

Buying Stress

Is there a Business Case for Delivery Penalties in Sourcing Factories?

An honors thesis for the Department of International Relations

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Tufts University, 2015

Abstract

This paper explores the economic determinants of the psychological manifestation of cognitive load in supervisors in sourcing factories. The questions addressed in this thesis are: 1. How do late delivery penalties implemented by the buyer affect the stress level of the supervisor in the sourcing factories? 2. How does the stress level of the supervisor influence the amount of verbal abuse the workers in the factory are subjected to? 3. How does this use of verbal abuse, affected by the delivery penalty, affect both wages and productivity? The purpose of answering these questions is to analyze the proposed business case for delivery penalties. If the penalty is found to increase profits, measured here through increased productivity, of both the firm and the buyer, then there is a business case for the penalty. If the penalty is found to decrease profits for the firm, the buyer, or both, there is no business case. However, regardless of whether or not the firm enjoys profit gains, the buyer will implement the delivery penalty. The theory proposed in this thesis is that the penalty increases stress, increases verbal abuse, decreases wages, and decreases productivity. Through the creation of a theoretical model and regression analyses, the results disprove the possibility of a business case.

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Chapter 1: Introduction

Globalization of the apparel industry has changed the process of manufacturing. Production is now not based within a country's borders. Rather, it is fractured with each step of the process assigned internationally to minimize the cost of production a practice called 'outsourcing.'

Since outsourcing became key to globalization and international trade during the 1970sⁱ, attention has been drawn to the poor working conditions within supplier firms. Poor working conditions include verbal abuse, low wages, excessive overtime with and without pay, and sexual harassment.

Poor working conditions are a reflection of the organizational relations between superiors and subordinates. Imbalances in the organizational structure between managers and workers can lead to dehumanization that manifests as harsh treatment of workers.ⁱⁱ Based on this information, it would seem as though the root of the poor working conditions stems from those in higher in the factory hierarchy, the manager and the supervisor. However, do the poor working conditions really arise from an organizational structure imbalance between the manager and workers, or is there another participant whose actions are contributing to this imbalance?

In a three-tiered model of a factory, a manager is assumed to decide the wage, a supervisor incentivizes the workers to work using pecuniary and non-pecuniary motivational techniques, and the worker chooses work effort toward production of the final product.

However, one more actor is needed when considering the working conditions in this factory model: the buyer. Oxfam¹ and the Catholic Agency for Overseas Development (CAFOD)² provide evidence that the corporate buyer's pricing pressure, shortened delivery times, and increased demand for larger orders have all affected their supplier's ability to follow buyer-required codes of conduct.ⁱⁱⁱ While NGOs, Western consumers, and organizations such as Oxfam and CAFOD have highlighted certain effects of buyer behavior, it is still important to understand the mechanism through which buyer practices determine working conditions on the production line. For example, delivery pressure applied to a factory manager by a buyer cascades through the production hierarchy, raising stress for supervisors and workers in turn.

The determinants of poor working conditions have been studied from different disciplinary perspectives. Economists focus on working conditions as a component of a compensation package. A configuration of working conditions and wages is selected to minimize the cost of providing workers with their reservation compensation as well as the minimum requirements they believe to be necessary in creating a cohesive work environment. With regards to the supplier's relationship with the buyer, the buyer chooses the working conditions and chooses the production amount, which affects the wages. However, considering that working conditions are poor and wages are often low, and the gains each receives from the package are always imbalanced due to the buyer's power of choice over the supplier.^{iv} Sociologists emphasize the power dynamic and working relationship between the supervisor and the worker.^v

¹ Website: <http://www.oxfamamerica.org/>

² Website: <http://www.cafod.org.uk/>

Social psychologists, like sociologist, focus on social relationships and power, but also introduce concepts such as cognitive load: the stress created by time pressure.^{vi} Cognitive load describes the amount of mental effort used to process information in the long-term memory, which is also called the working memory.^{vii} Cognitive load may be one cause of the abusive behaviors of the supervisor.

Stress in the workplace related to cognitive load could be caused by several buying practices that range from product specific changes, such as the number of orders and price changes, to factory changes, such as changes in code compliance.^{viii, ix} Such behaviors may worsen working conditions for subordinates, with ambiguous consequences for factory productivity.

Cognitive load in this thesis will be discussed as a two-fold phenomenon. This thesis is examining cognitive load on the part of the supervisors. On the side of the supervisor, cognitive load affects what types of motivational techniques the supervisor uses in order to incentivize work effort. High cognitive load has been shown to lower the use of positive motivational techniques and raise the level of harsh methods, such as verbal abuse. On the side of the buyer, their practices may increase cognitive load of the supervisors by implementing a penalty on the firm for failure to meet contractual obligations such as deadlines for product delivery.

The purpose of this research is to understand the role of buyer behavior in determining working conditions. Analysis will focus particularly on the role of delivery pressure in increasing cognitive load for supervisors, reducing the use of positive motivational techniques and increasing the use of verbal abuse.

Chapter 2 will present a literature review, discussing the current research in the psychological, sociological, and economic fields regarding cognitive load theory, power relations, changing demands in the apparel factory, and codes of conduct. We turn in Chapter 3 to a theoretical framework for analyzing buyer behavior, cognitive load and verbal abuse. The supervisor will choose between positive motivational techniques and verbal abuse, as a function of cognitive load. In addition, a theoretical framework of the buyer's profit function and the firm's profit function are presented in which penalties are introduced. Chapter 4 will include a discussion and presentation of the regression equations used in this thesis. Chapter 5 will give a description of the data and show the summary statistics. Empirical findings are reported and discussed in Chapter 6. Conclusions follow in Chapter 7.

Chapter 2: Literature Review

The study of buyer behavior and its effect on cognitive load is interesting because it adds a new dimension in the economic study of worker wellbeing and working conditions. Typically, when studying worker wellbeing, authors focus on how the supervisor or manager in a factory affects the ability of the worker to work through pecuniary incentives, such as incentivized pay, or non-pecuniary incentives, such as verbal abuse. However, little research has been done on the effect of the buyer on the supervisor, which would then lead to these non-pecuniary incentives, bad working conditions, and low worker welfare. Below we discuss literature related to

- cognitive load theory, how it applies to manufacturing and global supply chains, and how it relates to supervisor stress
- power imbalances between superiors and subordinates, and the stress that is a result of this relationship
- the changing demands in the apparel industry and what that means for workers and supervisors in the supply chains and
- voluntary codes of conduct and how multiple codes and monitoring can cause stress.

Globalization of the apparel industry has brought attention to the sourcing practices of multinational corporations and the effects of common sourcing practices on their suppliers. Schmitz and Knorrinda (2000) find that the footwear industry is a price-driven industry. Pricing behavior by the buyers may ultimately have adverse consequences for supervisors and workers in the globalization process.^x For example, production pressure and price fluctuations limit a supplier's ability to learn and upgrade

competencies. Other studies, such as Gioia et al. (1986) and Krackhardt (1987), have examined the power imbalances in the supply chains between buyers and vendors, managers and supervisors, and supervisors and line workers. These imbalances may foment violations of individual rights and abuses that take place in the factories and effect and how these companies take measures to improve working conditions. Tokatli (2007) focuses the changing demands of the apparel industry, and the voluntary codes of conduct created by the apparel companies to mitigate the violations and abuses within the factories.

A critical question to understand is why sourcing practices and organizational imbalances promote harsh working conditions. Economic theory concludes that working conditions are a consequence of the value that workers place on a marginal improvement in working conditions relative to the cost to the firm. If the marginal willingness to pay in terms of forgone wages is greater than the marginal cost to the firm, then a cost-minimizing firm will make the investment in improved working conditions. However, insights from social psychology suggest that additional factors may play a significant role.

Cognitive load theory is a psychological theory that offers additional insight into how buyer behavior affects and applies to the buyer–supplier relationship and the consequences for working conditions. Paas, Renkl, and Sweller (2003) outline and define cognitive load theory by explaining the three different types of cognitive load. Intrinsic cognitive load is the idea that instructions inherently have a level of difficulty, but this level of difficulty is manageable and the instructions and information are easy to comprehend.^{xi} Extraneous cognitive load is the idea that information and instructions

have a high level of difficulty in comprehension, and therefore it is difficult to process the information. Thus, the learner is ineffective at understanding the instructions.^{xii}

The authors argue that intrinsic cognitive load and extraneous cognitive load are additive. When intrinsic cognitive load is high, extraneous cognitive load will be high. These two forms of instruction are seen as, respectively, relatively ineffective and definitely ineffective because of how the instructors present the information. The information is not presented in a manner that adheres to the learner's abilities.

Germane cognitive load occurs when the information is presented to the learners in an effective manner so that they are able to understand and retain information. Germane cognitive load is the outcome instructors should strive for when presenting the information.^{xiii}

These concepts of cognitive load apply to the supervisors in vendor factories because they are receiving instructions from the buyer regarding production, delivery times, and compliance. The buyer creates the instructions, often with little regard to phrasing and how the firm managers will understand them. The manager then relays this information to the supervisor, knowing that this could increase the amount of stress or cognitive load that the supervisor experiences. If the sourcing practice is beneficial in maximizing profits, then the firm will continue to implement it and relay those types of instructions to the supervisor. This increases the levels of extraneous cognitive load within the supervisors and stress levels, potentially causing the supervisors to verbally abuse the workers to motivate them.

Supervisor's stress manifests in several different ways. Barrientos (2013) conducted a study that focused on how women-oriented NGOs attempt to improve

working conditions of a comparatively feminized labor force in fruit and garment global production networks. The focus of the paper does not speak to the present research question, but there is one line in the paper in which Barrientos reports on the pressures that promote stress in supervisors. She writes, “Commercial pressures on suppliers include: lowering the prices; rising standards paid for by the suppliers; shortening lead times from the placement of an order to delivery; increasing the number of small repeat orders rather than placing a single large advance order; plus the use of insecure contracts or sealed bids to spurn competition between suppliers.”^{xiv}

Over time, all of these pressures may contribute to poor working conditions within the factories. Large production orders that manufacturers are unable to meet may mean that overtime will be forced on the workers. Lowering the price could place downward pressure on workers’ wages or increase the probability of a late payment.

Cognitive load of managers created by buying practices may be transmitted to supervisors, with implications for their treatment of production workers. Gioia (1986) examines the verbal behaviors of superiors and in a performance evaluation setting. The authors use the word “attribution” which refers to attribution theory. Attribution theory refers to how information is used to explain events.^{xv} Managers seek attributions to explain the poor or successful performance of a subordinate in a specific task.^{xvi}

Gioia and Simms found that in the failure condition—or when there was low performance when attempting to finish the tasks during the experiment—there is a leniency effect, which happens because managers become less likely to actually place blame on the subordinate for their poor performance.^{xvii} However, the authors do find that “in terms of managerial verbal behaviors, higher performance evoked more positive

statements and low performance more punitive verbal behaviors and attributions for failure.”^{xviii}

In a buyer–supplier setting, this evidence shows that failure does bring on punitive measures. If the supplier fails to produce as much clothing needed to meet the production quota or doesn’t meet a delivery time, the buyer will take punitive measures. Evidence that verbal abuse is common in apparel factories has been provided by Rourke (2014).

Understanding the role of hierarchical imbalances in the factory requires analysis of the nature of the organizational social structure. Krackhardt (1987) conducted a study that focused challenging the results of another study conducted by Bernard, Kilworth, and Sailer (BKS) (1984). In the BKS study, the authors find that there is a distortion between events that actually occurred during the experiment, and the report that participant’s give after the experiment is finished.^{xix} That is, the interactions that occurred during the study were different from participant reports.^{xx} Krackhardt argues that there is a bias in BKS’ problem toward behavioral patterns when people interact with each other.^{xxi} But these patterns at the base depend on psychological perceptions and cognition.

Overall, Krackhardt found that in organizations there is a hierarchy that results in a “number of noncyclical, asymmetric advice relations.”^{xxii} This finding is important because it demonstrates the role of hierarchy between management and subordinates. If the subordinate perceives that he/she is unable to adequately communicate to their superior or is afraid to do so, the subordinate is less likely to seek interaction. As a consequence, the subordinate’s perception of the interaction could be different from the superior’s characterization of their relationship. If the superior believes that he/she has

created an environment where a supervisor is able to communicate and seek interaction, but does not do so, the superior may believe that there is nothing wrong with his/her behavior.

The apparel industry being buyer-driven means the industry is based on buyer demands. Styles and trends are subject to change in a moment's notice. This could cause undue stress for supervisors as they attempt to change production lines and move with the demands of the buyers and the global market. Tokatli et al. (2010) examine how changes in global tastes of clothing and how clothing is produced have affected Istanbul's economy. The article focuses on how the manufacturers in Istanbul contracted by leading brand firms have coped with new demands due to this change in taste and what the implications and effects are on the labor force.^{xxiii} They provide evidence that increased demand and new tastes for embellished clothing put pressure on manufacturing suppliers. Manufacturers have to shift from manufacturing clothing in a "ready-to-wear" fashion to the quick turn around times of fast fashion by increasing their competencies and technological skills.

But some buyers question whether they are responsible for the pressures and violations that are abundant in global supply chains. Insight Investment³ and Acona⁴ examined the buying behavior of the multinational companies. They suggest that while there are several violations and abuses that take place within the factories, all of the responsibility for those violations should not be on the managers and supervisors.^{xxiv} As the multinational companies increasingly source from larger supply chains, buying practices start to affect manufacturing. Due to changing tastes, increased demands, and

³ Website: <http://www.insightinvestment.com/>

⁴ Website: <http://www.acona.com>

less clarity, manufacturers are not able to always comply with the voluntary codes of conduct.^{xxv} However if the manufacturers a company contacts from are small due to lower costs, the process of making the clothing and having the demands from the buyer would put a lot of pressure on the supplier. This paper provides insight into the buying process and relates to cognitive load because increased demand for garments made by smaller manufacturers could cause more stress in the managers and supervisors who are trying to process the information at the same time as trying to fulfill previous orders that the suppliers placed, thus leading to poor working conditions.

Evidence suggests that changing demands do contribute to stress of supervisors. In terms of adhering to the voluntary codes of compliance, Iwanow (2005) found that there is so much pressure that “apparel factory inspectors are instructed by the government to be lenient in order to protect economic growth.”^{xxvi} Iwanow’s finding would imply that the demands from the consumer and the retailer are so daunting that compliance suffers, supervisors suffer, and workers suffer.

Locke et al. (2007) also conducted a study that questioned whether voluntary monitoring practices that have been implemented by many leading apparel companies are effective in improving working conditions and enforced labor rights in the foreign countries.^{xxvii} The authors use data from Nike’s M-Audits to see which factors determine factory compliance with the Nike’s code of conduct. Their findings show that on its own, Nike’s code of conduct is not very effective, but implemented in conjunction with other interventions, working conditions improved in the factories.^{xxviii}

To add emphasis to the inefficacy of self-imposed voluntary codes of conduct, it was shown in Iwanow’s study that China is the country with the most code of conduct

violations. In fact, between 10 and 25 percent of factories were reported to have used psychological and verbal abuse against workers. This finding could be because workers are not motivated enough to work and therefore supervisors resort to abuse.^{xxix} Such findings indicate that codes of conduct implemented by the lead apparel companies on their own do not change compliance

The conclusions of all of the pieces of literature are as follows:

The following presents some literature that suggests the following conclusions.

- Cognitive load is ineffective and causes a disruption in the way supervisors process information, allowing for stress levels to increase and verbal abuse to increase.
- Commercial pressures from the buyers promote stress in supervisors
- Low-performance could lead to leniency in punishment due to the attribution theory, but more often than not leads to punitive repercussions.
- Characterization and perception of a relationship depends entirely on one's position within the hierarchy in a firm. Perceptions do not always match up.
- Shifts in consumer demands can cause changes in apparel manufacturing at a moment's notice, causing increased stress in the suppliers.
- If buyers source from smaller manufacturers in order to minimize costs, but are still ordering large deliveries, the manufacturers will experience undue stress and increased pressure to meet the buyer's needs and still be compliant to the voluntary code of conduct.

- Voluntary codes of conduct are not necessarily as effective as a buyer might think because a supplier faces multiple, all with different requirements. This could lead to governments being more lenient in order to promote growth, or workers experiencing more verbal abuse.

In conclusion, the psychology literature on cognitive load suggests that increasing and more difficult instructions may increase cognitive load as well. Difficult instructions cause an increase in both intrinsic cognitive load and extraneous cognitive load. If the information presented to the supervisors by the managers causes an increase in both of these types of cognitive load, there is a high possibility that the supervisors will then turn to non-pecuniary incentives to increase productivity in the factory.

The literature reinforces the supposition that there is often an imbalance in the organizational hierarchy between superiors and subordinates, which can be related to the relationship between the buyer and supplier. The buyer ultimately has control over the amount of power the supplier has within the supply chain. They are free to prohibit and terminate contracts as they wish in the face of one small infraction by the supplier. With the buyer regulating the areas of manufacturing that produce profits and revenue, the supplier is relegated to the lower-return areas.

Chapter 3: Theoretical Model

Theoretical Framework

The purpose of this theoretical model is to understand how cognitive load affects working conditions in the firm; the role that buyer-imposed penalties play in determining working conditions, why the firm allows the penalty to be used even though it increases cognitive load; and why the buyer implements the penalty. The variables chosen above are indicators of what buyer behavior increase cognitive load in the supervisors. But this model is important in giving a reason as to why cognitive load happens and how it affects each actor in the model. The theoretical framework presented below was created to illustrate the economic relationships between choices made by each actor in the model (the supervisor, the firm, and the buyer) and cognitive load.

When considering the incentive structure of the firm in this section, a four-tiered model will be used. For simplicity's sake, a firm is comprised of three actors—a manager, a supervisor, and a worker. The buyer, which places orders with the firm, is a single actor as well. With the addition of the buyer, the business model presented in this thesis is a four-tiered model.

In this model, the manager sets the wages of the supervisor and the workers such that each agent meets the minimum utility required to be willing to remain employed with the factory. The supervisor chooses the motivation to incentivize the workers to work, and the workers choose the effort needed to meet production levels based on the motivation choice of the supervisor. The motivational technique, positive or negative, used by the supervisor depends on his or her cognitive load level. The buyer in this model chooses the penalties that will incentivize the firm to meet delivery times, which implies that the buyer is essentially choosing the amount of cognitive load.

The worker's pay in this model is determined by an hourly rate, α . The worker's utility function depends positively on pay (α), negatively on effort (e), and negatively on verbal abuse (v). In order to induce the worker to accept employment in the factory, the firm must set a wage-working conditions configuration that satisfies the worker's reservation utility, \bar{U}_w . Since the worker is paid by the hour, the level of effort is set just high enough to prevent the firm from terminating the worker. The worker takes this value to be $e = e_0$.

The worker's participation constraint then is as follows:

$$(1) \quad \bar{U}_w \leq \alpha(\bar{e} - e_0)(\bar{v} - v)$$

The disutility from effort is $(\bar{e} - e_0)$ and the disutility from verbal abuse is $(\bar{v} - v)$. If this minimum utility is not met, the worker will quit working at the firm.

Unlike the wage of the worker, the supervisor is paid by the piece, meaning their total pay depends on the piece rate, γ , and the quantity produced, q . The quantity produced depends linearly on the level of effort exerted by the worker and the motivation, M , applied by the supervisor. Thus, in this model, q is as follows:

$$(2) \quad q = e_0 + M$$

The total actual motivation depends on the positive motivation and verbal abuse, given by

$$(3) \quad M = I + \theta v$$

I reflects the positive motivation techniques that are an option for the supervisor to choose when incentivizing workers to work and v is verbal abuse. θ is an ambiguous productivity effect of verbal abuse. Theoretically, θ is ambiguous because there is no certain method of ascertaining whether or not verbal abuse increases productivity.

The supervisor's participation constraint is as follows:

$$(4) \bar{U}_s \leq \gamma(e_0 + M)(\varphi\bar{v} - v)(\bar{M} - M)$$

In this function, $\gamma(e_0 + M)$ represents the monetary compensation received by the supervisor. The supervisor in this model receives pay based on the number of pieces produced in the factory, a piece-rate system. The expression $(e_0 + M)$ represents the quantity, while γ represents the piece rate. M signifies the motivation techniques that the supervisor uses in order to incentivize her workers to work. The next expression, $(\varphi\bar{v} - v)$, reflects the disutility the supervisor gets from yelling. φ accounts for the individual based threshold for yelling, (\bar{v}) , and v represents verbal abuse. Finally, $(\bar{M} - M)$ is the relative disutility from using the motivation techniques.

As noted above, motivation, M , can be positive or negative. The supervisor is assumed to prefer positive techniques, I , but will use verbal abuse, v , under cognitive load. Verbal abuse, v , then, is proportional to total motivation, M , where the factor of proportionality is determined by the level of cognitive load, μ , as can be seen in equation (5).

$$(5) v = \mu M$$

Equation (5) indicates that as cognitive load increases verbal abuse also increases. This model assumes that supervisors have chosen a planned motivation technique and have decided to stick with that motivation technique.

The manager seeks to maximize profits. The firm's profit function is as follows:

$$(6) \pi = pq - t(\bar{q} - q) - \alpha - \gamma q$$

where p is the price per unit of output. The expression $t(\bar{q} - q)$ in equation (6) represents the costs the firm incurs from the penalty, pq is the revenue the firm gets from their

product and α and γq are the wages paid to the worker and supervisor respectively. t signifies the penalties that the firm faces if it does not deliver the full order, \bar{q} .

The higher the penalty t , the greater the pressure placed on the firm. Therefore, we take cognitive load, μ , to be equal to the penalty t . That is

$$(7) \mu = t$$

Finally, the buyer has two issues facing them. First, the buyer wants to set a price that maximizes profits. The second issue for the buyer is on time delivery. The buyer chooses the penalty to set for the firm if the delivery of the product is not on time so that they can collect revenues from it. The buyer's profit function is:

$$(8) \pi_B = p'q + t(\bar{q} - q) - pq$$

Where p' is the price at which the international buyer can sell the product to the final consumer.

p is taken to be the average total cost of the buyer, which includes the reservation levels of both the worker and the supervisor of the firm.

$$(9) p = \frac{\bar{U}_w + \bar{U}_s}{q}$$

$t(\bar{q} - q)$ is the penalty revenues that the buyer receives from implementing the penalty, and pq is what the buyer pays the firm. The effect of t on profits in the profit function of the firm and that of the buyer is different, which could lead to misaligned interests. It could be that the penalty is helping the buyer's profits, but is causing undue stress in the firm thereby lowering profits. In order to figure out if interests of both actors are aligned, I will look at the first order conditions.

The actor who is most relevant to this research question is the supervisor. The supervisor is the actor who processes information from the manager given by the buyer

and then relays that information to the worker. If the information is incomprehensible or, in this case, comes as a sort of threat of penalty, cognitive load will most likely increase in the supervisor. The increase in cognitive load affects the worker in that I believe the supervisor would be more likely to choose verbal abuse to motivate workers. Recall equation (4) in this section, the supervisor's utility function. The first derivative of this equation, taking $(\varphi\bar{v} - v)$ as given, since supervisors will yell, is:

$$(4a) \frac{d\bar{U}_S}{dM} \geq \gamma(\varphi\bar{v} - v)(\bar{M} - M) - \gamma(e_0 + M)(\varphi\bar{v} - v)$$

Setting the first order condition equal to zero, the utility maximizing amount of motivation is given by

$$(10) M^e = \frac{\bar{M} - e_0}{2}$$

M^e is planned motivation. The supervisor plans to use M^e to motivate the worker to work. However, under the weight of cognitive load, μ , the supervisor fails to do so. Supervisors want to motivate their workers, but due to the cognitive load, often they turn to yelling. Substituting equation (10) into equations (3) and (5), we see that actual verbal abuse and positive motivation are given by

$$(5a) v = \mu \left(\frac{\bar{M} - e_0}{2} \right)$$

$$(11) I = (1 - \mu) \left(\frac{\bar{M} - e_0}{2} \right)$$

Both of these equations show that planned motivation does affect the use and levels of yelling and positive motivation techniques within the factories.

Using (2) and substituting (3) in for M , then substituting (5a) and (11) in for v and I respectively, and finally simplifying, the resulting quantity equation is:

$$(12) q = \left[\frac{1}{2} + \frac{\mu}{2}(1 - \theta) \right] e_0 + (1 - \mu + \theta\mu) \frac{\bar{M}}{2}$$

The quantity equation is important because the first derivative will explain how penalties affect the output in factories, which can also be said for how cognitive load affects output in the factories because of (7). However, first, I would like to explain the reservation utilities of the worker and supervisor.

$$(13) \alpha = \frac{\overline{U}_W}{(\bar{e} - e_0)(\bar{v} - ((\mu)\left(\frac{\bar{M} - e_0}{2}\right))}$$

$$(14) \gamma = \frac{\overline{U}_S}{(e_0 + \left[\frac{1}{2} + \frac{\mu}{2}(1 - \theta)\right]e_0 + (1 - \mu + \theta\mu)\frac{\bar{M}}{2})(\varphi\bar{v} - v)(\bar{M} - \frac{\bar{M} - e_0}{2})}$$

By substituting (5a) into the worker utility function and solving for α , I now know the wage that the managers have to pay the workers in order to get and keep them at the factory. If the reservation level is not met, the worker will leave the factory. (14) is reservation level of the supervisor, with (12) and (10) substituted in. Similar to the worker, if the supervisor is not paid γ , the reservation level is not met, and the supervisor will leave the factory. So, the manager has to set the wage at γ in order to keep the supervisor at the factory. This is important to note because it is another piece that both the firm and buyer have to take into account in their profit functions, as seen in (9) and (6). For the buyer, this added piece is part of the price they set for the product that consumers buy, so it is part of their revenues. For the firm, this is part of their costs, which they need to pay their employees.

Focusing now on the penalties that the buyer puts in place, both the firm's profit function and the buyer's profit function depend on the effect of t . However, in order to fully understand the effect, we must first take the derivative of q , v , I , and M with respect to t . Remembering equation (7), I can easily substitute μ for t in the quantity equation. As such, the derivatives for v , I , and M are as follows

$$(5a') \frac{\delta v}{\delta t} = \left(\frac{\bar{M} - e_0}{2} \right)$$

$$(11a') \frac{\delta I}{\delta t} = - \left(\frac{\bar{M} - e_0}{2} \right)$$

$$(10') \frac{\delta M^e}{\delta t} = 0$$

$\frac{\delta v}{\delta t}$ is positive. v and t have a positive relationship, meaning that as the penalty increases verbal abuse. The relationship between verbal abuse and the penalty is important because it could have negative effects on the firm's profits if verbal abuse has a negative productivity effect.

The relationship between positive motivation techniques and the penalty is negative; as positive the penalty increases positive motivation decreases. This result, the inverse relationship between I and t , is to be expected intuitively. If the penalties for late deliveries were to rise, the stress of those penalties may cause the supervisors to choose a more direct and punitive way of motivating their workers instead of positive incentives.

When trying to figure out how the penalty will affect both the buyer and the supervisor, I need to look at the first derivative of the quantity equation, with t substituted in for μ . The derivative of q with respect to t is

$$(15) \frac{\delta q}{\delta t} = - \left[\frac{1-\theta}{2} \right] [\bar{M} - e_0]$$

From this equation, I see that $\frac{\delta q}{\delta t}$ is ambiguous. $\frac{\delta q}{\delta t}$ depends on θ . If θ is greater than 1, then $\frac{\delta q}{\delta t}$ will be greater than 0, meaning that t is big and that t has a positive effect on q . If θ is less than 1, $\frac{\delta q}{\delta t}$ will be less than 0, meaning that t is small and has a negative effect on q . Since $\frac{\delta q}{\delta t}$ is negative, I cannot tell whether or not the firm's and buyer's profits will be positively or negatively affected by $\frac{\delta q}{\delta t}$.

In order to understand the trends of both of these profit functions; I need to look at both of the derivatives of the profit functions.

$$(16) \frac{\delta \pi}{\delta t} = p \frac{\delta q}{\delta t} - (\bar{q} - q) + t \frac{\delta q}{\delta t} - \gamma \frac{\delta q}{\delta t}$$

$$(17) \frac{\delta \pi_B}{\delta t} = (\bar{q} - q) - (p' - t) \left[\frac{1-\theta}{2} \right] [\bar{M} - e_0]$$

In the first equation, (16), when differentiating π with respect to t , we find that the ambiguity of $\frac{\delta q}{\delta t}$ still holds. If $\frac{\delta q}{\delta t}$ is negative, the penalty will have a negative effect on the firm's π . This means that allowing the stress to increase in their supervisors is potentially detrimental to the firm and is definitely bad for profits. This could put the firm and the buyer at odds in terms of their interests. If $\frac{\delta q}{\delta t}$ is positive, the penalty will have a positive effect on π and will be good for the firm. The positive effect that $\frac{\delta q}{\delta t}$ has on profits means that the firm wants the verbal abuse and yelling the supervisor does to motivate workers to continue because quantity increases. What is interesting is that $\frac{\delta q}{\delta v}$ equals θ . The impact of v on q must be pretty strong in order to have $\frac{\delta q}{\delta t}$ greater than zero.

The second equation, (17), results in θ being ambiguous in this case. If θ is greater than 1, then verbal abuse increases output. This increases t , and the whole equation is positive. $(\bar{q} - q)$ has to be a negative term in order to drive the buyer to incentivize production. The buyer wants to increase t to the point where $q > \bar{q}$. At this point, the firm overshoots the output amount. This would cause the firm to want to keep t at such a high level. It is a punishment for the firm, but a reward for the buyer. If θ is less

than one, t increases q , but not as large as \bar{q} . The buyer won't push the firm until $q = \bar{q}$. However, while the firm does not like the penalty, the buyer will still use it.

The theoretical model presented in this chapter has offered an understanding of how the penalties implemented by the buyer affects all levels of the supply chain. Depending on how q interacts with t , firms can either support or oppose the penalty. The firm does not have a choice regarding the penalty, as the choice to implement the penalty is that of the buyer. The buyer chooses to implement the penalty based on their perception of having a business case for the penalty, essentially they believe that the penalty increases production and profits. The figure below illustrates the perceived business case for delivery penalties.

Figure 1



This figure illustrates the business model that buyers perceive to be happening when implementing delivery penalties, the work place stressor. Overall the buyer believes that the penalty is motivating the firm to meet the deadline, decreasing wages, while at the same time, increasing productivity. This increased productivity would increase profits overall, if this schematic were the case. However, I believe that instead of productivity increasing, due to the cognitive load and increased verbal abuse, productivity decreases

Chapter 4: Empirical Strategy

The overall question addressed in this thesis is why does verbal abuse occur? I take the route that implicates the buyer as the impetus for workplace stressors and psychological determinants that cause verbal abuse. However, as mentioned at the end of the theoretical chapter, there could be a business case for the use of this penalty to motivate the firm to meet the deadlines. If it is the case that the penalty increases μ , which increase yelling as a motivational technique, while at the same time decreasing wages and increasing productivity, the buyer has found a reason to induce yelling. But, it could be the case that there is no business related reason for the penalty, and, as I hypothesize, overall wages decrease and productivity decreases as a result of the cognitive load.

Empirically testing the model developed and presented in the third section includes measuring the relationship between the buyer's purchasing practices and cognitive load, which is shown to theoretically increase the amount of verbal abuse that the supervisors choose to use. In order to apply this model empirically, several questions must be answered in order to fully assess how buying practices are affecting the working conditions of the factory workers. These questions are as follows:

- How does the penalty affect verbal abuse?
- How is productivity affected by the penalty?
- How are wages affected by verbal abuse and cognitive load?
- Does verbal abuse increase or remain constant in the face of the penalty or cognitive load?

In answering these questions, I will be able to affirm the hypotheses set out earlier in this thesis. The answers will aid me in assessing the impact of different purchasing behaviors of the buyer, and how that affects increased cognitive load, and subsequently increased verbal abuse, in the factories.

The empirical section will be a four-stage analysis of the questions presented above. The assessments will be as follows:

- i. Assessing the impact of the penalty on verbal abuse. The model predicts that the relationship between the penalty and verbal abuse is positive.
- ii. Assessing the impact of the penalty on μ , cognitive load. The model predicts that, with the penalty, cognitive load should increase in the face of the penalty. I assume this because I hypothesize that cognitive load and the penalty are equal.
- iii. Assessing the impact of the penalty and verbal abuse on wages. The model predicts that as verbal abuse increases, workers wages increase as well.
- iv. Assessing the impact of the penalty and verbal abuse on output. The model predicts that the relationship between these two variables and output is negative, which is in line with what I have hypothesized.

4.1 A regression of supervisor stress on cognitive load.

The first step in the process of empirical testing in this thesis will be an examination of how cognitive load, in this case the buyer penalty, affects supervisor stress. As we know from equation (7) in the theoretical section, $\mu = t$. With this in mind, the regression equation is

$$(18) \mu(t)^1 = \beta_0 + \beta_1 \text{penalty} + \varepsilon$$

Where $\mu(t)^1$ measures the level of stress the supervisor experiences and *penalty* measures the concern the supervisors feel when exposed to the tax that buyers levy in the face of late deliveries.

For a richer understanding of how the penalty affects stress, I have decided to include the following equation

$$(19) \text{penalty} = \beta_0 + \beta_1 \text{facdemo} + \varepsilon$$

penalty in this equation still represents the measure of concern the supervisors feel when facing the tax of the buyers for late delivery. *facdemo* measures other factory demographics that could be affecting their ability to deliver on time. Understanding what is causing the penalty will give the buyers and insight into what is possibly occurring in the factory that is pushing them to implement this tax.

4.2 A regression model of verbal abuse on cognitive load and buyer behavior

The next step in the process examines how verbal abuse is affected by the penalty and demographic characteristics. In this thesis and theoretical section, I simplify assumptions saying that α , or worker incentives, and β , or supervisor incentives, should be excluded from the verbal abuse equation, as seen equation (5a) in Section 3. The equation is

$$(20) v(t)^1 = \beta_0 + \beta_1 \widehat{\mu(t)} + \beta_2 \text{demographics} + \varepsilon$$

In this equation, I use the estimated results from the supervisor stress equation (18), which, as mentioned above, measures supervisor stress levels. $\widehat{\mu(t)}$ measures the predicted responses from $\mu(t)^1$ as we know from equation (5) in Chapter 3 that stress does affect verbal abuse. Rather than use the stress variable again, I've decided to capture the predicted results because that would give a more accurate reading of what the

relationship between v and μ is expected to be. *Demographics* measures supervisor characteristics, which will be represented by factory characteristics, and worker characteristics. And, as mentioned above, I have reason to believe that worker and supervisor incentives will have an effect on the level of yelling in the factory.

4.3 A regression model of worker and supervisor wages

The third step in estimating my regression equations for this thesis is to estimate the wage equations. These equations are based on equations (13) and (14) of Chapter 3. Equation (13) expresses the workers reservation wage, which is estimated to be

$$(22) w(t)_w = \beta_0 + \beta_1 effort + \beta_2 \widehat{v(t)} + \varepsilon$$

In this equation, *effort* measures the worker's reservation utility, which in this thesis will be represented by a variable that measures the distance between the factory of interested and competitor factories. $\widehat{v(t)}$ is the predicted values from the first verbal abuse equation.

The supervisor reservation wage expressed in equation (14) yields this regression equation:

$$(23) w(t)_s = \beta_0 + \beta_1 effort + \beta_2 demographics + \beta_3 \widehat{v(t)} + \varepsilon$$

Effort here again measures the worker's reservation utility. *Demographics* includes only supervisor and firm characteristics because worker characteristics, such as what type of training they receive, are not directly related to how much the supervisor is paid. $\widehat{v(t)}$ is included in this equation as the main independent variable with which I am concerned. What I am looking for is whether or not verbal abuse has an inverse relationship with the supervisor's wages. As verbal abuse increases, do the supervisor's wages decreases?

4.4 A regression model of factory output

Finally, the last piece of analysis that I will examine in this thesis is the productivity of the factory in the face of verbal abuse. The equation is:

$$(24) \ q(t) = \beta_0 + \beta_1 effort + \beta_2 \widehat{v(t)} + \beta_3 demographics + \varepsilon$$

Similar to the supervisor's wage equation, the productivity regression takes into account the worker's effort in the factory, *effort*, and the characteristics of both the worker and the supervisor, *demographics*. The analysis differs due to the dependent variable as well as data restriction. While all of the other analyses will be cross-country analyses, this regression will be restricted to one country due to data limitations.

Although the analysis will only be of one country, after seeing the results from the regressions, I will be able to infer what the results for the other countries would be.

$$(25) \ w(t)_w = \beta_0 + \beta_2 \widehat{v(t)} + \beta_3 effort + \beta_4 q(t) + \beta_5 demographics + \varepsilon$$

After understanding how verbal abuse affects productivity, I would like to understand how productivity and verbal abuse affect the hourly wages of the worker. This regression equation is very similar to equation (22). $w(t)_w$ represents the wages of the workers. I have decided not to use the predicted value of $w(t)_w$ because this regression, as well as the productivity regression, are limited due to data restrictions. *effort* measures the worker's reservation utility, which in this thesis will be represented by a variable that measures the distance between the factory of interested and competitor factories. $\widehat{v(t)}$ is the predicted values from the first verbal abuse equation. I do not use the predicted values of $q(t)$ because there is no worry about collinearity.

Chapter 5: Data Discussion

5.1 Better Work Background

The data I will be using is data collected from an impact assessment of the Better Work and Evaluation Program. Beginning in 2009, Better Work is a partnership program between the International Labor Organization (ILO) and the International Finance Corporation (IFC). The Better Work program focuses on improving compliance within the factories and meeting standards set out by the ILO, as well as promoting competitiveness among businesses in global supply chains.^{xxx} The program is currently active in eight countries. The countries of focus in this study are Haiti, Indonesia, Jordan, Nicaragua, and Vietnam. Participation in the program is mandatory for Haiti and Jordan and voluntary in the other countries.

Participation in the Better Work program requires factory audits of compliance through surveys, improvement of labor practices, and inclusion and involvement of all stakeholders. At the factory level, Better Work attempts to make changes regarding workplace conditions and compliance by teaching factory managers, supervisors, and workers the skills and knowledge needed for undertaking compliance obstacles and ameliorating workplace conditions.^{xxxi} At the international level, the ILO and IFC use their influence to transform the apparel industry. These two international organizations do so by influencing federal laws and policies, employers, international buyers, and trade unions by implicating that good business practices and the maximum benefits received from those practices is not independent of good working conditions.^{xxxii}

In order to influence these bodies and actors, as well as teach the factories, Better Work collects research on compliance trends in the factories over a series of visits over several years. Using this data, the ILO and IFC can see if the buyers and factories they

work with are in compliance with the code of standards set out jointly by the two international organizations.

5.2 Survey Data Discussion

The empirical analyses in Chapter 6 primarily rely on the Impact Assessment data, which is data that is collected from surveys created and analyzed by a research team at Tufts University. The data is composed of responses to survey questionnaires given to factory workers and managers to give analysts perspective of factory organization from the manager's point of view as well as the worker's. The surveys include 5 components, four of which are individual manager surveys, and the last being the worker survey. The manager surveys are given to the Financial Manager, General Manager, Human Resources Manager, and Industrial Engineer. The questions on the manager surveys range from manager perception of the workforce to questions about their customers.

The worker survey includes questions that range in topics from health, workplace conditions, compensation, and demographics. This survey is voluntary and randomized, meaning that workers who participate during one visit to the factory do not necessarily participate in the next visit to the factor. The positions that the workers could hold include sewer, packer, finisher, cutter, mechanics, spreader, and others.

Survey data used in the analyses ranges from 2009 to 2014. Table 1 describes the total number of factories visited per year in each respective country.

Table 1

Number of Factories Surveyed per Year by Country

	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
<i>Haiti</i>	-	10	46	6	6	2
<i>Indonesia</i>	-	-	804	730	552	33

<i>Jordan</i>	14	356	457	201	507	10
<i>Vietnam</i>	3	1226	1232	1276	1357	22

Nicaragua has been left out of this table because the country does not have any factories with the maximum amount of visits for the empirical analysis in Chapter 6.

I created the country variable by renaming the factory identification codes to reflect which in which country the survey was conducted. For example, if a factory had the identification number indonesia555, I would replace that with country equaling Indonesia. This would make it easier to show summary statistics for this section. I also created individual country variables, whereby if the survey were conducted in Haiti, the haiti variable would equal 1.

The empirical analyses involve a four-stage analysis, with independent and dependent variables that will be described in the following sections in this chapter. Most of the tests conducted will be cross-country analyses due to the fact that I will be using variables from an integrated dataset created by the research team at Tufts University. However, when discussing production and wages, I will be conducting the analysis within individual countries, as it is more accurate to do so since not all of the countries were asked about time to production.

In the following subsections, I will be discussing the variables included in each regression and the significance of the variables.

5.2.1 Stress and Penalties

The first regression equation that I will be running and analyzing in Chapter 6 will be the regression of the buyer penalty on supervisor stress, equation (7) in Chapter 3 and equation (18) and (19) in Chapter 4. As discussed in Chapter 4, the stress equation

includes the variable stress on the left-hand side and the variable penalty on the right hand side. The questions I found that most relate to both of these variables are found in the general manager (GM) survey.

The question that reveals the stress level of the supervisor in the GM survey is, “What are the biggest production management problems that are obstacles to your business success?” This is the overarching question that is asked about several issues that the General Manager may face in the factory. As we will see, this question is the same question asked when discussing the late delivery penalty.

The responses to this question are “Serious problem,” “Modest problem”, “Minor problem”, or “Not a problem.” One of the obstacles to which the manager gives a ranking of how much is supervisor stress a problem for your business success. The rankings initially were coded as “Serious problem” equaling 1, “Modest problem” equaling 2, “Minor problem” equaling 3, and “Not a problem” equaling 4. For the purposes of easy analysis, responses to variables like these have been treated as dummy variables. The responses “Serious problem,” “Modest problem,” and “Minor problem” were coded as 1s because the managers were answering yes to the question. “Not a problem” was coded as 0 for no. Answers such as “Don’t know” (coded as -8) was coded as “.”, which is a missing value. Those who responded, “Do not want to answer “(coded as -9) were coded to be 1s. This was coded as 1 because I believe that if the respondent does not want to answer, it is for fear of repercussion. The following table, table 2, illustrates the responses of the managers sorted by country and cycle.

Table 2

What are the biggest production management problems that are obstacles to your business success? Tabulation of Stress level of supervisors

Haiti	Indonesia	Jordan	Vietnam
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<i>Cycle</i>	<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Yes	27	1	730	175	197	328	201	83	89	1909	857	782	209
No	-	-	30	26	-	98	59	-	13	255	20	30	60
Total	28		961		1068					4122			

In tabulating this variable, as well as other variables in this analysis, I have limited the number of cycles to five. If the factory had not been visited by Better Work for five cycles, it was not included in the analysis. This is why Nicaragua has been excluded from my empirical analyses. Here you see, that the most cycles that factories have received in Haiti and Indonesia is two. Jordan had all five cycles. Vietnam only had four cycles.

Table 2 shows that stress levels of the supervisors in the factory have always been seen as an obstacle to business success, or at least as viewed by the managers of the factories. We can see that in most cases, the number of yes responses over the course of the maximum number of cycles in each country decreases. In Jordan, we see that the number of Yes responses increases after the first cycle, but what is also interesting is that in the first cycle, there are not any no responses.

Finally, for this particular regression equation, (18), I use the variable *Penalty* to represent the penalty fee that the firms have to pay due to late delivery. The question posed is, similar to the stress variable, “What are the biggest production management problems that are obstacles to your business success?” The issue the managers respond to for this variable is “Customer penalties for late delivery.” The responses “Serious problem,” “Modest problem,” and “Minor problem” were coded as 1s because the managers were answering yes to the question. “Not a problem” was coded as 0 for no. Answers such as “Don’t know” (coded as -8) was coded as “.”, which is a missing value.

Those who responded, “Do not want to answer “(coded as -9) were coded to be 1s. Table 3 illustrates the tabulations of this variable.

Table 3

What are the biggest production management problems that are obstacles to your business success? Customer penalties for late delivery

	Haiti		Indonesia		Jordan					Vietnam			
<i>Cycle</i>	<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Yes</i>	27	1	730	132	197	368	231	83	102	1926	703	742	120
<i>No</i>	-	-	-	51	-	29	29	-	-	268	84	30	89
Total	28		913		1039					3962			

Consistently, throughout the maximum number of cycles for each country, the general managers have found that the customer penalty for later deliveries has been a problem.

Equation (19) includes other variables so as to avoid the omitted variable issue because, as stated in chapter 4, I believe that factory demographics could contribute to a supervisor’s stress level. Variables that I have included in the regression that together compose the *facdemo* variable in the equation are days lost to strike, order size of the primary customer, low efficiency rate of the workers, and shortage of skilled workers. All of these variables are coded similarly to the stress and penalty variables. The responses “Serious problem,” “Modest problem,” and “Minor problem” were coded as 1s because the managers were answering yes to the question. “Not a problem” was coded as 0 for no. Answers such as “Don’t know” (coded as -8) was coded as “.”, which is a missing value. Those who responded, “Do not want to answer “(coded as -9) were coded to be 1s. As these variables are not relevant to the main stress equation, I have not included the tabulations in this section.

5.2.2 Verbal Abuse and Stress

The verbal abuse equation in the theoretical chapter, equation (5), stipulates that verbal abuse equals the interaction of stress and positive motivation techniques. In section 5.2.1, I describe how I've estimated stress from the manager perspective. I will use this section to describe the other variables I've chosen to include in this equation.

Verbal abuse in this thesis will be analyzed using this question from the worker survey, "Is verbal abuse such as yelling or vulgar language a concern for workers in your factory?" The possible responses are: 1. "No, not a concern," 2. "Yes, discussed with co-workers," 3. "Yes, discussed with supervisor or manager," 4. "Yes, discussed with the trade union representative," 5. "Yes, considered quitting," 6. "Yes, threatened a strike," and 7. "Yes, caused a strike." This question is a check all that apply, but the responses 1 and 2-7 are mutually exclusive. This means that the worker cannot check no as well as the yes answers. As this is a check all that apply variable, the responses are coded as seven different questions. In order to create a single variable for verbal abuse, I created a dummy variable and replaced it such that all of the yes responses are 1s and the no response is 0. Again, "Do not want to answer" has also been coded as yes, as it is possible that the workers believe that they will face punishment if they answer in the affirmative. "Don't know" has been coded as no. The following table, table 4 shows the tabulation of the generated verbal abuse variable by cycle and country.

Table 4

Is verbal abuse such as yelling or vulgar language a concern for workers in your factory?

	Haiti					Indonesia				Jordan				Vietnam			
Cycle	1	2	3	4	5	1	2	3	1	2	3	4	5	1	2	3	4
Yes	6	3	2	-	-	348	109	14	58	112	56	15	21	176	61	66	9
No	36	7	6	2	2	697	112	19	223	414	235	114	85	2185	940	828	269
Total	85					1310			1333					4534			

The majority of workers in each country reported that yelling or vulgar language was not a problem in their factory. However, I assume that verbal abuse is a prevalent issue in the factories and should be considered a concern. Because of this assumption, I continue to use verbal abuse as a dependent variable, regardless of the summary statistics.

μ , the main independent variable with which I am concerned, in this equation will be represented by the predicted values of stress from the single variable regression, equation (18). It is necessary to capture the predicted values because if I were to use the stress variable as in the first regression, the variable would be omitted.

M will be estimated in this equation as demographic characteristics of the worker, supervisor, and the firm. First is *sex*, which is a question that asks the responder's sex. I have coded it as 1 for female and 0 for male. *Age* asks the respondent their age from a choice of 8 answers, each with ranges of ages. The first answer is "Younger than 16," which, if clicked, ends the worker's participation in the survey. *Residence* asks the respondent where they live, with five options ranging from living with family to renting a bedroom. *Education* asks for the highest level of education attained by the respondent. The answers vary from country to country due to the different school systems. *Fulltime* and *Worktime* are variables that measure the length of time at the factory. *Fulltime* measures the length of time the respondent has been a fulltime worker at the factory, while *worktime* measures the amount of time that the respondent has worked at the factory. The worker training variables are grievance training, quality control training, supervisor training, and health and safety training. Technical skills, labor management skills, sewing training, line training, communications training, and quality control training refer to the skills received by supervisors. The final variables included in this

regression are *currentoutput* and *femployee*. The first measures the current output that the factory is producing and the last is an index of the number of fulltime employees.

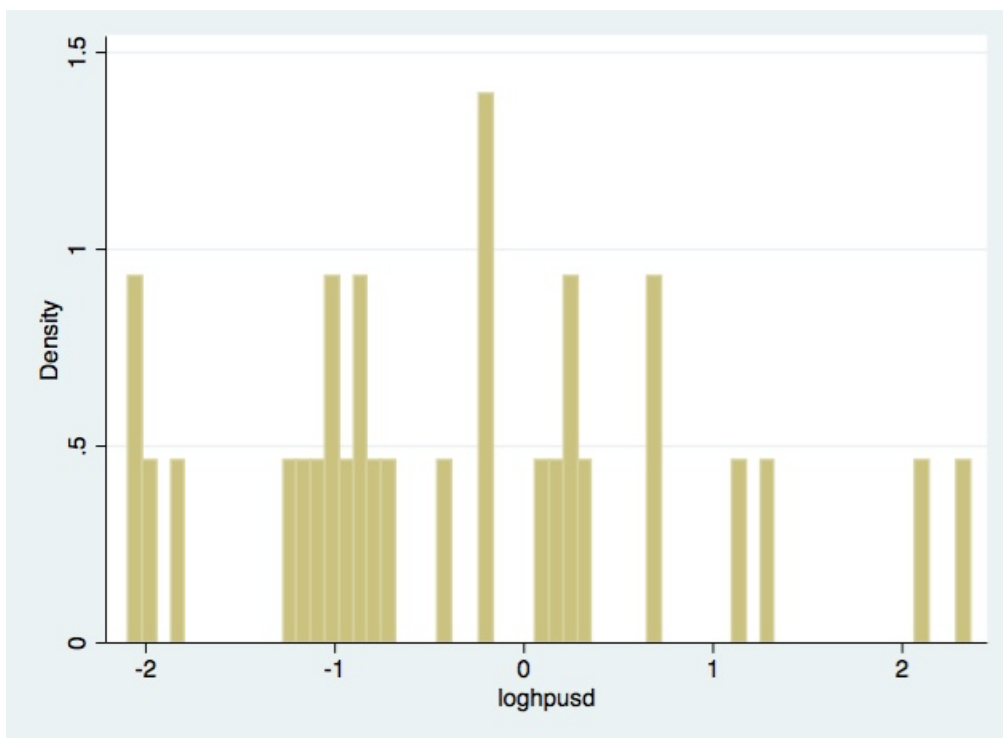
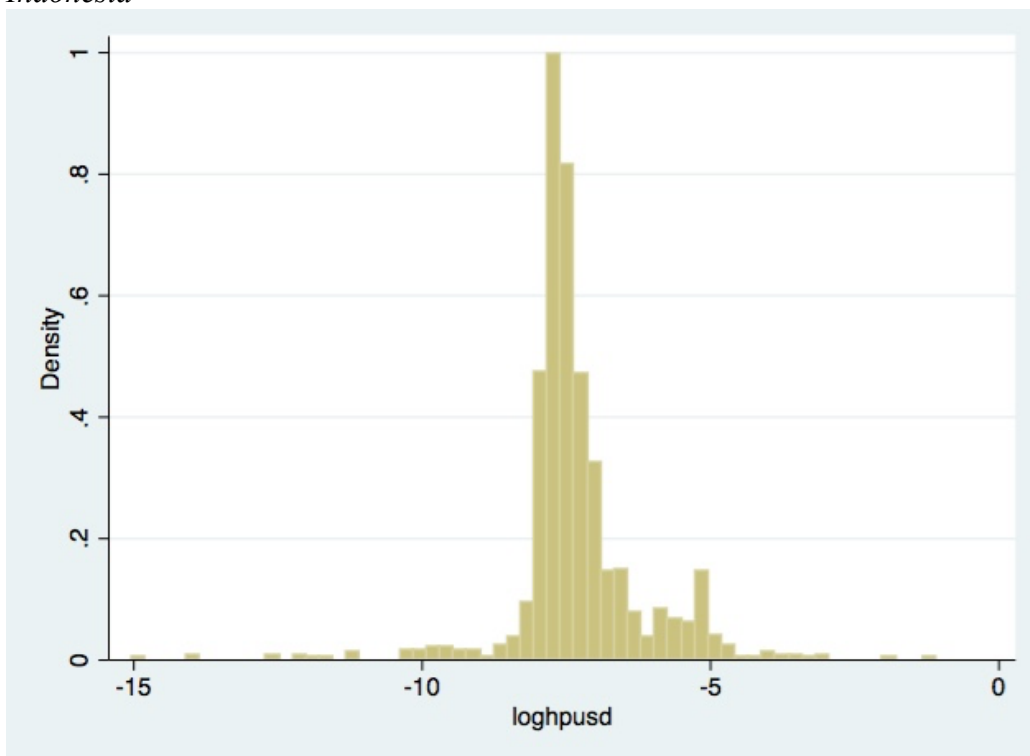
With these characteristic and demographic variables of the workers and the firm, I will be better able to tell what is really affecting the amount of verbal abuse the supervisors choose to use.

5.2.3 Wages and Verbal Abuse

The third step outlined in chapter 4 is the wage regression equations. These equations are testing the relationship between wages and verbal abuse, with wage as the dependent variable and verbal abuse as the independent variable.

In the survey, there is no question that specifically asks the worker about their hourly pay, so the wage dependent variable for the worker is a constructed variable of hourly pay. Workers are first asked, “How often are you paid?” The answers for this question are weekly, biweekly, monthly, bimonthly, or never. Second, they are asked, “How much did you receive the last time you were paid?” with answers in their respective national currencies. Using these two variables, as well as the variable *Totalhours*, weekly pay and hourly pay were determined. However, *hourlypay* was still reported in the national currencies. In order to have homogeneity in type of currency across all countries, the *hourlypay* variable, with currency conversions, yielded the *HourlyPayUSD* variable. The following charts depict the wage distribution of hourly pay as histograms by country.

Chart 1a *Haiti*

**Chart 1b***Indonesia***Chart 1c***Jordan*

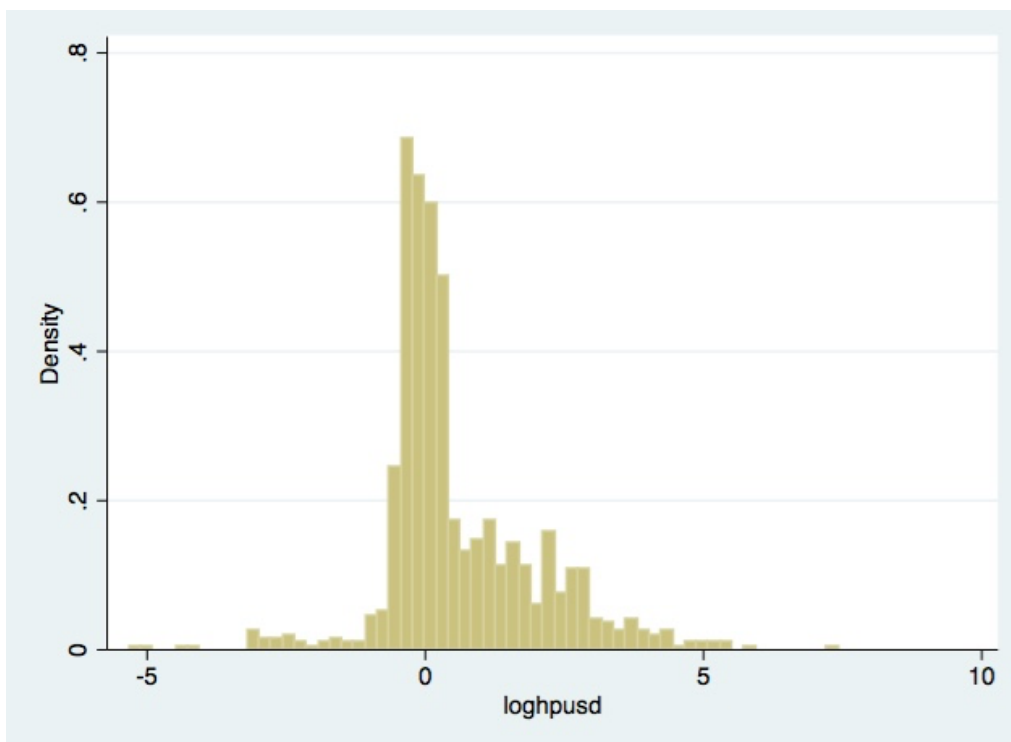
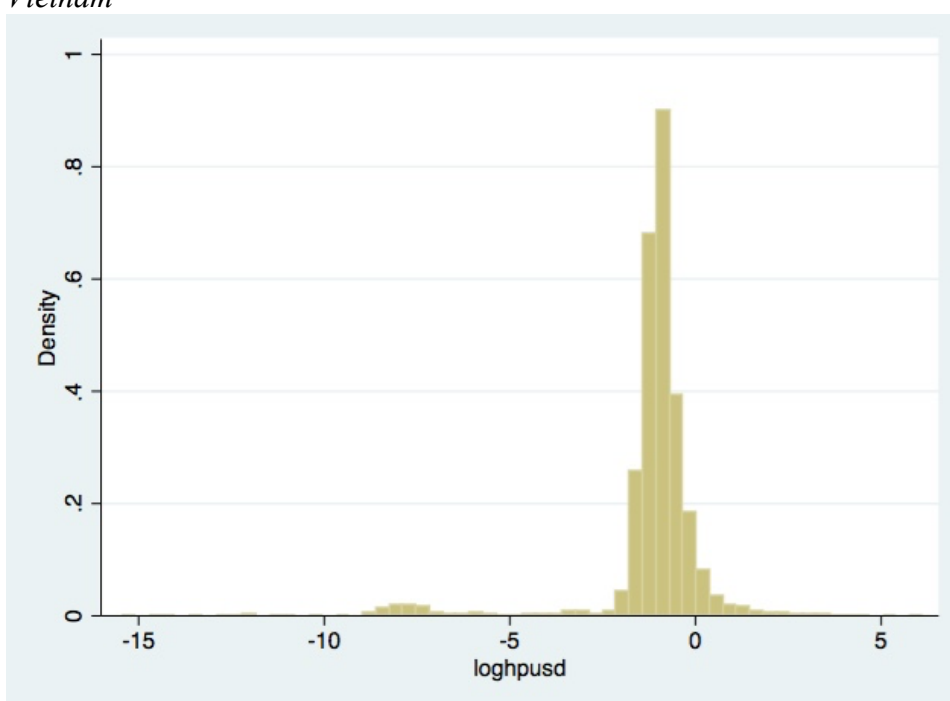


Chart 1d
Vietnam



These charts show that the frequencies generally hover around zero. The outlier is Indonesia where the frequency is very negative.

In all of these observations, the log of *HourlyPayUSD* was used and it will be used as the dependent variable in the worker wage equation to allow for logarithmic distribution.

Measuring verbal abuse in this equation is similar to how stress was measured for the verbal abuse regression. The predicted values of verbal abuse from the initial verbal abuse equation will be used as the independent variable of note.

In this equation, only the worker characteristics will be used. These variables are the same as those used in the verbal abuse equation. These variables include *sex*, *age*, *educ*, *fulltime*, *worktime*, *wqctrain*, *wgrievtrain*, *wsupervtrain*, and *whealthsafetrain*. These variables describe the sex, age, educational attainment level, length of working at the firm, and training received by the workers.

What is different in this equation is that year fixed effects will be used using the *xi:* regression command as well as *i.year*. Year fixed effects will control for the within-group variation that will occur due to time.

The second step in the wage equations is the supervisor's wages. Unlike the worker's wages, the supervisor does have a question regarding their wages, in the Human Resources survey. The question asks, "What is the total monthly pay and benefits or a typical supervisor in this factory?" Therefore, there was no need to generate a completely new variable based on total hours. However, like the worker's pay, the supervisor's pay was converted into USD from the respective national currencies. As a dependent variable, the logarithmic function was taken in order to have a more even distribution. The following charts depict the distributions of the supervisor's monthly pay by country. The countries included in the analysis are Indonesia, Jordan, and Vietnam.

Chart 2a
Indonesia

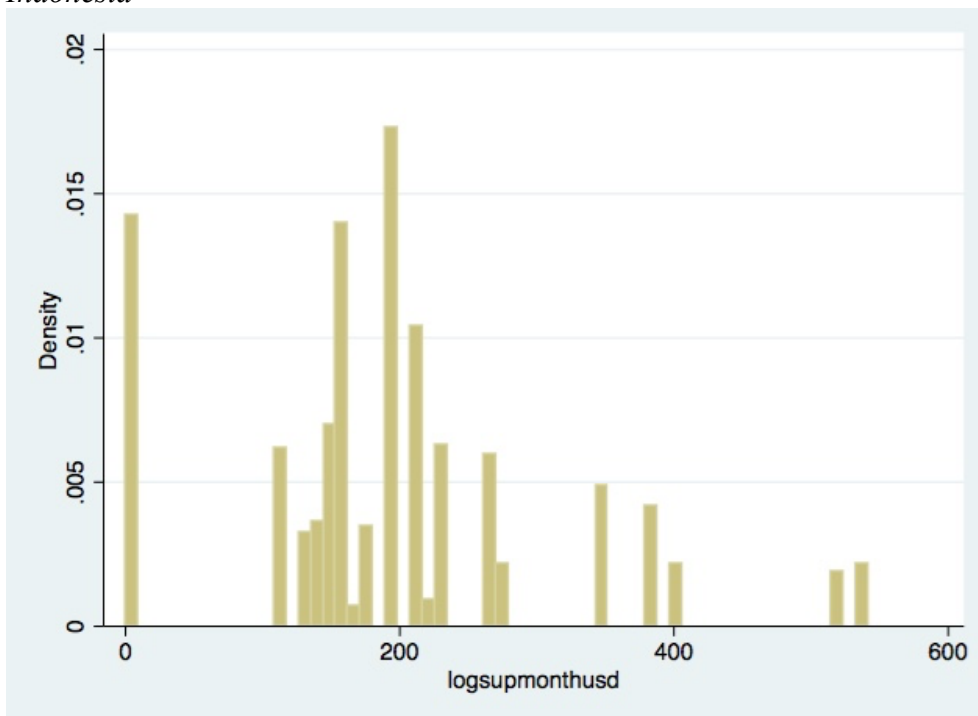


Chart 2b
Jordan

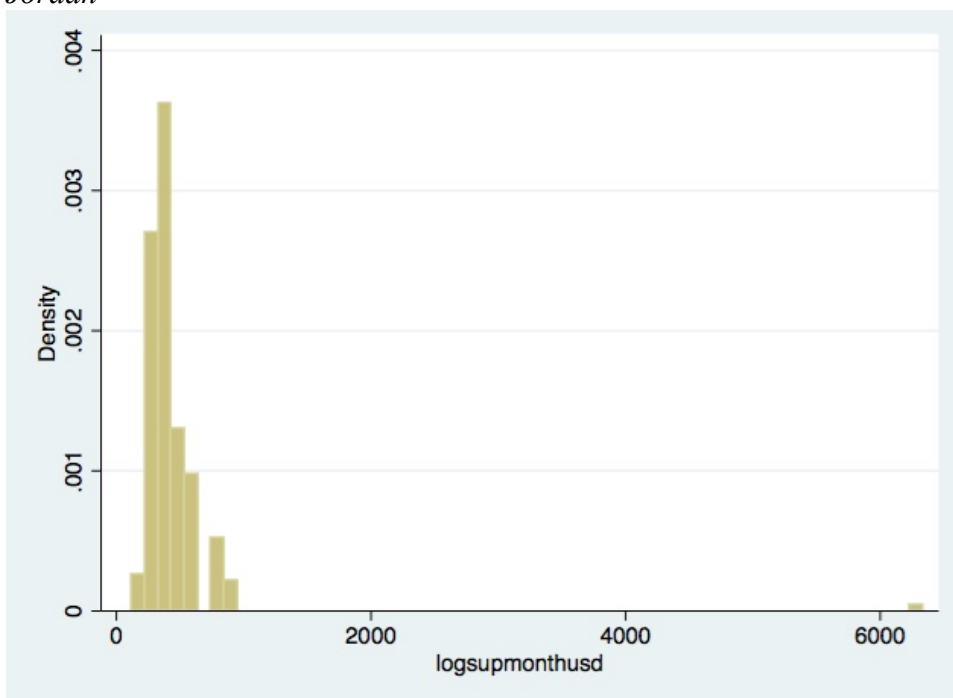
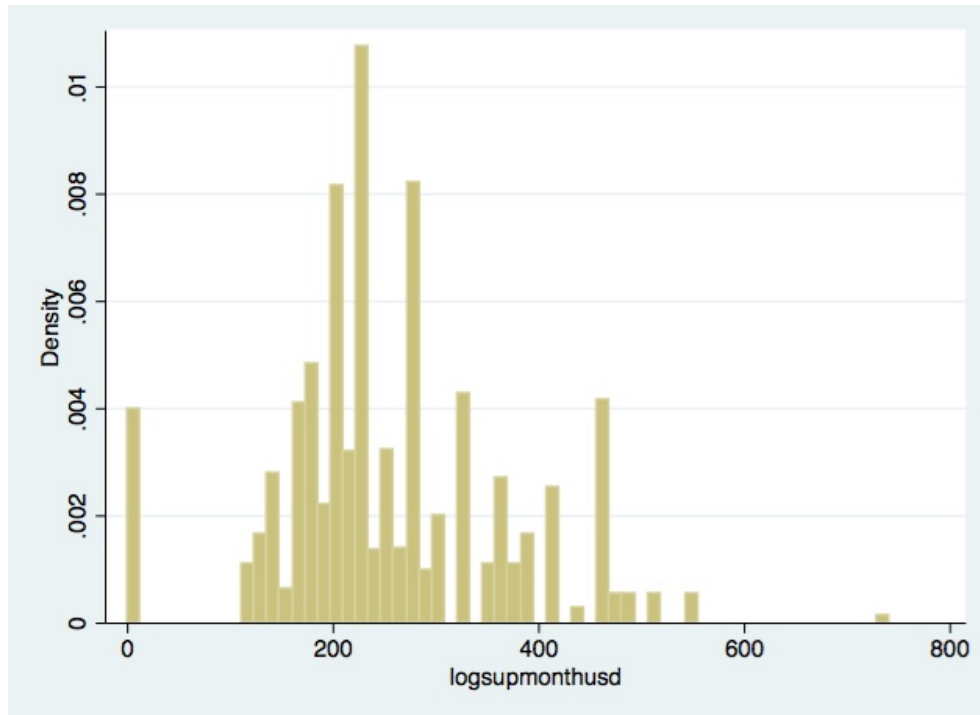


Chart 2c

Vietnam



These charts show that the log of supervisor's monthly pay in USD is skewed right.

Again, the measure for verbal abuse will be the predicted values of verbal abuse from the verbal abuse regression equations. The variables that will be used in this equation are *sex*, *age*, *educ*, *fulltime*, *worktime*, *techskills*, *lmskills*, *currentoutput*, *supqctrain*, *femployees*, and *supincent*. *Supincent* is a measure of the supervisor's wage incentive. The question from the HR survey asks, "What percentage of a typical supervisor's pay is based on the performance of the workers he or she supervises?" I interpret this question to mean, how much of the supervisor's pay is based on the production of the workers? This variable is important because, as chapter 3 states, I believe that the supervisors are paid on a piece-rate system based on the production of the workers he or she supervises. This question has eleven answers that either give

percentages, say that the supervisor's pay does not rely on worker productivity, or relies completely on workers productivity. Below is a tabulation of *supincent*.

Table 5

What percentage of a typical supervisor's pay is based on the performance of the workers he or she supervises?

	Indonesia	Jordan	Vietnam
<i>None.</i>	477	683	2279
<i>Less than 10 percent</i>	59	20	436
<i>10 to 19 percent</i>	78	61	104
<i>20 to 29 percent</i>	58	58	-
<i>30 to 39 percent</i>	-	-	90
<i>40 to 49 percent</i>	121	29	60
<i>50 to 59 percent</i>	30	30	33
<i>60 to 69 percent</i>	30	58	30
<i>70 to 79 percent</i>	45	-	120
<i>80 to 89 percent</i>	19	-	129
<i>Completely</i>	313	60	684

While this table shows that the majority of supervisor's pay does not depend on the productivity of the workers, I still believe that the supervisors are paid on a piece-rate system based on the output of the workers. Thus, I will still include this in the regression.

5.2.4 Productivity and Verbal Abuse

Finally, the last regression included in this analysis is the productivity regression. In the equation, verbal abuse, effort, and demographic characteristics are regressed on productivity in order to find the relationship between them.

Due to limitations in the data, this analysis is restricted to only Vietnam. The dependent variable, *TimeTarget*, is a variable composed of when the worker meets the production quota, when the worker starts work, when the worker finishes work, how often the worker is paid, the amount they were last paid, and hourly pay. The initial question posed in the Vietnam worker survey is, "What time do you usually finish your

production target on [Monday/Friday/Saturday/Sunday]?” Where, depending on the answer to the previous question of which days the worker usually works, the worker sees and responds to Monday, Friday, Saturday, and Sunday. For this analysis, I have chose to focus on Monday and Friday. The following table shows the summary statistics of these days. The charts illustrate the histograms corresponding to each day.

Table 6
Summary Statistics of Dependent Variable in Productivity Regression: Time to Target

	Mean	Standard Deviation	Minimum	Maximum
<i>Monday</i>	9.9	1.4	4	16
<i>Friday</i>	10.1	1.5	6	19

Chart 3a
Time to Target: Monday

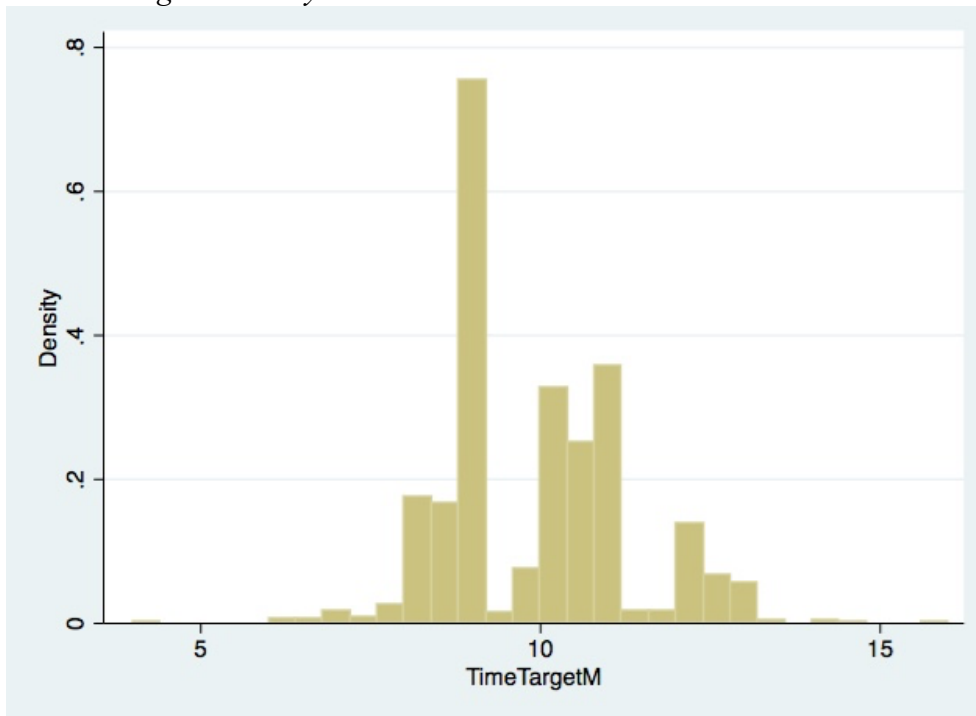
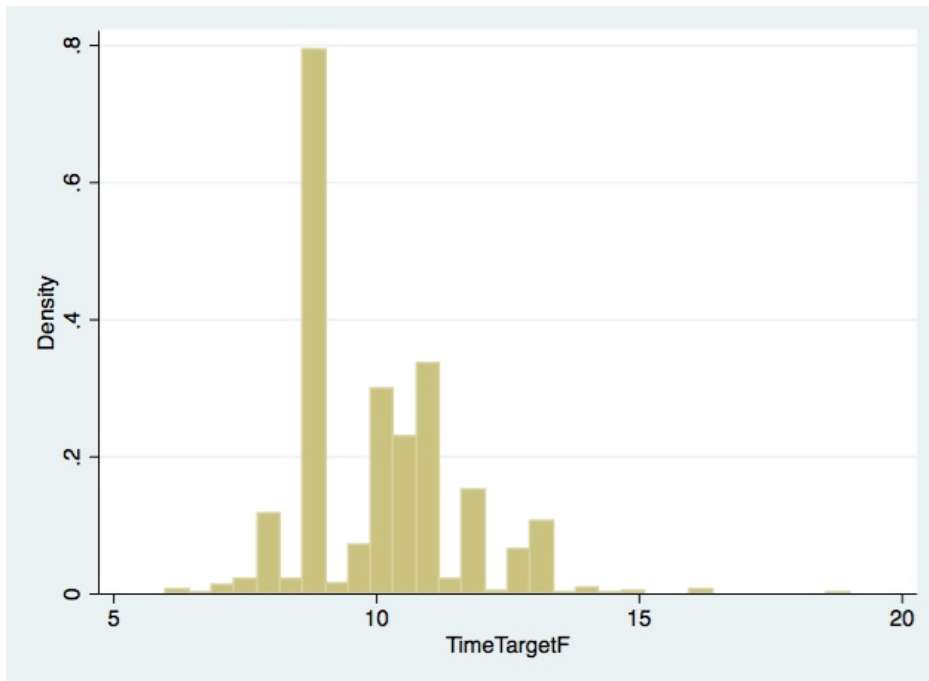


Chart 3b
Time to Target: Friday



One obstacle that needed to be addressed was the fact that this analysis would be coming from a different data set than the integrated data set used for the other analyses. Seeing as the production regression equation does use predicted verbal abuse, it was necessary to recreate the regression equations using the same variables, but only from the Vietnam data set.

This regression equation is similar to that of the wage equations. It uses all of the demographic characteristics—both worker and supervisor—as well as effort. The only different is, as mentioned before, the data being used comes only from the Vietnam data set.

After knowing how verbal abuse affects the productivity, it would be useful to know how productivity affects the wages of the workers. Again, since data on productivity is limited, I have only used the Vietnam data set to run this regression. The equation used, as mentioned before, is similar to that of the cross-country regression

equation. The difference is that only wages from the Vietnam data set are in the dependent variable and both Monday and Friday time to target variables are used.

Chapter 6: Empirical Analysis

As discussed in chapters 4 and 5, four sections of analysis are conducted in order to understand the complete relationship of cognitive load and stress and how it affects supervisors and workers alike. Cognitive load, stress, verbal abuse, wages, and productivity have been looked at from the manager perspective, supervisor perspective, and worker perspective. Discussion of the four sections and presentation of the regression outputs follows:

6.1: Regression analysis of Penalty on Stress

Before discussing the results of the primary regression of the penalty on stress, I find it important to analyze what is causing the penalty to occur. Therefore, I have included equation (19) from Chapter 4 in my analysis. The variables *loststrike*, *efficiency*, and *shortageskillw* are all the variables that *facdemo* from the regression equation in Chapter 4 represent. I believed that these variables were the most likely to cause the penalty and produce results without fear of collinearity. Table 7 below shows the regression output.

Table 7

VARIABLES	(1) penalty	(2) penalty	(3) penalty
loststrike	0.0120*** (0.00237)	0.0130*** (0.00240)	0.00232 (0.00182)
efficiency		-0.102** (0.0419)	-0.0417 (0.0311)
shortageskillw			0.956*** (0.0337)
Constant	0.882*** (0.0134)	0.976*** (0.0408)	0.0394 (0.0447)

Observations	945	945	921
R-squared	0.027	0.033	0.485

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

Using a cascading regression style, I have found that these three variables I have chosen are all significant at some point when regressed on *penalty*. This shows that these all do increase the use of the penalty in some way, whether the relationship is positive or negative.

Loststrike is the first variable regressed on penalty. In column one we see that the relationship between number of days lost to strike and the fee for late deliveries is positive and statistically significant at the 1% level. This implies that as the number of days lost to strike increases, the probability of the penalty being implemented also increases. The R^2 of this regression is quite low with the model explaining only 2.7% of the variation explained by the relationship between days lost to strike and the penalty. While the R^2 is low, the statistical significance of the variable *loststrike* gives reason to believe that it is one of the causes for the penalty.

In the second column, the variable *efficiency* is added in the regression. In this regression, *loststrike* has remained positive and statistically significant at the 1% level. Still implying that as the days of work lost to strike increase, the probability of the penalty being implemented also increases. *Efficiency* is also statistically significant, but at the 5% level. The coefficient on this variable is negative, indicating that as the efficiency of the workers at the factory decreases, the probability of the buyer putting in place a penalty fee for late delivery increases. The R^2 of this regression is still low. The model

only explains 3.3% of the variation in the data. Again, the statistical significance of the variables

In the third column of this regression output, *shortageskillw* is added to the equation. *Loststrike* and *efficiency* lose their significance in relation to the penalty in the presence of *shortageskillw*. The only variable is significant in this equation is *shortageskillw*, which is significant at the 1%. The coefficient of the variable is positive, indicating that the higher the shortage of skilled workers in the factory leads to the probability of the buyer placing a penalty on the firm to increase. The R^2 of this regression equation is much higher than the last: 50% of the variation in the data is explained by the model.

Next, the key independent variable *penalty* is regressed on the dependent variable *stress*. Results are presented from this cross-country analysis in table 8. The presented results offer a confirmation of the theorized results in Chapter 3 that the penalty is positively correlated with stress of the supervisors.

Table 8

VARIABLES	(1) stress
penalty	0.379*** (0.0110)
Constant	0.562*** (0.0105)
Observations	7,217
R-squared	0.142
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

The key independent variable—and the only independent variable—in this regression, penalty, is statistically significant at the 1% level and has a positive coefficient. This implies that as the use of the penalty increases, the probability of supervisor stress increases. The R^2 of this regression output is low, only the model explains 14% of the variation in the data, but nonetheless, the output is important. This regression output confirms the theory in chapter three that the stress and the penalty are positively correlated. Due to the statistical significance, I am able to reject the hypothesis that these two variables are unrelated.

The following section describes and analyzes the effect of supervisor stress on verbal abuse.

6.2 Regression of Stress on Verbal Abuse

In this regression output, the predicted values from the regression of penalty on stress are used and regressed on verbal abuse. Here, the dependent variable is *vabuse* and the key independent variable is *stress_slr*. Other variables included in this regression, as mentioned in Chapter 5, are demographic controls for workers and supervisors. Table 9 shows the regression results from the cross-country analysis. The results were conclusive in stating that stress has a positive relationship with verbal abuse, as theorized in Chapter 3.

Table 9

VARIABLES	(1) vabuse	(2) vabuse	(3) vabuse
stress_slr	0.119*** (0.0396)	-0.127 (0.150)	27.63** (12.01)

sex		-0.0194 (0.0485)	0.0296 (0.0770)
age		-0.0336** (0.0138)	-0.0367* (0.0213)
residence		0.0395 (0.0374)	0.00958 (0.0578)
educ		0.0829*** (0.0189)	0.0781** (0.0329)
fulltime		0.0219** (0.00992)	0.0318* (0.0171)
worktime		-0.00379 (0.00628)	-0.00972 (0.0108)
wqctrain		0.000542 (0.000390)	-0.00376** (0.00147)
wgrievtrain		-0.000327 (0.000343)	0.00409 (0.00287)
wsupervtrain		-0.00117** (0.000478)	-0.00687* (0.00357)
whealthsafetrain		0.000261 (0.000310)	0.00116 (0.00295)
techskills			0.00665 (0.137)
lmskills			0.0233 (0.309)
currentoutput			-0.00476** (0.00194)
supsewtrain			-0.00252 (0.00236)
suplinetrain			-0.00946 (0.0154)
supcommtrain			0.0117** (0.00509)
supqctrain			0.00195 (0.0136)
femployees			0.0194*** (0.00679)
Constant	0.0559 (0.0361)	0.308 (0.208)	-25.57** (11.31)
Observations	7,247	1,064	412
R-squared	0.001	0.046	0.138

Standard errors in parentheses

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

The first column of this regression shows the simple regression of the key

independent variable, *stress_slr*, on the dependent variable *vabuse*. The results show that *stress_slr* is statistically significant and positive. This signals that as the amount of stress the supervisors experience due to the penalty increases, the probability that they will choose yelling as a means for motivation increases as well. The R^2 of this regression output is very low, showing that the model used here only explains 0.1% of the variation in the data. While the R^2 may be low, the statistical significance of this result confirms the theoretical equation in chapter 3 that verbal abuse has a positive relationship with stress. By being statistically significant at the 1% level, I can reject the notion that supervisor stress and verbal abuse are unrelated.

Column 2 shows the same regression but with worker demographic controls. In this regression, *stress_slr* loses its significance, while *age*, *educ*, *fulltime*, and *wsupervtrain* all become significant. An interesting find here is the results of *wsupervtrain*. *Wsupervtrain* measures the percent of workers who receive training in supervisory skills. The variable is significant at the 5% level and the coefficient on the variable is negative. The negative coefficient implies that as the percentage of workers who receive training in supervisory skills increases, the probability of yelling by the supervisors to motivate the workers decreases. This could have strong policy implications for which types of trainings the workers receive.

The final column shows the regression now with supervisor and firm demographic controls added. In this regression, we see that *stress_slr* once again becomes statistically significant. *Age*, *educ*, *wqctrain*, *wsupervtrain*, *currentoutput*, *supcommtrain*, and *femployees* are also statistically significant.

Beginning with *stress_slr*, in the presence of supervisor and firm demographic

controls, the variable is statistically significant at the 5% level and is still positive. Meaning that even when controlling for worker, supervisor, and firm demographics, augmented supervisor stress increases the probability that the supervisors will choose to yell at the workers.

Second, *wqctrain* is statistically significant at the 5% level. This finding is very interesting in this regression, similar to the finding of supervisory skills training. This question asks for the percent of workers who have received quality control training at the factory. The coefficient of this variable in this regression is negative, indicating that as the percentage of workers who receive quality control training increases, the probability of the supervisors choosing to yell decreases. *Wsuprevtrain* is also significant, this time at the 10% level. These two results, as mentioned before, could have important policy implications as to which types of training that the workers in the factories receive.

The other interesting finding in this regression analysis is that *supcommtrain* is statistically significant at the 5% level and is positive. The question asks for the percentage of supervisors who receive communication skills training. Here, the results imply that as the percentage of supervisors who receive communication skills training increases, so does verbal abuse. I would expect the opposite to happen. However, it is possible that the communication skills training that the supervisors receive is ineffective at teaching the supervisors good communications skills and how to communicate effectively or communication skills training is introduced in situations in which verbal abuse is common.

6.3 Regression of Verbal Abuse on Wages

This section will analyze the two wage structures that occur in the factories.

Recall from Chapter 3 that I have assumed that workers are paid on an hourly basis and supervisors are paid on a piece-rate system. Due to this, the dependent variable of the worker's wage regression analysis is *loghpUSD*, which represents the log of hourly pay in United States dollars (USD). The dependent variable of the supervisor's wage regression analysis is *logsupmonthUSD*, which represents the log of monthly pay in USD. First, I will examine the worker's wage regression.

6.3.1 Worker Wages

The worker's wage regression includes year fixed effects in order to control for the permanent differences across the years. Country fixed effects did not work in this regression due to collinearity. Table 10 below shows the results of this regression.

Table 10

VARIABLES	(1) loghpUSD	(2) loghpUSD	(3) loghpUSD
vabuse_mlr	0.00101 (0.00437)	0.00514 (0.00469)	-0.0103 (0.0122)
o._Iyear_2010		-	-
_Iyear_2011		-0.00501** (0.00218)	-0.00393 (0.00304)
_Iyear_2012		-0.00493** (0.00241)	-0.00206 (0.00353)
o._Iyear_2013		-	-
_Iyear_2014		-0.00322 (0.00316)	-0.0165 (0.0103)
effort			-0.00110 (0.00206)
sex			-0.00230 (0.00273)
age			-0.000532

			(0.000922)
educ			0.00188
			(0.00143)
fulltime			0.000577
			(0.000690)
worktime			-0.000663
			(0.000403)
wqctrain			9.45e-05*
			(5.42e-05)
wgrievtrain			7.95e-05
			(6.28e-05)
wsupervtrain			-0.000157
			(0.000124)
whealthsafetrain			-8.46e-06
			(6.01e-05)
sewerpayprod			-0.000366
			(0.000230)
Constant	-0.00100	0.000987	0.00846
	(0.00192)	(0.00209)	(0.0122)
Observations	279	279	279
R-squared	0.000	0.021	0.062

Standard errors in parentheses

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

The first column of the regression output is the key independent variable *vabuse_mlr*, which is the predicted results from the verbal abuse regression, on the dependent variable *loghpusd*. The results are not statistically significant, so my hypothesis of a relationship between worker's wages and verbal abuse is unconfirmed.

The second column of this regression analysis includes the year fixed effects. Again, verbal abuse is not statistically significant, and the hypothesis I proposed is still unconfirmed. Throughout this regression analysis, verbal abuse remains not significant. The only variable of note that is significant at the 10% level is *wqctrain*. The variable is positive, implying that as the percentage of workers who receive quality control training in the factories increases, the hourly pay of the workers increases as well. However, the coefficient itself is rather small, so while the variable is statistically significant, the

amount by which the hourly pay of the worker would increase is insignificant, meaning much less than at least one cent.

6.3.2 Supervisor Wages

The focus of this section is supervisor wages. Similar to the worker's wage regression analysis, the supervisor's wage regression includes year fixed effects in order to control for the differences in wages that supervisors will receive across the years.

Table 11 shows the regression output for this analysis.

Table 11

VARIABLES	(1) logsupmonthusd	(2) logsupmonthusd	(3) logsupmonthusd
vabuse_mlr	-176.5*** (22.62)	-118.4*** (20.48)	-5,741*** (163.3)
timepromo			-1.664 (4.299)
o._Iyear_2010		-	-
_Iyear_2011		-34.31** (14.00)	-1,319*** (38.56)
_Iyear_2012		-116.9*** (14.64)	1,494*** (46.81)
_Iyear_2013		-2.967 (14.56)	177.3*** (15.92)
o._Iyear_2014		-	-
effort			-520.3*** (15.51)
sex			173.0*** (6.826)
age			-213.9*** (6.193)
educ			450.5*** (13.20)
fulltime			182.1*** (5.313)
worktime			-54.95***

			(1.838)
techskills			-1,690***
			(46.53)
lmskills			6,641***
			(188.2)
currentoutput			-78.21***
			(2.253)
supqctrain			17.01***
			(0.488)
femployees			-3.232***
			(0.807)
supincent			56.56***
			(1.837)
Constant	261.7***	281.6***	3,905***
	(9.632)	(15.19)	(108.1)
Observations	326	326	313
R-squared	0.158	0.408	0.908
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Column one of this regression output shows the regression of *vabuse_mlr* on *logsupmnthusd*. Verbal abuse in this equation is statistically significant at the 1% level, and is negative. This statistical significance and negative coefficient continues across all three regressions. Based on what the coefficients are saying, as the amount of yelling the supervisor uses increases, their monthly pay in USD decreases. There are two interpretations as to why this is happening. First, supervisors may not require a compensating differential for the yelling that they do. Such an outcome will occur if supervisors actually enjoy the power that yelling implies. Or, yelling actually lowers productivity. As productivity declines, supervisor compensation declines as well.

The next variable of which I would like to make note is the *effort* variable. *Effort* is statistically significant and negative in the third column. As a reminder, this variable is asking about the number of competitor firms located within one kilometer of the factory. Here, the coefficient is telling me that as the number of firms located within one

kilometer of the factory in question decreases, the pay of the supervisor increases. It could be that the workers are feeling less stress about competing with other firms, and are therefore increasing effort and increasing production.

The variables that represent skills the supervisor receives—*techskills*, *lmskills*, and *supqctrain*—are all statistically significant at the 1% level. Both labor management skills of the supervisor and quality training that the supervisors receive are positive, while technical skills is negative. The most interesting is *supqctrain*. As a higher percentage of supervisors in the factory receive quality control training, the wages of the supervisors increase.

6.4 Regression of Verbal Abuse on Productivity

This fourth section includes the analysis of verbal abuse on productivity. In Chapter 3, the effect of verbal abuse and the penalty on productivity was ambiguous due to θ and $\frac{\partial q}{\partial t}$. In this section, We expect to find that *vabuse_mlr*, which includes the results from the penalty, positively affects *TimeTargetM* and *TimeTargetF*, which are the measures of productivity. Tables 12 and 13 present my results

6.4.1 Monday

In this first regression analysis, I examine the effect of verbal abuse on productivity. As mentioned in Chapter 4, the analysis of this data is limited only to Vietnam. The question necessary for creating the productivity variables only appear in the Vietnam worker survey. Every analysis from this point in the paper forward will be restricted to Vietnam survey data.

Table 12

VARIABLES	(1) TimeTargetM	(2) TimeTargetM	(3) TimeTargetM	(4) TimeTargetM
vabuse_mlr	-0.449 (0.931)	-0.102 (0.789)	1.978* (1.112)	-0.815 (2.729)
effort		-0.0122 (0.0433)	-0.0178 (0.0433)	0.0202 (0.0511)
TotalHours		0.0743*** (0.00668)	0.0714*** (0.00663)	0.0666*** (0.00673)
timepromo			-0.00162 (0.0559)	-0.00599 (0.0550)
sex			0.384*** (0.144)	0.317** (0.142)
residence			-0.0780 (0.136)	-0.109 (0.137)
educ			-0.227*** (0.0820)	-0.0710 (0.152)
fulltime			0.0252 (0.0195)	0.0298 (0.0202)
wqctrain				-0.00591 (0.00443)
wgrievtrain				-0.00158 (0.00764)
wsupervtrain				0.00668 (0.00419)
whealthsafetrain				-0.000240 (0.00656)
techskills				-0.209 (0.189)
lmskills				-0.113 (0.259)
supsewtrain				0.00914* (0.00481)
suplinetrain				-0.00482 (0.00443)
supcommtrain				-0.000933 (0.00306)
supqctrain				-0.000547 (0.00541)
femployees				0.000164*** (5.87e-05)
Constant	9.861*** (0.109)	5.513*** (0.417)	5.851*** (0.614)	6.224*** (0.793)
Observations	300	300	298	298

R-squared	0.001	0.296	0.335	0.401
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Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This first regression analysis focuses only on productivity on Mondays. In the first column, I regress *vabuse_mlr* on *TimeTargetM*. In this first regression, verbal abuse is not statistically significant. This means, without controlling for anything else, there is no relationship between verbal abuse and productivity here. Having no relationship does not confirm my hypothesis, so I have included other variables in order to avoid omitted variable bias.

The second column shows the regression of verbal abuse, effort, and total hours on productivity. In this equation, only *TotalHours* is interesting. This variable measures the total number of hours the worker works. In this regression, *TotalHours* is positive and statistically significant at the 1% level. This implies that as the total number of hours the worker works, the time to meeting the productivity quota increases. Factories with longer work days will set a higher target which takes longer to complete.

In the third column, and only in the third column, verbal abuse becomes statistically significant. In this column, *vabuse_mlr* is statistically significant at the 10% level and positive, indicating that as the use of yelling as a motivational technique increases, the amount of time it takes for the worker to meet their productivity target increases as well. This finding is very important as it shows that verbal abuse is decreasing productivity in the factories. *TotalHours* is still significant at the 1% level. What is interesting is that education level is also statistically significant at the 1% level and is negative. This implies that educational level increases, the time it takes to meet the production target decreases, or the worker becomes more productive.

The fourth column includes all demographic controls. *TotalHours* is still statistically significant in this regression, but verbal abuse is no longer statistically significant.

6.4.2 Friday

Similar to the previous regression, this output analyzes the impact of verbal abuse on productivity, but this time focuses on productivity on Fridays.

Table 13

VARIABLES	(1) TimeTargetF	(2) TimeTargetF	(3) TimeTargetF	(4) TimeTargetF
vabuse_mlr	0.866 (1.160)	0.0628 (1.040)	-0.00623 (1.449)	2.078 (3.540)
effort		-0.155*** (0.0548)	-0.142** (0.0562)	-0.121* (0.0652)
TotalHours		0.0864*** (0.0100)	0.0850*** (0.0103)	0.0813*** (0.0108)
timepromo			0.0844 (0.0733)	0.0942 (0.0723)
sex			0.276 (0.187)	0.173 (0.185)
residence			0.00114 (0.173)	-0.0438 (0.176)
educ			-0.0262 (0.105)	-0.140 (0.195)
fulltime			0.0313 (0.0247)	0.0256 (0.0259)
wqctrain				-0.00508 (0.00554)
wgrievtrain				-0.000509 (0.00958)
wsupervtrain				0.000708 (0.00537)
whealthsafetrain				0.000442 (0.00853)
techskills				-0.400 (0.244)
lmskills				0.0616

				(0.338)
supsewtrain				0.00218
				(0.00641)
suplinetrain				0.00667
				(0.00579)
supcommtrain				-0.0128***
				(0.00390)
supqctrain				0.00281
				(0.00699)
femployees				4.32e-06
				(7.33e-05)
Constant	10.07***	5.443***	4.812***	6.239***
	(0.127)	(0.618)	(0.900)	(1.133)
Observations	310	310	308	308
R-squared	0.002	0.212	0.226	0.292

Standard errors in parentheses

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

The first regression focuses only on verbal abuse and productivity. Like before, verbal abuse is not statistically significant in this case. Due to this, it is necessary to control for other variables that could be correlated with *TimeTargetF*.

The second column includes the variables *effort* and *TotalHours*. Both of these variables are statistically significant at the 1% level. *TotalHours* is positive, implying that as the total number of hours worked increases, so does the time it takes to meet the production target. Interestingly, the coefficient on *effort* is negative. This indicates that as the number of competitors within one kilometer of the factory in question increases, the time it takes to meet the production target decreases, or the workers become more productive in the face of competition. These two variables are still statistically significant in both the third and fourth columns.

The other variable that is interesting in the fourth column that is statistically significant at the 1% level is *supcommtrain*. The coefficient of this variable is negative, suggesting that when the percentage of supervisors who receive communication skills

training increases, the time it takes to meet production targets decreases, or workers become more productive. This could have very important implications as to what skills factories should focus on when training their supervisors.

6.5 Regression of Time to Target on Log(HourlyPayUSD) in Vietnam

This final analysis will focus on how productivity and verbal abuse could affect the hourly pay of workers in Vietnam. In this regression, I have included year fixed effects in order to control for differences that could occur across the years.

Table 14

VARIABLES	(1) loghpUSD	(2) loghpUSD	(3) loghpUSD	(4) loghpUSD	(5) loghpUSD
vabuse_mlr	0.853*** (0.243)	0.747*** (0.224)	0.742*** (0.228)	0.896** (0.372)	0.0601 (0.590)
_Iyear_2011		0.273*** (0.0477)	0.270*** (0.0556)	0.297*** (0.0840)	0.292*** (0.0854)
_Iyear_2012		0.482*** (0.0471)	0.479*** (0.0536)	0.518*** (0.0865)	0.510*** (0.0914)
_Iyear_2013		0.619*** (0.0461)	0.617*** (0.0493)	0.682*** (0.0783)	0.670*** (0.0806)
o._Iyear_2014		-	-	-	-
effort			0.00164 (0.0136)	-0.00838 (0.0218)	-0.00854 (0.0243)
TimeTargetM				0.0272 (0.0275)	0.0128 (0.0274)
TimeTargetF				-0.0223 (0.0244)	-0.0301 (0.0241)
sex					0.161** (0.0640)
educ					0.0548 (0.0404)
fulltime					0.0328*** (0.00799)
wqctrain					-0.000364 (0.00110)
wgrievtrain					-0.00204

					(0.00228)
wsupervtrain					0.000672
					(0.000979)
whealthsafetrain					0.00114
					(0.00233)
Constant	-0.460***	-0.819***	-0.821***	-0.861***	-1.017***
	(0.0250)	(0.0383)	(0.0413)	(0.244)	(0.333)
Observations	1,072	1,072	1,072	276	276
R-squared	0.011	0.169	0.169	0.265	0.339

Standard errors in parentheses

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

In the first regression, I only focus on the relationship between verbal abuse and hourly pay in Vietnam. While in the other worker's wage regression, verbal abuse was not statistically significant; here verbal abuse is statistically significant. Verbal abuse is significant at the 1% level and is positive. This suggests that as the verbal abuse increases, worker's wages will also increase. This statement holds true in the regressions until the last regression where worker demographic controls are included in the equation.

These findings were the only ones of note in this equation. Productivity did not have a statistically significant effect on worker's wages for either Monday or Friday. Therefore, I cannot say for certain that there is a possibility of production increasing a worker's hourly wages.

6.6 Next Steps

The purpose of this thesis was to provide an analysis of the business case for late fee penalties implemented by the buyer on the factory, considering the possibility that the penalty causes undue and unnecessary stress in the supervisors. Further steps toward a deeper analysis of the penalty, verbal abuse, and cognitive load would include the following:

- 1) An in depth analysis of how the penalty and cognitive load affects countries in which Better Work operates but are outside of the analysis in this paper. This would allow further researchers to see if this trend extends across all countries in which sourcing factories are used
- 2) Allowing for country fixed effects to understand how verbal abuse affects wages of both supervisors and workers differently across years and across countries

Chapter 7: Conclusions

The 2014 research brief written by Better work entitled, “The Case Against Verbal Abuse in Garment Factories: Evidence from Better Work” notes that verbal abuse is driven by the wage structure of the supervisors and workers in the factory.^{xxxiii} They state that when a worker’s wage is piece-rate, they are less likely to be concerned with or make reports of verbal abuse. However, if the supervisor’s pay is based on the productivity and efficiency of the workers, verbal abuse is more likely to be reported.^{xxxiv} The findings in this report fall in line with what I found through my regression analysis. The directional relationship between supervisor wages, which are piece-rate in this analysis, and verbal abuse is negative. Verbal abuse is correlated with low supervisor wages. However, this does not imply a causal relationship. It is possible that the supervisors realize that verbal abuse is causing their wages to decrease and do not care due to the amount of stress, or they are yelling because of low productivity and efficiency, but are only further decreasing production. Regardless, I find that verbal abuse does have an effect on the piece-rate wages of the supervisor.

However, throughout this analysis, I have assumed that wages and choice of verbal abuse are entirely dependent on stress of the supervisor and the penalties put in place by the buyer. Stress and the penalty increase the yelling that occurs in the factory. The verbal abuse then causes productivity to decrease, most likely decreasing buyer profits.

Taking both of these findings into consideration, I can conclude that profit-maximizing firms should reduce the penalties that they put in place in order to provide better working conditions for the factory workers.

The figure below depicts the same question schematic as shown in Chapter 3. However, this figure 2 now shows the results of my analyses.



I have found that most of my hypotheses have been confirmed. The delivery penalty that the buyer implements does increase the stress level of the supervisor and the use of verbal abuse as a motivational technique. Where my empirical analyses and my hypotheses deviate is the question of how the delivery penalty affects wages. From the last regression output we can see that, when controlling for productivity, verbal abuse is statistically significant and positive. Thus, verbal abuse increases worker wages. The firm is paying a wage compensation differential to the worker due to the level of verbal abuse.

From the Time to Target on Monday regression, we see that verbal abuse increases the time it takes to meet the production target, so productivity of the workers in the face of verbal abuse decreases. While the surveys do not ask questions regarding supervisor productivity, we can see evidence for the negative based on the wage regression output. In the presence of verbal abuse, the wages of the supervisor decrease. I can only assume that the productivity of the supervisor is also decreasing when the productivity of the worker is decreasing.

The penalty encourages a negative workplace atmosphere by increasing the stress in supervisors. In order to meet the buyer's delivery time and avoid taxation, the supervisor resorts to verbal abuse. However, in order to create a positive atmosphere, there are alternative methods to encouraging factories to produce on time. One method would be a positive reward system. The buyer, instead of penalizing the factory, could incentivize the factory to delivery output on time through pecuniary means, such as bonuses. In this way, supervisors would be less stressed in trying to meet production targets, would have higher wages, and workers would likely be more efficient in order to beat nearby competition.

In conclusion, I have found that delivery penalties that firms perceive as a threat to business success increase supervisor stress and verbal abuse, lower productivity and supervisor wages and require firms to pay workers a compensating differential.

Bibliography

Attribution Theory | Simply Psychology. (n.d.). Retrieved November 23, 2014, from <http://www.simplypsychology.org/attribution-theory.htm>

Barrientos, Stephanie. (2013). Corporate Purchasing Practices in Global Production Networks: A Socially Contested Terrain. *Geoforum* 44. 44-51.

Better Work. Research Brief: The Case Against Verbal Abuses in Garment Factories | Better Work. (2014, January 1). Retrieved April 19, 2015, from <http://betterwork.org/global/?p=7092>

Cooper, G. (1998, December). Cognitive Load Theory & Instructional Design at UNSW. Retrieved April 20, 2015, from <http://dwb4.unl.edu/Diss/Cooper/UNSW.htm>

Feenstra, Robert C., Hanson, Gordon H. Globalization, Outsourcing, and Wage Inequality. (1996). National Bureau of Economic Research Working Paper 5424. 1
<http://www.nber.org/papers/w5424.pdf>

Gioia, Dennis A. & Sims Jr., Henry P. (1986). Cognition—Behavior Connections: Attribution and Verbal Behavior in Leader-Subordinate Interactions. *Organizational Behavior and Human Decision Processes* 33, 2. 197-229.

How We Work. (2014). Retrieved April 6, 2015, from http://betterwork.org/global/?page_id=5657

Inderst, R., & Wey, C. (2006). Buyer power and supplier incentives. *European Economic Review*, 647-667.

Insight Investment, & Acona. (2004). Buying Your Way into Trouble? The Challenge of Responsible Supply Chain Management,

Iwanow, H., McEachern, M.G., & Jeffrey, A. (2005) The Influence of Ethical Trading Policies on Consumer Apparel Purchase Decisions: A Focus on the Gap Inc. *International Journal of Retail & Distribution Management* 33,5. 371-387.

Krackhardt, David. (1987). Cognitive Social Structures. *Social Networks* 9, 2. 109-134.

Locke, Richard M., Qin, F., & Brause, A. (2007). Does Monitoring Improve Labor Standards? Lessons from Nike. *Cornell University ILR School* 61, 1.

Our People. (2014). Retrieved April 5, 2015, from http://betterwork.org/global/?page_id=5522

Paas, Fred, Renkl, Alexander, & Sweller, John. (2003). Cognitive Load Theory and Instructional Design: Recent Developments. *Educational Psychologist*, 38, 1

Schmitz, Hubert & Knorrinda, Peter. (2000). Learning from Global Buyers. Institute of Development Studies Working Paper 100.

Tokatli, Nebahat. (2007). Asymmetrical Power Relations and Upgrading among Suppliers of Global Clothing Brands: Hugo Boss in Turkey. *Journal of Economic Geography* 7.

Tokatli, Nebahat, Kizilgün, Ömür, & Cho, Jinsook Erin. (2010). The Clothing Industry in Istanbul in the Era of Globalisation and Fast Fashion. *Urban Studies* 48.

ⁱ Feenstra, Robert C., Hanson, Gordon H. Globalization, Outsourcing, and Wage Inequality. (1996). National Bureau of Economic Research Working Paper 5424. 1
<http://www.nber.org/papers/w5424.pdf>

ⁱⁱ Iwanow, H., McEachern, M.G., & Jeffrey, A. (2005) The Influence of Ethical Trading Policies on Consumer Apparel Purchase Decisions: A Focus on the Gap Inc. *International Journal of Retail & Distribution Management* 33,5. 371-387.

ⁱⁱⁱ Insight Investment, & Acona. (2004). Buying Your Way into Trouble? The Challenge of Responsible Supply Chain Management, 8

^{iv} Inderst, R., & Wey, C. (2006). Buyer power and supplier incentives. *European Economic Review*, 647-667.

^v Tokatli, Nebahat. (2007). Asymmetrical Power Relations and Upgrading among Suppliers of Global Clothing Brands: Hugo Boss in Turkey. *Journal of Economic Geography* 7. 67-92.

^{vi} Paas, Fred, Renkl, Alexander, & Sweller, John. (2003). Cognitive Load Theory and Instructional Design: Recent Developments. *Educational Psychologist*, 38, 1, 1-4
http://www.tandfonline.com/doi/pdf/10.1207/S15326985EP3801_1

^{vii} Cooper, G. (1998, December). Cognitive Load Theory & Instructional Design at UNSW. Retrieved April 20, 2015, from <http://dwb4.unl.edu/Diss/Cooper/UNSW.htm>

^{viii} Barrientos, Stephanie. (2013). Corporate Purchasing Practices in Global Production Networks: A Socially Contested Terrain. *Geoforum* 44. 44-51. Page 45.

^{ix} Iwanow, H., McEachern, M.G., & Jeffrey, A. (2005) The Influence of Ethical Trading Policies on Consumer Apparel Purchase Decisions: A Focus on the Gap Inc. *International Journal of Retail & Distribution Management* 33,5. 371-387. page 376

^x Schmitz, Hubert & Knorringa, Peter. (2000). Learning from Global Buyers. Institute of Development Studies Working Paper 100.

^{xi} Paas, Fred, Renkl, Alexander, & Sweller, John. (2003). Cognitive Load Theory and Instructional Design: Recent Developments. *Educational Psychologist*, 38, 1, 1-4
http://www.tandfonline.com/doi/pdf/10.1207/S15326985EP3801_1

^{xii} Ibid

^{xiii} Ibid

^{xiv} Barrientos, Stephanie. (2013). Corporate Purchasing Practices in Global Production Networks: A Socially Contested Terrain. *Geoforum* 44. 44-51. Page 45.

^{xv} Attribution Theory | Simply Psychology. (n.d.). Retrieved November 23, 2014, from <http://www.simplypsychology.org/attribution-theory.html>

^{xvi} Gioia, Dennis A. & Sims Jr., Henry P. (1986). Cognition—Behavior Connections: Attribution and Verbal Behavior in Leader-Subordinate Interactions. *Organizational Behavior and Human Decision Processes* 33, 2. 197-229.

^{xvii} Gioia, & Sims 209.

^{xviii} Ibid, 212

^{xix} Krackhardt, David. (1987). Cognitive Social Structures. *Social Networks* 9, 2. 109-134.

^{xx} Ibid

^{xxi} Ibid

^{xxii} Ibid

^{xxiii} Tokatli, Nebahat, Kizilgün, Ömür, & Cho, Jinsook Erin. (2010). The Clothing Industry in Istanbul in the Era of Globalisation and Fast Fashion. *Urban Studies* 48.

-
- ^{xxiv} Insight Investment, & Acona. (2004). Buying Your Way into Trouble? The Challenge of Responsible Supply Chain Management
- ^{xxv} Ibid
- ^{xxvi} Iwanow, H., McEachern, M.G., & Jeffrey, A. (2005) The Influence of Ethical Trading Policies on Consumer Apparel Purchase Decisions: A Focus on the Gap Inc. *International Journal of Retail & Distribution Management* 33,5. 371-387. page 376
- ^{xxvii} Locke, Richard M., Qin, F., & Brause, A. (2007). Does Monitoring Improve Labor Standards? Lessons from Nike. *Cornell University ILR School* 61, 1.
- ^{xxviii} Ibid
- ^{xxix} Iwanow (2005)
- ^{xxx} Our People. (2014). Retrieved April 5, 2015, from http://betterwork.org/global/?page_id=5522
- ^{xxxi} How We Work. (2014). Retrieved April 6, 2015, from http://betterwork.org/global/?page_id=5657
- ^{xxxii} Ibid
- ^{xxxiii} Better Work. Research Brief: The Case Against Verbal Abuses in Garment Factories | Better Work. (2014, January 1). Retrieved April 19, 2015, from <http://betterwork.org/global/?p=7092>
- ^{xxxiv} Ibid