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Texas A&M University and IZA

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ABSTRACT

Working Conditions, Transparency, and Compliance in Global Value Chains: Evidence from Better Work Jordan*

This paper estimates how compliance with national labor law and international labor standards within Jordan's garment exporting factories changed after the implementation of a transparency program that made compliance assessments publicly available. The estimation employs data from Better Work Jordan that cover all garment-exporting factories over the 2008-2018 period. Using a difference-in-difference approach that is often applied to control for endogeneity, this paper finds that compliance improved following the implementation of transparency. Compliance increased in a group of 28 critical compliance areas that represent fundamental worker rights relative to relevant comparison groups. The results are robust to a number of additional controls, definitions of the transparency period, and estimation approaches.

Corresponding author:
Raymond Robertson
The Bush School of Government and Public Service
Texas A&M University
4220 TAMU College Station
Texas 77843-4220
USA
E-mail: robertson@tamu.edu

Introduction

Global value chains are again at the center of a heated policy debate, both in Europe and in leading international organizations. While value-chain-related exports increase the demand for workers in developing countries (Robertson et al. 2009), they also have increased international attention to poor conditions in exporting factories. Disasters and media reports that include human rights violations, including forced labor and rape, create urgency about finding effective ways to increase compliance with national labor laws and international labor standards (Elliott and Freeman 2003; Jammulamadaka 2013; Sinkovics et al. 2016).

Finding a way to improve compliance with national labor laws and international labor standards is as challenging as it is critical. International firms, consumers (or at least NGOs representing the social sector of society), governments, and unions continue to debate in search of effective ways to improve compliance. Lee (2016) surveyed the range of approaches taken by lead firms of global supply chains, including corporate codes of conduct, international framework agreements, and others. Monitoring, or at least some form of assessments at the factory level seem to be a necessary, but far from sufficient, part of the solution. Self-monitoring and voluntary compliance are insufficient for improving compliance due to either insufficient incentives to address problems that are found (Kuruvilla and Verma 2006, Borial 2007, Locke 2013, Rossi et al. 2014) or competing incentives (Barrientos 2013). Perhaps in response to the growing realization that private monitoring is insufficient, third-party monitoring programs have both proliferated and have created a web of heterogeneous standards. Factories often complain about "monitoring fatigue" from having to both host numerous yet nearly identical assessments and meet a wide range of slightly different standards (Locke 2013).

The research question posed by this paper is "Did implementing transparency in Jordan increase compliance with national law and international labor standards?" Transparency has

been suggested as a way to increase compliance, but its effectiveness has been debated in both academic literature and policy circles. Studies that empirically evaluate transparency in global supply chains, such as this one, are rare but are important because prior research has generated mixed results about the effectiveness of transparency policies generally (e.g. Pozen 2018).

To be effective, the information generated from transparency policies must be used directly by decisionmakers (Weil et al. 2006), which helps explain why transparency policies that have produced incomplete or irrelevant information have been ineffective or even counterproductive (Fung et al. 2007). This line of reasoning suggests that transparency should matter in supply chains if the results produce information that is used in decision making by the relevant stakeholders. Egels-Zanden and Hansson (2016) illustrate this point by showing that supply chain transparency is more effective when used by corporations than consumers. In one of the first studies that directly evaluate transparency in garment supply chains, Robertson (2019) discovered that Cambodia's transparency program was significantly and positively associated with improved compliance in critical areas that are associated with fundamental worker rights.

This paper extends this literature by evaluating the changes in Jordan's garment export sector following the implementation of a transparency program. Jordan provides an excellent opportunity to study the potential role of transparency in supply chain compliance. Over the last thirty years, the Hashemite Kingdom of Jordan has developed a significant apparel export industry that is almost entirely linked to global supply chains. Since Jordan historically has had little experience in apparel or textile production, the rise of the apparel industry has been linked to foreign trade policies. Both U.S. and EU trade policies have created incentives for exporting apparel from Jordan. A ten-year agreement signed in 2016 by Jordan and the European Union allows 52 products to enter the European Union tariff-free (Barrie 2018). According to United

Nation's COMTRADE data, (nominal) apparel exports (HS61) grew from US$7.8 million in 1999 to $US1.25 billion in 2018.

These trade policies were accompanied by additional involvement in Jordan's apparel industry by the United States and Europe. The United States and the European Union worked closely with Jordan to use traditional trade policies – such as free-trade zones and preferential trade agreements – to help support other policy objectives.

One of several policy objectives was to increase compliance with national labor law and international labor standards in Jordan's apparel industry. To help achieve this goal, Better Work Jordan (BWJ) was established in 2008. BWJ followed the Better Work template that had developed following the success of Better Factories Cambodia. BWJ operations focus on three areas: assessment (essentially doing a kind of audit of working conditions within the garment factories), advisory services (offering advice to factories to help improve on areas identified in the assessment), and training (to support ongoing improvement in the factories).

In addition, BWJ had another characteristic that has been debated extensively in developed countries: transparency. Transparency in this context means making assessment results publicly available at the factory level. As noted below in the literature review section, both academics and policy makers debate transparency's potential effectiveness in improving working conditions. Papers that evaluate Cambodia's experience with transparency (Ang et al. 2012 and Robertson 2019a) find a positive association between transparency and compliance with national and international labor laws and standards.

The first phase of BWJ's transparency program lasted until 2011 when BWJ started reporting aggregate sector-level audit results. The World Bank made the installation of the factory-level transparency web portal a Disbursement Linked Indicator of the Programme For Results implemented in the context of the Jordan Response Plan (Syrian refugee crisis response)

and BWJ returned to factory-level transparency around 2016. Specifically, the Government of Jordan sanctioned the return to transparency in November 2016 based on assessments beginning in January 2017 that would be publicly posted starting in July 2017 (Better Work 2017).

When factory-level transparency was reinstated, the focus was on 28 critical issues that the ILO identified as central to worker well-being. The focus on the 28 critical issues helps make Jordan an excellent candidate for a difference-in-difference methodology that is well-established in the econometric program evaluation literature.

The econometric results suggest that compliance in the 28 critical issues improved in Jordan relative to other compliance areas. These results are robust to a wide variety of additional controls for factory characteristics and other relevant potential factors. To present these results, the next section briefly described the background of the Better Work program generally and in Jordan. The following section described the empirical approach and data. Section 4 contains the main results and the robustness exercises. The final section concludes.

Background

Jordan As an Apparel Exporter

Jordan's geographic location places it near conflict. Bordering Israel, Iraq, Saudi Arabia, and Syria, Jordan's political importance is difficult to overstate. Wars in the 1960s and 1970s motivated the United States to find ways to support Jordan. Economic cooperation between Israel and Jordan was a key component of the 1994 Peace Treaty. To support economic cooperation and development in the region, the United States and Jordan signed a Free Trade Agreement in 2001 (JUSFTA) and the U.S. Congress passed the Qualifying Industrial Zone (QIZ) law in 1996 (USTR, 2019).

As in Cambodia, prior to the trade agreement, Jordan's apparel exports were relatively small. The JUSFTA and the QIZ spurred foreign investment and apparel exports began to grow. Figure 1 shows the growth in Jordan's apparel exports over time to the world. Prior to 2000, the level of exports was very low, but begins to grow quickly.

Most of Jordan's apparel exports go to the United States. Figure 2 shows the share of Jordan's apparel and non-apparel exports that go to the United States. While the share of Jordan's exports of non-apparel goods that goes to the United States ranges between 20 percent and 40 percent over time, the share of apparel exports that goes to the United States is close to 100%. This share falls somewhat over time, but remains much higher than for all other goods.

Figure 1 also shows a dramatic decline in 2006. In 2006, the National Labor Committee (later called the Institute for Global Labour and Human Rights) released a report that revealed violations of international labor standards, labor law, and human rights in the garment industry. In addition to poor dormitory conditions, long work hours, and inconsistent pay practices, the report found instances of rape, torture, and beatings. Workers were especially vulnerable to such treatment because some garment factories were withholding passports of migrant workers. Since many of the workers were migrants, the extent of the passport problem, along with a list of other concerns deeply shook the industry. Exports dropped sharply. This sharp drop illustrates the importance of compliance with national labor law and international labor standards and was a "wake-up" call that reverberated through the global apparel industry.

Domestically, Jordan's government implemented several reforms to address the violations. The Ministry of Labor increased its budget and inspection intensity. Workers were moved from factories where violations were found. Some factories closed and criminal charges were brought against relevant managers.

Jordan's ambassador to the United States admitted problems in the garment factories and began to work with the U.S. government to attempt to address problems in the industry. One solution was to implement a Better Work program in Jordan. The Better Work Jordan program began in 2007.

Better Work Jordan

The roots of Better Work Jordan extend more than 7000 KM to Cambodia. In 1999, an innovative trade agreement between the United States and Cambodia linked access to the United States apparel market to improvements in working conditions in Cambodian garment factories. To assess Cambodian working conditions, the International Labour Organisation (ILO) of the United Nations developed the Better Factories Cambodia (BFC). The BFC program has been tied to significant improvements in working conditions in Cambodia (Beresford 2009, Berik and van der Meulen Rodgers 2010, Brown et al. 2014a, 2014b, 2014c, Kotikula et al. 2015, Robertson 2019b, Shea et al. 2010) and the success of the program laid the foundation for a global Better Work program in 2007. With programs in eight countries, the Better Work program's combination of assessment, remediation, and advisory services help countries improve the working conditions for garment workers. Better Work Jordan (BWJ) began in 2008.

Before the peace accord was signed in 1994 Jordan was a poor country with very few resources (Williams, 2015). A majority of the country's oil and manufactured goods were imported (Williams, 2015). The lack of a large domestic market prevented Jordan from industrializing at the same pace as some of its neighbors. By 1993 textile and garments accounted for only 8.21 percent of manufactured exports in Jordan compared to 52.9 percent in Egypt and 58.9 percent in Syria (Azmeh, Nadvi, 2014). The peace accords with Israel provided the Jordanian government with the political will to start investing in its own domestic production.

A key element of the peace accord was the QIZ. Both Israel and Jordan benefited highly from the agreement. Under the agreement 35% of the value of a product had to be produced in the QIZ (Azmeh, Nadvi, 2014). From that percentage Israeli inputs had to make up 8% (Azmeh, Nadvi, 2014). The new agreement with Israel also gave Jordan products greater access to markets in the United States (Azmeh, Nadvi, 2014). For instance, an amendment to the 1996 US-Israel Free Trade Agreement included products from the West Bank, Qaza, and other qualifying industrial zones from neighboring countries (Azmeh, Nadvi, 2014). With the prospect of a giant importer of their garment goods the Jordanian government rapidly implemented the QIZ.

Jordanian garments exports grew exponentially in the following years. The rapidly increased rate of production from garments companies in Jordan was largely assisted by Asian firms in Jordan. For instance, by 2008 71 garment firms (with over 100 workers) in the QIZ's were Jordan-owned and 42 were either partially or completely Asian-owned (Azmeh, Nadvi, 2014). Ownership was not only growing as a result of FDI from Asian countries, but migrant workers attributed to an increase in exports as well. By 2008 over 36,000 workers in the QIZ were migrant workers mostly from Sri Lanka, Bangladesh, China and India. Therefore, Jordan's garment sector's success is one that came through a collective effort (Azmeh, Nadvi, 2014).

While garment exports from Jordan to the United States increased over time the working conditions of the garment workers remained dismal. There have been widespread allegations of forced labor, sexual assault and harassment, trafficking, and discriminatory wages (BHRRC, 2018). After a series of scandals about exploited migrant workers in QIZ's the Jordanian Government request help from the Better Work program (BHRRC, 2018). The goal of the joint initiative was to improve the condition of workers, create a dialogue among national stakeholders and continue the financial success of the garment sector (BHRRC 2018).

Figure 1 shows that the drop in Jordan's garment exports stopped once the Better Work program and other reforms were implemented. Starting around 2009, exports start climbing again and continue to rise until 2018. The growth in exports was not a rapid as the initial expansion, but the growth was still significant.

Theoretic Considerations and Empirical Approach

While there are several potential approaches to modeling the firm's decision to become compliant, we begin with the simplest model of profit maximization. Treating (non)compliance as a potential production input that is a choice for the factory, factories will choose the level of (non)compliance at which the marginal benefit is equal the marginal cost. The marginal benefits might be lower immediate production costs (e.g. not providing fresh water, adequate rest rooms, or paying consistent wages). The marginal costs of noncompliance might include lower productivity (if workers are fearful or distressed) or potentially lost sales from reputation effects.

Transparency affects the perceived costs of noncompliance by potentially increasing the probability of lost sales. If factories behave according to the standard profit maximization model, they will, holding all else equal, respond to transparency by increasing compliance.

While the underlying theory is straightforward, it is important to address the other implied factors that might also be affecting compliance. In particular, unobserved factors (such as management quality) might affect the compliance decisions and may be correlated with transparency. In other words, if firms become more compliant after the return to disclosure for reasons other than disclosure (for example, they may have management that was more likely to be compliant for other reasons), the observed correlation between transparency and compliance would lead to misleading conclusions.

Potential third factors may be both observed and unobserved. Combining the supply-chain literature with the literature surrounding Better Work (including BFC) suggest that at least five potential confounding factors might affect the estimated relationship between transparency and compliance. These include which international buyers are purchasing from the factory (buyer relationship), factory size (measured as total employment), changes in the global apparel market, geographic location, and whether the factory is a first-tier or second-tier producer.

In the global apparel supply chain, factories produce for, and sell to, both retail and wholesale companies that both design and market clothing. These buyers differ in reputation risk because some brands are more in the public eye than others. For example, Nike and Gap Inc. are well known to consumers, but some companies that provide uniforms and workwear may not be as known to consumers. News about adverse conditions in garment factories may affect reputation-sensitive buyers more than others, which can motivate some buyers to take a greater interest in working conditions in their supplying factories. Several recent papers have shown that working conditions in factories that supply to reputation-sensitive buyers are higher than those in other factories (Oka 2010a, 2010b). Supply-chain leaders can purchase BWJ reports. Since Weil et al. (2006) suggests that those who would use transparency-generated data would value the reports the most, the supply-chain leaders that purchase the reports are coded as reputation sensitive. In practice, the group of buyers are major international retailers and name brands, and, as such, are those that are often characterized as "reputation sensitive" in other studies. The empirical analysis, therefore, includes controls for each factory's relationships with reputation-sensitive buyers.

Factory size and compliance are found to positively related in several studies. One reason why other studies may have found a positive relationship between compliance and factory size is that improvements in working conditions often involve fixed costs. Large factories can

spread these costs across more output, making the average cost per unit of output lower. Unfortunately, the data used in this study do not have measures of output at the factory level. Instead, we use total employment to measure factory size.

Garment factories often receive relatively small markups for their value added. Changes in global apparel prices, perhaps due to falling global apparel demand, may reduce the price factories receive. Robertson et al. (2019) find that falling apparel prices are associated with lower wages for apparel workers in Cambodia and Sri Lanka. Beresford (2009) argues that Cambodian working conditions did not fall after the end of the the MultiFibre Arrangement (MFA) in 2004 2004 but does not consider measures of demand. In Sri Lanka, Rawanpura and Wrigley (2011) argue that the financial crisis increased pressure on garment producers. As is commonly practiced, time effects in the regressions control for these factors.

Geographic location may also affect compliance decisions. If factories are in larger cities, they may face more competition for workers and therefore have an incentive to improve working conditions to attract workers. While a reasonable consideration, this concern may not be as relevant for Jordan because a very high proportion of the workers are migrants who face much larger costs of moving between factories than domestic workers would. Nevertheless, city-specific variables are included to control for this potential effect.

As mentioned above, having a relationship with a reputation sensitive buyer is correlated with higher levels of compliance with national labor law and international labor standards. One of the similar findings in the literature is that the distance between the buyer and the factories, often measured through subcontracting relationships, may result in lower compliance. Being at "arms-length" from a reputation sensitive buyer reduces reputation risk and therefore may reduce the cost of noncompliance. The estimation equations include an indicator for whether or not the factory is a "first tier" or "second tier" supplier.

Of course, there may be other factors that can affect compliance. Many of these might be unobservable, either because they are not easily measured or they were not included in the assessment tool or data collection. Such unobserved factors are problematic for estimation because they could be correlated with both compliance decisions and the transparency program.

These unobserved factors make many of the common approaches inappropriate. For example, "before and after" comparisons can be inaccurate if the selection into the treatment group is endogenous and contain factors that would otherwise explain future performance. Comparing compliance in the critical issues against compliance in the other questions after the transparency program went into place would be inaccurate if the difference between the two groups prior to the program were ignored (compliance may have been higher in the same group both before and after the program).

There are several ways to address concerns about endogeneity and the influence of unobserved factors. Randomized experiments, propensity score matching (PSM), and difference-in-difference models are three of the most common approaches used in evaluation (Imbens and Wooldridge 2009). In the absence of a randomized experiment, Imbens and Wooldridge (2009) point out, and appeal to Smith and Todd (2005) for support, that the difference-in-difference (DiD) approach provides a valid alternative to the PSM approach that addresses the same concern driving the PSM approaches.

This study employs a *difference-in-difference* approach. If unobserved factors affect compliance decisions in a constant and consistent way, then the difference in difference approach effectively removes the influence of these unobserved factors from the estimated effect. The validity of this approach relies on the identification of an appropriate comparison group. The key is finding a comparison group that is affected in the same way by the unobserved factors as the treatment group.

Finding an appropriate comparison group is often difficult and therefore rare in quasi-experimental studies. The implementation of Jordan's transparency program identifies an appropriate comparison group: the group of compliance issues that are outside of those included in the transparency program. Unobserved yet constant factors that affect compliance would either affect all compliance decisions in a similar way, or, if they affect the critical issues differently, would affect them both before and after the transparency program. Under these conditions, the transparency program would change the difference between the targeted group and the rest of the sample. The difference in the difference between the critical issues and the rest of the issues is considered to be the effect of the program in the program evaluation literature.

Implementing the difference-in-difference approach is straightforward and employs standard regression techniques. In particular, factory-question-level compliance is regressed on a dummy variable equal to one for all questions that cover the critical issues (the "treatment" group), a dummy variable equal to one for all periods after the transparency program went into effect (November 2016), and then the interaction between these two. To control for the observable factors described above, the regressions also include control variables (year, total employment, location, supplier "tier" (first or second), and having a reputation-conscious buyer).

Data and Summary Statistics

Data Source and Collection

As mentioned above, this study employs data from the Better Work Jordan program. The data follow factories over time. The data include all garment exporters in Jordan. As such, new factories enter the sample when they start exporting and leave either when they close or stop

exporting. Factories are observed when they have an assessment by Better Work Jordan.

Factories are on average visited slightly more often than once per year.

Sample Characteristics

To show how the sample changes over time Table 1 presents the number of factories by visit number (the first visit is 1, the second visit is 2, and so on). In the first year for which we have data, 2009, there were 14 factories in the program, and they all had their first visit in 2009. In 2010, ten factories came into the program with their first visit, and ten had their second visit. The table has a triangular structure each year new factories enter with a first visit, and factories that had been in the program previously have subsequent visits. By 2016, for example, 9 factories had their eighth visit from Better Work Jordan.

The factories range in size from having 10 employees to having 4197. The distribution of factories by size is very similar to that found in many developing countries: most are small-to - moderately sized (the overall mean size is about 833 workers), but there are several very large factories (in statistical terms, there is a long upper tail to the distribution). Often such distributions become normal when expressed in log form (that is, the log of total employment is approximately normally distributed), and this is the case in these data.

Table 1 also shows that, overall, there are 534 factory-visit observations. The data include questions designed to identify *noncompliance*. Technically, BWJ assessments identify *noncompliance* with national labor law and intentional labor standards. For the sake of prose throughout this study, the term "compliance" is defined as "the lack of noncompliance." Each assessment uses an assessment tool that contains about 250 individual questions that cover a wide range of working conditions in the factory that are linked to national labor law and international labor standards. In total, while questions are meant to be consistent over time,

slight variation and revision to individual questions leads to small changes in total number of questions over the length of the program.

To illustrate how compliance changes both across the range of factories within years and over time, Figure 3 presents mean compliance across all questions for each factory with a "box-and-whisker" plot. The horizontal axis is each year for which we have complete data. The vertical axis measures compliance as a ratio between zero and one. For each factory in each year, we calculate the average compliance across all questions in the assessment tool. If a factory is compliant on all questions, its average compliance score would be one. If the factory is compliant on half of the questions, the average compliance would be 0.5. The questions are not weighted other than to give each question equal weight, so the average is the simple arithmetic mean for each factory.

For each year, there is a "box", which is the shaded rectangle, and "whiskers". The shaded box represents the range in which the middle 50 percent of the scores fall (from the 25th percentile to the 75th percentile). The line in the middle of the shaded box represents the median compliance level across all factories in the sample. The "whiskers" represent the upper and lower adjacent values[1] as defined by Tukey (1977). The dots are those few observations that fall outside of the adjacent values, which might be characterized as outliers.

The median values generally rise over the sample period, but decline in the middle of the sample before rising again. The lower median values in the 2015-2016 years are accompanied by an increase in the spread of compliance. In general, the range of compliance across factories is larger after 2014 than before. Note that the transparency program begins in 2016, and median compliance rises consistently after 2016 until the end of the sample. The pattern (rise, fall, rise)

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[1] Formally, the whiskers are bounded by values that are 1.5 times the difference between the 25th and 75th percentile away from the upper and lower edge of the box.

is not being clearly driven by the compliance of new entrants, since the influence of the new entrants falls over time.

The individual compliance questions are grouped into two categories. The first category is the "critical issues" identified by Better Work Jordan staff in consultation with relevant stakeholders. The list of questions in Table 2 therefore represents the consensus among the factory managers, labor representatives, and Better Work staff employed by the International Labour Organisation as to what the critical issues for Jordan are.

The remaining questions are used as the comparison group. To illustrate the changes in compliance over time, figure 4 shows the change in mean compliance by year for each group of questions. Note that roughly both groups exhibit the rise-fall-rise patterns shown in Figure 3. The more important feature of the graph, however, is that the gap between compliance with the critical issues and all other questions is very large in the first two-thirds of the sample. Compliance in the critical issue areas is lower than in the comparison group. After the transparency program goes into effect, however, both series show rising compliance but the compliance in the critical issues questions rises faster and overtakes compliance in the comparison group. While Figure 4 heuristically illustrates the difference in difference over time, we now turn to the formal econometric analysis.

Empirical Approach and Results

As discussed earlier, the empirical approach involves estimating a standard difference in difference model. This model can be more formally specified as

(1) $C_{ijt} = a + bX_{ij} + dT_{jt} + gXT_{ijt} + hZ_{ijt} + e_{ijt}$

In equation (1), X is a dummy variable equal to one for the questions included the critical issues and zero otherwise, T is a dummy variable equal to one for the time periods in which the transparency program is in effect and zero otherwise, and XT represents the product (interaction) of X and T. The variable Z represents a vector of other control variables discussed earlier. The *a, b, d, g,* and *h* represent the coefficients that are the estimates of each variable's relationship with the compliance indicator *C*. In particular, the *g* variable represents the effect of the transparency program on compliance of the critical issues relative to the comparison group after the transparency program goes into effect. The subscripts *ijt* represent question *i* in factory *j* at time *t*. By assumption, the variable *e* represents the error term that is assumed to be independent and identically distributed across observations.

Main Results

Estimating equation (1) using ordinary least squares (OLS) generates the results shown in Table 3. The first column contains the baseline results that include the dummy variable for time periods after the program began in November 2016 ("Transparency"), a dummy variable for the questions that are in the critical issue categories shown in Table 2 ("Critical Issues"), and the interaction between these two variables ("Dif-n-Dif"). As described above, the interaction term measures the effect of the transparency program by estimating the difference in the difference between compliance in the critical issue questions and other questions before and after the transparency program.

The first row has a small and statistically insignificant estimate of -0.002, which implies that overall compliance (that is, in all areas) was not statistically different after the transparency program. The second row shows a negative and statistically significant estimate of -0.042. This estimate implies that average compliance in the critical issue areas is lower than in other areas. The third row shows a positive and statistically significant estimate of 0.046. The estimate

suggests that compliance in the critical issue areas increases relative to the other questions. In the program evaluation literature, this result would be interpreted as a positive and significant effect of the transparency program because compliance in the "treatment" group (the critical issue areas) increased relative to the rest of the questions.

Of course, factors besides the transparency program could be driving the improvement in compliance in the critical issue areas. In the rest of the results, we explore the potential confounding effects of the main alternative explanations for the results.

Robustness

Since there are many potential factors that could explain the improvement in compliance other than the transparency program, in this section we evaluate the potential role for unobserved factory characteristics, external factors that may have coincided with the transparency program, location, size, alternative definitions of the compliance period, purchasing relationships, and foreign versus domestic ownership.

Unobserved Factory Characteristics and Time Effects

Table 3 contains four columns. In addition to the results in column (1) discussed above, the remaining three columns introduce controls for unobserved (but constant) factory characteristics, time effects, geographic location, and factory size.

Column (2) contains the results of estimating equation (1) using OLS but with factory fixed effects that control for unobserved factory characteristics that do not change over time. In econometrics, this approach is known as "fixed effects" estimation and the coefficients are identified using the variation within factories over time. This variation is important because it captures the changes being made by individual factories instead of the differences between more and less compliant factories. The main message in column (2) is that the results are nearly

identical to column (1). This is an important result because it shows that the improvement in compliance was not due to differences in unobserved factory characteristics (such as manager ability or approach) that might give rise a systematic difference in compliance between factories.

In column (3) we add variables that capture the potential effects of other variables that may have changed through time but coincided with the transparency program. For example, a rising demand for compliance overall over time might induce firms to improve compliance overall, or there may have been a rising emphasis in compliance in critical issue areas over time. The time effects should control for these factors. The main result in column (3) is that, again, the results are nearly identical. The initial results are not being driven by external events that change over time.

In the last column of Table 3, we add variables for city and factory size (total employment). These variables are not reported but are available upon request. These variables show that there are significant differences across cities in terms of average compliance, but, perhaps surprisingly, total employment is not related to compliance. While these differences (or lack of differences) may be interesting, the main result from column (4) is that, again, the main results are not affected by including these additional variables. Therefore, we find no evidence that the results presented in column (1) are driven by factory size or geographic location.

Alternative Definition of Compliance Period

When Better Work Jordan began, the initial reports included public disclosure of factory-level compliance. That is, the initial stages of the program included a transparency component. The early transparency component was different than the later transparency program because it was short-lived and it did not focus on the critical issues. Instead, it included the compliance results in all areas.

In order to see if the results in Table 3 are consistent with a definition of transparency that includes this earlier period, Table 4 contains essentially the same estimation equations used in Table 3 with the only difference that the transparency variable is equal to one in both the early and later years. The critical issues variable does not change, which means that the results should be weaker than earlier if the explicit focus on the critical issues matters.

The main result of Table 4 is that the effect of the transparency program, again shown in the third row ("Dif-n-Dif"), are still positive and significant. The results are robust across all four columns (again the results across the four columns are nearly identical). What is evident when comparing Table 3 and Table 4, however, is that the estimates of the transparency program are slightly smaller (less positive). As noted above, the slightly less positive estimates imply that the explicit focus on the critical issues matters.

It is also interesting that the "Transparency" coefficients are negative and generally significant. This is exactly what we expect to see because compliance early in the program was lower than in later years overall. When only defined as the later period, the estimates are not statistically different from zero. When the lower compliance earlier period is included in the definition of the transparency variable, the estimate of the transparency period becomes negative. The main result, however, is that the same pattern emerges in that the data suggest that the transparency program generated positive and significant changes in compliance in the critical issue areas.

Another way to measure the effect of the transparency program would be to define the program as starting in July 2017 (when reports were actually posted on line) rather than November 2016 (when the beginning of the program was announced). If there was any doubt about whether or not the results would be posted on line, or if it is the availability of information

itself that affects compliance, we would expect that the results might be different if we defined the transparency program as starting in July 2017.

To test this hypothesis, Table 5 contains results from the same four equations in Table 3 but with the only difference that the transparency program is defined as starting in July 2017. Again, the results are very similar to Table 3. The main difference is that the estimated program effects are slightly larger in Table 5 than in Table 3, which, again, is what we would expect if there were doubts about whether the results would be posted or if it the availability of information that actually affects the incentives to become compliant. If anything, the effects of the program are larger when the later date is used to define the compliance period.

Including Buyers

Several papers cited above have suggested that foreign ownership and having a commercial relationship with a reputation-sensitive buyer are factors that affect a manager's decision to comply. BWJ tracks information about country of ownership and whether or not the factory has a relationship with a reputation-sensitive buyer. From an empirical standpoint, however, these measures are somewhat problematic because they do not change over time. That is, the available data are factory-specific and not factory-time specific, which makes it impossible to see of these relationships change for individual factories. The main econometric implication is that the potential effects of foreign ownership and having a relationship with a foreign buyer are captured by the factory-specific fixed effects shown in column (2) of Table 3.

Nevertheless, we can include the measures of foreign ownership and relationships with reputation-sensitive buyers if we do not include the factory-specific fixed effects. This specification is probably inferior to those in column (2) of Table 3 (and subsequent results that include the factory-specific fixed effects), but it would allow us to see whether or not these factors contribute in similar ways as found in previous studies (e.g. Robertson 2019).

To first illustrate the potential importance of foreign and domestic ownership, Figure 5 shows the average compliance for the two kinds of factories over time. Figure 5 suggests that mean compliance in domestic factories starts higher than in foreign factories, but mean compliance converged until 2015. Starting in 2015, mean compliance in the foreign factories increases sharply while compliance in the domestic factories falls until 2018. By the end of the sample, the gap in average compliance between the two kinds of factories is large.

Reputation sensitivity also affects compliance decisions. For the purposes of examining robustness, we are able to construct three three measures of reputation sensitivity. The first measure of reputation sensitivity is a 0/1 variable that is equal to one for factories that sell to buyers that purchase the reports from BWJ and zero for all other factories. The second measures uses the fact that BWJ also differentiates these buyers between "Participants" and "Partners". These levels can be differentiated using a variable equal to zero for factories that are not associated with buyers that purchase BWJ report, but is equal to 1 for "Participants" and 2 for "Partners." The third measure is a 0/1 variable that is equal to one for the factories that sell to buyers that are partners with Better Work Global. Since these measures are different proxies for the same idea (reputation sensitivity), we estimate three separate difference-in-difference regressions using one measure per equation. The results are shown in Table 6. Each column uses a different definition of reputation sensitivity.

As shown in previous studies, being associated with a reputation-sensitive buyer is positively associated with compliance regardless of which measure of reputation sensitivity is used. The effects in all three columns (one for each of the three measures) are relatively small (about 1-2 percent) but are statistically significant. Previous studies have suggested that reputation sensitive buyers may select factories with higher compliance or they may encourage improvements in compliance. In some cases, factories are rewarded for their improvements with

either longer-term relationships or, infrequently, higher prices for orders (Oka 2010b). But note that the main difference-in-difference results remain positive and statistically significant and do not change as the measure of reputation sensitivity changes.

Table 6 also includes individual country-of-ownership effects. The interpretation of the individual country variables is relative to the omitted country, which is Jordan. That is, each estimated country coefficient is the mean difference between compliance in factories whose owners are from a particular country and the compliance in the average Jordanian factories. Note that all but two of the countries have positive coefficients, meaning that foreign companies, on average, have higher compliance than Jordanian factories. There are significant differences across countries. The difference between Singapore's factories and Jordan's factories is the largest. Factories from both mainland China and Bangladesh have slightly lower compliance than the average Jordanian factory, but this difference is not statistically significant.

The main message from Table 6, however, is that the main results (the positive and statistically significant coefficient on the difference-in-difference variable) are not affected by explicitly including controls for having a relationship with a reputation sensitive buyer or controlling for country of ownership. The main results in Table 3 are very robust to differences in specification and including (or omitting) different variables.

Variation across Compliance Groups

Differences across compliance groups may affect the rates at which compliance changes over time. For example, some compliance groups may be more costly to address than others. To explore the robustness of the results across different compliance groups, Table 7 contains a list of the seven main compliance areas and five columns of data that describe how robust the main results are when we focus the estimation on each group separately.

The first column illustrates the relative size of the number of observations in the data that below to each compliance group. Since the number of time periods and factories is constant across groups, the listed sample sizes are directly proportional to the number of questions in each group. Child labor and forced labor have the fewest questions because these areas are very focused. Other areas, such as occupational safety and health, are less focused and therefore require more questions.

The share of questions within each group that are included in the transparency program as focus questions is shown in the second column. The questions included in the transparency program are always less than half of the total number of questions in each group and range from about 35% (in Child Labor) to 43.5% (in Contracts and Human Resources).

The next two columns show the average rate of compliance for the questions not included in the transparency program and for questions that are included in the transparency program in each group. Some of the differences are interesting. In the case of Child Labor and Compensation, the differences are negligible. In some categories, like Compensation, the compliance rate is higher for the questions that are not included in the transparency program. In other categories, like Discrimination, the pattern is reversed.

The final column includes the estimation results for just the difference-in-difference coefficient, which measures the difference in compliance after the transparency program went into effect. In one category, Freedom of Association and Collective Bargaining, the results are negative and statistically significant. The results are positive and statistically significant at the 1% level for four of the six remaining groups. Two of the groups, Child Labor and Forced Labor, do not show statistically significant changes after the transparency program. As shown in columns three and four, these categories had nearly zero noncompliance across both groups of questions, so it is not surprising that the changes after the transparency program were very small.

With the exception of Freedom of Association and Collective Bargaining, the results seem to be very robust across individual compliance groups.

Conclusions

Identifying ways to improve compliance in garment factories in developing countries is a critical goal of policymakers, international buyers, unions, inter-Government organizations, and NGOs. Audits alone seem to be insufficient for improving labor standards. Therefore, finding additional policies that may complement existing audits is important. One policy that has been identified in the literature is transparency. While the idea of the incentive inducing effects of transparency go back nearly 100 years, there is very little evidence about the effectiveness of transparency in modern global value chains.

This paper uses a policy experiment from Better Work Jordan to evaluate how transparency may induce improvements in compliance in Jordan's garment sector. The implementation of the program offered a rare opportunity to evaluate the effects of transparency relative to a clear comparison group and allowing for a clear identification strategy. The results from a well-established evaluation technique from the econometric program evaluation literature suggest that transparency is significantly associated with improvements in compliance. The results are robust to a wide range of specifications and additional controls.

The results in this paper are consistent with previous research (e.g. Robertson 2019) about the potential benefits of transparency in global value chains. The Better Work program in particular, and other social compliance stakeholders generally, are expanding the implementation of transparency programs that will create opportunities for future research.

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Figure 1: Jordan's Apparel Exports
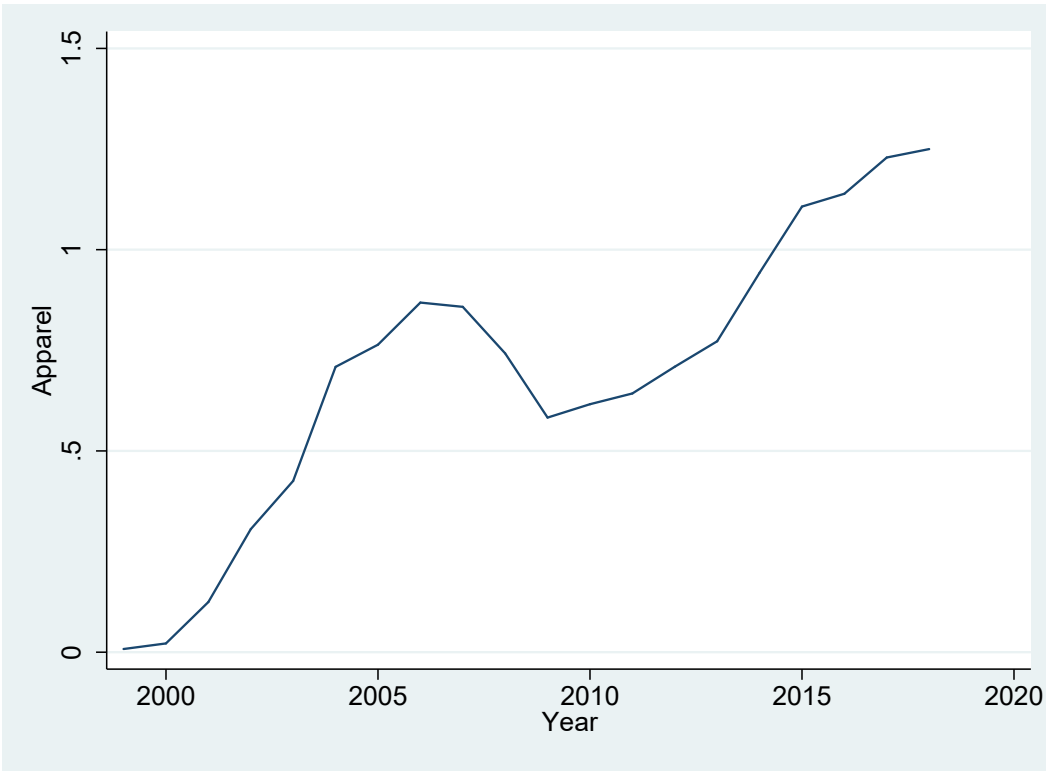
Notes: Author's elaboration using data from U.N. COMTRADE. Apparel represents HS61 and are in billions of nominal U.S. dollars.

Figure 2: US Share of Jordan's Apparel and NonApparel Exports
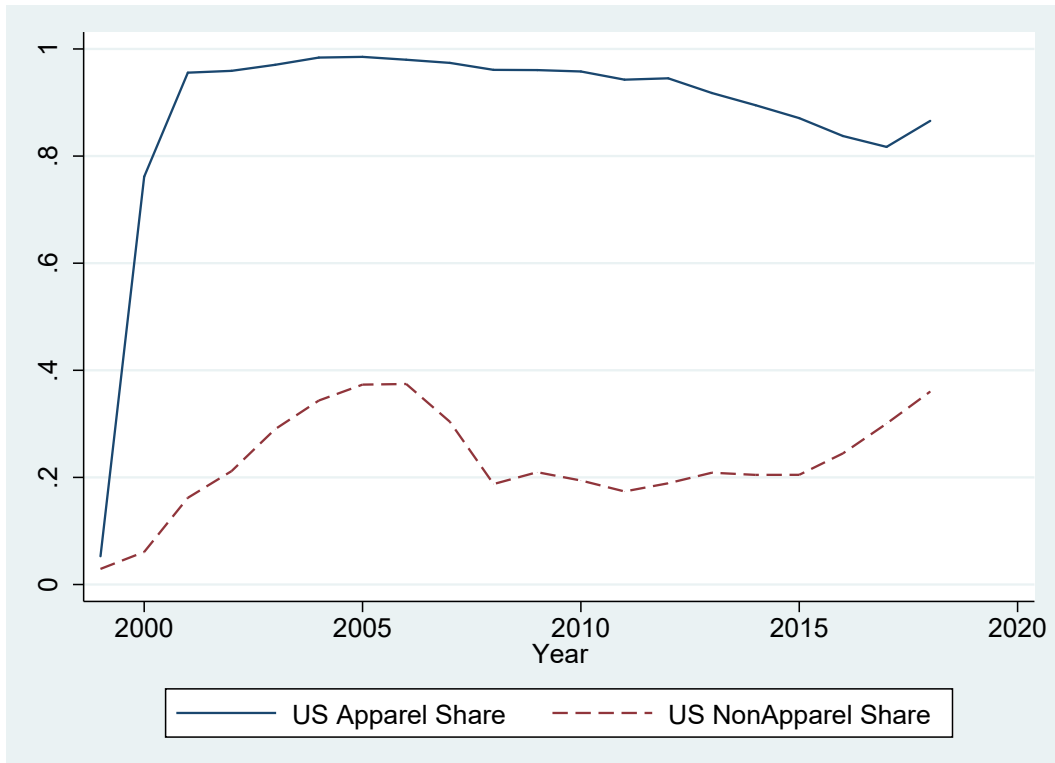
Notes: Author's elaboration using data from COMTRADE. Apparel represents HS61.

Figure 3: Distribution of Mean Compliance Over Time
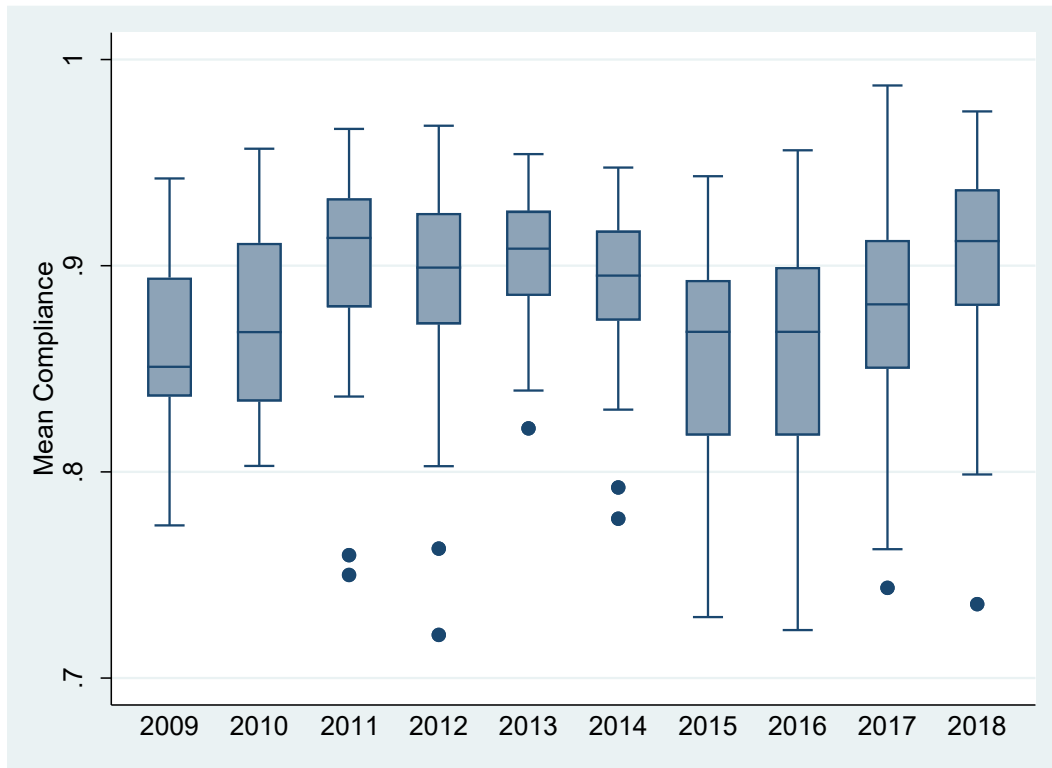
Notes: As noted in the text, this "box-and-whisker" plot contains a "box", which is the shaded rectangle, and "whiskers". The shaded box represents the range in which the middle 50 percent of the scores fall (from the 25th percentile to the 75th percentile). The line in the middle of the shaded box represents the median compliance level across all factories in the sample. The "whiskers" represent the upper and lower adjacent values[2] as defined by Tukey (1977). The dots are those few observations that fall outside of the adjacent values, which might be characterized as outliers

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[2] Formally, the whiskers are bounded by values that are 1.5 times the difference between the 25th and 75th percentile away from the upper and lower edge of the box.

Figure 4: Compliance in Critical and Other Issues Over Time
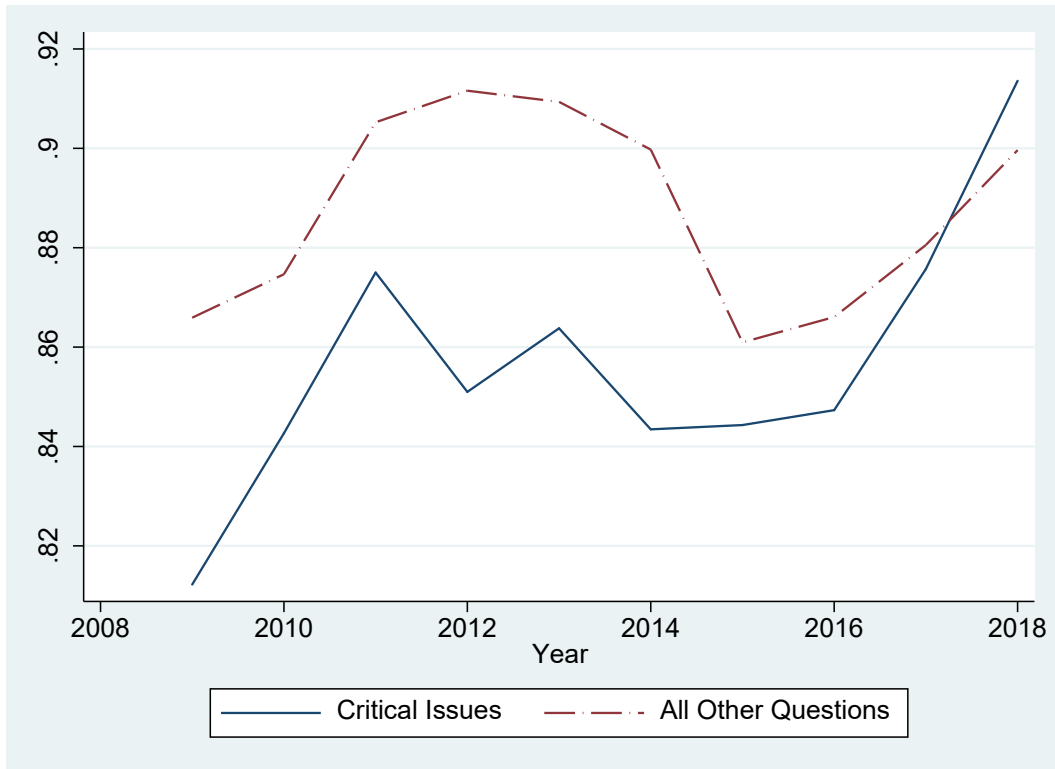
Notes: Compliance rates represent the simple (unweighted) arithmetic average of 0/1 compliance questions across all factories and all questions in each group. Critical Issues are listed in Table 2.

Figure 5: Mean Compliance by Ownership Status
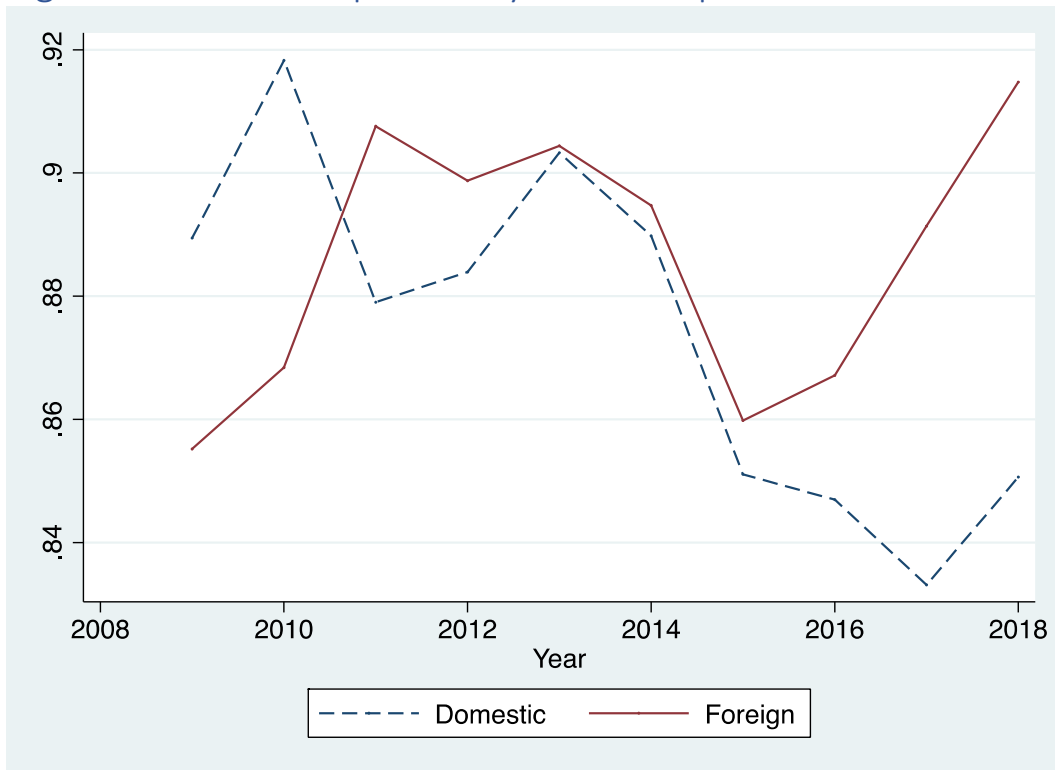
Notes: Compliance rates represent the simple (unweighted) arithmetic average of 0/1 compliance questions across all factories in each group. Ownership status (foreign or domestic) is determined by the nationality of the parent company as reported to Better Work Jordan.

Table 1: Factory Counts by Year and Visit Number

Visit	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1	14	10	10	23	5	5	10	7	7	10	2	103
2		10	9	14	19	5	4	10	7	6	2	86
3			8	12	14	14	6	3	10	6		73
4				8	12	14	12	4	4	10	1	65
5					9	12	10	13	4	4		52
6						9	12	9	12	4	1	47
7							9	13	8	12		42
8								9	13	8	5	35
9									9	12	2	23
10										8		8
Total	14	20	27	57	59	59	63	68	74	80	13	534

Table 2: Critical Issues

No.	Category	Question Text
1	Child Labour	Have you found any workers under the age of 16?
2	Discrimination	Is gender a factor in decisions regarding conditions of work?
3	Discrimination	Are workers subject to sexual harassment?
4	Discrimination	Does the employer terminate workers who are pregnant or on maternity leave or force them to resign?
5	Forced Labour	Does the employer restrict workers from leaving the workplace?
6	Forced Labour	Does the employer deny workers access to their personal documents (such as birth certificates, passports, work permits and ID cards) when they need them?
7	Forced Labour	Are workers forced to work overtime under threat of penalty?
8	FOA/CB	Does the employer require workers to join a union?
9	FOA/CB	Has the employer tried to interfere with, manipulate, or control the union(s)?
10	FOA/CB	Does the employer punish workers for joining a union or engaging in union activities?
11	FOA/CB	Has the employer terminated workers or not renewed their contract due to the worker's union membership or activities?
12	FOA/CB	Has the employer failed to implement any of the provisions of the collective agreement(s) in force?
13	FOA/CB	Has the employer punished any workers for participating in a strike?
14	Compensation	Does the employer pay at least minimum wage for ordinary hours of work to regular full time workers?
15	Compensation	Does the employer pay workers 125% of their normal wage for all ordinary overtime hours worked?
16	Compensation	Does the employer properly inform workers about wage payments and deductions?
17	Compensation	Does the employer pay workers correctly for maternity leave?
18	CHR	Has the employer taken sufficient steps to ensure that migrant workers do not pay any unauthorized fees?
19	CHR	Have any workers been bullied, harassed, or subjected to humiliating treatment?
20	OSH	Has the employer formed a joint worker/management OSH committee?
21	OSH	Are chemicals and hazardous substances properly stored?
22	OSH	Does the employer provide workers enough free safe drinking water?
23	OSH	Is the accommodation protected against fire?
24	OSH	Has the employer adequately prepared for emergencies in the accommodation?
25	OSH	Does the workplace have a fire detection and alarm system?
26	OSH	Are there enough emergency exits?
27	OSH	Are the aisles and emergency exits accessible, unobstructed and unlocked during working hours, including overtime?
28	OSH	Does the employer conduct periodic emergency drills?

Notes: Taken directly from Appendix E. FOA/CB stands for Freedom of Association and Collective Bargaining. OSH stands for Occupational Safety and Health.

Table 3:

Critical Issues Difference in Difference Estimates

VARIABLES	(1) Baseline	(2) Factory Fixed FX	(3) Time and Factory FFX	(4) City and Size
Transparency	-0.002	0.001	0.015	0.015
	(0.004)	(0.004)	(0.016)	(0.016)
Critical Issues	-0.042***	-0.043***	-0.039***	-0.039***
	(0.005)	(0.005)	(0.005)	(0.005)
Dif-n-Dif	0.046***	0.046***	0.043***	0.043***
	(0.009)	(0.009)	(0.009)	(0.009)
Constant				0.005
				(0.025)
	0.891***	0.898***	0.859***	0.823***
Observations	(0.002)	(0.010)	(0.013)	(0.181)
R-squared				

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. "After" represents all observations after November 2016, when the government of Jordan approved the return to public disclosure. "Dif-n-Dif" represents the difference in difference estimates.

Table 4:

Adding 2008-2011 to the Post 2016 Transparency Period

	(1)	(2)	(3)	(4)
		Factory Fixed	Time and Factory	City and
VARIABLES	Baseline	FX	FFX	Size
Transparency	-0.015***	-0.021***	-0.019**	-0.019*
	(0.003)	(0.003)	(0.010)	(0.010)
Critical Issues	-0.048***	-0.048***	-0.044***	-0.044***
	(0.006)	(0.006)	(0.006)	(0.006)
Dif-n-Dif	0.038***	0.039***	0.034***	0.034***
	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.898***	0.909***	0.874***	0.842***
	(0.002)	(0.011)	(0.011)	(0.182)
Observations	102,402	102,402	102,402	102,402
R-squared	0.001	0.006	0.008	0.008

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
"Transparency" represents all period after November 2016 and the 2008-2011
period. "Dif-n-Dif" represents the difference in difference estimates.

Table 5:

Transparency Since July 2017

VARIABLES	(1) Baseline	(2) Factory Fixed FX	(3) Time and Factory FFX	(4) City and Size
>July 2017	0.001	0.003	-0.021**	-0.021**
	(0.004)	(0.004)	(0.009)	(0.009)
Critical Issues	-0.040***	-0.040***	-0.036***	-0.036***
	(0.005)	(0.005)	(0.005)	(0.005)
Dif-n-Dif	0.048***	0.048***	0.045***	0.045***
	(0.009)	(0.009)	(0.009)	(0.009)
Constant	0.891***	0.897***	0.859***	0.819***
	(0.002)	(0.010)	(0.013)	(0.181)
Observations	102,402	102,402	102,402	102,402
R-squared	0.001	0.006	0.008	0.008

Notes: Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. "Late" stands for all period after July 2017, which is when public posting of assessment results for the 28 critical issues began. "Dif-n-Dif" represents the difference in difference estimates.

Table 6:
Robustness: Reputation Sensitivity and Country of Ownership

VARIABLES	(1) Measure 1: BWJordan	(2) Measure 2: BWJordan 2 Levels	(3) Measure 3: BWGlobal
Transparency	0.030***	0.029***	0.032***
	(0.011)	(0.011)	(0.011)
Critical Issues	-0.037***	-0.037***	-0.037***
	(0.004)	(0.004)	(0.004)
Dif-n-Dif	0.030***	0.030***	0.030***
	(0.006)	(0.006)	(0.006)
Reputation Sen.	0.011***	0.018***	0.017***
	(0.004)	(0.006)	(0.005)
Bangladesh	-0.002	-0.002	-0.000
	(0.006)	(0.006)	(0.006)
China	-0.009	-0.009	-0.007
	(0.006)	(0.006)	(0.007)
Hong Kong, China	0.033***	0.031***	0.023***
	(0.006)	(0.006)	(0.006)
India	0.020***	0.019***	0.017***
	(0.005)	(0.005)	(0.004)
Israel	0.058***	0.057***	0.057***
	(0.009)	(0.009)	(0.009)
Pakistan	0.071***	0.068***	0.065***
	(0.013)	(0.012)	(0.012)
Taiwan, China	0.015*	0.014*	0.013*
	(0.008)	(0.008)	(0.008)
Singapore	0.111***	0.110***	0.090***
	(0.014)	(0.014)	(0.014)
Sri Lanka	0.058***	0.059***	0.037***
	(0.009)	(0.009)	(0.009)
Turkey	0.027***	0.027***	0.024***
	(0.008)	(0.008)	(0.008)
Employment	0.002	0.002	0.002
	(0.002)	(0.002)	(0.001)
Constant	0.779***	0.779***	0.778***
	(0.016)	(0.016)	(0.015)
Observations	102,400	102,400	102,400
R-squared	0.009	0.009	0.009

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. . Omitted country in the ownership categories is Jordan.
"Dif-n-Dif" represents the difference in difference estimates.

Table 7

Robustness: Changes in Compliance for Select Groups

Compliance Group	Sample Size	Transparency Share	Compliance Rate: Not In Transparency	Compliance Rate: In Transparency	Difference in Difference
Child Labor	2,738	0.354	0.993	0.991	-0.010
					(0.009)
Compensation	13,006	0.404	0.922	0.904	0.067***
					(0.015)
Contracts and Human Resources	14,200	0.435	0.895	0.909	0.106***
					(0.020)
Discrimination	11,342	0.400	0.925	0.975	0.039***
					(0.013)
Forced Labor	7,981	0.376	0.992	0.973	0.006
					(0.008)
Freedom of Association and Collective Bargaining	14,118	0.406	0.880	0.887	-0.040***
					(0.014)
Occupational Safety and Health	33,484	0.414	0.805	0.804	0.069***
					(0.013)

Notes: Each compliance group has questions that are included in the transparency program and questions that are not. The total number of observations in each group is shown in the first column. The share of questions that are in the transparency group is shown in the second column. The compliance rates within each group for questions not in the transparency program are shown in the third column, and the average compliance rate within each group for questions in the transparency program are shown in the fourth column. The fifth column contains the difference-in-difference estimates using the same methodology as in Table 3 but estimated separately within each group. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.