Is Social Compliance Win-Win for Workers and Firms?

Evidence from Better Factories Cambodia

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Abstract

This paper presents findings from a field experiment conducted during the period 2015-2018 measuring the impact of a social auditing program on worker pay, work hours, work concerns, life satisfaction and productivity in global supply chains. Better Factories Cambodia is a factory auditing and capacity building program that monitors factory compliance with ILO core labor standards and Cambodian labor law.

Weekly hours declined by an estimated 5.8 from a baseline average 64 hours per week, all of which is attributable to a decline in overtime. Pay per hour rose by USD 0.374 on a base of USD 0.91, or 41.1 percent. In the months after a factory assessment, and particularly after the third assessment, workers were less likely to believe that they need regular overtime work to earn sufficient income for basic necessities. We also measured a decline in concern with low wages and overtime and an increase in life satisfaction.

Productivity is principally measured by the efficiency rate, a comparison of actual to planned production. Actual production rose relative to planned production by 9.8 percentage points after the first assessment and 11.0 percentage points after the second assessment, for a total of 20.8 percentage points on a base of 97.2, or 21.4 percent. The log of the efficiency rate rose by 15.6 percent after the second assessment. The percent change in the efficiency rate lies between 15.6 percent and 21.4 percent.

There was also a positive treatment effect on the production target. The target increased by 44.8 percent after the first assessment and 32.4 percent after the second assessment. However, it declined by 2.8 percent each month, indicating that factory managers may have been anticipating a larger productivity gain from participation in BFC than actually emerged. The increase in hourly pay was at least as large as the increase in productivity. Therefore, labor's cost share rose with social compliance, leaving an ambiguous impact on profits.

The estimated effect of social compliance on the firm is supported by a survey of manager perceptions. Managers reported believing that improving conditions of work increases productivity but has an ambiguous effect on profits.

The analysis contributes to the literature on establishing a positive impact of social compliance on productivity and worker wellbeing, and measuring the distribution of gains between workers and firms.

Key Words: worker well-being, apparel industry, compliance auditing, productivity, Better Factories Cambodia, International Labor Organization

Introduction

Concern with worker wellbeing in global supply chains has spawned an array of interventions intended to increase pay, lower work hours, reduce abuse and improve work and life satisfaction. A central question is whether interventions such as social audits and capacity building do, in fact, improve outcomes for workers. A secondary question is how interventions affect the productivity and profits of participating firms. Do interventions targeting working conditions increase productivity or is the benefit to the factory limited to attracting the business of customers seeking to avoid a reputation-damaging exposé of abusive conditions of work?

Below we present the results of a field experiment conducted during the period 2015-2018 measuring the impact of a social compliance program in the Cambodian apparel and footwear sectors on wages, work hours, workplace concerns, job satisfaction and productivity. Better Factories Cambodia (BFC), a joint project developed by the UN's International Labour Organization (ILO) and the International Finance Corporation (IFC), part of the World Bank Group, is one of the longest running social audit interventions in global supply chains. The program started in 2001, evolving out of a trade agreement between the US and Cambodian governments, and has continued to work with brands and retailers, governments, factory management and workers to assess factory compliance with core labor standards and Cambodian labor law.

Participation in BFC is mandatory for all Cambodian factories in the apparel, textile and footwear sectors seeking an export license. BFC factories are subject to annual unannounced two-day visits in which two enterprise advisors assess factory compliance with Cambodian labor law and core labor standards.[1] The results of each visit are used to determine a factory's specific needs for optional advisory services and trainings intended to improve compliance performance. Selected results of the assessments are publicly available online and factories may choose to have their full assessment reports reviewed by their main customers.

In order to test for a causal impact of social auditing in global supply chains on wages, work hours, life satisfaction and productivity, we used a novel methodology involving random assignment to program exposure. The sample consists of workers in 57 Cambodian apparel and

[1] Core labor standards are freedom of association and collective bargaining, nondiscrimination, child labor and forced labor.

footwear factories that had recently enrolled in Better Factories Cambodia. As a consequence of random assignment to program exposure, our data set consists of pairs of factories that were both due for an annual assessment but one had their survey data collection just before the assessment and the other just after the assessment. We also have pairs of factories which had assessments at the same time but one had their survey data collection two months after the assessment and the other had their survey data collection either six or twelve months after an assessment. Random assignment to program exposure allows us to measure the impact of a single assessment as well as curing or decay of the program treatment effect over time.

We find that weekly pay is not significantly affected by program exposure. However, weekly work hours declined by 5.6 hours (8.8 percent) and hourly compensation increased by USD 0.37 (41.1 percent). Workers also reported less need for overtime to meet basic necessities, less concern with work hours and their pay rate and higher overall life satisfaction. In comparison, productivity increased between 25.6 and 32.7 percent depending on the regression specification. Thus, the percent change in pay was at least as large as the increase in productivity, indicating an increase in labor's cost share. As a consequence, the impact of social compliance on profits is ambiguous. An important implication of our findings is that a dependable benefit from social compliance for a factory depends on the willingness of a factory's customers to reward compliance with a higher price and/or larger orders.

Manager beliefs are consistent with the findings from the statistical analysis. Most managers in the sample agreed that social compliance increases productivity while also believing that there is no relationship between social compliance and profits.

The analysis contributes to the literature by using a field experiment to establish a causal relationship from social compliance to wages, hours, worker wellbeing and productivity and measures the distribution of gains between workers and firms. We also establish that a factory's choice to become socially compliant may depend on the willingness of international buyers to compensate factories for the additional cost of compliance.

The paper proceeds as follows. We provide a review of the literature and detail the history of Better Factories Cambodia in the context of the global apparel industry. Next, we discuss the methodology including the experimental design, estimation strategy and explanation of the data. We then present the empirical findings on the impact of BFC on worker wellbeing, compliance and productivity. Conclusions follow.

Background and Literature

Factory managers are often attracted to workplace systems characterized by harsh conditions to compensate for low productivity and/or due to a limited knowledge of efficient human resource management (Bloom et al., 2013; Distelhorst and McGahan, 2018; Locke et al., 2009; Rahman, 2014; Rossi, 2013). Some managers may not be aware of productivity-enhancing innovations even after systematically exploring variations in their production process (Hanna, et al., 2012). Empirical evidence clearly indicates persistent managerial quality heterogeneity with inefficient managerial practices persisting for decades (Melitz, 2003; Bloom, et al., 2013; Bandiera, et al., 2007).

Over the last three decades, NGOs and international buyers have implemented interventions in global supply chains with the objective of introducing production systems that are both more productive and more humane. Interventions promote technical and human resource management capacity building, accompanied by mechanisms that induce firms to share performance improvements with workers. If it is the case that managers inefficiently under-allocate attention to conditions of work, then it is possible that remediation systems may accomplish their proximate objectives concerning working conditions while also improving outcomes for firms. That is, interventions intended to redress abusive conditions of work may be Pareto improving (Atleson, et al, 2008; Barrientos, et al, 2010; Boiral, 2007; Bromley and Powell, 2012; Eichholtz, et al, 2010; Heerwagen, 2010; Levine and Toeffel, 2010; Sabel et al, 2000; Ton, 2014). However, Osterman (2018), in a review of the literature on the business case for humane labor management, concludes that firms may not find a *high-road* labor management system profit-maximizing.

Production systems innovations, such as lean manufacturing, are associated with an improvement in productivity, a decline in defects and lead times and a reduction in labor violations (Arthur, 1994; Black and Lynch, 2004; Distelhorst et al., 2014; Distelhorst and Locke, 2018; Ichniowski et al., 1997; Lazear and Shaw, 2007; Levine and Toffel, 2010; MacDuffie, 1995). Lean systems can also be empowering for workers as they emphasize teamwork and the need for worker input in the production process. Innovations in pay practices that align worker and firm interests have been shown to bring improvements in productivity and worker wellbeing (Bandiera et al., 2007; Lollo and O'Rouke, 2018; Toosi et al., 2020). Organizational innovations such as production teams and multi-dimensional pay increase productivity, product quality and profitability (Dunlop and Weil, 1996; Ichniowski, et al, 1997).

Management-level interventions that narrowly target production or pay systems, however, have been criticized for not adequately managing their impact on workers. Lean manufacturing has also been associated with increased workload and stress and reduced

flexibility at work (Appelbaum et al., 2000; Lewchuk and Robertson, 1996). Pay interventions that are not accompanied by social protections can result in a deterioration in working conditions (Bird et al., 2017), introduce monitoring costs that may reduce profits (Freeman and Kleiner, 2005) and are associated with increased sexual harassment (Brown, et al., 2020).

Comprehensive social auditing systems address criticisms of narrow human resource and production systems interventions. Legal structures, customer requirements, certifications, etc., are all systems that affect the direction of managerial attention. Social audits can affect the information set of managers, which improves firm performance (Levine et al., 2012; Locke et al., 2009), while ensuring that some benefits of a production systems intervention accrue to workers. Further, reputation-sensitive international buyers may reward socially compliant factories with larger orders or a higher price to protect against the adverse effects of a working conditions exposé as found by Distelhorst and Locke (2018). However, there is considerable dispute concerning the ability of social audits to improve conditions of work (Kuruvilla et al., 2019; Kuruvilla and Fisher-Daley, 2019; Locke et al., 2007; Short et al., 2015).

The challenge arising from many, though not all, of these studies is that they do not effectively test for the causal direction from innovations such as production systems or social audits to productivity and worker wellbeing. For example, Bloom and Van Reenen (2007) find that worker wellbeing and productivity are correlated, but one does not cause the other. They are jointly determined by manager quality. Levine et al. (2012) is the only study with exogenous variation in exposure to a social audit. They analyze the effect of occupational safety and health inspections conducted by the state government of California on accident rates, and costs associated with accidents and firm profits, finding that accident rates and costs associated with accidents decline after an inspection with no adverse effects on profits or long-term growth.

Below, we present findings from a social compliance field experiment. Our purpose is to establish a causal relationship between social audits and measures of worker wellbeing including wages, work hours, working conditions concerns and job satisfaction. We also provide evidence on the impact of social audits on productivity, providing a comparison of wage and productivity changes. Such a comparison establishes whether workers are sharing in benefits from social compliance and provides evidence as to whether international buyers must increase price to cover additional costs of compliance.

Better Factories Cambodia

Better Factories Cambodia (BFC) was created in 2001 jointly by the United States, Cambodia and the ILO. The role of the ILO was to serve as an independent and objective body

to evaluate the working conditions of Cambodian factories. Participation was mandatory for any firm seeking an apparel or textile export license. By participating in the program, factories agreed to receive unannounced assessments conducted by highly-trained ILO inspectors. During an assessment, enterprise advisors assess whether a factory is in compliance with national labor laws and core labor standards defined by the ILO, including limits on working hours, enforcement of minimum wages and protections for occupational safety and health (ILO, c).

The theory behind BFC is to use a combination of monitoring, advising and training to improve working conditions and firm performance. Restrictions on work hours and enforcement of minimum wage laws would be expected to reduce work hours and excess overtime and increase hourly compensation. BFC may also trigger deeper organizational changes. Constrained in their use of abusive labor management techniques, factory managers may be forced to innovate, possibly adopting workplace systems that have been shown to increase productivity and worker wellbeing in other contexts (Bloom et al., 2013; Berik and Rogers, 2010).

Firms are motivated to participate based on a belief in a business case for social compliance. According to the business case, socially compliant workplaces are thought to be both more humane and more productive. In addition to the impact of compliance on productivity, participating firms may be more successful in attracting the business of reputation-sensitive international buyers who may be willing to pay a premium to protect themselves from damage that might occur from the disclosure of abuse in their suppliers.

Methodology and Data

1.1 Experimental Design

Participants. In order to measure the impact of Better Factories Cambodia, we conducted a field experiment during the period 2015-2018. Fifty-seven factories newly entering BFC were recruited to the study. At the beginning of the study, 12 factories had never had an assessment, 41 factories had had one assessment and the remaining four had had their second annual assessment.

In each factory, a random sample of five percent of the workforce, up to a maximum of 30 workers per factory, was invited to participate in survey of working conditions. Baseline survey responses from 1,339 workers were matched to the outcome of the most recent previous BFC assessment of their factory.

Each factory's participation in the study concluded with an endline data collection. An attempt was made to resurvey those workers who participated in the baseline. However, given the high turnover characteristic of apparel factories, a random selection of additional workers completed the sample. As with the baseline, endline survey responses from 1,421 workers were matched to the outcome of the most recent previous BFC assessment that occurred before the endline.

Our dataset, thus, consists of an unbalanced panel of worker survey responses and assessment outcomes. The associated assessment is the one that had most recently preceded the survey. The survey responses, thus, capture the impact of the assessment and any program exposure that may have occurred in the months between the last assessment and the survey.

Materials. Better Factories Cambodia is compulsory for all apparel, textile and footwear factories in Cambodia seeking an export license. Once enrolled in the program, they receive an initial assessment on compliance with national and international labor standards, after which a remediation plan is developed. Progress is assessed annually with unannounced 2-day audits.

Compliance is assessed against eight compliance categories. Four cover the core labor standards (1) freedom of association and collective bargaining, (2) nondiscrimination, (3) freedom from forced labor and (4) freedom from child labor. The other four categories reflect national labor law and include occupational safety and health, working time, compensation and management systems. Restrictions on excess overtime and laws establishing a minimum wage are expected to affect hours worked and compensation.

The assessment tool consists of nearly 250 questions. For each compliance point, factories are assessed on whether they are found to be noncompliant or whether there is no evidence of noncompliance. Noncompliance is coded as a *1* and no evidence of noncompliance is coded as a *0*.

Random Assignment. While the program is designed as an annual auditing program, due to logistical constraints, factory assessments are commonly between 11 and 15 months apart. In our experimental design, we used this variation in assessment interval to achieve exogenous variation in program exposure. Our identification strategy exploits randomized differences between the months between assessments and between assessments and two survey data collections.

At the beginning of the study, participating factories were sorted into assessment cohorts depending on how many assessments the factory had already completed before entering the study. Within these cohorts, factories were randomly assigned to have their next assessment either 11 months or 15 months after their last previous assessment.

The timeline of the study is depicted in Figure 1. The study begins with a baseline data collection (D_B). Factories are then stratified by the number of assessments they had already had at the time of the baseline. Factories depicted in Figure 1 are those which had already had their first assessment, as indicated by A_1.

Within each assessment cohort, factories are randomly assigned to one of two groups. Factories in Group 1 had their second assessment 11 months after their first assessment. Factories in Group 2 had their second assessment 15 months after their first assessment. Within each group, factories are randomly assigned to one of three endline data collections: 13 months, 17 months or 23 months after the baseline.

As a consequence of random assignment to assessment and data collection, we have six factory types, as indicated in Figure 1. Factory type D_1 had their second assessment at 11 months after their first assessment and their data collection at 13 months. Factory type D_4 also had their data collection at 13 months but their assessment at 15 months. Therefore, when D_1 and D_4 were both ready for their second assessment, they had their data collection at the same time. However, D_1had the assessment just before the data collection and D_4 had the data collection just after the second assessment. Therefore, the difference between $D_1$and D_4 is the treatment effect of the second assessment.

Now compare factory types $D_1$and D_2. Both had their second assessment 11 months after their first. However, factory type D_1 had their data collection two months after their second assessment while D_2 had their data collection six months after their second assessment. Therefore, the difference between D_1 and D_2 is the program curing or decay effect of four months of post-assessment program exposure. As will be seen below, we will include time fixed effects to control for other events that might have occurred in that six-month window. Other curing or decay windows are measured by comparing D_1 to D_3, D_2 to D_3 and D_5 to D_6.

1.2 Estimating Equations

The estimating equation for measuring the impact of program exposure on outcome y, for worker, *i,* in factory, *j,* in survey time period, *t*, is given by

$$y_{ijt} = \beta_o + \beta_1 cycle1_{jt} + \beta_2 cycle2_{jt} + \beta_3 cycle3_{jt} + \beta_4 MSL_{jt} + \beta_5 X_{ijt} + \alpha_j + \beta_7 Z_t + \epsilon_{jt} + \varepsilon_{ijt}$$

The assessments are indicated by the *cycle* variables*, cycle1*, *cycle2*, and *cycle3*, which capture which assessments a factory has received and are defined as:

$cycle\ A_{jt}$= 1 (*A* =1,2,3) if factory *j* has received the A^{th} assessment by time *t*.

$cycle\ A_{jt}$= 0 (*A* = 1,2,3) otherwise.

Given the coding of the cycle variables, β_A is the marginal treatment effect of the Ath assessment. Therefore, the total effect of BFC is the sum of the treatment variable coefficients, $\beta_1 + \beta_2 + \beta_3$.

MSL_{jt} refers to the months that have elapsed between *time t* and *factory j's* most recent previous assessment. In the case of factories that have received no assessments at time t, $MSL_{jt} = 0$. The coefficient β_4 is the marginal curing or decay effect that occurs per month after an assessment.

X_{it} is a vector of worker characteristics including gender, age, education, work experience, number of times promoted and marital status.

α_j captures factory fixed effects. Factory fixed effects capture unmeasured idiosyncratic factory characteristics that may affect working conditions.

Z_t captures year fixed effects. 2015 is the base year.

$\epsilon_{jt} + \varepsilon_{ijt}$ is an error term assumed to be normally distributed but correlated across workers within a factory.

1.3 Measures

Worker Wellbeing. In order to get a broad view of worker wellbeing, we use nine worker-reported outcomes that capture both objective and subjective measures. Summary statistics are presented in Table 1.

Consider first pay and hours. Low pay and excessive working hours are often cited as the most frequent labor violations in apparel manufacturing (ILO, 2018). Participants are asked how often they are paid and how much they received the last time they were paid. *Weekly Pay USD* is calculated by taking the figure for last pay and scaling the value of their last pay check by how frequently workers report being paid (every week, every other week, twice a month, etc.) For example, a worker who reports that they are paid once a month and that they were most recently paid USD 280 has a *Weekly Pay USD* value of USD 70.

Workers who are not paid regularly are not included in pay calculations. About 3.5 percent of workers say that they do not have a regular pay period.[2] We also exclude workers who report earning more than 3 USD per hour as they are unlikely to be production workers.

[2] Over 85% of workers are paid on a monthly basis.

In order to calculate weekly hours, workers are asked which days of the week they usually work. For each day they usually work, they are then asked their usual start and stop times. Workers are also asked how often they work on their rest day, and start and stop times when they work on their rest day. Regular days worked, number of rest days worked and start and stop times are then used to construct an average workweek schedule.

Overtime Hours is calculated as weekly hours above 48, the legal regular workweek in Cambodia (Dara, 2014). *Hourly Pay USD* is the result of dividing *Weekly Pay USD* by *Weekly Hours*. The legal work week in Cambodia as of 2013 is 60 hours a week, 48 hours plus an additional 12 hours of overtime ("Guide to the Cambodian Labor…", 2013).

Public policy evaluation literature notes the limitations of using only income to measure worker wellbeing as it does not capture perceptions of quality of life or work satisfaction (Forgeard et al., 2011). Wellbeing is measured subjectively by job satisfaction, life satisfaction, concern with pay rate, concern with overtime and a belief that overtime is required to earn adequate income.

Low Wage Concern and *Overtime Concern* measure worker responses to the questions "How concerned are you about wages being too low?" [1 (*Not Concerned*) to 4 (*Very Concerned*)] and "Are you concerned about too much overtime work?" [1 (*No, I'm not concerned*) to 4 (*Yes, I'm concerned*)]. Despite monthly take-home pay surpassing the legal minimum wage, low wages remain a major concern for workers. Throughout the program, greater than 55 percent of workers say they are either v*ery concerned* or s*omewhat concerned* about low wages, and no more than 25 percent of workers in a given cycle responded that they were *not concerned*. Conversely, despite many workers working longer than the legal limit, between 58 percent and 62 percent of workers are unconcerned with overtime throughout the study.

The low concern with overtime is consistent with the finding that the majority of workers believe that they need regular overtime in order to afford basic necessities. *Regular Overtime Sufficient Income* captures the extent to which workers agree with the statement, "To have sufficient income for basic necessities, workers like me have to work overtime on a regular basis." Responses are on a scale of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). In all cycles, greater than 75 percent of workers agreed or strongly agreed with the statement.

Job and life satisfaction are measured by the questions, "How satisfied are you with your job overall?" and "How satisfied are you with your life overall?" Responses are on a scale of 1 (*Very Dissatisfied*) to 5 (*Very satisfied*). On average, total sample responses lie between

"Very satisfied" and "Somewhat satisfied." Workers tend to rate satisfaction with their life higher than with their job.[3]

Compliance. Factory engagement with BFC is measured above by exposure to the program. The cycle variables measure which assessments a factory received and the number of months that have elapsed after an assessment in which BFC engages with a factory to achieve a record of compliance. Such an approach theorizes that participation in BFC is the principal determinant of its impact.

A second approach is to consider changes in individual points of compliance. BFC assesses factories on approximately 250 individual points of compliance. In the course of an assessment, a factory is assessed on whether there is evidence of noncompliance on each compliance question. Evidence of noncompliance is coded as a one. No evidence of noncompliance is coded as a zero. The compliance treatment variables are summarized in Table 2.

Focusing analysis on individual points of compliance allows us to determine whether attention of BFC to specific lapses in compliance affects work outcomes. Implicit in this second approach is a belief that BFC has its effect in helping factories identify and remediate specific problems.

Given the emphasis on outcomes for workers related to wages and hours, we focus specifically on work and pay compliance categories. Compliance on worktime is measured by whether factories are compliant with Cambodian labor law related to annual, maternity and breastfeeding leave (*Leave*), overtime hours (*Overtime*) and regular work hours (*Regular Hours*). Regular work hours is eight hours a day, six days per week. Overtime is limited to two hours per day and must be voluntary. Factories are required to obtain permission from the labor inspectorate for overtime and work on rest days.

Compliance with pay is measured by whether a factory is compliant with Cambodian labor law concerning the method of payment, overtime wages, paid leave, minimum wages, premium pay and wage information use and deductions. Regulation of overtime wages pertain to regular overtime, night work, public holidays and work on rest days and the provision of meals during overtime. Premium pay concerns regular hours worked at night. Regulation of method of payment concerns whether the factory pays workers in the form required by law and whether the worker is paid twice per month or as otherwise agreed to. Wage information use and deductions regulates unauthorized deductions, double books and inaccurate pay slips.

[3] Significant at the $p<.001$ level.

In order to determine whether individual points of compliance rather than program participation are critical to work outcomes, we conduct two tests. First, do individual points of compliance related to pay predict pay and concerns with pay, and second, do individual points of compliance related to work hours predict work hours, overtime and concerns with overtime? If the answer to either of these questions is "yes," then we need to determine whether program participation is improving compliance specifically on points of compliance related to wages and hours.

In order to conduct the first test, we estimate the impact equation above, replacing the cycle variables with the individual points of compliance. As above, the impact equations for wages, hours and wellbeing are estimated with a panel estimator with worker level random effects and year and factory fixed effects. Standard errors are clustered by factory.

In order to conduct the second test, we estimate the impact equation, using individual points of compliance as the outcome variable. Our interest is in determining whether the cycle variables predict individual points of compliance. As the compliance points and the cycle variables are contemporaneous, the MSL variable is excluded from the equation. The impact equation is estimated with a panel estimator with year fixed effects. Standard errors are clustered by factory. We estimate with both factory fixed and random effects.

Productivity. Turning to productivity, the standard measure of productivity in the apparel sector is the efficiency rate. The industrial engineer determines how long a particular task should take a worker to complete. The time needed to complete a task can either be determined by the international standard or by the industrial engineer's own experience. Time required for a task is used to set an hourly or daily production target.

The industrial engineer then measures how many pieces an individual or line actually completes in the allotted time. The ratio of actual production to planned production is the efficiency rate. An efficiency rate of 70 percent indicates that a worker completed 70 percent of the target in the allotted time.

The efficiency rate can also be measured by how long a worker needs to complete an hourly or daily target. For example, if the worker needs 70 minutes to complete 60 minutes' worth of work, the efficiency rate is 60/70=85.7 percent.

Workers do not typically know their efficiency rate. But they do know their target and how long it takes to complete the target. To measure the efficiency rate, then, we ask workers whether they have an hourly or daily target. We then ask them how long it takes to complete the target. For workers who indicate that they have an hourly target, the efficiency rate is 60 minutes divided by the number of minutes needed to complete the hourly target. For workers

who have a daily target the efficiency rate is 10 hours divided by the number of hours needed to complete the daily target.

The percent change in the efficiency rate is a measure of the impact of BFC on productivity—unless the factory is also changing the target. It is common for factories to increase the target after observing or anticipating an increase in efficiency. In such a case, the change in productivity is the sum of the percent changes in the efficiency rate and the target.

Thus, we estimate the impact equation taking the efficiency rate or the target as the outcome variable. Given the relatively small number of observations, the panel identifier is the factory rather than the worker, though, the equation controls for individual worker characteristics. Random effects are assumed and standard errors are clustered at the factory level.

Empirical Results

2.1 Pay and Hours

We begin by considering the impact of BFC on weekly pay, weekly hours, overtime hours and hourly pay. Regression results are reported in Table 3. Columns 1 and 2 report results for weekly pay and ln weekly pay. The estimated coefficients of the assessment cycle variables are all positive but not statistically different from zero. However, weekly hours (column 3) and overtime hours (column 4) both decline by about 5.8 hours after the first assessment. Though it should be noted that hours tend to creep back up by about 0.33 hours each month in the months after the assessment. Hourly pay, reported in column 5, rises by USD 0.37, or about 41.1 percent on a base of USD 0.91.

The treatment impact on work hours is clearly evident as depicted in Figure 2. Figure 2 presents a histogram of work hours over 48 by assessment cycle. Before the first assessment, the modal workweek is 66 hours, well above the maximum 60 hours of regular and overtime work allowable under Cambodian law. After the first assessment, the distribution becomes bimodal, with peaks at 54 and 66 hours. That is, half of the workers in the sample have a legal workweek after the first assessment. After the second assessment, the mode shifts to 54 weekly hours, though there continues to be a significant number of workers working a 66-hour week. Some decay occurs after the third assessment, with the distribution once again becoming bi-modal.

Findings of the impact of BFC on work hours and pay rate are confirmed by worker assessments of working conditions, as reported in Table 4. Workers were asked whether they

think that they need regular overtime, whether they are concerned about low wages and whether they are concerned with excess overtime.

We find that BFC reduces the need for regular overtime as reported in column (1) of Table 4. Workers' perceived need for regular overtime declines in the months after each assessment (β=-0.135) and particularly after the third assessment (β=-0.710). Low wage concern also continues to decline in the months after an assessment (β=-0.0726), as reported in column 2. We also measure a very large reduction in concern with overtime, as reported in column 3. The treatment effect after the second assessment is β=-1.625 and the reduction in concern cures in the months after each assessment (β=-0.0851).

We do not measure an increase in job satisfaction (column 4) but workers do report an increase in life satisfaction associated with the BFC treatment. As can be seen in column 5, there is a positive treatment effect in the months after an assessment (β=0.0866) as well as just after the third assessment (β=0.357).

2.2 Program Participation and Individual Points of Compliance

We next consider whether treatment is driven by participation in the program or whether assessment on specific compliance points encourages firms to change their wage and hours practices. We saw above that program participation reduces work hours and increases hourly pay. Are these improvements associated with new compliance on points related to wages and hours or simply the result of participation in the program?

We first consider whether compliance on individual points related to wages and hours predicts pay and hours. Results are reported in Table 5. We find that two compliance points related to pay predict pay. Firms that are noncompliant on overtime wages pay USD 33.95 less per week than firms for which there is no evidence of noncompliance. Firms that are noncompliant on minimum wages pay USD 148.5 less per week than factories for which there is no evidence of noncompliance. Thus, compliance on individual points related to pay is associated with higher pay. In contrast, we did not find any compliance points related to work time that predicted work hours.

The question though is whether improvements in individual compliance points is associated with program exposure. The answer to that question is "no." There does not appear to be a program exposure treatment effect on individual compliance points, as reported in Table 6. Generally, there is a decline in noncompliance with overtime wages (β=-0.0708) after the first assessment but the treatment effect is only significant at a p-value of 0.15. Such an

outcome indicates that working conditions improve following a general engagement with the factory rather than following some detected point of noncompliance.

3.3 Productivity

From a business perspective, a key question is whether there is a productivity gain associated with BFC that might offset the rise in labor costs. Results of the treatment effect on the efficiency rate and production target are reported in Table 7.

Consider first the impact on the efficiency rate as reported in column (1). We find that the efficiency rate rises by 9.8 percent after the first assessment and another 11.0 percent after the second assessment. The mean efficiency rate is 97.2 percent. Therefore, the cumulative effect of BFC on the efficiency rate is 21.4 percent. When we regress treatment on the natural log of the efficiency rate, we find a treatment effect after the second assessment of 15.6 percent. These two numbers indicate that individual efficiency increases by between 15.6 percent and 21.4 percent, which is significantly less than the 41.1 percent increase in the per-hour cost of labor.

Recall, though, that the efficiency rate accurately measures the impact on productivity only if the production quota is unchanged. It is not uncommon for factories, anticipating a productivity gain from a treatment, to increase the productivity target for workers. The impact of the BFC treatment on the target is reported in column 3. Notice that we find that factories are increasing the target after engagement with BFC. Firms increase the target by 44.8 percent after the first assessment and an additional 32.4 percent after the second. This is likely an anticipation effect, as the target falls by 2.9 percent each month in the months after the assessment.

After a year, the factory may have retreated from its original increase in the target, with a small increase of about 10 percent in the target after the first assessment and no change after the second. Thus, our estimated productivity gain is between 25.6 percent and 31.4 percent.

A couple of additional observations are worth noting about the above results. First, if, prior to BFC, workers were being exploited in the sense that they were paid below their marginal value product, these results indicate that BFC helped reduce exploitation by narrowing the gap between hourly compensation and the marginal product of labor. The fact that the increase in hourly pay is larger than the increase in productivity implies that BFC was effective is inducing factories to share the productivity gains with workers.

A critical question, though, is whether the results have revealed a business case for social compliance. The answer to that question is “no.” The fact that the efficiency rate is rising

implies that the marginal product capital, as well as labor, is rising, which has a positive effect on profits. However, the fact that wages are rising faster than productivity necessarily implies that unit labor costs are rising, which has a negative effect on profits.

In order to guarantee a business case for social compliance, a factory's main customers would have to reward a factory with higher price and/or larger orders to compensate for increased labor costs. Distelhorst and McGahan (2018) and Distelhorst and Locke (2018) find that some international buyers do compensate compliant factories. However, Amengual et al. (2019) report that in the long run purchase orders do not improve with upgraded labor practices. In fact, orders are more likely to rise in factories with declining labor standards.

3.4 Manager Perceptions of the Business Case for Social Compliance

Our results indicate, then, that social compliance improves conditions of work and worker productivity. The estimated impact on hourly compensation is larger than the increase in productivity, indicating that labor's cost share is rising. As a consequence, the impact of social compliance on a firm is ambiguous. The final question we would like to turn to is how the results from worker reports on pay and productivity compare to manager beliefs about the impact of social compliance on their organizations.

Prior to the study, managers were surveyed on their beliefs concerning the relationship between working conditions and firm performance. We asked whether they believed there is a relationship between working conditions and productivity and whether there was a relationship between paying workers as promised and profits. Response options were 1 (*Negative Relationship*), 2 (*Positive Relationship*) and 3 (*No Relationship*). Results are reported in Table 8.

Consistent with the statistical analysis, managers believe that there is a positive relationship between working conditions and productivity. Fully 75 percent responded that more comfortable working conditions are linked to higher productivity, with the remaining 25 percent evenly divided between believing that comfortable working conditions are associated with lower productivity or have no effect on productivity.

However, managers were less likely to believe that humane conditions increase profits. Fully 72 percent responded that there is no relationship between paying workers as promised and profits. The rest of the sample is split with 18 percent believing that paying workers as promised lowers profits and the remaining 10 percent believing it raises profits.

Manager beliefs, then, reflect evidence from the statistical analysis. Social compliance increases productivity but cannot reliably increase profits. An increase in profits may depend on the willingness of international buyers to compensate firms for social compliance.

Conclusion

This paper presents findings from a quasi-randomized controlled trial of the impact of Better Factories Cambodia (BFC) on worker wellbeing and worker productivity. BFC is a factory auditing and capacity-building program that monitors factory compliance with ILO core labor standards and Cambodian labor law.

The study began with a baseline survey of worker reports of wages, hours, indicators of working conditions and worker wellbeing and indicators of individual productivity. Factories were then stratified based on their most recent previous assessment. Within each stratum, factories were randomly assigned to one of two treatment groups. Factories in Group 1 had their next scheduled assessment one month early. Factories in Group 2 had their next assessment delayed by three months. Within each cohort, factories were then randomly assigned to one of four intervals between the baseline and endline data collections. As a consequence of the data collection protocol, our data set consists of pairs of factories who were both due for an assessment but one had their data collection just before the assessment, and the other just after the assessment. We also have pairs of factories who had assessments at the same time but one had their data collection two months after the assessment, and the other had their data collection either six or twelve months after an assessment. Random assignment to program exposure allows us to measure the impact of a single audit as well as curing or decay of the program treatment effect in the months after an assessment.

We find that treatment does not have a statistically significant effect on weekly pay. However, weekly hours decline by 5.8. All of the decline in hours is attributable to a decline in overtime. Pay per hour rises by USD 0.374 on a base of 0.91 USD, or 41.1 percent. In the months after an assessment and particularly after the third assessment, workers were less likely to believe that they must regularly work overtime to earn sufficient income. We also detected a decline in concern with low wages and overtime and an increase in life satisfaction.

We then turned to the question of whether compliance with individual assessment points related to pay and hours drives improvement, or whether the effect is attributable simply to participation in the program. Weekly pay is higher in factories that are compliant on overtime and minimum wage law. However, the treatment effect on individual points of compliance is weak, significant only at the 0.15 and 0.20 levels of significance. We do not detect

a treatment effect on any of the points of compliance related to work hours. Taken together, improvement in wages and hours arise due to participation in the program, rather than new compliance on points related to pay or hours.

We then turn to the impact on worker productivity. Productivity is measured by the efficiency rate. The efficiency rate, a standard measure of productivity in the apparel sector, is the ratio of actual to planned production. The efficiency rate rises by 9.8 percentage points after the first assessment and 11.0 percentage points after the second assessment, for a total of 20.8 percentage points on a base of 97.2, or 21.4 percent. Using the log of the efficiency as the dependent variable, we find that productivity rises by 15.6 percent after the second assessment.

However, the efficiency rate underestimates the productivity gain if an anticipated or realized productivity gain leads the factory to increase planned production. We do, in fact, find that the factory increases the production target by 44.8 percent after the first assessment and another 32.4 percent after the second assessment. This is likely an anticipation effect, as the target falls by 2.9 percent each month in the months after the assessment. Thus, after a year, the factory may have retreated from its original increase in the target, with a small increase in the target of about 10 percent after the first assessment and no change after the second.

Adding the treatment effect on the efficiency rate to the treatment effect on the target yields a total productivity gain between 25.6 and 31.4 percent. By comparison, the treatment effect on hourly pay is 41.1 percent. Such an outcome indicates that worker pay rose by considerably more than the increase in productivity associated with BFC participation, implying that BFC forced factories to share the productivity gains with workers.

An overall assessment of the impact on profits depends on the other compliance costs incurred by a factory and labor's cost share. Participating factories may have also been rewarded for participation in the program by their reputation-sensitive customers with larger orders or higher unit price, is indicated by the literature. A definitive statement concerning the impact of social compliance on costs and profits requires access to detailed firm level cost and revenue data.

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Figure 1 Identification Strategy

Figure 2 Weekly Working Hours over 48 Distribution

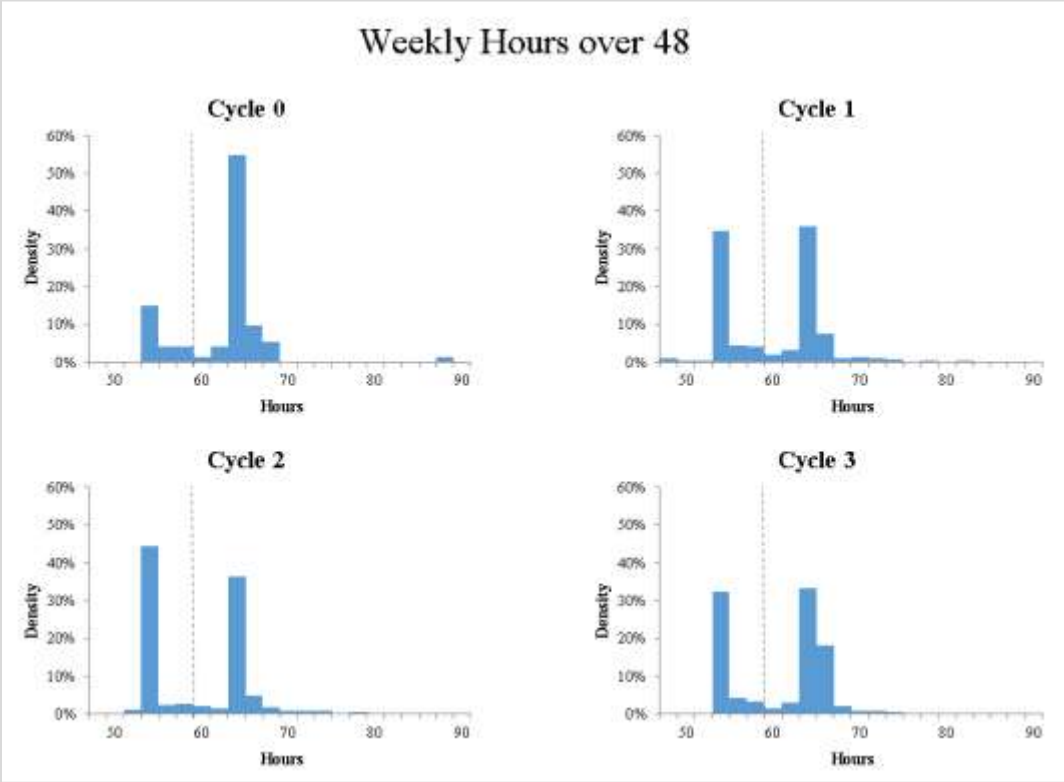

Table 1 Summary Statistics Worker Variables

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Female	650	0.826	0.379	0	1
Education	636	3.354	1.078	1	6
Age	650	3.071	1.384	1	6
Experience	644	6.669	2.806	1	11
Low Wages Concern	642	2.768	1.119	1	4
Divorced Widowed Separated	643	0.0731	0.260	0	1
Currently Married	643	0.569	0.496	0	1
Regular Overtime Sufficient Income	621	3.634	0.969	1	5
Job Satisfaction	640	4.153	1.061	1	5
Life Satisfaction	636	4.270	1.027	1	5
Overtime Concern	636	1.619	0.853	1	4
Promoted once	588	0.0867	0.282	0	1
Promoted two or more times	588	0.0425	0.202	0	1
Weekly Pay USD	659	53.80	18.70	5.952	190.5
Weekly Hours	659	59.81	6.867	36	86.50
Hourly Pay USD	659	0.909	0.329	0.105	2.976
Overtime Hours	659	12.03	6.353	0	38.50
Efficiency Rate	259	0.972	0.213	0.375	2
ln Production Target	320	4.295	0.758	2.708	6.802
Number of uniqueID	518	518	518	518	518

Table 2 Summary Statistics Factory Variables

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
cycle1	114	0.895	0.308	0	1
cycle2	114	0.456	0.500	0	1
cycle3	114	0.123	0.330	0	1
Months since last assessment	114	5.439	4.804	0	28
y_2016	114	0.474	0.502	0	1
y_2017	114	0.351	0.479	0	1
y_2018	114	0.149	0.358	0	1
Leave	108	0.131	0.212	0	0.800
Method of Payment	108	0.0556	0.158	0	0.500
Overtime	108	0.286	0.230	0	1
Overtime Wages	108	0.125	0.195	0	0.750
Paid Leave	108	0.161	0.170	0	0.714
Regular Hours	108	0.0556	0.148	0	1
Wage Info Use and Deduction	108	0.216	0.255	0	1
Min Wage	108	0.0671	0.111	0	0.250
Premium Pay	108	0.0185	0.135	0	1
Number of factorycode	54	54	54	54	54

Table 3 Impact of Program Exposure on Wages and Hours

VARIABLES	(1) Weekly Pay USD	(2) ln Weekly Pay USD	(3) Weekly Hours	(4) Overtime Hours	(5) Hourly Pay USD
Weekly Hours	0.0744	0.00257			
	(0.136)	(0.00355)			
cycle1	18.02	0.181	-5.833***	-5.759***	0.374*
	(12.65)	(0.142)	(2.227)	(2.161)	(0.212)
cycle2	6.089	0.0772	-0.988	-0.524	0.0925
	(18.71)	(0.208)	(2.871)	(2.829)	(0.301)
cycle3	3.276	0.00499	0.761	0.635	0.0575
	(7.107)	(0.106)	(1.421)	(1.380)	(0.123)
Months since last assessment	0.167	0.00231	0.322*	0.343*	0.000311
	(0.734)	(0.0116)	(0.191)	(0.182)	(0.0127)
Constant	16.27	3.326***	67.43***	19.30***	0.274
	(14.89)	(0.286)	(2.019)	(1.960)	(0.235)
Observations	550	550	550	550	550
Number of uniqueID	518	518	518	518	518

Worker panel, random effects estimator, year fixed effects, factory fixed effects, demographic controls

Robust standard errors in parentheses

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

Table 4 Treatment Effects on Worker Subjective Assessments

VARIABLES	(1) Regular overtime sufficient income	(2) Low Wages Concern	(3) Overtime concern	(4) Job Satisfaction	(5) Life Satisfaction
cycle1	0.0103	0.626	0.118	-0.265	-0.575
	(0.223)	(0.632)	(0.271)	(0.431)	(0.510)
cycle2	0.564	-0.283	-1.625***	-0.576	0.0361
	(0.412)	(0.870)	(0.335)	(0.760)	(0.442)
cycle3	-0.710**	-0.125	-0.00980	0.0859	0.357**
	(0.284)	(0.241)	(0.155)	(0.315)	(0.156)
Months since last assessment	-0.135***	-0.0726**	-0.0851***	0.0196	0.0866***
	(0.0479)	(0.0334)	(0.0256)	(0.0430)	(0.0319)
Constant	4.360***	1.524**	1.485***	4.296***	4.787***
	(0.534)	(0.606)	(0.339)	(0.531)	(0.565)
Observations	523	541	535	539	536
Number of uniqueID	494	510	504	508	504

Worker panel, random effects estimator, year fixed effects, factory fixed effects, demographic controls

Robust standard errors in parentheses

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

Table 5 Compliance Points and Wages and Hours

VARIABLES	(1) Weekly_Pay_USD	(2) ln_Weekly_Pay_USD	(3) Hourly_Pay_USD	(4) ln_Hourly_Pay_USD
Method_of_Payment	9.637	0.0669	0.115	0.0791
	(12.15)	(0.0945)	(0.243)	(0.153)
Overtime_Wages	-33.95*	-0.684**	-0.457	-0.611**
	(17.98)	(0.306)	(0.312)	(0.308)
Min_Wage	-148.5***	-0.976**	-3.491***	-1.329**
	(53.02)	(0.406)	(1.127)	(0.570)
Constant	38.87***	3.654***	0.623***	-0.480***
	(4.750)	(0.111)	(0.0782)	(0.0985)
Worker	RE	RE	RE	RE
Factory	FE	FE	FE	FE
Observations	523	523	523	523
Number of uniqueID	492	492	492	492

Worker panel, random effects estimator, year fixed effects, factory fixed effects, demographic controls
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 Treatment Effects on Compliance Points

VARIABLES	(1) Method of Payment	(2) Method of Payment	(3) Overtime Wages	(4) Overtime Wages	(5) Min Wage	(6) Min Wage
cycle1	-0.0614	-0.0934	-0.0708++	-0.0363	-0.0165	-0.0510+
	(0.0564)	(0.106)	(0.0492)	(0.0709)	(0.0326)	(0.0368)
cycle2	-0.00336	-0.0652	-0.00847	0.000582	0.00911	-0.0215
	(0.0457)	(0.0902)	(0.0514)	(0.0655)	(0.0208)	(0.0259)
cycle3	-0.0490	-0.0622	0.0207	0.0324	0.000989	-0.0250+
	(0.0892)	(0.0922)	(0.0739)	(0.0677)	(0.0143)	(0.0177)
Factory Effects	RE	FE	RE	FE	RE	FE
Observations	108	108	108	108	108	108
R-squared		0.072		0.058		0.089
Number of factorycode	54	54	54	54	54	54

Factory Panel, Random Effects and Fixed Effects Estimators, Year Fixed Effects
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, ++ p<0.15, + p<0.20

Table 7 Treatment Effects on Efficiency and Production Target

VARIABLES	(1) Efficiency Rate	(2) ln Efficiency Rate	(3) ln Target
cycle1	0.0978*	0.0913	0.448***
	(0.0555)	(0.0755)	(0.151)
cycle2	0.110**	0.156**	0.324**
	(0.0511)	(0.0736)	(0.147)
cycle3	0.0209	-0.00506	-0.0377
	(0.0762)	(0.0792)	(0.146)
Months since last assessment	-0.000411	0.00209	-0.0288**
	(0.00402)	(0.00475)	(0.0119)
Constant	0.915***	-0.0522	4.253***
	(0.0956)	(0.133)	(0.244)
Observations	235	235	289
Number of factorycode	48	48	51

Factory Panel, random effects estimator, demographic controls
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 Human Resource Manager Beliefs Cambodia (Percent)

Do you believe that there is a relationship between performance-based pay for supervisors and workers and supervisors' treatment of workers?	(Percent)
Yes, performance-based pay for supervisors and workers is linked to worse treatment of workers.	3
Yes, performance-based pay for supervisors and workers is linked to better treatment of workers.	58
No, there's no relationship.	39
Total	100
Do you believe that there is a relationship between productivity and working conditions in this factory?	(Percent)
Yes, more comfortable working conditions are linked to lower productivity.	13
Yes, more comfortable working conditions are linked to higher productivity.	75
No, there's no relationship.	12
Total	100

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