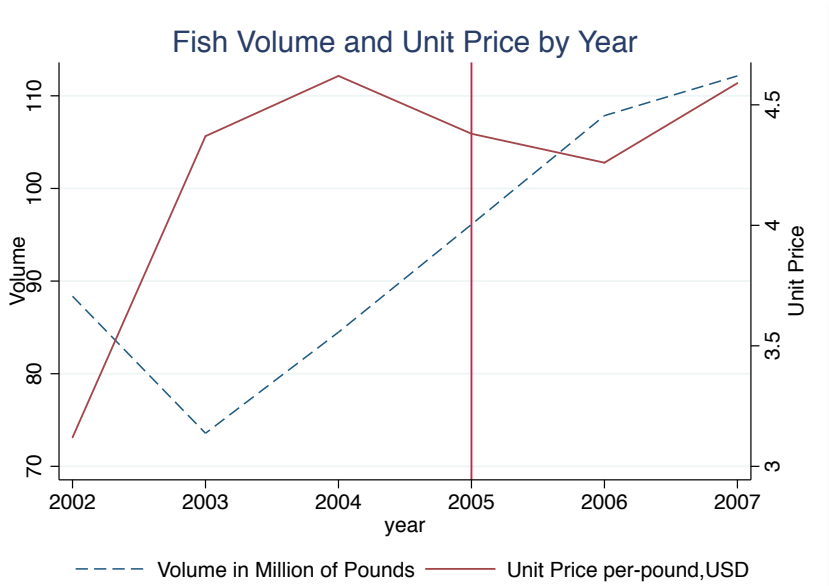

Figure 4: Export Price and Volume: Jute Goods

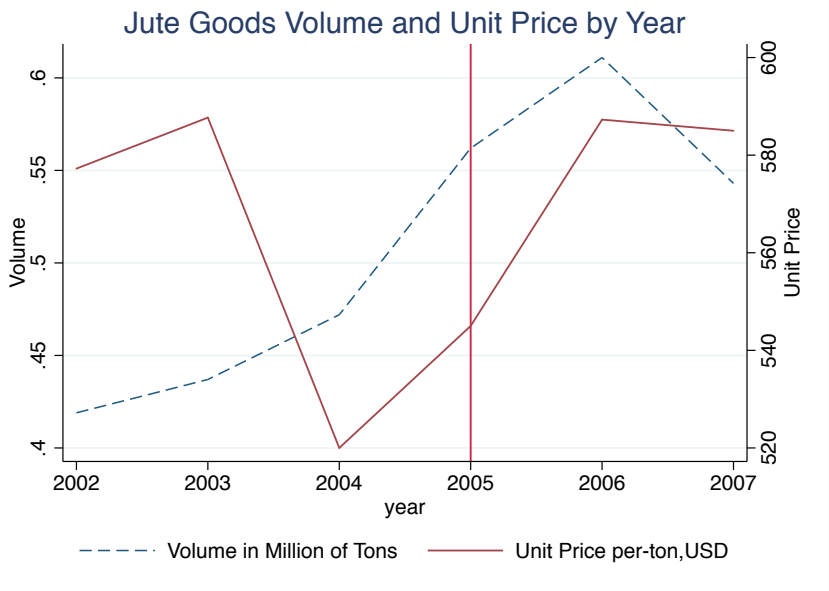

Figure 5: Number of Factories in 2004 in 10km Catchment Area

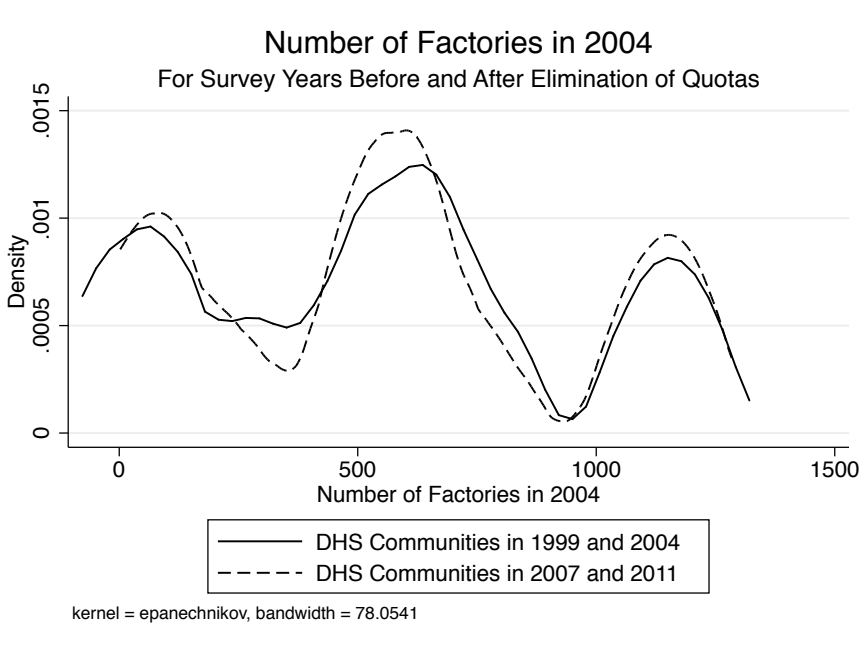

Table 1: Summary Statistics and Trend Analysis Before Elimination of Quotas

	Panel A: Summary Statistics for 1999 and 2004 Combined									Panel B: Trend Analysis, 2004 - 1999					
	Low Density			High Density						Low Density		High Density			
	Mean	SE	N	Mean	SE	N	Diff in Means	T-Stat	Total N	'04 - '99	SE	'04 - '99	SE	Diff in Means	T- Stat
Women's Characteristics															
Age	28.81	0.48	450	28.59	0.37	1450	-0.22	-0.43	1900	-0.23	0.99	0.25	0.37	0.49	0.95
Years of Completed Education	4.53	0.80	450	4.96	0.59	1450	0.43	0.47	1900	-2.55	1.34	-0.26	0.52	2.28	1.59
Currently Married (=1)	0.92	0.01	450	0.91	0.01	1450	0.00	-0.25	1900	0.00	0.02	0.02	0.02	0.02	0.78
Muslim (=1)	0.91	0.04	450	0.92	0.03	1450	0.01	0.25	1900	0.07	0.07	-0.04	0.04	-0.11	-1.36
Height-for-Age Z-Score	-2.26	0.07	353	-2.16	0.06	1079	0.10	1.33	1432	-0.01	0.14	0.04	0.07	0.05	0.29
Women's Outcomes															
Currently Working (=1)	0.31	0.03	450	0.30	0.04	1450	-0.01	-0.31	1900	0.11	0.05	-0.01	0.03	-0.12	-2.00
Working in Factory/Semi-Skilled Occ.	0.09	0.03	450	0.10	0.04	1450	0.01	0.20	1900	0.08	0.05	0.03	0.02	-0.04	-0.84
Husband Working in Factory/Semi-Skilled Occ.	0.35	0.04	444	0.40	0.05	1420	0.05	1.02	1864	0.06	0.08	0.03	0.03	-0.04	-0.45
Input on Own Health Decisions (=1)	0.61	0.04	450	0.59	0.04	1450	-0.02	-0.32	1900	0.00	0.09	-0.08	0.04	-0.08	-0.89
Input on Large Purchases (=1)	0.64	0.03	450	0.69	0.03	1450	0.05	1.27	1900	0.04	0.06	0.00	0.03	-0.03	-0.47
Input on Family Visits Decisions (=1)	0.67	0.03	450	0.69	0.03	1449	0.02	0.61	1899	0.01	0.07	0.01	0.00	0.00	0.05
Input on Child Health Decisions (=1)	0.66	0.04	442	0.68	0.03	1410	0.02	0.44	1852	-0.02	0.07	-0.07	0.03	-0.05	-0.65
Community Characteristics															
Number of Factories in 10km in 2004	33.84	11.91	450	706.17	11.39	1450	672.33	16.75	1900	29.25	21.29	-13.44	77.35	-42.69	-0.53
EPZ factory located in 10km (=1)	0.08	0.06	450	0.42	0.06	1450	0.34	3.94	1900	0.04	0.11	0.22	0.12	0.18	1.11
Piped Water (=1)	0.00	0.00	238	0.61	0.00	773	0.61	7.14	1011						
km to nearest boys school	1.13	0.31	169	0.68	0.39	684	-0.45	-1.32	853						

Notes: Height-for-Age Z-score is based on an international WHO reference population. I exclude piped water and distance to nearest boys school from the trend analysis because the 1999 Bangladesh DHS does not have DHS cluster characteristics. Standard errors clustered at the DHS cluster level.

Table 2: Effect of Living Near Garment Factories on Labor Market Outcomes

	Dependent Var: Woman is Currently Working		Dependent Var: Woman is Currently Working in Factory/Semi-Skill Occupation		Dependent Var: Husband is Currently Working in Factory/Semi-Skill Occupation	
	(1)	(2)	(3)	(4)	(5)	(6)
High Density	0.009	-0.005	0.070	0.058	0.152**	0.120
	(0.060)	(0.064)	(0.056)	(0.061)	(0.072)	(0.078)
High Density * After	0.121**	0.120**	0.070*	0.070*	-0.086	-0.079
	(0.049)	(0.049)	(0.041)	(0.041)	(0.058)	(0.059)
Includes DHS Cluster Characteristics	No	Yes	No	Yes	No	Yes
Mean Dependent Variable in 2004	0.31	0.31	0.11	0.11	0.4	0.4
Observations	3,450	3,450	3,450	3,450	3,380	3,380
R-squared	0.097	0.099	0.075	0.076	0.052	0.053

Notes: Data comes from the 2004, 2007, and 2011 Bangladesh DHS survey and BGMEA database. All regressions include age fixed effects, district fixed-effects, individual controls for marital status and religion. DHS cluster controls are EPZ status, piped water and electricity access, and distance to local boys school. Sample consists of ever married women age 18 - 40 and their husbands. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect of Living Near Garment Factories on Household Decision-Making

	Dependent Variable: Does woman have a final say in decisions regarding…			
	(1) Woman's Own Health	(2) Large Household Purchases	(3) Family Visits	(4) Their Children's Health
High Density	-0.079	0.055	0.053	0.028
	(0.071)	(0.073)	(0.072)	(0.061)
High Density * After	0.190***	0.157***	0.178***	0.128***
	(0.060)	(0.058)	(0.058)	(0.049)
Mean Dependent Variable in 2004	0.57	0.69	0.7	0.65
Observations	3,358	3,358	3,357	3,353
R-squared	0.085	0.067	0.066	0.090

Notes: Data comes from the 1999, 2004, 2007 and 2011 Bangladesh DHS survey and BGMEA database. It is a 1.7 standard deviation increase in the number of factories between low and high density areas. All regressions include age fixed effects, district fixed effects, individual controls for marital status and religion and community controls for EPZ status, piped water and electricity access and distance to local boys school. Sample consists of ever married women age 18 - 40. The excluded year is 2004. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Effect of Living Near Garment Factories by Wealth Quartile

Panel A: Women in Lowest Wealth Quartile Age 18 - 40

	Dependent Variable: Does woman have a final say in decisions regarding…				
	(1) Woman Working in Factory/Semi-Skill Occ.	(2) Woman's Own Health	(3) Large Household Purchases	(4) Family Visits	(5) Their Children's Health
High Density	0.102	-0.061	0.161	0.067	0.001
	(0.127)	(0.103)	(0.100)	(0.099)	(0.095)
High Density * After	0.130*	0.192**	0.201**	0.199**	0.191**
	(0.073)	(0.088)	(0.088)	(0.088)	(0.076)
Mean Dependent Variable in 2004	0.12	0.58	0.64	0.66	0.61
Observations	836	808	808	807	803
R-squared	0.158	0.106	0.101	0.092	0.101

Panel B: Women in Highest Wealth Quartile Age 18 - 40

	(1)	(2)	(3)	(4)	(5)
High Density	0.083	-0.032	-0.258	0.128	0.221
	(0.067)	(0.224)	(0.159)	(0.227)	(0.162)
High Density * After	-0.045	0.063	0.163	-0.060	-0.207
	(0.050)	(0.180)	(0.119)	(0.200)	(0.138)
Mean Dependent Variable in 2004	0.04	0.53	0.68	0.72	0.62
Observations	832	813	813	813	813
R-squared	0.068	0.174	0.187	0.165	0.181

Notes: Data comes from the 1999, 2004, 2007 and 2011 Bangladesh DHS survey and BGMEA database. It is a 1.7 standard deviation increase in the number of factories between low and high density areas. All regressions include age fixed effects, district fixed effects, individual controls for marital status and religion and DHS cluster controls for EPZ status, piped water and electricity access and distance to local boys school. Sample consists of ever married women age 18 - 40 and the husbands. The excluded year is 2004. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Effect of Living Near Garment Factories on Husband's Reported Domestic Violence

	(1) Domestic Violence in Last 12 Months	(2) Okay to physically harm wife
High Density	0.089	0.051
	(0.080)	(0.136)
High Density * After	0.166*	0.099
	(0.095)	(0.126)
Mean Dependent Variable in 2004	0.32	0.44
Observations	658	670
R-squared	0.152	0.174

Notes: Data comes from the 2004 and 2007 Bangladesh DHS Mens survey and BGMEA database. It is a 1.7 standard deviation increase in the number of factories between low and high density areas. All regressions include age fixed effects, district fixed effects, individual controls for marital status and religion and DHS cluster controls for EPZ status, piped water and electricity access and distance to local boys school. Sample consists of husbands of ever married women. Indicators for domestic violence are if the man pushed, slapped, punched, kicked, chocked, threatened or raped the wife. Reasons for physically harming wife are if she goes out without permission, neglects the kids or argues with the husband. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Effect of Living Near Garment Factories on Children's School Enrollment Status

Dependent Variable: Child Currently Enrolled in School (=1)		
	(1)	(2)
	Age 6 - 12	Age 13 - 18
High Density	-0.052	-0.022
	(0.051)	(0.099)
High Density * After	0.080**	-0.093
	(0.036)	(0.077)
Mean Dependent Variable	0.83	0.55
Observations	2,320	1,463
R-squared	0.125	0.313

Notes: Data comes from 2004, 2007 and 2011 Bangladesh DHS household roster and BGMEA database. It is a 1.7 standard deviation increase in the number of factories between low and high density areas. All regressions include age fixed effects, district fixed effects, age of mother, age of mother squared, individual controls for marital status, religion and mother's years of education. DHS cluster controls are EPZ status, piped water status, electricity access, and distance to local boys school. Sample consists of children age 6 - 18 of ever married women age 18 - 40. Excluded year is 2004. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Effect of Living Near Garment Factories on Women's Falsification Variables

	(1) Height-for-Age Z Score	(2) Years of Education
High Density	0.081	0.127
	(0.163)	(0.701)
High Density * After	-0.086	-0.966
	(0.137)	(0.634)
Mean Dependent Variable	-2.17	4.6
Observations	3,388	3,447
R-squared	0.025	0.131

Notes: Data comes from the 2004, 2007 and 2011 Bangladesh DHS survey and BGMEA database.It is a 1.7 standard deviation increase in the number of factories between low and high density areas. All regressions include age fixed effects, district fixed effects, individual controls for marital status and religion and DHS cluster controls for EPZ status, piped water and electricity access and distance to local boys school. Sample consists of ever married women age 18 - 40. Height-for-Age Z score is calculated using WHO international standars. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Effect of Living Near Garment Factories on Household Decision-Making by Recent Migration Status

	Dependent Variable: Does woman have a final say in decisions regarding…			
	(1) Woman's Own Health	(2) Large Household Purchases	(3) Family Visits	(4) Their Children's Health
High Density	0.079	0.151*	0.112	0.113
	(0.061)	(0.082)	(0.069)	(0.093)
New Migrant	0.375	0.214	-0.037	0.237
	(0.285)	(0.295)	(0.230)	(0.295)
High Density * New Migrant	0.088	0.101	0.119	0.067
	(0.200)	(0.235)	(0.192)	(0.224)
High Density * After	0.155**	0.163**	0.241***	0.057
	(0.069)	(0.072)	(0.080)	(0.067)
New Migrant * After	-0.189*	-0.111	0.026	-0.136
	(0.096)	(0.167)	(0.119)	(0.136)
High Density * New Migrant * After	0.137	0.039	-0.016	0.085
	(0.112)	(0.172)	(0.133)	(0.150)
Mean Dependent Variable Migrants	0.54	0.69	0.66	0.59
Mean Dependent Variable Non-Migrants	0.57	0.68	0.7	0.66
Observations	2,009	2,009	2,008	2,004
R-squared	0.126	0.110	0.119	0.109

Notes: Data comes from the 2004 and 2007 Bangladesh DHS survey and BGMEA database. New Migrant =1 if woman within the last two years. It is a 1.7 standard deviation increase in the number of factories between high and low density areas. All regressions include age fixed effects, district fixed effects, individual controls for marital status and religion and DHS cluster controls for EPZ status, piped water and electricity access and distance to local boys school. Sample consists of ever married women age 18 - 40. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Endogenous Factory Placement

Dependent Variable: Number of Factories in 2004 - Number of Factories in 1999, for 1999 DHS Clusters	
	(1)
Woman has input on her own health (=1)	3.006
	(4.057)
Woman has input on large purchases (=1)	-4.818
	(4.952)
Woman has input on family visits (=1)	6.245
	(3.820)
Woman has input on child health (=1)	5.441
	(6.102)
Height-for-Age Z-Score	-0.098
	(1.774)
Years of Education	0.579
	(0.642)
Muslim (=1)	1.397
	(8.787)
Currently Married (=1)	-5.427
	(15.996)
Mean Dependent Variable	121
Observations	427
R-squared	0.795

Notes: Data comes from the 1999 DHS and BGMEA database. Regression includes age fixed effects and district fixed effects. Sample consists of ever married women age 18 - 40. Standard errors are clustered at the DHS cluster level. *** p<0.01, ** p<0.05, * p<0.1

Appendix A: Table 1

Garment Factory Worker Questionnaire Summary Statistics

	Mean	SD	N
Garment Worker Characteristics			
Age	23.37	5.52	54
Female (=1)	0.93	0.26	54
Currently Married (=1)	0.63	0.49	54
Age of Marriage	17.24	3.96	38
Does spouse currently live with you? (=1)	0.82	0.38	39
Married before started work in garment factory? (=1)	0.50	0.51	36
Years of Completed Education	5.44	3.51	54
Have children? (=1)	0.51	0.50	54
If you have children…			
… Number of boys	0.92	0.60	28
… Number of girls	0.85	1.00	28
… Number of boys under age 5	0.50	0.58	28
… Number of girls under age 5	0.28	0.53	28
… Age of youngest child	5.32	3.23	28
If you have children under age 5…			
… Mother/Mother-in-Law watches them while you work (=1)	0.67	0.49	18
… Other family watches them while you work (=1)	0.28	0.46	18
Employment and Commuting Characteristics			
Years at current factory	2.84	2.67	54
Total years working at garment factory	4.35	3.43	54
Number of Factroies youhave worked at	1.69	0.86	54
Is garment factory job your first job where you earn a wage? (=1)	0.83	0.38	54
Did you start garment factory job immediately after leaving school? (=1)	0.25	0.43	53
Did you leave school early to work in garment factory? (=1)	0.36	0.48	52
How do you usually get to work…			
… by walking (=1)	0.69	0.47	54
… by bus (=1)	0.19	0.39	54
… by rickshaw (=1)	0.06	0.23	54
… by CNG (=1)	0.07	0.26	54
How many minutes does it take you to get to work?	23.80	21.29	54
Approximate distance from house to work (km)	2.73	2.69	20

	Mean	SD	N
Migration Characteristics			
Did you migrate to find work in a garment factory? (=1)	0.53	0.50	54
If you did migrate to find work in a garment factory…			
… How many years ago did you migrate?	8.67	7.59	28
… Do you return home by bus? (=1)	0.65	0.48	29
… Do you return home by train? (=1)	0.07	0.26	29
… Do you return home by boat? (=1)	0.21	0.41	29
… How long does it take you to return home (hours)?	9.23	6.52	27
… Approximate distance to original home (km)?	314.77	168.13	9
… Did you migrate with your family? (=1)	0.59	0.50	29
… Did you migrate alone? (=1)	0.41	0.50	29
How Garment Work has Your Impacted Life			
Since working in a garment factory do you have more, less or the same of the following…			
Independence from spouse and/or family			
…more	0.54	0.50	54
…less	0.00	0.00	54
…the same	0.46	0.50	54
Decision making authority overall			
…more	0.65	0.48	54
…less	0.02	0.14	54
…the same	0.33	0.48	54
Decision making authority over household purchases			
…more	0.67	0.48	54
…less	0.02	0.14	54
…the same	0.31	0.47	54
Decision making authority over your health			
…more	0.61	0.49	54
…less	0.09	0.29	54
…the same	0.30	0.46	54
Your energy and health			
…more	0.43	0.50	54
…less	0.30	0.46	54
…the same	0.28	0.45	54
Why Garment Work has Your Impacted Life			
Because you now have more money for yourself? (=1)	0.98	0.14	53
Because your family now has more money with your wages? (=1)	0.93	0.26	54
Because your spouse/family view you differently because of your ability to get a job in a garment factory? (=1)	0.81	0.39	53
Because the overall view of women has changed with the employment opportunities for women in garment factories? (=1)	0.94	0.23	54

	Mean	SD	N
Wages & Occupation Choice			
Who determines how your wages are spent?			
…you alone	0.22	0.42	54
…you and your spouse	0.43	0.50	54
… you and other family members	0.33	0.48	54
With your wages do you buy or save for the following?			
… food (=1)	0.83	0.38	47
… rent (=1)	0.81	0.40	47
… durable goods (=1)	0.74	0.44	47
… children's education (=1)	0.47	0.50	47
… clothing for yourself (=1)	0.98	0.15	47
… children's clothing (=1)	0.47	0.50	47
… doctor/clinic visit for yourself (=1)	0.87	0.34	47
… doctor/clinic visit for your children (=1)	0.47	0.50	47
… sending money to other family members (=1)	0.77	0.43	47
… lend money to others (=1)	0.36	0.49	47
… holidays/special occasions (=1)	0.85	0.36	47
Why did you chose to work in the factory you are currently working in…			
… close to your house (=1)	0.59	0.50	54
… refered by friend/family (=1)	0.59	0.50	54
… have extendend family that live near this factory (=1)	0.41	0.50	54
… spouse works near this factory (=1)	0.20	0.41	54
… factory offers nice ammenitites (=1)	0.89	0.32	54
… only job available (=1)	0.68	0.47	53
Occupation before working in garment factory…			
… work in your home (=1)	0.67	0.48	54
… work on a farm (=1)	0.20	0.41	54
… domestic help for someone else (=1)	0.15	0.36	54
… tailoring (=1)	0.33	0.48	54
… make handmade goods for others (=1)	0.41	0.50	54
… other (=1)	0.20	0.41	54
Occupation if you did not work in a garment factory…			
… work in your home (=1)	0.85	0.36	54
… work on a farm (=1)	0.35	0.48	54
… domestic help for someone else (=1)	0.35	0.48	54
… tailoring (=1)	0.70	0.46	54
… make handmade goods for others (=1)	0.68	0.47	53

Appendix A: Table 2

Garment Factory Owner Questionnaire Summary Statistics

	Mean	SD	N
Factory Characteristics			
Is factory located in EPZ? (=1)	0.13	0.34	54
Does factory produce woven goods? (=1)	0.35	0.48	54
Does factory produce knitwear goods? (=1)	0.50	0.50	54
Does factory produce woven and knitwear goods? (=1)	0.07	0.26	54
Does factory produce any other goods? (=1)	0.07	0.26	54
Year of Establishment	1999	8.20	54
Number of Factories owned by same owner	2.65	1.91	52
Employee Characteristics			
Number of current employees	1401.94	1826.66	54
Percent of Employees that are Male	38.11	20.83	54
Percent of Employees that are Female	61.89	20.83	54
Percent of Female Employees that are married	56.58	21.95	45
Number of employees at establishment year	460.45	468.12	51
Percent Growth in number of employees between establishment date and 2014	498.67	989.94	51
Year that Factory experienced largest employee growth	2009.55	5.14	42
Number of Employees in 2005	1348.85	1611.83	26
Employee growth between 2005 and 2014	67.65	139.22	26
Factory Amenities			
Does factory provide…			
…Cafeteria	0.78	0.42	54
…Free or reduced lunch	0.33	0.48	54
…Child Care	0.80	0.41	54
…Maternity leave	0.96	0.19	54
Importance of Laws and Policies			
How important are the following laws and policies with regard to your business…			
Agreement on Textiles and Clothing…			
…very	0.39	0.49	54
…somewhat	0.28	0.45	54
…not	0.24	0.43	54
Generalized System of Preferences			
…very	0.74	0.44	54
…somewhat	0.15	0.36	54
…not	0.06	0.23	54

	Mean	SD	N
How important are the following laws and policies with regard to your business…			
Supply of educated women working in garment industry			
…very	0.02	0.14	54
…somewhat	0.57	0.50	54
…not	0.37	0.49	54
Factory Location			
How important are the following for why your factory is located where it is…			
Good Quality Roads..			
…very important	0.96	0.19	54
Access to Suitable Building, that has gas and electricity…			
…very important	0.96	0.19	54
Located in EPZ…			
…very important	0.24	0.43	54
…somewhat important	0.39	0.49	54
…not important	0.33	0.48	54
Educated workforce who live nearby …			
…very important	0.00	0.00	54
…somewhat important	0.19	0.39	54
…not important	0.70	0.46	54
What is the number one reason why other factories locate where they do?			
Good Quality Roads (=1)	0.20	0.41	54
Access to Suitable Building, that has gas and electricity (=1)	0.30	0.46	54
EPZ (=1)	0.20	0.41	54
Available Workers (=1)	0.20	0.41	54
Migration Characteristics			
Percent of your female workers that migrated for garment work	75.47	22.08	47
Percent of female migrants that were married when migrated	37.29	25.48	41
Percent of your male workers that migrated for garment work	58.30	31.47	47
From how far way (km) do people migrate	260.98	111.28	41

Appendix A: Table 3 Effect of Living Near Garment Factories on Labor Market Outcomes

	Dependent Var: Woman is Currently Working	Dependent Var: Woman is Currently Working in Factory/Semi-Skill	Dependent Var: Husband is Currently Working in Factory/Semi-Skill
	(1)	(2)	(3)
High Density	-0.002	0.052	0.074
	(0.056)	(0.049)	(0.067)
High Density * After	0.119***	0.087**	-0.027
	(0.037)	(0.035)	(0.051)
Includes 1999	Yes	Yes	Yes
Includes DHS Cluster Characteristics	No	No	No
Mean Dependent Variable for 1999 and 2004	0.3	0.09	0.38
Observations	4,339	4,339	4,253
R-squared	0.097	0.082	0.052

Notes: Data comes from the 1999, 2004, 2007, and 2011 Bangladesh DHS survey and BGMEA database. All regressions include age fixed effects, district fixed-effects, individual controls for marital status and religion. Community controls are EPZ status, piped water and electricity access, and distance to local boys school. Sample consists of ever married women age 18 - 40 and their husbands. Standard errors are clustered at the DHS community level. *** p<0.01, ** p<0.05, * p<0.1