Are sweatshops profit-maximizing?

Answer: No. Evidence from Better Work Vietnam

17
DISCUSSION PAPER

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ABSTRACT

Estimating a translog profit function for Vietnamese apparel factories, we jointly test for managerial quality heterogeneity and whether higher quality managers choose more humane working conditions and earn higher profits. Working conditions are measured from the perspective of workers, based on a survey of working conditions, the perspective of management, based on a survey of HR managers, and compliance assessments of Better Work Vietnam. Given the limited number of observations of factory level financial data, factor analysis is used to reduce the number of working conditions variables to three factors. Working conditions measured from the perspective of workers is positively correlated with the ratio of revenue to total cost. The elasticity of the price-cost margin with respect to each of the three working conditions factors is positive and statistically significant. When working conditions are measured from the perspective of compliance assessments, two of the three factors positively predict the profit margin. However, when conditions are measured from the perspective of the HR manager, only one of the factors positively predicts firm profits. The findings are consistent with the hypothesis that attempted improvements in working conditions increase the profit margin only to the extent that those improvements are perceived by employees of the firm.

We then turn to understand the determinants of the positive relationship between profits and compliance. Compliance predicts higher work effort as measured by time to production target. Compliant firms also pay higher wages. However, the relationship between compliance and supply chain position is undetermined. Some working conditions predict higher supply chain position while others predict lower supply chain position.

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1. INTRODUCTION

Harsh conditions of work in the early stages of industrialization have generated a long-running debate concerning the social value of workplaces commonly referred to as 'sweatshops.' Proponents argue that harsh conditions of work in developing country firms are the inevitable consequence of the fine division of labor common in the early stages of industrialization and worker preferences over the tradeoff between pecuniary and nonpecuniary compensation.[1] In contrast, Sable et al. (2000) argue that sweatshops are the product of deficient managerial capital common in developing countries. Factory managers, who lack knowledge of human resource management innovations that emphasize positive motivational techniques such as incentive pay, may resort to verbal and physical abuse to elicit work effort.

Indeed, Melitz (2003) and Verhoogen (2008) attribute differences in firm performance to cross firm heterogeneity in the skill set of managers. Direct evidence is provided by Bloom et al. (2012) that factory managers in developing countries lack managerial capital that can impact productivity. Based on experimental evidence from textile firms in Delhi, a deficit in managerial capital related to the most basic organizational tasks such as inventory management was found to lower firm profits.

However, in the management of labor, innovations that increase productivity do not necessarily translate into increased profits. Harsh treatment of workers, particularly young women of limited literacy and market experience, may allow a firm to set compensation below the marginal value product of labor, thereby extracting monopsonistic rents (Freeman and Kleiner, 2005). As a consequence, there is a potential tradeoff between the efficiency benefits that arise when a factory manager employs high powered pay incentives and the loss of monopsonistic rents when a firm eliminates negative, nonpecuniary motivational techniques characteristic of sweatshops. That is, factory managers who

[1] For example, Sachs (2005).

clearly link compensation and work effort undermine attempts to extract monopsony rents through the use of abuse and deceptive pay practices.

The positive impact of high powered pay incentives on productivity is well documented. Bandiera et al. (2007) use an experimental methodology to investigate the impact of a switch to managerial performance pay on labor force quality and productivity in a fruit farm in the United Kingdom. The authors report that the introduction of managerial performance pay led to a 21 percent increase in average productivity of the pickers and to a 38 percent increase in the cross-worker dispersion of productivity.

A positive productivity impact of a broader array of HR innovations including incentive pay, multi-dimensional pay, teamwork, communication and problem-solving have also been found to increase productivity and profits. Ichniowski et al. (1995), using an empirical technique they call *Insider Econometrics*, examine the effect that introducing HR innovations had on productivity and profitability in the US steel industry. Production lines that adopted the most innovative and cooperative HR practices experienced a seven percent increase in productivity as compared to lines that adopted the least innovative and uncooperative practices. Moreover, the authors estimate that a one percent increase in productivity leads to a $27,900 increase in profits.

Evidence for a positive connection between incentive pay and productivity, based on an experimental approach provided by Bandiera et al. (2007), is generally considered definitive. However the use of *Insider Econometrics* by Ichniowski et al. (1996) to identify a link from HR innovations to profitability has been challenged. An *increase* in productivity may be accompanied by a *decrease* in profits when the monopsony losses are larger than the efficiency gains of closely linking pay and work effort.

Harrison and Scorse (2010) find a significant increase in wage *and* employment for foreign-owned exporting apparel, textile and footwear firms in Indonesia as a result of an anti-sweatshop

campaign and increases in the statutory minimum wage between 1992 and 1996. However, profits of firms differentially impacted by the minimum wage legislation and anti-sweatshop agitation declined. The combination of a rise in employment and a decline in firm profits following an increase in the minimum wage is a critical indicator of the presence of monopsonistic exploitation. Similarly, Freeman and Kleiner (2005) report that productivity in a US shoe factory *fell* by six percent while profitability *increased* by 25 percent as a result of a switch from piece rate to hourly rate.

Using a novel data set to estimate a profit function, we test three hypotheses central to the question of the profitability of labor management innovations in developing country firms. Analyzing data on labor management practices and performance of Vietnamese apparel firms, we jointly test for (1) the presence of cross-firm HR managerial heterogeneity and (2) the conjecture that firms with inferior managerial capital engage in harsher labor management practices and deceptive pay practices. Evidence that sweatshop-like conditions are the consequence of a deficit in labor management capital is provided if firms that choose harsh and deceptive labor management practices are also less profitable. We then turn to isolate the causal link between working conditions and profits by analyzing the contribution of labor practices to productivity, wages and supply chain position.

The data used in this analysis is based on factory manager and workers surveys on HR systems, working conditions and firm performance undertaken by Better Work Vietnam between January 2010 and December 2013. The empirical results provide evidence of cross-firm heterogeneity in managerial quality and that higher quality managers choose more humane labor management practices and manage more profitable firms.

The theoretical foundation for the empirical analysis is presented in Section 2. The data is described in Section 3 and results are presented in Section 4. Conclusions and directions for further research are detailed in Section 5.

2. THEORETICAL MODEL

We begin with a simple model of firm behavior as it relates to the choice of HR system. Firms are assumed to be price-takers in the goods market. However, they may have some market power in the factors markets. The firm, then, maximizes profits:

$$\prod = pf\left[e(g(Z))\right] - W(g(Z)) - P_Z Z \qquad (1)$$

where

Z is the vector of the firm's actions relating to the choice of HR system,

g is the transmission function relating the firm's actions to improve working conditions as perceived by the workers,

e is labor force work effort,

f is an unknown production function

W is wage bill for the firm and

$P_Z Z$ is the total cost of implementing working conditions *Z*.

Each working condition action *Z* is taken to be either pecuniary or nonpecuniary. If the action is pecuniary, Z increases the wage bill, implying that *W'* > 0, but is costless for the firm to implement, implying that P_Z = 0. For example, clarifying the relationship between work effort and compensation may limit the deceptive pay practices in which the firm can engage. Thus, the firm's wage bill increases, implying that *W'* is positive.

Alternatively, an action *Z* may involve providing a non-pecuniary benefit such as a workplace amenity. In such cases, workers may accept a lower wage but the factory must incur cost P_Z Z > 0 to provide the amenity. As a consequence, the wage bill may shrink but firm expenditure on amenities may increase, implying that *W'* < 0 and $P_Z Z$ > 0.

As usual, *f'* > 0. The production function is increasing in labor force effort. Labor force effort itself increases with improved working conditions, implying that *e'* > 0. However, an employee's

perception of working conditions depends on the effectiveness with which the firm implements their HR system. *g'* = 1 only if workers fully perceive the factory's attempt to improve working conditions.

The firm's manager is assumed to choose *Z* to maximize profits given beliefs about the impact of any action *Z* on the production process. That is, the firm's manager attempts to set

$$\frac{d\prod_e}{dZ} = pf_e'e_e'g' - w_e'g' - P_Z = 0 \tag{2}$$

where the subscript *e* indicates the firm's expectation of the derivative. The term $pf_e'e_e'g'$ is the efficiency benefit of increasing the power of incentives while $w_e'g'$ is the negative impact of increased worker agency that might accompany improved working conditions.

It is assumed that managers vary in their knowledge of the profit-maximizing set of HR practices. Cross firm heterogeneity depends on the manager's understanding of how to optimally organize the work place. However, if manager perceptions of the derivatives *f'*, *e'*, *g'* and *w'* are incorrect, then in reality,

$$\left| pf'e'g' - w'g' - P_Z \right| \geq 0 . \tag{3}$$

In such cases, the firm's choice of *Z* may not maximize profits. By comparison, for firms with perfect knowledge of *f'*, *e'*, *g'* and *w'*, equation (3) holds with strict equality.

In our framework, firms can make one of two possible errors. Firms can choose to do too little of action *Z*. Doing more *Z* would increase profits. If firms undervalue *Z*, $\frac{d\prod}{dZ} > 0$ when evaluated at the firm's current choice of *Z*. Firms can also choose too much *Z*. If firms overvalue *Z*, then $pf'e'g' - w'g' - P_Z < 0,$ implying that $\frac{d\prod}{dZ} < 0$ when evaluated at the firm's choice of *Z*. Our first testable hypothesis, then, follows directly.

Hypothesis 1: If there is cross-firm heterogeneity in information concerning the technology of working conditions and low-information managers choose too little *Z,* then $\frac{d\prod}{dZ} > 0.$

If, in fact, firms systematically choose too little *Z*, it is interesting to consider the cause of the error in calculating the first order condition. It is possible that the firm under appreciates the impact of *Z* on effort, *e*. However, it is also possible that there is an error in implementing the improvement in working conditions.

Consider how any action *Z* is perceived by workers in a firm. Let $Z_W = g(Z)$ be the workers' perception of an action *Z* taken by the firm's manager. The impact on profits of changing *Z*, as given by equation (2), will only coincide with the true impact on profits of a change in *Z* if $g' = 1$. That is, the worker perceives the same change in *Z* as the manager. The impact on profits of a change perceived by the workers is given by:

$$\frac{d\prod}{dZ_w} = pf'e' - w' - P_Z \qquad (3)$$

If $g'<1$ then $\frac{d\prod}{dZ} < \frac{d\prod}{dZ_W}$. In fact, if g' is close to zero, it is possible that $\frac{d\prod}{dZ} < 0$ and $\frac{d\prod}{dZ_W} > 0$. In other words, there may be improvements in *Z* that would increase profits but are perceived by the manager as being profit-reducing because of a failure of implementation, which brings us to our second hypothesis.

Hypothesis 2: If firms choose too little *Z* because changes in *Z* are not effectively implemented, then:

$$\frac{d\prod}{dZ_W} \geq \frac{d\prod}{dZ}.$$

That is, a one unit change in *Z* as perceived by the worker increases profits more than a one unit change in *Z* as perceived by the manager.

Hypotheses 1 and 2 are tested by estimating a translog profit function which is conditioned on choices made by the firm's manager. The purpose of conditioning profits on the HR system of the factory is to detect cross-firm variation in profits that is unrelated to output and input prices. The translog is a flexible functional form that does not impose restrictions on the profit function. As a consequence, profits can be estimated without an *ex-ante* knowledge of the structure of the production function.[2] A generalized function that expresses profits Π as a function of output prices p_i and factor prices w_j, conditional on the firm manager's information set I_k, can be written as:[3]

$$\prod(p_i, w_j; I_k) \tag{4}$$

Inferences about the information set can be made by observing the choice of HR system Z that is made by the manager. The generalized profit function is approximated by using the second order Taylor series expansion of equation (4), linearizing centered around 0 and simplified by applying Young's theorem. Taking the log of both sides, replacing the partial derivatives with parameters and placing the remainder in the error terms generates the translog profit function:[4]

$$\begin{aligned}\ln \Pi_k = \alpha_0 + \sum_i \sigma_i \ln(p_i) + \sum_j \beta_j \ln(w_j) + \lambda_k \ln(I_k) + \frac{1}{2}\{\sum_i \sum_m \gamma_{im} \ln(p_i)\ln(p_m) + \\ \sum_j \sum_n \tau_{jn} \ln(w_j)\ln(w_n)\} + \sum_i \psi_{ik} \ln(p_i)\ln(I_k) + \\ \sum_i \sum_j \upsilon_{ij} \ln(p_i)\ln(w_j) + \sum_j \kappa_{jk} \ln(w_j)\ln(I_k) + \varepsilon\end{aligned} \tag{5}$$

Terms generated from expansion of the translog profit function are simplified to accommodate specificities of the dataset:

- Output price p is not disaggregated at the product type level. An average price per piece of garment is calculated and assumed not to vary within firm. Thus, p = revenue/output.

[2] A similar argument is used by Bitzan (1997) who estimates a translog cost function for the railway industry.
[3] The notation used here follows Bitzan (1997).
[4] See Veeraragoo (2012) for details.

- Wages vary across employee positions but this is not reflected in the regression equations as the objective of this research is to determine whether exploitation of workers, regardless of their position within the firm, is profitable.

Hence, the regression equation is of the form:

$$\ln \prod_k = \alpha_0 + \sigma \ln(p) + \beta \ln(w) + \lambda_k \ln(I_k) + \frac{1}{2}\gamma[\ln(p)]^2 + \frac{1}{2}\tau[\ln(w)]^2 + \psi_k \ln(p)\ln(I_k) + \upsilon \ln(p)\ln(w) + \mu_k \ln(w) + X + \varepsilon \quad (6)$$

where *X* is a vector of firm controls including the type of product being manufactured, the reputation sensitivity of firm's customer, the position of the firm along the supply chain and a measure of economies of scale.

The choice of human resource management system *Z* is the realization of the information set I_k of the firm's manager. *Z* is measured along *n* dimensions, $Z_1 - Z_n$. The manner in which workers perceive the actions of the firm's manager is captured by the variables ZW_1 to ZW_n. Estimating the information set *I* by the HR variables, equation (6) then becomes:

$$\ln \prod = \alpha_0 + \sigma \ln(p) + \beta \ln(w) + \sum_{i=1}^{n} \lambda_i \ln(Z_i) + \frac{1}{2}\gamma[\ln(p)]^2 + \frac{1}{2}\tau[\ln(w)]^2 + \frac{1}{2}[\sum_{i=1}^{n}[\sum_{j=1}^{n} \phi_{ij} \ln(Z_i)\ln(Z_j)] + \psi_i \ln(p)\ln(Z_i) + \mu_i \ln(Z_i)\ln(w) + \upsilon \ln(p)\ln(w)] + X + \varepsilon \quad (7)$$

The hypotheses are tested for each of the three HR components. The linear combination of parameters which makes up Hypothesis 1 for HR_1 is presented below. This can easily be extended to HR_2 and HR_3:

$$Hypothesis\ 1: \frac{d\prod}{dZ_1} > 0$$

$$\Rightarrow \lambda_1 + \frac{1}{2}[\phi_{12} \ln(\overline{Z}_2) + .. + \phi_{1n} \ln(\overline{Z}_n)] + \psi_1 \ln(\overline{p}) + \mu_1 \ln(\overline{w}) > 0$$

where the overbar on variables *Z*, *p* and *w* indicates that the mean value of those variables is used in the hypothesis test.

Equation (7) can also be used to estimate the impact of implementing new HR system on profits, as perceived by the workers *ZW*.[5] Hypothesis 2, expressed in terms of its parameters, is given below for ZW_1:

$$Hypothesis\ \ 2: \frac{d\prod}{dZ_W} \geq \frac{d\prod}{dZ}$$

$$\Rightarrow \lambda_1^w + \frac{1}{2}[\phi_{12}^w \ln(\overline{ZW_2}) + ... + \phi_{1n}^w \ln(\overline{ZW_n})] + \psi_1^w \ln(\overline{p}) + \mu_1^w \ln(\overline{w}) \geq$$

$$\lambda_1 + \frac{1}{2}[\phi_{12} \ln(\overline{Z}_2) + ... + \phi_{1n} \ln(\overline{Z}_n)] + \psi_1 \ln(\overline{p}) + \mu_1 \ln(\overline{w})$$

Wages, Productivity and Supply Chain Position

The translog profit function presents us with a black box when considering the role that working conditions play in determining profits. According to equation (1), working conditions can alter wages, work effort and/or price, as reflected by the firm's supply chain position. In order to better understand the role that working conditions play, we can estimate the effort, wage and supply chain functions incorporated into equation (1).

Effort:

$$e = e(g(Z), D, I) \tag{8}$$

Effort can be measured by the time necessary to complete a production target and is assumed to be a function of working conditions, quality of human capital, other demographic characteristics and pay incentives (I). That is

$$e_{kl} = \gamma_o + \gamma_1 Z_l + \gamma_2 K_{kl} + \gamma_3 D_{kl} + \gamma_4 I_{kl} \tag{8'}$$

where e_{kl}, K_{kl}, D_{kl} and I_{kl} are effort, human capital, demographic characteristics and pay incentives for worker *k* in factory *l*.

Wages:

[5] The superscript *w* on the parameters and the use of variables *ZW* instead of *Z* are the only differences between the estimation equation from the perspective of management and that of the workers.

$$W = \text{w(g(Z), H,K,D)} \quad (9)$$

Similarly, weekly pay can be taken as a function of work hours, capital and demographic characteristics, yielding

$$W_{kl} = \delta_o + \delta_1 Z_l + \delta_2 K_{kl} + \delta_3 D_{kl} + \delta_4 H_{kl} \quad (9')$$

Supply chain position:

$$P_Z = P(Z, e, D) \quad (10)$$

Supply chain position is a function of working conditions, productivity and human capital which can be estimated as

$$P_l = \rho_o + \rho_1 Z_l + \rho_2 e_l + \rho_3 D_l \quad (10')$$

3. DATA

When a factory enters the Better Work Program, Better Work Enterprise Advisors visit the factory to collect information about the factory's compliance with labor standards and working conditions before implementing any other program elements or training. At some point after enrollment, an independent research team visits the factory from Better Work's impact evaluation program. The data used in the analysis below were collected during compliance assessments and the independent worker and manager surveys undertaken in Vietnamese apparel factories from January 2010 to December 2013.

More than 5100 workers were surveyed at over 185 factories. In each factory, 30 randomly selected workers and four factory managers undertake a self-interview via computer program using a PC tablet.

The population surveyed is not a random sample of workers in the Vietnamese apparel industry. Firm enrollment in Better Work Vietnam is voluntary and workers who are randomly selected have the option to refuse to participate. Limiting analysis to a self-selected group of apparel factories focuses

specifically on those factories that are attempting to achieve a competitive advantage by developing a record of compliant behavior.

The worker survey asks questions about worker demographics including information about households and family composition, health, compensation, benefits, training, working conditions, workplace concerns, mental wellbeing and life satisfaction. The human resource manager survey asks questions about the factory's human resource practices including hiring, compensation and training. This survey also asks about the manager's perception of workers concerns with factory conditions and practices.

Coding the Worker and Manager Data

All responses to questions for the worker and manager surveys were fitted to a scale that ranges from 0 to 1. This process differed slightly for each question depending on the type of question. However for all questions, answers nearer to 1 reflect a more desirable working condition.

There are four different types of questions on the surveys: binary yes or no questions, multiple choice questions with mutually exclusive answers, questions where the participant is prompted to check all that apply, and finally open ended questions. Each of these was coded as follows:

Yes/No questions. The more desirable response was coded as a *1* and the other as a *0*.

Multiple Choice questions. Responses were first ordered from least desirable to most desirable and then divided by the number of possible responses. Note this category includes all questions pertaining to concerns despite the fact that they were "chose all that apply." The reason is that the possible responses could still be rated from least severe to most severe and thus the most severe response given is the most relevant.

Multiple Response questions. The number of responses selected by the participant was divided by the total number of possible responses. The score was then subtracted from 1 if the responses were negative aspects of working conditions.

Open Ended questions. These questions solely dealt with wages, and hence each worker's reported wage was divided by the highest paid worker's wages.

Missing Data

Missing data is an issue since workers may either not know the answer or not want to answer one or more questions. Missing data is addressed through *multiple imputation by chained equations (MICE)* with *regression*. The procedure involves imputing the data several times in order to create several complete data sets. The analysis is repeated on each data set and the results are averaged.[6]

Heuristic Aggregate Construction

Working conditions aggregates are constructed from individual questions on the worker and manager surveys and the Assessment tool. Heuristic categories of questions were derived from the preexisting cluster and sub-cluster delineations in the Enterprise Assessment tool. Categories and their compliance points are detailed in the Appendix.

Compliance data are stratified into 8 clusters that are further divided into 38 sub-clusters. All of the compliance questions are simple yes/no questions; hence the compliance score is the mean of all the questions that belonged to a specific sub-cluster. The mean of all the sub-clusters within a cluster are calculated to obtain that cluster's score. Sub-cluster means were excluded due to missing data or zero variance across all factories. For example, there was little data with variance among the child labor sub-clusters; hence only the broad cluster of child labor was included when performing the analysis on the sub-clusters.

The sub-clusters identified by Better Work were used as a guideline for creating the heuristic aggregates from the worker and manager surveys. Questions on the worker and manager surveys were matched to the various sub-clusters and compliance questions within them. Then, as with the

[6] For more information about multiple imputation see Azur (2011) for an intuitive explanation and Rubin (1996) for a more rigorous explanation.

compliance aggregates, the mean of the questions that belonged within and aggregate was taken to be the score for that aggregate.

This procedure yielded 21 aggregates from the worker survey and 16 aggregates for the managers. Note that there are fewer aggregates for the worker and manager surveys than the compliance data. The reason is that there are several points that are covered on the compliance data that are not covered in the surveys. These include issues related to child labor, paid leave, and contracting procedures.

Control variables include worker demographics and an index controlling for the size of the factory. The index controlling for the size of the factory is composed of questions pertaining to how many full time and part time workers are in a factory.

Principal Component Analysis

Assessing working conditions based on the heuristic indexes provides an indication of the impact of individual working conditions on firm performance. However, given the limit on the sample size, it is necessary to further aggregate working conditions before estimating the profit function. Principal components analysis is typically used to identify underlying factors.

Running principal component analysis on all the questions from the worker, manager and compliance data yields 3 factors from each of the aforementioned categories. Factor loadings from the Worker Survey, Manager Survey and Compliance Assessments are detailed in the Appendix. The components of the resulting factors are detailed in Tables 1a (Worker), 1b (Manager) and 1c (Compliance). For workers, Factor 1 appears to relate closely with the most harsh aspects of working conditions including various concerns about pay, harsh treatment such as verbal, physical abuse, sexual harassment, chemical smells, accidents and injuries and excess overtime. Factor 2 reflects workplace amenities and the overall atmosphere of the factory, including conditions in the canteen, restroom, and

factory clinic and ability to solve problems with a supervisor or trade representative. Higher level concerns appear in factor 3 and include bonuses, benefits and training.

Table 1a Factor Components Ranked by Factor Loadings **Worker Survey Assessment of Working Conditions**		
Factor 1	**Factor 2**	**Factor 3**
Accidents and Injuries	Canteen Satisfaction	Bonuses
Physical Abuse	Restroom Satisfaction	Benefits
Verbal Abuse	Water Satisfaction	Induction Training
Sexual Harassment	Clinic Treatment Quality	Health Services
Excess Pay Deductions	Comfort talking to the TU Rep	Pay Statement Information
Air Quality	Supervisor Corrects with Fairness and Respect	Training Last Six Months
Chemical Smells	Temperature	Access to Drinking Wager
Punch Clock	Excess Deductions	Religious Obstacles to Promotion
Equipment Safety	Low Wages	Excess Pay Deductions

Table 1b Factor Components Ranked by Factor Loadings **HR Manager Assessment of Working Conditions**		
Factor 1	**Factor 2**	**Factor 3**
Sexual Harassment	Tet Bonus	Worker Committee Effectiveness
Chemicals	Low Wages	Trade Union Effectiveness
Equipment Safety	Late Wages	Worker Committees
Physical Abuse	Excessive Deductions	Verbal Abuse
Air Quality	Punch Clock	Induction Training
Inkind Compensation	Meal Allowance	Temperature
Accidents	Inkind Compensation	Supervisor Skills Training
Punch Clock	Temperature	Collective Bargaining Agreement
Late Wages	Supervisor Skills Training	Tet Bonus
Excessive Deductions	Verbal Abuse	Health Services

Table1c Factor Components Ranked by Factor Loadings **Compliance Assessment of Working Conditions**		
Factor 1	**Factor 2**	**Factor 3**
Leave Index	CBA index	Strikes index
Work Environment Index	Accommodations Index	Union Opposition Index
Emergence Preparedness Index	Osh Management	Health Services Index
Welfare Facilities Index	Work protections Index	Interference with Union Index
Work protections Index	Regular Hours Index	Chemicals Index

Chemicals Index	Chemicals Index	CBA index
Overtime Work Index	Welfare Facilities Index	Overtime Work Index
Health Services Index	Overtime Work Index	Osh Management

For managers, Factor 1 similarly relates to the most harsh aspects of work. Issues related to pay emerge in Factor 2, including low wages, late payment of wages, excessive deductions, concerns with the punch clock, meal allowance and excessive reliance on payment in kind. Factor 3 captures issues related to communication and problem solving such as worker committees and their effectiveness, supervisor training and collective bargaining.

While the factors for workers and managers emerge in intuitively compelling categories, the same cannot be said for the Compliance Assessments. The only exception is that Factor 3 appears to be dominated by the rights to freedom of association and collective bargaining.

Estimation of the Profit Function

Equation (7) is estimated using three specifications. In the first set, indicators of the HR system are based on worker perceptions, in the second set indicators are taken from the perception of factory HR manager and the third measures working conditions from the perspective of compliance. Variables of the equation are as follows:

Profits: Price-Cost Ratio = Revenue /Total Cost

= Sales /[Aggregate worker compensation + Cost of raw materials & intermediate goods + Cost of electricity + Cost of communication services + Cost of fuel + Cost of transportation]

Total wage: Total wage is the sum of the annualized labor costs.

Supply Chain Position: Supply chain position is determined by whether the factory operations are principally CMT or whether the factory is able to deliver FOB and whether the firm is a Preferred Supplier, Contractor or Subcontractor.

Estimation of the Effort Equation. From the work survey, participants are asked to report their typical work start and stop times each day and the time they typically finish their production target on Monday, Friday, Saturday and Sunday. Time to complete the production target, after controlling for the length of the work day, is taken as our measure of work effort. In addition to working conditions, we also include work incentives, including whether the worker is paid by the hour, the piece or some combination and whether the worker receives a productivity or annual bonus.

Estimation of the Wage Equation. From the worker survey, participants are asked to report their last pay amount in VND, how often they are paid and the hours they worked for each day in the past week. Pay amounts are first adjusted for the length of the pay period and then converted to U.S. dollars. The dependent variable is taken to be log of total pay, TP_{kl}, and weekly hours, H_{kl}, is added as a regressor.

Adjustments are made for clear data entry errors, as in cases in which the participant entered pay values in terms of thousands or millions. Observations are also dropped for participants who report not being paid regularly.

Demographic and factory characteristics include, gender, age, education, employment duration, times promoted, skills training and number of nearby competitors. Workers are asked whether they received basic skills training when they first started working in this factory. Additional controls include contract type (training, subcontract, fixed-term and open-ended) and factory position.

The Supply Position Equation. The supply chain position is indicated by whether a factory's relationship with its most important customer is as a preferred supplier, contractor or subcontractor and whether the firm produced FOB as an alternative to or in addition to CMT. Supply chain position is estimated as a probit with factory size, worker effort, wages and working conditions as explanatory variables.

Dependent variables are described in Table 2a with summary statistics provided in Table 2b.

Table 2a: Dependent Variables			
Variable	**Definition**	**Variable Type**	**Code**
Effort	What time do you complete your production target on Monday/Friday/Saturday/Sunday What time do you usually start work on Monday/Friday/Saturday/Sunday Limited to workers who have a daily production quota, start work before 12:00 p.m. and complete their target after 12:00 p.m.	Real	Hours
logHourlyPayUSD logWeeklyPayUSD	How often are you paid? How much did money did you receive the last time you were paid?	Real	USD
Average Hourly Wage	(Employee Compensation + Contributions)/Employment	Real	USD
Supply Chain Position	How would you characterize your business relationship with your most important customer?	Categorical Relationship1	1= Sub-contractor 2=Contractor 3= Preferred Supplier
		Binary prefsup	1=Preferred Supplier 0=Contractor or Subcontractor
	What production activities occur in this factory?	Binary FOB	1=FOB 0=CMT
	How would you characterize your business relationship with your second most important customer?	Categorical Relationship2	1= Sub-contractor 2=Contractor 3= Preferred Supplier
	Total Sales FOB CMT	Real	FOB/(FOB+CMT)

Independent variables are described in Table 3a with summary statistics in Table 3b.

Table 2b: Dependent Variables Summary Statistics					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Weekly Pay USD	1405	48.35938	52.97944	0	1142.857
Time to Target Friday	1428	10.09482	1.479006	6	19
FOB	1399	0.407434	0.491533	0	1
CMT	1399	0.91351	0.281187	0	1
Preferred Supplier	1428	0.462885	0.498795	0	1

Contractor	1428	0.328431	0.469807	0	1
Subcontractor	1428	0.152661	0.359787	0	1

Table 3a: Independent Variables				
Variable	**Definition**	**Name**	**Variable Type**	**Code**
Gender	Are you female or male?	female	Binary	Female = 1 Male = 0
Age		age	Integer	Years
Education	Highest level of schooling completed.	PrimarySchool LowerSecondary UpperSecondary ShortTermTech LongTermTech ProfSecondary JuniorCollege Bachelor	Binary	0=No 1=Yes
	How many years of schooling have you completed?	educ	Integer	Years
Training	Did you receive basic skills training when you first started working in this factory?	BasicSkills	Binary	0=No 1=Yes
Skill Level	How would you rate your skill level?	Unskilled Semiskilled Skilled Multi-skilled	Binary	0=No 1=Yes
Employment Duration	How long have you been working your present position?	Job Tenure	Integer	Years
Promotion	Have you been promoted since you joined this factory?	Promoted1 Promoted2 Promoted3	Binary	Promoted once Promoted twice Promoted three or more times
Total Hours	Which days did you work last week? What time did you start work each day? What time did you end work each day?		Real	Hours per week
Nearby	How many factories	Compete	Integer	Number

competitors	are located within one kilometer of your factory?			
Job	What is your job in this factory	Sewer Cutter Spreader Checker Mechanic Packer Quality Control Helper Other	Binary	0= No 1=Yes
Marital Status	Are you married?	married	Binary	Married = 1 Single, Widowed, Divorced = 0
Health Status	How would you rate your overall health	workerhealth1	Qualitative	0=Poor 1=Fair 2= Good 3=Very Good
Contract Type	Do you have a work contract?/What type of work contract do you have? No Training or Probation Temporary, <1 year Definite 1-3 years Open ended	NoContract Training Temporary Definite Open	Binary	0= No 1=Yes
Piece Rate Pay	How is your pay determined?	Hourly Piece HourPiece	Binary	0= No 1=Yes
	Do you receive any pay bonuses or allowances?	Annual Productivity	Binary	0= No 1=Yes
Year	What year is it?	year2010 year2011 year2012 year2013	Binary	0= No 1=Yes

Table 3b Independent Variables Summary Statistics					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Female	1428	0.815826	0.3877616	1428	0.815826
Age	1428	28.18838	6.923667	1428	28.18838
Education	1427	9.269797	2.661229	1427	9.269797

Married	1405	0.569395	0.4953372	1405	0.569395
Worker health	1428	1.771709	0.6951514	1428	1.771709
No Contract	1428	0.008403	0.0913158	1428	0.008403
Training	1428	0.029412	0.1690169	1428	0.029412
Temporary	1428	0.044118	0.2054284	1428	0.044118
Definite	1428	0.37395	0.48402	1428	0.37395
Open	1428	0.522409	0.4996726	1428	0.522409
Basic Skills	1427	1.213034	0.4095953	1427	1.213034
Unskilled	1428	0.019608	0.138697	1428	0.019608
Semiskilled	1428	0.345238	0.4756124	1428	0.345238
Skilled	1428	0.405462	0.4911533	1428	0.405462
Multi-skilled	1428	0.073529	0.261095	1428	0.073529
Job Tenure	1426	4.603086	3.371016	1426	4.603086
Promoted1	1428	0.131653	0.3382312	1428	0.131653
Promoted2	1428	0.028712	0.1670529	1428	0.028712
Promoted3	1428	0.020308	0.1411015	1428	0.020308
Total Hours	1428	58.95357	9.720414	1428	58.95357
Nearby Competitors	1399	2.577555	1.424127	1399	2.577555
Hourly Pay	1421	0.636875	0.4810696	1421	0.636875
Piece Rate Pay	1421	0.270232	0.444236	1421	0.270232
Hour & Piece	1421	0.12456	0.3303358	1421	0.12456
Annual Bonus	1420	0.360563	0.4803331	1420	0.360563
Productivity Bonus	1420	0.274648	0.4464939	1420	0.274648

4. EMPIRICAL RESULTS

Price-Cost Markup. Estimated elasticities for the price-cost markup are reported in Tables 4a (worker), 4b (manager) and 4c (compliance). The coefficient on the Unit Value is negative and statistically significant. One might expect that average price would be positively correlated with profits, though such an outcome is not necessarily the case. While the potential profit exists from selling high unit value products, this potential will be realized only if a firm's comparative advantage lies at the top of the value chain. Many Vietnamese factories have the capacity to deliver FOB, yet, we have found considerable evidence of factories attempting FOB, performing poorly, and then retreating to CMT.

Table 4a Price-Cost Ratio Estimated Elasticities by Imputation and Average Across Imputations Worker Survey Measurement of Working Conditions

	No Imput-ations	Imputations					Average Across Imputa-tions
		m=1	m=2	m=3	m=4	m=5	
Unit Value	-0.0093	-0.0094	-0.0094	-0.0094	-0.0094	-0.0094	-0.0094
Standard Error	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	
Average Monthly Compensation	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055
Standard Error	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Factor 1	0.0592	0.0588	0.0587	0.0587	0.0587	0.0588	0.0588
Standard Error	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	
Factor 2	0.0759	0.0756	0.0756	0.0755	0.0755	0.0757	0.0756
Standard Error	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	
Factor 3	0.0106	0.0110	0.0110	0.0111	0.0111	0.0110	0.0110
Standard Error	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	

All estimated coefficients statistically significant at the 99% level of significance.

Table 4b Price-Cost Ratio Estimated Elasticities by Imputation and Average Across Imputations HR Manager Measurement of Working Conditions

	No Imputa-tions	Imputations					Average Across Imputa-tions
		m=1	m=2	m=3	m=4	m=5	
Unit Value	-0.0077	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.00764
Standard Error	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
Average Monthly Compensation	0.0085	0.0084	0.0084	0.0084	0.0084	0.0084	0.00841
Standard Error	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	
Factor 1	1.5004	1.4960	1.4972	1.4961	1.4966	1.4966	1.49714
Standard Error	0.0073	0.0069	0.0068	0.0069	0.0069	0.0069	
Factor 2	-0.0380	-0.0395	-0.0394	-0.0394	-0.0394	-0.0393	-0.03916
Standard Error	0.0029	0.0027	0.0027	0.1056	0.0027	0.0027	
Factor 3	-0.0132	-0.0131	-0.0131	-0.0131	-0.0131	-0.0131	-0.01319
Standard Error	0.0017	0.0016	0.0016	0.0016	0.0016	0.0016	

All estimated coefficients statistically significant at the 99% level of significance.

Table 4c Price-Cost Ratio Estimated Elasticities by Imputation and Average Across Imputations Compliance Assessment of Working Conditions

	No Imputations	Imputations					Average Across Imputations
		m=1	m=2	m=3	m=4	m=5	
Unit Value	-0.0091	-0.0093	-0.0092	-0.0092	-0.0092	-0.0092	-0.0092
Standard Error	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0000
Average Monthly Compensation	-0.0180	-0.0176	-0.0177	-0.0177	-0.0177	-0.0177	-0.0177
Standard Error	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0000
Factor 1	0.2300	0.2338	0.2337	0.2337	0.2330	0.2333	0.2330
Standard Error	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024	0.0000
Factor 2	-0.2859	-0.2820	-0.2823	-0.2824	-0.2830	-0.2831	-0.2831
Standard Error	0.0040	0.0038	0.0038	0.0038	0.0039	0.0039	0.0000
Factor 3	0.1083	0.1081	0.1081	0.1081	0.1081	0.1081	0.1081
Standard Error	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0000

All estimated coefficients statistically significant at the 99% level of significance.

Turning to working conditions, the elasticities of the working conditions variables are all positive when conditions are assessed by workers, as can be seen from Table 4a. On average, a one percent increase in factors 1, 2 and 3 increase the ratio of Revenue to Cost by 0.059, 0.076 and 0.011 percent, respectively. Further, a one percent increase in average compensation is associated with a 0.005 percent increase in revenue relative cost. All estimated elasticitices are significant at the 99% level of significance.

However, when working conditions are assessed by HR managers, the relationship between working conditions and profits is not so robust, as can be seen by Table 4b. The elasticity of Factor 1 on profits is strongly positive ((1.5) but the estimated effect of Factors 2 and 3 are negative, (-0.04 and -0.01, respectively).

Thus, firms may perceive a positive payoff to eliminating the most harsh conditions of work such as sexual harassment, physical abuse and exposure the dangerous chemicals. However, they see a negative relationship between improvement in their perceptions of pay practices and unions, and firm profits. A positive relationship between working conditions and profits only emerges when workers' reports conform with manager perceptions of compliance.

When working conditions are assessed from the perspective of compliance assessments, the relationship between profits and working conditions is positive for two of the three factors. Communications and union rights (Factor 3) have a positive relationship with profits. The failure to clearly characterize Factors 1 and 2 likely lie at the apparent contraction in the relationship between profits and working conditions.

Productivity. Having established a positive relationship between working conditions as measured by compliance and overall firm performance, we turn now to attempt to determine the channel through which the positive effect occurs. Are profits positively correlated with working conditions because productivity rises, because firms provide workers with a more desirable mix between overall working conditions and wages and/or because suppliers reward firms that have attractive working conditions with a more remunerative contracting relationship?

Given the smaller number of regressors at this stage of the analysis, we expand the number of factors to four. As explained above, estimation of the translog price-cost equation requires interacting all working conditions variables, causing the number of regressors to rise geometrically with the number of factors. However, in the estimation of the productivity, wage and supply chain position equations, no such interactive terms are required. The four factors are characterized in Table 5.

Table 5 Four Factors			
Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
CBA	CBA	CBA	CBA
Union Interference	Health Services	Union Interference	Union Interference
Chemicals	Welfare	Strikes	Union Opposition
Emergency Preparedness	Work Environment	OSH Management	Chemicals
Health Services	Leave	Accommodations	Health Services
OSH Management	Overtime Regulations	Worker Protections	
Welfare	Regular Hours		
Worker Protections			
Work Environment			
Leave			

Estimates of the *Time to Production Target Friday* variable are reported in Table 6. Eight variations of equation (8') are reported. A comparison of each pair of results indicates the marginal contribution of the working conditions variables. Results reported in columns (1) and (2) include Total Hours as a control, while columns (3) and (4) do not. For each specification, one version includes all demographic and job controls and the other does not. As is clear in all specifications, the coefficient is positive and significant, indicating that factories with longer work days also require more time to complete the production target.

Table 6 Productivity: Time to Production Target Friday								
	(1)		**(2)**		**(3)**		**(4)**	
	Demo/Job Controls		**No Demo/Job Controls**		**Demo/Job Controls**		**No Demo/Job Controls**	
Total Hours	0.0777***	0.0792***	0.0772***	0.0788***				
	-0.00423	-0.00395	-0.00419	-0.00393				
Hourly	0.292**	0.309**	0.117	0.151	0.299*	0.331**	0.137	0.179
	-0.135	-0.125	-0.132	-0.123	-0.154	-0.143	-0.15	-0.14
Annual Bonus	-0.0995	-0.138*	-0.115	-0.147**	-0.0549	-0.106	-0.076	-0.125
	-0.0829	-0.0758	-0.0822	-0.0748	-0.0944	-0.0864	-0.0933	-0.085
Productivity Bonus	0.174*	0.126	0.157*	0.107	0.144	0.131	0.139	0.117
	-0.0897	-0.0814	-0.0895	-0.0815	-0.102	-0.0928	-0.102	-0.0927
Unskilled	-0.361	-0.434			-0.409	-0.428		
	-0.296	-0.279			-0.337	-0.318		
Semiskilled	-0.0806	-0.197*			-0.0595	-0.155		
	-0.12	-0.11			-0.136	-0.125		

Skilled	-0.226*	-0.294***			-0.232*	-0.295**		
	-0.12	-0.111			-0.137	-0.127		
Multi-skilled	-0.658***	-0.709***			-0.490**	-0.546***		
	-0.18	-0.165			-0.204	-0.188		
Compete	-0.0326	-0.0374	-0.0451	-0.0425*	0.00352	-0.00925	-0.0247	-0.034
	-0.0301	-0.0278	-0.028	-0.0248	-0.0342	-0.0317	-0.0318	-0.0282
year2010	-0.329**	-			-0.11	-		
	-0.135				-0.154			
year2011	-0.463***	-0.065			-0.366***	-0.165		
	-0.117	-0.117			-0.133	-0.134		
year2012	-	0.334***			-	0.158		
		-0.113				-0.128		
year2013	-0.171	0.128			-0.0304	0.0771		
	-0.139	-0.107			-0.159	-0.122		
factor1	-0.12		-0.13		-0.201		-0.322	
	-0.184		-0.173		-0.21		-0.196	
factor2	-0.421*		-0.642***		-0.579**		-0.665**	
	-0.246		-0.236		-0.28		-0.268	
factor3	-0.0282		-0.0779		-0.0204		-0.229	
	-0.384		-0.365		-0.438		-0.415	
factor4	-0.325		-0.0489		-0.211		0.112	
	-0.291		-0.22		-0.331		-0.25	
Constant	6.293***	5.495***	6.074***	5.435***	10.59***	9.960***	10.72***	10.02***
	-0.512	-0.361	-0.45	-0.305	-0.519	-0.324	-0.423	-0.23
Observations	1,171	1,360	1,188	1,382	1,171	1,360	1,188	1,382
R-squared	0.274	0.269	0.239	0.236	0.057	0.048	0.017	0.011
Standard errors below estimates.								
*** p<0.01, ** p<0.05, * p<0.1								

Not surprisingly, workers that report being paid principally by the hour (*Hourly*) also require more time to reach the production target. Payment of an annual bonus is also a significant predictor of productivity (*Annual Bonus*) in the specifications that do not include the working conditions factors.

Skill level is also a significant factor in reducing time to target. The coefficients on the skill categories are all negative and increase in absolute value with each skill level. Multi-skilled workers complete their production target 30 to 40 minutes faster than unskilled workers.

Turning now to working conditions, the coefficients of the factors are negative in all specifications, indicating that an improvement in working conditions is correlated with a shorter time to

target, or more work effort. The effect is strongest for factor 2 which is dominated by compliance related to overtime work and regular hours. However, work environment, welfare facilities and health are also significant contributors.

One might suspect, given the importance of work hours in factor 2, that we have a case of reverse causality. Factories that have come into compliance on work hours find that compliance requires a shorter work day and a smaller production target that can be reached in a shorter amount of time. Indeed, it is the case that the impact of compliance with factor 2 when we do not control for Total Hours (columns 3 and 4) is larger than when Total Hours is excluded from the equation (columns 1 and 2).

However, the fact that factor 2 is large and statistically significant, even after controlling for the length of the work day, indicates that there is an effect of factor 2 on the time to target that goes above and beyond the impact on the length of the work day. An alternative explanation that is consistent with the significance of factor 2 after controlling for the length of the work day is that firms forced by compliance to shorten the work day must find efficiencies in the production process. The possibility that complying with worker hours limitations has efficiency effects is corroborated by the impact of compliance on wages.

Turning to wages, our second possible source of gain in profits due to compliance might arise if workers prefer to trade off wages for improved working conditions. Firms that choose more compliance may be able to offer workers a reduced wage without adverse firm effect. In such a case, factories with higher compliance may also pay a lower average wage. However, wages will be positively correlated with compliance if there is a productivity gain associated with compliance that is shared with workers.

Estimates of the wage equation are reported in Table 7. Four variants are estimated. Columns (1) and (2) report estimates with job and demographic controls. Columns (3) and (4) are limited to the basic model. For each set of results, the first column (1 or 3) includes the working conditions factors.

Table 7 Weekly Wages USD				
	Demo/Job Controls		No Demo/Job Controls	
	Factors	No Factors	Factors	No Factors
	(1)	(2)	(3)	(4)
Total Hours	0.00136	0.00116	0.00128	0.00111
	-0.00183	-0.00169	-0.00189	-0.0018
Hourly	-0.0787	-0.0840*	-0.111**	-0.1000**
	-0.0513	-0.0471	-0.0522	-0.0494
Annual Bonus	0.00243	0.0232	0.0377	0.0768**
	-0.0312	-0.0283	-0.0324	-0.0299
Productivity Bonus	0.00573	0.0176	-0.0134	0.01
	-0.0339	-0.0303	-0.0354	-0.0327
female	-0.108***	-0.0975***		
	-0.041	-0.0363		
age	0.00752***	0.00785***		
	-0.00255	-0.00224		
Basic Skills	-0.0148	-0.00645	-0.0385	-0.0387
	-0.0357	-0.0323	-0.0372	-0.0345
Unskilled	-0.0668	-0.0371		
	-0.111	-0.104		
Semiskilled	-0.0202	-0.0316		
	-0.0454	-0.0412		
Skilled	0.0306	0.0307		
	-0.0455	-0.0416		
Multi-skilled	0.171**	0.179***		
	-0.0681	-0.0619		
Job Tenure	0.00339	0.00708	0.0152***	0.0210***
	-0.00485	-0.0043	-0.00481	-0.00439
Promoted 1	0.108**	0.118***	0.134***	0.123***
	-0.0448	-0.0407	-0.0466	-0.0435
Promoted 2	-0.114	-0.0776	-0.0978	-0.119
	-0.0889	-0.0813	-0.0901	-0.0854
Promoted 3	0.139	0.136	0.258**	0.232**
	-0.0991	-0.0938	-0.104	-0.101
Competition	0.0146	0.0198*	0.0310***	0.0405***
	-0.0113	-0.0104	-0.011	-0.00989
year2010	-0.300***	-		
	-0.0512			
year2011	-0.190***	0.126***		
	-0.0444	-0.0438		
year2012	-	0.308***		
		-0.042		
year2013	0.0328	0.410***		
	-0.0523	-0.0397		
Time to Target F	0.0034	0.00713	0.00736	0.0117

	-0.0111	-0.0102	-0.0115	-0.0108
factor1	-0.051		0.109	
	-0.0696		-0.0681	
factor2	-0.0552		-0.0625	
	-0.0932		-0.093	
factor3	0.431***		0.739***	
	-0.144		-0.143	
factor4	0.103		0.494***	
	-0.11		-0.0866	
Constant	3.260***	3.160***	2.816***	3.467***
	-0.235	-0.178	-0.191	-0.136
Observations	1,146	1,333	1,163	1,355
R-squared	0.25	0.25	0.131	0.083
Standard errors below coefficients.				
*** p<0.01, ** p<0.05, * p<0.1				

Before turning to the contribution of working conditions to wages, note that workers paid by the hour earn lower total weekly compensation than other workers, a findings that is consistent with the lower productivity of hourly workers discussed above. Female workers earn less than their similarly skilled, experienced and educated male counterparts, even after controlling for position in the factory. Older workers, those with longer job tenure and those who have been promoted also receive higher pay, and pay has been rising over the duration of data collection.

Turning to the working conditions factors, the statistically significant factors are all positive. That is, compliance actually increases the weekly wage, even after controlling for demographic characteristics, hours and productivity. The positive effect is most pronounced for factor 3 which is dominated by worker protections and OSH. Such an outcome is consistent with a productivity gain from compliance that is shared with workers in the form of better working conditions and higher compensation. Absent a productivity gain, a perfectly competitive complaint firm would have reduced wages as other working conditions improved.

The last possible profit gain for the firm could arise if improved compliance moved the firm up the supply chain. Results for supply chain position are reported in Table 8. Note first that productivity,

as indicated by time to target, significantly predicts supply chain position. The time to target negatively predicts firm status as a preferred supplier or contractor, is not a significant predictor of FOB and is a positive predictor of sub-contracting and CMT. That is, improvements in productivity move a firm up the supply chain.

Table 8 Supply Chain Position					
VARIABLES	**Preferred Supplier**	**Contractor**	**Subcontractor**	**FOB**	**CMT**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Time Target F	-0.0681***	-0.0673**	0.109***	0.026	0.249***
	-0.0256	-0.0272	-0.0313	-0.026	-0.0439
lnWeekly Pay USD	0.00905	0.0759	-0.223**	6.47E-02	0.000330***
	-7.19E-02	-7.66E-02	-9.17E-02	-7.23E-02	-7.51E-05
Employment	-9.06e-05***	0.000114***	-9.63e-05***	3.59E-05	0.142
	-2.58E-05	-2.54E-05	-3.37E-05	-2.53E-05	-0.102
factor1	-0.800***	0.557***	0.936***	-1.415***	0.256
	-0.169	-0.18	-0.232	-0.171	-0.239
factor2	0.945***	-1.683***	1.567***	0.938***	-0.36
	-0.232	-0.248	-0.324	-0.238	-0.349
factor3	0.566	-1.307***	2.604***	0.0151	-1.553**
	-0.354	-0.364	-0.727	-0.341	-0.613
factor4	-1.531***	1.626***	-0.452	-0.813***	0.0736
	-0.224	-0.232	-0.289	-0.223	-0.309
Constant	0.886*	0.672	-4.461***	-0.254	-0.849
	0.4642781	0. 6722784	-1.7533174	0.4657299	-0.757
Observations	1,163	1,163	1,163	1,163	1,163
Standard errors below estimates.					
*** p<0.01, ** p<0.05, * p<0.1					

However, the impact of compliance independent of its impact on productivity is ambiguous. Therefore, there is no evidence that buyers are rewarding firms for compliance performance with more attractive work contracts. To the extent that compliance matters for contracting relationship, the channel is through improved productivity. Higher productivity improves supply chain position.

5. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

Our central question is whether innovations in working conditions increase firm profits. That is, are exploitative practices profitable? The empirical results presented above show that no, exploitive practices are not profitable. We find evidence consistent with the hypotheses that there is cross-firm heterogeneity in managerial quality and that higher quality managers choose more humane and profitable labor management practices.

Further, the challenges of implementing HR innovations are a significant factor in deterring their adoption. Labor management innovations that HR managers believe they are introducing have a larger impact on profits when workers perceive a change in working conditions. That is, a one unit change in working conditions as perceived by the worker on firm profits is larger than a one unit change in working conditions as perceived by the manager. As a consequence, most innovations require effective implementation at the factory floor to improve profitability.

The regression results indicate a markedly different perspective of the managers relative to that of the workers. For several dimensions of the HR system, workers apparently fail to perceive innovations implemented by management.

The analysis presented above, while suggestive, is not definitive. It remains possible that profits and the HR system are jointly determined by a third factor not included in the analysis. A second possible limitation is the fidelity with which managers and workers report on their workplace perspectives.

Perhaps more importantly, the small number of factories limits the conclusions that can be drawn from the analysis. The number of factors identified was limited to three. When estimating the translog profit function, the number of variables grows geometrically with the number of factors due to the need to interact each factor with all other variables in the equation. Thus, the number of factors is limited by the size of the data set. However, evidence from Domat et al. suggests that there are, in fact,

four to eight underlying factors. The failure of the data to reveal underlying factors may be limiting our ability to fully disentangle the relationship between working conditions and profits.

The question then becomes, what is the causal mechanism? Why do improved working conditions improve firm performance? Do improved working conditions raise productivity, lower the wage that workers will accept to work in a less hostile environment or do compliant firms move up the value chain?

We find that the principle mechanism is increased work effort. The time to complete the production target is shorter in compliant factories even after controlling for the length of the workday. Factories share this higher productivity with workers rather than substituting lower pay for improved conditions of work. Such findings support the conclusion that the productivity cost of monopsonistic exploitation is greater than the gain from lower wages. In fact, we find evidence that firms forced to comply with working hours compliance find innovative strategies to improve productivity such as the use of pay incentives.

Finally, we find that compliance has a positive effect on productivity and productivity gains improve supply chain position. Thus, there appears to be a win-win-win in that compliance has a positive impact on productivity which is shared with workers in the form of higher wages, increases firm profits and delivers higher productivity to international buyers.

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APPENDIX

Appendix Factor Loadings Worker Survey Assessment of Working Conditions				
	Factor 1	Factor 2	Factor 3	Uniqueness
payoften				0.9936
latewage	0.483			0.7505
lowwage	0.5658	0.3208		0.5753
bonuses			0.6821	0.5243
tetconcern	0.4985	0.2579		0.6846
inkindconcern	0.5426			0.7045
benefits			0.6102	0.5958
statementinfo			0.3702	0.8426
piecerateex	0.354	0.2657		0.7951
deductions		0.3919	-0.4083	0.6681
deducconcern	0.6176			0.6052
faircorrect		0.5084		0.7074
verbal	0.6598			0.5412
physical	0.6786			0.5309
toilet				0.945
induction			0.5499	0.6858
trainingsix			0.359	0.802
promgender				0.98
sexharass	0.6284			0.5935
promethnicity/national origin				0.9876
promreligion			-0.2296	0.9237
clock	0.6043			0.6317
cba		0.2184		0.952
tucomfort	0.273	0.5104		0.6646
chemicals	0.608			0.5906
healthservices			0.4592	0.7635
treatquality		0.5641		0.6765
watersatis		0.6768		0.5305
canteensatis		0.7081		0.4795
bathsatis		0.6912		0.5063
oftendrink			0.2165	0.9511
equipment	0.6012			0.6243
accidents	0.7019			0.5059
temperature	0.4837	0.396		0.6075
air quality	0.6134	0.2987		0.5287
overtime	0.3837			0.8158
sunday	0.4402			0.8036
(blanks represent abs(loading)<.2)				

Appendix Factor Loadings HR Manager Assessment of Working Conditions				
	Factor 1	Factor 2	Factor 3	Uniqueness
Age Verification		-0.3393		0.8668
Late Wages	0.6759	0.5115		0.259
Low Wages	0.4776	0.5618		0.4297
Tet Bonus	0.646	0.5839	0.2838	0.1611
Inkind Compensation	0.7804	0.3722		0.2517
Meal Allowance		0.4728		0.721
Benefits		-0.3256		0.8676
Pay Statement Information		-0.4748		0.7341
Excessive Deductions	0.6759	0.5115		0.259
Verbal Abuse	0.5074	0.225	0.4628	0.4777
Physical Abuse	0.9502			0.0859
Induction Training		-0.449	0.4575	0.5845
Supervisor Skills Training	0.2	0.2716	0.3326	0.7756
Sewer Skills Training				0.9367
Sexual Harassment	0.9606			0.0691
Punch Clock	0.6868	0.4799		0.0691
Collective Bargaining Agreement	0.2038	-0.491	0.3091	0.6219
Worker Committees		0.2043	0.5569	0.6353
Worker Committee Effectiveness			0.7805	0.3666
Trade Union Effectiveness			0.7303	0.4352
Chemicals	0.9606			0.0691
Health Services		-0.2718	0.2549	0.8611
Equipment Safety	0.9606			0.0691
Accidents	0.6921			0.5209
Temperature	0.5206	0.3009	0.3525	0.5142
Air Quality	0.8403			0.2896

Appendix Factor Loadings Compliance Assessment of Working Conditions				
	Factor 1	*Factor 2*	*Factor 3*	*Uniqueness*
CBA index		*0.5787*	*0.2479*	*0.5973*
Interference with Union Index			*0.5171*	*0.6881*
Strikes index			*0.8094*	*0.3107*
Unionop Index			*0.8094*	*0.3107*
Chemicals Index	*0.4678*	*0.3299*	*0.5101*	*0.4121*
Emergence Preparedness Index	*0.6435*			*0.5382*
Health Services Index	*0.4286*		*0.6321*	*0.3879*
Osh Management	*0.3639*	*0.4637*	*0.2232*	*0.6028*
Welfare Facilities Index	*0.5155*	*0.2431*		*0.6549*
Accommodations Index		*0.537*	*-0.4047*	*0.5409*

Work protections Index	*0.502*	*0.4592*	*0.2135*	*0.4916*
Work Environment Index	*0.6499*			*0.573*
Leave Index	*0.6569*			*0.5535*
Overtime Work Index	*0.4514*	*0.2128*	*0.2374*	*0.6946*
Regular Hours Index	*0.2659*	*0.4553*		*0.7215*
(blanks represent abs(loading)<.2)				

Compliance Index Components	
Index	Compliance Point Components
CBA index	cbaindexI = rowmean(q_4039 q_4044 q_4050 q_4053 q_4059 q_4074 q_4076 q_4070)
Interference with Union Index	interferenceindexI = rowmean(q_4010 q_3960 q_4001 q_4004 q_4010 q_4018 q_4023 q_4027 q_4032 q_3968 q_3974)
Strikes index	strikesindexI = rowmean(q_4081 q_4084 q_4087 q_4090 q_4093)
Unionop Index	unionopsindexI = rowmean(q_1256 q_3931 q_2848 q_2849 q_3937 q_3945)
Chemicals Index	chemicalsindexI = rowmean(q_4006 q_4034 q_2887 q_4012 q_4015 q_4022 q_4029 q_4034 q_4037)
Emergence Preparedness Index	emergprepareindexI = rowmean(q_139 q_4182 q_4171 q_4173 q_4178 q_4174 q_4176 q_4178 q_4181 q_4182 q_4183)
Health Services Index	healthservicesindexI = rowmean(q_4158 q_4153 q_4156 q_4152 q_4153 q_4155 q_4156 q_4157 q_4158 q_4159)
Osh Management	oshmanageindexI = rowmean(q_3983 q_89 q_3983 q_2882 q_2883 q_3973 q_3983 q_3997)
Welfare Facilities Index	welfarefacilitiesindexI = rowmean(q_124 q_4162 q_4161 q_4162 q_4163 q_4164 q_4166 q_4167)
Accommodations Index	accommodationindexI = rowmean(q_1275 q_2919 q_2920 q_2921 q_2922 q_2923 q_2924 q_2925 q_2926 q_2927 q_2928 q_3384 q_3385)
Work protections Index	workprotectindexI = rowmean(q_4067 q_4069 q_4054 q_4049 q_4054 q_4057 q_4061 q_4064 q_4067 q_4069 q_4073 q_4108 q_4131 q_4132 q_4136 q_4139 q_4141)
Work Environment Index	workenvironindexI = rowmean(q_4145 q_4147 q_4148 q_4149
Leave Index	leaveindexI= rowmean(q_4111 q_4105 q_4107 q_4114 q_4116 q_4118 q_4120 q_4121 q_4123 q_4125)
Overtime Work Index	overtimeworkingindexI= rowmean(q_4091 q_4094 q_4096 q_4098 q_4099)
Regular Hours Index	regularhoursindexI = rowmean(q_4078 q_4079 q_4082 q_4085 q_4086 q_4088)

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