Exporting Sweatshops?

Evidence from Myanmar*

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October 3, 2017

This study investigates the causal effect of exporting on working conditions in Myanmar by drawing on a new firm survey. I use the rapid opening of Myanmar to foreign trade after 2011 alongside identification strategies that exploit product variations to obtain causal estimates of the impact of trade. The results show that exporting has large positive impacts on fire safety, healthcare management, and freedom of negotiation, weakly positive effects on wages, and insignificant effects on excessive working hours. I also find that exporting raises firm size, improves management practices, and increases the likelihood of receiving a labor audit.

JEL: J8, F16, O19, O32

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This paper is the author's first chapter of their PhD dissertation at Stanford University. I am grateful to Toshihiro Kudo and IDE-JETRO for sharing their data on the Myanmar garment industry. The paper benefited from advice from my thesis advisors Nick Bloom, Dave Donaldson, Pascaline Dupas, and Kalina Manova. I am also grateful for the comments from the participants of the seminars and conferences at which I presented the draft paper. My thanks also go to the staff of the Myanmar research company who helped with field data collection and to all the firm managers in Myanmar who took time to respond to our interviews. Financial support was provided by the Stanford Institute for Innovation in Developing Countries (SEED), Private Enterprise Development in Low-Income Countries (PEDL), the Stanford Center for International Development (SCID), the Stanford Freeman Spogli Institute (FSI), the Walter H. Shorenstein Asia-Pacific Research Center (Contemporary Asia Fellowship), and a SIEPR Ely Graduate Student Fellowship.

Globalization critics have argued that international competition pressures firms to cut costs and exploit workers in developing countries. Indeed, in theory, trade might worsen working conditions if the cost-cutting efforts for exporting are harsh on workers, such as paying lower wages and neglecting safety conditions. However, there are various factors through which globalization may rather improve working conditions in developing countries. First, globalization has raised the awareness of consumers in developed countries about the working conditions of producers in developing countries. Anti-sweatshop movements against companies whose suppliers abuse workers have pressured a number of large retail companies to monitor labor conditions at their supplier firms[1]. In addition, access to foreign markets may improve the return of firms upgrading their quality standards, which may involve paying higher compensation under efficiency wage settings. Furthermore, raising firm size to meet foreign demand may be complimentary to investment in working conditions that incurs fixed costs.

This study investigates how international trade affects working conditions in low-income countries by collecting and analyzing new firm survey data in Myanmar. I collect measures of firm-level working conditions and management practices by carrying out a field survey in Myanmar. This survey comprises three waves (2013–2015) of interviews with plant managers in garment and processed food firms. To understand the level of working conditions in Myanmar, I evaluate whether plant labor practices comply with international labor standards in terms of fire safety, health management, wages, working hours, and the presence of workers' representatives.

Myanmar offers an interesting case through which to examine the causal effects of trade liberalization. In the mid-2000s, Myanmar was under US and European Union (EU) trade sanctions, which limited the export profitability of manufacturing firms. In the late 2000s, de-

1. Examples for such cases date back to the campaigns against Nike and Reebok in 1990s to stop using child labor. More recently, campaigns targeted H&M and other large multinationals after the Rana Plaza collapse in Bangladesh to demand improved safety in supplier factories.

mand for Myanmar apparel products from Japan increased owing to the absence of Japanese sanctions and increasing Japanese demand in Southeast Asia. Then, in 2011, the Myanmar government suddenly initiated democratic and economic reforms including cutting the previous export tax, which substantially increased the value of apparel exports to Japan. The United States and EU then lifted their trade sanctions in late 2012 and 2013, respectively. Hence, Myanmar quickly transitioned from almost an autarky in the mid-2000s into an open economy by the mid-2010s.

The main empirical strategy used to estimate the causal impact of exporting is based on the fact that the requirements to qualify for Japan's preferential tariffs for low-income countries were stricter on knitted apparel than on woven products. The manufacturing process for making knitted and woven apparel from fabric is the same. However, when Japanese demand rapidly expanded to Southeast Asian countries in the late 2000s, Myanmar exports of woven apparel grew rapidly compared with those of knitted apparel. Therefore, I use the production of woven apparel in 2005 as an instrumental variable (IV) to predict exporting in 2013–2015.

The baseline empirical results suggest that exporting has large positive impacts on non-wage working conditions. In particular, exporting leads to the adoption of better fire safety and health management as well as improvements in negotiation freedom. The overall magnitude of these effects is large: exporting improves the measure of working conditions adopted herein (an index evaluating fire safety, healthcare, and freedom of negotiation) by 125%, which is similar to the difference between local plants and multinational plants operating in Myanmar. The estimated impact on wages is positive but weakly significant because of a lack of precision. The effect of exporting on working hours is found to be negative and statistically insignificant. These results are extensively tested for robustness. Employing two alternative identification strategies using variations in geography and industry provides similar results.

My survey data allow me to investigate possible channels. The first is a channel through which foreign buyers pressure local suppliers to comply with international labor standards. My data show that exporting significantly increases the chance of receiving a labor compliance audit, which is typically required by foreign buyers for starting trade. Secondly, improvements in working conditions may be a byproduct of technology adoption such as new management practices that are complementary to working conditions[2]. My results indicate that exporting leads to the adoption of the management practices recommended in developed countries. Finally, investment in working conditions may exhibit an increasing return to scale. For example, introducing fire alarms and creating new communication mechanisms with workers are both likely to require some fixed costs. I also find that exporting leads to larger sales and employment. The results of the decomposition analysis show that firm size explains 51% of the differences in the working conditions scores between exporters and non-exporters, while labor audits (proxy of buyer pressure) explain 20% and management scores explain 12%.

This study is related to three strands of the literature. First, there is a large body of work on the impacts of exporting on firm performance. Recent empirical trade studies have provided ample evidence that better market access facilitates technology adoption and productivity and quality upgrading (Lelieva and Trefler, 2010, in Canada, Park et al., 2010, in China, Bustos, 2011, and Brambilla, Lederman and Porto, 2012, in Argentina, Verhoogen, 2008, in Mexico, and Atkin, Khandelwal and Osman, 2014, in Egypt)[3]. Verhoogen (2008) shows that immediately after the Mexican peso crisis, more productive firms increased ex-

2. When management practices and working conditions are complements, the introduction of such practices may improve working conditions. Distelhorst, Hainmueller and Locke (2016) show that the introduction of lean management led to improvements in working conditions, measured by compliance audits, in Nike factories.

3. Furthermore, these studies are built on the numerous empirical studies that have compared export starters with non-starters by using panel data (e.g., Bernard and Jensen (1999)), which have typically shown a strong association between exporting status and firm productivity but rather weak evidence on the causal effects of exporting.

ports, raised wages, especially those of white-collar workers, and grew the rate of ISO 9000 certification. However, the impacts on working conditions, especially those on non-wage conditions such as fire safety, health management, negotiation, and working hours, have received little scholarly attention despite increasing focus on such aspects in trade policy debates (Robertson et al., 2009; Brown, 2009)[4]. To my knowledge, this is the first empirical study showing the causal impact of trade on occupational safety and health, negotiation, working hours, and wages, using firm-level microdata in a developing country[5].

Second, this study is built on sociology and economics studies of social movements that pressure firms in global supply chains to comply with international labor and environmental standards (Vogel, 1995; Elliot and Freeman, 2003; Locke, 2013; Seidman, 2007; Bartley and Child, 2014; Harrison and Scorse, 2010). In particular, Harrison and Scorse (2010) show that US anti-sweatshop campaigns in the 1990s targeted to several large US apparel and footwear retail companies led to an increasing wage premium in Indonesia[6]. Their evidence is consistent with a number of studies that have documented companies' voluntary

4. Labor standards regarding safety and freedom of negotiation have been central issues in recent policy debates on free trade agreements (see the labor chapter in the Trans-Pacific Partnership as well as the criteria used to determine the status of the Generalized System of Preferences of the United States and EU for low-income countries).

5. Alam, Amin and Rives (2013) find no systematic differences in occupational injuries to Bangladeshi children in the exporting and non-exporting sectors. However, such evidence may reflect the sector-level differences in injury rates. Regarding the issue of trade and child labor, Edmonds and Pavcnik (2005) provide evidence based on Vietnam household data that increases in the relative prices of exported products through trade liberalization reduce child labor. Child labor is not investigated in my study because of the difficulty collecting relevant information from firm managers. Several studies have used cross-country panel data to investigate the relationships between exposure to trade and the adoption of regulatory frameworks on labor and environmental standards, particularly to test the "race to the bottom" hypothesis (Busse, 2004; Edmonds and Pavcnik, 2006; Neumayer and Soysa, 2006; Mosley and Uno, 2007; Greenhill, Mosley and Prakash, 2009; Flanagan, 2006; Prakash and Potoski, 2006). In terms of developed countries, the recent study by Hummels, Munch and Xiang (2016) in Denmark shows that higher export demand increases injuries, potentially because of lengthening working hours and workers being forced to undertake more intensive job tasks. My setting in Myanmar is different from theirs, however, in that Myanmar is a much lower-income country.

6. This study differs from Harrison and Scorse (2010) in that instead of looking at the impact of exposures to anti-sweatshop campaigns, I examine the overall impact of exposures to foreign demand. Another difference is that I evaluate various outcomes of working conditions not only wages, such as fire safety, health management, negotiation, and working hours.

initiatives to implement international labor and environmental regulations, so-called "private voluntary regulation" (e.g., Locke (2013); Elliot and Freeman (2003); Locke, Rissing and Pal (2013); Distelhorst and Locke (2016)). However, studies using labor audit data have provided mixed results on whether private voluntary regulation improves labor standards (Locke, 2013; Locke, Qin and Brause, 2007). A key difference of my study is that I show the overall impact of being included in a global supply chain for a firm in a developing country. Pressure from stakeholders is only one explanation why inclusion in a global supply chain improves working conditions.

Third, this research provides the first causal evidence on the impact of exporting on management practices. How firm managers organize the production process is a key part of production technology that determines firm performance (Bertrand and Schoar, 2003; Bloom and Reenen, 2007; Bloom et al., 2013). Although previous empirical studies have examined the impact of trade on productivity and the composition of skilled workers, and technology upgrading, the impact of trade on managerial input remains largely uninvestigated[7].

The rest of the paper is organized as follows. Section 1 introduces the data. Section 2 describes my main identification strategy, followed by the empirical results in section 3. Then, I summarize the results of the robustness checks in section 4, and conclude in section 5.

7. Some recent studies have shown that export performance is positively associated with production hierarchies (Caliendo, Monte and Rossi-Hansberg, 2015) and management practices (Bloom et al., 2012, 2017).

1 Data

1A. Survey data from 2013–2015

My main data source is the garment plant panel data that I collected in three waves of field surveys conducted in 2013, 2014, and 2015[8][9]. Given the absence of an enterprise census in Myanmar, at the beginning of the first wave in May 2013, I assembled a population list of garment plants in Yangon and Mandalay, the two major industrial regions in Myanmar, by combining information from industry directories, lists of manufacturers provided by industry associations, firm registration records, and local wholesalers [10]. Between June and August 2013, my survey team contacted all 238 garment plants in our population list, and we were granted interviews in 176 plants. During the second season, in May 2014, I repeated the population database construction and found 305 plants. Between June and August 2014, we contacted these plants and were granted 201 interviews. By repeating the same exercise in May 2015, I found 351 plants and interviewed 209 of them. In all years, we asked about employment, export orientation, owner characteristics, management practices, and workplace conditions at the beginning of the fiscal year (April). In the same manner, I also surveyed the processed food sector. I first constructed a population database of manufacturers in the sector in 2013 and 2014. Of the 316 processed food plants surveyed, only one exported its products[11]. While the original survey contains data on foreign-owned firms, I focus only

8. A research company in Myanmar helped me conduct face-to-face interviews in Burmese with garment plant managers.

9. It is worth noting that the garment industry (or the apparel industry in general) on which I focus in this study is characterized by buyer-driven commodity chains in which large brand name retailers play key roles in setting up the protocols for the entire production chain (Greffi, 2009). The centralized structure of the supply chains in the apparel industry helps explain why anti-sweatshop movements often target this sector. The supply chain structure is important to consider when judging the external validity of this study's results and their generalizability to other industries.

10. One potential concern is that I might be missing many small firms unlikely to appear in my original dataset. For this reason, my results best describe the behaviors of middle-sized to large firms. Excluding firms with fewer than 100 employees provides similar results (see Section 4).

11. This is presumably because developed countries have stringent imported food security regulations. This feature is used for my robustness checks as discussed more in Section 4.

on domestic firms with less than 50% foreign owned in this study. In my main analysis in Sections 2 and 3, I further limited the sample to firms established before 2005 to use the product variations in 2005 as an IV. After these processes, the sample for my main analysis contains 143 unique plants observed in at least one of the three years and 345 total plant-year observations[12].

Survey instruments on workplace conditions were constructed to measure the level of compliance with international labor standards. To this end, I referred to the ILO's labor standards, and more practically, to the detailed auditing manuals of globally recognized initiatives that provide auditing and certification programs on labor compliance for private companies[13]. Labor standards typically have eight major areas[14]: forced labor, child labor, wages, working hours, discrimination, harassment, freedom of association, and occupational health and safety. Given the sensitivity of some of these topics, I spoke with managers about five areas of compliance: fire safety, occupational health management, freedom of association (termed freedom of negotiation herein), wages, and working hours.

Regarding *fire safety*, I asked, "What kind of equipment do you have for fire safety?" and "Do you practice fire drills?" Typical answers to the first question included marked exit, extinguisher, hose, alarm, and evacuation route map. Such fire-fighting equipment and training are explicitly advised to be installed and practiced according to the auditing manuals of certification initiatives.

12. There were 137 unique firms observed in at least one of the three years.

13. These initiatives include the Fair Labor Association, Business Social Compliance Initiative (BSCI), and Worldwide Responsible Accredited Production (WRAP). In particular, the BSCI was found to be the most widely adopted certification among the Myanmar garment firms interviewed in my survey. The auditing manual of the BSCI is available at its website `http://www.bsci-intl.org`. In addition, a consultant who works in the certification industry helped me construct the questionnaire to address the practices that auditors typically check in the garment industry. It is important to note that the auditors' checklists in the initiatives' manuals on each area of standards are typically more comprehensive than my survey instrument. In addition, auditors usually check the response of firm managers with those of factory workers. Auditors also arrive on a random date so that managers cannot plan and manipulate the results. Given my lack of authority to request lengthy and qualified information, I constructed my instrument to be sufficiently simple and feasible to be conducted within the given time and ensure a high-quality response.

14. An extensive summary of these standards is documented by Smith and Feldman (2003).

Regarding *(occupational) health management*, I asked the following questions: "Do you have a record of injuries at your plant?" "Do you have a list of hospitals to go to in case of emergency?" "Do you have a private contract with a health clinic?" and "Is there a nurse or a doctor at this plant?" The auditing manuals of certification initiatives suggest that auditors check the use of injury records to revise the firm's injury protocols, the presence of qualified staff to be present at the workplace to provide first aid, and training to supervisors regarding how to ensure workers follow the emergency protocols[15].

Questions on *freedom of negotiation* were asked to measure the communication structure of workers and management regarding workplace issues. I asked, "Is a workers' leader in this plant, and if so was she/he appointed by this firm or by workers?" Where a leader was present, I asked how frequently the managers met with the leader on a regular basis. In addition, I asked whether the plant has a suggestion box, which could be another potential communication point. As before, these points are typically checked by auditors[16]

Working hours were measured by plants' average weekly working hours including overtime hours. For *wages*, I used monthly wages including overtime payments. To minimize the variation caused by the fact that different skill levels are required at different plants, my measure of wages is for an entry-level sewing operator. As for working hours and wages, international standards typically require compliance with local regulations. The Factory Act (1951) in Myanmar requires that working hours should not exceed 10 hours and working days should not exceed 6 days. However, when my survey was conducted, no minimum wage had yet been set in Myanmar.

For fire safety, health management, and freedom of negotiation, no consensus was reached on how to quantify these aspects. For my main empirical analysis, I thus construct scores

15. For example, see the BSCI's auditing manual (2.0 EN Part II) performance area 7.

16. The check-points of BSCI's auditing manual (2.0 EN Part II) performance areas 2 and 3 include "How often do management and workers meet to discuss improving working conditions?" "How does management follow up on workers' requests or complaints?" "How is the workers' representative elected?" and "Has management appointed a workers' representative to undermine workers' democratic decision-making?"

on a scale from 0 to 1 and find the average within each dimension. The overall working conditions score is the average of three dimensions: fire safety, health management, and freedom of negotiation[17]. Table A2 in the Appendix documents the scoring based on the survey questions. Many of the firms in the sample have few safety and health measures as well as very little negotiation points with workers; however, some firms appear to be practicing high labor standards (see Figure A1 in the Appendix for the distributions of the scores).

A potential concern about my survey measures is misreporting by managers. To examine this possibility, the survey teams arranged plant tours after the interviews in 2013. During these tours, they observed and later recorded the presence of marked fire exits and light levels. These observations correlate with the working conditions scores in the expected directions: fire exits are more likely to be observed in plants with higher fire safety scores, while a low light level is negatively correlated with health scores and negotiation scores[18]. In the sample of plants used for the main analysis, in 2013, 87% arranged plant tours, and there were no systematic correlations between the indicator of receiving a factory tour and the performance measures (working conditions scores, export, employment)[19]. I conduct two ways of robustness checks to my main analysis: (1) using the observations of fire exits on the plant tour as an alternative outcome measure and (2) focusing on a subsample of firms in which observations of fire exits were consistent with the manager's answer. Both of these produce qualitatively similar results to my main specification, although the reduction in sample size by using only observations in 2013 leads to imprecise estimates[20].

Following the standards outlined in the literature on management and business practices, I measured management practices by using some of the criteria specified in the World

17. Different ways of aggregating the scores provide similar results. See Section 4 for the robustness check.
18. See Table A3 in the Appendix for the results.
19. See Table A4 in the Appendix for the results.
20. See Tables A4 and A5 in the Appendix for the results. The empirical strategy follows the same specification as the one explained in Section 2.

Management Survey (WMS)[21] (Bloom and Reenen, 2007) and in the US Census Bureau's Management and Organizational Practices Survey. Managers were asked nine questions about three dimensions of work: production monitoring, quality control, and machine maintenance. After the interviews, scores were constructed on a scale from 0 to 1 (Table A6 in the Appendix shows the original questions and the ways of scoring based on them). Then, I averaged the scores by dimension to construct management scores for production monitoring, quality control, and machine maintenance. The overall management score is the average of the scores across these three dimensions.

1B. Survey data in 2005

The data on garment firms in 2005 were obtained from the Survey on the Garment Industry in Myanmar (SGIM), which was collected by IDE-JETRO (Kudo, 2008). This survey targeted all Yangon garment firms in 2005 by constructing a list of existing garment firms in mid-2005 based on information from the garment industry association and a local market research company. Surveyors carried out interviews at 142 of the 165 firms found. The survey records information about 2005 sales, assets, working capital, product categories, and managers' characteristics. They also contain detailed information on products as well as the plant addresses, which I use for my identification strategy, as I explain in the next section.

21. In 2014, the WMS was conducted in Myanmar and 50 garment firms in my sample were also interviewed in the WMS. Therefore, I compare my management score with the management score in the WMS among these 50 firms and find that the two scores are highly significantly correlated (see Table A7 in the Appendix). Among the four dimensions of management practices asked in the WMS (operation, monitoring, target, and human management), my overall management score is best predicted by the score on monitoring in the WMS, which makes sense considering the questions asked in my survey.

2 Baseline empirical strategy

The main empirical equation of interest is

$$Y_{it} = \xi_0 + \beta_E Export_{it} + \xi_x X_{it} + \eta_t + u_{it}, \tag{1}$$

where i indexes plants; t indexes the years from 2013 to 2015; Y_{it} is one of the plant performance measures in year t; $Export_{it}$ is the share of export sales[22] relative to total sales in year t; X_{it} are a set of firm characteristics included as control variables; and η_t are the year fixed effects.

Since $Export_{it}$ is likely to be endogenous in the above equation, I use an IV strategy. The IV used in the baseline specification is a type of firms' apparel product in 2005, by which the increases in foreign demand from 2005 to 2015 differed substantially for the reason described more below.

2A. Background: From a closed economy to market opening

Myanmar was almost autarkic in 2005. The estimated share of manufacturing exports in GDP was only 2%[23] owing to several institutional factors. Myanmar was under US import sanctions, which prohibited all imports from the country, and the EU's tariff sanction, which excluded Myanmar from the set of low-income nations that receive its preferential tariffs. Furthermore, the Myanmar government until 2011 imposed a 10% tax on all earnings from processing trade, which had been the principal means of exporting for manufacturing firms.

The only large economy that did not place any trade sanctions on Myanmar before 2011 was Japan, and it continues to grant a preferential tariff to Myanmar. Coinciding roughly

22. In the survey, sales are recorded as export sales if the products are known to be sold in foreign countries. The variation in the intensive margin of exporting was negligible. Only few plants export fewer than 100% of their products if they export. See the basic statistics in Table A1 in the Appendix.

23. Appendix A.2 describes the calculation.

with the start of the Liancourt Rocks disputes in 2005 and continuing through the late 2000s, Japanese demand on apparel shifted from products made in China to those made in Southeast Asia[24]. As shown in Figure 1, where apparel exports from Myanmar to Japan are plotted over time, exports of apparel from Myanmar to Japan gradually increased during the late 2000s (from 52 million USD in 2005 to 180 million USD in 2010)[25].

In 2011, the Myanmar government initiated democratization reforms, and during the next two years many trade barriers were lifted[26]. The process started in October 2010 with the election of Thein Sein, who represented the military party. The new government started a number of political and economic reforms. It reduced export tax to 2% in 2011 and ended the tax altogether in 2012. The result was a large increase in the exports of apparel to Japan (in 2011, the value was 340 million USD, which was a 92% increase from the previous year)[27]. The new government also initiated political reforms that included the release of political prisoners and meetings with Aung San Suu Kyi, the leader of the opposition party who had previously been placed under house arrest by the military government. These political changes led the United States to lift its import ban in November 2012. Moreover,

24. Figure A2 in the Appendix illustrates the increase in apparel exports from Southeast Asia to Japan after 2007 and the decline in exports from China to Japan after 2011.

25. Firstly, these numbers are still small compared with those of neighboring countries. For example, Vietnam, a country with a similar population size as Myanmar, exported apparel to Japan worth 586 million USD in 2005 and 1.16 billion USD in 2010. Secondly, the gradual increase in the value of apparel exports from Myanmar before 2005 as seen in Figure 1 is mostly explained by exports by foreign direct investment (FDI) firms. In my survey sample in 2013, 18 FDI firms (mostly Korean- and Japanese-owned) were established in Myanmar before 2005. The estimated total value of exports to Japan by these 18 firms in 2012 based on my survey data is 53 million USD.

26. These democratization reforms were somewhat unexpected. In 2009, the *New York Times* reported that "Secretary of State Hillary Rodham Clinton, frustrated over the junta's intransigence on human and political rights, ordered the policy review. 'Clearly, the path we have taken in imposing sanctions hasn't influenced the Burmese junta,' she said last month. 'Reaching out and trying to engage them hasn't worked either.' The reforms started with the election of Sein Thein in 2010. Regarding prospect of this election, the same article concludes as follows. The regime has pledged to hold 'multiparty, democratic elections' in 2010 as part of its 'road map to democracy.' The last previous election, in 1990, was a landslide victory for the opposition. The junta, however, refused to recognize the result and has remained in power ever since." (McDonald, March 26, 2009)

27. In 2011, apparel exports to Japan accounted for the largest share of total exports (41% of the total exports of apparel from Myanmar to the world).

in May 2013, the EU lifted its sanction on Japanese preferential tariffs (GSP), meaning that most Myanmar products could now enter EU countries under preferential tariffs. The total value of Myanmar's apparel exports increased from 900 million USD in 2010 to around 1.56 billion USD in 2014.

In contrast to the increase in apparel exports, exports of processed food stayed negligible even after 2011[28]. This figure presumably reflects foreign countries' food security policies accompanied by stringent regulations on food imports. As studied by Jongwanich (2009), regulations on food safety standards impose large constraints on food manufacturer exports in developing countries. Indeed, as noted earlier, in my sample of 595 processed food and beverage plants, only one plant exported its products.

2B. Product variation in 2005 influencing later exporting decisions

To infer the impacts of this trade opening on local firms, I exploit a predetermined source of firm-level variation in 2005 that affected exporting from 2013 to 2015, the production of woven apparel products that qualify for Japanese preferential tariffs with fewer constraints.

After the mid-2000s, Japanese demand for woven apparel products (e.g., shirts and jackets) increased, whereas that for knitted apparel products (e.g., T-shirts, polo-shirts, and sweaters) did not. This is evident in Figure 1, which plots the values of these two types of apparel exports from Myanmar to Japan. The difference reflects the rule of origin requirements for GSP.

Under the preferential tariff regime, Japan allows a product from a beneficiary country to enter the Japanese market with a free tariff rate if the rule of origin requirements is met. In general, the requirements set the required conversions for each product in beneficiary

28. This is confirmed in Figure A3, which plots the values of apparel and processed food exports from Myanmar to the world over time.

countries. In the case of knitted apparel products (Harmonized System (HS) code 61), the products have to be processed in the beneficiary country from textile yarn (HS 50 to 59) to knitted fabric (HS 60) and from knitted fabric to knitted apparel (HS 61). In the case of woven products (HS 62), products are eligible for GSP if there is a conversion in the beneficiary country from woven fabrics (HS 50 to 59) to woven apparel (HS 62)[29]. For this reason, woven garment manufacturers can use low-cost fabric imported from China to export to Japan under GSP, while knitted garment manufacturers cannot. This is a large constraint for the knitted apparel group because the Myanmar textile industry is significantly underdeveloped[30]. Without GSP, Japanese MFN (most favored nation) tariff rates on apparel range from 9% to 12%.

The manufacturing process from fabric to apparel is technically similar across these products (Figure A7 displays pictures of two factories producing woven and knitted apparel products in Myanmar). While knitted and woven apparel is distinguished by the types of fabrics they use (i.e., knitted fabric stretches more than woven fabric), the sewing technology is the same. For this reason, sewing workers need to be trained in either knitted or woven manufacturing. This makes switching products from knitted to woven difficult and therefore firms must retrain workers in addition to obtain knowledge about the production of new product types. This creates an analytically useful context for examining how the setting in 2005 affected the trajectories of exporting and firm outcomes thereafter.

In the main empirical specification, I use a firm-level measure of the production of woven apparel before 2005 as an IV for exporting from 2013–2015[31]. For the reasons described

29. It is unclear why the Japanese government sets the rule of origin in this particular way. One possible reason is that the rule defines that all apparel products have to be converted from HS 5 to HS 6 within a country. For woven apparel, this means converting from fabric (HS 50 to 59) to apparel (HS 62); for knitted apparel, this means converting from textile yarn (HS 50 to 59) to apparel (HS 61).

30. According to the field interviews conducted in 2014, most garment producers, including those that sell domestically, import fabric from China.

31. In spirit, using the variations in the rules of origin by knitted and woven apparels as a natural policy experiment is close to the studies by Demidova, Kee and Krishna (2006); Kee and Krishna (2008), who examine the performance of Bangladeshi woven and knitted apparel producers based on the premise that

above, the production of woven apparel before 2005 is likely to have affected whether a firm exported to Japan in later years. In addition, this could have affected exporting to other countries as well, as the fixed cost of exporting to an additional country may be decreasing in the number of countries to which the firm previously exported[32].

To construct a measure of woven production before 2005, I combined information from the SGIM data in 2005 and a question in the survey in 2014 asking whether the firm had produced woven products before 2005. For firms observed in the SGIM data, I define an indicator for "woven firm" as a variable that takes the value of 1 if the number of woven products divided by the number of all products exceeds half. Ten of the 20 product categories are classified as woven products in the SGIM data. Under the above definition, 62% of the firms in the SGIM data are categorized as woven firms. For firms not observed in the SGIM data, I use the indicator variable constructed from the survey question in 2014 asking whether the firm had produced mainly woven products before 2005. After the imputation, 56% of the plant-year observations in the main sample are identified as woven firms.

The samples used for my baseline analysis are domestically owned garment firms that started operation before 2005[33]. A total of 143 such plants (137 firms) were observed at least once during 2013, 2014, and 2015; of these, 98 plants were observed every year. Table A1 in the Appendix provides the basic statistics of the variables used for the baseline analysis.

the restrictive rules of origin for the EU GSP required all types of apparel products to be produced from domestic yarn and that Bangladesh had abundant production of domestic knitted fabric but not of woven fabric, resulting in the setting where only knitted apparel producers were able to easily export to EU countries. The EU GSP is unlikely to have influenced firms in Myanmar for two reasons: (1) the rules of origin for 2007 and (2) Myanmar has been granted the EU GSP since 2013. In addition, unlike in Bangladesh, domestic production of both knitted and woven fabric is limited in Myanmar.

32. The data support this hypothesis, as described in Section 4.2.

33. I exclude all firms that were partially or fully owned by a foreign entity for at least one of the years during 2013–2015.

2C. Firm performance in 2005 by product variation in 2005

My key identifying assumption for this instrument is that had it not been for foreign demand from 2005 to 2013, there would have been no systematic differences in the outcomes from 2013 to 2015 by being woven firms or not. A potential threat to this identification strategy is the possibility that knitted and woven garment processes differ in terms of their optimal management styles or plant sizes. Another concern is that some firms might have expected the potential of the Japanese market and started to produce woven products before 2005 in readiness for exporting.

To address these concerns about the exclusion restriction on the instrument, I examined the garment firm data in 2005 to test whether observable firm performance was different for the production of woven or knitted products. In this specific setting of the Myanmar garment sector, the instruments should not be related to the firm performance variables in 2005 if the exclusion restriction is valid.

While the 2005 data do not share the same measures of working conditions and management as my survey data, I observe the basic firm performance variables: productivity, firm size, wages, labor share (the labor cost share in value added), managers' tenure, and the proportion of highly educated workers. Notably, many of these variables are positively correlated with the measures of working conditions and management in my survey data of non-exporting garment firms from 2013 to 2015 (Table A8 in the Appendix reports the results). Hence, if woven production and working conditions are correlated in the absence of trade, I expect to see positive correlations between woven production and the above variables in 2005.

By using the 2005 data, Table 1 reports the OLS estimates that regress each of the performance measures on woven production. The performance measures include total factor productivity (TFP), the log of sales, employment, number of sewing machines, employment growth, capital intensity, wages, manager's years of experience in the garment industry,

and manager's years of education. TFP is defined as log(value added)- 0.469*log(labor)-0.531*log(capital), where value added is defined as sales less the cost of fabric, labor is production hours, and capital is asset value[34]. Capital intensity is defined as log(capital)-log(labor). Wages are the log of hourly wages in Myanmar kyat. The results show no systematic differences in firm performance and characteristics by woven production[35].

3 Baseline empirical results

3A. Determinants of exporting status (first-stage results)

Table 2 shows the results of the OLS estimation of the first-stage equation where export intensity is regressed on the production of woven products in 2005. The standard errors are clustered at the firm level. Column (1) shows the baseline specification in which I only control for the year and Yangon and Mandalay region fixed effects. In columns (2)–(5), I add the control variables describing the owner's characteristics that could affect product choice. These indicators include whether the owner is ethnic Chinese or a university graduate as well as firm age.

The results in columns (1)–(3) show that woven production has the expected effects on exporting in the expected direction: woven production in 2005 has a positive effect on export share and export status from 2013–2015. Including all controls, the coefficient of woven production is positive and highly significant, implying that the production of woven products before 2005 increases the probability of exporting during 2013 and 2015 by 27

34. The factor weights are constructed from the labor cost share in value added and assuming a constant return to scale.

35. A shortcoming of this analysis is the small sample size. That said, the directions of the signs are not systematic across measures. The sample size of the main two-stage least squares (2SLS) specifications ranges from 98 to 128 observations of firms in each year. Still, by separating the data by year, I observe the significant effect of woven production in 2005 on exporting and firm performance in every year. In addition, as a robustness check, I match the 2005 data with my survey data from 2013–2015 (resulting in a panel sample of 46 firms) and control for the 2005 firm characteristics in the 2SLS. Section 4.2 discusses the results of this exercise.

percentage points on average. I find that only a few exporting firms export less than 100% of their products. Therefore, the effect of woven production on the share of export sales relative to total sales is similar to that for the result using the exporting indicator variable. In the main IV specification shown next, I use the export share of sales to represent the intensity of exporting, although the main results are qualitatively the same by using the exporting indicator.

The large and significant effect of woven production on exporting could have proceeded through two channels. In the first channel (described above), firms that produced woven products could apply for the Japanese preferential tariff, using Chinese fabric as an input, while firms that produced knitted apparel could not. For this reason, when Japanese demand increased in Southeast Asia in the late 2000s, woven product firms had a greater advantage in exporting to Japan than knitted product firms. The results in column (4) confirm this channel, showing that firms that produced woven products in 2005 were significantly more likely to have exported to Japan between 2013 and 2015. In the second channel, after woven product firms started exporting to Japan, they improved management, increased capacity, and achieved compliance. By the time western import sanctions were lifted in 2012 and 2013, these firms had already paid the fixed costs of investment and were more likely to export to western countries. Column (5) examines this possibility by running an OLS regression using exports to EU countries or the United States as the dependent variable, and the result suggests that the exporting process is path-dependent[36].

Moreover, firms producing knitted products in 2005 were more likely to switch products than otherwise, possibly because of rising Japanese demand since the late 2000s. My data show that 72% of firms that mainly produced knitted products in 2005 switched to mainly

36. The large overlap between exporters to the EU/United States and exporters to Japan also supports this hypothesis. Indeed, 13% of the plants in my sample sell to both Japanese and European/US markets, while 16% of the plants sell to European/US markets and 21% sell to Japan.

producing woven by 2014, while 13% of other firms switched to knitted products[37]. Although this issue does not bias my IV estimates, it could reduce their efficiency by weakening the correlation between the woven IV and exporting in 2013–2015. One potential reason for the strong first stage could be that firms producing woven garments in 2005 had first-mover advantage in receiving orders from Japanese companies in late 2000s, and this enabled them to accumulate sufficient experience to receive orders from Europe and US companies after 2013.

A potential concern is that the firm survival rate from 2005 to 2013 may have depended on the production of woven apparel in 2005, which would lead to bias in my 2SLS estimates. Among the 120 firms that I observe in the 2005 SGIM data, 57% are observed either in my survey data or in industry directories during 2013–2015[38]. Based on the sample of firms in the 2005 SGIM data, I tested whether survival to 2013[39] correlates with firm performance and the IVs. While survival was found to be positively correlated with initial firm size, its correlation with 2005 woven production is negligible and insignificant (for the results, see Table A10 in the Appendix). These results imply that selection issues due to firm survival are unlikely to bias my results.

3B. Impact on working conditions

Table 3 reports the results of the second-stage estimates. The control variables are the same as those used in the first-stage regressions (see columns (1) and (2) in Table 2), and standard errors are again clustered at the firm level.

Panel A of Table 3 presents the baseline results for working conditions. Column (1)

37. In my survey in 2014, I asked the proportion of current sales from woven products. See Table A9 in the Appendix for the results of the determinants of product switches.

38. I observe 46 plants both in the 2005 SGIM data and in my survey. In addition, 97 plants are not observed in the 2005 SGIM data but are in my survey.

39. Survival is defined as a dummy variable that takes 1 if the firm is observed either in the survey data from 2013–2015 or in the Myanmar Textile and Garment Industry Directories from 2013–2015.

shows the 2SLS estimate of the working conditions score, which, as described earlier, is the average of the fire safety, health management, and freedom of negotiation scores. The estimated coefficient is positive (0.268) and significant (standard error = 0.086). Moreover, the magnitude of the effect is large compared with the means of the scores (0.214), while adding the control variables in column (2) influences the coefficient minimally. Columns (3)–(5) show that the 2SLS estimates for the fire safety, health management, and freedom of negotiation scores are all positive and large, and statistically significant for fire safety and negotiation scores. Column (6) shows that the estimated coefficient for the log of hourly wages is also positive and large, although marginally significant, implying that wages increase by 15% by becoming a full exporter[40]. Column (7) shows the estimate for working hours above 60 hours per week (taking a value 0 for firms where workers typically work less than or equal to 60 hours per week), which is a variable proxying for excessive working hours. The estimated coefficient is negative and insignificant. In summary, these results suggest that exporting leads to positive outcomes for workers. Indeed, the signs and magnitudes of the 2SLS coefficients are similar to the coefficients of the OLS estimates for most of the outcomes (see Panel A of Table A11 in the Appendix). This finding might occur because initial working conditions were relatively less important than the other aspects of firms for selecting into exporting.

The magnitude of the effects is shown to be large by comparing the scores of Myanmar firms with those of foreign-owned firms operating in Myanmar. Although not included in the sample used in the main analysis, my survey collected data on 45 foreign-owned firms in Myanmar (from 2013 to 2015), which are mostly owned by parent companies in Korea (47%), Japan (26%), and Hong Kong (9%). The average working conditions scores for the Myanmar

40. Data on wages are missing in the 104 plant-year observations where firms did not hire any worker in the previous year (i.e., firms with no hiring of entry-level operators). These missing observations are not statistically correlated with the instrument (woven production in 2005) after controlling for the basic control variables used in the regressions.

and foreign-owned firms are 0.24 (Myanmar) and 0.50 (foreign), respectively, which imply that exporting raises the working conditions to the levels of multinational firms.

There may be multiple reasons why working conditions improve through exporting. Although it is difficult to draw conclusive evidence on the pathways, my survey data shed light on some of these mechanisms. One mechanism might be that foreign buyers pressure supplier factories to improve their conditions. In many interviews, managers stated that before a firm can initiate a new trading deal with a foreign buyer, compliance audits must be passed. Such audits are deemed to be necessary for a variety of reasons; for example, buyers might be concerned about the risk of being criticized for supporting "sweatshop" factories when unfavorable working conditions in local factories are disclosed in the media[41]. In the last column of Table 3, the dependent variable is a dummy that indicates whether a plant has ever been subjected to a labor or environmental compliance audit[42]. Only 15% of plants in the baseline sample indicated that they have been audited. The estimated coefficient of exports is positive, significant, and large (0.378).

Given the audit requirements imposed by foreign buyers, it might be puzzling why firms with unfavorable working conditions survive if workers care about working conditions and can freely move across firms. One potential concern is that there may be another aspect influencing workers' welfare which is unable to be measured in my survey and this aspect could be affected negatively by a firm's exporting behavior. Unfortunately, this possibility cannot be tested by using my data. Yet, according to my field interviews with garment workers, the current situation in the Myanmar garment sector is reasonably described by the models based on search and mobility costs. Many garment workers live nearby their

41. Labor compliance audits are typically implemented by a third party. Several initiatives such as the BSCI and WRAP provide standardized sets of auditing, certifying, and consulting services for manufacturing firms and buyers. Auditing staff randomly choose a day to visit supplier firms to check fire safety equipment and health measures as well as talk with workers.

42. This question is asked only in the survey waves in 2014 and 2015. The audits in the questions exclude government audits.

workplaces and obtain information about other factories through their friends and relatives. Therefore, even though the labor market may be eventually converging to an equilibrium described by compensating differentials, the transition to the steady state is likely to be slow.

3C. Impact on firm size

A larger firm size due to exporting may reduce the average cost of investment in working conditions that incurs fixed costs (e.g., fire equipment). I find that exporting has a large and significant positive effect on firm size. Columns (1)–(6) in Panel B of Table 3 show the 2SLS estimates, using the logs of firm size, number of sewing machines, and sales (value added) as the dependent variables. The measure of sales was obtained only in the first survey wave in 2013; therefore, the sample sizes for sales and labor productivity are small (100 plants). The coefficients for plant size are large, positive, and significant, suggesting that exporting increases firm size by 3.5 times (= exp(1.5)-1)[43]. This is reasonable considering that exporting firms are 4.5 times larger than non-exporting firms in my sample (570 workers for exporting and 128 workers for non-exporting plants on average). Indeed, increasing firm size could explain the incentive to improve working conditions. Upgrading fire safety (e.g., purchasing a fire alarm) serves as a type of fixed investment that exhibits an increasing return to scale. Therefore, increasing firm size by exporting might lead to upgrading working conditions. However, the scale effect does not explain the extent to which exporting affects wages. In columns (7) and (8), the dependent variable is labor productivity as measured by the logarithm of value added per worker. The estimated coefficient of labor productivity is large (suggesting a 155% increase), but imprecisely estimated[44].

43. The 2SLS estimates for sales and labor productivity are lower than their OLS counterparts, showing that labor productivity is highly positively correlated with exporting (see Panel B of Table A11 in the Appendix). Taking these results together with the OLS estimates for working conditions discussed earlier, they are consistent with the hypothesis that selection into exporting was based on firm productivity rather than on working conditions.

44. For sales, employment, labor productivity, and wages, I observe these measures both in 2005 and after 2013. Therefore, as a robustness check, I match the sample over time and estimate a DID specification

3D. Impact on management practices

The results on working conditions might also be explained by efficiency wage theory. The empirical trade literature finds extensive evidence that access to larger foreign markets improves a firm's return from investing in upgrading productivity or quality (Verhoogen, 2008; Lelieva and Trefler, 2010; Bustos, 2011; Atkin, Khandelwal and Osman, 2014; Bloom et al., 2017). In theory, providing better working conditions may be a way in which to enhance productivity or elicit workers' effort to produce high-quality goods (Shapiro and Stiglitz, 1984; Verhoogen, 2008). To investigate such a channel, I examine how exporting simultaneously affects management practices.

Overall, my evidence supports that exporting induces managers to acquire better management practices. Panel C of Table 3 shows the results for management practices and the related dependent variables. Columns (1) and (2) report the 2SLS estimates of the coefficients of exporting on overall management practices score. The estimated coefficients of exporting with the control variables are positive and significant at the 1% level. Columns (3)–(5) show the estimates of the individual management scores in all three dimensions: production monitoring, quality control, and machine maintenance. All coefficients are positive and those for production monitoring and machine maintenance are statistically significant. A potential channel explaining the above results is that foreign buyers transfer knowledge or request that plant managers improve management practices. The dependent variable in column (6) takes the value of 1 if the plant's main buyer requests the plant's production data[45]. The dependent variable in column (7) takes the value of 1 if the plant's main buyer sends staff to suggest how to improve efficiency and quality. The estimated effect of exporting on

for woven production, using 2005 as the baseline year. This results in a sample of 62 domestic garment plants in Yangon both in 2005 and after 2013. As shown in the Appendix, the estimated coefficients of the interaction of woven production and years after 2013 are positive for all four outcome variables and statistically significant for sales and labor productivity.

45. The main buyer is defined as the most important buyer in terms of plant sales. The variable was recorded during the 2015 survey only and thus the number of observations is comparatively small.

these variables is large, positive, and significant.

Efficiency wage theory implies that firms improve working conditions to induce a higher effort from employees. In addition, better working conditions might help keep and attract skilled workers, which is another way for firms to improve productivity or quality. The survey data in the garment sector show that on average about 6% of workers voluntarily quit their jobs every month, typically without notifying their managers; by contrast, the turnover rate is less for firms with better working conditions (for the results, see Table A12 in the Appendix).

3E. Decomposition analysis

The results above point to several possible channels through which exporting positively influences working conditions. Conducting a decomposition analysis allows us to examine the contribution of each observable variation to explaining the differences in working conditions between exporters and non-exporters. The results of the Blinder–Oaxaca decomposition analysis show that differences in firm size explain 51% of the differences in the working conditions scores between exporters and non-exporters, variations in the experience of labor audits explain 20%, and variations in management scores explain 12%[46]. The results explaining the differences in working conditions between woven firms and knit firms produce similar results. One caveat to such a decomposition analysis is that the results cannot be interpreted as a causal statement[47]. Still, it is notable that the experience of labor audits, a proxy of foreign buyers' pressure, explains only a modest proportion, whereas other production-side factors such as firm size and management practices explain a large proportion.

46. Table A13 in the Appendix shows the results in more detail. The footnote to the table explains the decomposition method.

47. I would need the exogenous variation in firm size, management practices, and labor audits to make causal inferences

3F. Robustness checks

In the previous subsections, I presented evidence that several years after 2005, firms induced to export have on average significantly better working conditions, are larger, and adopt better management practices than other firms. Next, I extensively test the robustness of the baseline findings.

First, the sample sizes in the balancing tests in 2005 on the instruments (Table 1) are small (126 firm observations). Therefore, the standard errors in the estimates might be too large to detect that some of these characteristics may have been directly affecting performance from 2013 to 2015. To address this concern, I restricted my samples to firms in the 2005 SGIM dataset and directly controlled for firm size (log of sales), TFP, and capital intensity. Although this reduces the sample size to 128 observations of 46 firms, the statistical power in the first stage was above 4 and the 2SLS results remained the same as the main results. In addition, redoing the baseline analysis by using only the sample in a single year in the 2013 survey with 119 plant observations generated qualitatively similar results to the baseline results. The results are shown in Table A14 in the Appendix. As an alternative way in which to examine the selection issue, I estimated the impact of exporting on firm size, productivity, and wages in the DID specification by comparing the changes in these variables between 2005 and the years after 2013 by woven production status in 2005 (see Table A15 in the Appendix). The results show that woven firms become statistically significantly larger in terms of both employment and sales as well as more productive. The estimated coefficients of the log of wages are also large and positive, consistent with the baseline results.

Second, woven or exporting firms may be clustered in different regions for such reasons as the existence of production knowledge spillovers. In that case, the increase in Japanese woven apparel demand might lead to a larger number of entries in that sector than in the knitted apparel sector, which could affect regional labor market competition and working conditions. To investigate this channel, I controlled for the number of garment plants (found

in my firm population list for 2015) within a 300-meter radius of the firm and within a 1-kilometer radius of the firm. I also estimated the equation by controlling for the 25 townships fixed effects to control for unobserved local time-invariant effects. In all of these exercises, the coefficients of exporting remained similar to the main results (for the results, see Table A16 in the Appendix).

Third, the ways of aggregating working conditions and management practices across questions may affect the results. As a robustness check, I converted the raw scores (from 0 to 1) into z-scores by normalizing by raw scores to mean zero and standard deviation one. The z-scores for fire safety were obtained as the averages of the z-scores within the dimension. I repeated this process to construct z-scores for health management and negotiation. Replicating Panels A and C of Table 3 with these z-scores generated estimates with mostly the same signs and significance levels (for the results, see Table A17 in the Appendix). In addition, the 2SLS results for each of the raw scores of working conditions imply that most of the coefficients for each outcome are positive, although the precision of the estimates varies (for the results, see Table A18 in the Appendix). The raw scores are highly correlated each other across and within each dimension of working conditions; therefore, aggregation reduces the measurement errors and improves efficiency.

Fourth, the main specification assumes that in both the Yangon and the Mandalay regions, the impact of airport travel time and other geographical variables on firm performance is similar. However, these two regions are far from one another and could differ in many ways. For instance, Yangon is a coastal area, whereas Mandalay is far from the coast. For this reason, I excluded Mandalay firms and reran the same regressions as in the main specification (for the results, see Panel A of Table A19 in the Appendix).

Fifth, my survey data might omit small firms that have not registered with the government, industry associations, or industry directories that are the source of my population database. As a precaution, I restricted my sample to firms that had more than 100 em-

ployees during the first year of observation (for the results, see Panel B of Table A19 in the Appendix).

Sixth, I imputed the measure of woven production in 2005 by using a retrospective survey question in 2014 in case the firm was not observed in the 2005 data. Two-thirds of firms in my baseline sample are not observed in the SGIM data in 2005, even though their firm age indicate that they were operating in 2005. To measure woven production in 2005 of these firms, I used the retrospective survey question in 2014 asking whether the firm's main product was woven before 2005. This might have caused measurement errors in the instrument. To address this issue, I estimated the model with samples restricted to firms observed in the SGIM data in 2005. In all of these exercises, the main results for overall working conditions, audits, management scores, and employment size stay the same, although some estimates of the individual working conditions scores lack precision because of the small sample sizes (for the results, see Panel C of Table A19 in the Appendix). In these three experiments, the coefficients of exporting remained positive and significant with no major changes.

4 Alternative empirical strategies

As additional robustness tests of the main results, I explore the effect of exporting on firm outcomes using two alternative identification strategies. In summary, even when using different exogenous variations, the main results are consistent with the baseline results.

4A. Proximity to international airports in 2005

4A..1 Proximity to airports as an alternative IV

Plant proximity to international airports is another source of predetermined variation in exposure to trade. Proximity to international airports is likely to affect trade costs for three reasons. First, foreign buyers visit manufacturing plants when they first decide from which

plants to purchase products[48]. Face-to-face communication through plant visits is important in Myanmar because phone and Internet connections are underdeveloped. In these settings, even an hour of difference in travel time could affect a buyer's decisions about exporting[49]. Second, proximity to an airport is also important because when trading starts buyers usually send technical staff to local plants every season to oversee product design changes. As noted in previous studies of flight distance in the United States (Giroud, 2013; Giroud and Mueller, 2012), monitoring by trade partners is easier if the costs of visiting (i.e., flight costs) are low. The buyer is likely to consider this benefit when choosing a plant with which to place a first order. Third, some garment firms ship products by air rather than by sea, particularly during peak season, when final products are needed at short notice.

The exclusion restriction for using airport proximity as an IV requires that the instrument affects firm performance only through its exports, conditional on the control variables. For six principal reasons, this condition is satisfied by proximity to airports. First, the Myanmar economy has long had limited access to foreign trade because of sanctions and the domestic export tax. When plants produced for the domestic market, proximity to international airports gave them no competitive advantage. Second, it is not likely that airport proximity influenced the degree of import competition in my setting. Myanmar's imported apparel from other countries in 2014 was 136 million USD, which is low for its exports and population size[50]. In addition, EU and US trade sanctions only related to Myanmar's exporting not its importing. Third, city congestion in Yangon has increased considerably since the 2011 reforms. Without traffic, the travel distance would have had a weaker impact on the choices

48. These foreign visitors are often the CEOs or sourcing managers of retail companies and they typically spend fewer than three days in Yangon. Many of these visitors are unfamiliar with Myanmar, which for many years had limited international trade activity. Although they have ex-ante information about local firms, apparel buyers can easily access online directories list the names, locations, and phone numbers of garment factories.

49. Supporting this view, during field interviews, some foreign buyers who visited Yangon said that they are most attracted to plants located within one hour of travel time to airports.

50. The source of this information is UN Comtrade. The population of Myanmar in 2014 was an estimated 52 million.

of trade partner. For these reasons, it is unlikely that firms in 2005 chose locations closer to international airports in anticipation of this benefit. Fourth, I control for observable geographic factors that could be correlated with distance to the airport as well as with firm performance[51]. In particular, I control for (1) the location of plants within Yangon's industrial zones and (2) travel distance to the region's city center[52][53]. Fifth, based on the garment firm data collected in 2005, Table 4 shows that there was no systematic correlation between distance to airport and firm performance in that year after including the control variables. Finally, by using the survey data for the processed food sector, which produces goods that are not exported, I find no evidence that proximity to airports is correlated with firm performance. If the exclusion restriction underlying this second instrument is satisfied (e.g., no differences other than proximity to airport should affect firm performance), airport distance in these non-exporting industries should have no effect on firm performance.

The baseline sample for the main analysis consists of domestically owned plants that operated before 2005 (the same criteria as the baseline sample using the woven production instrument) and has non-missing information on addresses in 2005. It includes 120 plants (117 firms) observed at least in one of the three survey waves. The total number of plant-year observations during 2013–2015 is 298. Plants far from airports were less likely to export during 2013–2015 (see Figure A4 for the map)[54]. Since no measure of travel time can reliably

51. For instance, airports require large areas of land, and governments often construct them in suburban areas where land is more abundant and relatively cheap compared with city centers. Large plants can be built in the same areas for the same reason. In addition, these areas are also likely to be developed by governments as industrial zones, which generally provide superior road and electricity services.

52. Figure A5 in the Appendix shows the factories in industrial zones as well as the location of the city hall in Yangon.

53. These geographical control variables are also measured for the plant locations in 2005. The map in Figure A5 of the Appendix shows the location of the city center and plants in industrial zones.

54. I use the plant locations in 2005 to measure the proximity to the nearest airport. For firms in the Yangon region, the nearest airport is Yangon International Airport; for firms in the Mandalay region, it is Mandalay International Airport. Information on plant addresses in 2005 is obtained from the 2005 SGIM data. If the firm is not observed in the 2005 data and did not move plants after 2005, the address in 2005 is used for the address in the survey years. If the firm is not observed in the 2005 data and moved plants after 2005, I omit the observation from my baseline analysis.

account for traffic congestion in Myanmar, I conducted a traffic survey during May to July 2015 to construct measures of travel time to airport from each plant[55].

4A..2 Results of the airport IV estimation

Column (1) of Table 5 shows the result of regressing exports on airport proximity. I control for a dummy variable that indicates whether the plant is located in an industrial zone as well as the travel time to the city center. The coefficient of travel time to airports including all controls is negative and significant, suggesting that a reduction to below one hour of travel time leads to an increase in the probability of exporting by 27 percentage points on average.

The remaining columns in Table 5 report the 2SLS results, using airport time as an IV. All regressions include the geographical control variables used in the first-stage results. Columns (2)–(4) show the results of the 2SLS estimates for the working conditions variables. The estimate for the overall working conditions score is positive (0.19) and significant (standard error = 0.10). The level of the coefficient is also reasonably close to the earlier results using the woven production instrument. The estimated coefficient for the log of wages is positive as in the baseline results, although the level is slightly lower (0.066) and the standard error is higher (0.132). The coefficient for excessive working hours is positive but insignificant as in the baseline results. The estimated coefficients of receiving a compliance audit, the overall management score, the log of employment, log of sales, and labor productivity are all positive and significant as shown in columns (5)–(7). To summarize, the estimated coefficients are

55. Eight locations in Yangon in which many garment firms are found were selected (see Figure A6). Local taxies were hired to drive to and from the international airport five times for each location. The Appendix summarizes the results from the traffic survey. Buyers are most plausibly concerned about the maximum time of travel because missing a return flight (on the way back to airport) or rescheduling meetings with plant managers (on the way from the airport) is costly. To incorporate this notion, I define travel time in my main specification as an estimate of the upper bound of the one-sided 95% confidence interval of travel time to airports. Appendix A.1 explains how the estimates were constructed based on the traffic survey as well as using Google Maps (2015).

comparable to the baseline results using the woven production IV, although there are some differences in their magnitude possibly due to the low statistical power of the airport time instrument for predicting current export status and the difference in the samples because of missing addresses in 2005[56].

By examining my survey samples in the processed food sector, I investigate concerns about the exclusion restriction, namely that airport distance could be a proxy for the unobserved differences in infrastructure or in local labor markets that affect firm performance directly. Processed food firms sell their products almost entirely in the domestic market. This practice reflects foreign countries' food security policies, which in many countries are accompanied by stringent regulations on food imports. If proximity to airports affects only the performance of exporters, then this variable should have little or no impact on the performance of processed food firms, few of which export. The data confirms that airport travel time is not correlated with working conditions and management score, and firm size in processed food sector[57].

4B. Changes in working conditions from 2013 to 2015

As an alternative to the above IV approaches, I estimate a DID specification that exploits the differences in industries' exporting trends from 2013 to 2015. The trade sanctions of the United States and EU countries were lifted in 2012 and 2013, respectively. As a result,

56. By estimating the 2SLS specification with both woven production and airport proximity in 2005 as the instruments for exports, I find that the estimated coefficients are similar to those where only one of the instruments is used. The results of the overidentifying restriction tests using both instruments (Hansen J statistics) suggest that the null hypothesis that the instruments are exogenous is not rejected for each of the main outcome variables (for the results, see Table A20 in the Appendix).

57. Table A21 in the Appendix reports the results of this exercise. In the processed food sector, the measures of sales and management practices are collected in 2013 and the data on working conditions scores are available for 2013 and 2014. In addition, as shown in the same table, using pooling both processed food and garment sample, I regressed outcome measures on airport travel time and its interaction with garment dummy. The estimated coefficients of airport travel time for processed food sector are positive and insignificant, while those of airport travel time interacted with the dummy variable for the garment sector are negative and statistically significant.

apparel exports to EU countries and the United States increased sharply from 2012 to 2014. On the contrary, exports of processed food remained negligible even after 2011[58], presumably because of the stringent food security policies in developed countries. Therefore, by using the processed food sector as a control group, I can evaluate the impacts of these increases in exporting to the United States and EU.

The sample is the domestic garment and processed food plants interviewed from 2013 to 2015, excluding new firms that started to operate in these industries after 2011[59]. This leads to a baseline sample of 486 plants (178 garment plants and 308 food plants) observed in one of the three years. In all specifications, I include the firm fixed effects and year fixed effects.

Column (1) of Table 7 reports the results for the share of exports to the EU and United States in terms of sales[60]. The estimated coefficient of the interaction of the garment sector and year is positive (0.0177) and statistically significant (standard error = 0.008), implying a 60% annual increase in the share of regional sales. By contrast, the share of exports to Japan did not increase in these periods as expected.

As shown in column (3), the DID estimate for overall working conditions is positive (0.0456) and statistically significant, suggesting a 30% annual increase in the working conditions scores in the garment sector compared with the processed food sector. The result for hourly wages is also positive and significant, and the result for working hours is negative and significant. These results are consistent with those using the 2SLS specification in that exporting affects workers' welfare. The last two columns show the results for the employment and management practices scores. The coefficients are small, positive, and not

58. Figure A3 in the Appendix shows the time trends of exports in apparel and processed food.

59. The exclusion of newer plants aims to eliminate the endogeneity concern arising from the selection of industries after the trade liberalization in 2011. I also exclude processed food firms that have fewer than five employees to make the sample comparable to the garment plant sample, where the smallest firm size is six persons.

60. Although the ideal measure of an exporting outcome in this setting would be the value of exports to the EU and United States, this information was not collected in the 2014 and 2015 waves. Instead, I thus use the regional share of sales relative to the plant's total sales, which is relatively less sensitive information than sales and therefore easier to collect.

statistically significant. This finding could be partly due to the short period of observations (e.g., management practices may not change in just one or two years).

As an additional robustness test, I estimated a firm-fixed-effect model by using only the garment firms (see Table A22 in the Appendix for the results). The results confirm that firms that increased their share of exporting to EU countries or the United States significantly improved working conditions, in terms of overall working conditions scores and wages, from 2013–2015. Moreover, these firms were increasingly more likely to receive labor audits and to improve management practices.

Overall, these results are consistent with the earlier two sets of IV results. Nevertheless, two underlining factors that were absent in the previous IV specifications may influence the results in this sector-by-sector specification. First, the interpretation of the effect of exporting would differ from the earlier IV specification in that the effect can be attributed to increasing exporting to EU countries or the United States, but not to Japan. A potentially important difference in the destinations is that anti-sweatshop concerns and human rights NGOs are presumably stronger in western countries than in Japan. Second, in this specification, the results might be influenced by the differential levels of labor market tightness in these industries over time. During 2013–2015, there was a rapid increase in foreign demand for Myanmar apparel products that is likely to have increased demand for garment workers but not for processed food workers[61]. Therefore, if labor markets are segregated between the two sectors, the results might reflect the effects of increasing the bargaining power of workers in the apparel sector in these periods.

61. On the contrary, the supply of workers might not easily increase in just three years, depending on the mobility of workers from rural areas and different kinds of occupations.

5 Concluding remarks

Many developed nations grant preferential tariffs to low-income countries as a means of promoting economic development. Yet, despite their prevalence, there is little evidence that these trade policies benefit workers in beneficiary countries. On the one hand, as often claimed by anti-globalization activists, higher exposure to global trade might put firms under increasing cost-cutting pressure, which might result in undermining working conditions. On the other hand, access to markets in high-income countries may induce firms to upgrade working conditions due to higher incentive to improve production quality and larger firm size. Trade could also improve conditions if the global anti-sweatshop movement is sufficiently strong to pressure international companies into imposing high labor standards in global supply chains.

To investigate the causal effects of exporting on working conditions in a low-income country, I collected measures on working conditions (fire safety, health management, freedom of negotiation, wages, working hours) and management practices in manufacturing firms in Myanmar through a unique field survey from 2013 to 2015. My baseline empirical results draw on a natural experimental setting in the Myanmar garment sector, where exporting from 2013–2015 was affected by firms' products in 2005 when trade was limited.

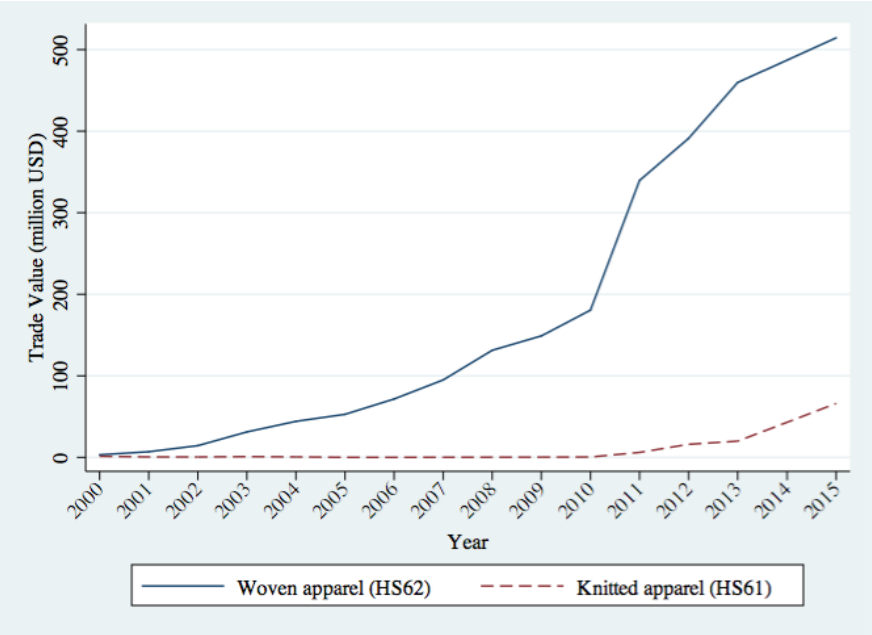
Overall, my baseline empirical results show that exporting to high-income countries positively and substantially affects working conditions: by exporting, the labor standards of Myanmar firms become comparable to those of multinationals operating in Myanmar. The positive effects on working conditions are observed in the areas of fire safety, health management, and worker–firm negotiation as well as wages. In addition, there is no evidence that exporting leads to excessive working hours.

Looking at potential channels, I find that exporting induces local firms to be audited for compliance with international labor standards. Many global apparel companies in the United

States and Europe demand these audits when they first contract with suppliers in developing countries, presumably because they are often blamed by activist groups for accidents and child labor incidents in their sourcing factories. Such pressure by foreign buyers may be coupled with incentives such as the better contract deals (prices and order size) offered by these buyers. In addition, this study finds that exporting has a positive effect on firm performance measured by firm size and management practices. Such evidence is consistent with standard trade models where access to larger markets provides firms with a higher incentive to upgrade efficiency and quality. Hence, efficiency wage theory, which suggests that firms provide better working conditions in order to enhance efficiency, may also explain the results.

6 Figures and tables

Figure 1: Value of apparel exports to Japan



Notes: Total value of Japanese imports of HS 61 (knitted apparel) and HS 62 (woven apparel) from Myanmar reported by Japan. Source: UN Comtrade

TABLE 1: Firm performance in 2005

	(1) TFP	(2) Sales	(3) Num. workers	(4) Num. machines	(5) Growth	(6) Wage	(7) Labor share	(8) Manager's tenure	(9) % univ. grads
Woven	-0.0167	-0.0481	0.225	-0.0409	0.0546	-0.049	-0.0063	-0.614	-0.028
	(0.232)	(0.291)	(0.209)	(0.217)	(0.0941)	(0.0776)	(0.0451)	(1.487)	(0.0582)
Obs.	122	126	126	126	122	126	126	102	112
Mean	-0.676	11.01	5.050	4.916	-0.221	3.228	0.459	9.686	0.213

Notes: Robust standard errors are shown in parentheses. Woven production is an indicator variable that takes the value of 1 if the number of woven products divided by the number of all products produced in the plant is above half in 2005 if observed in the 2005 SGIM data; otherwise, these data are imputed from the survey question in 2014 on whether the firm produced woven products before 2005. Number of workers, number of sewing machines, and wages (hourly wages) are in logarithms. TFP = log(value added) -0.469*log(total hours work) -0.531*log(asset value), where 0.469 is the average of the cost share of labor in value added. Growth is the measure of employment growth defined by log(employment in 2005) - log(employment in 2004). Labor share is the cost share of labor in value added. Manager's tenure is the year of experience of the manager. "% univ. grad. workers" is the proportion of university graduate workers in the firm. Number of observations and the mean of dependent variable are shown in the last rows. Source: Data from the 2005 SGIM (IDE-JETRO).

TABLE 2: First-stage results of exporting and woven production

	(1)	(2)	(3)	(4)	(5)
	Export (share in sales)		Exporting (indicator)	Exporting to Japan (indicator)	Exporting to EU/US (indicator)
Period	2013–15	2013–15	2013–15	2013–15	2013–15
Woven (2005)	0.269	0.273	0.270	0.180	0.130
	(0.0694)	(0.0658)	(0.0667)	(0.0618)	(0.0556)
Owner college graduate		0.238	0.249	0.154	0.0359
		(0.0635)	(0.0638)	(0.0602)	(0.0534)
Owner ethnic Chinese		0.112	0.128	-0.0175	-0.00344
		(0.0986)	(0.101)	(0.122)	(0.0806)
Firm age		-0.00319	-0.00233	-0.00893	-0.00344
		(0.00524)	(0.00528)	(0.00488)	(0.00421)
Obs.	345	345	345	345	345
F test IV=0	15.02	17.22	16.42	8.453	5.440
Prob > F	0.000165	0.00006	0.00008	0.00426	0.0212
N firms	137	137	137	137	137

Notes: Observations are at the level of plant-years. All regressions include the year fixed effects and region fixed effects. Standard errors are clustered at the firm level and shown in parentheses. The exporting indicator takes 1 if the products are sold to a foreign country. Woven production is an indicator variable that takes the value of 1 if the number of woven products divided by the number of all products produced in the plant is above half in 2005 if observed in the 2005 SGIM data; otherwise, these data are imputed from the survey question in 2014 on whether the firm produced woven products before 2005. Owner ethnic Chinese is an indicator variable that takes 1 if the owner of the firm is Chinese Burmese or Chinese. Source: Survey of garment firms in 2013–2015 conducted by the author.

TABLE 3: 2SLS RESULTS (IV= WOVEN PRODUCTION IN 2005)

Panel A: Impact on working conditions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Working		Individual scores			Log	Hours	Audit
	conditions score		Fire	Health	Negotiation	wage	(>60/week)	
Period	2013–15		2013–15	2013–15	2013–15	2013–15	2013–15	2013–14
Export share	0.268	0.267	0.363	0.205	0.230	0.150	-3.890	0.378
	(0.0860)	(0.0837)	(0.134)	(0.118)	(0.0965)	(0.0909)	(2.632)	(0.187)
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	345	345	345	345	345	241	341	226
F (IV)	15.02	17.22	17.22	17.22	17.22	20.91	17.52	8.164
Mean	0.214	0.214	0.314	0.112	0.216	-1.259	2.271	0.150
N firms	137	137	137	137	137	135	137	117

Panel B: Impact on firm size and productivity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent var.	Log employment		Log sewing machines		Log sales		Log sales per worker	
Period	2013–15		2013–15		2013		2013	
Export share	1.513	1.552	1.454	1.470	1.893	1.926	0.912	0.936
	(0.555)	(0.542)	(0.569)	(0.558)	(0.663)	(0.646)	(0.620)	(0.591)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	345	345	345	345	108	108	108	108
F (IV)	15.02	17.22	15.02	17.22	16.57	17.33	16.57	17.33
Mean	0.245	0.245	0.314	0.204	0.216	-1.259	2.271	0.150
N firms	137	137	137	137	106	106	106	106

Panel C: Impact on management practices scores

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Management score		Individual scores			Buyers	Buyers
			Production	Quality	Machine	record	make
						record	suggestions
Period	2013–15		2013–15			2015	2015
Export share	0.293	0.274	0.164	0.174	0.485	1.031	0.942
	(0.100)	(0.0968)	(0.107)	(0.152)	(0.198)	(0.341)	(0.323)
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	345	345	345	345	345	115	115
F (IV)	15.02	17.60	17.60	17.60	17.60	4.223	4.223
Mean	0.550	0.550	0.608	0.634	0.409	0.200	0.191
N firms	137	137	137	137	137	112	112

Notes: All regressions include the year fixed effects and region fixed effects. Standard errors are clustered at the firm level and shown in parentheses. The control variables include the owner college graduate dummy, owner ethnic Chinese dummy, and firm age. In Panel A, social audit takes 1 if the plant has ever received a labor or environmental compliance audit. The question on the social audit was asked only in the survey waves in 2014 and 2015. All dependent variables are taken as logarithms in Panel B. Log sales per worker are defined by log sales - log employment. The values of sales are observed only in 2013; therefore, columns (5)–(8) restrict the sample to firms with non-missing sales observations in 2013. In Panel C, "Buyer request record" takes 1 if the main buyer sends staff who request production data on the plant. "Buyer make suggestions" takes 1 if the main buyer sends staff who suggest how to improve production processes or quality. These two variables were observed only for the survey in 2015. Source: Survey of garment firms in 2013–2015 conducted by the author.

TABLE 4: Firm performance in 2005 by airport proximity

Dep Var.=	(1) TFP	(2) Sales	(3) Num. workers	(4) Num. machines	(5) Growth	(6) Wage	(7) Labor share	(8) Manager's tenure	(9) % univ. grads
Airport time	0.420	0.252	-0.0647	0.0351	0.0945	-0.104	-0.0178	-0.528	-0.0130
	(0.415)	(0.442)	(0.268)	(0.240)	(0.120)	(0.127)	(0.0628)	(2.147)	(0.0532)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	117	120	120	120	116	120	120	98	106
Mean	-0.671	11.01	5.044	4.908	-0.218	3.228	0.462	9.713	0.214

Notes: Robust standard errors are shown in parentheses. Airport time is the estimated driving time to Yangon International Airport (hours). All regressions control for travel time to the city center and the dummy variable for being located in an industrial zone. The number of workers, number of sewing machines, and wages (hourly wages) are in logarithms. TFP = log(value added) −0.469*log(total hours work) −0.531*log(asset value), where 0.469 is the average of the cost share of labor in value added. Growth is the measure of employment growth defined by log(employment in 2005) - log(employment in 2004). Labor share is the cost share of labor in value added. Manager's tenure is the year of experience of the manager. "% univ. grad. workers" is the proportion of university graduate workers in the firm. Source: Data from the 2005 SGIM (IDE-JETRO).

TABLE 5: 2SLS results (IV= airport proximity in 2005)

Dep var	(1) Export (share)	(2) Working conditions score	(3) Log wage	(4) Hours (>60/wk)	(5) Audit	(6) Manage-ment score	(7) Log employ-ment	(8) Log sales per worker
Method	OLS	IV	IV	IV	IV	IV	IV	IV
Period	2013–15	2013–15	2013–15	2013–15	2014–15	2013–15	2013–15	2013
Airport time (2005)	-0.27							
	(0.0877)							
Export		0.186	0.0657	2.342	0.665	0.336	1.245	1.609
		(0.102)	(0.132)	(2.921)	(0.246)	(0.141)	(0.651)	(0.896)
Obs.	298	298	207	295	189	297	298	102
N firms	117	117	116	117	98	117	117	98
F test IV=0		9.507	9.509	9.876	4.244	9.614	9.507	8.820
Mean	0.354	0.257	-1.251	2.175	0.159	0.561	4.973	7.263

Notes: Observations are at the level of plant-years. All regressions control for travel time to the city center, the dummy variable for being located in an industrial zone, the year fixed effects, and the Mandalay region dummy. "Export" is the share of sales from exports relative to the plant's total annual sales. Standard errors are clustered at the firm level and shown in parentheses. Airport time is the estimated driving time to Yangon International Airport. Observations are included only if the plant address in 2005 was identified. Source: Survey of garment firms in 2013–2015 conducted by the author.

TABLE 6: Time trends by the exporting (garment) and non-exporting (processed food) sectors during 2013–2015

	(1) Export to EU/US (share)	(2) Export to Japan (share)	(3) Working conditions (score)	(4) Wage (Log)	(5) Hours (>60/wk)	(6) Employ-ment (Log)	(7) Manage-ment (score)
Period	2013–15	2013–15	2013–15	2013–14	2013–15	2013–15	2013,2015
Garment	0.0177	-0.00205	0.0451	0.172	-1.073	0.0112	0.00100
x Year	(0.00812)	(0.00813)	(0.00906)	(0.0545)	(0.481)	(0.0324)	(0.00903)
Obs.	1,045	1,045	1,045	500	1,009	1,045	681
N firms	427	427	427	378	427	427	423
Mean	0.0293	0.0541	0.164	-1.321	2.940	3.831	0.365

Notes: All regressions include the firm fixed effects and year fixed effects. Standard errors are clustered at the firm level and shown in parentheses. "Export to Japan (share)" and "export to EU/US (share)" are the sales share of exports to Japan and to the EU/United States, respectively. Wages are the logarithm of hourly wages. Data on wages were not collected in 2015 for the processed food sector. Working hours are the logarithm of working hours per week including overtime hours. Source: Survey of garment and processed food firms in 2013–2015 conducted by the author.

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