Effects of Safety Law Enforcement on the Manufacturing Industry in a Developing Country: Evidence from a Multinational Involvement in the Apparel Sector of Bangladesh[1]

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Abstract

Industrial workplace safety and workers' rights remain vulnerable in many developing countries. While developing countries need to accelerate the performance of their industrial sectors to address issues like unemployment and poverty, they must also address the safety and security of their workers. Bangladesh has faced increased scrutiny of its apparel export sector since the deadly collapse of Rana Plaza that killed more than 1100 workers and left injured more than 2500. Aiming to improve workplace safety and worker rights, international buyer groups, the Government of Bangladesh, ILO, and other organizations have taken various actions. The international buyer groups, Accord and Alliance, completed their initial five years tenure in December 2018. This study empirically compares the export-oriented apparel sector to non-apparel sectors before and after the international surveillance episode. The study finds that in the decade prior to the Rana Plaza collapse and international involvement, places where apparel was the dominant manufacturing sector experienced substantially higher employment growth compared to places without apparel. Over the subsequent decade, this trend reversed. In fact, registered employment declined in apparel-dominant places while it increased in places without apparel. The main contribution of this study is quantifying the potential trade-off between worker safety and employment opportunities.

[1] Work in progress

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1. Introduction

Over time with the global progress towards industrialization, the safety focus of the manufacturing industry has evolved and varies with the status of the country's development. Industrial workplace safety and workers' rights remain vulnerable in many developing countries. While developing countries need to accelerate the performance of their industrial sectors to address issues like unemployment and poverty, they must also address the safety and security of their workers. While undertaking safety measures improves safety conditions, there are factors to discourage the required measures. Akbar and Ahsan (2019) find that most significant challenges are related to cost and financial concerns and factory capacity and capability issues. Cohn and Wardlaw (2016) reveal that financing friction has adverse investment impact on workplace safety that has implications for worker welfare and firm value. There is also evidence of safety improvement without much economic cost. Kerrissey and Schuhrke (2016), studying 51 countries of global south during 1985 to 2002, show that strengthening collective labor rights, increased links with INGOs are associated with fewer workers' deaths while the economic indicators like economic globalization, foreign direct investment and exports do not have significant relationship to fatalities. Abad et al. (2013) in an assessment of consequences of OHSAS 18001 certification process on safety performance and labor productivity of Spanish firms for the period 2006–2009 show that the adoption of the OHSAS 18001 has significantly positive effects on safety performance and labor productivity. Implementations of the Occupational Safety and Health Act (OSHA) in 1970 draws quite a few evaluating studies in the USA (Bartel and Thomas, 1982; Gray and Scholz, 1990; Gray and Mendeloff, 2002). Studies cover individual-level safety intervention, safety training, group and organizational context, supervisory and managerial safety commitment (Aburumma et. al., 2019; Hofmann et al., 2017; Leitão and Greiner, 2016; Burke et al., 2011; Hale et al., 2010; Flin et al., 2000; Goldenhar and Schulte, 1996). I aim in this study to understand the implication of safety measures for employment.

This study focuses on the Ready Made Garment (RMG) or apparel, the second largest garment exporter only after China and one of the most flourishing sectors in Bangladesh. Workplace safety has improved all over, yet

injuries, fatalities, and occurrences of occupational disease are high in many countries including Bangladesh. Safety improvement requires additional expenses, where sufficient safety assurance already does not exist. However, a big part of safety improvement comes from owners' caring, awareness, and workers' responsiveness, which may not necessarily incur additional costs. For example, using a fire exit or keeping the main door unlocked may not need additional cost but care. On the other hand, to improve infrastructure and logistics, install safety tools need additional expenses. Being an underdeveloped industrial sector in a least developed country, both lacking have been the reality in the manufacturing sector of Bangladesh. After the deadly collapse of Rana Plaza that killed more than 1100 workers and left injured more than 2500, Bangladesh has faced increased scrutiny of its export sector, and an international buyer group became active (Greenhouse, 2013; Ministry of Labor and Employment, 2013). In 2013, about 250 European and American companies who sourced from Bangladesh's RMG sector signed two initiatives, Accord and Alliance, respectively, aiming to improve workplace safety and worker rights in 2300 factories. Since then, the Government of Bangladesh, the International Labor Organization (ILO), and other organizations have also taken various actions. Accord and Alliance completed their initial five years tenure in December 2018. This study will help understand the implication of safety measures in the industrial sector from a developing country perspective where existing practices undermine the workers' safety and security.

Over the period, the garments industry progressed tremendously in safety compliance under three plans of actions with the most significant progress in structural assessment of RMG factory building (Ansary and Barua, 2015). During the surveillance period buyers organization committed to share a tiny portion of the safety improvement cost lately for them who cannot afford the expenses otherwise. However, this may not be enough to survive small firms. On the other hand, the availability of modern technology may lead the large viable firms to replace workers with machines. All these can contribute to workers laid off in the manufacturing sector. Other possibilities could be including that nonviable firms shut down or merge with other firms, and the released workers get absorbed by the new structure of the firms. There is no commendable analysis about the impact of labor market

in this country of high unemployment, particularly the youth unemployment. My interest in this research is to empirically assess whether the international buyers' organization led workers' safety and welfare scrutiny contributed to the sector's performance, particularly in terms of employment. Empirical approach of this study is to compare the export-oriented garments sector to non-garment sectors before and after the international surveillance episode. While the level of performance differs across these sectors, the rate of change may have been similar prior to the spike in international enforcement. I expect to find adverse effect on the sector in terms of employment and overall industry performance, and perhaps positive impacts on workers' well-being through improved workplace safety. The main contribution of this study is quantifying the potential trade-off between worker safety and employment opportunities.

In this study with progress so far, I compare high apparel employment share upazila (similar geography to thana/sub-district) with low one in 2009 and 2019. I use 2001 and 2011 total employment to know the pre-treatment trend of employment. Expected mean of log of employment of the comparison upazila in 2001 is 10.95. Employment is 68 percent higher in upazilas that have apparel share in the total employment above 40 percent. Between 2001 and 2011 employment increased 14 percent in the comparison groups which is 41 percent in high apparel upazilas over low apparel upazila. Expected mean of log of registered employment of the low apparel intensive upazila in 2009 is 8.05. Difference in means in the base period between high and low apparel share upazila exhibits very high employment in the apparel dominant upazila; registered employment is 297 percent higher. Registered employment increases 51 percent in comparison group but decreases 79 percent in treatment group over comparison group between 2009 and 2019. Log of number of establishment is 4.71 in comparison group in 2009. Number of establishment is likely to be 146 percent higher if the upazila has apparel share above 40 percent in 2009. In 2019 number of establishment in comparison group is 37 percent higher but number of establishment is 46 percent lower in treatment upazila over comparison upazila. Mean employment in comparison upazilas in 2001 about 66 thousand, high apparel upazilas more than double that level of employment. Between 2001 and 2011 total employment increased by about 1000 per year in comparison group. In high

apparel group the annual increase was about 13,000. Comparison upazilas increase registered employment by about 300 per year between 2009-2019. High apparel upazilas show no increase in registered employment in level form over this period. The findings support the hypothesis and are the expected result in the wake of massive safety scrutiny. While safety in life is the ultimate priority, high unemployment burden is existing in Bangladesh, with about one-third of educated youth being unemployed. The findings of this study may help policymakers and industry stakeholders to undertake necessary steps to address safety, employment, and the sector's performance. I am not very sure if such a thing ever happened before; that is, the buyer companies hosted external third party organizations responded by imposing local safety laws on the local firms. In this sense, the study would be unique in its context and significance. The finding of this study, although not yet strictly conclusive, conforms with the other studies that safety improvement may pose an adverse effect to the employment in the industry unless other necessary ameliorating adjustment is ensued.

Studies have been done on the RMG sector from multidimensional aspects, including workers' health, education, women empowerment, and so on. Scientific studies that assess the effect of Rana Plaza occurrence and subsequent safety initiatives on industry performance are far and few between. To the best of my knowledge, not many study empirically evaluated the safety effect on industry performance. A recent study of the Bangladesh case by Boudreau (2019), partnering with Alliance, provides experimental evidence on the effects of private enforcement of labor law on firms and workers, where government enforcement is lacking. The study was conducted over a period of one year and covered some 84 factories. The experiment assigns worker-manager safety committees in 41 supplier establishments while another 43 establishments are the control group. The findings suggest that firms' Corporate Social Responsibility (CSR) initiatives can successfully generate public goods/curtail public bads. In particular, an index based on self-reported measures of job satisfaction and mental well-being as well as revealed preference measures, including absenteeism and turnover, significantly decrease due to the intervention. Supplier competitiveness, including labor productivity, wages, and employment, do not provide evidence of adverse effects. There are positive but small effects on labor productiv-

ity. Estimated treatment effects on wages are negative but are also close to zero and not statistically significant. Finally, estimated treatment effects on employment are close to zero. Overall, the study documents a significant improvement in labor law compliance due to the intervention. This study has experimented with a specific type of safety measure, safety committee assignment, only for one year on 84 factories that are covered by Accord. A world bank policy paper evaluates the effect of the reform on garment workers using the labor force survey data. The study revealed that although there is some improvement in terms of sick leave and workplace safety measures, it has damaging consequences in job security and wage(Bossavie,L., Cho, Y., and Heath, R., 2019). Jacobs and Singhal (2017) study 39 publicly traded global apparel retailers who have significant garment sourcing in Bangladesh to examine if the Rana Plaza building collapse has motivated the firms to source production in high-cost developed countries rather than low-cost developing countries. The study has not found any significant effect except the negative stock market effect to retailers on the collapse day, the magnitude and significance of which was dissipated by the following day. Instead, as the study mention, they reacted by developing two different agreements to improve factory and worker safety in Bangladesh —the Accord on Fire and Building Safety in Bangladesh (AFBSB) and the Alliance for Bangladesh Worker Safety (ABWS). While the above study is useful to know the demand side response of the sector, it is also important to know the supply side response.

2. Background

RMG industry is the major industrial sector in predominantly informal sector driven economy of Bangladesh. Over time it has become the single most important export-oriented sector in Bangladesh. The sector's share in the total export of the country was 3.90 percent in 1983-84, which has been 79.33 percent in 2008-09, 81.1 percent in 2013-14 and 84.21 percent in 2018-19 (Figure 1 (a)). Being one of the main foreign exchange earning sectors of the economy among two, RMG and remittance, RMG has been enjoying uncompetitive support in the country.

The RMG industry in Bangladesh employs literally millions of workers. In 1985-86 total employment in the RMG industry was 0.1 million, which has become 2.8 million in 2008-09, 4 million in 2012-13 and it continued till available data 2017-18 (Figure 1 (b)). The share of female employment in the RMG industry is enormous (in 2012, 64 percent according to Survey of Manufacturing Industry 2012, 58.4 per cent percent according to survey by Centre for Policy Dialogue) which is being reported to be declining in recent years. In Bangladesh female education used to be very low, their labor force participation was negligible and girl child marriage is still one of the highest in the world. In such structure of the workable population, RMG industry grabbed the opportunity of low wage worker and provision of least work life condition by employing women which also contributed to women's empowerment.

The status of economy and human quality triggered the RMG sector to boom with flexible policy support from government and other stakeholder. The overall situation has not promoted quality of workers' lives, workplace safety and diversification of industry. Figure (1) presents the trends of RMG's export share and employment.

Entailing all the progress of the industry in economic term, the quality life and working condition of the workers remained precarious. Keeping aside the wage and benefits, the workplace condition was in grave danger without having safety, security, quality assurance. Fire and small accidents were the normalized incidents of the industry. In April 2013, the collapse of the Rana Plaza building where five garment factories were located, killed more than 1100 workers and left more than 2500 injured. Only five months earlier, 112 workers had been killed while being trapped inside the burning Tazreen Fashions factory. These accidents appalled the stakeholders of industry including the buyers. The consequences of worse condition of workers' lives, frequent accidents invited the international buyers' action followed by Rana plaza disaster.

At present, Bangladesh is said to have the safest readymade garments industry among developing countries (The Guardian, 2018). OHSE reviewed 16 national daily newspapers and reported the accidents data for 2005-2009.

Solidarity Center reports the accidents of garment sector with factory name, location, date, injuries, death and a little description of causes and outcome during November 14, 2012 –November 19, 2019 (Table 1). When we deduct 1134 deaths and 2500 injuries from period 2012-2019, the death and injuries become much lower in the later period compared to the earlier period 2005-2009. The statistics may not be complete and comparable, but we can have a sense of safety condition from the following table.

3. Data and Method

3.1. Data

Bangladesh's statistical agency, 'Bangladesh Bureau of Statistics (BBS)' produces all the data I am using. The main data for this study come from two business censuses –Business Register 2009 (hereafter BR2009) and Business Directory 2019 (hereafter BD2019) and two population censuses –2001 and 2011. I purchased BR2009 and BD2019 datasets from the BBS. In BR2009 dataset, number of establishment level entry is 100194. In the BD2019, the number of establishment level entry is 127042. The minimum size of establishment in terms of number of establishment is 10 in the business censuses. In the industrial classification code, two digit codes 13 is for textiles and 14 for apparel industry. I only identify these two types of industry because apparel industry is our treatment group, textile industry might be somewhat connected with the apparel industry and all others are in control group.

Population census is good microdata for person's employment status, the data is collected at individual level but not at the establishment level and also detailed information is not there. I use population censuses 2001 and 2011 to observe the employment trend situation of pre-treatment period. I collected census data from IPUMS International (2020). Publicly available census data contain 10 percent observations of 2001 census and five percent observations of the 2011 census. The information was collected through direct interviews with everyone who spent the survey night in Bangladesh. 2001 sample census is systematic samples of every 10th dwelling with a random start, drawn by IPUMS. 2011 sample census is a systematic sample of every 10th dwelling with a random start, drawn by BBS.

Business censuses data contain establishment level information of the registered business. The population censuses data covers information at individual level and in the population census I cannot identify the industry precisely the employee work in. Therefore, I cannot compare treated apparel sector with controlled other sectors in the earlier periods than 2009 from my datasets. To deal with this issue I instead of identifying establishment apparel vs. non-apparel, I identify the apparel dominant upazilas in 2009 and compare these upazilas before 2013 and after.

3.2. Data Organisation

I collapsed employment data by upazila separately for population censuses and business censuses since the employment is not same for both. Hence, I find total employment in the upazila in the census years and total registered business employment in the upazila in business census years. Between 2001 and 2019, there has been quite a lot of administrative reorganization of geographic locations. After addressing them as accurately as possible, I come up with 500 upazila during the whole period 2001-2019. Before any adjustment, total number of upazila in our population data is 507 in 2001 and 543 in 2011. To make 2001 and 2011 equivalent, I checked which new upazila were created between 2001 and 2011 from the website of upazila and other sources online. Then, I merged the new upazila with old one; in this step I come up with 507 upaziala in 2001 and 512 in 2011. Then I checked which upazila originated from more than one upazila and merged them all together. I dropped Mirsharai upazila even though it is not a new upazila and also existing currently because this upazila does not exist in our 2019 business census data set. I dropped Karnafuli upazila because it does not exist in the 2011 population census data. Hence, I come up with 500 upazila in both 2001 and 2011. To make 2009 and 2019 upazila equivalent to arranged 500 population census upazila, I take following approach. In 2009 data set, upazila names are missing for 93 observations. I filled up missing upazila information taking information from other observation rows and address columns, searching online and applying best guess. After addressing these missing upazila observations, total number of upazila in 2009 is 536. Total number of upazila in 2019 is 565. To make BR2009 and BD2019 up-

azila equivalent, I checked the change, split and merge of upazila between 2009 and 2019, and accordingly change the 2019 upazila. To address this, I searched upazila website, open google search and best guess using existence and non-existence of this or related upazila in the years. After this adjustment total number of upazila in 2019 535 which is same as 2009 except Mirsharai. Then I adjust 2009 and 2019 upazila in line with population censuses.

The baseline year is 2009 – pre-treatment year of available business census data. I distinguished the upazilas by share of apparel employment in the total registered employment of the upazila. The highest share of apparel employment in total registered employment in upazila is 83 percent in 2009. Taking about the middle percent share, I consider upazilas in 2009 with more than 40 percent apparel share in total registered employment as treated upazila and the remaining are control. Following this approach, I find 20 upazilas as treated and 480 as control. I can access 10 percent observations of 2001 and 5 percent observations of 2011 observations. Therefore, I adjusted the sample with weights – 10 for 2001 and 20 for 2011.

I use government censuses, and I cannot identify the establishment over time from the available data. Therefore, the estimate will be at the geographic upazila level. I estimate if safety has been improved in the industry and how much is due to the measures taken after The Rana Plaza catastrophe.

3.3. Method

To find the effect of upazila employment due to safety improvement, I estimate the following model for 2001 and 2011, and 2009 and 2019 separately. The estimates of 2001 and 2011 help us to understand the trend of employment before undertaking safety measures.

$$E_{ut} = \beta_0 + \beta_1 D_u + \beta_2 t + \beta_3 D_u t + e_{ut} \tag{1}$$

E = total employment in upazila u and year t
u = upazila/thana (sub-district)

$$t = \begin{cases} 1 & \text{year after treatment (in business census regression 2019, in population census 2011)} \\ 0 & \text{year before treatment (in business census regression 2009, in population census 2001)} \end{cases}$$

$$D_u = \begin{cases} 1 & \text{apparel share in total employment is above 40 percent in the upazila u} \\ 0 & \text{otherwise (otherwise)} \end{cases}$$

The safety law implementation after the Rana Plaza occurrence, particularly by Accord and Alliance, can be taken as exogenous. The buyer organizations enforced the safety law to the export-oriented RMG firms. Though the participation was voluntary, the export-oriented firms had no other choice except going local or out of business. Needless to say, shifting business orientation from international to local is not easy and sometimes impossible, considering the volume of supply and type of production. This exogenous positive safety shock allows us to estimate the effect of safety measures in the industry in difference-in-difference identification strategy, possibly applying the common trend assumption.

4. Results

Number of upazila with more than 40 percent apparel employment in total registered employment in the upazila in 2009 is 20 out of 500 upazila. Since the baseline business census data is 2009, I compare apparel dominant upazilas as treatment upazilas with the remaining upazilas as controlled in the pre and post period of 2009. Therefore, the number of total treatment upazila is 20 and control upazila is 480 for all the years —population censuses 2001 and 2011, and business censuses 2009 and 2019. In addition, as a robustness check, I exclude upazilas that have 0<apparel share$\leq$40% in 2009 and this gives us number of control upazila 410 in each year. I also exclude upazilas that have 0<apparel share$\leq$40% and textile share>50% in 2009 as a spillover effect check; in this case I have control upazila 393 and treatment upazila 20.

Regression results for log transformed outcome variables are presented in the Table (2) and Table (3), and corresponding mean differences are in Figure (2) and Figure (3). In the Tables, first columns are for all 1000 ob-

servation upazilas (500 in each year), second columns for 860 (430 in year) observations that exclude upazilas with 0<apparel share≤40%, and third columns for 826 (413 in each year) observations that exclude upazilas with 0< apparel share≤40% and textile share> 50 in 2009. Appendix Table (4) presents the regressions results of outcome variable as total employment in the upazila between 2001 and 2019, and Table (5) presents regression results of outcome variables as number of registered establishments between 2009 and 2019. Appendix Figure (4) presents difference of high and low apparel apparel intensive upazila between 2009 and 2019 in total employment (a) and in number of establishment (b).

Panel A of Table (2) presents regression results for pre-treatment period population census data 2001 and 2011. Expected mean of log of employment of the comparison upazila in 2001 is 10.95. Employment is 98 percent higher in upazilas that have apparel share in the total employment above 40 percent. Between 2001 and 2011 employment increased 15 percent in the comparison groups which is 50 percent in high apparel upazilas over low apparel upazila. Results are pretty similar when I exclude upazilas with moderate share in employment as robustness check and as spillover check exclude both moderate apparel share and high textile share upazilas. Result are highly significant and robust in pre-treatment period. Due to the significantly large apparel employment in 2011 compared to 2001, we may not precisely rely on the after treatment regression result for causal inference. However, pre-treatment estimates from population censuses are for total employment but the estimates from business censuses are only for registered employment. Panel B presents regression results for 2009 and 2019 business censuses, square parentheses contain confidence interval in the interpretation. Expected mean of log of employment of the low apparel intensive upazila in 2009 is 8.05 [7.96 8.15]. First row, difference in means in the base period between high and low apparel share upazila, exhibits very high employment in the apparel dominant upazila; employment is 1850[2.38 3.56] percent higher. Employment increases 66 [.46 .57] percent in comparison group but decreases 54 [-1.12 -.45] percent in treatment group over comparison group between 2009 and 2019. Table (3) exhibits that log of number of establishment is 4.71 [4.63 4.79] in comparison group in 2009. Number of establishment is likely to be 330 [.98 1.95] percent higher if the upazila has

apparel share above 40 percent in 2009. In 2019 number of establishment in comparison group is 45 [.33 .41] percent higher but number of establishment is 36 [-.68 -.23] percent lower in treatment upazila over comparison upazila. The results of first column in the regression tables are plotted in corresponding figure. In the diagram, horizontal axis shows the share of apparel employment in the upazila and vertical line plots the pre and post year's mean value from zero. The round points are difference of value in each upazila between 2009 and 2019. The solid lines present the mean value of difference for upazila with apparel share $\leq$40% and apparel share>40%. The The continuous dot line indicates zero.

Second column in the tables presents regression result excluding the upazila that has apparel share between 0 and weakly lower than 40 percent. By dropping moderate shared apparel upazila, I can observe if the regression results are driven by some very high share of apparel upazila. From second column we do not see such an evidence. Even though the magnitude of change variables have increased and comparison upazila's mean value in base year has decreased slightly, there is no change in level of significance and direction of the results. In the base regressions all the coefficients are already significant at 1 percent level and in the robustness check regression of column two results remain similar. In addition to moderate share apparel upazila, I drop upazilas that have textile share more than 50 percent in column 3. Textile is very close to apparel sector; hence, there is chance of influence of one sector to another through market linkage. Excluding high textile share upazila can change our result significantly if there is such influence. However, we do not see noteworthy change in the result. We can consider this as spillover effect, which is not observed in the result. The result remain robust.

The findings are consistent with pattern of employment in Bangladesh. The sheer size of employment in Bangladesh is in informal sector and in the formal sector apparel industry has been playing big role. As a reflection, we see big difference between apparel and non-apparel sector dominant upazila in Panel (B) of business census data, which is not apparent in Panel(A) of population census data that contain all type of employment in Table (2). y2019 is increase in comparison group which indicates registered non apparel

employment dominant upazila's employment is significantly higher in 2019 compared 2009, similar is apparent in total employment too. Comparison upazilas increase registered employment by about 5 percent per year between 2009-2019. This is expected in a country with more working age population. However, differential change in treatment group Dy2019int, apparel dominant upazila observed a significant decline in registered employment in 2019, meaning high apparel upazilas show no increase in registered employment over this period, instead it decreased. This is the expected result in the wake of massive safety scrutiny.

However, I do not come to the concrete conclusion given that our conventional common trend in the pre-treatment period does not hold.

5. Conclusion

In this paper, I study the labor market and industry's outcome in terms of employment of the safety improvement in the readymade garment industry in Bangladesh led by international buyers' organisation.

I find that in the decade prior to the Rana Plaza collapse and international involvement, places where apparel was the dominant manufacturing sector experienced substantially higher employment growth compared to places without apparel. Over the subsequent decade, this trend reversed. In fact, registered employment declined in apparel-dominant places while it increased in places without apparel.

This is my ongoing project. I am trying to explore the implications further with different data and methodological settings.

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Table (1) Injuries and deaths in RMG industry

	2005 and 2009	Nov 24, 2012 – Nov 19, 2019
Killed	6,261	1,310
Injuries	11,783	3,883
Total	18044	5193
Source:	OSHE (2014)	Solidarity Center (2019)

Note: Solidarity center's news paper tracking contains 1134 deaths and 2500 injuries during rana plaza collapse on 24 April 2013.

Table (2) Log employment in the upazilas between 2001 and 2019

VARIABLES	Total employment	Total employment	Total employment
	Panel A: Population census 2001 and 2011		
2009 apparel			
share > 40%	0.68***	0.75***	0.76***
	(0.165)	(0.165)	(0.165)
y2011	0.14***	0.12***	0.12***
	(0.00753)	(0.00762)	(0.00787)
Dy2011int	0.41***	0.43***	0.43***
	(0.0615)	(0.0615)	(0.0615)
Constant	10.95***	10.87***	10.86***
	(0.0267)	(0.0280)	(0.0286)
	Panel B: Business census 2009 and 2019		
2009 apparel			
share > 40%	2.97***	3.20***	3.26***
	(0.301)	(0.301)	(0.301)
y2019	0.51***	0.53***	0.56***
	(0.0271)	(0.0278)	(0.0277)
Dy2019int	-0.79***	-0.81***	-0.83***
	(0.171)	(0.171)	(0.171)
Constant	8.05***	7.82***	7.76***
	(0.0476)	(0.0426)	(0.0408)
Observations	1,000	860	826
Sample upazila	all	excl. 0<apparel share≤40	excl. 0<apparel share≤40 and textiles share>50

Table (3) Log of total registered establishment count in the upazila 2009 and 2019

VARIABLES	No. establish	No. establish	No. establish
2009 apparel			
share > 40%	1.46***	1.64***	1.68***
	(0.246)	(0.246)	(0.246)
y2019	0.37***	0.39***	0.41***
	(0.0201)	(0.0207)	(0.0204)
Dy2019int	-0.46***	-0.48***	-0.50***
	(0.115)	(0.115)	(0.115)
Constant	4.71***	4.54***	4.49***
	(0.0398)	(0.0367)	(0.0346)
Observations	1,000	860	826
Sample upazila	all	excl. 0<apparel share≤40	excl. 0<apparel share≤40 and textiles share>50

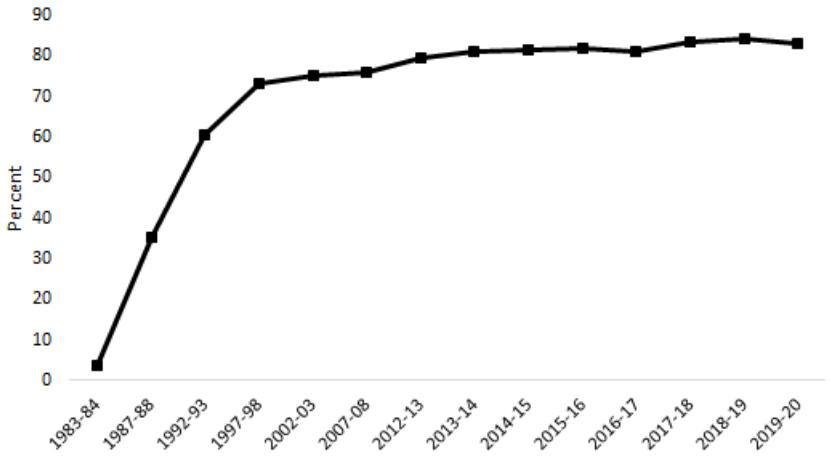
*** p<0.01, ** p<0.05, * p<0.1

Notes on Tables

OLS estimates. Standard errors clustered at upazila level in parentheses.
Variables: 2009 apparel share>40% is apparel share dummy: 1 for upazila with apparel employment share in registered employment in 2009>40%, 0 otherwise;
y2019 is year dummy : 1 for 2019, 0 for 2009;
Dy2019int is interaction term between year2019 and 2009 apparel share>40%.
Column: First: All upazilas (500 in each year),
Second: upazila excluding 0<apparel employment share in upazila≤40% (430 each year),
Third: upazila excluding 0<apparel employment share in upazila≤40% and upazila excluding textile employment share>50% (413 each year).

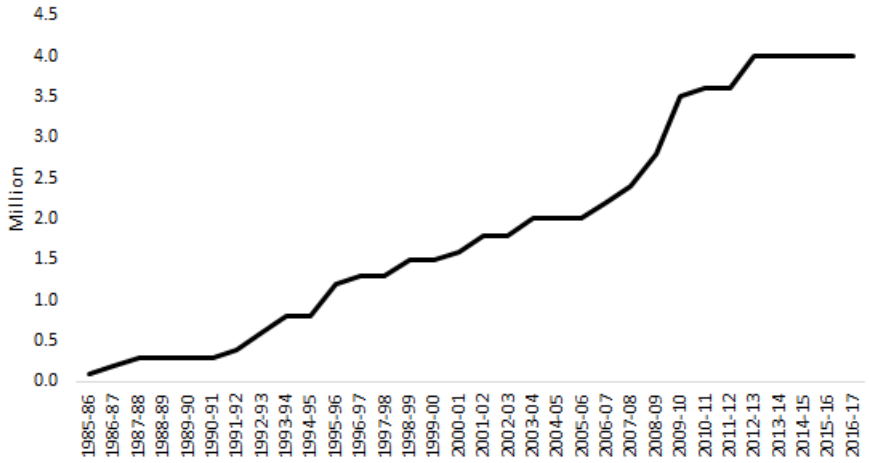
Figure (1) Total export and employment in RMG industry of Bangladesh

(a) Percent share of RMG to Total Export



Source: BGMEA, `https://www.bgmea.com.bd/page/Export_Performance`

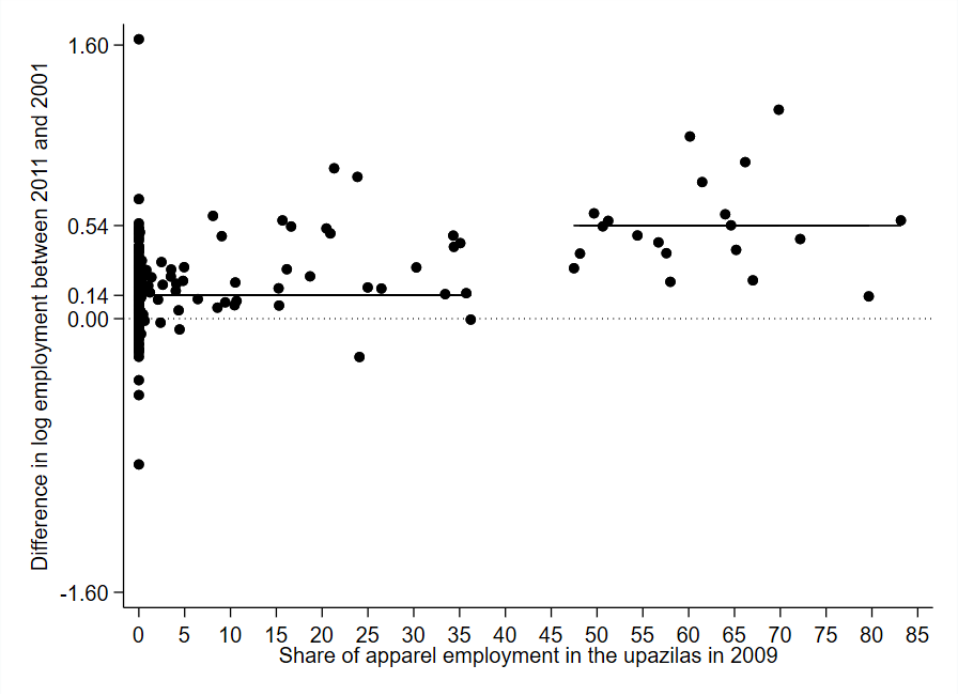
(b) Number of RMG employment in million



Source: ILO (2020) (original source BGMEA, `http://bgmea.com.bd/home/pages/TradeInformation` does not exists any more)

Figure (2) Difference in log employment

(a) Difference in log employment 2011 and 2001



(b) Difference in log employment 2019 and 2009

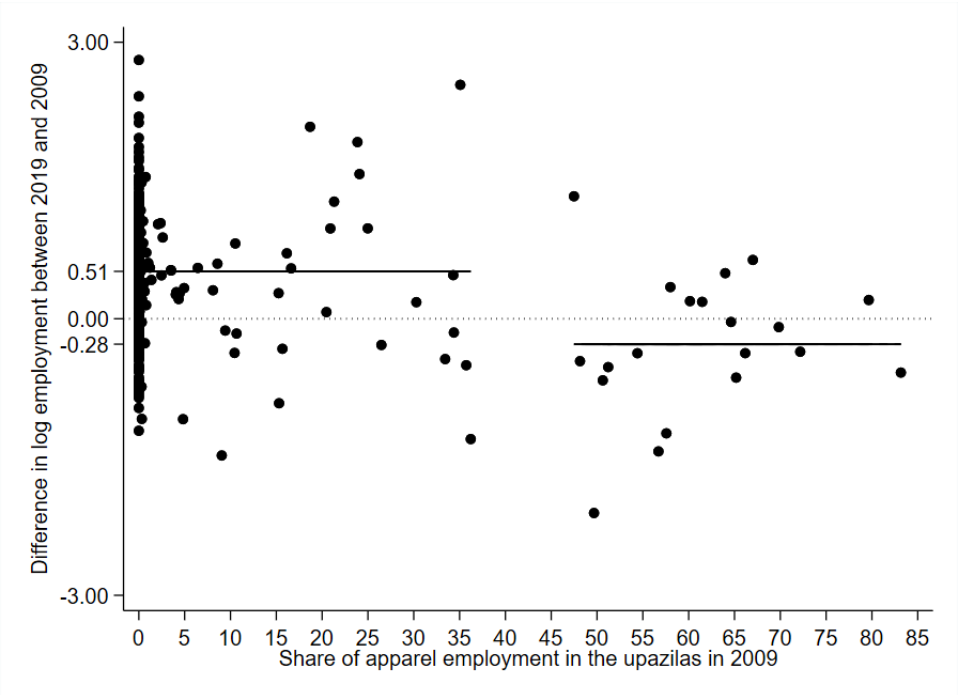
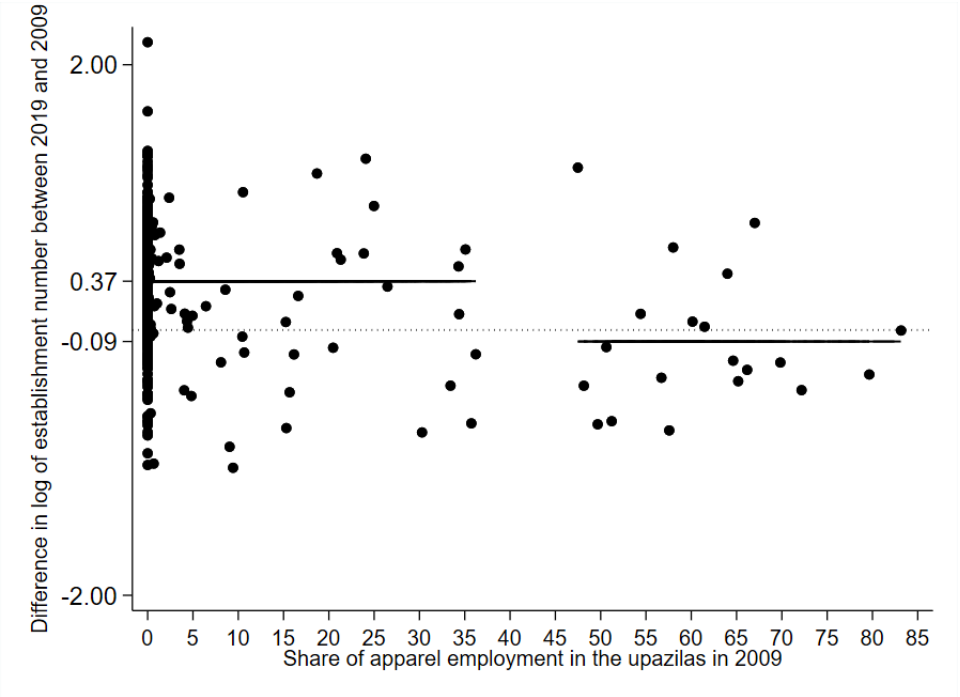


Figure (3) Difference in number of establishment



Appendix

Table (4) Total employment in the upazila between 2001 and 2019

VARIABLES	Total employment	Total employment	Total employment
Panel A: Population census 2001 and 2011			
2009 apparel			
share > 40%	83,182***	88,620***	88,962***
	(28,562)	(28,568)	(28,573)
y2011	10,696***	7,566***	7,388***
	(811.6)	(581.6)	(594.5)
Dy2011int	125,070***	128,200***	128,378***
	(35,420)	(35,430)	(35,434)
Constant	65,711***	60,273***	59,931***
	(1,573)	(1,470)	(1,490)
Panel B: Registered business census 2009 and 2019			
2009 apparel			
share > 40%	111,490***	113,814***	114,329***
	(26,442)	(26,449)	(26,451)
y2019	3,430***	2,491***	2,697***
	(461.8)	(227.0)	(210.2)
Dy2019int	-11,206	-10,265	-10,472
	(12,308)	(12,307)	(12,308)
Constant	6,086***	3,762***	3,247***
	(508.7)	(253.0)	(153.7)
Observations	1,000	860	826
Sample upazila	all	excl. 0<apparel share≤40	excl 0<apparel≤40 and textiles>50

*** p<0.01, ** p<0.05, * p<0.1

Note: OLS estimates. Std errors clustered at upazila level in parentheses

Table (5) Total number of registered establishment in the upazila, 2009 and 2019

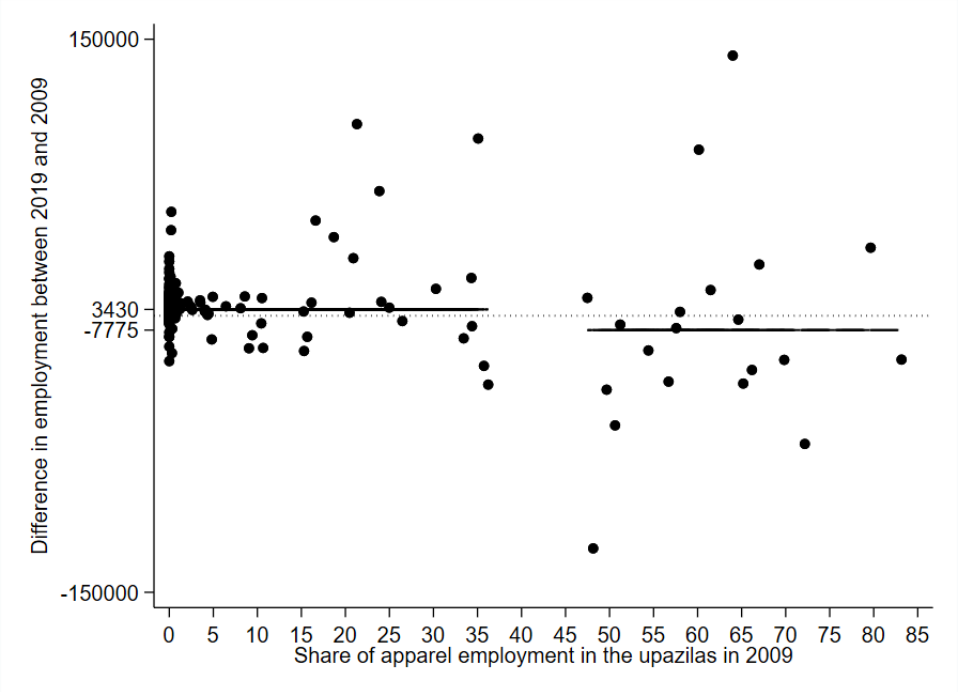
VARIABLES	No of est	No of est	No of est
2009 apparel			
share > 0.4	665.4***	712.7***	728.3***
	(205.8)	(205.7)	(205.6)
y2019	60.42***	60.15***	63.40***
	(6.864)	(4.659)	(3.915)
Dy2019int	-166.3*	-166.1*	-169.3*
	(92.21)	(92.11)	(92.09)
Constant	173.5***	126.1***	110.5***
	(11.38)	(8.159)	(3.824)
Observations	1,000	860	826
Sample upazila	all	excl. 0<apparel share≤40	excl. 0<apparel share≤40 and textiles share>50

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors clustered at upazila level in parentheses

Figure (4) Difference between 2009 and 2019 in upazilas with apparel share>40 and ≤40

(a) Difference in total employment



(b) Difference in number of establishment