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ISSN: 2365-9793

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ABSTRACT

The Effects of International Scrutiny on Manufacturing Workers: Evidence from the Rana Plaza Collapse in Bangladesh*

After the tragic factory collapse of Rana Plaza in 2013, both the direct reforms and indirect responses of retailers have plausibly affected workers in the Ready Made Garment (RMG) sector in Bangladesh. These responses included a minimum wage increase, high profile but voluntary audits, and an increased reluctance to subcontract to smaller factories. This paper uses six rounds of the Labor Force Survey and adopts a synthetic control approach to evaluate the net effects of these changes on garment workers. While we find that working conditions did improve, we find evidence of adverse effects on several other outcomes for workers. In particular, while the reforms initially increased female workers' wages, their wages had fallen an estimated 20 percent three years after Rana Plaza. We also show suggestive evidence that female workers' contracts displayed a similar short-term increase and ultimate long-term decrease. Male workers, by contrast, if anything experienced only short-term adverse effects.

JEL Classification: F16, J16, J31, J32, J81, O12
Keywords: garment sector, working conditions, gender, minimum wage

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* We thank S Anukriti, Andrew Foster, Melanie Khamis, Adriana Kugler, Annemie Maertens, Tyler McCormick, David Newhouse, Laura Schechter, Shing-Yi Wang, Chris Woodruff, and attendees of the 2018 World Bank/IZA Jobs & Development Conference, the University of Washington Labor-Development Brownbag, the World Bank Jobs Group Brownbag Lunch Series, the Georgetown Center for Economic Research 2019 Biennial Conference, the Korea Development Institute School of Public Policy Seminar, the University of Washington Forum for Political Economy and Economics, the 2019 Determinants of Productivity in Low Income Countries workshop at LMU/DIW, North Carolina State ARE, Howard, the 2020 Econometric Society World Congress, and the University of Georgia for helpful comments. This research was made possible by the generous support from the Korea World Bank Partnership Facility Trust Fund for Bangladesh. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

1 Introduction

The collapse of the Rana Plaza factory building in Bangladesh in April 2013 killed over a thousand workers and injured about 2,500 others. It is widely considered the worst accident in the history of the global garment industry, and the world's worst industrial disaster since the 1984 Bhopal gas tragedy in India (Reuters, 2017). In its aftermath, local and international attention on the ready-made garment (RMG) sector intensified, resulting in a series of new policies and changes to the behavior of retailers. Direct reforms included an increase in the minimum wage and high-profile but voluntary audits examining safety. Indirectly, retailers may have pressured factories to improve working conditions or have become hesitant to buy from factories that subcontract or that appear to be skirting labor regulations. While the intended goal was to improve working conditions and raise wages, a concern arose that reforms which raise costs among garment factories could ultimately hurt workers.

In this paper, we evaluate the net effects of these post-Rana Plaza changes on workers in the RMG sector in Bangladesh. We use six rounds of the Bangladesh Labor Force Survey, spanning from 2003 to 2016, and employ a difference-in-difference estimation strategy that compares workers in the garment sector to workers in a synthetic control group of industries (separately by gender) that display parallel trends in four key outcomes – wages, an index of working conditions, hours of work, and whether the worker receives a contract – prior to the Rana Plaza collapse. We show that estimated treatment effects are very similar when we use separate synthetic control groups selected to match the trend in each individual outcome. Each survey was collected in all four quarters of the year, allowing us to separately examine short-term effects (in the remainder of 2013) and medium-term effects (in 2015 and 2016).

We begin by examining wages. Theoretically, wages could have increased due to the minimum wage increase or pressure from buyers to raise wages. Alternatively, wages could fall as firms shift spending on total compensation more towards working conditions. These effects could vary by gender over time, and we indeed find that a close-to-zero and insignificant overall effect on wages conceals substantial variation across genders and year. In particular, women's wages on average increased by 18% relative to men's after Rana Plaza, and by 11% relative to women in synthetic

control industries ($P = 0.179$). However, this average is the combination of a wage increase of 20% in 2013 (relative to women in the synthetic control), a zero effect in 2015, and a decrease of 25% in 2016. By contrast, the treatment effect on the wages of male garment workers (relative to men in synthetic control industries) was -9.5% in 2013 ($P = 0.134$) but close to zero and insignificant in both 2015 and 2016. We argue that one potential explanation for the wage losses among female workers is that it is particularly costly for firms to improve benefits for female workers.

We go on to examine measures of working conditions (including non-wage benefits and health/safety), working hours, and job security. As intended by the reforms, we find that working conditions increased by 0.45 standard deviations after Rana Plaza. This effect was felt more strongly by women; their working conditions increased by 0.60 standard deviations more than males' working conditions (though this difference was not statistically significant at conventional levels; P = 0.208). The point estimate on the improvement in working conditions for women is largest in 2013, but given the noise in the estimate, we cannot determine whether there is a similar downward trend over time as appears in the wage estimates.

Hours of work also increased by an average of 1.8 hours across rounds and genders. The average increase was driven by men, who work 3.7 more hours per week after Rana Plaza than men in synthetic control industries. At the same time, after decreasing in the short run, women's hours had also risen in 2016; women worked an average of 3.4 more hours per week in 2016 compared to women in synthetic control industries. Finally, we examine job security, as measured by the probability that a worker has a written contract. While these results should be viewed as suggestive given the rejection of parallel trends, we show that estimated treatment effects are robust to a variety of imperfect control groups. These results suggest that workers were 4 percentage points less likely to have a written contract after the reforms. A similar pattern of delayed effects on women arises when we examine the probability of receiving a contract: by 2016, female workers were 19 percentage points less likely to have a written contract. Men were an average of 8.8 percentage points less likely to receive a contract ($P = 0.109$), an effect which is more stable over time.

Together, these effects paint a complex picture of the net effect on workers' welfare. The fact

that working conditions improved is important, given high baseline levels of reports of harassment and abuse. For example, 37% of female garment workers reported abuse in the first quarter of 2013 (i.e., immediately before the Rana Plaza collapse). While the short term wage increase likely helped many female workers, they eventually have begun to suffer wage declines. The suggestive evidence for decrease in contracts for female workers suggests additional welfare losses, as hypothetical choice experiments have indicated that job stability is a highly valued aspect of formal work among Bangladeshi workers (Mahmud et al., 2019). The hours increase among women in 2016 can also have negative welfare consequences if much overtime is unpaid, and indeed, could have been a mechanism underlying decreases in hourly wages. While we cannot quantify whether the overall effect on welfare is positive or negative (as we lack data to estimate workers' relative preferences between different job aspects), an unambiguous lesson from our results is that the welfare consequences of international scrutiny may differ in the short term versus medium-term.

These changes affect many workers and their families, given that the RMG sector in Bangladesh is widely considered to be a key contributor to the country's robust economic growth, poverty reduction, and women's empowerment. The sector's share of total exports increased from 53 percent in 1995 to 83 percent in 2017, with its exports reaching about USD 28.1 billion (Farole et al., 2017). The export share of GDP tripled between 2003 and 2017, and Bangladesh is now the world's second largest garment exporter after China. The sector provides jobs and earnings opportunities to over 4 million low and semi-skilled workers, and represents over 40 percent of the total industrial employment in the country. Moreover, the large expansion of the garment industry has provided employment opportunities to women, changing their decisions on schooling, marriage, and childbearing (Heath and Mobarak, 2015).

We join a small literature on the effects of international pressure on workers' outcomes. Harrison and Scorse (2010) find that international attention to the wages and working conditions in textiles and footwear factories in Indonesia in the 1990s raised wages. Amengual and Distelhorst (2019) find that a management change at Gap Inc. increased labor compliance in sourcing garment factories. We build on their results to study whether these improvements can come at the expense of other job quality measures, in the context of a highly competitive international garment

market in which Bangladeshi factories face simultaneous pressures to produce at lower costs. The resulting cost-cutting measures may particularly hurt female workers, who have both limited employment options outside of the RMG sector and who particularly value improvements in working conditions (Khosla, 2009, Begum et al., 2010, Gibbs et al., 2019, Subramanian, 2019). In this context, our results indicate that international pressure post Rana Plaza, which was focused on working conditions, was indeed successful in improving working conditions, but factories may do so at the expense of women's wages and job security in the medium run.

Our results also speak to a literature that points out that regulation intended to help workers may raise the cost of hiring workers and thus have unintended negative consequences on the workers it is meant to help. For instance, Besley and Burgess (2004) find that pro-worker labor regulations in India decreased productivity and ultimately increased urban poverty. Botero et al. (2004) show that similar results hold in a sample of 85 countries; heavier regulation of labor is associated with lower employment rates. Parker, Foltz and Elsea (2016) find that policies targeting human rights abuses can have similar effects: legislation aimed at stopping the export of conflict minerals hurt infant health in the Democratic Republic of the Congo.[1]

We add to this literature by showing that international scrutiny can have similar unintended effects as formal regulation. Moreover, our estimated treatment effects reflect the net effects of direct reforms and indirect responses, which may kick in at different points in time. Some of the direct regulatory reforms, such as an increase in the minimum wage would have an immediate effect, if any, on workers' wages. Other responses, such as increased compliance with safety requirements, may take more time to materialize and also trigger indirect responses by employers over time that can also affect workers' outcomes. We find that the net effects of the reforms indeed greatly vary over time, with effects on female workers' wages and employment security being initially positive while becoming more negative over time.

Our paper also joins a large literature on the relationship between wages and working conditions. Standard theories of compensating differentials posit that firms choose wages and working

[1] Adhvaryu, Nyshadham and Xu (2018) and Boudreau (2019) highlight a complementary mechanism in Indian and Bangladeshi garment factories, respectively. These papers argue that reforms that raise workers' expectations for job quality can decrease job satisfaction if these expectations are not met.

conditions to equalize the marginal utility of an additional dollar investment in wages versus working conditions for the marginal worker. We join Summers (1989), Mitchell (1990) and Almeida and Carneiro (2012) in emphasizing that wages fall when firms are compelled by external forces to improve their working conditions. In our case, we add that these wage decreases may take time to develop, especially if combined with a short-term boost to wages such as the minimum wage increase.

Finally, our work is also related to a literature in trade and development on the ways in which destination countries affect workers in export industries in low-income countries. The existence of a wage premium for working in an export factory suggests that access to international markets helps workers in low income countries, as their firms make increased profits from selling to wealthier consumers in high-income countries (Verhoogen, 2008, Frías, Kaplan and Verhoogen, 2009, Amiti and Davis, 2011). The sudden opportunity to export that came with Myanmar's trade liberalization also improved working conditions in garment factories (Tanaka, 2020). However, exposure to trade can also hurt workers in import-competing industries, and Topalova (2010) and Kovak (2013) find evidence that reductions in trade barriers increased poverty in India and Brazil, respectively. Other work finds that consumer sentiment also matters. Dragusanu and Nunn (2018) find that fair trade certification in Costa Rica helps coffee farmers, though there are distributional consequences: unskilled farmers are unaffected. Our quantile regressions show that distributional effects go in the opposite direction in our study – higher wage workers appear to lose more – suggesting that the effects of international pressure may reach lower paid workers in ways that certification may not, if it results in minimum wage increases.

The rest of the paper is organized as follows. Section 2 presents the context of the post-Rana Plaza reforms and international scrutiny that affected the RMG sector following the collapse. Section 3 explains the theoretical mechanisms through which these changes might affect garment workers. In section 4, we describe our data and our identification strategy, and provide evidence for the validity of the identification strategy in section 5. Section 6 reports and discusses our main results. Section 7 concludes.

2 Context

2.1 Employment in the Garment Sector

The garment sector currently employs approximately 4 million workers in Bangladesh in over 5,000 factories, and accounts for over 40 percent of the country's total industrial employment and 84 percent of export earnings (Farole et al., 2017). Employment in the RMG sector has grown at an explosive yearly rate of 15.5 percent since its inception in the early 1980s, as indicated by data from the Bangladesh Garment Manufacturers Exporting Association (BGMEA) in figure 1. This growth has been fueled by migration from rural areas, and rural migrants' lack of information appears to contribute to poor working conditions (Boudreau, Heath and McCormick, 2017). Workers are fairly mobile; by 12 months after the time of hiring, for instance, only 62 percent of all hired workers who are still working in the garment industry remain in their original factory (Heath, 2018).

2.2 Safety Standards in the RMG Sector, before and after Rana Plaza

Before the Rana Plaza collapse, workers had protested, and some safety measures had been put in place, such as the Fire Prevention and Fire Fighting Law of 2003, the Fatal Accidents Act of 1855, the Bangladesh National Building Code of 2006, and the Labour Act of 2006. However, the effectiveness of these acts was limited; they were overall vague, narrowly defined, and lacked focus (Rahman and Moazzem, 2017). Moreover, authorities lacked technical expertise, and enforcement was weak. For instance, factory visits were pre-announced, and factories with violations found only needed to be revisited within a span of three years.

The fast growth of the industry led large factories to subcontract to small factories in order to remain cost competitive and meet deadlines. Labowitz and Baumann-Pauly (2015) estimate that in 2015, 54% of garment factories in Bangladesh are such unregistered, indirect sourcing factories. As illustrated in Figure 2, the immediate aftermath of Rana Plaza was marked by a noticeable decline in the number of factories registered with the Bangladesh Garment Manufacturers and Exporters Association (BGMEA), consistent with the shutdown of non-compliant factories. This

drop in the registered number of factories, combined with no noticeable decline in total garment employment post Rana Plaza (Figure 1), indeed suggests that some industrial reorganization took place in the garment industry. While the principal factories are typically compliant to worker and safety norms/codes, their subcontractor factories are small, often huddled into buildings that are not designed for industrial purposes, but house five or more small factories.[2] The general consensus among industry experts is thus that working conditions in these factories are worse than those in the principal factories that sell to retailers (Rahman and Moazzem 2017; Naved et al. 2018).

Following the Rana Plaza incident, the representatives of the Government of Bangladesh, the European Union (EU) represented by the European Commission, and the International Labour Organization (ILO) supported the Bangladesh Sustainability Compact to promote improved labor standards and responsible business conduct in the RMG sector in Bangladesh. Representatives from industry (including brands, retailers and small and medium enterprises), employers, trade unions and other key stakeholders also supported the initiative. They put in place the National Tripartite Action Plan on Fire Safety and Structural Integrity, which consisted of a set of detailed measures to improve safety in RMG factories.

In parallel, although major retailers initially discussed a single coordinated industry response, two different industry agreements emerged. European buyers joined to create the Accord on Fire and Building Safety in Bangladesh (AFBSB), and a group of American buyers joined to create the Alliance for Bangladesh Worker Safety (ABWS) in 2013. Both initiatives were voluntary measures meant to assess RMG factories' compliance to building and fire safety. The Accord is a legally-binding agreement that commits signatories to a five-year program of safety audits and remediation investments in their Bangladeshi supplier bases. The Alliance has similar stated goals as the Accord but with more limited binding commitments, including for financing remediation.

As a result of these measures, the majority of export-oriented RMG factories have been assessed and those that did not qualify have been flagged for remediation. Focus groups conducted by Kabeer, Haq and Sulaiman (2019) in 2017 indicated that many workers had witnessed improvements such as the widening of exit staircases or formation of health and safety committees.

[2]The Rana Plaza factory was also housed in a building that was permitted for commercial purposes, but it was illegally renovated to have more units for industrial purposes.

Moreover, workers felt newly empowered to speak up about any safety violations they witness; one focus group member gave the example that "if [he] sees a crack on the wall, [he] can speak up."

While the Accord and Alliance have provided some help with remediation financing to make these improvements, the reforms prescribed by the Accord and Alliance have been primarily financed by the factories themselves, under buyer pressure. This led to an important rise in compliance-related expenditures, and therefore to an increase in the cost of doing business for RMG entrepreneurs while facing increased pressure from buyers to bring down their prices (Reuters, 2019). As a result, some factories had to increase workers' production targets to make up for additional expenditures on compliance requirements, while some could simply not cope with the additional expenses, which led to business closures.

2.3 Minimum Wage Increase

The minimum wage is set at the industry level in Bangladesh, with no formal overall minimum wage. The garment industry is one of the few sectors that has statutory minimum wages; these have been in place since 1985. One minimum is set for each of the seven grade levels, corresponding to different levels of skills and experience in the industry. After subsequent periodic revisions to reflect inflation and cost of living, it was set at BDT 3,000 (USD 38) a month as of 2010 for low-skilled workers. As a response to the Rana Plaza collapse, workers protested in favor of a minimum wage increase, seeking a "living wage" of BDT 9,500 (USD 120). Factory owners argued that such a large increase would hamper competitiveness, and in December 2013, the garment sector's minimum wage was raised, but only to a compromise of BDT 5,300 (USD 68) a month for low-skilled workers. This represents an increase by 77% compared to the previous minimum wage.[3]

Figure 3 provides a histogram of the monthly earnings of workers in the RMG sector in 2013 quarter 1 (before the Rana Plaza collapse) and 2015 (after the minimum increase had been in effect for over a year) using the Bangladeshi Labor Force Survey data described in section 4.1. Note

[3]In December 2018, after the period studied by this paper, the minimum wage was further raised to BDT 8,000.

that while our data on earnings includes all take home pay (inclusive of payments like bonuses and overtime pay) the minimum wage applies only to base pay, so that fewer workers earn below the minimum wage than would be expected if they reported base pay separately. Overtime pay is likely to be important, given that it is legally required after 48 hours, and 62% of workers in 2013 quarter 1 worked strictly more than 48 hours. Even so, 1.3% of workers earned total take-home pay below the new minimum wage in 2013, while none did by 2015. Under the estimate that 20% of workers' take-home pay is overtime (Reuters, 2018), an estimated 4.6% of workers earned below the new minimum in 2013 Q1.

3 Theoretical mechanisms through which International Scrutiny may affect Garment Workers

The previous section describes several of the different mechanisms through which international scrutiny post Rana Plaza may have affected garment workers. There are sufficiently many mechanisms at play that we do not seek to isolate specific mechanisms or develop a formal theory that specified the role of international scrutiny in garment sector labor markets. Instead, we give an overview of the different potential mechanisms and their net predictions for our four key outcomes: working conditions, wages, receipt of a contract, and hours of work.

3.1 Working Conditions

We start with working conditions, the outcome for which we have the clearest theoretical prediction. Buyers and other international observers pushed for better working conditions after Rana Plaza. While these efforts may have succeeded, it is also possible that garment factories improved official conditions, but these improvements did not actually impact workers' day to day experiences. For instance, firms could instruct lower-level managers not to abuse workers, but the managers may not follow these directions. It is also possible that working conditions may improve on some dimensions – in particular, those that are easier to scrutinize – and get worse on others, leading to a net zero change in an aggregate index of working conditions. Thus, we anticipate that

working conditions either increased, or did not change if the push toward better conditions was subverted by firms.

3.2 Wages

Wages may change either due to improvements in working conditions or direct channels that would likely increase wages, such as the minimum wage increase or pressure from buyers to increase wages. Another mechanism that would raise wages occurs if workers now perceive jobs as less safe than pre-Rana Plaza. If labor markets are not perfectly competitive (such that firms were already paying workers their full marginal revenue product), firms would then choose to raise wages as they face increasing turnover.

On the other hand, improvements in working conditions prompted by international scrutiny after Rana Plaza might lower wages. In a wide class of wage-setting models, firms divide total compensation between wages and non-wage benefits, and compelling firms to increase non-wage benefits would decrease wages (Summers, 1989, Mitchell, 1990, Almeida and Carneiro, 2012). Moreover, the decreased reputation of the Bangladeshi name might lower the marginal revenue product of Bangladeshi clothing (if buyers now perceive an increased risk of bad publicity), and this decrease would be passed on to workers unless employers have complete market power and were already paying workers a wage equal to the value of their outside option.

Wage effects may not be uniform across workers. Most obviously, low wage workers may benefit more from the minimum wage increase or because international pressure to raise wages was centered on low wage workers. Additionally, one of the mechanisms described above may apply more closely to a certain group of workers. For instance, if firms are prompted by international scrutiny to offer sick leave, and women are more likely to take advantage of sick leave due to caretaking responsibilities, it will be differentially costly to hire women and firms will pass more of this cost onto the wages of women. Alternatively, women may have more inelastic labor supply into the garment sector due to worse outside options, and they may be more willing than men to accept lower wage offers. If so, then the wages of surviving women will fall more than men.

3.3 Contracts

The international scrutiny that workers faced after Rana Plaza may have increased the uncertainty that firms face about the future. For instance, firms may perceive an increased likelihood that orders will be cancelled if audits find any issues in their factories. In this environment, firms would place increased value on flexibility, such as the ability to quickly scale up or down the size of their labor force, and they may be less likely to offer workers formal contracts. At the same time, if international scrutiny involved direct pressure related to contracts, firms might be more likely to offer contract. Thus, like wages, the theoretical prediction on contracts is ambiguous.

3.4 Hours of Work

Finally, we examine hours of work, given that activities and qualitative evidence have argued that Rana Plaza does affect the amount of overtime workers do. For instance, Nazma Akter, founder of the Awaj Foundation, a labour rights organization, argues that "since the disaster, employees have to work harder". She goes on to explain that "they have higher production targets. If they cannot fulfil them they have to work extra hours but with no overtime. It is very tough; they cannot go for toilet breaks or to drink water. They become sick." (Weekly, 2016).

One potential theoretical basis for this outcome would be if firms want to reduce hourly wages (as proposed above), but they find it easier to ask workers for unpaid overtime than decrease base pay (say, because of sticky base pay, or because it is more effective to compete for workers on base pay). Alternatively, the increased cost of subcontracting may mean that firms who have not lost orders increase their output, and they find it easier to increase hours per worker than hire more workers, possibly because of the increased uncertainty described in the above subsection. Increases in hours may be especially likely in an environment in which firms are cutting hourly compensation anyway; they may find it more competitively advantageous to do so by requiring unpaid overtime rather than cutting pay directly.

4 Empirical Strategy

4.1 Data

We use the Labor Force Surveys (LFS) conducted in 2003, 2005, 2010, 2013, 2015, and 2016 by the Bangladesh Bureau of Statistics. The Bangladesh LFS was designed to be representative at the national level – for both rural and urban areas – as well as for each of Bangladesh's eight divisions. All working-age (age 15 to 64) individuals from the selected households are interviewed for detailed labor market outcomes including labor market status, type of employment, monthly wages for those that are paid employees, hours worked, detailed occupation and sector of activity at the four-digit level, as well as working conditions. The sample sizes are large, with over 100,000 individuals in working age interviewed in years prior to 2015, and above 300,000 in 2015 and 2016. The 2003-2013 surveys took place over the course of a year, while the 2015 and 2016 surveys represented four distinct quarterly surveys that we merged together. Thus, any seasonality in wages (bonuses or raises) should be averaged out over the course of each survey.

In each survey round, workers were asked the number of hours they had worked over the past seven days. By contrast, the measures of earnings varied from year to year, so to construct our measure of hourly wages:

- In 2003, workers were asked monthly earnings from their main activity in the past year. We calculate each worker's average hourly earnings by dividing this amount by the hours worked in the past week multiplied by 4.33 (the average number of weeks in a month, across the year).

- In 2005, 2010 and 2013, workers were asked about earnings from the previous week in their primary job, so we divide this by the hours worked in the past week.

- In 2015 and 2016, workers were asked take home earnings for the past one month. We calculate average hourly earnings by dividing this amount by the hours worked in the past week multiplied by 4.33.

In each round, earnings were asked to paid employees: both regular wage workers and well as

casual/piece rate workers. While, prior to 2013, self-employed workers were asked about their earnings, for consistency over our period of study, we restrict our sample to paid employees. We deflate all wages to 2010 taka using the consumer price index.[4]

There may be differences in the wages calculated across the different survey rounds. The fact that the 2003 survey asked about monthly earnings over the past year presumably means that respondents reported their average monthly income over the year, which reduces variance between workers. Similarly, the average weekly pay over the past month in 2015 and 2016 could display lower variance than in rounds 2005-2013, when workers reported weekly pay directly. However, any level differences between years would be absorbed in the year fixed effects in the regression analysis, and would not be a leading concern unless they systematically vary between garment and non-garment sectors, conditional on the control variables in our main specification (equation 1).

The data also contain several measures of non-wage benefits and other aspects of job quality. Some of these variables are only available in later rounds, as summarized in the table below:

Measure	Years available	Details
Sick Leave	all	Paid sick leave provided by employer
Maternity Leave	2010 onwards	Maternity leave provided by employer (does not specify paid)
Contract	2005 onwards	Written contract (oral contract coded as zero)
Injured	2013 onwards	Hurt in any accident at work
Dangerous	2013 onwards	At least one reported danger (see below)
Abused	2013 onwards	At least one report of abuse (see below)

Specifically, the reported dangers could include dust, fumes, noise or vibration; fire, gas, flames; extreme cold or heat; dangerous tools; work underground or at heights; work in water/pond/river; workplace too dark or confined; chemicals/explosives; other things (specify). Reported abuse could include: constantly shouted/insulted; beaten /physically hurt; sexually abused; others.

Table A3 gives the frequency of specific abuses and dangerous conditions. The most common

[4] https://ycharts.com/indicators/bangladesh_consumer_price_index_wdi

abusive behavior faced by garment workers was being constantly shouted at or insulted (13% of women and 12% of men), though 5% of women reported experiencing sexual abuse. The most common dangerous conditions were dust, fumes, noise and vibrations (19% of women and 17% of men) and dangerous tools (15% of women and 14% of men).

We combine these five binary measures (sick leave, maternity leave, reports of injuries on the job, having been abused, and dangerous conditions) into a single index of working conditions by standardizing each variable (within the estimation sample) to have standard deviation of one. We then sum the standardized variables available for each observation (depending on the round from which the observation came) and then re-standardize that sum so that the final working conditions measure has a standard deviation of one across the estimation sample.

4.2 Timing of the Treatment

The collapse of Rana Plaza occurred on April 24, 2013. Rescue efforts continued until May 13, including the high profile rescue of a woman on May 10. Workers began to riot two days after the collapse and were joined the next day by left-leaning political parties, including the Bangladesh National Party. Rioters demanded the arrest of those whose negligence they believed contributed to the collapse and an independent commission to identify safety threats. Protests continued off and on for many months.

Response from retailers also began shortly after the collapse. Specifically, retailers and NGO's met one week after the collapse and created the Accord on Factory and Building Safety. The Alliance came in place in July 2013. Activists also pushed retailers in the months following the collapse, with some calling for boycotts, but others calling for brands to stay and "clean up the industry" (Judy Gearheart, executive director of the International Labor Rights Forum on April 29, 2013).

Overall, wage and working conditions responses to the Rana Plaza incident and subsequent reforms likely unfolded gradually across the months following the incident. Some responses – such as compositional changes in the industry due to factory shutdowns – could have taken even longer. We consider the first quarter of 2013 to be pre-treatment, drop the second quarter (as it is a mix

of pre-treatment survey periods and those surveyed in the immediate aftermath), and consider the third and fourth quarters to be post-treatment. Thus, while our baseline specification averages the effects on workers surveyed from 5 weeks to 3 years after the Rana plaza collapse, we also run specifications where we explicitly consider treatment effect heterogeneity by time since the collapse.

4.3 Identification Strategy

Our treatment group consists of workers employed in the apparel or textile industry according to the ISIC-3 classification (ISIC-3 two-digit codes 17 or 18), which we refer to together as the garment industry. While post-Rana reforms were more closely targeted at apparel factories than at textile factories, we also include textile workers in the treatment group because the textile industry is closely tied to garment in the value chain and thus reforms that affect the garment industry may also have impacted the textile industry. Moreover, given that the activities of the textile and garment industries are similar, it is possible that some garment workers were reported as textile workers and vice versa during survey data collection.

As a control group for treated garment sector workers, we construct a synthetic group of industries to match pre-trends in workers' outcomes in the garment industry, conditional on the control variables in equation 1 (Abadie and Gardeazabal, 2003). Because outside the garment industry, men and women do very different kinds of jobs, we select separate control groups for men and women. To avoid concerns about overfitting (given that we only have four pre-treatment time periods), we restrict our donor pool for each gender to industries with at least 100 pre-treatment observations of that gender. Our main specification incorporates synthetic control industries that are matched to the treatment group based on their pre-trends with respect to the outcomes studied in this paper: namely, wages (conditional on the observable human capital controls in equation 1), hours worked, formality of employment and an index of working conditions (whose construction is described in section 6.2), each normalized to have standard deviation one.

Table 1 gives a list of the industries in our primary synthetic control group, which is matched on all four outcomes. For both males and females, the synthetic control group consists primarily of

other manufacturing industries. Given that we did not impose a preference for manufacturing in the selection, it is reassuring that overtly similar industries were selected. In particular, the largest contributors to the female synthetic control group were manufacture of foods and beverages (30%) and manufacture of other non-metallic mineral products (29%). For males, the largest contributors were publishing, printing and reproduction of recorded media (24%) and manufacture of chemicals and other chemical products (25%), though other manufacturing groups (tobacco, tanning and dressing of leather, other non-metallic mineral products) were represented as well. For robustness, we also consider control groups matched separately for each of the four outcomes we consider; these industries are reported in table A1.

Table 2 reports summary statistics by gender for the treatment and primary synthetic control group.[5] There are some differences in personal characteristics and labor outcomes between the treatment and control groups. While these level-differences are not necessarily a concern for identification if the synthetic control group plausibly displays a parallel trend in each key outcome (a question which we discuss in section 5), they are useful for interpreting the type of workers in treatment and control industries. For instance, both male and female workers in the garment industry are younger, less educated, and more likely to be in Dhaka division compared to workers in synthetic control industries. While female garment workers earn approximately the same average (unconditional) wage as those in the control group, male garment workers earn less. Both genders are less likely to be abused or report dangerous conditions if they are in garments, and are more likely to be in a firm with ten or more workers.

Then, for an outcome Y for worker i in geographic area j (specifically, the division) at time t, we estimate the following equation:

$$\begin{aligned} Y_{ijt} =& \beta_1 Garment_{ijt} + \beta_2 Garment_{ijt} \times PostRanaPlaza_t \\ &+ Female_{ijt} \times \lambda_{jt} + \gamma_t Female_{ijt} \times X_{ijt} \times \lambda_t + \varepsilon_{ijt} \end{aligned} \tag{1}$$

The estimated β_2 gives the net causal effect of the post-Rana Plaza reforms on the outcome of garment workers, under the assumption of parallel trends between the garment sector and synthetic

[5]Table A2 provides the analogous statistics for the synthetic control groups for each individual outcome.

control industries. We include gender interacted with both division by year fixed effects and year fixed effects interacted with a vector of control variables X_{ijt}: namely age, education, and an urban dummy. These controls flexibly account for changes in labor outcomes over time that may vary by location or a worker's human capital, and possibly differently so by gender.

5 Evidence for the validity of identification

5.1 Test for parallel pre-trends

Equation 1 estimates the causal impact of the Rana Plaza reforms on garment workers under the assumption that control workers would exhibit parallel trends in outcomes in the absence of the treatment. We use synthetic control industries matched on all workers' outcomes as our first control group, under the assumption that those synthetic control industries have labor forces whose outside options evolve similarly over time and face similar industry-wide shocks. Given that the synthetic control matches four key outcomes, we begin by assessing whether trends are parallel between the garment sector and the synthetic control groups leading up to the reform for *each* outcome.

Specifically, we examine a garment dummy interacted with year dummies over pretreatment time periods (2003, 2005, 2010 and 2013 quarter 1), to test whether there is a non-linear pre-treatment trend in garment areas. We estimate the following equation separately for men and women:

$$Y_{ijt} = \beta_0 Garment_{ijt} + \beta_t Garment_{ijt} \times \lambda_t + \lambda_{jt} + \gamma_t X_{ijt} \times \lambda_t + \epsilon_{ijt} \tag{2}$$

We then test whether the estimated $\hat{\beta}_t$ coefficients are jointly significant, which would indicate that the difference between the garment sector and the synthetic control industries varies from period to period in the pre-treatment period.

The estimation results are given in table 3 and visually in figure 4. The primary control group – the synthetic control matched on all workers' outcomes – while not perfect, appears roughly parallel in wage residuals (conditional on the control variables in equation 1) in the first panel, especially for men. However, since the trends are not perfectly parallel – as evidenced by the rejection of joint

insignificance of the year dummies for women in column 1 – we also consider separate synthetic control groups matched on wages (and each of the three other outcomes we consider). Using synthetic controls for each workers' outcome reduces by construction the magnitude of coefficients associated with year dummies, which, indeed are no longer statistically significant individually or jointly for each of our wages, working conditions, and hours of work. We therefore show results for both the synthetic control matched on all outcomes and on each individual outcome: the synthetic control matched on all outcomes features the failure of parallel pre-trends we just discussed (except for contracts), but treatment effects are also easier to interpret when all outcomes use the same control group. As we will discuss in section 6, we find it very reassuring that results are quite similar across both types of control groups.

Since we still reject parallel trends for contracts even with a synthetic control group matched only on contracts, we conduct two additional robustness checks for our contract results. First, we consider several additional control groups: all wage workers, all non-agricultural wage workers, and all manufacturing workers. Second, we estimate treatment effects dropping 2005, given that it appears that 2005 is the year in which contracts were most different compared to control groups: the main effect of *Garment* in table 3 is large and positive, and later year dummies are all negative. Table A5 tests for pretrends for each new control group, and table A6 shows estimated treatment effects, analogous to our main treatment effects discussed in section 6. While none of the new control groups is perfect either – we still reject parallel trends for each – our estimated treatment effects are very similar across different treatment groups, despite the fact that they are very different ex ante. Similarly, estimated treatment effects are also similar when we drop 2005, though the time path downward for women becomes flatter in the synthetic control matched on all outcomes. Broadly, we view these results as together providing suggestive evidence of causal treatment effects on contracts.

5.2 Other Identification Considerations

Even if trends are parallel leading up to Rana Plaza, a violation of the parallel trend assumption required for difference-in-difference would occur if the control group was indirectly affected by the

treatment. For instance, other similar industries could be hurt if the reputation of all Bangladeshi industries – not just the garment sector – were hurt, and thus firms in these other industries were also prompted to improve working conditions. While we cannot totally rule out these effects, we know of no anecdotal evidence that other industries were affected by the Rana Plaza collapse. The garment industry is very high-profile, and discussion tends to center on it per se.

Alternatively, if workers pushed out of the garment industry joined other industries, outcomes in both the treatment and control group could be affected by an outward shift in labor supply. We examine the potential for such shifts in figure 5. It shows a short-term dip in garment sector employment, which appears to dissipate by 2015. Thus, we conclude that there were not large overall extensive margin effects.

Even if there are not large effects on the size of the garment sector workforce, there could be a composition change in the types of workers that remain in the garment industry post Rana Plaza (compared to those in control industries). While we can partially address this issue by controlling for observable worker demographics interacted with year and gender dummies in equation 1, we acknowledge that there might be changes in unobservable worker characteristics (such as ability) that are correlated with labor market outcomes. If so, treatment effects estimated by equation 1 will capture both compositional changes and causal effects on a given type of worker.

While we of course cannot test for changes in unobservable characteristics directly, we examine composition changes along key observables (workers' years of education, gender, age, marital status, whether a child lives in their household, urban location, and Dhaka area location), under the premise that changes in unobservables are likely correlated with changes in observables (Altonji, Elder and Taber, 2005). Figure 6 estimates compositional changes by gender, both pooled across all post-treatment time periods and separately by period. We find relatively minimal evidence of compositional change, especially among female garment workers. Female garment sector workers were 0.4 standard deviations less likely to be in urban areas, post Rana Plaza: this effect is driven by a short term change in 2013 which has gone away by 2015 and 2016. By 2015 and 2016, male garment workers were more educated and more likely to be married. Further, table A4 looks for differences in gender composition. There is an overall increase of 3.1 percentage points

that a garment sector worker is female, post Rana Plaza. However, this effect is not statistically significant, and also is driven by 2013. All together, while we do not wish to argue that there are no compositional changes, we do argue that they are not substantial–especially for female workers–and so our results are not entirely driven by changes in the types of workers in garments. Rather, they also represent causal effects on a fixed type of worker.

One may also be concerned that the policy changes that took place after Rana Plaza are contemporaneous to other shocks affecting the garment industry, which could also affect workers' outcomes. For example, the garment industry in Bangladesh may have been affected by increased global competition or other shifts in the global economy that may have taken place in the post Rana Plaza period. While we include fixed effects interacted with gender and other control variables to capture macroeconomic shocks, it is still possible that the macroeconomic variables affect the garment industry, say because it more extensively relies on exports, as discussed in section 2.1.

To investigate this possibility descriptively, we look at changes in garment exports from Bangladesh and its main competitors over time before and after Rana Plaza. As shown in Figure 7, we do not observe a noticeable change in export growth from Bangladesh after the Rana Plaza collapse. Garment exports from Bangladesh continued to increase after 2013 at a steady pace, and its global market share actually increased after Rana Plaza: the share of Bangladesh in global clothing exports had risen from 2.5% in 2005 to 4.2% in 2010, and continued to rise to 6.4% in 2018 (WTO, 2019). We also do not observe a noticeable break in exports for the other main exporters of garment post Rana Plaza, except for China, where the value of exports declined after 2013.[6]

Although this descriptive evidence is not a formal proof of the absence of shocks to the garment industry contemporaneous to Rana Plaza, it alleviates concerns that our estimates may capture the influence of contemporaneous shocks. It also indicates that international demand for garment products from Bangladesh was not substantially affected by the Rana Plaza event, possibly due to the rapid safety and regulation responses documented in section 2.2. Therefore, while reduced demand could have been a mechanism behind the treatment effects we estimate, they appear

[6]The decline in Chinese export value has been mostly attributed to a willingness to move away from low-value apparel up to the value chain, and to an increase in labor costs.

instead to be driven by firms' responses to increased international scrutiny.

6 Results

6.1 Treatment Effects on Wages

Table 4 reports the results of our synthetic control estimation (both using the synthetic control matched on all outcomes, and on each individual outcome) on our key outcomes: hourly wages, working conditions, contracts, and hours of work. Starting with hourly wages, estimates in column 1 and 2 show that the post-Rana Plaza reforms had little impact on average wages, across genders and years. In panel B, we break find evidence of differential impacts by gender: males wages fell by approximately 7.2 percent, post-Rana Plaza. By contrast, females wages fell by less post-Rana Plaza, and if anything, rose: in the synthetic control estimate matched on all outcomes in column 1, they rose by 11 percent (P = 0.110).

However, these overall effects conceal differential patterns over time for each gender. To see these patterns, we add interactions between $Garment \times Post$ and $Garment \times Post \times Female$ with year dummies to equation 1 and show the associated marginal effects for each gender and year in figure 8.[7] While effects on women's wages were initially positive right after Rana Plaza in 2013, presumably reflecting the effects of the new minimum wage, women's wages declined in the following years: they had declined by 10 percent by 2015, and by 20 percent by 2016, compared to pre-Rana Plaza levels. While these wage effect estimates are quite large, especially in 2016, they are close to the magnitude of the pre-Rana Plaza main effect of working in the garment industry on women's wages (24 percent). That is, the garment industry used to pay considerably more than other employment opportunities for women (conditional on the control variables in equation 1), but after Rana Plaza, it paid about the same. By contrast, men's wages drop by 9.5 percent in 2013 (P = 0.134), but showed small and statistically insignificant effects in 2015 and 2016. Marginal effects estimated using synthetic control industries matched on hourly wage trends only instead of all outcomes show very similar results, with slightly larger negative effects for women

[7]The point estimates for the specifications which produce these figures are available in the online appendix, which can be found at `http://faculty.washington.edu/rmheath/BCH_online_appendix.pdf`.

in 2015 and 2016.

As table 2 shows, male and female workers are observably different: female workers are younger, less educated, and more likely to be in urban areas or in Dhaka. To test whether the wage declines of female workers were driven by differential treatment effects based on these observable characteristics, we add to equation 1 interactions between $Garment \times Post$ (and its interaction with year dummies) with binary variables capturing below median education, below median age, urban location and Dhaka district.[8] Figure A1 compares the estimated treatment effect on females and males including these additional controls with the original marginal effects given in Figure 8. The coefficients remain very similar, and the differential treatment effect on female wages in 2016 remains highly significant, as reflected in table 1 in the online appendix. Therefore, it does not appear that the differential wages effects by gender are driven by observable differences between the genders.

Another possible explanation for the differential wage effects by gender is that women are in parts of the wage distribution whose wages are particularly affected by international scrutiny. To test for this possibility, figure 9 displays quantile regressions that allow for heterogeneous effects along the wage distribution, which may vary by gender and year. Panel A includes both genders. While low-earning men appeared to benefit from Rana Plaza, women throughout the wage distribution (and especially high-earning women) lost earnings after Rana Plaza.

Panel B of figure 9 focuses on women and breaks down wage effects by year. The *Garment* dummy in the upper left panel indicates that the garment sector wage benefit for women, pre-Rana Plaza, was strongest among high earning women. For instance, women at the 70th percentile of the wage distribution earned approximately 15 percent more in garments (conditional on observable human capital) than in control industries. In 2013, immediately after Rana Plaza, there were wage gains in the low part of the distribution, consistent with effects from the minimum wage increase dominating for these women. Indeed, women at the 10th percentile of the wage distribution earned

[8]We construct binary variables to lend a clearer interpretation of the main effects of $Garment \times Post$ and $Garment \times Post \times Female$ after including these additional variables interacted with treatment. That is, the main effects of $Garment \times Post$ and $Garment \times Post \times Female$ give the estimated treatment effects on males and females, respectively, who are below median age and education, do not work in an urban area or in Dhaka, and live with no children.

an estimated 25 percent wage increase. By 2015 and 2016, by contrast, these gains had evaporated, and all but the highest earning women had suffered wage decreases. Turning to men, in Panel C, the wage effects in 2013 showed a similar pattern to women, in that low-earning men also had wage increases of roughly the same magnitude. Also analogously to women, in 2015 and 2016, higher earners began to benefit, though the lowest wage earners suffered smaller wage decreases.

Together, these results suggest that the minimum wage increase did have a moderate impact on lower wage workers in 2013. A consideration in interpreting our estimates as the net effect of the bundle of post Rana Plaza reforms is whether the minimum wage increase would have occurred (and been a similar magnitude) even absent Rana Plaza. While worker protests invoked Rana Plaza, we acknowledge that this does not prove that the minimum wage increase would not have otherwise happened, given that the current minimum had not changed in three years. In that case, we would want to net out the effects of the minimum wage increase from our estimated treatment effects. The fact that women see an overall wage decrease by 2016 suggests that the minimum wage is not a large driver of our estimated wage effects in the medium term. Therefore, these effects would be very similar even if we did not consider the minimum wage among the causal mechanisms linking Rana Plaza to worker-level outcomes.

Figure 9 indeed provides little evidence that the wage decreases women suffered in 2015 and 2016 occurred because women were disproportionately in the part of the wage distribution affected by international scrutiny. Combined with the results in A1, we conclude that it is something more fundamental about gender that drives women's wage decreases. As described in section 3.2, there are two broad possibilities: non-wage benefits are differentially costly to provide to women, or women have more inelastic labor supply into the garment industry because they have worse outside options than men. If this latter explanation dominates, then we would expect the garment industry to become more female after Rana Plaza. By contrast, table A4 showed no evidence that the garment industry had become differentially female in 2015 and 2016, when the wage decreases appear for women. Accordingly, we conclude that improving working conditions is differentially costly for women, and indeed, in the next subsection, we will find suggestive evidence that women differentially report improved working conditions after Rana Plaza.

6.2 Treatment Effects on Non-pecuniary Aspects of Job Quality

The stated objective of much of the international scrutiny post Rana Plaza reforms was to improve safety and working conditions inside garment factories. In column 3 and 4 of table 4, we report estimates of the effects of the Rana Plaza reforms on the index of working conditions described in section 4.1, using the same identification strategy as we used with wage effects in the previous subsection. Overall, we find that Rana Plaza increased the working conditions faced by garment workers by 0.45 standard deviations (0.54 using a synthetic control matched only on conditions). Panel B suggests that these effects were driven primarily by women, whose working conditions rose by 0.82 standard deviations (though the difference between men and women is not statistically different at conventional levels, P = 0.208). In figure 8 we again show marginal effects by gender and year. While these effects on women are highest in magnitude in 2013, the estimates by year are quite noisy, so we conclude that there is not enough evidence to make a conclusion on the time path of the effects.

Columns 5 to 6 of table 4 (panel A) explore the effects of the post-Rana Plaza reforms on hours worked. Across all post-treatment time periods, weekly hours worked have increased by 1.8 hours (2.0 hours for the synthetic control matched only on hours). As for wages, figure 8 shows that effects differ between genders, and that they become more pronounced over time for women. By 2016, women in the garment industry worked about 3 more hours weekly compared to pre-Rana Plaza levels (5 hours for the synthetic control matched only on hours), and this effect is statistically different from both zero and the initial effects in 2013. The weekly hours of male garment workers also increased post Rana Plaza, although the increase in hours worked was larger in 2013 and then diminished over time. By 2016, male workers were working about 1 to 2 hours more per week compared to pre-Rana Plaza, although the effect is not statistically significant. Overall, there is evidence that employers responded to Rana Plaza by increasing the number of hours worked by employees, for men in the short run and women in the medium run. If some of the additional hours work constitute unpaid overtime, these increases could be mechanisms behind the reduction in hourly wages discussed in the previous subsection. Alternatively, if some of the effect is driven by paid overtime, it could indicate increased production pressure in primary

factories, for whom subcontracting is no longer a viable option after having received large orders.

In column 7 and 8 of table 4 we also examine the effects of Rana Plaza on the likelihood of holding a formal written contract in the garment industry. These results should be viewed as suggestive given that the synthetic control matched on contracts still rejects parallel pretrends, as we discussed in section 5.1. The coefficients in Panel A show that the probability to hold a formal contract post Rana Plaza across genders and years was reduced by about 3 percentage points, although this effect statistically significant. Figure 8 shows that, as for other outcomes, marginal effects greatly vary between genders, with female workers being disproportionately affected by 2016. By 2016, the likelihood to hold a formal written contract had declined by close to 20 percentage points for women, while adverse effects for men by 2016 are between 5 and 10 percentage points depending on the specification used. The negative effects for women, as for wages, are more pronounced over time. These results suggest that employers may have gradually responded to the increased costs imposed by the reforms by offering more precarious employment contracts that allow firms greater flexibility to adjust the size of the labor force. Results with alternative control groups in table A6 – as discussed in section 5.1 – broadly confirm this pattern. As shown in figure A1, the negative effect on holding a written contract for women in 2016 seems largely driven by gender per se as opposed to observable workers' characteristics correlated with gender.

7 Conclusion

This paper studies the effects of the post-Rana Plaza reforms on labor market outcomes of garment workers compared to synthetic control groups of workers who exhibited similar evolution of labor outcomes, pre Rana Plaza. While we find that increased international scrutiny achieved its goal of improving working conditions and increased wages for female workers in the short run, by 2016, female workers had suffered reductions in wages (a 20% wage reduction) and suggestive evidence of a decrease in job security (a 19 percentage point decrease in the receipt of contracts). One possible explanation for these reductions is that employers compensated for the cost of improving working conditions (many of which were differentially utilized by women, such as sick leave) by lowering the wages of the female workers for whom the new minimum wage was not binding.

Taken together, our results suggest that the push to improve working conditions after Rana Plaza may have brought unintended consequences, which were particularly felt by female workers a few years after the reforms. Research on the effects of international scrutiny and other policies to help workers should seek to include as long a time horizon as possible, and fielding regular labor force surveys will help researchers detect the time path of effects. Policy makers should also take into account such consequences when implementing reforms, and consider pairing them with policies that mitigate potential adverse effects on workers' job security and wages.

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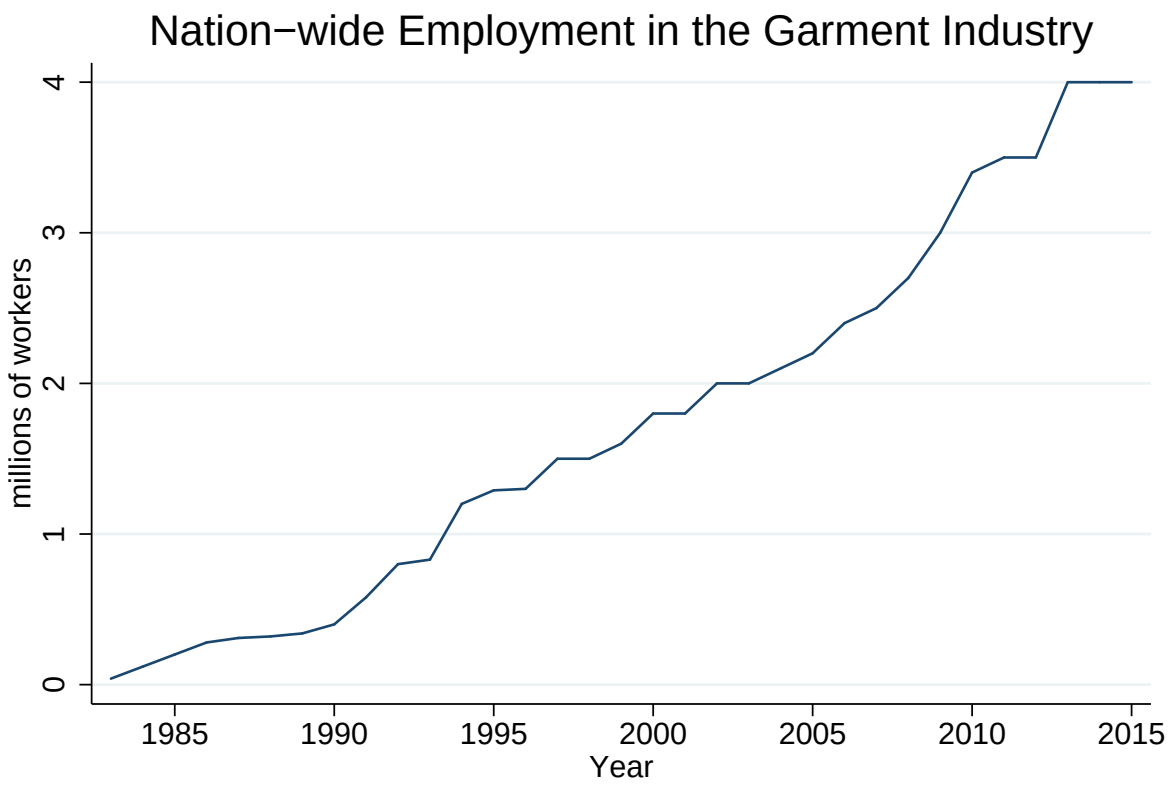
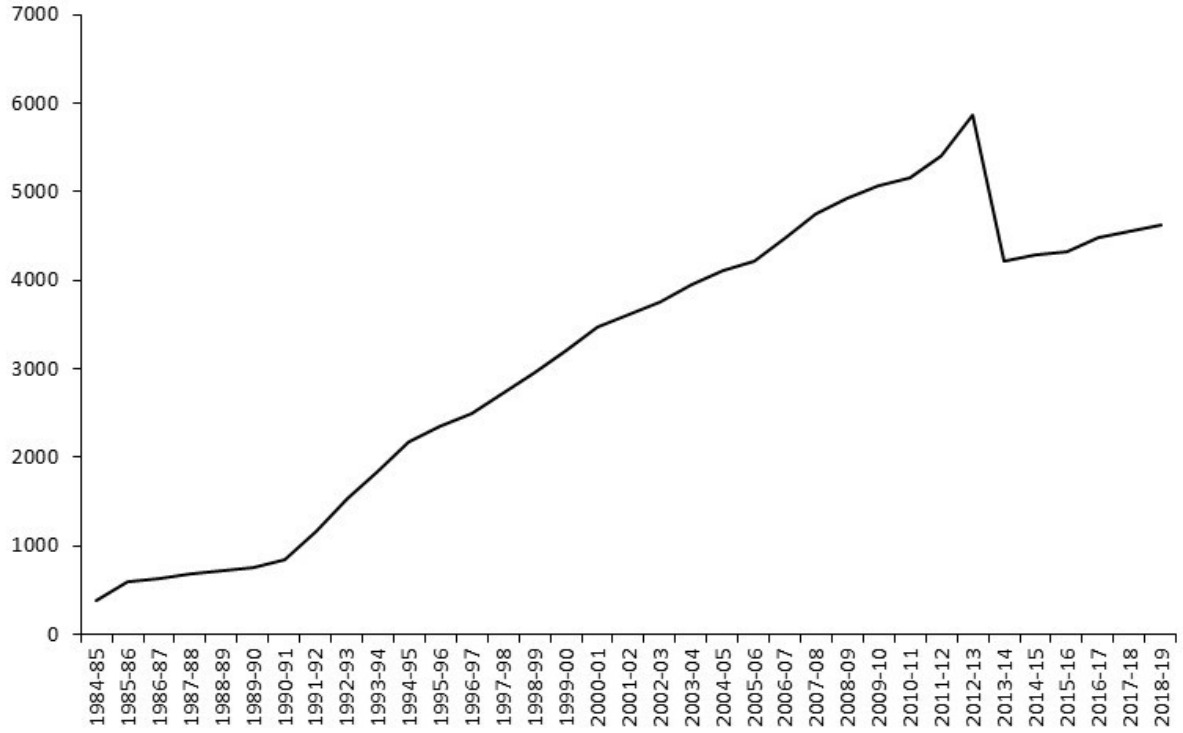
Figure 1: Total employment in the garment industry over time



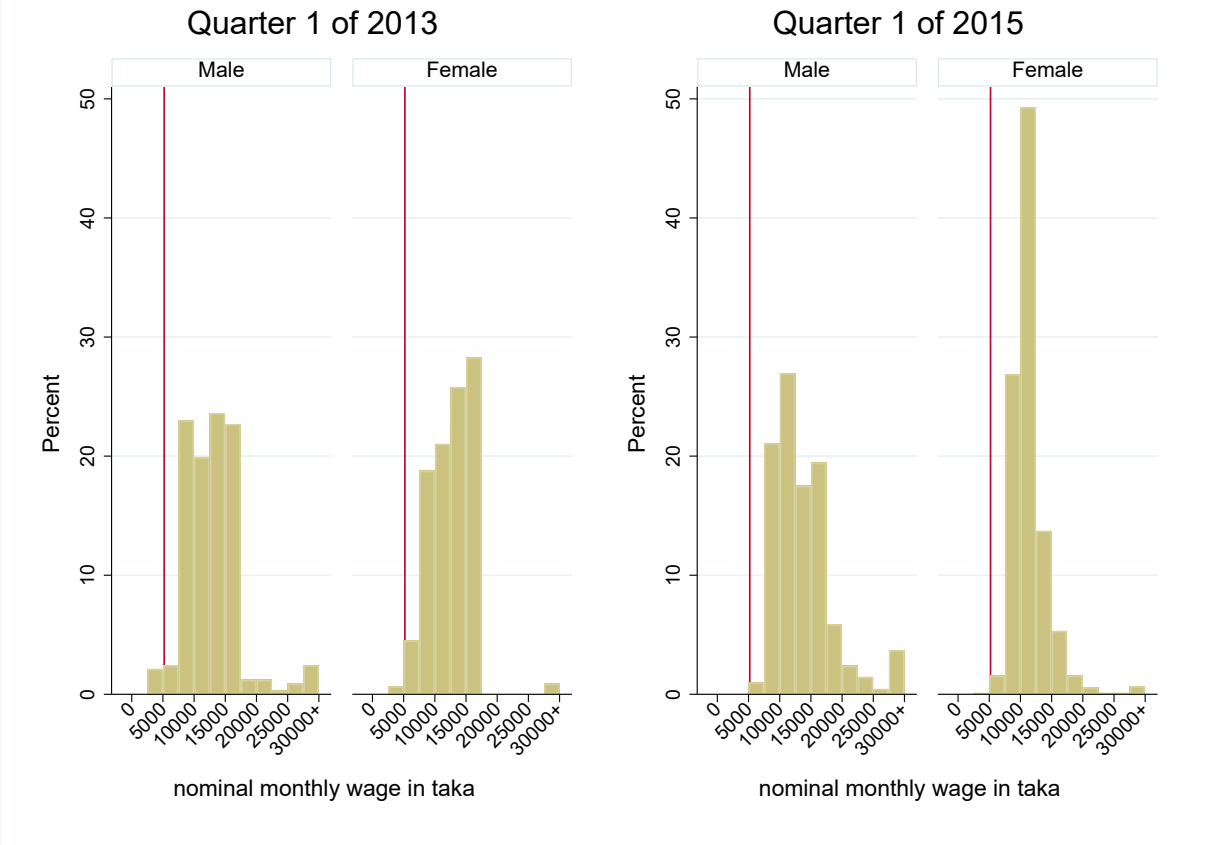
Source: Bangladesh Garment Manufacturers' Export Association (BGMEA)

Figure 2: Total Number of registered garment factories



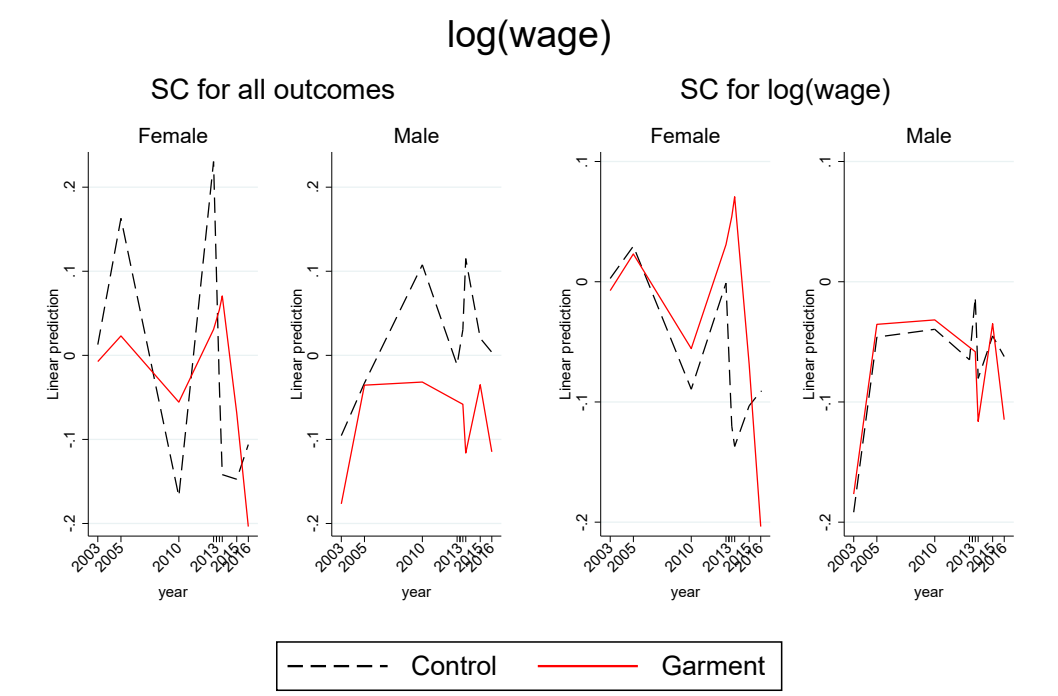
Source: Bangladesh Garment Manufacturers and Exporters Association (BGMEA)

Figure 3: Wages in the garment industry before and after Rana Plaza, by gender

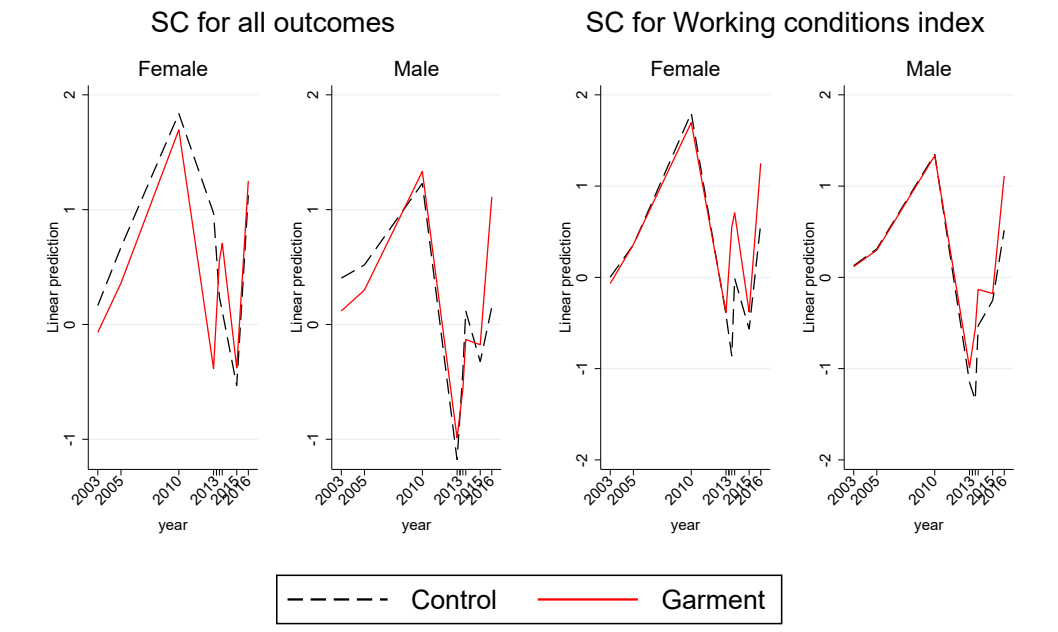


Notes: The vertical red line represents the new nominal minimum wage implemented in the garment industry from January 2014 onwards after the Rana Plaza collapse.
Source: Bangladesh National Labor Force Surveys.

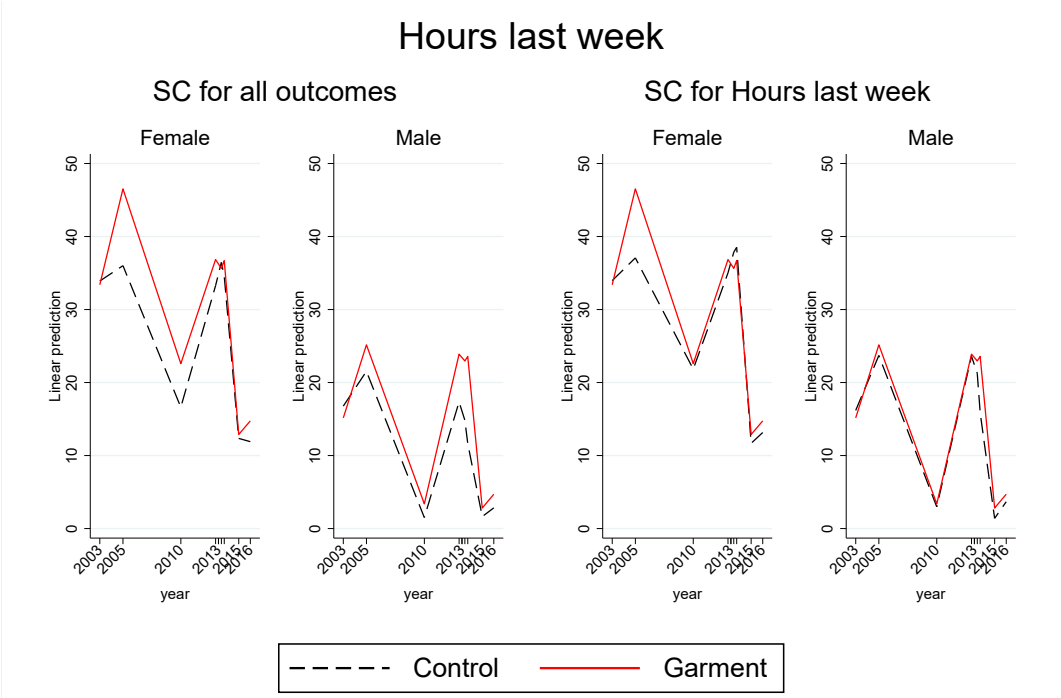
Figure 4: Trends over time



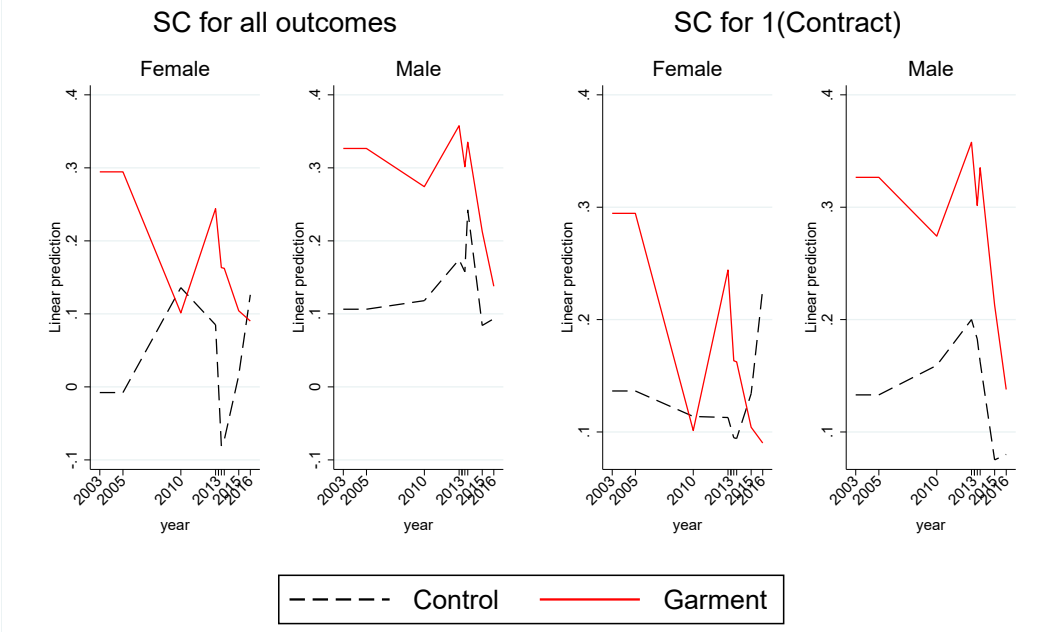
Graphed are residuals, conditional on age, gender, level of schooling, region dummies, and dummy for urban location, interacted w/ year dummies and gender dummies, and a triple interaction w/ year and gender.



Graphed are residuals, conditional on age, gender, level of schooling, region dummies, and dummy for urban location, interacted w/ year dummies and gender dummies, and a triple interaction w/ year and gender.



Graphed are residuals, conditional on age, gender, level of schooling, region dummies, and dummy for urban location, interacted w/ year dummies and gender dummies, and a triple interaction w/ year and gender.



Graphed are residuals, conditional on age, gender, level of schooling, region dummies, and dummy for urban location, interacted w/ year dummies and gender dummies, and a triple interaction w/ year and gender.

Figure 5: Percentage of workers in the garment industry

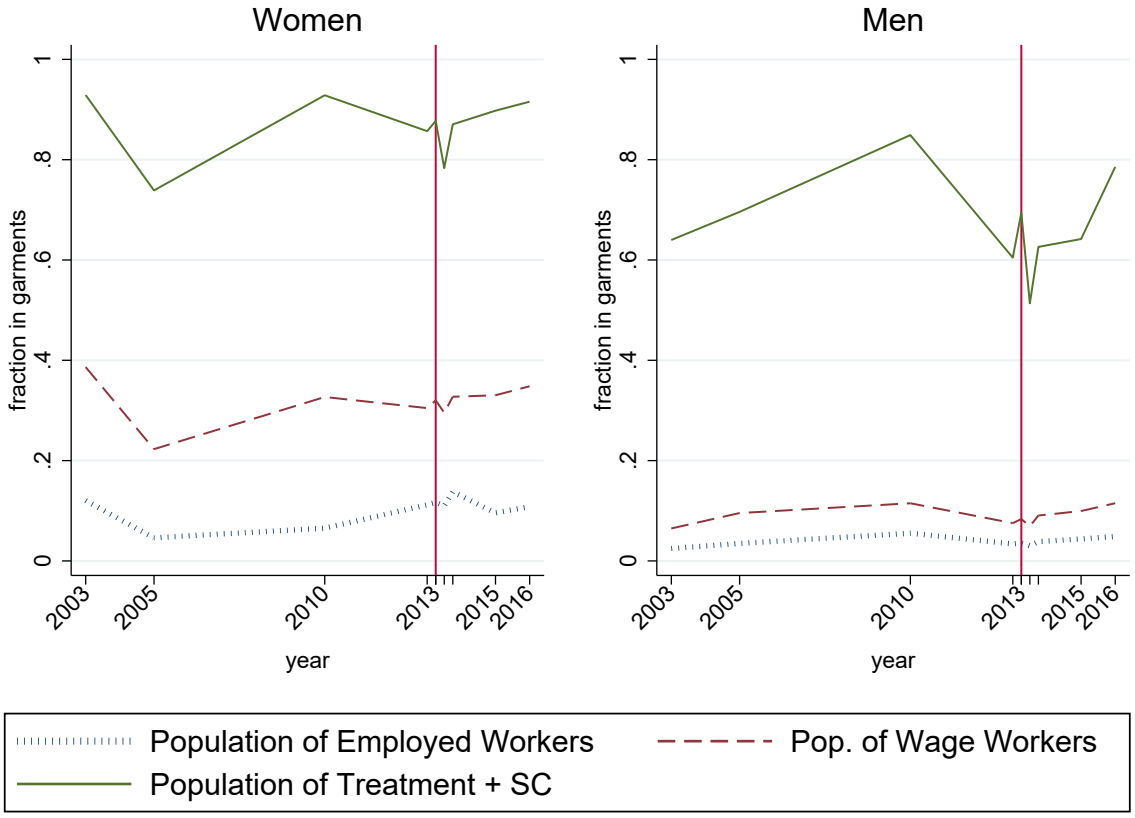
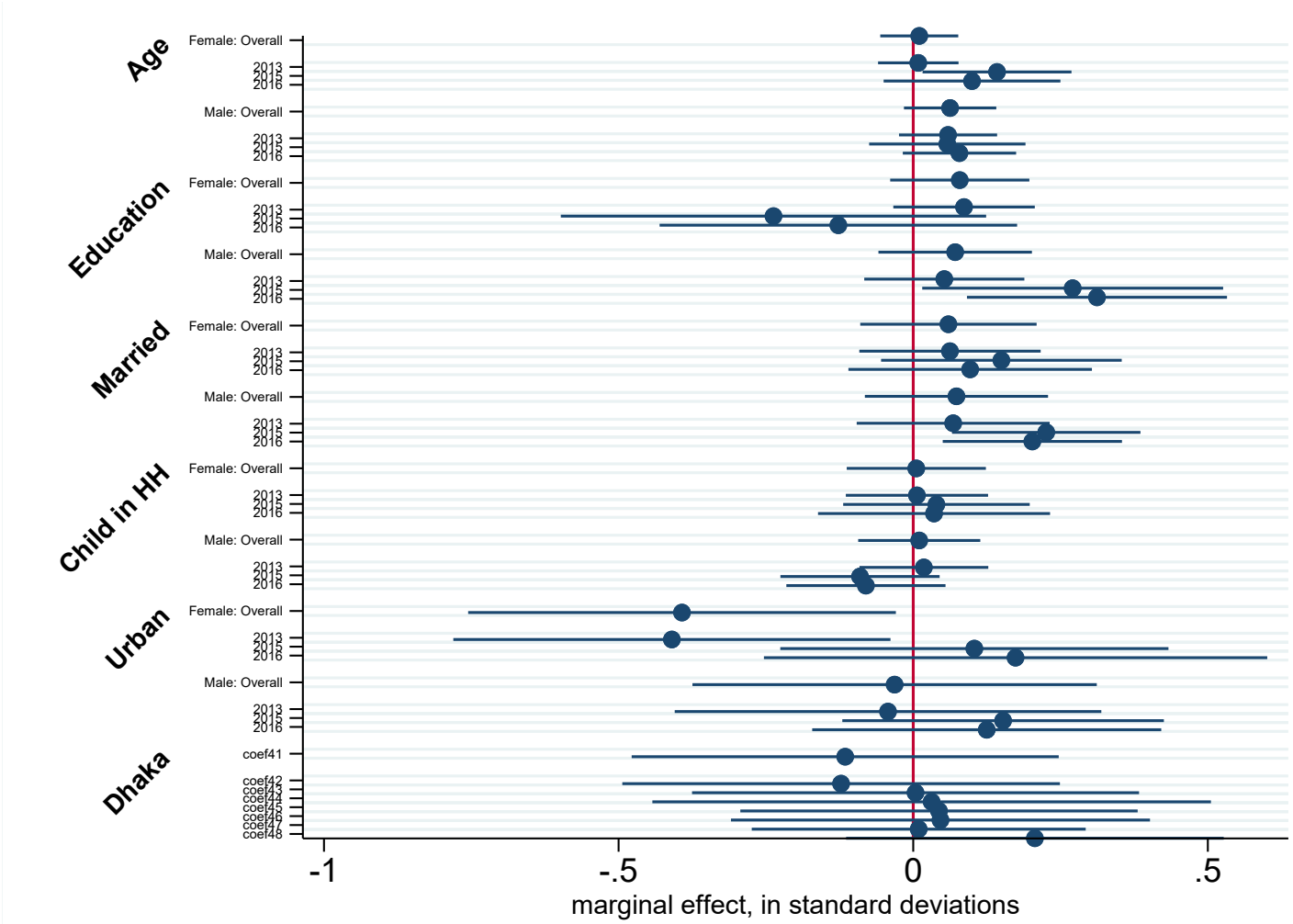
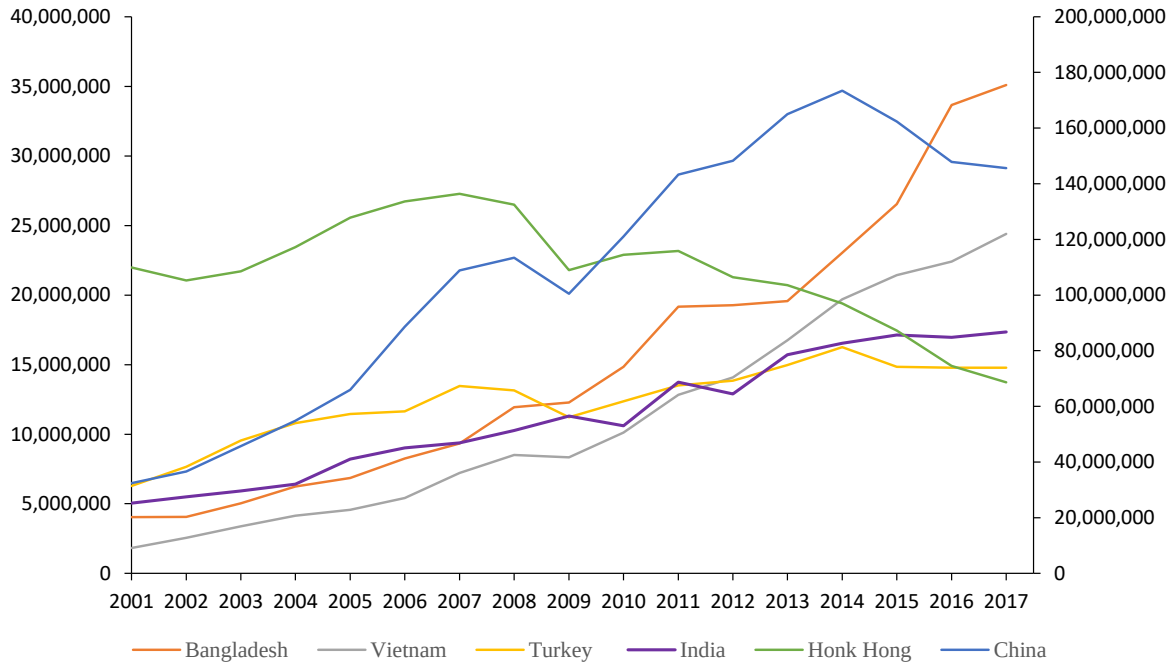


Figure 6: Compositional changes in garment workers, post Rana Plaza



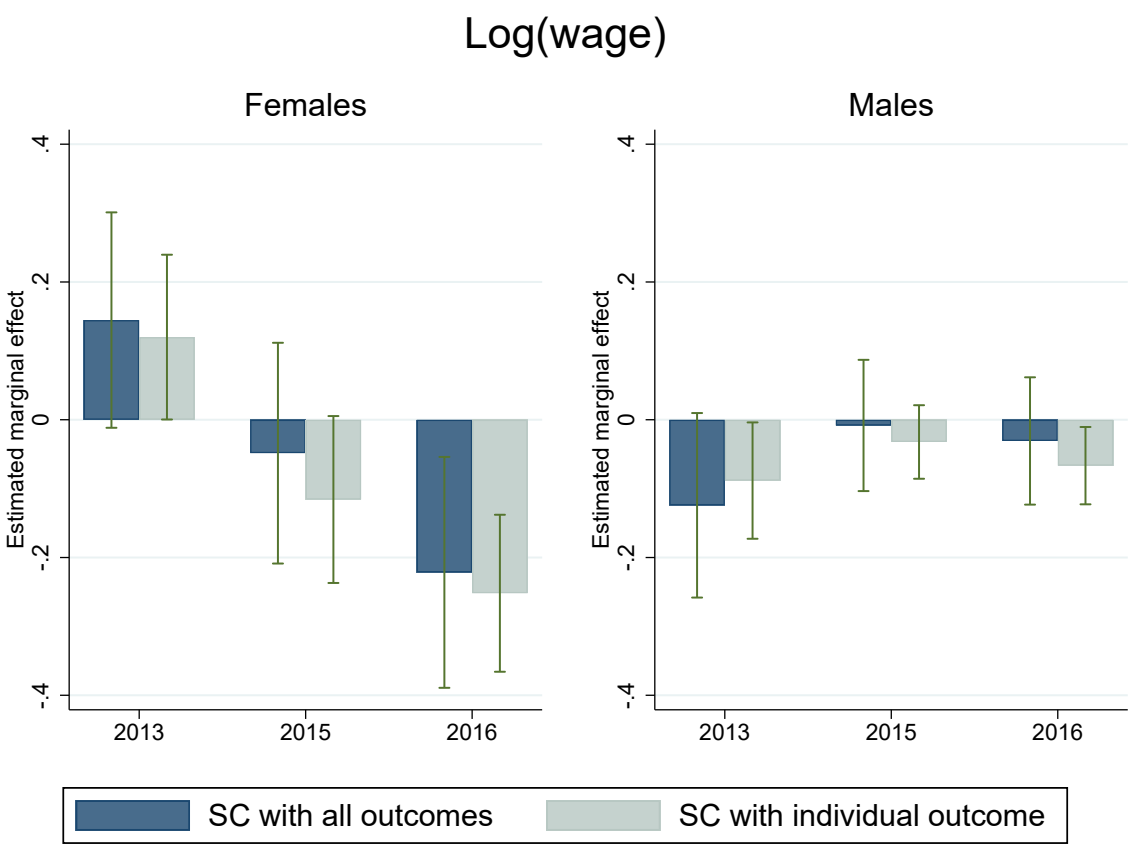
*Notes: Depicted are marginal effects by gender and year estimated from regressions of the bold variables on the left on an indicator for Garment × Post, as well as the main effect of Garment (interacted with gender) and year dummies. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

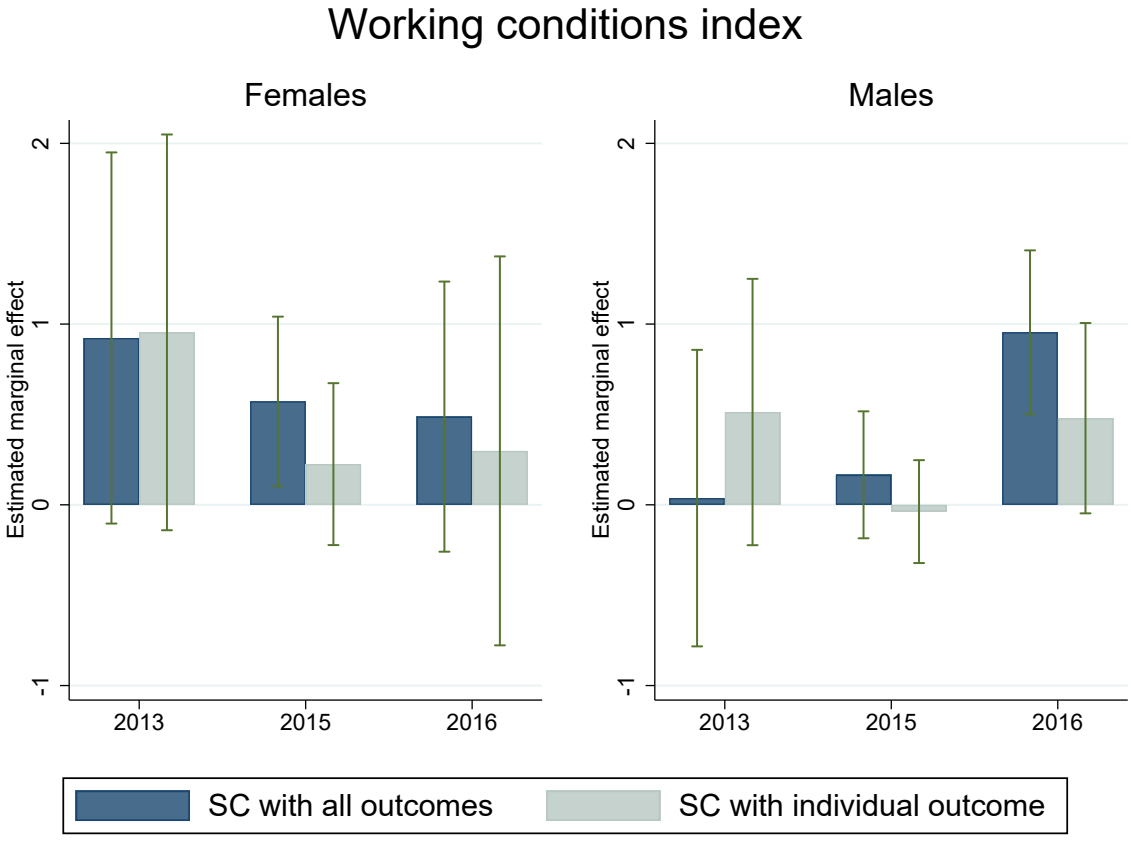
Figure 7: Total value of apparel exports by exporting country (in 1,000 USD)



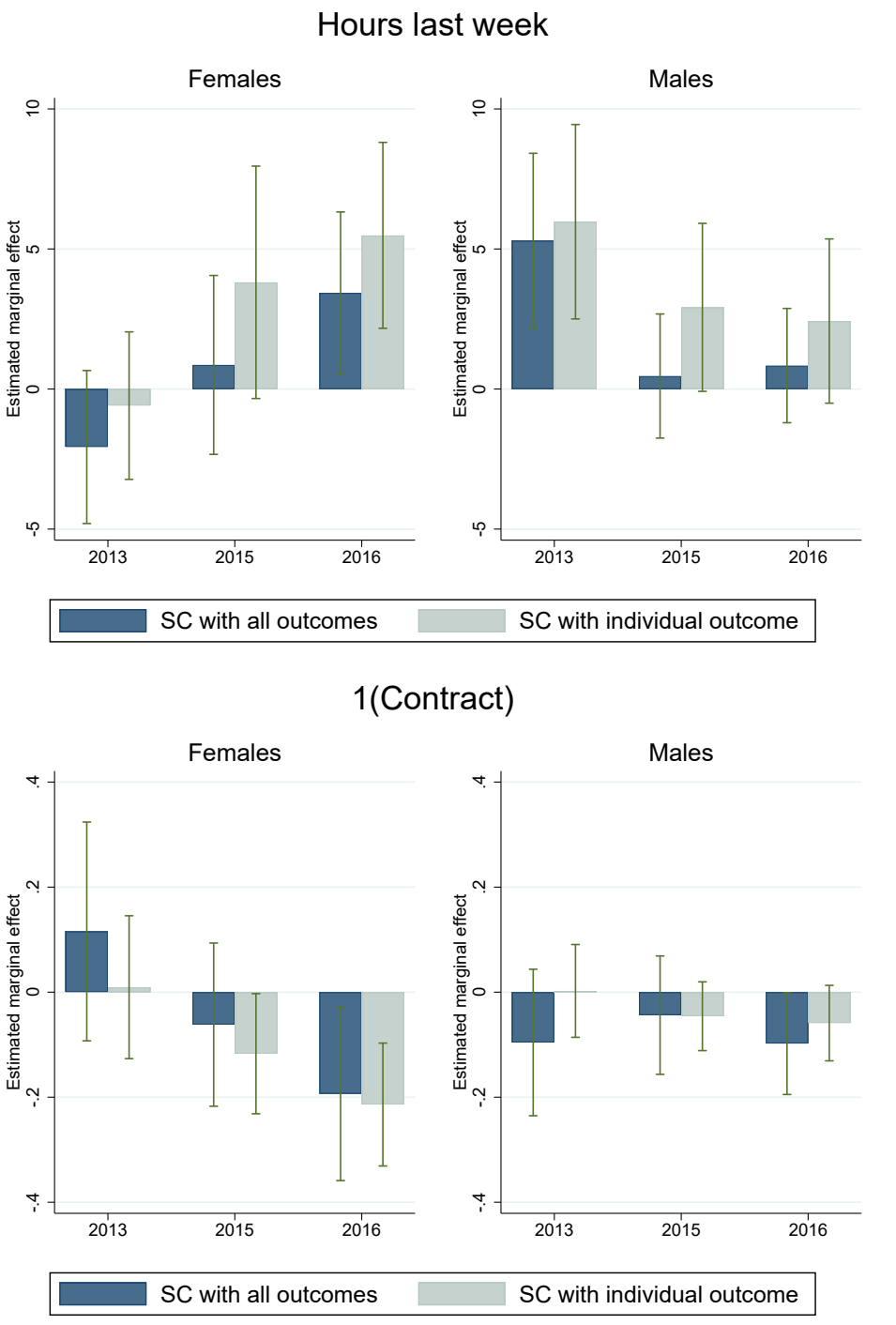
Note: The y-axis on the left reports the value of exports for all countries except China. The y-axis on the right the value of exports for China.
Source: UN COMTRADE and ITC statistics.

Figure 8: Marginal effects by year





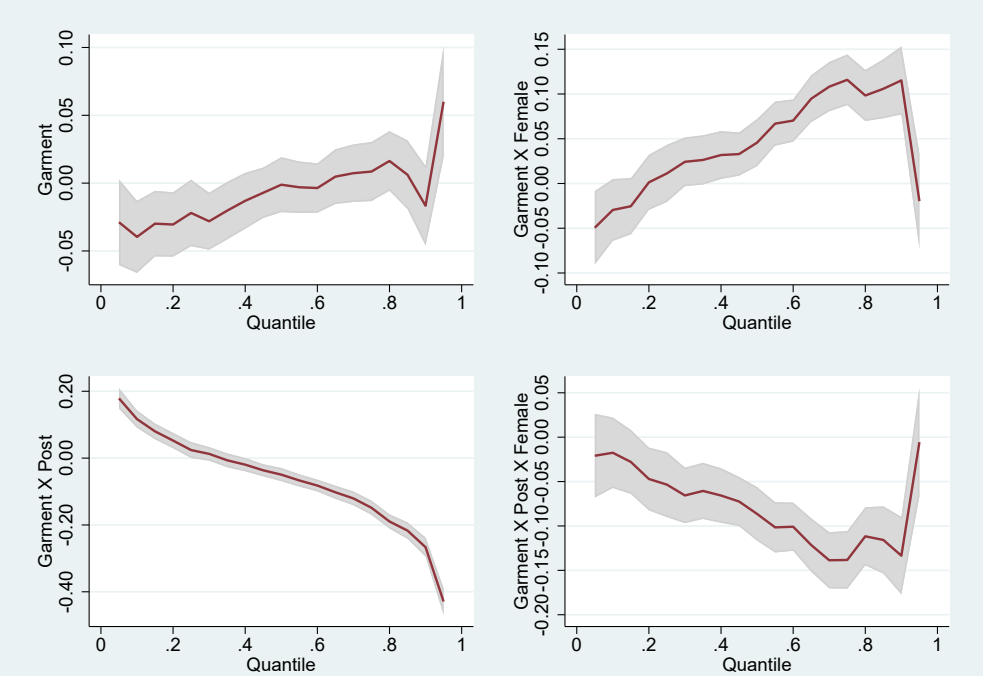
Marginal effects by year (continued)



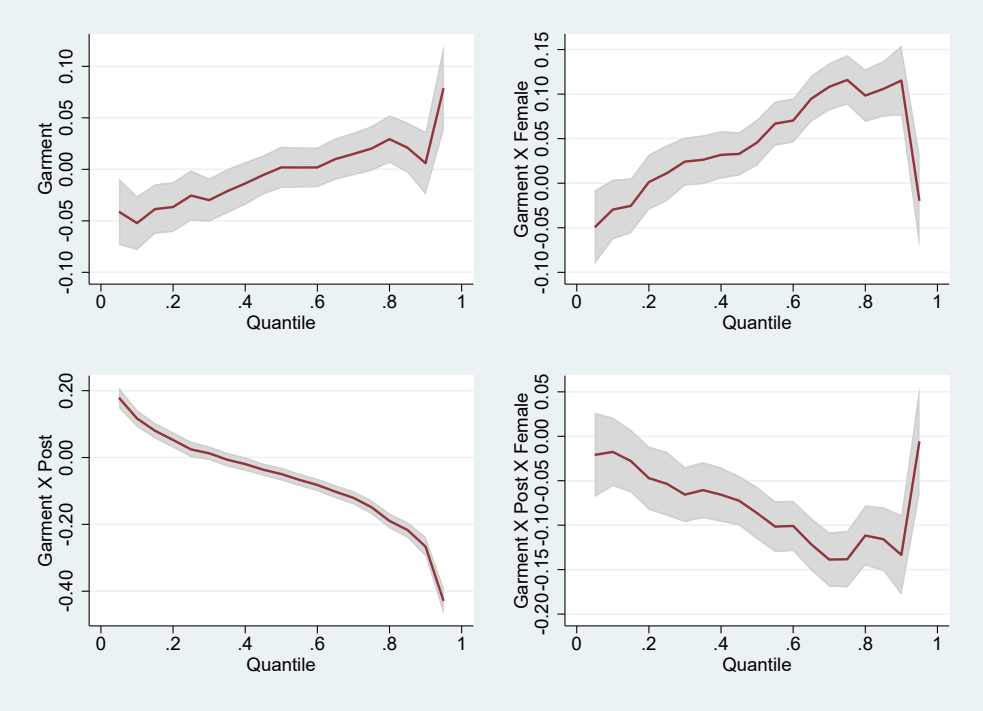
*Notes: Depicted are marginal effects by gender and year, from estimates of equation 1. These regressions include controls for worker's age, gender, level of schooling, region dummies, and dummy for urban location, interacted with year dummies and gender dummies, and a triple interaction with year and gender. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

Figure 9: Quantile treatment effects for wages (Panel A): Both genders

SC for all outcomes

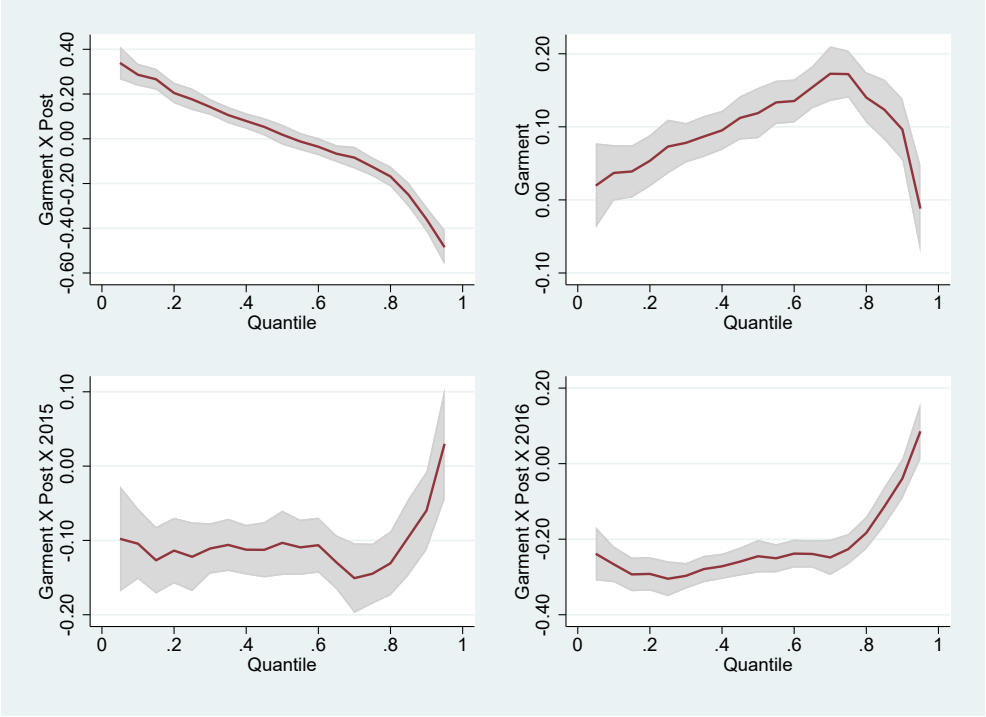


SC for wages

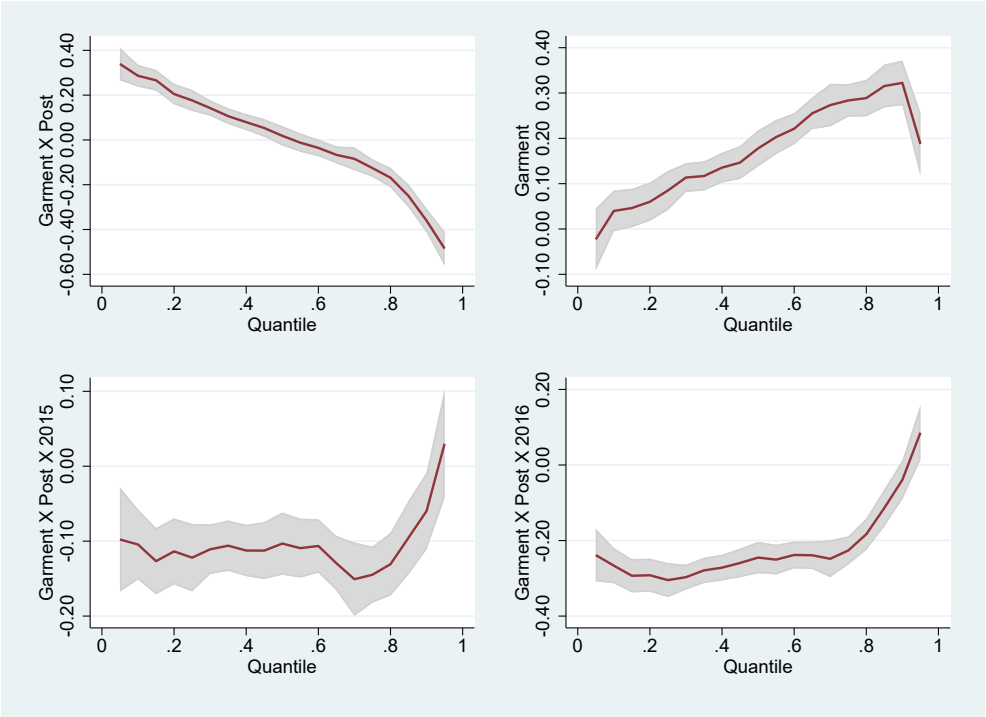


Quantile treatment effects for wages (Panel B): Females Only

SC for all outcomes

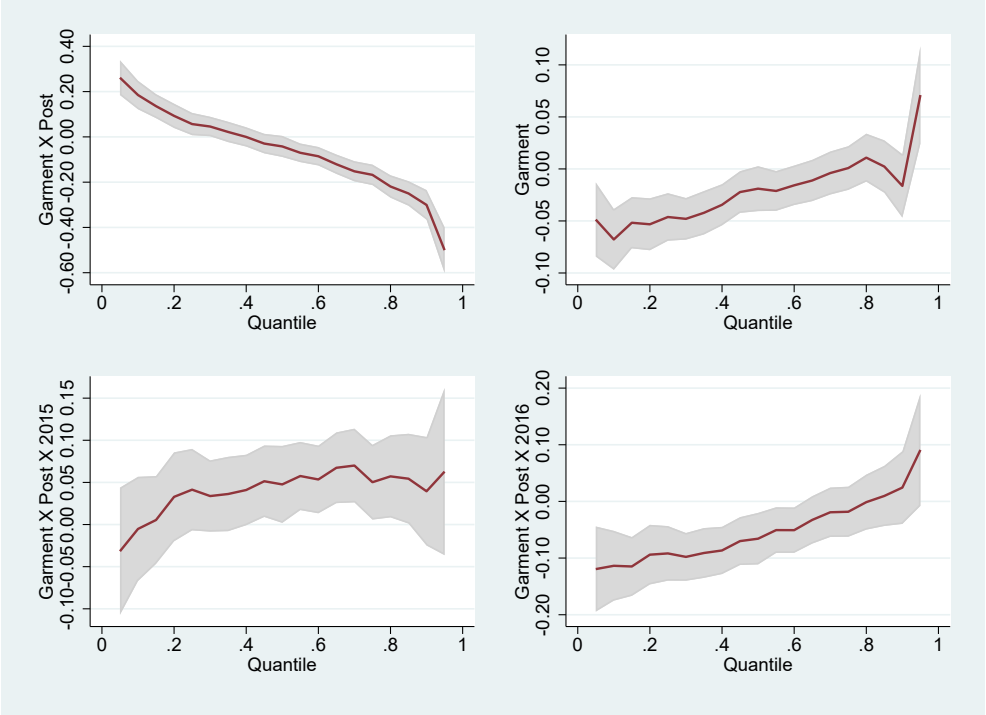


SC for wages



Quantile treatment effects for wages (Panel C): Males Only

SC for all outcomes



SC for wages

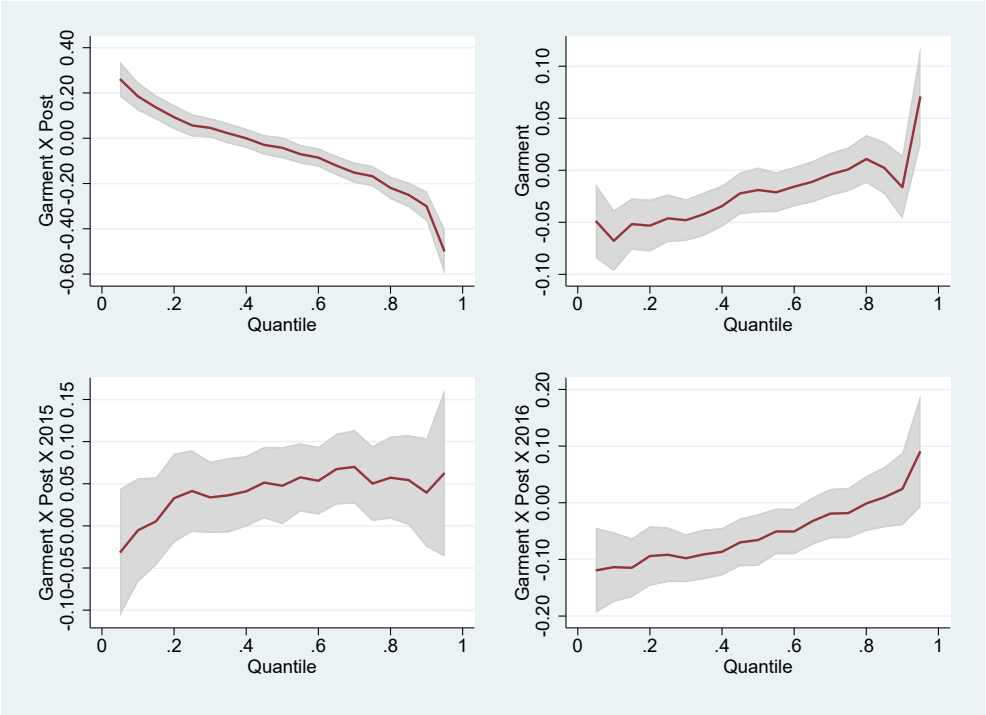


Table 1: Synthetic Control Industries

ISIC 3 code	Industry	Weight: Females	Weight: Males	N: Females	N: Males
15	Manufacture of food products and beverages	0.30	0.00	1131	4338
16	Manufacture of tobacco products	0.00	0.17	416	529
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.00	0.12	332	1046
22	Publishing, printing and reproduction of recorded media	0.00	0.24	28	415
24	Manufacture of chemicals and chemical products	0.00	0.25	387	1919
26	Manufacture of other non-metallic mineral products	0.29	0.05	780	2180
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	0.00	0.09	217	3509
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	0.23	0.00	3420	52034
65	Financial intermediation, except insurance and pension funding	0.18	0.00	459	2440
67	Activities auxiliary to financial intermediation	0.00	0.07	280	1672

Notes: Donor pool of industries for each gender includes all industries with at least 100 employees in the pre-treatment periods (2003, 2005, 2010, and 2013 Q1). The sample size (N) gives the total number of female and male workers, respectively, in that industry throughout the six rounds of labor force surveys that we use (2003; 2005; 2010; 2013; 2015; 2016)

Table 2: Summary statistics in estimation sample

	Garments		Other Manufacturing		P-values for test of equality F vs M		Gar vs Other	
	Female	Male	Female	Male	Gar	Other	F	M
Age	26.265	29.453	32.541	34.067	0.000	0.000	0.000	0.000
Years of education	5.053	6.791	6.310	8.924	0.000	0.000	0.000	0.000
Is currently married	0.684	0.655	0.605	0.735	0.000	0.000	0.000	0.000
Children in hh	0.712	0.736	0.703	0.713	0.060	0.617	0.839	0.487
Urban	0.582	0.467	0.545	0.537	0.000	0.467	0.095	0.000
Hourly wage (taka)	32.263	43.110	32.475	53.016	0.000	0.000	0.874	0.000
Hours last week	52.419	55.568	48.225	51.632	0.000	0.000	0.000	0.000
1(Sick leave)	0.327	0.356	0.435	0.447	0.000	0.267	0.000	0.000
1(Maternity leave)	0.451	0.281	0.352	0.182	0.000	0.000	0.000	0.000
1(Contract)	0.597	0.628	0.513	0.624	0.000	0.000	0.000	0.766
1(Injured)	0.015	0.022	0.012	0.053	0.002	0.000	0.638	0.000
1(Abused)	0.172	0.122	0.232	0.172	0.000	0.000	0.004	0.000
1(Dangerous)	0.300	0.299	0.445	0.521	0.918	0.000	0.000	0.000
Firm size 10+	0.700	0.766	0.588	0.474	0.000	0.000	0.000	0.000
Year = 2003	0.104	0.075	0.089	0.098	0.000	0.129	0.277	0.004
Year = 2005	0.083	0.142	0.132	0.121	0.000	0.090	0.000	0.045
Year = 2010	0.111	0.146	0.145	0.141	0.000	0.541	0.016	0.613
Year = 2013	0.307	0.190	0.543	0.542	0.000	0.940	0.000	0.000
Year = 2015	0.193	0.208	0.042	0.046	0.001	0.385	0.000	0.000
Year = 2016	0.203	0.239	0.049	0.052	0.000	0.392	0.000	0.000
Barisal	0.013	0.029	0.051	0.054	0.000	0.436	0.000	0.000
Chittagong	0.203	0.136	0.132	0.157	0.000	0.001	0.000	0.044
Dhaka	0.655	0.623	0.504	0.460	0.000	0.000	0.000	0.000
Khulna	0.025	0.032	0.060	0.095	0.001	0.000	0.000	0.000
Rajshahi	0.045	0.093	0.087	0.089	0.000	0.656	0.000	0.681
Rongpur	0.036	0.072	0.087	0.073	0.000	0.012	0.000	0.873
Sylhet	0.008	0.004	0.040	0.030	0.000	0.006	0.000	0.000
Mymensingh	0.015	0.011	0.039	0.041	0.006	0.659	0.000	0.000
N	12,971	16,104	1951	7840				

Notes: Wages deflated to 2010 taka; the average exchange rate in 2010 was 69 taka/1 USD. Firm size available only 2010 onwards. Contract available 2005 onwards. Injured, Dangerous, and Abused available only 2013 onwards.

Table 3: Pre-trends

Dependent Variable	Log(hourly wage)		Working Conditions	
Synthetic control to match outcome	All	Wage	All	Work Cond
Garment	-0.111**	0.0203	-0.176*	0.0967
	(0.0456)	(0.0387)	(0.102)	(0.0638)
Garment × Female	0.144	0.0661	0.0277	-0.122*
	(0.0975)	(0.0663)	(0.123)	(0.0685)
Year = 2005 × Garment	0.0364	0.00508	0.100	-0.0568
	(0.0738)	(0.0636)	(0.177)	(0.0951)
Year = 2010 × Garment	0.0258	0.0523	0.351*	-0.0543
	(0.0874)	(0.0538)	(0.196)	(0.259)
Year = 2013 × Garment	0.0879	0.0315	0.332	0.321
	(0.0785)	(0.0580)	(0.530)	(0.453)
Year = 2005 × Garment × Female	-0.380	-0.154	-0.115	0.250**
	(0.254)	(0.140)	(0.242)	(0.110)
Year = 2010 × Garment × Female	0.175	0.0636	-0.333	-0.0860
	(0.149)	(0.102)	(0.376)	(0.366)
Year = 2013 × Garment × Female	-0.272**	-0.0272	-1.485*	-0.369
	(0.132)	(0.106)	(0.887)	(0.594)
F-stat for joint sig of garment X year dummies	2.771	0.725	1.006	1.309
P-value	0.0110	0.629	0.420	0.249
F-stat – male dummies	0.423	0.376	1.136	0.321
P-value	0.737	0.770	0.333	0.810
F-stat – female dummies	4.074	0.770	1.171	2.012
P-value	0.00675	0.511	0.319	0.110
F-stat – net effect on females	4.846	1.235	0.848	1.842
P-value	0.00230	0.295	0.468	0.137
R2	0.380	0.370	0.343	0.353
N	9691	64012	9691	65271

Pre-trends (continued)

Dependent Variable	Hours		1(Contract)	
Synthetic control to match outcome	All	Hours	All	Contract
Garment	0.392	-0.800	0.241***	0.196***
	(1.004)	(1.334)	(0.0552)	(0.0310)
Garment × Female	-0.601	-0.857	0.0891	-0.115**
	(2.140)	(2.687)	(0.119)	(0.0556)
Year = 2005 × Garment	0.344	2.209		
	(2.530)	(2.117)		
Year = 2010 × Garment	0.963	0.264	-0.134*	-0.157***
	(1.416)	(1.679)	(0.0801)	(0.0421)
Year = 2013 × Garment	2.437	-0.0661	-0.103	-0.0620
	(1.713)	(2.338)	(0.0946)	(0.0588)
Year = 2005 × Garment × Female	2.955	-4.038		
	(4.393)	(4.578)		
Year = 2010 × Garment × Female	1.383	0.879	-0.264	0.00586
	(2.594)	(3.379)	(0.170)	(0.101)
Year = 2013 × Garment × Female	2.246	4.205	-0.0490	0.0812
	(2.769)	(3.695)	(0.164)	(0.101)
F-stat for joint sig of garment X year dummies	1.002	0.871	2.575	4.081
P-value	0.422	0.515	0.0361	0.00266
F-stat – male dummies	0.694	0.453	1.497	7.068
P-value	0.555	0.715	0.224	0.000867
F-stat – female dummies	0.273	1.194	1.382	0.346
P-value	0.845	0.310	0.251	0.708
F-stat – net effect on females	1.464	1.288	3.645	1.506
P-value	0.222	0.277	0.0263	0.222
R2	0.257	0.270	0.162	0.164
N	9691	61583	6745	46418

*Notes: Contract available 2005 onwards, so 2005 dummies omitted. All regressions include controls for worker's age, gender, level of schooling, region dummies, and dummy for urban location, interacted with year dummies and gender dummies, and a triple interaction with year and gender. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

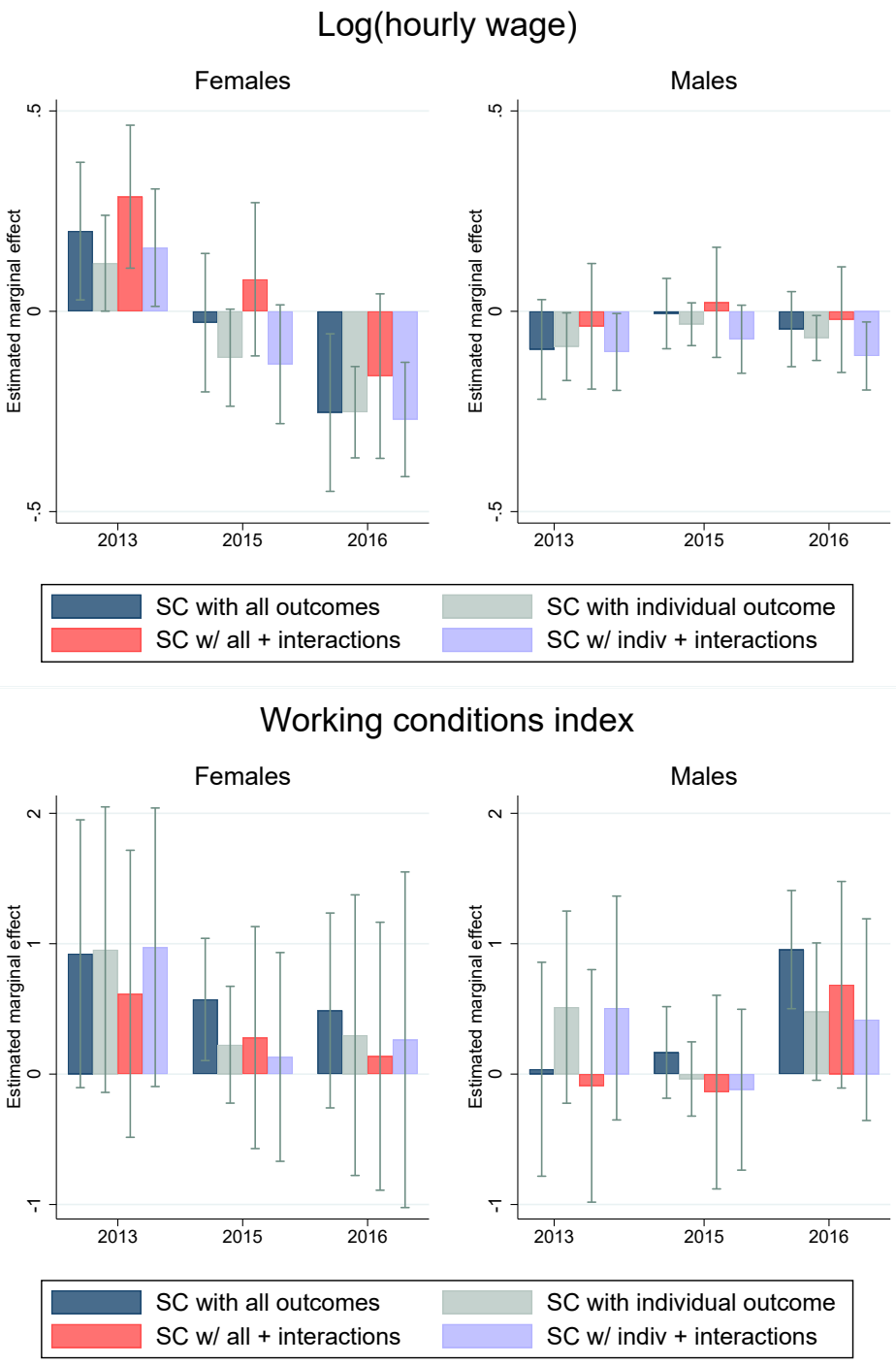
Table 4: Treatment effects of Rana Plaza on garment workers

Dependent Variable	Log(hourly wage)		Working Conditions		Hours		1(Contract)	
Synthetic control to match outcome	All	Wage	All	Work Cond	All	Hours	All	Contract
Panel A: Overall								
Garment	-0.0548*	0.0544***	-0.124	0.0758	1.760***	-0.329	0.145***	0.0735***
	(0.0323)	(0.0204)	(0.128)	(0.132)	(0.628)	(0.759)	(0.0325)	(0.0222)
Garment × Post	0.00899	-0.0475	0.448*	0.543*	1.794*	2.038*	-0.0312	-0.0355
	(0.0465)	(0.0289)	(0.267)	(0.302)	(0.943)	(1.043)	(0.0519)	(0.0337)
R2	0.431	0.417	0.239	0.252	0.195	0.199	0.150	0.151
N	37760	175446	37760	180569	37760	168143	34772	167381
Panel B: By Gender								
Garment	-0.0718**	0.0441**	0.0389	0.138	1.394*	-0.210	0.159***	0.113***
	(0.0326)	(0.0220)	(0.150)	(0.133)	(0.774)	(0.872)	(0.0355)	(0.0203)
Garment × Post	-0.0719	-0.0731**	0.224	0.427	3.725***	4.938***	-0.0879	-0.0171
	(0.0492)	(0.0317)	(0.301)	(0.285)	(1.253)	(1.420)	(0.0548)	(0.0336)
Garment × Female	0.0473	0.0528	-0.452*	-0.186	1.017	-0.196	-0.0385	-0.0988**
	(0.0723)	(0.0442)	(0.264)	(0.194)	(1.219)	(1.379)	(0.0738)	(0.0469)
Garment × Female × Post	0.182*	0.107*	0.597	0.338	-4.684***	-4.146**	0.139	-0.0295
	(0.0937)	(0.0594)	(0.474)	(0.359)	(1.718)	(1.894)	(0.100)	(0.0616)
Female Post	0.110	0.0330	0.821	0.764	-0.959	0.792	0.0510	-0.0470
P-value	0.179	0.534	0.0500	0.0830	0.443	0.554	0.573	0.425
R2	0.431	0.417	0.239	0.252	0.195	0.199	0.150	0.152
N	37760	175446	37760	180569	37760	168143	34772	167381

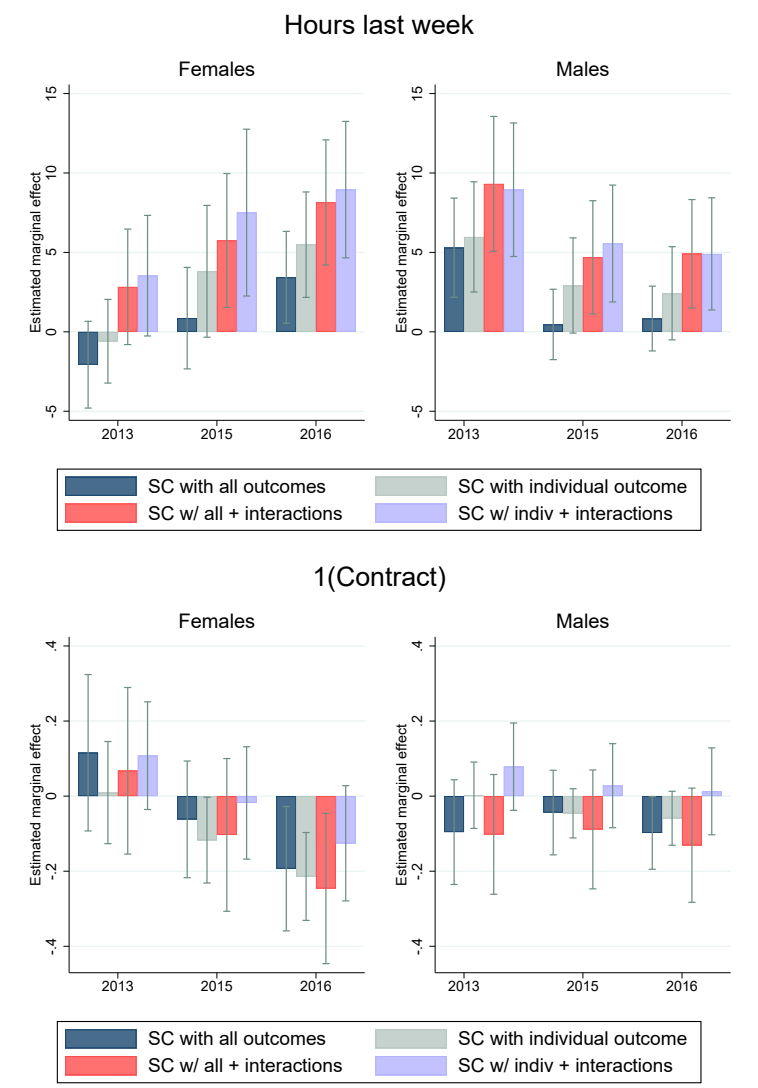
*Notes: All regressions include controls for worker's age, gender, level of schooling, region dummies, and dummy for urban location, interacted with year dummies and gender dummies, and a triple interaction with year and gender. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

Appendix

Figure A1: Marginal effects by year



Marginal effects by year (continued)



*Notes: Depicted are marginal effects by gender and year, from estimates of equation 1. These regressions include controls for worker's age, gender, level of schooling, region dummies, and dummy for urban location, interacted with year dummies and gender dummies, and a triple interaction with year and gender. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

Table A1: Synthetic controls for individual outcomes

ISIC 3		Weight for synthetic control to match: Wage		Conditions		Contract		Hours		N:	
code	Industry	F	M	F	M	F	M	F	M	F	M
1	Agriculture, hunting and related service activities	0.02	0.02	0.02	0.00	0.01	0.01	0.00	0.00	96220	133919
2	Forestry, logging and related service activities	0.01	0.03	0.01	0.00	0.13	0.01	0.00	0.00	1853	2664
5	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	522	9276
14	Other mining and quarrying	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.23	83	854
15	Manufacture of food products and beverages	0.02	0.01	0.37	0.00	0.03	0.01	0.32	0.01	1131	4338
16	Manufacture of tobacco products	0.15	0.01	0.03	0.00	0.01	0.08	0.00	0.01	416	529
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.42	332	1046
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.01	326	2739
22	Publishing, printing and reproduction of recorded media	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.01	28	415
24	Manufacture of chemicals and chemical products	0.00	0.03	0.00	0.11	0.00	0.02	0.00	0.02	387	1919
26	Manufacture of other non-metallic mineral products	0.08	0.02	0.38	0.73	0.01	0.02	0.68	0.01	780	2180
27	Manufacture of basic metals	0.00	0.15	0.00	0.00	0.00	0.01	0.00	0.01	83	1017
28	Manufacture of fabricated metal products, except machinery and equipment	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	204	2443
36	Manufacture of furniture; manufacturing n.e.c.	0.00	0.03	0.00	0.00	0.00	0.02	0.00	0.01	1266	4760
40	Electricity, gas, steam and hot water supply	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	124	1223
45	Construction	0.02	0.02	0.05	0.00	0.01	0.01	0.00	0.00	1948	26049
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	217	3509
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.01	981	11910
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	0.03	0.01	0.02	0.00	0.01	0.01	0.00	0.02	3420	52034

Synthetic controls for individual outcomes (continued)

ISIC 3		Weight for synthetic control to match: Wage		Conditions		Contract		Hours		N:	
code	Industry	F	M	F	M	F	M	F	M	F	M
55	Hotels and restaurants	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.13	586	3564
60	Land transport; transport via pipelines	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.01	726	24995
61	Water transport	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	68	1860
63	Supporting and auxiliary transport activities; activities of travel agencies	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.01	141	1965
64	Post and telecommunications	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.01	110	1096
65	Financial intermediation, except insurance and pension	0.42	0.02	0.01	0.00	0.00	0.03	0.00	0.00	459	2440
66	Insurance and pension funding, except social security	0.00	0.01	0.00	0.00	0.00	0.31	0.00	0.00	171	575
67	Activities auxiliary to financial intermediation	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00	280	1672
74	Other business activities	0.00	0.02	0.00	0.00	0.00	0.10	0.00	0.01	506	4136
75	Public administration and defence; social security	0.02	0.02	0.01	0.00	0.01	0.03	0.00	0.00	1689	11746
80	Education	0.03	0.01	0.01	0.12	0.30	0.05	0.00	0.00	6899	9370
85	Health and social work	0.01	0.04	0.01	0.00	0.47	0.01	0.00	0.00	2611	5341
91	Activities of membership organizations n.e.c.	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	153	2106
92	Recreational, cultural and sporting activities	0.00	0.02	0.00	0.05	0.00	0.01	0.00	0.00	1554	9340
93	Other service activities	0.02	0.03	0.04	0.00	0.01	0.01	0.00	0.01	2257	6109
95	Private households with employed persons	0.19	0.20	0.03	0.00	0.01	0.01	0.00	0.01	10757	2195

Table A2: Summary stats for synthetic controls for individual outcomes

	Garments		SC:				P-values for test of equality					
			Wages		Conditions		F vs M		Gar vs SC Wages		Gar vs SC Cond	
	Female	Male	Female	Male	Female	Male	SC: Wage	SC: Cond	Female	Male	Female	Male
Age	26.265	29.453	33.168	34.844	30.877	31.917	0.000	0.000	0.000	0.000	0.000	0.000
Years of education	5.053	6.791	5.351	6.185	5.090	6.831	0.000	0.000	0.004	0.000	0.673	0.320
Is currently married	0.684	0.655	0.570	0.733	0.591	0.710	0.000	0.000	0.000	0.000	0.000	0.000
Children in hh	0.712	0.736	0.705	0.752	0.705	0.744	0.000	0.000	0.794	0.011	0.780	0.420
Urban	0.582	0.467	0.520	0.442	0.523	0.450	0.000	0.000	0.000	0.000	0.000	0.000
Hourly wage (taka)	32.263	43.110	29.594	40.045	24.682	37.335	0.000	0.000	0.001	0.000	0.000	0.000
Hours last week	52.419	55.568	47.153	50.710	48.653	51.920	0.000	0.000	0.000	0.000	0.000	0.000
1(Sick leave)	0.327	0.356	0.380	0.275	0.322	0.293	0.000	0.000	0.000	0.000	0.660	0.000
1(Maternity leave)	0.451	0.281	0.309	0.117	0.350	0.232	0.000	0.000	0.000	0.000	0.000	0.000
1(Contract)	0.597	0.628	0.413	0.317	0.392	0.477	0.000	0.000	0.000	0.000	0.000	0.000
1(Injured)	0.015	0.022	0.009	0.036	0.009	0.046	0.000	0.000	0.146	0.000	0.123	0.000
1(Abused)	0.172	0.122	0.245	0.173	0.253	0.193	0.000	0.000	0.000	0.000	0.000	0.000
1(Dangerous)	0.300	0.299	0.485	0.377	0.643	0.613	0.000	0.000	0.000	0.000	0.000	0.000
Firm size 10+	0.700	0.766	0.469	0.257	0.625	0.633	0.000	0.008	0.000	0.000	0.000	0.000
Year = 2003	0.104	0.075	0.100	0.099	0.094	0.095	0.701	0.739	0.652	0.000	0.177	0.000
Year = 2005	0.083	0.142	0.111	0.122	0.112	0.106	0.000	0.000	0.000	0.000	0.000	0.000
Year = 2010	0.111	0.146	0.146	0.126	0.140	0.137	0.000	0.102	0.000	0.000	0.000	0.005
Year = 2013	0.307	0.190	0.552	0.557	0.556	0.566	0.143	0.000	0.000	0.000	0.000	0.000
Year = 2015	0.193	0.208	0.043	0.047	0.045	0.048	0.008	0.002	0.000	0.000	0.000	0.000
Year = 2016	0.203	0.239	0.048	0.049	0.052	0.049	0.755	0.003	0.000	0.000	0.000	0.000
Chittagong	0.203	0.136	0.146	0.198	0.120	0.135	0.000	0.000	0.000	0.000	0.000	0.796
Dhaka	0.655	0.623	0.428	0.381	0.523	0.481	0.000	0.000	0.000	0.000	0.000	0.000
Khulna	0.025	0.032	0.089	0.097	0.065	0.094	0.000	0.000	0.000	0.000	0.000	0.000
Rajshahi	0.045	0.093	0.105	0.099	0.080	0.136	0.006	0.000	0.000	0.000	0.000	0.000
Rongpur	0.036	0.072	0.107	0.077	0.104	0.060	0.000	0.000	0.000	0.001	0.000	0.000
Sylhet	0.008	0.004	0.051	0.048	0.040	0.036	0.045	0.000	0.000	0.000	0.000	0.000
Mymensingh	0.015	0.011	0.028	0.024	0.031	0.018	0.000	0.000	0.000	0.000	0.000	0.000
N	12971	16104	8551	142831	24110	132648						

Summary stats for synthetic controls for individual outcomes (continued)

	Garments		SC: Contract		SC: Hours		P-values for test of equality: F vs M		Gar vs SC Contract		Gar vs SC Hours	
	Female	Male	Female	Male	Female	Male	SC: Contract	SC: Hours	Female	Male	Female	Male
Age	26.265	29.453	33.835	35.837	30.700	32.445	0.000	0.000	0.000	0.000	0.000	0.000
Years of education	5.053	6.791	7.996	9.272	4.763	6.076	0.000	0.000	0.000	0.000	0.077	0.000
Is currently married	0.684	0.655	0.696	0.767	0.586	0.753	0.000	0.000	0.153	0.000	0.000	0.000
Children in hh	0.712	0.736	0.654	0.781	0.716	0.862	0.000	0.000	0.003	0.000	0.940	0.000
Urban	0.582	0.467	0.555	0.474	0.525	0.472	0.000	0.000	0.005	0.155	0.008	0.622
Hourly wage (taka)	32.263	43.110	46.677	54.241	21.720	43.146	0.000	0.000	0.000	0.000	0.000	0.966
Hours last week	52.419	55.568	45.526	49.545	49.444	53.741	0.000	0.000	0.000	0.000	0.000	0.000
1(Sick leave)	0.327	0.356	0.614	0.463	0.312	0.207	0.000	0.000	0.000	0.000	0.463	0.000
1(Maternity leave)	0.451	0.281	0.479	0.300	0.362	0.073	0.000	0.000	0.008	0.000	0.000	0.000
1(Contract)	0.597	0.628	0.660	0.658	0.391	0.242	0.418	0.000	0.000	0.000	0.000	0.000
1(Injured)	0.015	0.022	0.015	0.030	0.009	0.017	0.000	0.000	0.866	0.000	0.366	0.204
1(Abused)	0.172	0.122	0.184	0.130	0.265	0.184	0.000	0.000	0.229	0.040	0.000	0.000
1(Dangerous)	0.300	0.299	0.242	0.246	0.723	0.657	0.130	0.000	0.000	0.000	0.000	0.000
Firm size 10+	0.700	0.766	0.486	0.405	0.700	0.452	0.000	0.000	0.000	0.000	0.984	0.000
Year = 2003	0.104	0.075	0.112	0.107	0.086	0.090	0.001	0.009	0.165	0.000	0.173	0.002
Year = 2005	0.083	0.142	0.121	0.117	0.105	0.129	0.015	0.000	0.000	0.000	0.069	0.051
Year = 2010	0.111	0.146	0.158	0.145	0.138	0.115	0.000	0.000	0.000	0.726	0.046	0.000
Year = 2013	0.307	0.190	0.519	0.532	0.575	0.573	0.000	0.447	0.000	0.000	0.000	0.000
Year = 2015	0.193	0.208	0.043	0.049	0.043	0.044	0.000	0.453	0.000	0.000	0.000	0.000
Year = 2016	0.203	0.239	0.047	0.050	0.053	0.048	0.006	0.000	0.000	0.000	0.000	0.000
Chittagong	0.203	0.136	0.168	0.210	0.113	0.169	0.000	0.000	0.000	0.000	0.000	0.000
Dhaka	0.655	0.623	0.362	0.358	0.562	0.526	0.114	0.000	0.000	0.000	0.000	0.000
Khulna	0.025	0.032	0.113	0.103	0.055	0.039	0.000	0.000	0.000	0.000	0.000	0.018
Rajshahi	0.045	0.093	0.112	0.108	0.076	0.046	0.003	0.000	0.000	0.000	0.001	0.000
Rongpur	0.036	0.072	0.107	0.080	0.101	0.106	0.000	0.003	0.000	0.001	0.000	0.000
Sylhet	0.008	0.004	0.062	0.059	0.023	0.072	0.007	0.000	0.000	0.000	0.000	0.000
Mymensingh	0.015	0.011	0.022	0.020	0.035	0.010	0.007	0.000	0.003	0.000	0.000	0.403
N	12971	16104	23705	142831	1126	142831						

Notes: Wages deflated to 2010 taka; the average exchange rate in 2010 was 69 taka/1 USD. Firm size available only 2010 onwards. Contract available 2005 onwards. Injured, Dangerous, and Abused available only 2013 onwards.

Table A3: Summary statistics on specific abusive behaviors and dangerous conditions

	Garments		Other Manufacturing		P-values for test of equality F vs M		Gar vs Other	
	Female	Male	Female	Male	Gar	Other	F	M
Abusive behavior								
constantly shouted/insulted	0.126	0.118	0.158	0.100	0.088	0.000	0.000	0.000
beaten /physically hurt	0.006	0.003	0.008	0.006	0.002	0.213	0.327	0.004
sexually abused	0.047	0.001	0.011	0.001	0.000	0.000	0.000	0.758
others	0.003	0.002	0.000	0.004	0.020	0.001	0.008	0.001
Dangerous conditions								
dust, fumes,noise or vibration	0.185	0.172	0.234	0.185	0.011	0.000	0.000	0.008
fire, gas, flames	0.007	0.019	0.049	0.118	0.000	0.000	0.000	0.000
extreme cold or heat	0.029	0.040	0.058	0.079	0.000	0.000	0.000	0.000
dangerous tools	0.153	0.137	0.178	0.187	0.001	0.266	0.004	0.000
work underground or at heights	0.002	0.004	0.011	0.028	0.083	0.000	0.000	0.000
work in water/pond/river	0.003	0.003	0.001	0.009	0.827	0.000	0.172	0.000
workplace too dark or confined	0.020	0.021	0.031	0.028	0.566	0.409	0.002	0.001
chemicals/explosives	0.005	0.013	0.036	0.057	0.000	0.000	0.000	0.000
other things (specify)	0.001	0.005	0.006	0.013	0.000	0.001	0.000	0.000
N	10,386	11,363	2229	11,527				

All variables available only 2013 onwards.

Table A4: Changes in gender composition, post-Rana Plaza

Dependent Variable	Female	
Garment	0.0775***	0.0831***
	(0.0281)	(0.0298)
Garment × Post	0.0308	0.0339
	(0.0297)	(0.0307)
Garment × Post × 2015		-0.0474
		(0.0476)
Garment × Post × 2016		-0.0703
		(0.0560)
Observations	37855	37855
R^2	0.024	0.024

*Notes: Year dummies included. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

Table A5: Pre-trends for contracts; alternate control groups

Dependent Variable	1(Contract)		
Control Group	All Wage Workers	All minus Agric	Manufacturing
Garment	0.383***	0.358***	0.414***
	(0.0314)	(0.0316)	(0.0310)
Garment × Female	0.126***	0.129***	0.0516
	(0.0413)	(0.0416)	(0.0565)
Year = 2010 × Garment	-0.0713*	-0.0729*	-0.187***
	(0.0395)	(0.0397)	(0.0463)
Year = 2013 × Garment	0.0368	0.0343	-0.140**
	(0.0583)	(0.0582)	(0.0604)
Year = 2010 × Garment × Female	-0.252***	-0.243***	-0.326***
	(0.0544)	(0.0553)	(0.0983)
Year = 2013 × Garment × Female	-0.220***	-0.261***	-0.0729
	(0.0610)	(0.0640)	(0.101)
F-stat for joint significance of garment × year dummies	7.832	7.834	7.340
P-value	0.000	0.000	0.000
F-stat – male dummies	2.824	2.857	8.669
P-value	0.0595	0.0576	0.0002
F-stat – female dummies	11.75	12.05	5.578
P-value	0.000	0.000	0.004
F-stat – net effect on females	13.72	12.99	11.53
P-value	0.000	0.000	0.000
R^2	0.396	0.355	0.269
N	53410	36843	8726

*Notes: All regressions include controls for worker's age, gender, level of schooling, region dummies, and dummy for urban location, interacted with year dummies and gender dummies, and a triple interaction with year and gender. Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*

Table A6: Pre-trends for contracts; alternate control groups

Dependent Variable	1(Contract)				
Control Group	All Workers	All minus Agri	Manufact.	SC All	SC Contract
Years included		2005 onwards		2010 onwards	
Garment	0.356***	0.329***	0.322***	0.121***	0.0744***
	(0.0182)	(0.0182)	(0.0218)	(0.0466)	(0.0258)
Garment × Post	0.0269	0.0370	-0.0214	-0.0570	0.0415
	(0.0421)	(0.0421)	(0.0580)	(0.0773)	(0.0478)
Garment × Female	-0.0297	-0.0318	-0.106**	-0.0897	-0.0822
	(0.0231)	(0.0238)	(0.0503)	(0.0839)	(0.0605)
Garment × Female × Post	-0.0902**	-0.103**	0.0648	0.263**	-0.0095
	(0.0447)	(0.0470)	(0.0779)	(0.125)	(0.0833)
Garment × Post × 2015	-0.129***	-0.133***	-0.154***	0.0521	-0.0482
	(0.0443)	(0.0441)	(0.0589)	(0.0765)	(0.0482)
Garment × Post × 2016	-0.220***	-0.217***	-0.143**	-0.00206	-0.0613
	(0.0459)	(0.0456)	(0.0601)	(0.0706)	(0.0505)
Garment× Female × Post	0.0985**	0.116**	0.0150	-0.230**	-0.0784
× 2015	(0.0446)	(0.0469)	(0.0744)	(0.109)	(0.0699)
Garment× Female × Post	0.0737	0.0926**	-0.0692	-0.307***	-0.162**
× 2016	(0.0449)	(0.0469)	(0.0726)	(0.108)	(0.0709)
Male in 2015	-0.102	-0.0960	-0.175	-0.0050	-0.0070
P-value	0	0.0010	0	0.940	0.855
Male in 2016	-0.193	-0.180	-0.165	-0.0590	-0.0200
P-value	0	0	0	0.308	0.619
Female in 2013	-0.0630	-0.0660	0.0430	0.206	0.0320
P-value	0.181	0.184	0.657	0.0610	0.684
Female in 2015	-0.0940	-0.0820	-0.0950	0.0280	-0.0950
P-value	0.0230	0.0510	0.200	0.735	0.168
Female in 2016	-0.209	-0.190	-0.169	-0.103	-0.191
P-value	0	0	0.0200	0.244	0.0060
R2	0.361	0.324	0.195	0.123	0.125
N	205460	165945	43187	31816	146786

*Notes: Sampling weights included. Standard errors clustered at the primary sampling unit: *** p<0.01, ** p<0.05, * p<0.1*