Should I Stay or Should I Go?

Analyzing the decision of the firm to prevent worker return migration

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ABSTRACT: Building on the Harris-Todaro model of labor migration, I construct a model of labor migration that analyzes the wage-setting choices of factories employing primarily migrant workers, when managers have the additional choice of restricting return migration. This is modeled as increasing the perceived transaction costs of leaving on the part of the worker, following the social psychological literature on abuse. The effect of this decision on the optimal mix of wages and factory conditions is analyzed. Theoretical expectations about these relationships are derived and then are tested empirically using data from the Better Work Jordan project. The results of the estimation suggest that factories are utilizing these restrictive policies to manipulate the worker's reservation wage and offer lower wages and worse factory conditions in factories where these policies are in place. This finding then suggests certain interventions that may help prevent these types of abuses.

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1 Introduction

As construction gets underway in preparation for the 2022 World Cup hosted by Qatar, stories of the primarily migrant workers hired to build the arenas in which the games will be played have begun to surface. Human rights violations have been reported in camps housing the workers, including limited access to drinking water, the denial of the timely payment of wages, and restricted access to worker documentation to prevent leaving.[1] It is this last phenomenon that is the subject of this thesis. Migrant workers are particularly vulnerable to human rights violations, as their freedom to leave a poor working environment can easily be rescinded by restricting access to their documentation, a practice that prevents them from legally crossing borders or finding alternate employment. I aim to uncover the conditions under which an employer would choose to utilize restrictive policies, by incorporating the social psychological dynamics of harassment and abuse, with the hope of understanding how workplace dynamics contribute to the perpetuation of these manipulative restrictions.

Traditional models of migration allow factories to set wages and quantities to entice workers to migrate to the factory. However, we observe in the real world that there are many more choices than just these two at the firm's disposal. The theoretical framework below allows worker compensation to be comprised of two components, the wage rate and factory conditions. The factory has a third additional choice once the worker has arrived, which is whether or not they wish to take possession of the worker's documents to prevent them from returning home.

The social psychology literature considering harassment suggests that employer control over documentation may have important consequences on the worker's perception of agency and

[1] Aziz, Omar and Murtaza Hussain, "Qatar's Showcase of Shame" *New York Times*, January 5, 2014, http://www.nytimes.com/2014/01/06/opinion/qatars-showcase-of-shame.html.

ability to leave. In the theoretical model proposed in this paper, the deterrent effect is modeled as increasing the transaction cost of return migration and thus decreasing the reservation wage of the worker. This changes how much the worker values the option of leaving the factory.

However, workers also dislike working in factories where they are being restricted in their choices, and so the utility from working at the factory is also declining. The effect on productivity is *a priori* unclear. The social psychological literature provides no definitive conclusion of the expected impact of dehumanizing factory policies on worker effort.

Thus the question is: which effect dominates? Is it the case that factories must offer workers better factory conditions and higher wages to remain in a factory where restrictive policies are being utilized? Such an outcome falls more in line with the current economic literature addressing harassment in the workplace, where workers must be offered a compensating differential to stay under poor working conditions. Or, do factories limit worker movement in order to prevent them from leaving in the face of lower wages and worse factory conditions? Factory managers likely introduce restrictive policies under the expectation that workers facing increased costs to leaving will tolerate reduced compensation. The goal of my thesis is to provide an answer to this question. To my knowledge, there is very little in the economics literature that attempts to explain this phenomenon, and so this work forms a first step in studying these questions.

In the following sections, a theoretical framework is established wherein the factory chooses the optimal levels of factory conditions, wages, and restrictive policies to maximize profits. Theoretical expectations are derived that predict the conditions under which the factory will choose to employ restrictive policies, and it is shown that the profit-maximizing conditions are ambiguous on the optimal choice of f.

An empirical strategy is then developed and theoretical expectations are tested using the Better Work Jordan dataset, which contains data from the Jordanian apparel sector between 2010-2013.

Approximately 75% of workers in Jordanian garment factories are migrant workers, with the largest portion coming from Southeast Asia, and in particular Sri Lanka and Bangladesh. Most of these workers are on temporary contracts that prevent them from relocating to different factories within Jordan. Once a migrant worker enters the country, her only choices are to remain at the factory or return to her home country. In addition, according to labor laws in Jordan, factories are required to pay the moving costs of migrants that wish to return home once the contract ends. These circumstances have, in some cases, allowed factories to introduce policies that restrict workers from moving home, and may provide an opportunity to test the conditions under which factories choose to utilize such regulations.

The empirical framework used to model the simultaneous choice of factory conditions, wages, and restrictive policies employs the three stage least squares technique developed by Zellner and Theil (1962). The four endogenous variables at the firm's disposal are wages, factory conditions, per worker effort, and restrictive policies. Each variable is instrumented using survey response data that exploits the multi-stage data collection process employed by Better Work and the Tufts University Better Work Monitoring and Evaluation team. This creates natural exogenous variation in several key variables by gathering data measuring the same processes at five levels: responses from factory managers, from general managers, from factory workers, from industrial engineers, and from inspections of the factory for compliance with labor laws. This method yields consistent and unbiased estimates of the relationship between utilizing restrictive policies and wages, factory conditions, and effort, given that key assumptions hold in the data.

The paper proceeds as follows: section (2) presents a review of the literature; a theoretical framework is outlined in section (3), section (4) describes the dataset and presents some summary statistics; section (5) outlines the empirical strategy; section (6) discusses the results of the estimation; and section (7) concludes.

2 Literature review

A review of the literature is laid out in two parts, corresponding to the two primary dimensions of labor migration and social psychology. First, models of labor migration decisions are discussed, along with their implications for this project. Next, I present a review of models incorporating the dynamics of harassment in firm decisions and the predicted responses by workers to different forms of harassment, from the social psychology literature.

A foundational piece in the area of migration and, in particular, rural to urban migration, is the work of Harris and Todaro (1970). The authors establish a model in which rural-urban migration exists despite high levels of urban unemployment and positive marginal products in the rural (or, agricultural) sector. The purpose of their paper is to explain observed behavior that appears to be irrational at first glance. An equilibrium is defined in the labor market in which there exists unemployment in the urban sector. Migration is the result of a minimum wage law in the urban sector that sets the wage higher than the free market would allow. Workers make the decision to migrate based on an expected urban wage, which is a function of the institutional wage and the unemployment rate.

In the model, migration would cease to exist if the minimum wage law were not in place. Because the introduction of a minimum wage law leads to a decline in employment and output in both sectors, potential policies are then discussed to address this negative outcome, with respect to the theory. Migration restrictions are determined to be the most effective approach for limiting the negative impact of a minimum wage law, under the predictions of the theory. The work upon which the theoretical model described below is based draws heavily from the approach established in the Harris-Todaro paper.

Katz and Stark (1986) build on the Harris-Todaro theoretical model by suggesting an alternate hypothesized relationship between urban unemployment and migration to the urban sector. They propose a model where migrants are risk averse actors who face an expected wage in the urban sector that is lower than the rural wage. Prior to their work, empirical testing suggested that key predictions in the Harris-Todaro model failed to hold in developing countries. For example, Speare and Harris (1986) argue that wage differentials are not the motivating factor in migration decisions in Indonesia. They suggest that job opportunities requiring differential skills may be located in distinct geographic labor markets, with the wage in equilibrium across markets, and migrants are responding to this by moving to their preferred jobs.

Katz and Stark construct a model in which the worker chooses to undertake an actuarially unfair gamble by choosing to migrate. This is achieved by expressing the rate of return as an increasing function of investment, or wealth, and showing that the worker may still choose to migrate even if the worker is risk-averse. When the worker stands a small chance of earning a much higher level of wealth due to the increasing returns on investment, they may take the chance of migrating.

The authors offer a second explanation for the phenomenon of a lower-than-expected urban wage by allowing worker utility to depend upon social rank, which is a function of wealth. This approach is interesting as it opens up an analysis of return migration. The Katz and Stark model can easily be adapted for the purpose of studying return migration decisions.

Katz and Stark (1987) add to this analysis by examining how information asymmetry may influence the wage-setting decisions of firms and the migration decisions of workers. Migrant workers have varying skill levels, and workers have greater information about their skill levels than do foreign employers. This leads to potential equilibria where low skilled workers and high skilled workers choose to migrate, but moderately skilled workers remain at home. Following the discovery of ability levels, high skilled workers will not be made worse off but low skilled workers will be made better off. Their paper addresses an important aspect of the choice to migrate, namely, informational asymmetry.

More recent analyses of migration decisions that incorporate the possibility of return migration make use of life cycles models, accounting for wealth accumulation and remittances to family in the home country. The potential applications of the life cycle models are outlined in Carmichael (1989), which allow for factory-worker relationships with a fixed end date and the introduction of mandatory retirement and pensions and dynamic wage profiles.

Building on the critique of Katz and Stark, Dustmann (2003) utilizes a life cycle model to address both the issue of migration to the urban sector when the wage rate is lower after migration and to find the optimal length of migration duration. He hypothesizes that migration duration and the wage differential between the home country and the away country will have an inverted u-shape. Migration durations will be shorter if there exists either a very small wage differential or a very large one. The author then empirically tests the hypothesis using data from a survey of German migrants between 1984 and 1996. The results confirm an inverse u-shaped relationship between wage differentials and migration duration. The interpretation is related to savings behavior. A large wage differential allows the worker to stay in the away country for a short period and return home once they have saved enough, and a very small wage differential fails to incentivize them to remain in the away country while their preferences are aligned with the home country.

The theoretical model established in section (3) takes as its most direct inspiration the work of Rebitzer and Taylor (1995), building on Shapiro and Stiglitz (1984). The model the authors present aims to explain how increasing the minimum wage can lead to an increase in employment. This is meant as an argument against the belief that minimum wage laws lead to unemployment.

In their analysis, efficiency wages are used to account for a positive relationship between wages and labor demand. The firm faces the problem of setting wages so as to elicit a high level of effort from workers, since low effort yields zero productivity. Firms will choose the lowest possible wage that will discourage shirking. I extend this model in the framework developed below to reflect the choice of the worker to remain in the factory instead of to return home.

The papers outlined above describe the current state of research modeling migration and return migration decisions. Next, I summarize work in the social psychology literature discussing abuse and its effects on behavior to provide a context for the incorporation of psychological responses to abuse in an economic setting. This literature adds an additional dimension to the relationship between factory policies and worker productivity and return migration, and should be considered when attempting to formalize how workers respond to working conditions. However, the results described in the literature should not be taken as gospel and are only introduced to start a discussion about how abusive policies can impact productivity.

The phenomenon of limiting worker return migration by taking documentation or restricting phone calls home has two main social psychological features. First, factory supervisors and managers have a great deal of power over migrant workers, and are able to exploit that power to achieve their goals. Second, this power dynamic is associated with an increased risk of dehumanization by higher powered employees and dehumanization in turn has significant effects on worker behaviors.

Dehumanization in factories occurs through denying workers their free movement and threatening them with deportation. These actions limit workers' agency and characterize them as passive or unfeeling. Haslam (2006) defines this process as mechanistic dehumanization, or, denying people the characteristics that define human nature and instead considering them as tools or machines. The act of restricting workers from leaving the factory in order to elicit more work can be characterized as dehumanization in that impeding a worker's return migration denies that worker her agency and puts the factory's production targets ahead of the worker's well-being. In the theoretical framework established in section (3), the abusive behaviors used by the firm to impede return migration are modeled as decreasing the reservation wage of migrants, leading the worker to value leaving the factory less.

Beginning with a discussion of the role of power in this framework, Galinsky, Gruenfeld, and Magee (2007) find that, in an experimental setting, actors with less power are less likely to engage in negotiations. Power is defined as the ability to control one's own and others' resources and outcomes, which is the traditional definition in the psychology literature. In their experiment, participants were assigned to the high power or low power group and then asked to remember a situation in which they were in power or when someone else had power over them, depending on the group to which they were assigned. Through this process, the participants are placed in either a high power or low power mind set. The participants were then told they were either the buyer or the seller of a power plant. Individuals in the high power group were more likely to make the first offer, and the selling price was higher in situations where the high power participant was the seller. Such an outcome indicates that the dominant influence over the final price was the first offer. The results from this experiment can be applied to the factory setting to make certain inferences about how workers may respond to factory policies. As workers have much less power than managers, it seems likely that managers would have the dominating influence over negotiations at the factory.

In their study of the antecedents and consequences of harassment, Bergman, Langhout, Palmieri, Fitzgerald, and Cortina (2002) find that the larger the difference is between the rank of the perpetrator of abusive behaviors and the victim, the less likely it is that the perpetrator will be disciplined. The authors use data on reported instances of sexual harassment in the military in

1996 to study the mechanics of reporting sexual harassment. They find that more offenses are reported when the victim has a high rank and that cultivating an image of harassment as unacceptable within the context of the workplace is strongly related to increased instances of reporting. Since factory workers have very little power within the context of the firm, these results imply that they would be less likely to report abuses. The study also suggests that creating an environment that encourages reporting of abusive tactics may be a helpful intervention on the part of Better Work Jordan to limit the impact of restrictive policies on worker well-being.

Furthermore, Van Kleef, Oveis, van der LoŴe, LuoKogan, Goetz, and Keltner (2008) show that an increased perception of power is related to a greater degree of dehumanization. In their experiment, the authors establish participants' underlying sense of power through the use of a survey. Participants are identified as either high power or low power based on their responses to the survey. The participants are then paired up and asked to describe a time of great emotional distress or upheaval. The authors find that individuals with a greater sense of power respond to listening to the distress of a partner with less distress (i.e. it causes them less pain to listen to someone else's suffering). The high power partner also responded with less compassion. The results of this experiment indicate that individuals with a stronger sense of power are more likely to dehumanize others. Thus, we can consider restricting worker return migration as a form of dehumanization in the context of the factory. The mechanism through which this process occurs is presented in this study. Factory managers in a high power mind set don't face a cost to causing distress to their workers, who have a low power mind set.

In the social psychology literature, increasing perceived power on the part of the abuser is related to increased dehumanization, which in turn may be related to greater acceptance of factory policies. Workers employed in firms with a greater degree of power distance between managers and workers are less likely contradict management decisions and more reserved in expressing themselves to supervisors of a different ethnic background (Bochner and Hesketh 1994).

If we consider the decision to return home as a rebuttal of factory policies, these results would suggest that introducing restrictive policies that dehumanize workers would reduce return migration, since workers that are being dehumanized are less likely to contradict managers. The social psychological literature around abuse lends significance to the possible relationship between worker compensation and productivity in factories where workers are prevented from leaving. A practice by supervisors of manipulating the psychological responses to abuse to induce workers to remain at the factory would provide an answer for the question of why factories engage in behavior that would seem to be less-than-optimal. It should be noted that this outcome does not depend upon physically restraining workers, only on creating the perception of the difficulty of leaving the factory. The framework might then be extended to consider other methods of harassment that are observed in a factory setting.

An important qualification to mention is that the results from the social psychology literature may not apply to the factory setting. It is certainly not a given that the results found in an experiment will hold in a factory environment. However, the results described above are interesting and add another layer to the question of how restrictive factory policies impact worker productivity. The theoretical framework and empirical estimation outlined below are agnostic on how, or even if, psychological responses play a role in productivity and return migration decisions.

Finally, there are several studies using the Better Work dataset employed in the empirical estimation in section (4). Brown, Dehejia, and Robertson (2011) use the Better Work Cambodia dataset to analyze the relationship between working conditions and factory survival rates. They find that working conditions in Cambodian garment factories do not appear to have a strong relationship with survival rates, implying that increasing working conditions is not related to factory closures.

Brown, Dehejia, and Robertson (2012) also use the Better Work Cambodia dataset to study retrogression rates on factory conditions. This is to study whether factories are likely to backtrack on the adoption of positive factory policies. The authors find that retrogression is fairly uncommon, and decreases when pressure is placed on factories. They also find that costly changes are less likely to be undone (i.e. if a factory adds additional bathrooms to comply with labor laws, it is unlikely that they would fall out of compliance with this law in following years).

Additionally, Adler et al (2013) use the Better Work Vietnam dataset to examine the importance of factory conditions in determining worker satisfaction. This is to see if there are ways for factories to improve worker satisfaction with minimal cost. They employ a factor analysis technique similar to the one described below. The authors find that factory managers are not identifying the issues that are most important to workers.

3 Theoretical framework

In this model, the worker lives for one period. At the beginning of the period, she makes her decision to either remain at home, migrate, or migrate and then return home, after realizing wages and conditions in the factory following migration. The factory, anticipating her choice, chooses wages and factory conditions that will induce the worker to stay. The decision of the factory to use policies restricting worker migration is analyzed. The purpose of the model is to identify the conditions under which restrictions on worker return migration are profit-maximizing, which will in turn suggest possible interventions aimed at mitigating these manipulative factory policies. A very simple constrained optimization problem is constructed for the factory, and the response of the factory's optimal choices of wages and factory conditions to the additional tool of preventing return migration is analyzed. Table (1) in the appendix lists all variable names and notation, for reference.

3.1 The worker's problem

First, the worker maximizes her utility by choosing amongst her possible outcomes. She faces two successive choices: whether to migrate or remain at home, and then whether to return home upon realizing conditions and wages at the factory. The total monetary compensation paid to the worker is given by $w=\alpha e$. α is taken to be the piece rate, e is per worker productivity, and w will be the total compensation to the worker. The wage is paid as a piece rate in every scenario. If the worker chooses to migrate, she will be the one to pay the costs in every case.

The worker first decides whether to remain at home or migrate to the away country. She will maximize her total utility by choosing between the two options given by:

$$V_H=w_H a_H(\bar{e}-e_H) \tag{1}$$

$$V_M^E=(w_M^E-c_M)a_M^E(\bar{e}-e_M^E) \tag{2}$$

Equations (1) and (2) are interpreted as follows. The worker receives V_H if she chooses to remain at home for the entire period, with home wages α_H and home factory conditions, a_H. These are taken to be constant, fixed parameters. She also chooses the level of effort, e_H, she wishes to expend, given this compensation package. She expects to earn V_M^E if she migrates. V_M^E is a function of expected factory wages, α_M^E, and expected factory conditions, a_M^E. The worker will choose to migrate if $V_H<V_M^E$, or, the expected utility from migrating is greater than the utility from remaining at home. For this analysis, this condition is assumed to be satisfied. The decision to migrate is taken to be essentially exogenous in order to focus specifically on the decision to return

home. The factory is put under no obligation to satisfy the expectations of the worker upon arrival in the factory.

Once she has arrived at the factory, the worker faces the decision to either stay at the factory for the length of the contract period, or return home. Her two options are given by:

$$V_S=(w_S-c_M)a_S(\bar{e}-e_S) \qquad (3)$$

$$V_R=(w_H-c_M-A)a_H(\bar{e}-e_R) \qquad (4)$$

Upon arriving at the factory, the worker receives V_S and earns the piece rate α_S and experiences factory conditions a_S and pays migration costs c_M. This is the utility the worker will earn if she stays in the factory for the length of the contract. If the worker returns home, she will earn V_{RM}. Because the worker has returned to the home country, she will earn home wages and experience home factory conditions. She will also have to pay to travel home. The fixed cost of return migration is called *A* and can be thought of as the cost of a plane ticket home. In this imagined scenario, workers only pay the cost of return migration if they leave before the end of the contract period, so workers staying in the factory avoid this cost. If the worker remains in the factory, the factory will pay for the plane ticket to the home country. The worker will choose to stay in the factory for the contract period provided that $V_R \leq V_S$.

At this point, the factory may also choose to prevent workers from remigrating through the implementation of policies such as limiting worker phone calls home, failing to provide valid contracts and IDs and taking worker documentation. These policies are henceforth referred to as migration restrictions. These restrictions are modeled as an additional variable of choice, *f*, which impacts both V_S and V_R. Migration restrictions serve as an additional choice for the factory that ranges between zero, meaning no policies in place and the worker has the freedom to leave the factory, and ∞, meaning the worker is unable to leave the factory, or is, in essence, enslaved. As described below, this will be represented empirically as an index of policies that restrict worker return migration.

If migration restrictions are put in place, the worker faces a new set of choices. Instead of seeing options (3) and (4), the worker will now choose between the following two options:

$$V_F = \frac{(w_F - c_M) a_F (\bar{e} - e_F[D(f)])}{R(f)} \quad (5)$$

$$V_R = (w_H - c_M - A - T(f)) a_H (\bar{e} - e_R) \quad (6)$$

If the factory utilizes migration restrictions, the worker receives V_F from staying in the factory. This worker will earn α_F and experience factory conditions a_F if she remains in the factory for the contract period. She will also choose the level of effort she wishes to expend, e_F. If she chooses to return home, she will now pay the fixed return migration cost *A*, and some additional transaction cost, *T*(*f*), a function of the migration restrictions. The worker will choose to remain at the factory provided that $V_R \leq V_F$. This will be the incentive compatibility constraint that the factory must satisfy to prevent return migration.

Forcing workers to remain in the factory interacts with their utility at the factory, given by V_F, in two ways. In the first, the perceived cost of effort changes, as seen in the function *D*(*f*). The introduction of *f* may have productivity effects, which will depend on the shape of *D*(*f*). In the second, worker satisfaction declines, as seen in the function *R*(*f*). These two interactions reflect the social psychological reality of abusive conditions. Workers may lose agency and be more willing to accept factory policies once abuse is applied, but this does not directly translate to an increase in utility. Thus, it may be the case that worker productivity increases while total utility decreases.

The worker also faces increased transaction costs to return migration upon the introduction of *f*, modeled as *T*(*f*) in equation (6). *T*(*f*) can refer to either the physical costs of leaving, or of the perception of increased costs. Increased perceived costs are associated with a worker's loss of agency, as workers who feel powerless to change their situation may also perceive that they do not have the resources to undertake return migration. The factory may also choose different wages and factory conditions, α_F and a_F.

In summation, by implementing policies restricting a worker's return migration decision, the factory can manipulate her perception of the costs of relocation. However, abusive policies also reduce the worker's valuation of staying at the factory, modeled using the function $R(f)$, and her perception of the costs of effort, $D(f)$.

To give shape to these functions, $R'(f)>0$ and $T'(f)>0$, with $R(0)=1$ and $T(0)=0$. These assumptions reflect the psychological effect of restricting worker behavior, with $T'(f)>0$ being the primary mechanism through which factories benefit from restraining workers. If $T'(f)>0$, the perceived cost of return migration is increasing as more restrictive policies are used. *A priori*, the shape of $D(f)$ is unknown, as workers may become more productive under the use of f, or they may decide that effort is more costly when they are being manipulated. The nature of this relationship will help determine whether these strategies will be used by the factory. However, under the above construction, $D(0)=1$. The construction of these functions allows us to consider V_S and V_F as one utility function, with V_S being a special case where no restrictive policies are used, or, $f=0$.

Given realized factory wages and conditions, the worker chooses the level of effort she wishes to expend by maximizing her utility for each case. The solutions to the respective optimization problems are given by:

$$e_H = \frac{\bar{e}}{2} \qquad (7)$$

$$e_S = \frac{\bar{e}}{2} + \frac{c_M}{2\alpha_S} \quad (8)$$

$$e_F = \frac{\bar{e}}{2D(f)} + \frac{c_M}{2\alpha_F} \quad (9)$$

$$e_R = \frac{\bar{e}}{2} + \frac{c_M + A + T(f)}{2\alpha_H} \quad (10)$$

From the solutions above, it is clear that the relationship between worker effort and migration restrictions depends upon the function $D(f)$. The relevance of determining the direction of this relationship will be discussed further in the following sections. Again, due to the construction of these functions, when $f=0$, $e_S=e_F$. It is also apparent that worker effort increases upon migrating ($e_H<e_S$), provided that the cost of migrating is not equal to zero. The worker also expends more effort upon remigrating, in order to compensate for the lost income from paying migration and return migration costs.

3.2 The firm's problem

Knowing how worker productivity will respond to changes in wages, factory conditions and migration restrictions, the factory then maximizes profits subject to the worker's incentive compatibility constraint. This constraint is given by $V_R \leq V_F$. In other words, the factory must offer the worker wages and factory conditions that will incentivize her to remain in the factory. The factory is also allowed to utilize migration restrictions to make leaving more costly for the worker.

A simplified production function is given by $q=e$, where e is defined as above. Profits depend on the market price, the wage rate, and factory conditions and fixed return migration costs. In the case of temporary work contracts, the factory is obligated to pay the return migration costs of workers who choose to finish their contract. As explained above, this fixed per worker cost is represented as *A*. Then, profit per worker can be defined as:

$$\pi=(p-\alpha)e-a-A \quad (11)$$

In other words, the factory earns $(p-\alpha)$ per unit of output *e*, where *p* is the selling price of each unit and α is the piece rate, and pays for factory conditions, *a*, and for the worker's return migration costs, *A*. The firm is a price-taker under perfect competition, and so the price is represented as a constant parameter. It is assumed that migration restrictions, *f*, are costless for the firm, and so only enter into the problem through the worker's incentive compatibility constraint. In order to retain the worker, the factory must satisfy one of the following constraints:

$$V_R=(w_H-c_M-A)a_H(\bar{e}-e_H)\leq(w_S-c_M)a_S(\bar{e}-e_S)=V_S \quad (12)$$

$$V_R=(w_H-c_M-A-T(f))a_H(\bar{e}-e_H)\leq\frac{(w_F-c_M)a_F(\bar{e}-e_F[D(f)])}{R(f)}=V_F \quad (13)$$

Inequality (12) represents the constraint of the firm that allows free movement between the factory and the home country, while inequality (13) represents the constraint of the firm that has introduced migration restrictions. In both cases, the constraint requires that the worker earn at least as much utility from staying at the factory as she would from returning home. This is the condition that will keep the worker at the factory.

Then, the firm can choose which constraint to satisfy, either (12) or (13), to keep the worker at the factory after her arrival, and this choice will depend upon the shape of the profit function. Because equation (12) is a special case of equation (13), where f=0, henceforth, I'll refer only to equation (13) for the analysis.

Thus the factory faces a constrained optimization problem, maximizing profits subject to the worker's indifference curve in (13). This is represented by the following Lagrangian:

$$\mathcal{L}=(p-\alpha)e-a-A-\lambda(V_R-V_F) \tag{14}$$

Examining the first-order conditions of this profit-maximization problem and showing that profits increase by setting $f>0$ will indicate the conditions under which policies restricting worker movement are supported by the firm.

The resulting first order conditions are given by:

$$\frac{\partial\mathcal{L}}{\partial\alpha_F}=0=(p-\alpha_F)\frac{\partial e}{\partial\alpha_F}-e+\lambda\left[\frac{\partial V_F}{\partial\alpha_F}\right] \tag{15}$$

$$\frac{\partial\mathcal{L}}{\partial a_F}=0=-1+\lambda\left[\frac{\partial V_F}{\partial a_F}\right] \tag{16}$$

$$\frac{\partial\mathcal{L}}{\partial f}=0=(p-\alpha_F)\frac{\partial e}{\partial f}-\lambda\left[\frac{\partial V_R}{\partial f}-\frac{\partial V_F}{\partial f}\right] \tag{17}$$

$$\lambda\frac{\partial\mathcal{L}}{\partial\lambda}=0=\lambda[V_R-V_F] \tag{18}$$

From equation (16), it is clear that $\lambda\neq0$. That means that the constraint in equation (13) is binding and the profit-maximizing solution will lie on the worker's indifference curve. Because calculating exact solutions for each control variable is of little practical necessity, the choice of the firm to utilize restrictive policies will be examined through the profit function along the set of profit-maximizing bundles.

Since the constraint is binding, we know that, along the set of profit-maximizing bundles $\{\alpha^*,a^*,f^*\}$,

$$a^*=\alpha^*\frac{D(f^*)}{\bar{\alpha}}\left[\alpha\bar{e}-c_M-A-T(f^*)\right]^2\left[\alpha^*\bar{e}-c_MD(f^*)\right]^{-2}R(f^*) \tag{19}$$

Factory conditions along the set of optimal choices can be expressed as a function of f, the wage rate, and the fixed parameters of the model. Then, along this set of points, the factory will choose α and *f*, with *a* being chosen according to (19), and α being expressed as a function of *f* and the fixed parameters. In other words, the factory will choose the profit-maximizing level of migration restrictions as a function of the fixed parameters of the model. I'll call this choice f^*. As suggested by equation (19), whether the factory will set $\alpha_F<\alpha_S$ and $a_F<a_S$ is unclear and depends upon the functions $D(f)$,$R(f)$ and $T(f)$ and upon the specific values of the parameters in the model. The profit-maximizing choice of wages will be given by $\alpha^*=\alpha^*(f^*)$, and factory conditions can be expressed as $a=a^*(\alpha(f^*),f^*)$. As a result, the profits can be expressed as $\pi^*=\pi[a^*(f),\alpha^*(f),f]$ .This equation maps out how the profit-maximizing level of profits responds to migration restrictions. The relationship between profits and the optimal choice of wages and factory conditions and the use of migration restrictions, *f*, can be expressed as:

$$\frac{d\pi^*}{df}=\frac{\partial\pi}{\partial e}\frac{de^*}{df}+\frac{\partial\pi}{\partial\alpha}\frac{d\alpha^*}{df}+\frac{\partial\pi}{\partial a}\frac{da^*}{df} \qquad (20)$$

Or,

$$\frac{d\pi^*}{df}=\frac{de^*}{df}(p-\alpha^*)-e^*\frac{d\alpha^*}{df}-\frac{da^*}{df} \qquad (21)$$

The factory will choose to set $f>0$ provided that $\frac{d\pi}{df}>0$ at $\{\alpha^*,a^*,0\}$. Since $\frac{\partial\pi}{\partial e}$ is always positive and $\frac{\partial\pi}{\partial\alpha}$ and $\frac{\partial\pi}{\partial a}$ are always negative, the sign of this derivative will depend upon $\frac{de^*}{df}$, $\frac{d\alpha^*}{df}$, and $\frac{da^*}{df}$. That is, the decision of the firm to utilize policies restricting worker movement depends upon how these policies influence worker productivity, factory conditions and wages (insofar as limiting workers allows the factory to provide less amenable factory conditions and/or lower wages through shifting the worker's indifference curve).

These relationships are depicted in Figure (1) in the appendix. Indifference curves are graphed for the worker and iso-profit curves are shown for the factory and the optimal mix of wages and factory conditions are noted at points (A), (B), and (C). Assume that the factory is at point (A) when there is free movement from the factory (i.e. f=0). Point (A) lies on the indifference curve defined in equation (12). If the factory chooses to utilize restrictive policies (i.e. f>0), the factory will move to either point (C) or point (B). These points lie on indifference curves given by equation (13). If restricting worker movement causes the factory to end up at point (C), the factory will be earning lower profits, and paying higher wages and offering better factory conditions in order to induce the worker to stay. On the other hand, if the factory moves to point (B), they will be offering lower wages and worse factory conditions and earning higher profits. If the factory moves from point (A) to point (C), setting f>0 is not profit-maximizing. In this case, the factory would prefer to incentivize workers to remain in the factory, rather than using migration restrictions to deter them from leaving. In this case, the factory would set f=0 and provide the wages and factory conditions at point (A).

Figure (2A) in the appendix then maps out the shape of profits as a function of f in the case where the firm moves from point (A) to point (B), while Figure (2B) examines the case where the firm moves from point (A) to point (C). The profit function is graphed solely as a function of the optimal choice of f to see how profits react to the introduction of restrictive policies. This is to give a very brief depiction of how the choices of $\{\alpha^*(f), a^*(f), f\}$ can be mapped to the profit domain as a function of f and how this leads to the profit-maximizing solution for f^*.

To break the problem down into further detail, the relationship between worker productivity and forcing policies depends upon the function $D(f)$. More specifically, from equation (9), we have

$$\frac{\partial e_F}{\partial f} = -\frac{\bar{e}}{2}\left[\frac{1}{D(f)}\right]^2 D'(f) \qquad (22)$$

Thus, if forcing workers to stay in the factory causes them to work harder, it must be true that $D'(f)<0$, and if the opposite effect is observed, it must be true that $D'(f)>0$.

Returning to equation (21), in identifying what conditions will lead to a profit-maximizing solution with $f>0$, first assume that $D'(f)<0$. Then, $\frac{d\pi^*}{df}$ will be unambiguously greater than zero provided that $\frac{da^*}{df}<0$, and $\frac{d\alpha^*}{df}<0$. The simple interpretation of these conditions is that, if migration restrictions induce greater output and allow the factory to offer worse factory conditions (i.e. cheaper factory conditions) and lower wages, then these restrictive policies will be profit-maximizing.

Alternatively, if the opposite relationships are observed, $\frac{d\pi^*}{df}$ in equation (21) will be strictly less than zero. Thus, if workers require both higher wages and better factory conditions to be induced to stay under restricted movement, the factory would prefer to incentivize workers using only wages and factory conditions. However, if these derivatives work in opposite directions, so that, when restricting worker movement, worker productivity declines but the optimal choice of either wages or factory conditions is lower, or vice versa, the direction of the profit function is less clear.

The focus of empirical testing will be to determine whether either of the two above scenarios are realized. If it can be clearly seen that utilizing migration restrictions is a profit-maximizing strategy, this will suggest one set of potential interventions for preventing these types of worker manipulations. On the other hand, if it is clearly not an optimal choice to prevent worker return migration, then another set of practices is appropriate.

If it is the case that migration restrictions are profit-maximizing, it should also be the case that it is in the best interest of the firm to allow some freedom of movement. This is evident in the behavior of the many factories that restrict workers, but do not physically lock them in the factory. In order for an interior solution to exist, where workers are limited in their return migration choices, but not completely prevented from leaving, it must be true that there are diminishing returns to utilizing these policies. This would require that $\frac{d\pi^2}{d^2f}$<0. The second derivative is given by:

$$\frac{d\pi^2}{d^2f} = \frac{de^{*2}}{d^2f}(p-\alpha^*) - 2\frac{de^*}{df}\frac{d\alpha^*}{df} - e\frac{d\alpha^{*2}}{d^2f} - \frac{da^{*2}}{d^2f} \tag{23}$$

The direction of the second derivative is not clear, but if $\frac{de^*}{df}>0$ and $\frac{d\alpha^*}{df}<0$ (satisfying the conditions under which profits are unambiguously increasing), the second term will certainly be positive. So in order for an internal solution to exist, forcing workers to remain in the factory must have diminishing returns in either effort, wages, or working conditions. The interpretation is that factories can offer lower wages and less favorable working conditions, but only up to a point, as continuing to utilize manipulative policies causes the incentive compatibility constraint to move outward and become more costly for the firm to satisfy.

4 Data Description

The dataset used to test the theoretical results outlined above comes from the Better Work Jordan program. The Better Work project aims to study working conditions and operating policies in the apparel sector, using factory inspections to assess compliance with labor laws and international workplace standards. The aim of the project is to introduce policy interventions and influence legislation to improve the lives of factory workers. The program has been introduced in 6 countries including Haiti, Vietnam, Jordan, Nicaragua, Cambodia and Indonesia. Garment factories enrolled in the program receive biannual compliance visits from Better Work where any violations of labor laws or industry standards are noted. For the purposes of evaluating the impact of the Better Work initiatives, the Better Work Monitoring and Evaluation (BWME) team also implements surveys in factories enrolled in the project. Factory managers, general managers, industrial engineers, and workers are each surveyed once per year and asked questions relating to working conditions and factory operations.

As previously noted, this analysis uses data specifically from the Jordanian apparel sector. Garment workers in Jordan are primarily migrant workers and issues of limited access to worker documentation have been regularly reported. Thus, Jordanian garment factories provide an opportunity to test the conditions under which restrictive policies are profit-maximizing. One important issue to note is that, in Jordan, the length of stay is determined in a contract that is signed before the migrant begins work. So it may be the case that documents are taken from the worker for safekeeping, and not to restrict movement. However, taking documentation is a technically illegal practice, so I use any instance of taking documentation as restricting movement. This lack of differentiation between the two possible scenarios is a weakness of the data and the resulting estimates, but it is not likely to significantly change the results. A related weakness of the analysis is that migrant workers have signed contracts that specify the length of stay, and so their decisions to return migrate are limited by their contracts. Since the analysis focuses on policies used by the factory that are illegal, rather than the return migration decision of migrant workers, it is still interesting to look at why these policies are used.

In the Better Work compliance data, working conditions at the factory are assessed in terms of eight clusters, which are: child labor, discrimination, forced labor, freedom of association, compensation, contracts and human resources, occupational safety and health, and working time. Each cluster is represented by several compliance points. Compliance points are associated with specific questions that are checked in each factory and recorded as either compliant or non-compliant. Table (4) provides a list of each cluster and its associated compliance points.

Additionally, in the BWME survey program dataset, general and factory managers respond to questions relating to the market position, sales, costs, and output of the factory, while industrial engineers respond to survey questions relating to output and the production processes of the factory. Workers are surveyed regarding their experiences while working at the factory including wages and working conditions, along with providing information about demographic characteristics and their expectations about working at the factory and working in their home country. They are also asked questions to assess mental and physical health and general life satisfaction.

One notable limitation of the data is the lack of information about migration decisions. Workers respond to questions asking about when they expect to leave the factory, but there is no information regarding the specific length of the stay for migrants that leave before the end of their contracts.

4.1 Factory-level characteristics

Starting in 2011, factory participation in Better Work was required by the Jordanian government for any exporting apparel factory. This led to an enrollment of 60 factories employing approximately 90% of all workers in the garment sector. Prior to the enactment of the law in 2011, some factories had voluntarily joined the program. Early joiners to the program received one compliance visit and worker and factory manager survey in 2010. As a result, the dataset is constructed as an unbalanced panel at the worker level, with visits starting in 2010 and 32 factories with both compliance visits and surveys for at least one year.

19 of the 32 factories included in this panel utilize one or more policies aimed at restricting worker return migration, either through taking worker documentation (permits or identification), or limiting movement outside of the factory. Only 2 factories were found non-compliant on forced labor issues such as abusing prison labor or coercing workers to work overtime. The majority of workers are 21-35 years old, while more than 50% report finishing at least some secondary schooling and around 66% are female. In this sample, 66% of workers were born outside of Jordan, with the majority coming from Bangladesh and Sri Lanka. Frequency distributions for some worker demographic variables are presented in Table (2).

4.2 Constructing the dataset

In order to estimate the relationships considered in section (3), several variables must be constructed from the dataset. Table (3) reports summary statistics for some key variables used in the estimations below. These variables were created as follows.

The wage variable is based on a response from the worker survey. Workers report the amount of money they received in their last paycheck, along with their pay period and the number of days they worked. That information is used to construct a daily wage in US dollars, and then to create a yearly wage variable. A weighted wage index is used in the estimations, with the yearly wage weighted by the maximum reported wage.

To approximate the costs of migration and return migration, worker survey responses are used. Workers respond to questions about how much they spent to obtain a work contract and how much they expect it would cost to return home. According to the naming convention laid out in section (3), c_M and A are approximated using the worker survey responses to these two questions, converted to USD. In the estimations below, responses are weighted so they are expressed as indices between zero and one.

Worker productivity is represented as the efficiency rate of each line in the factory, which is a response in the industrial engineer's survey. The efficiency rate is a measure of the actual output of the factory compared to the potential output of the factory operating at full capacity. Productivity is also approximated using a worker survey response to whether or not the worker received a productivity bonus recently. The productivity bonus variable ranges from zero to 4, where zero refers to no bonuses and 4 refers to a worker that received an attendance bonus, a productivity bonus for her production line, and a productivity bonus for her own productivity and a skill bonus.

The price variable is reported in the survey of the general manager. Managers report revenue in the factory and quantity produced, which is used to construct a measure of the price of output in USD.

The remaining variables to be discussed are the factory conditions variable and the index *f*. There are many different elements that contribute to a positive or negative work environment, and these must be included in any measure of factory conditions, an issue that is addressed in the succeeding section. It is also important to establish how the variable *f* will be constructed, as it is the primary variable of interest. The process used to measure *f* will also be discussed in detail in a following section.

4.2.1 Worker satisfaction

To understand the components of factory conditions in determining worker satisfaction, a factor analysis approach is used. This is to create one measure of factory conditions that incorporates the many dimensions of the workplace environment and summarizes the data obtained from the Better Work factory compliance visits. Once the data has been factored into separate, orthogonal variables, I can then compress the eight clusters of factory compliance into one variable which represents the worker's satisfaction in the factory.

First, all compliance questions are sorted according to their respective compliance point. For instance, the compliance question "Does the workplace have a fire detection and alarm system?" was placed in the emergency preparedness compliance point. Again, all 38 compliance points are listed in the appendix in Table (4). In the dataset, for each question, factories receive either a 0, which means compliant, or a 1, which means non-compliant. I have chosen to recode the data so that 1 refers to compliance. Then, for every compliance point, indices were created using the factory average across compliance questions grouped into that point. Compliance indices represent the compliance rate across all questions within a compliance point. Indices with zero variance, including the union operations compliance index, were dropped from the analysis. A finding of zero variance for a compliance index implies all factories were compliant across all visits and all questions.

The compliance indices are then factored using principle component analysis. The suggested number of factors was seven using Horn's Parallel Analysis technique and retaining only factors with resulting eigenvalues greater than one. Using the Kaiser criterion, 8 factors yield eigenvalues greater than one. 7 factors were used for this analysis, following the suggestion of Gorusch (1974) that the Kaiser method overestimates the number of factors. The results of the factor analysis yield 7 orthogonal variables that summarize the 38 compliance points. Factor loadings are presented in Table (5). This table shows the weights given to each index in all seven factors. I have chosen to present only weights greater than 0.1 to make the table more readable.

Cronbach's α scores for each of the 7 factors are presented in Table (6). Cronbach's α tests the degree to which the components of the factors are measuring the same phenomenon. 4 of the factors have scores close to the cut-off point of 0.7, while 3 factors have quite low measures of internal consistency.

Looking at the resulting factor loadings in Table (5), there is some clear agreement between the factors predicted by the principal components analysis, and the compliance clusters used by Better Work to analyze factory conditions, listed in Table (4). The first factor is comprised of collective bargaining, freedom of association, and payment issues, which fall into two of the compliance clusters created by the project, namely, the freedom of association and compensation clusters. The second factor is closely related to the freedom of association and occupational safety and health clusters, while factor 3 includes occupational safety and health and compensation compliance points. Factor 4 includes occupational safety and health compliance points and several contracts and human resources compliance points, along with the discrimination compliance points. Factor 5 includes primarily compliance points from the contracts and human resources compliance cluster. Factor 6 is comprised primarily of occupational safety and health and contracts issues and factor 7 includes just 4 compliance points with weights greater than 0.2, from freedom of association, occupational safety and health, and discrimination clusters. As a result, we can be reasonably sure that our factors are measuring and accurately summarizing separate aspects of factory conditions.

Next, to determine the relationship between self-reported well-being and factory conditions, worker well-being is regressed on these seven factors. The dependent variable is created from worker survey responses. Workers answer questions about feeling restless, sad and hopeless, and the amount of time devoted to fun activities. For each worker, a well-being index is created as row average for the 4 questions. I coded the data so that a higher well-being index reflects a higher degree of well-being. Summary statistics for this index are provided in Table (3). The regression is run via OLS and includes some worker demographic characteristics such as age and education.

The predicted values from this regression are used to approximate factory conditions for each worker, and are taken to represent the variable *a* both in the above theoretical framework and below, in the empirical estimations.

These predicted values are included to reflect the portion of worker well-being that is determined by factory conditions. This allows us to approximate individual worker satisfaction with factory conditions using the compliance data. An increase in worker satisfaction implies that the factory is compliant across more compliance points. In the appendix, summary statistics for the resulting factory conditions are presented in Table (3), and the results of the regression of well-being on the 7 factors are presented in Table (7). Factors 2, 3, and 4 are significant in this regression, while the remaining 4 factors have coefficients that are not significantly different from zero.

The results of this factor analysis approach mirror closely the results found in Adler et. al (2013), which uses the Better Work Vietnam dataset to study the relationship between factory compliance data and worker well-being. The authors use a similar approach to the one described above and find similar factor loadings amongst the compliance data, and associated α scores and regression estimates.

4.2.2 Worker return migration

The decision of the factory to prevent worker return migration is represented as an index calculated as the factory average of a set of compliance questions. The compliance questions included in the index are listed below:

1. Do migrant workers have valid work permits and residence IDs?
2. Does the employer pay for the return trip of migrant workers who have been expelled from the country because of an invalid residence ID?

3. Has the employer taken steps to ensure that migrant workers do not pay any unauthorized fees?
4. Does the employer deny workers access to their personal documents?
5. Does the employer use threats such as deportation, cancellation of visas or reporting to the authorities in order to force workers to stay at the job?

The variable *f*, as described in section (3), is taken to be an index calculated as a row mean of the above five compliance questions. In section (3), an increase in the variable *f* implied that workers were more restricted in their migration decisions. So, I have left these compliance questions in their initial format, with a zero reflecting compliance and a one reflecting non-compliance. The index will range between zero, representing full compliance on all compliance questions, with no restrictions on worker movement, and one, indicating that all five violations occur in the factory.

If a factory were to take worker documentation or fail to provide the worker with a valid residence ID, the worker would be severely restricted in their choices. An additional concern for migrant workers are recruitment fees and costs associated with obtaining a work permit. In some cases, workers become indebted in the process of obtaining their jobs and cannot leave even in the face of poor working conditions due to these debts. As a result, the five compliance points included in the index provide a basic summary of the extent to which factories limit migrant workers. Indeed, some of these factory interventions reflect illegal actions, where the factory is breaking the law in order to limit return migration. Workers in factories where these policies are in place would face a much greater obstacle to leaving than those in factories where residence IDs are provided routinely and workers are not threatened or indebted.

5 Empirical strategy

To understand how profits are related to migration restrictions, I estimate four equations. The theoretical framework in section (3) suggests that the relationship between migration restrictions and profits will depend upon the relationship between restrictions and wages, factory conditions, and worker productivity. If it can be shown that the factory offers lower wages and worse factory conditions when migrate restrictions are used, with increasing per worker productivity, then it can be inferred from the theoretical framework in section (3) that profits are increasing in these restrictions. Thus, an answer can be provided for the question of why factories implement migration restrictions. This is the motivation behind estimating the four equations outlined below.

5.1 Worker productivity, wages, and factory conditions

As shown above, in section (3), along the profit-maximizing set of choices, wages, factory conditions and the variable *f*, representing migration restrictions, will be chosen simultaneously, with worker effort also depending upon wages and *f*. So, in order to estimate the impact of migration restrictions on productivity, factory conditions and wages, a simultaneous equations approach is needed. Recalling the fixed parameters included in the model laid out in section (3), migration costs, return migration costs, and the wage at home will also serve as explanatory variables. Thus, the following four structural equations are estimated:

$$e=\beta_0+\beta_1\alpha+\beta_2 c_M+\beta_3 A+\beta_4 ed+\beta_5 w_H+\beta_6 s+\beta_7 fctage+\beta_8 cnc+\Sigma_{i=1}^{i=10}\Delta_i Dept_i+\gamma_1 f+\varepsilon \qquad (24)$$

$$\alpha=\varphi_0+\varphi_1 e+\varphi_2 p+\varphi_3 a+\varphi_4 A+\varphi_5 ed+\varphi_6 fem+\varphi_7 c_m+\varphi_8 w_H+\varphi_9 age+\Sigma_{i=1}^{i=10}\Phi_i Dept_i+\gamma_2 f+\varepsilon \qquad (25)$$

$$a=\delta_o+\delta_1 A+\delta_2\alpha+\delta_3 e+\delta_4 s+\delta_5 p+\delta_6 fctage+\delta_7 c_M+\delta_8 w_H+\Sigma_{i=1}^{i=10}\varrho_i Dept_i+\gamma_3 f+\uparrow \qquad (26)$$

$$f = \lambda_0 + \lambda_1 e + \lambda_2 a + \lambda_3 \alpha + \lambda_4 A + \lambda_5 p + \lambda_6 c_M + \lambda_7 w_H + \lambda_8 rid + \lambda_9 s + \Upsilon \quad (27)$$

Worker efficiency depends upon the cost of migration and return migration, the wage rate at home, the index *f* and the wage rate. These variables all appear in the theoretical framework. I have also controlled for the education level of the worker, and the stress levels of the supervisor, denoted by *s*. Also, in order to introduce exogenous variation in *e*, to ensure that the equation is identified in the estimation, a second measure of efficiency is included from the factory manager's survey. The variable *cnc* is a response to the question of whether the efficiency rate is a concern in the factory. Worker efficiency is represented as the efficiency rate in the factory from the industrial engineer's survey, as explained in section (4). As a robustness check, these regressions were also run using whether the worker received a productivity bonus as the dependent variable. I also include the factory's age as an explanatory variable, to control for the fact that older factories may have less efficient production lines. This variable is called *fctage* in equation (24).

Wages depend upon worker effort, the price of factory output, as reported in the general manager's survey, factory conditions, return migration costs and migration costs, the wage at home and *f*. The worker's education level, gender, and age are included as controls.

Factory conditions depend upon return migration and migration costs, the wage rate, effort levels, the price of output, *f*, and the wage at home. The age of the factory is included as an additional explanatory variable to help control for unobservable factory-level characteristics that are constant over time. The supervisor stress variable, *s*, is also assumed to be related to conditions in the factory.

The variable *f* is a function of the wage rate in the factory, factory conditions, effort levels, the price of output, the wage rate at home, return migration costs, and migrations costs. To introduce exogenous variation in *f*, to ensure that these equations are identified, I have also included the variable *rid*, which is the worker response to whether she has access to her worker ID. The variable *rid* represents a second measure of migration restrictions, as the index *f* measures the compliance rate across migration restrictions from the Better Work dataset and the variable *rid* measures the compliance rate from the Tufts University worker survey. Supervisor stress, *s*, is also included in the estimation.

Worker effort, wages, and factory conditions all include department dummies, to account for potential differences in worker experience depending upon the particular job held at the factory. Whether factory managers choose to implement restrictive policies is assumed to be a factory-wide decision.

Additionally, each equation is estimated using indicator variables for each visit, to control for any changes in policy that occurred between visits (a simple alternative would be year dummies, however one factory received two visits within one year, one in March and one in November, so the visit approach is more appropriate). Thus, the dynamic aspect of factory policies in response to changing conditions within the Jordanian apparel sector is not addressed, and the impact of any change in factory attitude towards wages, conditions, or restricting worker return migration will not be estimated.

Two main policy initiatives in Jordan were adopted in the relevant period affecting working conditions in the apparel sector. In 2010, the government passed a law allowing workers to form trade unions and, in 2013, two employer associations signed a collective bargaining agreement to improve working conditions for the 50,000 workers covered by the agreement. These are the two most notable policy changes to occur within the timeframe of this dataset, and the impacts of the policies will be flushed out in the visit dummy coefficients. However, this change may provide an interesting opportunity in the future to study how collective bargaining agreements influence worker outcomes.

Naturally, the coefficients of interest are γ_1, γ_2,and γ_3 , which estimate the relationship between forcing workers to remain in the factory and effort levels, factory conditions, and wages. According to the theoretical results, if γ_2, γ_3 <0 and γ_1>0, choosing to utilize some policies included in the index *f* is a profit-maximizing choice. In section (3), this condition was stated as $\frac{de^*}{df}>0$, and $\frac{d\alpha^*}{df}$, $\frac{da^*}{df}$ <0. If the opposite signs are observed, this would suggest that workers in factories with restrictive policies must be compensated with higher wages and better factory conditions in order to prevent return migration. However, in order to observe an internal solution, where workers are allowed to leave if they choose (i.e. the factory puts policies in place that discourage worker movement, but don't entirely prevent it), it must be true that there are diminishing returns to using these policies.

5.2 Identification

A necessary condition for these equations to be identified is that the number of excluded instruments is greater than or equal to the number of endogenous variables. In the above estimates, department dummies are used to induce exogenous variation in wages, efficiency rate, and factory conditions, as these would be subject to changes at the department level, while the variable *f* is a factory-wide policy variable. Supervisor stress induces exogenous variation in *f*, factory conditions, and efficiency rates. Additionally, the worker survey response to whether the worker has access to her residence ID is used as an instrument for *f*, and the manager survey response to whether a low efficiency rate was a concern for the factory is used as an instrument for the efficiency rate of the factory. The age of the factory is also used as an explanatory variable for factory conditions and the efficiency rate, with the interpretation that older factories are less likely to be in compliance with certain labor laws and may have older or less efficient production processes.

Worker productivity has two endogenous explanatory variables, factory conditions and *f*, and two excluded instruments, prices and whether the worker has a residence ID. Wages are related to 3 endogenous explanatory variables, with three excluded instruments: supervisor stress levels, the age of the factory, and whether the efficiency rate is a concern in the factory. Three endogenous explanatory variables appear in the equation for factory conditions, which is identified through whether the worker has access to a residence ID, whether a low efficiency rate is a concern in the factory, and the education level of the worker. The variable *f* is identified through education level, the level of supervisor stress, and department dummy variables.

In particular, a worker survey response to whether she has access to her residence ID is a reasonable instrument for *f*, as it essentially provides a second method of measuring factory compliance with labor laws dealing with return migration. Additionally, a factory manager response to whether the efficiency rate is a concern in the factory provides a similar opportunity to exploit the multi-stage data collection process utilized by this project.

Furthermore, a necessary and sufficient condition for the identification of these structural equations is the rank condition. This condition is satisfied, which can be shown using the approach laid out in Gujarati (2004). In matrix form, the system of equations is given by:

$$\begin{bmatrix} e \\ \alpha \\ a \\ f \end{bmatrix} = \Omega + \begin{bmatrix} \beta_3 & \beta_2 & \beta_5 & \beta_4 & 0 & 0 & \Sigma_{i=1}^{i=10}\Delta_i & \beta_8 & \beta_6 & 0 & \beta_7 & 0 \\ \phi_4 & \phi_7 & \phi_8 & \phi_5 & \phi_6 & \phi_9 & \Sigma_{i=1}^{i=10}\Phi_i & 0 & 0 & \phi_2 & 0 & 0 \\ \delta_1 & \delta_7 & \delta_8 & 0 & 0 & 0 & \Sigma_{i=1}^{i=10}\rho_i & 0 & \delta_4 & \delta_5 & \delta_6 & 0 \\ \lambda_4 & \lambda_6 & \lambda_7 & 0 & 0 & 0 & 0 & 0 & \lambda_9 & \lambda_5 & 0 & \lambda_8 \end{bmatrix} X + \begin{bmatrix} \epsilon \\ \varepsilon \\ \upsilon \\ \Upsilon \end{bmatrix}$$

In this notation, Λ is a 4x12 matrix with each of the coefficients to be estimated for each equation, $[\beta_2,\ldots,\beta_6,\Delta_1,\ldots,\varphi_1\ldots]$ and X is a 12x1 matrix of exogenous variables. Ω is a 4x1 matrix of the endogenous variables in each equation, with the coefficients to be estimated. Following Gujarati (2004), a 4x12 matrix is constructed with ones replacing the coefficients from the matrix Λ.

$$\begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

Then, to ensure that the *ith* equation is identified, in the *ith* row, first, each column with a zero in that row is eliminated, and then the row itself is eliminated. If the remaining matrix has a rank of 3, or the number of suspected endogenous variables minus one, then the equation is identified. This is performed for each row to find that all equations are identified and the system satisfies the rank condition.

The estimation technique used is three-stage least squares, developed by Zellner and Theil (1962). By building off of the two-stage least squares method, using disturbances to instrument for endogenous variables, the authors construct an econometric method that simultaneously estimates all coefficients in the system of equations. The authors show that coefficient estimates for one equation are more efficient when the other equations are over-identified when this technique is used in place of two-stage least squares. Furthermore, under-identified equations are eliminated from the estimation process and equations with a zero disturbance (i.e. those defined only with exogenous variables) are also dropped from the analysis.

6 Results

6.1 Endogeneity

Table (8) presents the results of a linear regression via OLS separately estimating the impact of using *f* on wages, factory conditions, and worker productivity. In the wage and factory conditions equations, the variable *f* has a positive coefficient, and is highly significant in the factory conditions equation. In the worker productivity equation, the variable *f* has a positive and highly significant estimated coefficient. However, these estimates are likely to be biased and inconsistent, as factories choose wages, factory conditions, and *f* simultaneously, and effectively choose worker productivity through the choice of wages and *f*. Thus each of these four equations contain endogenous independent variables and OLS will return biased estimates of these relationships.

To address this concern, a test of the endogeneity of factory conditions, worker productivity, wages, and the variable *f* is performed. Following the approach suggested by Hausman (1978), the reduced form of each equation is first estimated via OLS and the residuals are predicted. Then each structural equation is estimated, including the residuals as additional explanatory variables. Finally, an F-test is performed to test the null hypotheses that the predicted coefficients on the saved residuals are jointly equal to zero. If the null hypothesis can be rejected at a sufficiently small significance level, this provides evidence that the variables are correlated with the dependent variable.

In the case of wages, the null hypothesis that factory conditions, productivity, and *f* are all exogenous cannot be rejected at any reasonable significance level. However, a test of the worker productivity structural equation rejects at the 1% level a test of exogeneity of wages and *f*. Using this method also suggests that wages, worker productivity, and *f* are all endogenous in the factory conditions structural equation. Finally, a test of the endogeneity of wages, factory conditions, and productivity in *f* rejects at the 1% level the joint insignificance of the coefficients on the predicted residuals from the reduced form estimation. These results provide strong evidence that OLS estimates will be biased due to the suspected endogeneity, and support the use of three-stage least squares to estimate the relationships described above while allowing each endogenous variable to be chosen simultaneously.

6.2 Estimation results

The results of this estimation technique are presented below in Table (9) and provide convincing evidence that firms experience increasing profits as a function of *f*, according to the specification of firm profits laid out in section (3). As shown in the table, $\gamma_1 > 0$, while $\gamma_2 < 0$, and $\gamma_3 < 0$. While insignificant at traditional significance levels, the p-value of the estimated coefficient γ_1 is about 0.18. These results provide tentative evidence that utilizing migration restrictions is a profit-maximizing decision, although the lack of strongly significant results suggests that there may be alternate explanations for these relationships. The finding that per worker productivity is increasing in the use of restrictive policies is surprising in an economic sense, but falls in line with the social psychological interpretation of abuse, wherein workers feel dehumanized and lose agency in abusive situations, causing them to react unpredictably.

The results also suggest that worker productivity is declining in the factory wage rate, a result that is predicted by the theoretical model in section (3). However, the estimated coefficients on the efficiency concern variable in the productivity equation, and the residence ID variable in the *f* equation suggest that they are weak instruments.

In general, this is a surprising result, as it contradicts the economic logic of the issue. Classic models looking at how changes in workplace environment alter the optimal mix of compensation and output would suggest that as conditions at the workplace become less agreeable, the wage rate must be raised to keep the worker from leaving. We can see from these results that this is not what is happening in these factories, which would suggest that the social psychological manipulation of worker's perceptions is keeping them at the factory, even when wages and factory conditions are declining.

Next, results are presented estimated using only factories with $f>0$. The purpose is to see if the relationship between the optimal choice of wages, factory conditions, and f is perhaps different in factories using f compared with those choosing to incentivize workers to stay in the factory. Because the decision to restrict worker movement in part depends upon exogenous parameters and the shape of the profit function, it may be the case that factories setting $f=0$ are structurally different from factories setting $f>0$, and this may skew the results from above. Table (11) provides summary statistics for some factory-level characteristics, to see if there are any clear differences between factories that use migration restrictions and those that don't. From the table, it appears that factories that do not use migration restrictions are more likely to have no competitors within 1 kilometer and are less likely to have holdings or operations in other countries.

From the results in Table (10), we can see that the number of observations falls to 285 from 449, implying that more than half of the workers in the sample work in factories where policies are being used to dissuade return migration. Under this specification, the estimated coefficient on f in the wage equation becomes negative and significant, while the estimated γ_3 remains negative and significant. The estimated value for γ_1 remains positive and significant. My finding provides strong evidence that firms utilizing restrictive policies are maximizing profits under the theoretical utility and profit functions laid out in section (3). Firms preventing return migration are able to offer lower wages and worse factory conditions. The hypothesized explanation for this is the increased perceived transaction costs. These factories also experience greater productivity due to the the manipulation of the shape of the worker's indifference curve.

Returning to the graph presented in section (3), these results imply that the firms are facing an indifference curve according to the first case, whereby upon introducing f, the worker's indifference curve shifts in. The implication is that the effect of increasing the transaction costs to remigrating is not outweighed by decreasing satisfaction from working in a factory utilizing migration restrictions, in determining the shape of the worker's indifference curve. These findings have important implications for how factory conditions are related to the optimal choice of wages by a firm. By manipulating the perceptions of workers, the factory is able to offer lower wages and worse factory conditions. These results could be extended to additional cases of worker manipulation in a factory setting to both explain how these poor working conditions come to exist and establish policies to prevent their recurrence.

6.3 Robustness check

As a robustness check, these structural equations are also estimated using an alternate measure of worker productivity. The worker survey contains information about whether the worker received a productivity bonus in the factory. I use it to replace the efficiency rate from the industrial engineer's survey in the estimation. The results are similar to those described in Table (9). γ_1 remains positive and significant. γ_2 switches sign and remains insignificant while γ_3 remains negative and is significant at the 1% level. The coefficient on the wage rate remains negative and highly significant in the productivity equation. Thus the results of the above estimations are not sensitive to measurement error stemming from the industrial engineer's survey response and we can be reasonably certain that these results are robust to alternate measurements of worker productivity.

7 Conclusion and future avenues of research

The results presented in section (6) provide evidence that factories find it optimal to restrict worker return migration by manipulating the perception of the workers' alternate options (i.e. their reservation wage). This result may either be due to increasing the actual cost of return migration through implementing restrictions, or to increasing the perception of the difficulty of leaving. The change in the cost of return migration, and the resulting change in the reservation utility of the worker, yields a possible explanation for why we see these types of negative factory policies, and suggests potential interventions for preventing these types of abuses.

The social psychology literature summarized above would suggest that these outcomes occur when the power structure of the firm and the attitude of the workplace towards abuse are not conducive to reporting. Because the factory is taking advantage of the changes in the perceived level of difficulty of leaving the workplace, this should be the target of policy interventions aimed at increasing worker agency. If workers are made aware of both the laws governing factory behavior towards migrant labor, and their options outside of the factory, this should diminish the impact of return migration restrictions, by providing workers with the information they need to make the choice that best represents their wishes. This is already a goal of the Better Work Jordan agenda, so it may be interesting to look at the changes over time in factory policies to evaluate if providing more information to workers indeed dampens the effect of return migration restrictions.

However, the evidence provided above only describes a partial equilibrium analysis. Future work that is needed to fully understand this problem is a complete description of the equilibrium state in this labor market. For the dataset used in this analysis, there is not a great degree of variation between factories with respect to the number of migrants employed, so this dynamic was not of particular interest. There are however obvious implications of utilizing these policies on the flow of immigrants into the country and into the factory. Incorporating a full description of labor supply under the use of migration restrictions would be an important addition to the analysis.

It would also be interesting to see this analysis applied to the garment industry in a different country. Since every country has differing labor laws, it would be interesting to see what results would be found using data from other countries. For instance, in Jordan, most workers are on contract, so the length of the working period is fixed when the worker arrives in the country. So, while we know that workers do not always have access to their passports and working documents, this may only be temporary and not intended to restrict the migrants from returning home (i.e., the factory is holding on to the documents for safekeeping). This may confound our results and so looking at another country may uncover a different effect.

Additional investigation into the reporting of factory conditions should also be done, to be sure that the results we see are not caused by information asymmetry between workers and managers. It may be the case that the abusive tactics on the part of the firm are being implemented by factory supervisors, on their own, without the knowledge of factory managers. This would suggest that a dynamic other than the one described in this analysis is causing these results.

The empirical analysis should also be extended to consider possible sorting behavior amongst workers and firms. It may be the case that factories using migration restrictions attract workers that are more responsive to these techniques. This would exaggerate the results that I have found.

A final additional area of further research is the recruitment behavior of factories and the extent of public awareness of factory conditions in the home country. In this analysis, the decision to migrate is essentially exogenous, based on exogenous expected wages and factory conditions.

Once the worker has arrived, these expectations may or may not be realized and that is not examined here. The factory does have some control over these expectations, however, both in the form of recruitment behavior, which may mislead the worker into expecting wages higher than they receive, and in the form of information being passed between workers in the factory and potential migrants at home. This would introduce a dynamic aspect to the problem, whereby the actions of the firm influence profits in the current period and the labor supply in future periods.

8 Appendix: Figures and Tables

Table 1: Table of variables

Variable	Variable name	How it's created
α	Wage rate	From worker survey; represented as a yearly wage index in USD
e	Productivity	From industrial engineer survey; reflects relationship between actual output and the capacity of the factory
c_M	Migration costs	From worker survey; represented as an index in USD
A	Remigration costs	From worker survey; represented as an index in USD
w_H	Wage at home	From worker survey; represented as an index in USD
p	Price	From general manager survey; represented as an index in USD
fctage	Factory age	From general manager survey; created using the date the factory was opened
cnc	Efficiency concern	From general manager survey; response to whether a low efficiency rate is a concern in the factory
ed	Education	From worker survey; level of education of the worker
age	Age	From worker survey; age of the respondent
s	Supervisor stress	From general manager survey; response to whether the supervisor's stress level was a concern in the factory
rid	Residence ID	From worker survey; worker response to whether the worker has access to her residence identification card

FIGURE 1. Condition for profit maximization

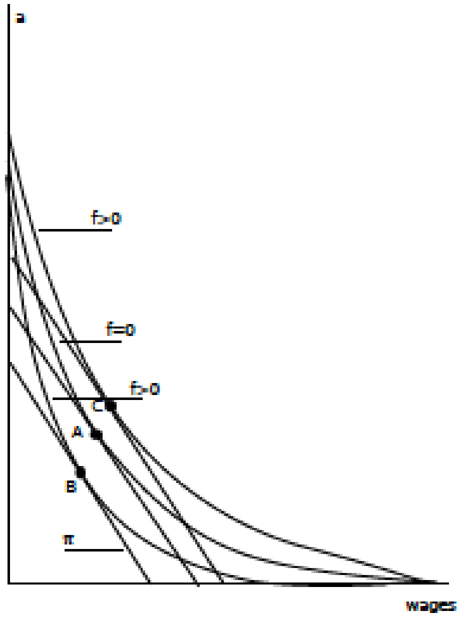
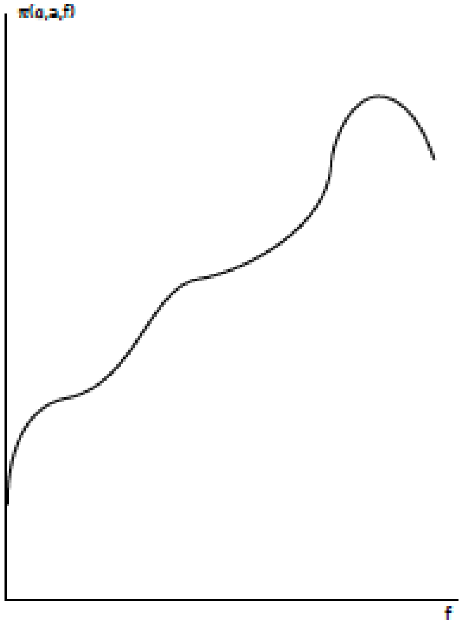
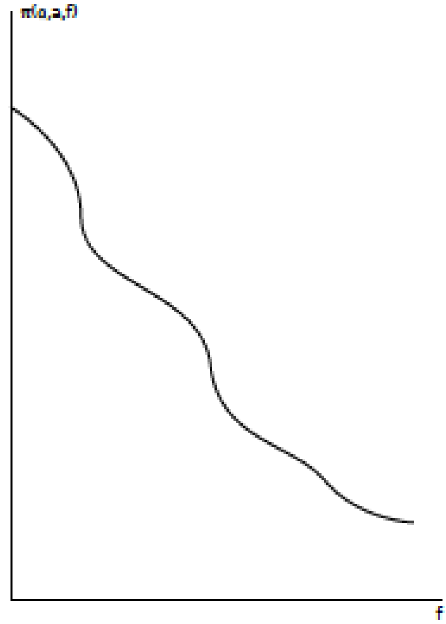


FIGURE 2. The relationship between π and f^*



(A) $\frac{\partial \pi}{\partial f} > 0$



(B) $\frac{\partial \pi}{\partial f} < 0$

Table 2: A frequency distribution of worker demographics

Education	Frequency	Cumul. Dist.
No formal education	53.0	5.1
Primary school	149.0	19.5
Lower secondary school	189.0	37.8
Upper secondary school	342.0	70.8
Short-term technical training	29.0	73.6
Long-term technical training	27.0	76.2
Professional secondary school	139.0	89.7
Junior college diploma	75.0	96.9
Bachelor's degree	32.0	100.0
Total	1,035.0	
Age	**Frequency**	**Cumul. Dist.**
18-20	73.0	7.0
21-25	257.0	31.4
26-30	303.0	60.3
30-35	221.0	81.3

36-40	127.0	93.4
40 or older	69.0	100.0
Total	1,050.0	

Birth	Frequency	Cumu l. Dist.
Jordan	362.0	34.6
Bangladesh	205.0	54.2
Sri Lanka	318.0	84.6
Pakistan	3.0	84.9
China	25.0	87.3
Other	133.0	100.0
Total	1,046.0	

Table 3: Summary statistics for key variables

Variable	Mean	SD	N
Worker characteristics			
Factory conditions	5.09	.318	877
Worker well-being	5.10	2.46	1025
Yearly wages	4649.99	10522.94	912
Yearly wage at home	1573.40	1973.19	1077
Cost of migration to the worker	367.57	1242.70	1077
Factory characteristics			
Price	321.67	951.28	1076
Efficiency rate	1.1	0.52	756
f	0.086	0.12	1077

Table 4: Compliance clusters

Compliance cluster	Compliance point
4*Child labor	Child laborers
	Unconditional worst forms
	Hazardous work
	Documentation and protection of young workers
4*Discrimination	Race and origin
	Religion and political opinions
	Gender
	Other
4*Forced labor	Coercion
	Bonded labor
	Forced labor and overtime
	Prison labor
5*Freedom of association and collective bargaining	Freedom to associate
	Union operations
	Interference and discrimination
	Collective bargaining
	Strikes
6*Compensation	Minimum wages
	Overtime wages
	Method of payment
	Wage information, use and deduction
	Paid leave
	Social security and other benefits
4*Contracts and human resources	Employment contracts
	Contracting procedures
	Termination
	Dialogue, discipline, and disputes
8*Occupational safety and health	OSH management systems
	Chemicals and hazardous substances
	Worker protection
	Working environment
	Health services and first aid
	Welfare facilities
	Worker accommodation
	Emergency preparedness
3*Working time	Regular hours
	Overtime
	Leave

Table 5: Factor loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
CBA	0.9297	0.1411	0.1794		0.1214		
Interference				0.1422	0.2561		0.7490
Strikes		0.1893	0.8728	0.2531			
Free association	0.4051	0.2335	0.8293	0.1749			
Chemicals		0.4106					
Emergency preparation		0.5170	0.4002		0.0534	0.4406	
Health services		0.3078			0.4916		
OSH management		0.4548				0.2566	0.3651
Welfare facitlities		0.1602	0.5275	0.1018	0.2886		
Accommodations	0.0416	0.4534		0.6905		0.1686	
Worker protection		0.396	0.4653		0.4120	0.1729	
Work environment	0.2166	0.4416	0.2644	0.2039			0.3795
OSH		0.8372	0.1899		0.1127	0.1489	0.1908
Leave					0.7138		
Overtime hours		0.7994					
Regular hours				0.1171	0.2190	0.6667	0.2707
Work time		0.7250			0.1472		
Payment method	0.4092	0.6587					
Wage	0.9297	0.1411	0.1794		0.1214		
Wage premium	0.5988			0.1878	0.3954	0.3284	
Benefits	0.7902				0.4405		
Information				0.3876	0.5889	0.2047	0.1360
Deductions	0.7350			0.1717		0.1882	
Discipline	0.7075	0.2388					
Gender discrimination	0.4123	0.3248		0.4432			0.1742
Race discrimination		0.5257		0.6545	0.2480		
Forced labor		0.1871	0.7064	0.3694			

Table 6: Cronbach's α

Factor 1	0.5874
Factor 2	0.7565
Factor 3	0.5975
Factor 4	0.6722
Factor 5	0.4090
Factor 6	0.2712
Factor 7	0.1665

Table 7: Worker satisfaction estimation

VARIABLES	(1) Well-being Index
Factor 1	0.00998
	(0.0912)
Factor 2	-0.164**
	(0.0781)
Factor 3	0.186*
	(0.102)
Factor4	-0.164*
	(0.0904)
Factor 5	0.0900
	(0.0878)
Factor 6	0.0122
	(0.0863)
Factor 7	0.0606
	(0.0634)
Wage	1.011
	(0.891)
Female	0.160
	(0.200)
Age	-0.0751
	(0.0651)
Educ	0.0843*
	(0.0434)
Constant	4.902***
	(0.461)
Observations	758
R-squared	0.024

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: OLS Estimation Results

VARIABLES	(1) Wage	(2) *f*	(3) Factory conditions	(4) Productivity
f	0.000516		0.209***	0.716***
	(0.0202)		(0.0145)	(0.0638)
Factory conditions	0.0300	1.022***		
	(0.0550)	(0.107)		
Productivity	-0.00223	0.232***	-0.0446***	
	(0.00317)	(0.0265)	(0.00841)	
Wage		-0.0361	0.00272	-0.0986
		(0.0324)	(0.0236)	(0.0963)
Return migration costs	-0.0129	0.0489	-0.0756***	0.0944
	(0.0353)	(0.0481)	(0.0236)	(0.0679)
Migration costs	0.101	0.187***	-0.0582***	-0.132**
	(0.0904)	(0.0437)	(0.0175)	(0.0660)
Home wage	-0.0332	0.0581	-0.0772***	0.225***
	(0.0358)	(0.0486)	(0.0218)	(0.0750)
Price	0.0767*	0.103***	-0.0283***	
	(0.0421)	(0.0141)	(0.00814)	
Residence ID		0.0194		
		(0.0134)		
Efficiency concern				-0.264***
				(0.0312)
Constant	-0.0301	-0.345***	0.316***	0.785***
	(0.0432)	(0.0422)	(0.0151)	(0.0643)
Worker demographics	Yes	No	No	Yes
Factory characteristics	No	No	Yes	Yes
Department dummies	Yes	No	Yes	Yes
Visit dummies	Yes	Yes	Yes	Yes
Observations	510	455	454	534
R-squared	0.273	0.338	0.415	0.320

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Simultaneously estimating α, *f*, *a*, and *e*

VARIABLES	(1) Wage	(2) *f*	(3) Factory conditions	(4) Productivity
f	-0.0237		-0.877**	0.493
	(0.0854)		(0.376)	(0.364)
Factory conditions	0.194	-0.366*		
	(0.341)	(0.194)		
Productivity	0.0661	0.675***	1.371*	
	(0.0520)	(0.161)	(0.721)	
Wage		-0.236	-1.119	-1.567**
		(0.207)	(1.382)	(0.728)
Return migration costs	-0.00715	-0.105	-0.250	0.130
	(0.0392)	(0.0754)	(0.177)	(0.105)
Migration costs	0.0950*	0.221*	0.420	-0.0854
	(0.0494)	(0.118)	(0.320)	(0.170)
Home wage	-0.0438	-0.232**	-0.540*	0.267***
	(0.0409)	(0.0912)	(0.293)	(0.104)
Price	0.0855***	0.115***	0.240	
	(0.0177)	(0.0446)	(0.171)	
		(0.0469)	(0.219)	(0.0664)
Residence ID		0.0257		
		(0.0206)		
Efficiency concern				-0.0774
				(0.0773)
Constant	-0.136*	-0.387**	-0.774	0.605***
	(0.0826)	(0.157)	(0.576)	(0.0814)
Worker demographics	Yes			Yes
Factory characteristics			Yes	Yes
Department dummies	Yes		Yes	Yes
Visit dummies	Yes	Yes	Yes	Yes
Observations	449	449	449	449

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Simultaneously estimating α, *f*, *a*, and *e* using only *f*>0

VARIABLES	(1) Wage	(2) *f*	(3) Factory conditions	(4) Productivity
f	-1.286***		-11.44***	2.642***
	(0.284)		(4.133)	(0.453)
Factory conditions	0.182	0.00798		
	(0.143)	(0.0809)		
Productivity	0.538***	0.398***	6.834**	
	(0.105)	(0.0277)	(2.842)	
Wage		-0.0929	-17.59*	1.393
		(0.0643)	(9.588)	(0.847)
Return migration costs	-0.0859**	-0.0573*	-1.848**	0.163
	(0.0412)	(0.0306)	(0.937)	(0.121)
Migration costs	0.111**	0.0120	2.407	-0.145
	(0.0561)	(0.0443)	(1.509)	(0.193)
Home wage	-0.0619	-0.0214	-2.178*	0.0655
	(0.0446)	(0.0339)	(1.290)	(0.143)
Price	0.0414**	-0.00766	1.083	
	(0.0161)	(0.0157)	(0.718)	
Residence ID		-0.0119		
		(0.00845)		
Efficiency concern				0.0697
				(0.144)
Constant	-0.335***	-0.174***	-2.771**	0.480***
	(0.0837)	(0.0312)	(1.361)	(0.121)
Worker demographics	Yes			Yes
Factory conditions			Yes	Yes
Department dummies	Yes		Yes	Yes
Visit dummies	Yes	Yes	Yes	Yes
Observations	285	285	285	285

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Relative frequency distributions for factory characteristics

Variable	All factories	*f*=0	*f*>0
Ownership			
Publicly listed	6.48	0	12.34
Privately held, LLC	50.84	46.82	54.47
Private enterprise	6.82	13.18	1.06
100% foreign owned company	34.86	40.00	30.21
Other	1.01	0	1.91
Number of apparel factories located within 1 km			
None	14.86	17.41	12.55
1 to 2	7.04	6.82	7.23
3 to 5	18.99	12.94	24.47
6 to 10	28.27	21.18	34.68
11 or more	27.60	34.82	21.06
Does the establishment have holdings or operations in other countries?			
No	42.32	56.05	29.71
Yes	57.68	43.95	70.29
Factory age			
1 to 5 years	13.02	10.86	14.90
6 to 10 years	59.09	64.45	54.43
11 to 15 years	18.66	19.26	18.14
16 to 20 years	9.22	5.43	12.52

Table 12: Robustness check using productivity bonus

VARIABLES	(1) Wage	(2) *f*	(3) Factory conditions	(4) Productivity bonus
f	0.129		-0.372***	3.425***
	(0.125)		(0.132)	(0.779)
Factory conditions	0.459	-1.396***		
	(0.849)	(0.125)		
Productivity bonus	-0.127	0.0697	0.0352	
	(0.239)	(0.0624)	(0.0428)	
Wage		-0.442*	0.0632	-5.073***
		(0.248)	(0.269)	(1.029)
Return migration costs	0.0212	-0.0601	-0.0290	0.119
	(0.0430)	(0.0593)	(0.0292)	(0.152)
Migration costs	0.0981	0.105	-0.0273	0.162
	(0.0813)	(0.105)	(0.0661)	(0.274)
Home wage	0.0495	-0.137**	-0.0661*	0.527***
	(0.112)	(0.0637)	(0.0389)	(0.154)
Price	0.0601	0.0610*	-0.00445	
	(0.0454)	(0.0361)	(0.0263)	
Residence ID		0.0101		
		(0.0154)		
			(0.0298)	(0.194)
Efficiency concern				-0.315***
				(0.0860)
Constant	-0.102	0.386***	0.249***	0.0521
	(0.161)	(0.0419)	(0.0178)	(0.0950)
Worker demographics	Yes			Yes
Factory characteristics	No	Yes	Yes	Yes
Department dummies	Yes	No	Yes	Yes
Visit dummies	Yes	Yes	Yes	Yes
Observations	559	559	559	559

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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