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The Effects of Reciprocity and Worker Skill on the Effort-Wage Relation under Incomplete Contracts

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THE EFFECTS OF RECIPROCITY AND WORKER SKILL ON THE EFFORT-WAGE
RELATION UNDER INCOMPLETE CONTRACTS

By

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ABSTRACT

Prior research suggests that individuals receiving higher than market wages reciprocate with higher than enforceable levels of effort. This study examines whether the effectiveness of these reciprocity-based rewards depends on a worker’s skill level. My experimental results indicate that the effort-wage relation is significantly more positive when reciprocity concerns are present. High skill workers demonstrate a less positive effort-wage relation than other workers when reciprocity concerns are absent. However, the incremental influence of reciprocity is stronger for high skill workers than for other workers. My results contribute to a better understanding of the prevalence of flat-wage contracts in practice for positions that require high skill.
CHAPTER ONE

INTRODUCTION

1.1 Overview of Research Question

This dissertation examines the incremental effect of reciprocity on the efficiency of flat-wage contracts in high and low productive efficiency markets and if the source of the productive efficiency moderates this relation. Specifically, I isolate the effect of reciprocity (Rabin 1993) on contract efficiency incremental to distributional preferences (Fehr and Schmidt 1999) and other non-pecuniary incentives and investigate how equity (Adams 1965) concerns that are present when productive efficiency is determined by worker skill interact with these other fairness norms. I expect that reciprocity influences workers’ effort provision incremental to other non-pecuniary incentives and the influence of reciprocity on worker effort is moderated by whether productive efficiency is determined by factors internally-related to the worker or externally-related to the worker.

1.2 Overview of Background

In most situations, it is impossible for firms to contract on every eventuality or directly observe worker effort. Given this inability to create complete contracts, most contracts are incomplete in nature (Williamson 1985). Flat-wage contracts\(^1\) are a type of incomplete contract that is commonly used in practice (MacLeod and Parent 1999; Fehr and Gachter 2000; Hannan 2005). In particular, flat-wage contracts are more likely to be used when trying to hire workers for jobs requiring high levels of specific skills, such as with professionals, for industries that are more capital-intensive than labor-intensive, and for positions associated with higher recruitment costs (Flood et al. 2001; Yang 2008). While they are commonly used, the efficiency and

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\(^1\) A flat-wage contract is a contract where the worker’s pay is entirely determined by a fixed salary and there is no state- or performance-contingent portion of the worker’s pay.
profitability of flat-wage contracts is often debated and has been the subject of a large amount of research in accounting and economics (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan et al. 2002; Hannan 2005; Kuang and Moser 2009; 2011; Douthit et al. 2012; Choi 2013). This research documents a positive relation between the wage level of flat-wage contracts and the effort levels supplied by workers, referred to as the “effort-wage relation.”

Traditional agency theory assumes that individuals only receive utility from wealth and leisure (e.g. Baiman 1982; Lambert 2001). This assumption leads to the prediction that individuals will only forego their leisure by providing effort if the effort leads to a sufficiently large increase in wealth in expectation. As such, this traditional theory generally predicts that incentive contracts with contingency pay tied to performance are necessary to motivate above-minimum effort from workers (Baiman 1982). However, this prediction does not hold for all settings. When tasks have multiple valuable dimensions, when production environments are noisy, when outcomes are difficult to measure accurately, and when agents are very risk-averse, it is theoretically preferable to use a flat-wage contract instead of an incentive-based contract (Holmstrom and Milgrom 1991; Lambert 2001). The preference for flat-wage contracts in these settings results from the difficulty firms have in determining and measuring the effort-outcome relation. Incentive contracts pay workers based on outcomes in order to motivate effort. Thus, understanding and measuring this relation is necessary to efficiently incorporating incentive contracts; otherwise, workers will demand an excessive risk-premium in their pay to accept the contract.

Even in simple, one-dimensional, and noiseless tasks, however, flat-wage contracts have been shown to motivate above-minimal effort from workers (e.g. Hannan 2005; Kuang and Moser 2009). These findings are contradictory to the predictions of traditional agency theory.
However, these findings are consistent with behavioral theories that predict that social norms motivate effort incremental to concerns for wealth and leisure. Beginning with Akerlof’s (1982) gift exchange models, theorists have proposed that flat-wage contracts can motivate above-minimal effort due to reciprocity (Rabin 1993), equity, distributional preferences (Fehr and Schmidt 1999; Bolton and Ockenfels 2000), altruism, spite (Levine 1998), and promise-keeping concerns (Stevens and Thevarajan 2010). Reciprocity is the behavioral construct most commonly used to explain why flat-wage contracts motivate above-minimal effort levels, leading to such contracts being referred to as “reciprocity-based” (Hannan 2005; Kuang and Moser 2009; 2011). Thus, it is important to consider workers’ perceptions of fairness, such as reciprocity and distributional preferences, when designing and implementing flat-wage contracts.

1.3 Overview of Motivation and Contribution

Although reciprocity is considered to be the predominant social norm used for explaining the observed effort-wage relation under flat-wage contracts, other social norms also predict an observationally-similar effort-wage relation. A second social norm that is often used to explain the effort-wage relation is distributional preferences. While reciprocal responses to intentional behavior is documented in dilemma games (Bolton et al. 1998), ultimatum games (Blount 1995), trust games (Cox 2004), bilateral gift exchange markets (Charness 2004), and moonlighting games (Falk et al. 2008), other studies document that only distributional preferences are important (e.g. Bolton et al. 2000). Recent research suggests that both distributional preferences and reciprocity theory have incremental explanatory power to each other for predicting behavior and are important in economic decision-making (Falk et al. 2008; Douthit and Stevens 2014). However, research also suggests that many norms that are important determinants of behavior in

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2 Reciprocity is generally defined as responding in like kind to the intentional behaviors of others (Cox and Deck 2005).
the laboratory may be less salient in out-of-laboratory decision settings. Douthit and Stevens (2014) argue that distributional preferences are often heightened in laboratory settings due to the transparent payoffs of all parties that are not usually available in settings outside of the laboratory. They further advocate, consistent with prior literature (e.g. Rabin 1993; Rousseau 1995; Hannan 2005), that reciprocity concerns are an important determinant of behavior both outside and inside the laboratory. As such, since both distributional preferences and reciprocity are likely to lead to a positive effort-wage relation in laboratory experiments, but only reciprocity is considered to be a primary determinant of behavior in practice, it is important to isolate how much of the effort-wage relation is due to reciprocity incremental to distributional preferences and other non-pecuniary incentives.3

The efficiency of flat-wage contract theoretically results from the influence of fairness concerns, either distributional preferences or reciprocity. Firms are only willing to pay increased flat-wage salaries if they expect that the increase in salaries will trigger a sufficient increase in effort to offset the cost of increased wages. That is, firms will only pay higher salaries if they expect fairness concerns to lead to a sufficiently strong response of higher effort levels. Different factors can influence this expectation, however. For one, the effort-outcome relation is a vital determinant of the expected value of increased salaries. As workers’ effort becomes more efficient, the effort-outcome relation becomes stronger and firms see a greater increase in productivity for each marginal increase in effort (Baiman 1982; Stevens and Thevaranjan 2010).

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3 Charness (2004) is the study that comes closest to isolating the incremental impact of reciprocity in flat-wage contract settings. His setting randomly matches one worker with one firm and forces them to contract with each other. This limits the information about other workers’ pay and the worker’s action set considerably. A labor market approach where multiple firms offer flat-wage contracts to a group of workers who take turns accepting a contract or rejecting the available contracts is more appropriate than the bilateral gift exchange approach since labor contracts are not made in a vacuum, workers are aware of peer-level opportunities and pay options. Additionally, allowing workers to reject offers allows for a more robust action space for workers to express their preferences. These differences between Charness’s bilateral gift exchange environment and the labor market typically observed in accounting research makes it valuable to attempt to isolate the incremental impact of reciprocity in a gift exchange market.
Thus, in high productive efficiency markets, it is presumably less risky for firms to offer higher salaries in an attempt to motivate higher effort since the threshold for a sufficient effort increase is lower. However, it is also likely that workers will consider the risk taken by the firm when the firm makes their wage choice as a signal of trust. Low productive efficiency firms are taking on higher risk and demonstrating more trust, or kinder intentions, to the workers and are therefore more likely to activate fairness concerns. Prior research does not document a difference in the effort response to wages for low and high productive efficiency firms, however (Hannan et al. 2002). This suggests that firms in high productive efficiency markets will be more willing to use flat-wage contracts to motivate effort.\(^4\) While this research suggests that firms with higher productive efficiencies will be more willing to offer flat-wage contracts, it ignores differences in worker characteristics between high and low productive efficiency environments and the effect of how the high or low productive efficiency was determined.

The efficiency with which workers’ effort influences firm production is determined jointly by the firm’s production technology and workers’ skill level (Baiman 1990). While improving the firm’s production technology and a worker’s skill level will each improve the efficiency of worker effort, the two elements are unique aspects of the production environment. The firm’s production technology is externally-related to the worker and is shared by all workers in the firm while the worker’s skill, inversely, is internally-related and unique to the worker.\(^5\) Prior research has failed to distinguish between these two determinants of productive efficiency when considering the effectiveness of flat-wage contracts. Individual’s perceptions about the

\(^4\) This tendency is consistent with theoretical research. Stevens and Thevaranjan (2010) develop a principal-agent model where agents have a moral sensitivity that creates a disutility if they diverge from the agreed-upon standard of effort. In their setting, flat-wage contracts with a salary premium are preferable to incentive contracts for high productive efficiency markets.

\(^5\) It is possible that these aspects could interact over time. One aspect of worker skill could be in the design and implementation of more efficient production technology for the firm. To the extent that this can occur, the uniqueness of these two aspects may dissipate over time. However, I leave this multi-period question for future research to consider.
fairness of a situation are determined by endogenous aspects of the decision setting and fairness is a major determinant of workers’ responses to employment contracts (Rousseau 1995; Kuang and Moser 2009). Additionally, high and low skill individuals tend to respond differently to incentives and contracts (Hennessey 2000). Thus, since the efficiency of flat-wage contracts is caused by fairness concerns, which are influenced by endogenous aspects such as worker skill, it is important to consider where a firm’s productive efficiency originates when considering the efficiency of flat-wage contracts. This is also important to consider since the type of worker being contracted oftentimes determines the form of contract offered. In particular, firms are more likely to use flat-wage contracts when they are trying to hire workers for jobs requiring high levels of specific skills, as with professionals, for industries that are more capital-intensive, and for positions associated with higher recruitment costs (MacLeod and Parent 1999; Yang 2008).

This dissertation contributes to several streams of literature and fields of study. First, this study answers calls in the accounting literature to look explicitly at how reciprocity aids in motivating pro-social behavior within organizations (Luft 1997; Sprinkle 2003). Additionally, the results of this dissertation contribute to accounting theory by providing a behavioral understanding of the impact of fairness norms on the efficiency of flat-wage contracts in high and low productive efficiency markets. The results suggest that flat-wage contracts used in high skill labor markets are not only prescribed by traditional economic theory, but also have increased efficiency in motivating effort due to an increased sensitivity to reciprocity of high skill workers. Thus, I contribute to theory by beginning with an agency model prediction and using behavioral theory to extend agency theory in order to increase its descriptive ability. Brown et al. (2009) advocate this approach in order to maximize an experimental study’s ability to contribute to our understanding and theory. This study further contributes to the accounting
literature by including an endogenously-earned worker skill level as a determinant of worker responsiveness to wages. Prior research in this area has only looked at the effect of exogenous factors on worker responsiveness to wages (e.g. Hannan 2005; Choi 2013).

Second, this study also contributes to the social norm theory and literature. I isolate the influence of a single social norm, reciprocity, incremental to other social norms and see how this norm interacts with other social norms. In particular, I demonstrate interactions between different social norms whereby one social norm may aid in or deter the activation of other norms. Finally, my study makes a methodological contribution to the literature by demonstrating a cleaner method of isolating the incremental effects of reciprocity experimentally and demonstrating a method whereby worker skill level may be manipulated instead of measured. The ability to manipulate worker skill is important from a methodological standpoint because it allows a researcher to examine the effects of worker skill without confounding their designs by population differences. My study also considers the effort-wage relation to be the dependent variable and then examines how different contextual factors strengthen or weaken this relation, an approach that future research can benefit from.

1.4 Overview of Method

This dissertation examines the effect of reciprocity on the efficiency of flat-wage contracts in high and low productive efficiency settings and examines if the source of this productive efficiency (worker skill vs. production technology) influences this efficiency. I examine these factors using a controlled, incentivized, laboratory experiment. The experimental design is composed of two phases; however, both phases take place within the same experimental session. The first phase is a real-effort performance task that is performed for 5 minutes. Specifically, participants have to identify how many times a given letter appears in a
grid of letters. The second phase is an experimental gift exchange market based on previous studies (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan et al. 2002; Hannan 2005; Kuang and Moser 2009; 2011). This second phase takes place in two separate labor markets: a high productive efficiency and a low productive efficiency market. Within this design, I implement a 2x2 between-subject factorial design. The first factor I manipulate is if the worker’s placement into a high or low productive efficiency market is related to worker aspects (performance-based placement vs. random placement). The second factor I manipulate is the firms’ volition in setting wage levels for workers (firms choose wage offers vs. wage offers exogenous). The first factor allows me to investigate the influence of having productive efficiency that is a result of worker skill versus a purely exogenous productive efficiency. The second factor allows me to isolate the incremental effect of reciprocity on the effort-wage relation. Participants are paid a show-up fee as well as any earnings they accumulate in the two phases in cash at the conclusion of the experimental session.

In the first phase of the experiment, participants are presented with a series of 10x10 grids of letters and are asked to identify how many times a given letter appears in the grid of letters. Each correct response is rewarded with a $0.10 payment and a new grid/letter combination is presented. Each incorrect response leads to a blank screen and locks the computer for 5 seconds before another attempt at solving the grid can take place. The participants have 5 minutes to complete as many grids as possible. There is no information given regarding a link between the performance task and the second phase of the experiment, only that there is a second phase of the experiment. This first phase took place in all sessions of the experiment; however, performance on this task only influenced the second phase of the experiment in the treatments where productive efficiency is determined by worker skill (performance-based market
placement). In these treatments, above-median performance on the letter-search task earns workers a high productive efficiency while below-median performance on the letter-search task earns workers a low productive efficiency. In the other treatments, the performance on the letter-search task does not influence any aspect of the second phase of the experiment.

In the second phase of the experiment, participants take place in a gift exchange market with either a high or low productive efficiency. Participants are assigned to the role of either a firm or a worker. Firms offer flat-wage contracts to the market they are participating in. Workers see the wage offers from all firms and take turns choosing to accept a contract or reject all of the remaining contracts. Once a contract has been accepted, it is no longer available to other workers. The workers who accepted a contract then choose how much effort they wish to provide to the firm. The effort is costly to the worker but is beneficial to the firm. There are no identifiers in the labor markets. That is, each period, firms cannot tell which worker they are contracting with and workers cannot tell which firm they are contracting with. In this second phase of the experiment, I implement my second manipulation. In half of the treatments, the firms choose what level of flat-wage contract they want to offer to the labor market. In the other half of the treatments, the wage levels are forced exogenously. That is, the firm does not have any say in what level of wage they offer to the market in these treatments. It is common knowledge if the firm can choose the wage level or if the wage level is determined without any say from the firm. When the firm does not get to choose their wage, the wage levels that are chosen in the treatments where firms choose the wage levels are used so that the magnitude and order of observed wages is the same across treatments. The only difference between these treatments is the firm’s ability to choose the wage. As such, there is only an intentional action when the firm
can choose the wage and reciprocity will only influence behavior in this setting. Thus, this manipulation captures incremental concerns for reciprocity.

1.5 Overview of Results

The results from my dissertation provide several important insights and open up opportunities for future research. As hypothesized, I find that there is a positive effort-wage relation and reciprocity has an incremental effect on this relation such that the effort-wage relation is more positive when firms can choose the wage level they offer. Thus, consistent with theory and prior research, it appears that flat-wage contracts generate some of their ability to motivate above-minimal effort from reciprocal concerns in workers. Additionally, the results support the presence of a work ethic where non-minimal effort is provided on average and distributional preferences appear to also aid in the generation of a positive effort-wage relation. This result is important since many of the fairness norms hypothesized to influence the effort-wage relation observed under flat-wage contracts are more prevalent in many laboratory settings than in external decision settings. However, reciprocity is considered to be a prevalent fairness norm in many business settings and a primary determinant of behavior in practice (e.g. Rousseau 1995). As such, observing a significant incremental impact of reciprocity on the effort-wage relation provides empirical support for the behavioral assumption that leads to flat-wage contracts being called “reciprocity-based” (Hannan 2005; Kuang and Moser 2009; 2011).

I also hypothesize and find that in the high productive efficiency market the effort-wage relation is less positive when the productive efficiency is determined by worker skill (performance-based market placement) than when productive efficiency is determined exogenous to the worker (random market placement) when there are no reciprocity concerns activated. This result is consistent with the equity literature that suggests individuals shift their
preferences towards a more self-serving distribution of outcomes when they feel they have earned something (Cox et al. 2007). Practically speaking, this result indicates that the use of flat-wage contracts in high skill environments is less beneficial than in environments that have a high productive efficiency as a result of production technology. This is inconsistent with literature that suggests flat-wage contracts should be used in high skill environments, such as with professionals, instead of incentive contracts (Stevens and Thevaranjan 2010). However, this result is documented in the absence of reciprocity concerns. When reciprocity concerns are activated by allowing the firms to choose the wage they offer to the labor market, flat-wage contracts regain their efficiency in high skill labor markets. Consistent with my hypothesis, the incremental impact of reciprocity in high productive efficiency markets is stronger when productive efficiency is determined by worker skill than when productive efficiency is determined by production technology. This result suggests that the efficiency of flat-wage contracts in high skill environments is dependent on the impact of reciprocity. As such, these results provide a behavioral explanation for why flat-wage contracts are used in high skill environments incremental to the traditional agency reasons for why these contracts are used in such settings. High skill workers appear to be more sensitive to reciprocity than workers who just happen to be in a high productive efficiency market. Thus, firms that employ high skill workers can benefit from using contracts that are reciprocity-based.

I also investigate the effects of having productive efficiency be determined by worker skill and the interaction of worker skill and reciprocity in the low productive efficiency markets. The results in the low productive efficiency market document that the effort-wage relation is less positive when productive efficiency is determined by worker skill. Unlike the high productive efficiency market, there is no difference in the incremental impact of reciprocity between when
productive efficiency is determined by worker skill than when it is determined by production technology. These results are consistent with theoretical research that suggests that flat-wage contracts are only expected to generate a positive effort-wage relation for high productive efficiency firms. Stevens and Thevaranjan’s (2010) model predicts that for firms with relatively low productive efficiency, firms can rely on workers’ work ethic to generate a first-best level of effort. In these settings, it is not necessary for firms to pay wages above the cost of a worker’s effort to motivate the desired level of effort, making an effort-wage relation unnecessary. My results combine to provide further behavioral support for why flat-wage contracts are more common in high skill environments than in low skill environments since there appears to be little incentive to rely on reciprocity-based contracts in low skill settings.

In my supplemental analysis, I examine if firms are able to capitalize on workers’ reciprocity preferences in order to increase their profit. It is only valuable to increase wage offers if workers respond to an increase in wages with an adequate increase in effort. In the high productive efficiency market, I find that firm profit increases with the wage offered, but at a decreasing rate. Firms are able to profit to some extent on workers’ response to wages by offering higher wages. However, they offer wages that are slightly below the profit-maximizing wage level. In the low efficiency market, I find that firm profit also increases with the wage offered, but at a decreasing rate as well. The magnitude of this effect is smaller in the low productive efficiency market than in the high productive efficiency market. However, firms in the low productive efficiency appear to offer the profit-maximizing wage level on average in these markets. Firms appear to be fairly adept at predicting what effort level they should expect in response to their wage offers for low to average wages, while workers seem to overestimate their effort response to wage offers for all wage levels. Thus, I find that firms are able to
forward-induct the influence of reciprocity and worker skill in order to improve their welfare by offering appropriate wage levels. This is consistent with models of social norm activation that suggest that social norms will influence the decisions and behavior of both parties of a setting when they are activated (Bicchieri 2006).

1.6 Organization of the Dissertation

The remainder of this dissertation is organized as follows. Chapter two presents the background of my study. This chapter provides a review of studies that investigate the efficiency of flat-wage contracts in accounting and economics as it relates to the present study and introduces the two models that will be used for the theoretical development and hypotheses development of this study. Chapter three presents the theoretical development of this study and leads to the development of my formal hypotheses. Chapter four presents the details of my research design by describing the participants, experimental procedures for both of my experimental tasks, the post-experimental questions and payment of participants, and how I measure my dependent variables, independent variables, and relevant control variables. Chapter five discusses the data analyses and results of this study by presenting the manipulation checks, the descriptive statistics, the formal tests of my directional and non-directional hypotheses, and my supplemental analyses. Chapter six concludes this study and provides directions for future research. Appendix A presents a summary of the experimental procedures. Information relating to the approval and details of running this experiment are presented in the remaining appendices. Specifically, the Human Subjects Committee and Institutional Review Board approval to conduct this dissertation, informed consent forms, experimental instructions, post-experimental questionnaires, and screenshots of the experiment for each the roles are provided in Appendix B through H, respectively.
CHAPTER TWO

BACKGROUND AND MODEL

2.1 Chapter Introduction

This chapter of the dissertation is divided in two main sections. The first section of this chapter provides a review of the literature on the efficiency of incomplete contracts and flat-wage contracts in accounting and economics as it relates to this study. The second section of this chapter provides the details of two models that will be utilized in my theoretical development and in the formation of my hypotheses. The first model is an expected utility model developed by Cox, Friedman, and Gjerstad (2007) that is capable of incorporating reciprocity, equity, and distributional preferences into individuals’ decision making. The second model is Bicchieri’s (2006; 2008) model of social norm activation that explains when reciprocity, equity, and distributional preferences will be activated and enter into the Cox et al. (2007) model’s utility functions.

2.2 Incomplete Contracts

Traditional agency theory assumes that individuals have preferences that are purely self-interested, which is narrowly-defined as only receiving utility from their own wealth and leisure. This assumption leads traditional theory to predict that workers will only forego their leisure to exert effort, which is beneficial to the firm, if the expected increase in their own wealth as a result of this effort is sufficiently large to justify the loss of utility from leisure (Koford and Penno 1992). As such, traditional theory predicts that incentive contracts with pay linked explicitly to performance are necessary to motivate workers to exert above-minimum levels of effort (Baiman 1982; Lambert 2001).
However, since effort is not directly observable, it is often not possible for firms to achieve a first-best outcome where all actions are chosen cooperatively with all parties’ interests in mind and all information is costlessly and truthfully communicated (Lambert 2001). That is, there is an agency cost associated with the use of incentives to motivate effort from self-interested workers due to monitoring costs for the firm, bonding costs for the worker, and risk premiums demanded by risk-averse workers that lead to second-best outcomes (Jensen and Meckling 1976; Holmstrom 1979). The cost of explicitly linking payment to performance can be sufficiently high such that firms may choose to create a contract that is not complete. For example, when the link between effort and performance is noisy, performance is difficult to measure quantitatively, as with many professionals, and agents are very risk-averse, the cost of accurately monitoring worker effort and the premium workers demand to take on the risk associated with incentive pay can become untenably high (Milgrom and Roberts 1992; Lambert 2001). In these instances, traditional theory suggests that the cost of motivating effort with incentive contracts is too high and firms should not employ them. Stevens and Thevaranjan (2010) extend the traditional agency model and incorporate moral sensitivity into the agent’s utility function in addition to their self-interest and document that using informal contracts based on social norms can lead to superior outcomes versus incentive contracts for firms with relatively low and relatively high productivity firms, given a sufficiently high level of moral sensitivity in agents. As such, it is theoretically-preferable for firms to forego incentive-based contracts in some settings, even when complete contracts are possible.

In practice, it is often impossible for firms to contract on every contingency, as is assumed by many theoretical models, or directly observe worker effort. As such, contracts are often incomplete in nature by necessity (Williamson 1985; Christ et al. 2012). Flat-wage
contracts, or a non-contingent fixed salary, are a prevalent form of incomplete contract used in practice (MacLeod and Parent 1999; Fehr and Gachter 2000). Traditional theory predicts that these flat-wage contracts will fail to motivate above-minimal effort from workers since there is no pecuniary incentive tied to performance (Lambert 2001). Contrary to this prediction, flat-wage contracts often generate above-minimal effort levels from workers (e.g. Fehr et al. 1993; Hannan et al. 2002; Kuang and Moser 2011).

Beginning with Akerlof’s (1982) seminal paper, there has been a long line of research examining the use of labor contracts serving as a partial gift exchange whereby firms give workers a gift of above-market wages in exchange for above-minimal effort. This gift exchange leads to a positive relation between the level of the wage paid to workers and the level of effort provided by workers, referred to as a positive effort-wage relation. Thus, by paying a higher wage than required by market forces or legal mandate, firms can motivate non-minimal effort from workers even when there is no connection between performance and pay, inconsistent with traditional agency theory. Studies on flat-wage contracts document a positive effort-wage relation across a wide spectrum of settings and in the presence of a variety of moderators. For example, the effort-wage relation is documented when firms and workers are forced to contract one-on-one in a bilateral exchange setting (e.g. Charness 2004), when the labor market has an excess supply of workers or firms (Brandts and Charness 2004), when the firm’s productivity is high or low, when the participant population is undergraduate or MBA students (Hannan et al. 2002), when exogenous and random profit shocks impact the firm’s profitability (Hannan 2005), when other forms of contracts are available (Kuang and Moser 2009), when the workers can participate in negotiating their wages (Kuang and Moser 2011), and when the firm is susceptible to losses (Gose and Sadrieh 2012). This research maintains that fairness concerns, such as
reciprocity and equity concerns, motivate the effort-wage relation. As such, flat-wage contracts are referred to as “reciprocity-based” contracts (e.g. Hannan 2005; Kuang and Moser 2009). Collectively, this line of research suggests that behavioral concerns present in flat-wage contracts can successfully motivate above-minimal effort in many settings despite lacking the formal incentive structure of performance-based pay as a result of the social norms activated in flat-wage contract settings.

In addition to motivating above-minimal effort from workers, incomplete contracts are also potentially desirable to firms for other behavioral reasons in many circumstances. Incomplete contracts often signal trust in the worker while more complete contracts are often perceived as distrusting or alienating (Etzioni 1971). This trust can motivate autonomy, innovative, risk-taking, and appeal to an individual’s intrinsic motivations for hard work more than a complete contract (Rousseau 1995). These benefits are most likely to be impactful when dealing with individuals who have a potentially large action set, have to perform tasks that require special skills, or have to generate creative products or solutions, such as with many professionals (Smith 2010a). Kachelemeier et al. (2008) document that trying to tie explicit incentives to qualitative and intrinsic tasks, such as creativity, may actually backfire and lead to reduced overall performance. These behavioral theories suggest that, consistent with the predictions of traditional economic theory, in many high productivity work settings with professional and specialized workers the use of flat-wage contracts may be preferable to the use of performance-based incentive contracts. Empirical research documents a systematic relation between the form of contract offered and the type of labor market a firm is participating in that would provide support for these behavioral theories. Jobs that require higher levels of specific skills, that are relatively more capital-intensive, and that have higher recruitment costs tend to
use more relational contracts that rely on informal controls instead of complete incentive contracts (MacLeod and Parent 1999; Yang 2008).

One of the primary factors considered when deciding what form of contract to employ is its impact on how much effort workers invest into production for the firm. However, the productive efficiency of the worker’s effort is important to consider since it determines the value of motivating increased effort to the firm. For example, if a worker’s effort is very efficient, each marginal increase in effort leads to a large increase in firm productivity. If a worker’s effort is very inefficient, a large increase in effort is needed to lead to a marginal increase in firm productivity. In the first instance, firms can afford to pay a fairly high wage to motivate higher effort from workers since the marginal increase in effort is more valuable. In the second instance, firms cannot afford to pay a fairly high wage to motivate higher effort from workers since the marginal increase in effort is not very valuable. The importance of this productive efficiency is recognized and incorporated into many models. For example, one of the primary implications of Stevens and Thevarajan’s (2010) model is that the choice to rely on social norms and workers’ moral sensitivity to motivate effort instead of formal incentive contracts is determined by workers’ moral sensitivity and the productive efficiency of the firm. Their model suggests that firms with relatively high productive efficiency should rely on flat-wage contracts that include a salary premium to motivate effort.\footnote{In low productive efficiency environments, workers’ moral sensitivity leads to a work ethic that results in a first-best work effort from workers.}

While prior literature has considered the influence of productive efficiency in their models, they have ignored the source of this efficiency. Productive efficiency of the firm is determined jointly by the firm’s production technology and the worker’s skill (Baiman 1990). These two factors combine to determine the value of the worker’s effort to the firm such that an
increase in either of these factors makes the worker’s effort more effective in producing output (Bonner and Sprinkle 2002; Stevens and Thevaranjan 2010). Prior literature controls for these factors using a scalar on the worker’s effort to represent the net effect of both worker skill and firm production technology. However, an important distinction between these factors is that the firm’s production technology is exogenous to the worker and is common to all members in the firm while the worker’s skill is internally-related and unique to the worker. As such, changes in worker skill is likely to influence a worker’s perception about their worth and rights whereas changes in firm production technology is less likely to influence these perceptions since it is exogenous to the worker. This difference is of paramount importance when dealing with flat-wage contracts since the ability of such contracts to motivate effort from workers is derived primarily from workers’ fairness concerns (Rabin 1993) and fairness concerns are commonly determined by factors that are endogenous to settings (Bicchieri 2006). Given that the choice to offer flat-wage contracts is related to the level of worker skill, understanding the effect of worker skill on flat-wage contract’s ability to motivate effort from workers is an important aspect that is currently not considered.

2.3 Models

As previously mentioned, the ability of flat-wage contracts to motivate above-minimal effort levels from workers is often attributed to the influence of different social fairness norms, such as reciprocity, distributional preferences, and equity (e.g. Rabin 1993; Bolton and Ockenfels 2000). As such, it is necessary to be able to model how these different norms interact with each other and when each of these norms is likely to be active in influencing behavior. I use insights from two separate models to achieve this task. First, I use Cox et al.’s (2007) utility model to provide a framework for discussing the interactions of reciprocity, distributional
preferences, and equity concerns. While this framework is useful for predicting how norms influence behavior, it treats the presence of norms as exogenous and does not consider when and why these norms are active and influential. To address this issue, I use insights from Bicchieri’s (2006) model of social norm activation. This model demonstrates when social norms will be active and influence behavior. In developing my theory and hypotheses in Chapter 3, I use Bicchieri’s model to predict when social norms will be active and influence the utility functions modeled by Cox et al.

2.3.1 Cox, Friedman, and Gjerstad Model

Cox et al. (2007; CFG, hereafter) develop a model of an individual’s expected utility function that is capable of incorporating the behavioral effects of multiple social norms into individual’s decision making. This utility function is defined as a function of an individual’s own and other parties’ payoffs where the relative concern for others’ payoffs is determined by Adam Smith’s (1976) moral sentiments of gratitude and resentment. Said technically, these moral sentiments determine the relative weight that is placed onto others’ payoffs, or the marginal rate of substitution between the utility from an individual’s own payoff and the utility from others’ payoffs. They represent these moral sentiments as an individual’s emotional state. This emotional state is dependent on an individual’s perceptions regarding their own and others’ relative status and property rights as well as their perception of the kindness or unkindness of other parties. Thus, as an individual’s perceived status and property rights and an individual’s perceptions about others’ kindness or unkindness influences an individual’s level of other-regarding preferences in an individual’s expected utility function, thus influencing their behavior.
CFG’s framework is important to my dissertation since it is capable of incorporating multiple fairness-based social norms simultaneously. The three social norms of interest in this dissertation are distributional preferences, reciprocity, and equity. All three of these social norms can be factored into the CFG framework. Distributional preferences are defined as the preference over the relative distribution of payoffs between parties (Fehr and Schmidt 1999; Bolton and Ockenfels 2000). By including a non-zero weight on the payoff of other parties, distributional preferences are present in the CFG framework. The magnitude of weight placed on others’ payoffs is determined by the level of distributional preferences when concerns for status, property rights, or reciprocity are active. An individual will derive a positive utility (or avoid a disutility) by giving payoffs to another party until their preferred distribution of payoffs is achieved. Reciprocity is defined as responding in like kind to the intentions of others (Rabin 1993; Cox and Deck 2005). CFG’s framework is able to incorporate reciprocity concerns by having the relative weight on others’ payoffs be determined by an emotional state that is tied to the perceived kindness or unkindness of others’ actions. As others’ behavior is perceived as more kind (unkind), the relative weight placed on others’ payoffs is increased (decreased) such that an individual must give more (less) payoffs to others in order to maximize their expected utility. Finally, equity concerns can also be incorporated into CFG’s framework. Equity is defined as the desire to maintain a fair input-to-payoff ratio (Adams 1965; Bicchieri 2008). Equity concerns are present in CFG’s framework since the emotional state of an individual, which determines the relative weight they place on others’ payoffs, is determined by an individual’s relative status and property rights. An increase (decrease) in perceived status and/or property rights shifts the equitable distribution of payoffs towards one that is preferable to the individual (others). This

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7 CFG do not model this as a purely linear relation. The MRS between an individual’s own payoffs and others’ payoffs changes based on the level of payoffs each party is receiving in addition to changes caused by status, property rights, and perceived kindness or unkindness.
will result in a decreased (increased) relative weight placed on others’ payoffs. Thus, CFG’s model is able to incorporate all three of the social norms that are of interest to this dissertation at once.

2.3.2 Bicchieri Model

While CFG’s framework is capable of predicting the influence of multiple fairness norms on individuals’ utility functions and decision-making, it considers the presence of norms to be present or absent without concern for what activates these norms. Bicchieri (2006) provides a theory of social norm activation that explains when individual norms will be activated, what causes their influence on behavior, and what mitigates/exacerbates a norm’s influence. Her model has been used to help explain how contextual aspects of an environment can lead to norms being activated and how these norms influence behavior across actors in many settings, including accounting (Tayler and Bloomfield 2011; Douthit et al. 2012; Davidson and Stevens 2013), economics (Houser and Xiao 2010), psychology (Rossano 2012), and decision making (Bicchieri and Xiao 2009). Bicchieri (2006) defines social norms as formal or informal rules that serve to guide behavior. These norms have developed ecologically over time and serve as a mechanism that is useful in coordinating individuals on a single equilibrium when multiple equilibriums exist. Social norms are important to society as a whole since this coordination mechanism often leads to Pareto superior outcomes and reduces social welfare loss as a whole. Thus, understanding when and why social norms are activated, sustained, and diminished is extremely important.

Bicchieri predicts that most individuals are not pure conformers to social norms; instead, many individuals are conditional conformers to social norms.\(^8\) That is, most individuals will not

\(^8\) Bicchieri (2006) distinguishes between moral norms and social norms based on this distinction of conditional conformists. Moral norms are norms that are adhered to unconditionally in every circumstance. Social norms are
blindly adhere to social norms in every situation, but will adhere to the social norms when elements of the environment and contextual setting meet specific conditions necessary to activate social norm adherence in individuals. The conditions necessary for social norm activation can be broken into two general categories: 1) Contingency and 2) Conditional Preferences. When both of these two conditions are satisfied, the social norm becomes activated and it begins to influence an individual’s decision-making. Contingency is an initial condition that must be met before Conditional Preferences become relevant to social norm activation. Contingency is the requirement that individual \(i\) knows that a given social norm exists and is applicable to situations of the current type, \(s\). If \(i\) does not know that a given norm exists or might apply to situation \(s\), then they will not exhibit preferences for that norm and the requirements of Conditional Preferences do not need to be considered.

Given that the requirement of Contingency has been established, Conditional Preferences determine if a given social norm is activated and adhered to or ignored. There are two sets of expectations in \(i\) that lead to Conditional Preferences for adhering to a given social norm. In particular, \(i\) must have (2a) Empirical Expectations and (2b) Normative Expectations in order to have Conditional Preferences for adhering to a given social norm. Empirical Expectations represent \(i\)’s beliefs about the relative proportion of others in the population who adhere to the social norm in situations similar to \(s\). Normative Expectations represent \(i\)’s beliefs about the relative proportion of others in the population who expect \(i\) to conform to a given social norm in situations similar to \(s\).\(^9\) Conditions (2a) and (2b) are met when \(i\) believes that a sufficiently large

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\(^9\) This is the general form of Normative Expectations discussed by Bicchieri. A stronger form of Normative Expectations includes the possibility of sanctions. In this case, \(i\) believes that a sufficiently large subset of the population not only prefers for \(i\) to conform, but may be willing to sanction behavior through the use of penalties and rewards.
subset of population $P$ adheres to a given social norm and expects $i$ to adhere to the social norm as well. When these conditions are met, $i$’s Conditional Preferences for social norm adherence are activated and $i$ exhibits preferences for adhering to the social norm. While both Empirical Expectations and Normative Expectations aid in meeting Conditional Preferences for social norm adherence, only Normative Expectations are a necessary condition for Conditional Preferences to be met if $i$ recognizes the expectations of others within the population are legitimate in and of themselves (Bicchieri 2008). Once a norm is activated in an individual, the norm is considered relevant and divergence from the norm begins to create a disutility that affects decision making (Blay et al. 2014).

Bicchieri’s (2006) model predicts that factors that influence an individual’s beliefs and expectations will determine if a social norm is activated or not in a given situation. Rather than starting from scratch in every situation to determine if their Contingency and Conditional Preferences for the social norm are met, individuals rely on aspects of a setting to activate preformed mental scripts that inform the individual that a given social norm is either activated or not. Thus, individuals seek out contextual clues from the setting to inform them which of their prior experiences, and its associated mental script, is most applicable to this situation. Bicchieri’s model suggests that contextual clues serve to inform individuals about their conditional preferences for social norms and activate these social norms so that they will influence decisions and behavior.

2.3.3 Summary

For my dissertation, I combine aspects of these two models to create my theoretical foundation for examining the effects of reciprocity and worker skill on effort levels under flat-wage labor contracts. Bicchieri’s model explains when social norms will be activated and will
influence an individual’s decision making and CFG provides an expected utility framework that explains how the activated norms will influence an individual’s degree of other-regarding preferences and behavior. As such, Bicchieri’s model allows me to make the social norms that determine an individual’s emotional state in CFG’s utility function endogenous, whereas they are exogenous to CFG’s model. This hybrid combination of these two theories allows me to predict when each social norm will be activated by contextual aspects of a setting, how each activated social norm will influence an individual’s expected utility and their consequent behavior, and how different social norms interact when multiple social norms are activated simultaneously.
CHAPTER THREE
THEORETICAL DEVELOPMENT AND HYPOTHESES

3.1 Chapter Introduction

This chapter of the dissertation develops my theory with regard to my setting and develops my hypotheses. Since my theory is based on the effect of social norms that are activated by contextual factors, this chapter is based in the influence of contextual factors. It is divided into three main subsections. The first subsection of this chapter details the importance of reciprocity in my setting and my theoretical expectations regarding reciprocity. The second subsection of this chapter details my theoretical expectations of the influence of worker skill level and reciprocity in a high productive efficiency market. The third subsection of this chapter details my theoretical expectations of the influence of worker skill level and reciprocity in a low productive efficiency market.

3.2 Contextual Factors

My dissertation examines how social norms influence the effort provision of workers under flat-wage contracts. As detailed in Bicchieri’s (2006) model in Chapter 2, social norms are activated by contextual clues present in a setting. Thus, this section discusses the contextual factors that are relevant to workers’ effort choices in flat-wage contract settings. The first contextual factor is the firm’s volition in the level of flat-wage contract they offer to workers. This first factor is intended to isolate the effect of reciprocity concerns in workers incremental to other monetary and non-pecuniary incentives. The second contextual factor is the source of a firm’s productive efficiency. This second factor is intended to isolate the effect of equity concerns that arise as a result of productive efficiency being a result of worker skill. This section
details the behavioral impact of these contextual factors on workers’ effort provision under flat-wage contracts.

3.2.1 Reciprocity

Traditional agency theory assumes that individuals are motivated solely by wealth and leisure. As such, the theory predicts that contracts that are not monetarily linked to performance measures will fail to motivate any effort from subordinates (Baiman 1982; Lambert 2001). However, flat-wage contracts are commonly used in practice, despite lacking any formal link between performance and pay (MacLeod and Parent 1999; Fehr and Gachter 2000). Agency theory does predict that flat-wage contracts are optimal in settings with overly complicated tasks, with multi-dimensional tasks where not all valued dimensions can be contracted on, and for tasks with noisy performance measurement (Holmstrom and Milgrom 1991; Lambert 2001). However, experimental studies document a positive relation between wage and effort levels that can improve contract efficiency even with simple, one-dimensional, and noiseless tasks (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan et al. 2002; Hannan 2005; Kuang and Moser 2009; 2011; Douthit et al. 2012; Choi 2013). These findings suggest that behavioral factors besides wealth and leisure influence effort provision.

Behavioral theories provide alternative explanations for why flat-wage contracts can be efficient and why these contracts appear in practice. Flat-wage contracts often signal trust in workers, which motivates autonomy, innovative risk-tasking, and can appeal to individuals’ intrinsic motivation for hard work more than complete contracts (Rousseau 1995; Flood et al. 2001; Smith 2010a). Other theorists explain the use and efficiency of flat-wage contracts by expanding traditional self-interested utility functions to include concerns for social norms. These theories incorporate different social norms, such as reciprocity, distributional fairness, equity,
altruism, spite, and promise-keeping, and they systematically predict that flat-wage contracts will motivate effort above the minimally-enforceable level and will also generate a positive effort-wage relation (e.g. Rabin 1993; Levine 1998; Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Charness and Haruvy 2002; Charness and Rabin 2002; CFG; Stevens and Thevaranjan 2010).

Many of these behavioral theories are based on the importance of social norms of fairness to decision making. Fairness concerns are an important motivator of behavior in both social and professional settings (Rousseau 1995; Bicchieri 2008; Smith 2010b). These concerns are capable of reducing efficiency of complete contracts and improving the efficiency of incomplete contracts (Kuang and Moser 2009) as well as influencing workers’ ethical concerns (Zhang 2008; Chen and Sandino 2012; Douthit and Stevens 2014). While these theoretical models suggest that fairness concerns are an important social norm in many contracting setting, the construct of fairness lacks a unifying definition (Bicchieri 2006). Fairness has many definitions and theoretical constructs that can be activated in different settings, each with its own implications and predictions (Camerer 2003; Smith 2010b). This dissertation focuses primarily on the incremental influence of reciprocity for two reasons in particular. First, reciprocity is considered to be the most prevalent theory used to explain the positive effort-wage relation that is observed under flat-wage contracts. Second, reciprocity is considered to be a prominent fairness norm that is activated and influential in non-laboratory settings (Rousseau 1995). Douthit and Stevens (2014) argue that many fairness norms that are activated and prevalent in laboratory settings are less salient in practice. As such, the theoretical importance of this social norm for explaining the effort-wage relation in practice is important and helps to improve the external validity of this study.
Reciprocity is generally defined as the tendency to respond in like kind to the intentional behavior of others (Rabin 1993; Cox and Deck 2005). That is, reciprocity is responding to kind actions kindly and unkind actions unkindly. Reciprocity can take the form of positive reciprocity or negative reciprocity. Positive reciprocity is the willingness to sacrifice monetary payoffs to help another because of perceived kindness while negative reciprocity is the willingness to sacrifice monetary payoffs to harm another because of perceived unkindness. Reciprocity is a strong determinant of behavior that is valuable to firms and society as a whole. This norm evolved ecologically to allow society to maintain social stability (Gouldner 1960). Studies of accounting history suggest that accounting recordkeeping developed in order to allow reputation-based trust to develop such that individuals could indirectly reciprocate\textsuperscript{10} to the actions of others, promoting social order and improving economic efficiency (Basu and Waymire 2006; Waymire 2009). Reciprocity is considered to be an extremely prevalent social norm that is deeply entrenched into our mental scripts such that it has become an automated response in many individuals that they may not even realize that the social norm is impacting them or be able to explain its influence (Simon 1957; Cialdini 1996). Gouldner (1960) argues that the norm of reciprocity is so engrained and far-reaching into every aspect of individuals’ lives that it has become a moral norm instead of a social norm.\textsuperscript{11} The impact of reciprocity has been studied in a number of accounting settings, including in management control systems (e.g. Christ et al. 2012; Christ 2013), under flat-wage contracts (e.g. Hannan 2005; Kuang and Moser 2009; 2011; Douthit et al. 2012), and in audit negotiations (e.g. Ng and Tan 2003; Sanchez et al. 2007; 2011).\footnote{Indirect reciprocity is responding unkindly (kindly) to unkind (kind) actions of others even if the actions were not direct towards one’s self.} \footnote{Consistent with Bicchieri’s (2006) distinction between moral and social norms, I argue that reciprocity is a social norm instead of a moral norm since adherence to the norm is conditional on the expectations of others in at least some situations.}
Collectively, this research suggests that reciprocity is an important social norm that can impact behavior across a wide variety of settings and populations. Given the prevalence of reciprocity norms, Akerlof (1982) develops a gift exchange model that examines the influence of reciprocity in explaining why flat-wage contracts are used and why they are efficient in some settings. Akerlof’s model is motivated by a study by Homans (1954) that documented the behavior of a group of cash posters in a utilities company. The posters worked for a fixed wage in an environment where poor performance was rarely punished and good performance was rarely rewarded and their output was easily observable. Despite this, workers consistently outperformed the company’s stated expectations and the company never adjusted their expected level of output. This setting was not explainable by traditional economic theory and posed an interesting case study. Akerlof’s model pulls insights from theories in sociology regarding the concept of gift-giving and the concept of a fair day’s work for a fair day’s pay to provide a theory that may explain this behavior. His theory suggests that the employment contract represents a partial gift exchange whereby firms offer workers a gift of above market-clearing wages and workers reciprocate with a gift of above minimally-enforceable effort levels. This reciprocal gift exchange increases the social surplus and leads to higher wages for workers and higher production for firms. Since Akerlof’s model, reciprocity has been one of the most prominent social norms used to explain the efficiency of flat-wage contracts.

12 There are other ways firms can initiate a gift exchange by being kind. For example, the utility company did not raise its expectations, despite the average over-performance, or punish the workers who fell beneath the expected production level. This signaled kind intentions and fair treatment to the cash posters as a group and motivated continued high effort and productivity from the group as a whole, on average.

13 Efficiency-wage theory is a related concept to gift exchange in many ways. In particular, both predict similar behavior. In efficiency-wage theory, a firm pays a worker an above-market wage so the worker feels they have something at risk (i.e. the high wage is not easily replaceable in the market) which motivates the worker to work harder to avoid losing their above-market wage job. A key difference between these theories is the motivation behind individual’s actions and that gift exchange predicts a positive effort-wage relation even in single-period games.
Motivated in part by Akerlof’s gift exchange model, Rabin (1993) develops a more general model of reciprocity in a two-person normal-form setting by utilizing psychological game theory to develop an expected utility model that incorporates preferences for reciprocity. His model incorporates psychological payoffs and the intentions of other parties into individual’s utility functions in addition to the traditional self-interested incentives of wealth and leisure. In a flat-wage contract setting, his model predicts that, ceteris paribus, when a firm offers a higher (lower) wage to workers, the workers will view this offer as originating from more (less) kind intentions. If workers perceive the actions of the firm as kind, they will maximize their psychological utility by sacrificing some of their monetary payoff to repay the firm’s kind intentions by providing higher levels of effort, leading to a positive effort-wage relation. Negative reciprocity is only possible in this setting if workers have a non-minimal work ethic. That is, workers can only punish the firm if they perceive the firms actions as unkind, by reducing their effort if they respond to neutral intentions with non-minimal effort. Theorists have extended Rabin’s general model to include social welfare, altruism, and equity concerns in addition to reciprocity (Charness and Haruvy 2002; Charness and Rabin 2002; Falk and Fischbacher 2006), for sequential-move settings (Dufwenberg and Kirchsteiger 2004), and to incorporate the effects of status and property rights (CFG). While these theories differ in many aspects, they all share a key element that classifies them as reciprocity theories: they are based on the role of perceived intentions in predicting behavior that deviates from traditional agency predictions.

While reciprocity is considered to be the most prominent social norm that is used to explain the positive effort-wage relation, the social norm of distributional fairness is also commonly used to explain the positive effort-wage relation. Fehr and Schmidt (1999) and Bolton
and Ockenfels (2000) develop models that are based on individuals’ utility functions including concerns for distributional fairness. In particular, Fehr and Schmidt (1999) develop a model where individuals experience a disutility from outcomes that contain an inequitable distribution of payoffs while Bolton and Ockenfels (2000) model individuals as experiencing utility for both their own total pecuniary payoffs and their relative payoffs compared to other parties. The implication of both of these models is that individuals want to maximize their pecuniary payoff while minimizing their divergence from a reference point of relative distribution of payoffs. Early research assumed the reference point used to evaluate individual’s distributional preferences is an equal split of payoffs where individuals suffered a smaller disutility from divergences from the 50/50 split when they received more than 50% than when they received less than 50%. Later research relaxes the assumption of a 50/50 reference point and instead assumes that individuals will behave similarly with regards to other endogenously-determined reference points (e.g., 70/30, 60/40, 90/10, etc.). Distributional preferences theory leads to a setting where individuals will seek to maintain a relative distribution of the available payoff. In a flat-wage contract setting, as firms offer higher (lower) wages to workers, workers must provide more (less) effort to maintain their desired relative distribution of payoffs. Therefore, distributive preferences theory also predicts the positive effort-wage relation that is observed in the prior literature.

As discussed in Chapter 2, CFG’s framework is capable of incorporating both distributional preferences and reciprocity into an individual’s utility function. Since theory suggests that multiple social norms are likely to influence behavior in this setting, it is important to be able to identify when contextual factors in the setting will activate each of the norms. Distributional preferences are likely to be activated by the contracting setting in general since it
is salient to both firms and workers that their actions have a direct impact on both their payoffs and those of the other party. Thus, I expect that the contextual setting in general will activate a social norm of distributional preferences. These activated distributional preferences will lead to a positive relative weight being placed onto the payoffs of others, in CFG’s framework, and will lead to a positive effort-wage relation.

Reciprocity, on the other hand, is less likely to be activated by the setting alone and will only be activated when contextual clues suggest that this norm is applicable to a given situation. Reciprocity requires an intentional act by the first-mover, the nature of which is recognizable by the second-move so that they may respond in like kind (Bellamare et al. 2011). When the first-mover (the firm) does not have the ability to intentionally choose an action, it is unlikely that the context will trigger a mental script that contains expectations consistent with reciprocity in the second-mover (workers) since there is no intentions for them to perceive. However, when the firm intentionally chooses an action, workers will perceive kind or unkind intentions from the firm that activates the reciprocity norm by developing expectations of “doing unto others as they have done unto you”. As such, Bicchieri’s model predicts that manipulating the firm’s ability to choose a wage level isolates the incremental effect of reciprocity for workers. Incremental concerns for reciprocity will strengthen the effort-wage relation caused by distributional

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14 While it is not realistic to imagine a setting where the firm would have no input into workers’ wage levels, this setting provides important experimental control and allows me to isolate the construct of interest, reciprocity, as cleanly as possible. The context of my experimental setting is important to activate an individual’s preferences for adhering to social norms; however, the ability to create settings that isolate the variables of interest to enhance internal validity is a strength of the experimental method (Libby et al. 2002) and recreating the “mundane realism” of out-of-laboratory settings is of secondary concern provided that “experimental realism” within the laboratory setting can be maintained (Aronson et al. 1985). That is, the primary concern of the experimentalist is to maintain internal realism is to ensure that subjects view the experiment and their decisions as serious and impactful to them (Aronson et al. 1985, 485). This experimental realism is created by tying payment to their actions and making payoffs salient and dominant to motivate experimental focus and effort (Smith and Walker 1993; Friedman and Sunder 1994; Croson 2005).

15 A similar method is utilized to isolate the incremental effect of concerns for the social norm of honesty in a participative budgeting setting in experiments by Rankin et al. (2008), Douthit and Stevens (2014), and Blay et al. (2014).
preferences, as workers respond to the intentions of firms. Specifically, higher (lower) wages will be perceived as kind (unkind) intentions and will influence a worker’s emotional state by gratitude (resentment) such that they increase (decrease) the relative weight placed on others’ payoffs. This increase (decrease) in the relative weight placed on others’ payoffs will lead to an increase (decrease) in the amount of costly effort a worker is willing to provide to benefit the firm. Thus, the incremental effect of reciprocity will lead to a more positive effort-wage relation, as predicted by prior literature. To summarize, I expect that distributional preferences influence the level of effort that is provided under flat-wage contracts. However, I also expect that a significant amount of the effort-elicitation that occurs under flat-wage contracts is a result of the influence of reciprocity concerns. My first set of formal hypotheses follow from the above discussion.16

Hypothesis 1a: The level of effort provided by workers is positively related to the wage they are paid.

Hypothesis 1b: The effort-wage relation is more positive when firms can choose the level of wage that is offered to the labor market than when firms cannot choose the level of wage that is offered to the labor market.

My first set of hypotheses is related to the effects of distributional preferences and reciprocity in motivating above-minimal effort levels from workers. It is important to understand the incremental effect of reciprocity on the effort-wage relation since reciprocity concerns are prevalent in out-of-laboratory settings and are believed to motivate the efficiency of flat-wage

16 Unless otherwise noted, all hypotheses are presented in the alternative form.
contracts. The remainder of this chapter examines the contextual factors that influence the effort-wage relation and how reciprocity concerns are heightened or mitigated by these contextual factors.

### 3.2.2 High Productive Efficiency Market

While reciprocity is important in flat-wage contracts since it serves as an effort-elicitation mechanism, it is only one aspect of the production environment related to firm productivity. Another integral part of the production environment to consider is how efficiently worker effort is turned into productive output for the firm. The productive efficiency of worker effort is commonly modeled as a productivity scalar on worker’s effort level that translates effort into output. As productive efficiency increases, the firm can afford to pay a higher marginal cost to motivate increases in effort since this effort is more valuable to the firm. Thus, in high productive efficiency settings, it is less risky for firms to attempt to motivate increased effort by paying higher wages.

While Hannan et al.’s (2002) experimental results suggests that productive efficiency does not influence workers’ responses to wages, theoretical research by Stevens and Thevaranjan (2010) suggests that it is important to consider the productive efficiency of an environment when deciding to use complete incentive contracts versus flat-wage contracts that rely on social norms to motivate increased effort. They consider a principal-agent setting where agents’ utility functions incorporate the agent’s moral sensitivity in addition to concerns for wealth and leisure. Their model demonstrates that firms with relatively high productive efficiency are better off using a flat-wage contract with a salary premium, such as paying above the market wage, than using a performance-based incentive contract. A flat-rate contract with a salary premium is observationally equivalent to the positive effort-wage relation observed in traditional gift
exchange studies. Firms with relatively low productive efficiency are also better off using a flat-wage contract; however, they do not use a salary premium and only motivate effort up to the worker’s level of work ethic. It is important to note that their model is based on the social norm of promise-keeping, since workers and firms make an explicit agreement about the standard of effort as part of the contracting, and the model does not incorporate reciprocity or other social norms that are important in flat-wage contract settings.\(^{17}\) Instead, reciprocity and worker’s work ethic arise endogenously to their model as a result of the promise-keeping norm. Finally, while their model predicts that the firm’s productive efficiency is important to consider, they assume, as do traditional agency models, that productive efficiency is exogenous to the setting and is unaffected by the characteristics of the agent.

### 3.2.2.1 Worker Skill

Firm productivity is determined jointly by the worker’s effort level provided, the firm’s production technology, and the worker’s skill level (Baiman 1990). The firm’s production technology and the worker’s skill combine to determine the productive efficiency of the worker’s effort to the firm. An improvement in either the firm’s production technology or the worker’s skill level makes the worker’s effort more valuable to the firm (Sprinkle 2003; Stevens and Thevaranjan 2010). The net effect of these two factors is generally presented in principal-agent models and experimental tests as a productivity scalar on the worker’s effort that determines productive output; however, they are distinct elements of the production setting. Possibly the most important distinction between these two efficiency-determining factors is that the firm’s production technology tends to be exogenous to the worker and is shared by all members in the

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\(^{17}\) In their model, promise-keeping creates the observational equivalence of a gift-exchange. Since my dissertation does not entail an explicit agreement about the standard of effort between the workers and firms, it is unlikely that the contextual clues will activate the social norm of promise-keeping in my setting. Thus, this model is not relied upon explicitly in developing my hypotheses besides motivating the importance of considering productive efficiency.
firm while the worker’s skill is internally-generated and unique to the worker. Thus, a high productive efficiency environment can occur because a firm has an efficient production technology or because a worker has a high skill level.

Most experimental investigation and theoretical models tend to either ignore or control for the source of a firm’s productive efficiency and, consequently, workers’ skill levels. Worker skill is a particularly relevant element to consider in flat-wage contracts settings, however. Firstly, high skill labor environments have become more common in recent years (Autor et al. 2008). Self-selection theory in economics suggests that the ability of workers determines the form of contract that they prefer. Theory and experimental evidence suggests that workers with high skill at a task prefer to self-select into performance-based incentive contracts instead of flat-wage contracts since their expected pay is higher under the performance-based incentive contracts with high performance, ceteris paribus (Demski and Feltham 1978; Sprinkle and Williamson 2007; Kachelmeier and Williamson 2010). Prior empirical research also documents that the form of contract offered is systematically affected by the type of worker that a firm is attempting to employ. However, this research documents that firms tend to offer the opposite of what self-selection theory predicts workers to prefer. Jobs that require workers with high levels of skills, such as with academics and professionals, tend to use relatively more flat-wage contracts (MacLeod and Parent 1999; Yang 2008). Thus, high skill positions are becoming more prevalent and firms’ choice to use flat-wage contracts is often driven by the need to hire a high skill employee. A possible reason for this unpredicted contract design choice by firms may be that high skill workers are more sensitive to the social norms-based incentives than other workers (Hennessey 2000).
While distributional preferences and reciprocity are considered to be the primary social norms that motivate the effort-wage relation under flat-wage contracts, it is important to consider the impact of equity concerns when the influence of worker skill is present. Equity is a social norm that captures individual’s tendency to want to maintain a fair input-to-payoff ratio (Adams 1965; Bicchieri 2008). A worker’s skill level likely influences a worker’s perception regarding the amount of input they make to the firm’s profitability and productivity. In CFG’s framework, worker’s skill level influences their perceived status and property rights, influencing their emotional state and the relative weight they place on the payoff of other parties. As such, equity concerns are clearly important. Additionally, equity concerns are also likely to influence the activation and instrumentation of the other relevant social norms. For example, experimental research in economics documents mixed results regarding the relative impact of reciprocity and distributional preferences (e.g. Blount 1995; Bolton et al. 1998; Bolton et al. 2000; Cox 2004; Charness 2004; Falk et al. 2008). These mixed results are likely the result of the fact that equity concerns are nested within both distributional preferences and reciprocity theories.

Distributional preferences theory predicts that individuals maximize their monetary payoff while minimizing their divergence from a reference point. In CFG’s framework, these preferences result in a positive relative weight being placed on the utility received from other’s payoffs. Early distributional preference models assume that the reference point was exogenously determined, such as an equal split of the available surplus, in order to help their models be more tractable. However, more recent theories suggest that the reference point for evaluating distributional preferences is determined by endogenous aspects and represents what an individual perceives to be an equitable split of the available surplus. Therefore, aspects that influence an
individual’s perception about what constitutes an equitable outcome will influence how they define their distributional preferences.

Equity concerns are influenced by endogenous aspects of the decision setting (Bicchieri 2006) so it is likely that the source of a firm’s productive efficiency may differentially influence a worker’s equity concerns, and their consequent distributional preferences. A firm’s production technology is exogenous to the worker and is unlikely to influence their perceptions regarding what a fair input-to-payoff ratio is. Worker skill, on the other hand, is internally-related to workers and is likely to influence both what the worker perceives to be a fair input-to-payoff ratio is and what the worker’s input is intrinsically. Said simply, in a high skill environment that is devoid of concerns for reciprocity, high skill workers are likely to see their high skill level as being an initial gift to the firm that merits a high wage in and of itself. When a worker receives feedback that they possess a high skill level, they are likely to activate their mental script that informs them that they should experience an increase in their relative status and perceive themselves as having greater property rights. The activation of equity concerns shifts their emotional state in CFG’s framework such that they perceive an equitable outcomes as one that is more favorable to them. This leads them to reduce the relative weight placed on others’ payoffs and shifts their utility function closer to the traditional agency theory utility functions that are purely self-interested. Prior research in economics documents similar effects of allowing participants to earn their status in a variety of settings (e.g., Hoffman et al. 1994; Fahr and Irlenbusch 2000; Oxoby and Spraggon 2008). Thus, in the absence of reciprocity concerns, I expect that having productive efficiency tied to worker’s skill levels instead of a firm’s production technology is likely to make workers’ more self-interested and reduce the effort-wage relation. This expectation is presented formally below:
Hypothesis 2: In the absence of reciprocity concerns, the effort-wage relation in high productive efficiency markets is less positive when productive efficiency is influenced by worker skill than when it is determined solely by the firm’s production technology.

3.2.2.2 Reciprocity and Worker Skill

Hypothesis 2 predicts that workers reduce their other-regarding preferences, as exhibited through a positive effort-wage relation, when they are high skill compared to other workers. This hypothesis would suggest that firms are in error by offering flat-wage contracts to high-skill workers given that high skill workers would economically prefer to contract under a performance-based incentive contract and high skill workers’ elevated status and perceived property rights makes them less likely to respond to the distributional preferences norms embedded in flat-wage contracts with increased effort. However, these flat-wage contracts are hypothesized to be “reciprocity-based” by prior research (Hannan 2005; Kuang and Moser 2009) and Hypothesis 2 is in the absence of reciprocity incentives. While I anticipate that equity concerns will be activated by having productive efficiency tied to worker skill in the presence and the absence of reciprocity concerns, it is the interaction of worker skill and the reciprocity-based incentives of flat-wage contracts that is of primary concern in a high skill labor environment, given the prevalent usage of flat-wage contracts is common in many high skill labor markets.

As mentioned previously, equity concerns are nested in reciprocity theory as well as distributional preferences theory. As such, it is likely that there is an interaction of worker skill, which activates equity concerns, and reciprocity concerns in my setting. Reciprocity theory
predicts that individuals respond to the intentional behavior of others in like kind. However, the intention of others cannot be directly evaluated since the beliefs of others are unobservable and private information. Therefore, individuals are forced to proxy for the intentions of others based on the information that they can observe: the outcomes of the other party’s actions compared to a reference point (Falk and Fischbacher 2006). As with distributional preferences theory, this reference point is typically the equitable distribution of outcomes. Therefore, equity concerns also influence reciprocity concerns by shifting the reference point against which individuals compare an observed outcome when determining the kindness or unkindness of another party’s intentions.

Based on the same theoretical development used for Hypothesis 1b and Hypothesis 2, I expect that reciprocity concerns are activated by allowing firms to intentionally choose the level of the flat-wage contract they offer to the market and equity concerns are activated by having productive efficiency be related to the worker’s skill level instead of solely tying productive efficiency to the firm’s production technology. The effect of equity concerns on the high skill worker’s reference point for evaluating the intentions of firms is to make it more likely the worker sees a wage offer as unkind, leading to an emotional state of resentment and negative reciprocity, and less likely that the worker sees a wage offer as kind, leading to an emotional state of gratitude and positive reciprocity. Charness (2004) finds that the response to negative reciprocity is larger in magnitude than the response to positive reciprocity. As such, I would expect that equity concerns will make the influence of reciprocity concerns more impactful in the presence of high skill workers.

This theory can also be expressed in CFG’s expected utility framework. High skill workers’ elevated status and perceived property rights will make it more likely that the intentions
of others are perceived as unkind for relatively low wages, triggering an emotional state of resentment. This emotional state will lead to a reduced relative weight on the outcome of others and a reduced effort provision for low wage offers. It is possible that high skill workers could still perceive others to be kind for offering high enough wages, triggering an emotional state of gratitude. This emotional state of gratitude will lead to an increased relative weight on the outcomes of others and an increased effort provision for high wage offers. However, the magnitude of the reduction in effort provision to wage offers that are perceived as unkind will be greater than the magnitude of the increase in effort provision to wage offers that are perceived as kind. Additionally, the activated equity concerns in high skill workers elevate their perceived status and property rights, making it more likely that they will perceive the offered wages from firms as being deserved, at best, or being unkind, at worst, and less likely they will perceive them as being kind. Said simply, the incremental influence of reciprocity concerns will be heightened by the equity concerns activated by tying productive efficiency to worker skill in a high productive efficiency market compared to having productive efficiency be determined solely by the firm’s production technology. My third formal hypothesis and final hypothesis relating to the effectiveness of flat-wage contracts in high productive efficiency markets is stated formally below:

**Hypothesis 3:** In the high productive efficiency market, the effect of allowing firms to choose the level of wage that is offered to the labor market on the effort-wage relation is more positive when productive efficiency is influenced by worker skill than when it is determined solely by the firm’s production technology.
3.2.3 Low Productive Efficiency Market

My second and third hypotheses are related to the effects of worker skill and the incremental effect of reciprocity in the presence of worker skill for high productive efficiency environments. This high productive efficiency market is the primary setting of interest in this dissertation for several reasons. First, theoretical research suggests that the efficiency and desirability of flat-wage contracts versus performance-based incentive contracts is greater in a high productive efficiency market than in a low productive efficiency market because the risk premium with incentive contracts is too high for low productive efficiency workers (Stevens and Thevaranjan 2010). Second, high skill positions are becoming more common and prevalent over time (Autor et al. 2008). Third, the usage of flat-wage contracts is more common in high skill environments than in low skill environments (MacLeod and Parent 1999; Yang 2008). Finally, the usage of flat-wage contracts by firms in high skill environments is anomalous to traditional economic theory that suggests that workers in such environments prefer performance-based pay instead (Demski and Feltham 1978).

Theory suggests that many low skill and low productive efficiency environments should also utilize flat-wage contracts (e.g. Sprinkle and Williamson 2007; Stevens and Thevaranjan 2010). There is an important distinction between the suggested use of flat-wage contracts in high productive efficiency environments and low productive efficiency environments. In the high productive efficiency environments, firms are trying to maximize their profitability by using social norms-based incentives in flat-wage contracts to motivate increased effort levels from their workers. However, in the low productive efficiency environments, the usage of flat-wage contracts often represents a “giving up” phenomenon by either the worker or the firm. In self-selection settings, low skill workers realize that the pay from a flat wage is likely to be higher
than the pay they would receive based upon their performance and prefer flat-wage contracts. Firms realize that the value of a marginal increase in effort to the firm is low in these settings. As such, the cost of incentivizing an increase in effort is often higher than the value of the increased effort since it does not translate well into increased production. Finally, the low productive efficiency of worker’s effort in these environments are oftentimes low enough that relying on worker’s work ethic is sufficient to generate effort. Nevertheless, flat-wage contracts are also utilized and suggested in low productive efficiency environments and behavioral aspects in these contracts may be sufficient to counter-act this giving up phenomenon that motivates their use. Therefore, I examine the impact of having productive efficiency be related to worker’s skill levels and the incremental influence of reciprocity concerns when productive efficiency is tied to worker skill in low productive efficiency markets in this subsection.

3.2.3.1 Worker Skill

In the preceding subsection’s discussion, I predict that having productive efficiency be influenced by a worker’s skill level instead of solely from a firm’s production technology will activate equity concerns in workers that influences their behavior. However, the influence of this activation depends on the signal that is received by workers regarding their skill levels. The influence of worker skill on equity concerns is less clear for low skill workers. Self-serving attribution bias predicts that individuals will likely believe feedback that tells them that they are high skill, but it is less likely that individuals will believe feedback that tells them that are low skill. Individuals attribute positive outcomes to intrinsic factors about themselves, but they attribute negative outcomes to situational factors and other external factors (Larson 1977). That is, individuals see good things as being earned and bad things as bad luck or an unfair situation. Individuals also consistently over-evaluate their relative ability levels (e.g. Horswill et al. 2004).
Collectively, this overly optimistic self-image and attribution bias leads to a setting where workers in low productive efficiency environments are unlikely to consider perceptions regarding their skill level to be legitimate or accurate. A fundamental element of Bicchieri’s (2006) model of social norm activation is the role of an individual’s expectations and beliefs. It is necessary that a decision-maker view the *Normative Expectations* of his referent group to be legitimate in order for a given norm to be activated. As such, if low skill workers do not believe that their skill level is legitimate, then the equity concerns in this environment will not be activated by contextual clues.

The uncertainty about the ability of contextual factors to activate equity norms in a low productive efficiency environment makes it difficult to generate a theoretical prediction with confidence. As such, I detail theoretical predictions assuming that equity concerns are activated and theoretical predictions assuming that workers do not perceive their low skill level as legitimate. If workers do believe that they are actually low skill, the activated equity concerns will change their opinion of what constitutes a fair input-to-payoff ratio. Low skill workers will perceive that they deserve a low input-to-payoff ratio or that they are providing lower input. This will shift the reference point they use to determine their distributional preferences towards one that is less self-interested and has more other-regarding preferences. In CFG’s framework, this can be expressed as reducing their perceived status and property rights, generating an emotional state of gratitude for the wages they receive, and increasing the relative weight they place on the payoffs of others. This would result in a more positive effort-wage relation as a result of having worker skill influence productive efficiency.

If, however, workers do not believe that they are truly low in skill and this expectation is illegitimate, the feedback regarding their skill level will cause internal dissonance and a negative
Mood regulation theory predicts that individuals seek to avoid negative affective states and maintain positive affective states (Larsen 2000). Thus mood regulation theory suggests that workers will attempt to reduce their negative affective state. There are two ways in which the worker can improve their affective state. The first method is by increasing their fairness in order to avoid additional negative affect that may originate from diverging from a social norm (c.f. Blay et al. 2014). The second way to potentially improve their state is by being more selfish so that they can maximize their utility from wealth to offset the disutility from their negative affective state. These two methods of mood regulation work in opposite directions. If workers decide to reduce their negative affective state by becoming more concerned with fairness, then I would expect to observe an outcome that is observationally-equivalent to the outcome predicted if workers perceive their low skill as legitimate. If workers decide to reduce their negative affective state by becoming more selfish, then I would expect to observe the opposite effect. As individuals become more selfish, they reduce the relative weight on others’ payoffs and their utility function begins to resemble traditional, self-interested, agency theory utility functions. In this case, I would expect to see a less positive effort-wage relation as a result of having worker skill influence productive efficiency.

There are multiple theories regarding the influence of relating productive efficiency to worker skill in a low productive efficiency environment. If workers accept that their skill level is legitimate, equity theory suggests that they will exhibit a more positive effort-wage relation. If workers do not accept that their skill level is legitimate, as predicted by self-serving attribution bias, mood regulation theory suggests that they will either increase their fairness concerns and exhibit a more positive effort-wage relation or increase their self-interest and exhibit a less positive effort-wage relation.

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18 Affect is a general state of feelings, such as moods (Larsen 2000), emotions (Fiske and Taylor 1991), and the goodness or badness attached to an event or item (Finucane et al. 2000).
positive effort-wage relation. Given that it is unlikely that equity concerns are activated in this setting, I am left with two theories that make opposing directional predictions of behavior. The magnitude and prevalence of each theory’s effect is an empirical question and it is not possible to know ex ante if one of the theories dominates the other or if they offset. As such, I do not make a directional prediction for the effect of worker skill on the effort-wage relation in the low productive efficiency environment. Instead, I present a null hypothesis related to this empirical question for my fourth hypothesis:

**Hypothesis 4:** In the absence of reciprocity concerns, the effort-wage relation in low productive efficiency markets is the same when the productive efficiency is influenced by worker skill and when it is determined solely by the firm’s production technology.

**3.2.3.2 Reciprocity and Worker Skill**

Hypothesis 4 examines the influence of equity concerns that may arise as a result of relating productive efficiency to worker skill in low productive efficiency environments in the absence of reciprocity. Since flat-wage contracts are believed to derive their effectiveness from reciprocity concerns, it is important to consider the influence of worker skill on the incremental influence of reciprocity. If workers believe that their low skill level is legitimate, then their equity concerns will be activated and they will shift the reference point against which they evaluate the intentions of firms towards one that is less generous to themselves as a result of their reduced status and property rights. This leads to a setting where the effect of positive reciprocity is more likely since it is more likely that a wage offer exceeds their reduced reference point.
Negative reciprocity is unlikely since the expected wage is already low in these markets due to the reduced reference point. As such, the activated equity concerns will heighten the impact of reciprocity in the low productive efficiency environment. The result of these equity concerns will be a reduced perceived status and property rights, leading to an emotional state of gratitude that increases the relative weight placed on others’ payoffs. This results in an increased sensitivity to the reciprocity concerns for low skill workers compared to other workers, generating a more positive effort-wage relation, and indicates that flat-wage contracts may be effective at motivating effort in low productive efficiency environments instead of representing firms and workers “giving up”.

The above discussion assumes that both reciprocity and equity concerns are activated in the low productive efficiency environment. However, as in the setting where only distributional preferences were activated, workers are not likely to accept their skill level as legitimate and equity concerns are unlikely to be activated in such a case. As before, if workers believe that they do not legitimately possess a low skill level, this will create a negative affective state and individuals will attempt to regulate this mood by either increasing their concerns for fairness or increasing their self-interest. The only potentially impactful distinction between this setting and the setting discussed in detail in the previous subsection is the presence of the activated reciprocity norm. Since the reciprocity norm is activated, in addition to distributional preferences, the disutility from diverging from a social norm is likely to be stronger. This suggests that workers are more likely to regulate their mood through increasing their fairness instead of regulating their mood by increasing their self-interest in this setting. However, this does not suggest that the effect of reciprocity will be heightened by having productive efficiency related to worker skill. Once again, given the opposing theories in this setting, I do not make a
directional prediction for my fifth hypothesis regarding the incremental influence of reciprocity concerns across the two sources of productive efficiency. Instead, I present this empirical question as a null hypothesis as well:

**Hypothesis 5:** In the low productive efficiency market, the effect of allowing firms to choose the level of wage that is offered to the labor market on the effort-wage relation is the same when productive efficiency is influenced by worker skill as when it is determined solely by the firm’s production technology.
CHAPTER FOUR

EXPERIMENTAL DESIGN

4.1 Chapter Introduction

This chapter of the dissertation details the specifics of the experimental method I employ to test my hypotheses. In the first section, I discuss the participants who took part in the experiment and the recruitment procedures for these participants. I then detail the experimental procedures in the following section. This section is broken down into two subsections that detail the performance task performed by participants and then the flat-wage contract labor market that participants completed. The third section discusses the post-experimental questionnaires and the procedures that were used to distribute payment. Finally, I discuss the measures and variables that I use to conduct my analyses. In particular, I present subsections discussing the measurement of my dependent variables, my independent variables, and important control variables.

4.2 Participants

Participants for this study were recruited from a pool of college students at Florida State University’s main campus that volunteered to be placed on an email list that notified them of economics experiments being conducted on campus. The email announcement is a standard experimental recruitment generated by the lab administrator that details the guaranteed show-up fee and the maximum amount of time the experiment can last. This email contained a link that allowed participants to reserve a spot in an upcoming experiment. Participants were only allowed to reserve one spot in one session for the experiment at a time and could not sign up for a subsequent session of the experiment after they had participated. That is, each participant could only participate once.
There were 240 participants in this study (229 undergraduate students and 11 graduate students). The mean and median participant was a junior. 115 participants were females (48%) and 125 participants were males (52%). The self-reported GPA for the students who participated was fairly high: averaging 3.1 out of 4. The mean (median) participant had about 24 (18) months of work experience. 105 participants reported having a year or less experience (44%), 151 participants reported having two years or less experience (63%) and 25 participants reported have more than five years or more experience (10%).

The choice to use student participants instead of professional business participants to examine my hypotheses is motivated by a number of factors. First, it is common practice to use primarily undergraduate students in economic studies on the efficiency of flat-wage contracts (e.g. Fehr et al. 1993; Fehr et al. 1998; Cooper and Lightle 2013). If anything, the use of undergraduate students biases against finding results consistent with my hypotheses. Hannan et al. (2002) conduct experimental sessions that use undergraduate participants and experimental sessions that use M.B.A. students in a gift exchange environment. They find that the M.B.A. student population recalls their relevant work experience and experience heightened reciprocity concerns, leading to more efficient flat-wage contracts and a stronger effort-wage relation for this population. As such, the use of undergraduate students biases against finding results consistent with my hypotheses. A second factor that informed my decision to use a general student population is their influence on my ability to maintain experimental realism. Experimental realism captures the idea that participants take the experiment seriously and are forced to consider the influence of their choices on outcomes (Aronson et al. 1985). This is achieved in economics-based experiments by relying on the induced value theorem (Smith 1976). In order to ensure that the relevant payoff rules are impactful on decisions, payoffs need
to be salient to participants, monotonically increasing, and dominant (Smith and Walker 1993; Friedman and Sunder 1994). It is difficult to ensure that experimental payoffs are able to fulfil the requirements of the induced value theorem for professional business participants due to the relatively low nature of payoffs in laboratory experiments compared to payoffs in external settings (Croson 2005). In line with this argument, many methodologists suggest that professional participants should not be used for a study unless it is absolutely necessary (Peecher and Solomon 2001; Libby et al. 2002). Finally, the purpose of experiments is to test the theoretical relation between variables that may generalize to other settings (Kerlinger and Lee 2000, 17). This dissertation examines the relation between having productive efficiency tied to worker skill and reciprocity with workers’ effort provision under flat-wage contracts. The lack of professional participants does not play into the theoretical relation expressed between these variables.

4.3 Experimental Procedures

My experiment employs a 2x2x2 factorial experimental design for this dissertation where the firm’s volition in the wage offered to workers (choice vs. no choice), the determinant of productive efficiency (firm production technology vs. earned worker skill), and the level of productive efficiency (high productive efficiency vs. low productive efficiency) were manipulated between-subjects. The experiment consisted of two distinct phases, with both phases occurring in the same experimental session. The first phase of the experiment was a performance task that participants had a fixed amount of time to perform the task as many times as possible during. The second phase of the experiment was a flat-wage contract labor market based on the gift exchange markets used in prior research (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan 2005). The flat-wage contract labor market phase of the experiment took place in a high
productive efficiency and low productive efficiency labor market concurrently in each session, although participants only participated in one of the two productive efficiency labor markets. All of the other between-subject manipulations were employed on a between-session basis as well. Detailed instructions were given prior to participation in each phase of this experiment. The following subsections detail the procedures for each phase of my dissertation. A brief summary of the experimental procedures in each of these two experimental phases is presented in Appendix A.

Prior to scheduling any experimental sessions, I obtained approval to conduct my study from the Institutional Review Board and the Human Subjects Committee (Approval Memorandum is attached in Appendix B). At the beginning of the experimental session, prior to receiving any of the experimental materials or instructions, participants received an Informed Consent Form detailing the potential risks and benefits of this study. After answering any questions from participants regarding the consent form, participants read and signed the Informed Consent Form, agreeing to participate in the study. A copy of this form is attached in Appendix C. No potential participants declined to give their consent. The two primary phases of my experiment and my post-experimental questionnaire were all conducted using the z-tree software package (Fischbacher 2007).

4.3.1 Part 1: Performance Task

The first phase of my experiment was a performance task that was completed by all participants. This task is included in the experimental design in order to create a way of dichotomizing people as being either low skill or high skill, in the treatments where productive efficiency is influenced by workers’ skill levels, that is performance-based and is endogenous to the experimental session. The instructions and mechanics of the performance-based phase of the
experiment do not differ between experimental treatments. At the beginning of the experimental session, participants were randomly sorted into two comparison groups: A and B. These groups would later become the participants’ roles (as firms and workers) in the labor market phase of the experiment. This relation was never revealed to the participants, however. Using two comparison groups was helpful since it ensured that half of the workers and half of the firms would be in the top half and bottom half of performers for the task in their comparison group in every session.

After learning their comparison group letter, the participants received detailed instructions for the performance task phase of the experiment. A copy of these instructions is available in Appendix D. The instructions were then read aloud to participants as they read along. At the end of the instructions, any questions from participants regarding the rules of the performance task were answered.

The performance task was to correctly identify the number of times a given letter appeared in a 10x10 grid of letters. Participants had five minutes to correctly respond to as many grids as possible and had to answer each grid/letter combination correctly before advancing to the next grid. To discourage rapid and random guessing, each incorrect answer locked the computer and made the grid of letters invisible for five seconds. Each correctly solved grid/letter combination paid participants a piece-rate of $0.10.19

The purpose of this performance task was to give an endogenous measure of participant performance that could be used to justify to participants that they possessed a high skill level or a low skill level when productive efficiency was related worker skill. My theory predicts that equity concerns activated by receiving feedback that you are a high skill worker or a low skill

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19 Participants were not told that their performance on the performance task phase of the experiment may impact any aspects of the labor market phase of the experiment. As such, it was necessary to provide participants with motivation to attend to the task. This $0.10 piece-rate is intended to help keep participants motivated to attempt and complete grid/letter combinations for the full five minutes. There is no evidence of participants quitting on the letter-search task prior to the end of the time.
worker will influence the efficiency of flat-wage contracts and moderate the influence of reciprocity concerns present in these contracts. The theory this experiment is designed to test is not concerned with the influence of population differences or individual differences. As such, it is of paramount importance that performance on this task was not driven by innate or demographic differences. To address this potential concern, I generate two different series of grid/letter combinations for participants to complete. Each participant only received one of these series of grids and the series were markedly different in their difficulty. Participants were told they would all complete a letter-search task with the same rules. They were not aware that there were different series of grid/letter combinations, which series of grids they received or that other participants might have a different set of grids. It was never explicitly or implicitly stated that all participants would receive the same exact grid/letter combinations and no deception was involved. By randomly assigning participants to series of grids that were very different in their difficulty, I effectively randomly assign participants into high performers and low performers on the letter-search task. This is a crucial design feature since it ensures that performance on the task should not be predicted by innate or demographic factors, such as personality factors, gender or intelligence. At the end of the five minutes, the performance task phase of the experiment ended and participants learned if they performed in the top or bottom half of their group (role) on the task.

The letter-search task was used for my performance task for a number of reasons. First, letter-search tasks have been used in prior experimental studies (e.g. Webb et al. 2013). Second, this task is effort-sensitive. While some strategic guessing can be employed to maximize performance, task performance is linked strongly to the level of effort and focus put into the task. The participants’ perceptions about the task were also instrumental in the decision to use this
task for my dissertation. The nature of the task is fairly direct and simple. Participants are likely to perceive that the task is effort-sensitive and dependent on their focus. Participants are also likely to perceive relatively high performance levels and low performance levels on the task as being fair or deserved due to the straight-forward nature of the task. Finally, the task is easy to explain to participants such that they understand what is expected of them and they possess the necessary training and skills to perform the task adequately. As such, the use of the letter-search task in the performance task phase of my experiment is appropriate for the purposes of this dissertation.

4.3.2 Part 2: Labor Market

The second phase of the experiment was a flat-wage contract labor market adapted from the instruments used in prior gift exchange studies in accounting and economics (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan et al. 2002; Hannan 2005; Kuang and Moser 2009; 2011). I implemented my experimental manipulations during this phase of the experiment. At the end of the performance task phase, the instructions from that portion of the experiment were collected and detailed instructions about the labor market portion of the experiment were distributed to participants. I read the instructions aloud as participants read along on the instructions they had been handed. After reading the instructions aloud, I answered any questions that participants had regarding this phase of the experiment. A copy of the experimental instructions that were seen by participants is available in Appendix E. I describe the basic experimental setting and the order of operations in my setting below. In the four subsequent subsections, I provide the traditional economic prediction that assumes that individuals are motivated solely by their utility for wealth and I detail the changes that occur to my basic setting as a result of the between-subject factors I manipulate.
At the start of the first period, participants learned if they had been randomly assigned to the role of a firm or a worker. Half of the participants were assigned as firms and half of the participants were assigned as workers. Participants kept the role they were assigned throughout the entire experiment. Additionally, before the first period, participants learned the magnitude of the productivity scalar for the labor market they were participating in. This productivity scalar translated workers’ effort levels into productive output for the firm. Each labor market consisted of five firms and five workers. Firms each offered a flat-wage employment contract to a labor market and the workers in that market took turns choosing a wage offer or rejecting all of the offers that remained in the market until each worker had selected a contract or had turned down all of the remaining contracts in their market. Once a contract had been chosen by a worker, it was not available to other workers. After choosing their contract, each worker selected a level of effort to provide to the firm. Worker effort was positively related to firm output and negatively related to worker payoff. The cost of effort was an increasing convex function of the level of effort provided. In particular, the cost of effort in experimental Lira corresponding to each possible effort level choice is presented in Table 1 below:

<table>
<thead>
<tr>
<th>Effort Level</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Effort</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

The payoff function to the worker is given by:

$$\Pi_{\text{Worker}} = w - c(e)$$ if a contract is accepted,

---

20 I use a chosen-effort task as this provides a cleaner test of my theory by controlling for differences in aptitude at performing the experimental task. I determine skill in the first task and then control for it. Research documents a similar effort-wage relation for chosen and real effort tasks (Sprinkle 2003). The use of a chosen-effort in lieu of a real-effort task is common in experiments (e.g. Hannan 2005; Douthit et al. 2012). It is important, however, that chosen effort mirrors the theoretical properties of effort, however. Effort is considered to be 1) costly to the worker, 2), valuable to the firm, and 3) the cost of effort is positively related to the level of effort provided (Lambert 2001). The effort choice in my setting reflects these theoretical properties.
\[ \Pi_{\text{Worker}} = 20 \text{ Lira if no contract is accepted.} \]

where \( w \) is the chosen contract’s wage and \( c(e) \) is the cost of effort for the effort level chosen.

Firms offered a flat-wage contract between 20 and 120 Lira to the market each period. The level of flat-wage contract was bounded at 20 Lira so that, even at the highest effort level that created a \( c(e) \) of 18 Lira, workers were protected from receiving negative experimental earnings in a period. Once a contract was accepted, the worker accepting the contract chose an effort level that determined the firm’s productive output. If the contract offer was not accepted by a worker, the firm received no payout for the period. The payoff function of the firm is given by:

\[
\Pi_{\text{Firm}} = (120 - w) \times ke \text{ if contract is accepted}
\]

\[
\Pi_{\text{Firm}} = 0 \text{ Lira if contract is not accepted}
\]

where \( w \) is the wage offered to workers in the labor market, \( e \) is the effort level chosen from the worker who accepted the contract, and \( k \) is the productivity scalar on workers’ effort that determines the effectiveness of this effort at generating productive output. In prior studies, \( k \) is exogenously set at 1 and suppressed from the firm’s payoff function. In my study, \( k \) is equal to one on average. Allowing \( k \) to vary is necessary to be able to create settings that vary in the productive efficiency. At the end of the period, firms learned what effort level had been provided by the worker who accepted their wage offer and both firms and workers learned their experimental earnings from that period. Then, a new period began and the labor market phase of the experiment restarted with firms offering a new wage offer to the labor market. This continued for ten periods. The entire experiment lasted about 50 minutes per session on average.

To avoid reputation concerns becoming prevalent during the ten experimental periods for workers and firms, the labor market was conducted in the absence of identifiers for either role.
That is, the wage offers were posted in random order without any identification regarding which firm had generated which offer and no information was ever communicated regarding which worker selected which wage offer. To further simulate a single-period setting, payment was made from a single period that was randomly selected by the computer program at the end of the session. Additionally, to ensure that workers each had a fair chance to receive the premium wage offers, each worker had exactly two opportunities to select their wage offer first, second, third, fourth, and fifth in a period over the course of the experiment. All of the information in this basic setting was common knowledge to all participants, including that their wage offers and effort choices were anonymous. Examples of the screenshots that were actually seen by participants during the experiment are displayed in Appendix G and H for participants assigned as firms and workers, respectively.

4.3.2.1 Traditional Economic Prediction

Traditional economic theory assumes that individuals receive utility only for wealth and leisure. In the case of this experimental setting, the construction of effort as having a direct monetary cost captures the presumed utility from leisure that people experience. As such, the traditional economic prediction in my setting assumes self-interested wealth maximization by both firms and workers. Once a worker has accepted a contract, their pay is strictly decreasing in the level of effort they provide to firms. Workers will maximize their wealth by choosing to provide an effort level of 0.1, which is the minimum in my setting and has no cost of effort to the worker. Firms’ forward induction tells them that workers will provide the minimal effort level, regardless of the wage level offered, once they have selected a contract to maximize their own wealth. With this knowledge, firms maximize their own wealth by offering the lowest possible wage of 20 Lira to workers. Workers are economically-indifferent between accepting and
rejecting a wage offer of 20 Lira, given their outside option is worth 20 Lira. Assuming firms want to ensure that workers will always accept their wage offers so that they always receive some payoff, firms will offer 21 Lira.

Thus, the traditional economic prediction for my setting is that firms will offer a wage of 21 Lira each period and workers will always accept the wage offer. Workers will then provide the minimum effort level of 0.1. This leads to expected payoffs of 21 Lira per period for workers and 9.9 Lira per period for firms. Since traditional economic theory does not allow for reciprocity, equity, or distributional preferences to influence behavior, my experimental manipulations do not change these strong economic predictions with one exception. When the firms do not have volition in the wage offers that are made to workers, they cannot ensure that they maximize their wealth by offering the lowest possible wage offer that will be accepted. However, workers are predicted to continue to respond to all wages with an effort level of 0.1. Thus, the expected payoff in this treatment is slightly changed based on what wage levels firms are required to offer to workers, but the predicted behavior by decision-makers with an available action set is unchanged.

4.3.2.2 Productive Efficiency Manipulation

The first factor I manipulated between-subjects was the productive efficiency of the market firms and workers are participating in at two levels. In each experimental session, the labor market phase of the experiment took place in two distinct labor markets simultaneously. Five of the firms and five of the workers were assigned to each of these two distinct labor markets in each session and they remained in the labor market they were assigned to for the duration of the entire session. The only difference between the two labor markets was the

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21 Specifically, for every 1 Lira in wages above the 21 Lira optimum that a firm is required to offer to the labor market, the expected payoff of the firm decreases by 0.1 Lira and the expected payoff of the worker increases by 1 Lira.
magnitude of the productivity scalar on workers’ effort, \( k \). On average, \( k \) was set equal to one. However, in the High Productive Efficiency labor market, \( k \) was equal to 1.3 and, in the Low Productive Efficiency labor market, \( k \) was equal to 0.7. It was common knowledge to all participants what the productivity scalar was equal to on average across the two labor markets and what the productivity scalar for their respective labor market was.

Hannan et al. (2002) manipulate firm productivity at two levels in a similar flat-wage contracting setting. Instead of manipulating the magnitude of the productivity scalar, Hannan et al. manipulate the firm’s available funds at two levels: high productivity (120 Lira) and low productivity (70 Lira). In their setting, the firm’s payoff is equal to:

\[
\Pi_{\text{Firm}} = (X - w) * e
\]

where \( X \) is the firm’s available funds and the other terms are defined as above. When the firm is low productivity, the firm’s potential payoff is lower and the marginal cost to the firm of a given salary is higher than when the firm is high productivity. They do not find that manipulating productivity in this manner creates a differential effort response to wages in their experimental setting.

I manipulate the productivity scalar instead of manipulating the firm’s available funds for three main reasons. First, I am interested in the construct of productive efficiency while their study was interested in productivity. These are interrelated constructs, but not identical. Productivity represents the amount of output a firm is capable of producing while productive efficiency represents the relation between a workers’ effort and firm output. Second, the productivity scalar is a constant measure of how efficiently worker’s effort is translated into output for the firm and presents a cleaner test of my variable of interest. Finally, it is not possible to justify why a firm’s available funds are lower or higher as a result of worker skill. Thus,
changes of productivity when the productive efficiency is influenced by workers’ skill levels are less likely to be attributable to aspects that are related to unique and endogenous aspects of the worker.

4.3.2.3 Reciprocity Manipulation

The second factor that I manipulated between-subjects was the ability for reciprocal preferences to influence workers’ effort choices. My experimental design isolates the incremental effect of reciprocity by manipulating the firm’s volition in their wage offers to the labor market. In the Wage Choice (reciprocity concerns activated) treatment, firms chose the level of wage offered to the market each period of the experiment, as in the basic setting detailed above. In the No Wage Choice (no reciprocity concerns activated) treatment, the firms could not choose the level of wage offered to the market. Instead, the wage offer levels and sequences from the firms in the Wage Choice treatment were exogenously forced onto the firms in the No Wage Choice treatment. For example, Firm Alpha in the No Wage Choice treatment was required to use the same offers in the same order as Firm Alpha in the Wage Choice treatment. This No Wage Choice treatment served as a control treatment that allows me to isolate my variable of interest, reciprocity, as cleanly as possible by controlling for every aspect of the setting except the source of a firm’s wage offer. Reciprocity is based on responding to the intentions of others. The only difference between my Wage Choice and No Wage Choice treatment is that firms’ intentionally choose their wage offers in the Wage Choice treatment, but do not intentionally choose their wage offers in the No Wage Choice treatment. It was common knowledge that the wage offers were not influenced in any way by the firms in a given session for the No Wage Choice treatments.
Charness (2004) uses a similar experimental manipulation to attempt to isolate the incremental effect of reciprocity on the observed effort-wage relation under flat-wage contracts. In his study, he manipulates the firm’s volition in wage offers, as my experimental manipulation does. However, an important difference between our manipulations\(^{22}\) is the manner in which wage offers are determined when the firm has no choice. In his study, Charness uses a random-draw mechanism from the range of possible wage offers, such as drawing numbers from a bingo cage. In my study, I gather the actual wage choices by period of firms who chose the wages they offered and then exogenously forced the same wages to appear in the same order in the setting where firms cannot choose the wages they offered. This method provides a cleaner test of reciprocity incentives since it eliminates noise that may arise from using a random-draw of wage offers and controls for order and magnitude effects that could influence perceptions of the fairness of a given wage differentially across treatments. While my No Wage Choice treatment does not have a realistic symmetry with a true labor market, it utilizes a strength of the experimental method by providing an important experimental control that helps isolate the variable of interest.

### 4.3.2.4 Worker Skill Manipulation

The third factor that I manipulated between-subjects was the source of a labor market’s productive efficiency. This factor was manipulated at two levels: productive efficiency could originate from the firm’s production technology or from a worker’s skill level. In all treatments, firms were randomly assigned to either a High Productive Efficiency labor market or a Low...

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\(^{22}\) Other differences exist between his study and this dissertation. For example, he utilizes a bilateral gift exchange environment where workers only observe one wage offer before making their effort choices and they are not able to reject wage offers from firms. My study utilizes a gift exchange market where workers observe a group of wages from different firms and can choose between them. Additionally, they are able to reject wage offers from firms. These differences alone increase the action space and information set for workers. Given that this study is interested in endogenously-determined fairness norms, the ability to observe wage offers from a labor market is the more appropriate setting for my research questions.
Productive Efficiency labor market such that half of the firms in each session went to each labor market. When productive efficiency was determined solely by the firm’s production technology, the No Worker Skill treatment, workers were randomly assigned to either a High Productive Efficiency labor market or a Low Productive Efficiency labor market such that half of the workers in each session went to each labor market. This served as my control treatment. When productive efficiency was influenced by the worker’s skill level, the Worker Skill treatment, workers who performed above (below) the median of workers in their session on the letter-search performance task were assigned to the High (Low) Productive Efficiency market. In case of a tie at the median, workers on the median score were randomly assigned so that each of the labor markets had half of the workers from the session.

It is important to point out that the only purpose of the letter-search performance task in the first phase of the experiment is to allow for my Worker Skill manipulation. This manipulation is intended to capture the incremental impact of having productive efficiency tied to worker skill, ceteris paribus. As such, I needed a task that participants would interpret their performance on as being representative of their abilities and effort. However, I am interested in the influence of worker’s perceiving that their productive efficiency is tied to aspects about themselves. By using two different series of grids that vary drastically in their difficulty, I am able to create a close symmetry between my Worker Skill and No Worker Skill treatments. The random assignment of a difficult series of grids is likely to result in a worker “earning” a low productivity scalar and random assignment of an easy series of grids is likely to result in a worker “earning” a high productivity scalar. Thus, I am effectively assigning workers randomly to either a High Productive Efficiency labor market or a Low Productivity Efficiency labor market in both my Worker Skill and No Worker Skill treatments. The only difference in these
treatments is that, in the Worker Skill treatment, workers perceive their labor market assignment as being based on their value-add to the firm in the form of endogenously-determined worker skill instead of perceiving their labor market assignment as being exogenously-determined and random.

There were 3 sessions conducted for each experimental treatment. The experiment lasted for a total of ten periods in every session. The performance task was only performed in the first period of the experiment while the labor market phase of the experiment was conducted in all ten periods. The experimental design and abbreviations for each experimental condition are presented graphically in Table 2.

**Table 2: Experimental Design**

<table>
<thead>
<tr>
<th>High Productive Efficiency</th>
<th>Worker Skill</th>
<th>No Worker Skill</th>
<th>Worker Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reciprocity</td>
<td>No Wage Choice</td>
<td>High-NWC-NWS</td>
<td>High-NWC-WS</td>
</tr>
<tr>
<td>Wage Choice</td>
<td>High-WC-NWS</td>
<td>High-WC-WS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low Productive Efficiency</th>
<th>Worker Skill</th>
<th>No Worker Skill</th>
<th>Worker Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reciprocity</td>
<td>No Wage Choice</td>
<td>Low-NWC-NWS</td>
<td>Low-NWC-WS</td>
</tr>
<tr>
<td>Wage Choice</td>
<td>Low-WC-NWS</td>
<td>Low-WC-WS</td>
<td></td>
</tr>
</tbody>
</table>
4.4 Payment and Questionnaires

After completing the tenth and final period of the labor market phase of the experiment, the participants were presented with a post-experimental questionnaire to complete. This post-experimental questionnaire consisted of either 30 questions, for workers, or 32 questions, for firms. The first five questions gathered demographic information about the participant. The majority of the remaining questions were asked using a 7-point Likert scale to elicit responses. These questions were actually statements and participants were asked to indicate their agreement or disagreement on a Likert scale. The Likert scale ranged from 1, which was labeled “Strongly Disagree,” to 7, which was labeled “Strongly Agree”. The midpoint of 4 was labeled “Neutral”. The remaining points on the Likert scale were left unlabeled. Finally, at the end of the questionnaire, participants were asked to indicate how much effort they expected workers to provide (or they should provide if they were a worker) between 0.1 and 1.0 for a series of hypothetical wage ranges. The post-experimental questionnaire questions in their entirety are available in Appendix F.

Upon completing the post-experimental questionnaire, participants entered an ID number that was sitting at their computer terminal. This ID number was used to call participants back for payment. Participants’ experimental earnings for the session were calculated as their piece-rate earnings from the performance task phase of the experiment plus the experimental Lira earned in the randomly selected payment period of the labor market phase of the experiment translated into dollars at a rate of 3 Lira = $1. In addition to their experimental earnings, participants received a fixed $10 for showing up to the experiment on time and participating. Once all subjects had entered their ID number, they were called by ID number into a private room one at a time to receive their payment. Participants were paid their show-up fee and experimental earnings in
cash, signed a receipt of payment, and then left the laboratory. On average, participants earned approximately $12.75, plus their $10 show-up fee. Workers experimental earnings were about twice as high as those of firms ($16.80 vs. $8.61). The lowest experimental pay received by a participant was $1.20 by a firm participant in the Low-NWC-WS treatment. The highest experiment pay received by a participant was $32 by a worker participant in the High-NWC-NWS treatment. Each session lasted about 50 minutes on average.

4.5 Measures

In this section, I discuss the measures and variables that I used to conduct my analyses. The first subsection discusses the measurement of my dependent variables. I discuss my independent variables in the second subsection and identify important control variables in the third and final subsection.

4.5.1 Dependent Variables

My hypotheses are related to factors that influence the effort-wage relation under flat-wage contracts. To examine the effort-wage relation, I treat the level of effort provided as my primary dependent variable and regress it on the level of wage that is offered (e.g. Charness 2004; Hannan 2005). However, from a theoretical standpoint, it is the relation between effort and wage levels that is my true dependent variable, even though statistically, the wage level is treated as an independent variable. Effort is measured as the effort level chosen by a worker, ranging from 0.1 to 1.0. It is not possible to generate an effort level for a worker when they reject all of the contracts that are available in the market. These period observations are dropped due to a lack of a dependent variable.

Although not hypothesized, a primary concern for firms when deciding how to structure the employment contracts they offer is the influence these contracts have on the firm’s bottom
As such, as a part of my supplemental analysis, I examine the influence of my contextual and theoretical factors on firm’s profit. Firm profit is measured as the experimental Lira earned by a firm in a given period. Unlike with effort, a rejected contract is a meaningful dependent variable in regard to firm profit. As such, period observations that result in a contract not being accepted by any of the workers are not dropped for analyses that use firm profit as their dependent variable.

4.5.2 Independent Variables

The primary independent variable in my study is the wage level offered to workers. Since my hypotheses relate to the effort-wage relation, the wage level offered to workers is also a part of my theoretical dependent variable. The remainder of my independent variables are hypothesized to moderate the relation between the wage level and my primary dependent variable of effort.

My experimental design employs a 2x2x2 between-subject factorial design. However, only two of the three between-subject factors represent independent variables for my study. The productive efficiency of the market (High Productive Efficiency vs. Low Productive Efficiency) provides two alternative settings to examine the influence of my other manipulations and it does not represent an independent variable itself. The remaining two factors I manipulate represent my independent variables of interest: Reciprocity and Worker Skill. As detailed in my experimental procedures, I am able to examine the incremental influence of reciprocity by manipulating if firms have volition in the wage levels they offer to the market and I am able to examine the incremental influence of worker skill by manipulating if productive efficiency is influenced by worker skill or not. Thus, these experimental manipulations represent my independent variables and allow me to test moderators of the effort-wage relation.
4.5.3 Control Variables

Prior research on the effectiveness of flat-wage contracts in motivating gift-exchange behavior suggests that prior work experience is a potentially important covariate to control for. Hannan et al. (2002) and Hannan (2005) find that the effort-wage relation is more pronounced for populations who have higher levels of work experience. While my participant pool has relatively low levels of work experience and the influence of population differences is outside of the scope of this study, their results suggest that it is important to control for participants’ prior work experience in my setting. Work experience is measured as participants’ self-reported work experience in months. Based on the prior results, I would anticipate an interaction of wage levels and work experience on effort levels.
CHAPTER FIVE

DATA ANALYSIS AND RESULTS

5.1 Chapter Introduction

This chapter of the dissertation describes and presents the data analysis and results from my experiment. In the first section, I present and discuss the results of my manipulation checks. I provide descriptive statistics by experimental condition in the second section. In the third section, I present and discuss the results of my formal hypotheses tests for my directional hypotheses that were developed in Chapter 3. I present and discuss the results of my formal hypotheses tests for my null hypotheses that were developed in Chapter 3 in the fourth section. In the fifth section, I present and discuss my supplemental analyses. These supplemental analyses are broken down into subsections that discuss the robustness of my findings, my analysis of productive efficiency differences, my analyses regarding the effect of my experimental manipulations on firm profit, and discuss some interesting results that are present in my analysis of post-experimental questionnaire responses.

5.2 Manipulation Checks

As a part of the post-experimental questionnaire, participants responded to a number of statements that were designed to test the effectiveness of my experimental manipulations and controls. Participants responded to a number of statements on a 7-point Likert scale to indicate their level of agreement with the statement (1 = Strongly Disagree, 4 = Neutral, and 7 = Agree). Tests of the effectiveness of manipulations are conducted as a one-tailed t-test of differences of mean from the neutral position (4). The mean responses to my manipulation check statements by experimental condition and overall are presented in Table 3.
<table>
<thead>
<tr>
<th>Post-Experimental Question</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm chose the wage offered to the labor market.</td>
<td>N/A</td>
<td>N/A</td>
<td>5.93</td>
<td>4.50</td>
<td>5.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.22</td>
<td>4.50</td>
<td>5.22</td>
</tr>
<tr>
<td>The wage offered to the labor market was generated outside of the experiment.</td>
<td>5.53&lt;br&gt;&lt;0.001</td>
<td>5.97&lt;br&gt;&lt;0.001</td>
<td>N/A</td>
<td>N/A</td>
<td>5.75&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.53</td>
<td>5.97&lt;br&gt;&lt;0.001</td>
<td>5.75&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>The market I participated in was a high productive efficiency market.</td>
<td>5.43&lt;br&gt;&lt;0.001</td>
<td>5.97&lt;br&gt;&lt;0.001</td>
<td>5.27</td>
<td>5.33</td>
<td>5.50&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.43</td>
<td>5.97&lt;br&gt;&lt;0.001</td>
<td>5.50&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>The workers earned their placement into the market they were in based on their</td>
<td>N/A</td>
<td>5.50&lt;br&gt;&lt;0.001</td>
<td>N/A</td>
<td>5.00&lt;br&gt;0.026</td>
<td>5.25&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>performance in the first half of the experiment.</td>
<td></td>
<td></td>
<td>5.47&lt;br&gt;&lt;0.001</td>
<td>5.50&lt;br&gt;&lt;0.001</td>
<td>5.25&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>The workers were randomly assigned into the market they were in.</td>
<td>5.47&lt;br&gt;&lt;0.001</td>
<td>N/A</td>
<td>5.63&lt;br&gt;&lt;0.001</td>
<td>N/A</td>
<td>5.55&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.47</td>
<td>5.63&lt;br&gt;&lt;0.001</td>
<td>5.55&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>Workers could accept any contract not yet chosen or reject all remaining contracts.</td>
<td>5.87&lt;br&gt;&lt;0.001</td>
<td>6.40&lt;br&gt;&lt;0.001</td>
<td>6.17</td>
<td>6.27</td>
<td>6.18&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.87</td>
<td>6.40&lt;br&gt;&lt;0.001</td>
<td>6.18&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>Workers could choose any work level to provide between 0.1 and 1.0</td>
<td>6.27&lt;br&gt;&lt;0.001</td>
<td>6.43&lt;br&gt;&lt;0.001</td>
<td>6.60</td>
<td>6.50</td>
<td>6.45&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.27</td>
<td>6.43&lt;br&gt;&lt;0.001</td>
<td>6.45&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>I did not know which firm offered which contract (worker accepted the contract I</td>
<td>5.97&lt;br&gt;&lt;0.001</td>
<td>6.37&lt;br&gt;&lt;0.001</td>
<td>6.50</td>
<td>6.30</td>
<td>6.29&lt;br&gt;&lt;0.001</td>
</tr>
<tr>
<td>offered) to the market.</td>
<td></td>
<td></td>
<td>5.97</td>
<td>6.37&lt;br&gt;&lt;0.001</td>
<td>6.29&lt;br&gt;&lt;0.001</td>
</tr>
</tbody>
</table>
Table 3: Continued

<table>
<thead>
<tr>
<th>Post-Experimental Question</th>
<th>Low-NWC-NWS</th>
<th>Low-NWC-WS</th>
<th>Low-WC-NWS</th>
<th>Low-WC-WS</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm chose the wage offered to the labor market.</td>
<td>N/A</td>
<td>N/A</td>
<td>5.87</td>
<td>5.23</td>
<td>5.55</td>
</tr>
<tr>
<td>The wage offered to the labor market was generated outside of the experiment.</td>
<td>4.87</td>
<td>5.87</td>
<td>N/A</td>
<td>N/A</td>
<td>5.37</td>
</tr>
<tr>
<td>The market I participated in was a low productive efficiency market.</td>
<td>6.47</td>
<td>6.20</td>
<td>6.67</td>
<td>6.07</td>
<td>6.35</td>
</tr>
<tr>
<td>The workers earned their placement into the market they were in based on their performance in the first half of the experiment.</td>
<td>N/A</td>
<td>5.70</td>
<td>N/A</td>
<td>4.7</td>
<td>5.20</td>
</tr>
<tr>
<td>The workers were randomly assigned into the market they were in.</td>
<td>5.57</td>
<td>N/A</td>
<td>5.23</td>
<td>N/A</td>
<td>5.40</td>
</tr>
<tr>
<td>Workers could accept any contract not yet chosen or reject all remaining contracts.</td>
<td>6.17</td>
<td>6.43</td>
<td>6.37</td>
<td>6.33</td>
<td>6.33</td>
</tr>
<tr>
<td>Workers could choose any work level to provide between 0.1 and 1.0</td>
<td>6.60</td>
<td>6.63</td>
<td>6.53</td>
<td>6.73</td>
<td>6.63</td>
</tr>
<tr>
<td>I did not know which firm offered which contract (worker accepted the contract I offered) to the market.</td>
<td>6.43</td>
<td>6.10</td>
<td>6.50</td>
<td>6.16</td>
<td>6.30</td>
</tr>
</tbody>
</table>

NWC is the No Wage Choice treatment.
WC is the Wage Choice treatment.
NWS is the No Worker Skill treatment.
WS is the Worker Skill treatment.
High is the High Productive Efficiency market treatment.
Low is the Low Productive Efficiency market treatment.
p-values are two-tailed t-tests of differences of mean from the neutral response of 4 on a 7-point Likert scale. Higher numbers represent a great degree of agreement with the statement.
The responses to these post-experimental questions suggest that my experimental manipulations and controls were effective. Responses indicate that participants were able to correctly identify if the firm chose the wage level that was offered to the workers or if the wage offers were generated exogenously. Thus, my reciprocity manipulation appears to have been successful. Participants in both the High Productive Efficiency markets and Low Productive Efficiency markets were able to correctly identify if they participated in the high or low efficiency market, suggesting that my productive efficiency manipulation was also successful. Finally, participants were able to accurately identify if workers earned their placement into a high or low productive efficiency market based on their performance in the letter-search task or by random assignment. This suggests that my worker skill manipulation was also effective. Additionally, participant responses indicate that they understood that workers could accept any open contract or reject all remaining contracts, that workers had the freedom to provide any effort level between 0.1 and 1.0, and that both workers and firms were anonymous. All of these comparisons were strongly significant (all p-values < 0.001).

5.3 Descriptive Statistics

Descriptive statistics regarding the wage levels offered and effort levels provided for each of my experimental treatments are presented in Table 4. As stated in the previous chapter, since the effort-wage relation is my primary variable of interest, observations where the contract is rejected are not included in these statistics since they do not yield an effort level to generate an effort-wage relation.
Table 4: Descriptive Statistics by Experimental Condition

### High Productive Efficiency

<table>
<thead>
<tr>
<th>Reciprocity</th>
<th>No Wage Choice</th>
<th>Worker Skill</th>
<th>Average Accepted Wage</th>
<th>St. Dev.</th>
<th>Rejections</th>
<th>Average Effort</th>
<th>St. Dev.</th>
<th>Effort-wage Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Worker Skill</td>
<td>55.25</td>
<td>16.94</td>
<td>4.7%</td>
<td>0.352</td>
<td>0.240</td>
<td>0.134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Skill</td>
<td>54.48</td>
<td>15.23</td>
<td>3.3%</td>
<td>0.363</td>
<td>0.274</td>
<td>-0.066</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Low Productive Efficiency

<table>
<thead>
<tr>
<th>Reciprocity</th>
<th>No Wage Choice</th>
<th>Worker Skill</th>
<th>Average Accepted Wage</th>
<th>St. Dev.</th>
<th>Rejections</th>
<th>Average Effort</th>
<th>St. Dev.</th>
<th>Effort-wage Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Worker Skill</td>
<td>44.53</td>
<td>11.71</td>
<td>4.0%</td>
<td>0.279</td>
<td>0.249</td>
<td>0.121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Skill</td>
<td>44.49</td>
<td>16.47</td>
<td>3.3%</td>
<td>0.205</td>
<td>0.183</td>
<td>0.142</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 indicates that the average accepted wage is higher in the High Productive Efficiency markets (54.77 Lira) than in the Low Productive Efficiency markets (44.51 Lira). Additionally, the average effort provided is higher in the High Productive Efficiency markets (0.36) than in the Low Productive Efficiency markets (0.29). This is consistent with theory that suggests that it is less risky to try and motivate increased effort with increased pay in high productive efficiency environments. Table 4 further indicates that workers did not reject all of
the available wage offers very frequently (3.8% of offers were rejected). Finally, the descriptive
statistics in Table 4 suggest that there is a positive correlation between the effort provided and
the wage level offered and that this effort-wage relation becomes more positive when reciprocity
concerns are activated, consistent with my hypotheses. These descriptive statistics provide
informal support for the conjecture that flat-wage contracts are more effective effort-elicitation
mechanisms in high productive efficiency environments and their relative value compared to
incentive contracts may be greater to the firm in such settings (Stevens and Thevaranjan 2010).

Figure 1 presents graphs of the time-series of firms’ wage offers and the effort-wage
relation over the ten periods of the experiment. Since firms and workers were anonymous,
reputation concerns should not be present, and pay was from one randomly-determined period,
firms and workers should treat each period as independent. This time-series provides an informal
investigation of this conjecture. Panel A of Figure 1 presents a time-series of the firm’s wage
offers for the High Productive Efficiency and Low Productive Efficiency markets. Panel B of
Figure 1 presents a time-series of the firm’s wage offers for the No Worker Skill and Worker
skill treatments. The time-series for the firm’s wage offers for the No Reciprocity and
Reciprocity treatments is captured by the “Overall” line in these two time-series. Since the wages
offered are exogenously forced to be identical between these two treatments, they represent the
period mean. It is visibly clear that there is no systematic change in firm’s wage offers across the
duration of the experiment. Panels C through E of Figure 1 present a time-series of the effort-
 wage relation across the duration of the experiment for my two Productive Efficiency treatments,
my two Worker Skill treatments, and my two Reciprocity treatments, respectively. There appears
to be no systematic increase or decrease in the effort-wage relation across all of the experimental
conditions or in either of the Productive Efficiency treatments individually. However, it appears
that there may be a slightly positive (negative) trend in the effort-wage relation under the Worker Skill (No Worker Skill) and Reciprocity (No Reciprocity) treatments. A repeated-measures ANOVA find no significant within-subject effects of period on the effort-wage relation, however (F = 0.83, p = 0.55, two-tailed and F = 0.99, p = 0.43, for Reciprocity and Worker Skill, respectively). Finally, neither firm’s wage offers nor the effort-wage relation appears to suffer from an end-of-game effect.²³

Panel A: Wage Offers by Firms across Period by Productive Efficiency

![Panel A: Wage Offers by Firms across Period by Productive Efficiency](image)

Figure 1: Time-Series of Wage Offers and the Effort-Wage Relation

²³ Even though it appears that the effort-wage relation collapses entirely in Period 10 of the No Reciprocity treatment, the effort-wage relation was less than 0.15 in four of the preceding nine periods. Thus, I do not interpret this data point as signifying an end-of-game effect in my experiment.
Panel B: Wage Offers by Firms across Period by Worker Skill

Panel C: The Effort-Wage Relation across Period by Productive Efficiency

Figure 1: Continued
Panel D: The Effort-Wage Relation across Period by Worker Skill

Panel E: The Effort-Wage Relation across Period by Reciprocity

Figure 1: Continued

Figure 2 presents histograms that document the relative distribution of accepted wages into 10 Lira wage ranges and the effort level provided in response to these wage offers. For
expositional ease in these figures, effort levels are transformed by the power of 10 (i.e. an effort level of 0.4 is presented as 4). Panel A presents the overall results for all treatments. It is immediately apparent that firms rarely offer wages above 70 Lira and the modal response to all wage ranges appears to be an effort level of 0.1. In order to observe relative behavior in each of these wage ranges, a histogram that documents the relative frequency of each effort level for each wage range is presented in Panel B. In this histogram, it is apparent that there is a positive effort-wage relation based on the effort provided by wage range. As the wage range increases, a larger portion of workers provided higher effort levels. Panels C and D of Figure 2 present the histograms of the absolute and relative frequency, respectively, of effort levels by wage ranges in the No Reciprocity treatment. Panels E and F present these same results in the Reciprocity treatments. As with the histograms in the full sample, the modal effort response to all wage ranges is the minimum effort available (0.1) in the No Reciprocity treatment. However, the histograms suggest that there is a relation between the effort provided and the wage accepted, even absent reciprocity concerns. In the Reciprocity treatment, the modal effort response for wages below 70 Lira continues to be the minimum effort available. However, for wages above 70 Lira, the modal effort is now positive. This suggests that there is a positive effect of wages on effort in most cases above 70 Lira. Additionally, a comparison between the histograms in Panels C and D to the histograms in Panels E and F suggests that the effort-wage relation appears to be more significant in the presence of reciprocity concerns. Thus, this figure provides informal support for my first set of hypotheses and the theory that reciprocity helps flat-wage contracts elicit effort from workers.
Panel A: Effort Provided by Wage Range for Full Sample

Panel B: Relative Frequency of Effort Provided by Wage Range for Full Sample

Figure 2: Histograms of Effort Choices for Wage Ranges
Panel C: Effort Provided by Wage Range in No Reciprocity

Panel D: Relative Frequency of Effort Provided by Wage Range in No Reciprocity

Figure 2: Continued
These descriptive statistics provide informal support for my hypothesis that the effort-wage relation is motivated to a significant degree by reciprocity-based incentives.
The final set of descriptive statistics I present are in regard to my performance task. As I previously detailed, the letter-search task employed two distinct series of grid/letter combinations that varied significantly in their expected difficulty. The intention of this manipulation was to allow me to randomly assign people as either high or low performers on the task exogenously. Due to the differences in difficulty between the two series of grids, the letter-search task should not assign participants to labor markets based upon demographic factors. Descriptive statistics regarding performance on the letter-search task and the demographic information for workers who were sorted into High Productive Efficiency or Low Productive Efficiency based on their performance is presented in Table 5.

Panel A of Table 5 presents the number of grids completed across my two series of grids and across my Worker Skill conditions. I expect that participants should be able to complete significantly more easy grids than hard grids. Since the exact same information is given to participants about the letter-search task prior to its completion, there should not be a significant difference in performance between these two treatments. Participants who received the easy series of grids completed about 50% more grids on average than the participants who received the hard series of grids. The difference in performance was statistically significant (p < 0.001, two-tailed). As expected, there was no effect of the Worker Skill treatment on performance on the letter search task (p > 0.10, two-tailed). Panel B of Table 5 presents the demographic information for workers in the Worker Skill treatment and parametric and nonparametric tests of differences between high and low performers. This is the only group who had their performance on the letter-search task determine an aspect of the labor market phase of the experiment. Parametric t-test of differences in group means reveal that there is no difference in self-reported GPA or gender make-up between high and low performers (p > 0.10, two-tailed). The work
experience of high performers was marginally higher than that of low performers under the parametric t-tests (p = 0.09, two-tailed). None of these demographic aspects were statistically different when a nonparametric Wilcoxon rank-sum test was conducted (all p’s > 0.10, two-tailed). These descriptive statistics and statistical tests provide empirical evidence that by manipulating the difficulty of the series of grid/letter combinations between-subjects was successful in assigning individuals as high and low performers and avoiding confounds with demographic factors.

Table 5: Letter-Search Performance by Grid Difficulty

Panel A: Number of Grids Completed by Worker Skill and Grid Difficulty

<table>
<thead>
<tr>
<th></th>
<th>Easy Grids</th>
<th>Hard Grids</th>
<th>Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Worker Skill</td>
<td>22.35</td>
<td>14.27</td>
<td>8.08</td>
<td>0.000</td>
</tr>
<tr>
<td>Worker Skill</td>
<td>20.82</td>
<td>14.02</td>
<td>6.80</td>
<td>0.000</td>
</tr>
<tr>
<td>Difference</td>
<td>1.53</td>
<td>0.25</td>
<td>0.25</td>
<td>0.686</td>
</tr>
</tbody>
</table>

Panel B: Worker Demographics in Worker Skill Treatment

<table>
<thead>
<tr>
<th>GPA (self-reported)</th>
<th>High Performers</th>
<th>Low Performers</th>
<th>High – Low</th>
<th>T-test of differences of mean</th>
<th>Wilcoxon rank-sum test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>p-value</td>
<td>t-stat</td>
<td>p-value</td>
<td>z-stat</td>
</tr>
<tr>
<td>3.08</td>
<td>1.54</td>
<td>0.130</td>
<td>1.20</td>
<td>0.231</td>
<td></td>
</tr>
<tr>
<td>3.24</td>
<td>0.16</td>
<td>0.130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage Female</td>
<td>0.53</td>
<td>0.40</td>
<td>0.13</td>
<td>1.03</td>
<td>1.03</td>
</tr>
<tr>
<td>Work Experience</td>
<td>30.90</td>
<td>21.27</td>
<td>9.63</td>
<td>1.74</td>
<td>1.47</td>
</tr>
</tbody>
</table>
5.4 Tests of Directional Hypotheses

This section details the formal tests of the directional hypotheses I develop in Chapter 3: Hypotheses 1-3. Hypothesis 1a (H1a) predicts a positive effort-wage relation and Hypothesis 1b (H1b) predicts a more positive effort-wage relation when reciprocity is present. The results of my analyses regarding this set of hypotheses are presented in Table 6. Panel A of Table 6 presents the average wage accepted and average effort provided by period. As discussed in Chapter 4, traditional economic theory predicts that individuals will provide the lowest effort level possible (.01) regardless of the wage they receive. Anticipating this, firms will offer the lowest wage level possible that a worker would accept (21 Lira). The wage offered and effort provided is above the traditional predictions in all 10 periods (all p’s < 0.01, two-tailed). The results presented in Panel A of Table 6 also provide some statistical support for H1a. The effort-wage relation, captured by a Spearman correlation of the accepted wage offer and effort level provided, is significant and positive in all 10 periods (p < 0.01, one-tailed, in seven periods and p < 0.05, one-tailed, in three periods).

Panel B of Table 6 presents the results of an ordered Probit regression that investigates the effect of the wage level, the firm’s ability to choose the wage they offer, and the interaction of these two factors on the effort provided by workers.\textsuperscript{24,25} Prior literature documents that the level of effort individuals provide is influenced by their prior work experiences. As such, I

\textsuperscript{24} Ordered Probit regression is a generalization of the linear regression models for cases where the dependent variable is discrete, finite, and possesses a natural ordering (Hausman et al. 1992; Borooah 2001). Since my primary dependent variable is the worker’s effort level, which ranges from 0.1 to 1.0 and can only take on one of ten values, this is the appropriate regression model for my regression analyses that use worker’s chosen effort level as a dependent variable. Ordered Probit regression models have been commonly used in prior research for experimental investigations that examine the impact of contracts and contextual factors on effort choices (e.g. Brandts and Charness 2004; Douthit et al. 2012).

\textsuperscript{25} A repeated-measures ANOVA was conducted to test for period effects. I find no significant main effect for period and no significant interactions between period and my experimental manipulations. My results are qualitatively unchanged if I exclude Period 1, Period 10, or Period 1 and Period 10. To control for the repeated observations within participants, I cluster error terms at the participant level for all my regressions.
control for participants’ work experience in addition to the factors of interest in my regressions. This regression model is summarized below:

\[ \text{Effort} = \beta_0 + \beta_1 \text{Wage} + \beta_2 \text{Reciprocity} + \beta_3 \text{Wage} \times \text{Reciprocity} + \beta_4 \text{Experience} + \beta_5 \text{Experience} \times \text{Wage} + \beta_6 \text{Experience} \times \text{Reciprocity} + \varepsilon_i \]

where \( \text{Effort} \) is the effort level chosen by workers, \( \text{Wage} \) is the level of wage offer accepted by a worker, \( \text{Reciprocity} \) is a dummy variable equal to 1 if the firm was able to choose the wage offer made to the labor market and 0 otherwise, \( \text{Wage} \times \text{Reciprocity} \) is the two-wage interaction of \( \text{Wage} \) and \( \text{Reciprocity} \), \( \text{Experience} \) is participants’ self-reported prior work experience in months, \( \text{Experience} \times \text{Wage} \) is the interaction of \( \text{Experience} \) and \( \text{Wage} \), and \( \text{Experience} \times \text{Reciprocity} \) is the interaction of \( \text{Experience} \) and \( \text{Reciprocity} \). H1(a) predicts a positive sign on \( \beta_1 \), and H1(b) predicts a positive sign on \( \beta_3 \). The p-values in all of my regression analyses are one-tailed tests for the factors related to my directional hypotheses and are presented in bold. All other p-values are two-tailed. The results of this analysis support my first set of hypotheses. I document a significant main effect of the wage level (\( z = 5.10, p < 0.01, \) one-tailed) and a significant interaction between the wage level and the firm’s ability to choose the wage they offer to the market (\( z = 3.06, p < 0.01, \) one-tailed). This suggests that there is a positive effort-wage relation and reciprocity concerns make this relation significantly more positive. The results of these analyses provide strong support for my first set of hypotheses and suggest that prior study are correct in referring to flat-wage contracts as “reciprocity-based” contracts since they garner much of their effectiveness from reciprocity-incentives.

---

26 Including higher-order interactions of my work experience control do not qualitatively changes the results of my tests. For ease of presentation, these higher-order interactions are not presented.
Table 6: The Effect of Wage Level and Reciprocity

Panel A: Mean Wage and Effort by Period

<table>
<thead>
<tr>
<th>Period</th>
<th>n</th>
<th>Wage</th>
<th>Effort</th>
<th>Spearman Correlation</th>
<th>p-value (one-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>111</td>
<td>48.1</td>
<td>.42</td>
<td>0.247</td>
<td>0.004</td>
</tr>
<tr>
<td>2</td>
<td>115</td>
<td>50.7</td>
<td>.33</td>
<td>0.214</td>
<td>0.017</td>
</tr>
<tr>
<td>3</td>
<td>116</td>
<td>48.2</td>
<td>.31</td>
<td>0.331</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>4</td>
<td>118</td>
<td>48.0</td>
<td>.32</td>
<td>0.214</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>117</td>
<td>48.0</td>
<td>.33</td>
<td>0.270</td>
<td>0.002</td>
</tr>
<tr>
<td>6</td>
<td>112</td>
<td>49.1</td>
<td>.33</td>
<td>0.375</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>7</td>
<td>117</td>
<td>51.1</td>
<td>.31</td>
<td>0.280</td>
<td>0.001</td>
</tr>
<tr>
<td>8</td>
<td>117</td>
<td>50.2</td>
<td>.29</td>
<td>0.375</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>9</td>
<td>114</td>
<td>51.7</td>
<td>.32</td>
<td>0.272</td>
<td>0.004</td>
</tr>
<tr>
<td>10</td>
<td>117</td>
<td>51.2</td>
<td>.28</td>
<td>0.205</td>
<td>0.013</td>
</tr>
</tbody>
</table>

Overall Mean 49.6 (.32)
(standard deviation) (16.1) (.26)

Panel B: Ordered Probit Regression of Effort on Reciprocity (with clustered error terms)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.017</td>
<td>5.10</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>0.167</td>
<td>1.02</td>
<td>0.309</td>
</tr>
<tr>
<td>Wage*Reciprocity</td>
<td>0.019</td>
<td>3.06</td>
<td>0.001</td>
</tr>
<tr>
<td>Experience</td>
<td>0.001</td>
<td>0.22</td>
<td>0.828</td>
</tr>
<tr>
<td>Experience*Wage</td>
<td>0.000</td>
<td>0.46</td>
<td>0.649</td>
</tr>
<tr>
<td>Experience*Reciprocity</td>
<td>-0.024</td>
<td>-3.41</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Pseudo R^2 = 3.61%

The results of the analyses conducted to test my second and third hypotheses are presented in Table 7. Hypothesis 2 (H2) predicts that, in the High Productivity Efficiency labor market, the effort-wage relation is less positive when productive efficiency is influenced by worker skill than when it is determined solely by production technology in the absence of reciprocity concerns. To test H2, I estimate an ordered Probit regression of the effect of the wage level, the worker’s earned labor market placement, and the interaction of these two factors on the
effort provided in the High Productive Efficiency labor market. This regression is summarized below:

\[
\text{Effort} = \beta_0 + \beta_1 \text{Wage} + \beta_2 \text{Worker Skill} + \beta_3 \text{Wage} \times \text{Worker Skill} + \beta_4 \text{Experience} + \\
\beta_5 \text{Experience} \times \text{Wage} + \beta_6 \text{Experience} \times \text{Worker Skill} + \epsilon_i
\]

where \text{Worker Skill} is a dummy variable equal to 1 if the is assigned to their labor market based upon their performance in the letter-search task and 0 otherwise, \text{Experience} \times \text{Worker Skill} is the interaction of \text{Experience} and \text{Worker Skill}, and all other variables are as defined previously. H2 predicts a negative sign for \(\beta_3\). The results of this analysis are presented in Panel A of Table 7. As expected, the interaction of the wage level and the worker’s earned market placement is significantly negative (\(z = -2.64, p < 0.01\), one-tailed). This is consistent with my theory that high skill workers will shift their equity concerns such that they develop less generous distributional preferences due to their elevated perceptions of their own status and property rights. Thus, I find support for H2.

Hypothesis 3 (H3) predicts that the effect of reciprocity is more pronounced for high skill workers than for other workers. To test H3, I estimate an ordered Probit regression of the effect of the wage level, the firm’s ability to choose the wage they offer, the worker’s earned market placement, and the two- and three-way interactions of these factors on the effort provided in the High Productive Efficiency labor market. This regression is summarized below:

\[
\text{Effort} = \beta_0 + \beta_1 \text{Wage} + \beta_2 \text{Reciprocity} + \beta_3 \text{Worker Skill} + \beta_4 \text{Wage} \times \text{Reciprocity} + \\
\beta_5 \text{Wage} \times \text{Worker Skill} + \beta_6 \text{Reciprocity} \times \text{Worker Skill} + \beta_7 \text{Wage} \times \text{Reciprocity} \times \text{Worker Skill} \\
+ \beta_8 \text{Experience} + \beta_9 \text{Experience} \times \text{Wage} + \beta_{10} \text{Experience} \times \text{Reciprocity} + \\
\beta_{11} \text{Experience} \times \text{Worker Skill} + \epsilon_i
\]
where Reciprocity*Worker Skill is the interaction of Reciprocity and Worker Skill,
Wage*Reciprocity*Worker Skill is the three-way interaction of Wage, Reciprocity, and Worker Skill, and all other variables are as defined previously. H3 predicts a positive coefficient on \( \beta_7 \).

The results of this analysis are presented in Panel B of Table 7. I document the predicted three-way interaction (\( z = 2.17, p = 0.02 \), one-sided). Thus, the incremental influence of reciprocity is stronger in high productive efficiency environments when productive efficiency is influenced by workers’ skill levels. This result provides a behavioral explanation for why workers in jobs requiring high levels of skill are often employed under flat-wage contracts and other relational and incomplete contract forms. This finding also implies that prior studies that do not allow for worker skill and different productive efficiency markets may understate the importance of behavioral factors on the contract efficiency of flat-wage contracts.

Table 7: Worker Skill and Reciprocity in High Productive Efficiency Markets

Panel A: Ordered Probit Regression of Effort on Worker Skill in No Reciprocity (with clustered error terms)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.012</td>
<td>1.63</td>
<td>0.051</td>
</tr>
<tr>
<td>Worker Skill</td>
<td>-0.294</td>
<td>-0.80</td>
<td>0.422</td>
</tr>
<tr>
<td>Wage*Worker Skill</td>
<td>-0.034</td>
<td>-2.64</td>
<td>0.004</td>
</tr>
<tr>
<td>Experience</td>
<td>0.011</td>
<td>0.47</td>
<td>0.637</td>
</tr>
<tr>
<td>Experience*Wage</td>
<td>0.001</td>
<td>3.03</td>
<td>0.002</td>
</tr>
<tr>
<td>Experience*Worker Skill</td>
<td>0.006</td>
<td>0.29</td>
<td>0.776</td>
</tr>
</tbody>
</table>

Pseudo \( R^2 = 3.65\% \)
Table 7: Continued
Panel B: Ordered Probit Regression of Effort on Reciprocity and Worker Skill (with clustered error terms)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.021</td>
<td>4.76</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>-0.420</td>
<td>-1.53</td>
<td>0.126</td>
</tr>
<tr>
<td>Worker Skill</td>
<td>0.097</td>
<td>0.42</td>
<td>0.677</td>
</tr>
<tr>
<td>Wage*Reciprocity</td>
<td>0.024</td>
<td>2.80</td>
<td>0.003</td>
</tr>
<tr>
<td>Wage*Worker Skill</td>
<td>-0.003</td>
<td>-0.31</td>
<td>0.759</td>
</tr>
<tr>
<td>Reciprocity*Worker Skill</td>
<td>0.633</td>
<td>1.40</td>
<td>0.162</td>
</tr>
<tr>
<td>Wage<em>Reciprocity</em>Worker Skill</td>
<td>0.040</td>
<td>2.17</td>
<td>0.015</td>
</tr>
<tr>
<td>Experience</td>
<td>0.001</td>
<td>0.11</td>
<td>0.916</td>
</tr>
<tr>
<td>Experience*Wage</td>
<td>0.000</td>
<td>0.36</td>
<td>0.716</td>
</tr>
<tr>
<td>Experience*Reciprocity</td>
<td>-0.032</td>
<td>-2.32</td>
<td>0.021</td>
</tr>
<tr>
<td>Experience*Worker Skill</td>
<td>-0.003</td>
<td>-0.23</td>
<td>0.815</td>
</tr>
</tbody>
</table>

Pseudo $R^2 = 6.25\%$

Thus, I reject the null hypothesis of no differences in the effort-wage relation in favor of my directional alternative hypotheses for H1a, H1b, H2, and H3. Flat-wage contracts create a positive effort-wage relation and the magnitude of the effort-wage relation is made larger by reciprocity concerns. Equity concerns that arise in high skill workers reduce their other-regarding preferences and result in lower responsiveness to wages in the absence of reciprocity concerns. However, high skill workers are more responsive to the reciprocity incentives in flat-wage contracts, increasing the effectiveness in these high skill markets. In the next section, I test my two null hypotheses that were developed in Chapter 3 regarding the influence of worker skill and reciprocity in low productive efficiency environments.

5.5 Tests of Non-Directional Hypotheses

The results of my analyses regarding my fourth and fifth hypotheses are presented in Table 8. Hypothesis 4 (H4) tests the effect of allowing workers to earn their productive
efficiency in the Low Productive Efficiency labor market. To test H4, I estimate an ordered Probit regression of the effect of the wage level, the worker’s earned market placement, and the interaction of these two factors on the effort provided in the low productive efficiency market in the absence of reciprocity concerns. This regression is summarized below:

\[
Effort = \beta_0 + \beta_1 \text{Wage} + \beta_2 \text{Worker Skill} + \beta_3 \text{Wage} \times \text{Worker Skill} + \beta_4 \text{Experience} + \\
\beta_5 \text{Experience} \times \text{Wage} + \beta_6 \text{Experience} \times \text{Worker Skill} + \epsilon_i
\]

where all variables are as defined previously. H4 does not provide a directional prediction. If workers perceive the equitable outcome as one that is unfavorable to them as a result of their low skill level, my theory predicts a positive sign on \(\beta_3\). However, workers are not likely to perceive themselves this way; therefore, placement into the Low Productive Efficiency market will cause a negative affective reaction. Workers may decide to maximize their wealth by providing less effort in order to regain a positive affective state. In this case, I would expect a negative sign on \(\beta_3\). Results of this analysis are presented in Panel A of Table 8. I document a marginal negative interaction of the wage level and the workers’ earned placement (\(z = -1.73, p = 0.08, \text{two-sided}\)), consistent with the second theory. This result suggests that self-serving attribution bias leads workers to believe that their skill level is not legitimately low and the workers then attempt to reduce their negative mood caused by this dissonance by becoming more self-interested.

My fifth and final hypothesis (H5) tests if the effect of reciprocity is different when productive efficiency is influenced by worker skill than when it is determined solely by the firm’s production technology in the Low Productive Efficiency labor market. To test H5, I estimate an ordered Probit regression of the effect of the wage level, the firm’s ability to choose the wage they offer, the worker’s earned market placement, and the two- and three-way
interactions of these factors on the effort provided in the Low Productive Efficiency labor market. This regression is summarized below:

\[
\text{Effort} = \beta_0 + \beta_1 \text{Wage} + \beta_2 \text{Reciprocity} + \beta_3 \text{Worker Skill} + \beta_4 \text{Wage} \times \text{Reciprocity} + \\
\beta_5 \text{Wage} \times \text{Worker Skill} + \beta_6 \text{Reciprocity} \times \text{Worker Skill} + \beta_7 \text{Wage} \times \text{Reciprocity} \times \text{Worker Skill} + \\
\beta_8 \text{Experience} + \beta_9 \text{Experience} \times \text{Wage} + \beta_{10} \text{Experience} \times \text{Reciprocity} + \beta_{11} \text{Experience} \times \text{Worker Skill} + \varepsilon_i
\]

where all variables are as previously defined. As with H4, H5 does not provide a directional prediction. If workers believe their skill level is legitimate, theory predicts a positive sign on \(\beta_7\). However, the results of my analysis regarding H4 suggest that workers are not likely to believe their skill level is legitimately low. As such, workers will likely become more self-interested. In this case, I would expect a negative sign on \(\beta_7\). The results of this analysis are presented in Panel B of Table 8. I do not find evidence of the effect of reciprocity being different when productive efficiency is influenced by worker skill and when it is determined solely by the firm’s production technology in the Low Productive Efficiency labor market (\(z = 0.54, p = 0.589\), two-sided).

**Table 8: Worker Skill and Reciprocity in Low Productive Efficiency Markets**

**Panel A: Ordered Probit Regression of Effort on Worker Skill in No Reciprocity (with clustered error terms)**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.021</td>
<td>2.40</td>
<td>0.016</td>
</tr>
<tr>
<td>Worker Skill</td>
<td>-0.457</td>
<td>-1.20</td>
<td>0.228</td>
</tr>
<tr>
<td>Wage*Worker Skill</td>
<td>-0.016</td>
<td>-1.73</td>
<td>0.083</td>
</tr>
<tr>
<td>Experience</td>
<td>0.020</td>
<td>1.51</td>
<td>0.131</td>
</tr>
<tr>
<td>Experience*Wage</td>
<td>0.001</td>
<td>2.86</td>
<td>0.004</td>
</tr>
<tr>
<td>Experience*Worker Skill</td>
<td>-0.014</td>
<td>-0.69</td>
<td>0.490</td>
</tr>
</tbody>
</table>

Pseudo R\(^2\) = 3.99%
Table 8: Continued
Panel B: Ordered Probit Regression of Effort on Reciprocity and Worker Skill (with clustered error terms)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.019</td>
<td>3.30</td>
<td>0.001</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>-0.072</td>
<td>-0.19</td>
<td>0.848</td>
</tr>
<tr>
<td>Worker Skill</td>
<td>-0.003</td>
<td>-0.01</td>
<td>0.990</td>
</tr>
<tr>
<td>Wage*Reciprocity</td>
<td>0.002</td>
<td>0.18</td>
<td>0.859</td>
</tr>
<tr>
<td>Wage*Worker Skill</td>
<td>-0.008</td>
<td>-1.29</td>
<td>0.196</td>
</tr>
<tr>
<td>Reciprocity*Worker Skill</td>
<td>0.985</td>
<td>1.83</td>
<td>0.068</td>
</tr>
<tr>
<td>Wage<em>Reciprocity</em>Worker Skill</td>
<td>0.007</td>
<td>0.54</td>
<td>0.589</td>
</tr>
<tr>
<td>Experience</td>
<td>0.004</td>
<td>0.47</td>
<td>0.640</td>
</tr>
<tr>
<td>Experience*Wage</td>
<td>0.000</td>
<td>3.12</td>
<td>0.002</td>
</tr>
<tr>
<td>Experience*Reciprocity</td>
<td>-0.024</td>
<td>-1.82</td>
<td>0.068</td>
</tr>
<tr>
<td>Experience*Worker Skill</td>
<td>-0.003</td>
<td>-0.22</td>
<td>0.827</td>
</tr>
</tbody>
</table>

Pseudo $R^2 = 4.45\%$

Combined with the results from H2 and H3 regarding the High Productive Efficiency labor markets, the results presented in this section regarding the Low Productive Efficiency labor markets suggests that reciprocity-based gift exchange behavior should only be expected in high productive efficiency environments. This is consistent with analytical research in Stevens and Thevaranjan (2010) that suggests that firms in low productive efficiency environments can motivate first-best effort levels without relying on reciprocity as a result of the workers’ work ethic and the relatively low level of first-best effort in these settings.

5.6 Supplemental Analysis

This section presents supplemental analyses to my formal hypothesis tests. First, I discuss the robustness of my primary results. In the second subsection, I discuss differences between the effort-wage relations in my high and low Productive Efficiency labor markets. Next, I present and discuss analyses relating to the effects of my experimental manipulations on the firm’s
profit. Finally, I present responses to my post-experimental questionnaire and discuss some implications.

### 5.6.1 Robustness

Prior research on the effort-wage relation under flat-wage contracts documents a non-linear effect of wage levels on effort levels such that effort increases as wages increase but at a decreasing rate. This non-linear effect of wages on effort exists in my data as well. However, including these non-linear effects of wages does not qualitatively change the results of any of my hypotheses tests. Another potential issue that could influence my results is the workers’ response to maximum wage levels from firms. When a firm offers a wage level of 120 Lira, the firm algebraically guarantees that they will receive no payout from that period. As such, the worker cannot reward or punish the firm by their effort choice under these contracts. There is no rationale for the worker to provide a non-minimum effort level in this setting and responses to these wage levels are theoretically uninterpretable. Only 0.33% of the wage offers were 120 Lira and excluding these observations from my analyses does not qualitatively change any of my results. My results are also qualitatively unchanged by considering both the non-linear effects of wage offers and excluding maximum offers simultaneously. As noted earlier, my results are also not driven by start-of-game or end-of-game effects. My results are robust to excluding the first period, the last period, or both the first and last period. Finally, my results are robust to including higher-order interactions with my work experience control. It is important to point out that in most of my regressions, the interaction of Experience and Wage is significant, as suggested by prior research. However, prior studies examined populations with significantly more work experience and only in settings where there was Wage Choice. As such, significance of my control variables should be interpreted with caution.
5.6.2 Productive Efficiency Differences

As discussed in Chapter 4, Hannan et al. (2002) examine high and low productivity markets to see if the effort-wage relation differs between them. They do not find support for this conjecture in their study. My study differs slightly from theirs in regards to productivity. They examine productivity effects by manipulating the firm’s available resources for wages and production while I manipulate the productivity scalar on workers’ effort choices. Distributional preferences theory predicts that workers in the Low Productive Efficiency labor market will have to supply higher effort for each wage increase than workers in the High Productive Efficiency labor market in order to maintain the same distribution of payoffs in my setting. Given that workers do not experience both productive efficiency markets, I do believe that the differences in productive efficiency are salient enough and participants are unlikely to enforce their distributional preferences with sufficient precision for this prediction to hold. In untabulated results, I estimate an ordered Probit regression of the effect of the wage level, the productive efficiency of the market, and the interaction of these factors on effort. While my setting is somewhat different from Hannan et al.’s, I also do not find a difference in the effort-wage relation between the two productivity markets ($z = 0.05$, $p = 0.48$, one-sided).

5.6.3 Firm Profit

One of the benefits of reciprocal behavior is its potential to mitigate agency problems in contracting. Therefore, I investigate if firms capitalize on reciprocity preferences in workers to increase their earnings. Increasing wages is expected to increase the effort level of workers; however, it also directly reduces the firm’s payoff. It is only valuable to increase wage offers if workers respond to the change in wage offers with a sufficiently large increase in effort. I present the results of my firm profit analyses in Table 9.
Since firms cannot make a strategic decision when they are not able to choose the wage they offer to the market, I only investigate the setting where the firm chooses the wage they offer and reciprocity concerns are activated.\textsuperscript{27} I estimate two OLS regressions with error terms clustered at the participant level on the linear and non-linear effects of firms’ wage offers on firm’s experimental earnings. The first regression is in the High Productive Efficiency labor market and the second is in the Low Productive Efficiency labor market. These regressions are summarized below:

\begin{equation}
\text{Firm Profit} = \beta_0 + \beta_1 \text{Wage Offer} + \beta_2 \text{Wage Offer}^2 + \varepsilon_i
\end{equation}

where \textit{Firm Profit} is the firm’s experimental earnings, calculated as \((120 - \text{Wage Offer}) \times ke\), \(k\) is the productivity scalar on the workers’ effort and is equal to 1.3 in the High Productive Efficiency labor market and 0.7 in the Low Productive Efficiency labor market, \(e\) is the effort level provided by the worker accepting the firm’s wage offer, \textit{Wage Offer} is the level of Lira offered to the workers as an employment contract, and \textit{Wage Offer}^2 is the interaction of \textit{Wage Offer} and \textit{Wage Offer}. \textit{Wage Offer}^2 captures the non-linear effects of \textit{Wage Offer} on \textit{Firm Profit}.

The results of this analysis in the High Productive Efficiency labor market are presented in Panel A of Table 9. I document that firm profit increases with the level of wage offered (\(t = 3.69, p < 0.01\), two-tailed) but at a decreasing rate (\(t = -3.43, p < 0.01\), two-tailed). This regression’s results indicate that increasing the wage offer from 30 Lira to 40 Lira will increase the firm’s profit by 7 Lira and the profit maximizing wage level for firms is an offer of 64 Lira. Firms actually offered an average wage of 55 Lira in these labor markets, indicating that they were risk-averse in their wage offers, but were reasonably close to a profit-maximizing level. The results of this analysis in the Low Productive Efficiency labor market are presented in Panel

\textsuperscript{27} I examine the effect of wage offers on firm profit across wage choice treatments. I find firm profit increases in wages, but at a decreasing rate. Firm profit increases more in wages when the firm chooses the wage offered.
B of Table 9. I document that firm profit is increasing with the wage offered \((t = 1.98, p = 0.06,\) two-tailed) at a decreasing rate \((t = -2.97, p < 0.01,\) two-tailed) in this market as well. Increasing the wage offer from 30 Lira to 40 Lira will increase the firm’s expected profit by 1 Lira in this labor market and the profit maximizing wage offer is 47 Lira in these markets. Firms in this market offered an average of 45 Lira, which is very close to the profit-maximizing wage level.

**Table 9: The Effect of Reciprocity on Firm Profit**

**Panel A: OLS Regression of Firm Profit on Wage Offer in High Productive Efficiency Market (with clustered error terms)**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage Offer</td>
<td>1.611</td>
<td>3.69</td>
<td>0.001</td>
</tr>
<tr>
<td>Wage Offer(^2)</td>
<td>-0.013</td>
<td>-3.43</td>
<td>0.002</td>
</tr>
<tr>
<td>Constant</td>
<td>-19.527</td>
<td>-1.64</td>
<td>0.112</td>
</tr>
</tbody>
</table>

\(R^2 = 7.29\%\)

**Panel B: OLS Regression of Firm Profit on Wage Offer in Low Productive Efficiency Market (with clustered error terms)**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage Offer</td>
<td>0.302</td>
<td>1.98</td>
<td>0.057</td>
</tr>
<tr>
<td>Wage Offer(^2)</td>
<td>-0.003</td>
<td>-2.97</td>
<td>0.006</td>
</tr>
<tr>
<td>Constant</td>
<td>10.530</td>
<td>2.25</td>
<td>0.032</td>
</tr>
</tbody>
</table>

\(R^2 = 1.44\%\)

5.6.4 Post-Experimental Questionnaire

Table 10 presents participant responses to my post-experimental questionnaire items that were not included as manipulation checks by experimental treatment and overall. With the exception of questions that ask for an effort level response, all questions were answered on a 7-point Likert scale \((1 = \text{“Strongly Disagree,”} 7 = \text{“Strongly Agree,”} \text{and} 4 = \text{“Neutral”}). P-values are related to two-tailed t-tests of differences of mean from the neutral response of 4.
Table 10: Responses to Post-Experimental Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>High-NWC-NWS Mean</th>
<th>High-NWC-WS Mean</th>
<th>High-WC-NWS Mean</th>
<th>High-WC-WS Mean</th>
<th>Overall Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>p</em>-value</td>
<td><em>p</em>-value</td>
<td><em>p</em>-value</td>
<td><em>p</em>-value</td>
<td><em>p</em>-value</td>
</tr>
<tr>
<td>It was unethical for a worker to choose a low work level.</td>
<td>3.50 0.198</td>
<td>3.43 0.146</td>
<td>3.80 0.610</td>
<td>4.03 0.926</td>
<td>3.70 0.101</td>
</tr>
<tr>
<td>It was unethical for a firm to offer a low wage offer to the market.</td>
<td>N/A N/A</td>
<td>4.37 0.345</td>
<td>4.47 0.191</td>
<td>4.42 0.109</td>
<td>4.42 0.109</td>
</tr>
<tr>
<td>I wanted to maximize my earnings.</td>
<td>6.67 0.000</td>
<td>6.67 0.000</td>
<td>6.50 0.000</td>
<td>6.50 0.000</td>
<td>6.63 0.000</td>
</tr>
<tr>
<td>I wanted to be seen as fair by the other party.</td>
<td>4.53 0.140</td>
<td>4.53 0.190</td>
<td>4.30 0.380</td>
<td>5.03 0.005</td>
<td>4.60 0.001</td>
</tr>
<tr>
<td>I wanted to maximize the combined payoff of both parties.</td>
<td>4.77 0.026</td>
<td>4.37 0.363</td>
<td>4.60 0.110</td>
<td>4.87 0.014</td>
<td>4.65 0.000</td>
</tr>
<tr>
<td>I feel the firm’s offers to the labor market were fair.</td>
<td>4.20 0.506</td>
<td>4.93 0.001</td>
<td>4.80 0.014</td>
<td>5.37 0.000</td>
<td>4.83 0.000</td>
</tr>
<tr>
<td>I wanted both parties to have even payoffs.</td>
<td>4.20 0.495</td>
<td>3.77 0.452</td>
<td>4.23 0.508</td>
<td>4.70 0.040</td>
<td>4.23 0.162</td>
</tr>
<tr>
<td>I wanted to be fair to the other party.</td>
<td>4.17 0.587</td>
<td>4.30 0.393</td>
<td>4.77 0.012</td>
<td>5.03 0.001</td>
<td>4.57 0.000</td>
</tr>
</tbody>
</table>

|                                                | Low-NWC-NWS Mean | Low-NWC-WS Mean | Low-WC-NWS Mean | Low-WC-WS Mean | Overall Mean |
|                                                 | *p*-value         | *p*-value        | *p*-value        | *p*-value       | *p*-value   |
| It was unethical for a worker to choose a low work level. | 4.03 0.939        | 3.10 0.023       | 3.20 0.061       | 3.60 0.388      | 3.48 0.015 |
| It was unethical for a firm to offer a low wage offer to the market. | 4.37 0.317        | 3.27 0.068       | 3.90 0.803       | 3.13 0.034      | 3.67 0.089 |
Table 10: Continued

<table>
<thead>
<tr>
<th>I wanted to maximize my earnings.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.53 0.000</td>
<td>6.70 0.000</td>
<td>6.70 0.000</td>
<td>6.60 0.000</td>
<td>6.63 0.000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I wanted to be seen as fair by the other party.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.37 0.401</td>
<td>3.93 0.854</td>
<td>4.60 0.136</td>
<td>4.70 0.083</td>
<td>4.40 0.044</td>
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</table>

<table>
<thead>
<tr>
<th>I wanted to maximize the combined payoff of both parties.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.37 0.423</td>
<td>4.43 0.232</td>
<td>4.73 0.068</td>
<td>4.87 0.024</td>
<td>4.60 0.032</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I feel the firm’s offers to the labor market were fair.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.40 0.136</td>
<td>4.13 0.690</td>
<td>5.10 0.000</td>
<td>4.83 0.025</td>
<td>4.62 0.000</td>
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</table>

<table>
<thead>
<tr>
<th>I wanted both parties to have even payoffs.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.73 0.508</td>
<td>4.70 0.303</td>
<td>4.40 0.308</td>
<td>4.33 0.370</td>
<td>4.29 0.115</td>
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</table>

<table>
<thead>
<tr>
<th>I wanted to be fair to the other party.</th>
<th>Low-NWC-NWS Mean p-value</th>
<th>Low-NWC-WS Mean p-value</th>
<th>Low-WC-NWS Mean p-value</th>
<th>Low-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.30 0.464</td>
<td>4.43 0.182</td>
<td>4.80 0.039</td>
<td>4.63 0.057</td>
<td>4.54 0.003</td>
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**Worker Only Questions**

<table>
<thead>
<tr>
<th>I wanted to maximize the firm’s payoffs.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.87 0.011</td>
<td>2.93 0.056</td>
<td>3.00 0.030</td>
<td>4.13 0.792</td>
<td>3.23 0.002</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I felt entitled to a high wage offer.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.07 0.056</td>
<td>4.87 0.171</td>
<td>4.67 0.173</td>
<td>5.67 0.001</td>
<td>5.07 0.000</td>
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<table>
<thead>
<tr>
<th>I was concerned the firm wanted to be treated fairly.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20 0.054</td>
<td>3.87 0.792</td>
<td>3.67 0.454</td>
<td>4.73 0.166</td>
<td>3.87 0.570</td>
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<table>
<thead>
<tr>
<th>I wanted to treat the firm fairly.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.47 0.192</td>
<td>4.00 1.000</td>
<td>4.53 0.088</td>
<td>5.00 0.073</td>
<td>4.25 0.260</td>
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<table>
<thead>
<tr>
<th>I was concerned that the firm would reduce later offers if I provided a low work level.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00 1.000</td>
<td>4.67 0.207</td>
<td>5.07 0.020</td>
<td>4.80 0.195</td>
<td>4.63 0.015</td>
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</table>

<table>
<thead>
<tr>
<th>I felt obligated to provide a higher work level when I received a higher wage offer.</th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
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<tr>
<td>4.27 0.582</td>
<td>4.27 0.639</td>
<td>5.33 0.012</td>
<td>4.87 0.181</td>
<td>4.68 0.013</td>
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Table 10: Continued

<table>
<thead>
<tr>
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<th>High-NWC-NWS Mean</th>
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<th>High-WC-NWS Mean</th>
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<td>p-value</td>
<td>p-value</td>
<td>p-value</td>
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<tr>
<td>I felt the firm expected a higher work level when they offered a higher wage offer.</td>
<td>4.87</td>
<td>0.109</td>
<td>5.60</td>
<td>0.003</td>
<td>6.20</td>
</tr>
<tr>
<td>I felt that other workers provided higher work levels when they received a higher wage offer.</td>
<td>4.13</td>
<td>0.758</td>
<td>4.67</td>
<td>0.191</td>
<td>4.93</td>
</tr>
<tr>
<td>For a wage offer of 20-40 Lira, how much effort should you provide?</td>
<td>0.107</td>
<td>0.220</td>
<td>0.227</td>
<td>0.227</td>
<td>0.195</td>
</tr>
<tr>
<td>For a wage offer of 41-60 Lira, how much effort should you provide?</td>
<td>0.280</td>
<td>0.433</td>
<td>0.400</td>
<td>0.433</td>
<td>0.387</td>
</tr>
<tr>
<td>For a wage offer of 61-80 Lira, how much effort should you provide?</td>
<td>0.400</td>
<td>0.607</td>
<td>0.593</td>
<td>0.560</td>
<td>0.540</td>
</tr>
<tr>
<td>For a wage offer of 81-100 Lira, how much effort should you provide?</td>
<td>0.573</td>
<td>0.733</td>
<td>0.733</td>
<td>0.700</td>
<td>0.685</td>
</tr>
<tr>
<td>For a wage offer of 101-120 Lira, how much effort should you provide?</td>
<td>0.707</td>
<td>0.860</td>
<td>0.847</td>
<td>0.820</td>
<td>0.808</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Low-NWC-NWS Mean</th>
<th>Low-NWC-WS Mean</th>
<th>Low-WC-NWS Mean</th>
<th>Low-WC-WS Mean</th>
<th>Overall Mean</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>p-value</td>
<td>p-value</td>
<td>p-value</td>
<td>p-value</td>
<td>p-value</td>
</tr>
<tr>
<td>I wanted to maximize the firm’s payoffs.</td>
<td>2.47</td>
<td>0.002</td>
<td>3.47</td>
<td>0.217</td>
<td>2.80</td>
</tr>
<tr>
<td>I felt entitled to a high wage offer.</td>
<td>5.00</td>
<td>0.003</td>
<td>4.60</td>
<td>0.237</td>
<td>5.13</td>
</tr>
<tr>
<td>I was concerned the firm wanted to be treated fairly.</td>
<td>3.27</td>
<td>0.127</td>
<td>3.40</td>
<td>0.199</td>
<td>3.73</td>
</tr>
<tr>
<td>I wanted to treat the firm fairly.</td>
<td>3.53</td>
<td>0.372</td>
<td>3.73</td>
<td>0.546</td>
<td>3.73</td>
</tr>
<tr>
<td>I was concerned that the firm would reduce later offers if I provided a low work level.</td>
<td>4.13</td>
<td>0.825</td>
<td>3.33</td>
<td>0.245</td>
<td>4.73</td>
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Table 10: Continued

<table>
<thead>
<tr>
<th>Question</th>
<th>Low-NWC-NWS</th>
<th>Low-NWC-WS</th>
<th>Low-WC-NWS</th>
<th>Low-WC-WS</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt obligated to provide a higher work level when I received a higher wage offer.</td>
<td>3.87 (0.846)</td>
<td>3.47 (0.357)</td>
<td>4.33 (0.632)</td>
<td>5.27 (0.022)</td>
<td>4.23 (0.452)</td>
</tr>
<tr>
<td>I felt the firm expected a higher work level when they offered a higher wage offer.</td>
<td>5.20 (0.036)</td>
<td>4.73 (0.143)</td>
<td>5.13 (0.062)</td>
<td>5.93 (0.000)</td>
<td>5.25 (0.000)</td>
</tr>
<tr>
<td>I felt that other workers provided higher work levels when they received a higher wage offer.</td>
<td>4.67 (0.252)</td>
<td>4.40 (0.395)</td>
<td>4.20 (0.774)</td>
<td>5.13 (0.011)</td>
<td>4.60 (0.027)</td>
</tr>
<tr>
<td>For a wage offer of 20-40 Lira, how much effort should you provide?</td>
<td>0.167</td>
<td>0.127</td>
<td>0.207</td>
<td>0.247</td>
<td>0.187</td>
</tr>
<tr>
<td>For a wage offer of 41-60 Lira, how much effort should you provide?</td>
<td>0.300</td>
<td>0.253</td>
<td>0.347</td>
<td>0.420</td>
<td>0.330</td>
</tr>
<tr>
<td>For a wage offer of 61-80 Lira, how much effort should you provide?</td>
<td>0.420</td>
<td>0.360</td>
<td>0.467</td>
<td>0.567</td>
<td>0.453</td>
</tr>
<tr>
<td>For a wage offer of 81-100 Lira, how much effort should you provide?</td>
<td>0.507</td>
<td>0.473</td>
<td>0.600</td>
<td>0.733</td>
<td>0.578</td>
</tr>
<tr>
<td>For a wage offer of 101-120 Lira, how much effort should you provide?</td>
<td>0.567</td>
<td>0.573</td>
<td>0.727</td>
<td>0.840</td>
<td>0.677</td>
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**Firm Only Questions**

<table>
<thead>
<tr>
<th>Question</th>
<th>High-NWC-NWS</th>
<th>High-NWC-WS</th>
<th>High-WC-NWS</th>
<th>High-WC-WS</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>I wanted to maximize worker payoffs.</td>
<td>4.87 (0.032)</td>
<td>4.00 (1.000)</td>
<td>4.00 (1.000)</td>
<td>4.27 (0.484)</td>
<td>4.28 (0.154)</td>
</tr>
<tr>
<td>For a wage offer of 20, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.307</td>
<td>0.193</td>
<td>0.133</td>
<td>0.173</td>
<td>0.202</td>
</tr>
<tr>
<td>For a wage offer of 40, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.453</td>
<td>0.360</td>
<td>0.280</td>
<td>0.300</td>
<td>0.348</td>
</tr>
<tr>
<td>For a wage offer of 60, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.580</td>
<td>0.587</td>
<td>0.493</td>
<td>0.420</td>
<td>0.520</td>
</tr>
</tbody>
</table>
Table 10: Continued

<table>
<thead>
<tr>
<th></th>
<th>High-NWC-NWS Mean p-value</th>
<th>High-NWC-WS Mean p-value</th>
<th>High-WC-NWS Mean p-value</th>
<th>High-WC-WS Mean p-value</th>
<th>Overall Mean p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>For a wage offer of 80, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.760</td>
<td>0.720</td>
<td>0.640</td>
<td>0.567</td>
<td>0.672</td>
</tr>
<tr>
<td>For a wage offer of 100, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.873</td>
<td>0.833</td>
<td>0.833</td>
<td>0.653</td>
<td>0.798</td>
</tr>
<tr>
<td>For a wage offer of 120, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.940</td>
<td>0.933</td>
<td>0.993</td>
<td>0.720</td>
<td>0.897</td>
</tr>
<tr>
<td>I wanted to maximize worker payoffs.</td>
<td>5.00</td>
<td>4.73</td>
<td>4.47</td>
<td>3.33</td>
<td>4.38</td>
</tr>
<tr>
<td>For a wage offer of 20, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.253</td>
<td>0.233</td>
<td>0.187</td>
<td>0.367</td>
<td>0.260</td>
</tr>
<tr>
<td>For a wage offer of 40, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.440</td>
<td>0.400</td>
<td>0.413</td>
<td>0.633</td>
<td>0.348</td>
</tr>
<tr>
<td>For a wage offer of 60, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.613</td>
<td>0.513</td>
<td>0.633</td>
<td>0.747</td>
<td>0.520</td>
</tr>
<tr>
<td>For a wage offer of 80, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.753</td>
<td>0.653</td>
<td>0.720</td>
<td>0.853</td>
<td>0.672</td>
</tr>
<tr>
<td>For a wage offer of 100, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.813</td>
<td>0.847</td>
<td>0.853</td>
<td>0.920</td>
<td>0.798</td>
</tr>
<tr>
<td>For a wage offer of 120, what work level would you expect (between 0.1 and 1.0)?</td>
<td>0.847</td>
<td>0.880</td>
<td>0.853</td>
<td>0.960</td>
<td>0.897</td>
</tr>
</tbody>
</table>
Consistent with my study maintaining experimental realism, participants indicated that they were concerned with maximizing their own earnings (mean = 6.63, t = 47.58, p < 0.01). Prior experimental studies suggest that individuals have some preferences for improving social welfare by increasing the total shared surplus. Participants in my study also indicate that they have some interest in maximizing the social welfare by maximizing the combined payoffs (mean = 4.63, t = 4.78, p < 0.01). While my setting attempts to simulate a one-period setting by making pay come from one randomly selected period and making firms and workers anonymous, it is possible that workers were concerned with maintaining a group reputation to ensure higher levels of future wages. Workers responses in the Reciprocity treatments indicate that there was some concern for maintaining the group reputation (mean = 4.95, t = 3.77, p < 0.01). However, the lack of an end-of-game effect in the last period would suggest that this was not the primary motivator of behavior. These responses provide further support that participants considered the effect of their decisions on their present and potential future payoffs in addition to their effect on the total surplus.

My hypotheses rely on the Bicchieri (2006) model of social norm activation to predict when social norms will influence behavior. This model requires that an individual must be aware that a social norm is relevant to a decision setting (Contingency), believe that a referent group expects a person to adhere to a social norm (Normative Expectations) and that members of a referent group adhere to a social norm (Empirical Expectations). In order to examine if workers developed the beliefs that Bicchieri’s model predicts are necessary for norm-adherence, I examine responses to the post-experimental questionnaire items. The norm of reciprocity is expected to be activated when the firm can choose the wage level offered to the labor market. The following tests are conducted in the Reciprocity treatments. Responses to “I felt obligated to
provide a higher work level when I received a higher wage offer” indicate that the workers were aware that the reciprocity norm was relevant (mean = 4.95, t = 3.36, p < 0.01). Responses to “I felt the firm expected a higher work level when they offered a higher wage offer” indicate that the workers Normative Expectations were met (mean = 5.68, t = 7.40, p < 0.01). Response to “I felt that other workers provided higher work levels when they received a higher wage offer” indicate that the workers Empirical Expectations were met (mean = 4.77, t = 3.03, p < 0.01). Thus, my post-experimental questionnaire responses indicate that the conditions necessary for reciprocity to be activated were met in my Reciprocity treatments.

My experimental results suggest that flat-wage contracts are able to gain their efficiency largely due to the reciprocity-based incentives that are present in these contracts. Reciprocity theory (e.g. Rabin 1993) suggests that individuals will suffer a disutility from providing low effort when wages are high. To investigate this theory, I examine workers responses to the post-experimental questionnaire “It was unethical for a worker to choose a low work level” in response to changes in wages and my Reciprocity treatments. I estimate an ordered Probit regression of the effect of the wage level, the firm’s ability to choose wage offers, and the interaction of these factors on responses to this questionnaire item. The results of this analysis are presented in Table 11. Panel A presents the results of this full regression. There is not a significant main effect of the wage level (z = 1.49, p = 0.14) or allowing firms to choose the wage level (z = -0.69, p = 0.49). There is a significant interaction of the wage level and allowing firms to choose the wage level (z = 2.66, p < 0.01). To follow up this significant interaction, I conduct a pair of simple effects tests examining the effect of the wage level within each of my Reciprocity treatments. The results of these simple effects tests are presented in Panel B of Table 11. There is a significant effect of the wage level on workers’ perceptions of how unethical it is
to give a low effort level when reciprocity concerns are activated ($z = 3.26, p < 0.01$), but not when reciprocity concerns are not activated ($z = 0.75, p = 0.45$). Consistent with this finding, in the Reciprocity treatments, workers responded that they “felt obligated to provide a higher work level when [they] received a higher wage offer” (mean = 4.95, $t = 3.36, p < 0.01$). These results provide supporting evidence regarding the processes underlying my reciprocity-based hypotheses.

Table 11: The Effect of Wages and Reciprocity on Ethical Perceptions

Panel A: Ordered Probit Regression of Wage and Reciprocity on Ethical Perceptions (with clustered error terms)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>0.005</td>
<td>1.49</td>
<td>0.135</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>-0.136</td>
<td>-0.69</td>
<td>0.487</td>
</tr>
<tr>
<td>Wage*Reciprocity</td>
<td>0.019</td>
<td>2.66</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Pseudo $R^2 = 0.94$

Panel B: Simple Effects Tests

<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>z-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage (within No Reciprocity)</td>
<td>-0.004</td>
<td>-0.75</td>
<td>0.451</td>
</tr>
<tr>
<td>Wage (within Reciprocity)</td>
<td>0.015</td>
<td>3.26</td>
<td>0.001</td>
</tr>
</tbody>
</table>

My results in the Low Productive Efficiency market suggests that workers experience dissonance by being assigned a low skill level when they do not legitimately believe they are low skill and it causes a negative affective state. My results suggest that workers reduce this negative affective state by becoming more self-interested and less concerned with adhering to fairness norms. I investigate if workers who are earned low skill are differentially sensitive to fairness concerns than workers who are randomly assigned to the Low Productive Efficiency market. In
an untabulated test, workers with low skill responded more positively to the post-experimental questionnaire item “I feel the firm’s offers to the labor market were fair” than workers who were randomly assigned to the Low Productive Efficiency market ($t = 1.90, p = 0.07, \text{ two-sided}$), indicating that low skill workers believed that the wages they received were more fair. Despite this, the results from my experiment suggest that low skill workers exhibit a lower effort-wage relation. This supports my theory regarding workers self-serving attribution bias that prohibits them from believing that they legitimately possess low skill.

Finally, the results regarding firm profit suggest that firms are fairly adept at anticipating workers’ responses to increases in wages and consider this when selecting the wage they offer to the labor market. In order to examine this ability, I gathered post-experimental questionnaire responses from workers and firms to examine their expectations. Workers indicated what level of effort they should provide for each range of wage offers and firms indicated what level of effort they would expect for each range of wage offers. Figure 4 graphically presents these responses and the actual worker effort levels observed in the experiment. Several key observations can be made from this figure. Workers systematically over-estimate the level of effort they will provide at a given wage range compared to the level of effort they actually provide and workers were more optimistic about their effort levels than firms. Firms appear to be reasonably accurate in predicting worker effort responses to wages for wage levels at 60 Lira and below. However, firms systematically overestimate the response to increased wages above 60 Lira. Overall, this supports the regression results of firm profit and supports the assertion that firms are reasonably adept at predicting the effort response of workers to wage levels.
Figure 3: Firm and Worker Expected Effort and Actual Effort by Wage Level

*Firm Expected Effort* captures exit questionnaire responses from participants in the role of a firm regarding the effort level they would expect from workers for a given range of hypothetical wage offers.

*Worker Expected Effort* captures exit questionnaire responses from participants in the role of a worker regarding the effort level they would expect to provide for a given range of hypothetical wage offers.

*Actual Effort* is the average effort level provided at different levels of actual wage offers during the experiment.
CHAPTER SIX

CONCLUSION

6.1 Chapter Introduction

Traditional economic theory predicts that labor contracts that do not link monetary payoffs to performance will fail to motivate positive effort levels from workers (Lambert 2001). Despite this prediction, flat-wage contracts, where pay does not depend on performance, are commonly used in practice (Fehr and Gachter 2000) and have been documented to generate positive effort from workers (e.g. Fehr et al. 1993; Hannan 2005; Kuang and Moser 2009; Choi 2013). As a result of reciprocity-based incentives present in flat-wage contracts, workers provide higher effort as their wage level increases, referred to as a positive effort-wage relation. My dissertation extends the prior literature on flat-wage contracts by examining three factors that influence the efficiency of these contracts. In particular, I examine the effect of differences in productive efficiency, the incremental effect of reciprocity, and if having productive efficiency be influenced by worker skill moderates the influence of reciprocity. This chapter presents a summary of my research questions, my experimental method, and results. In the final section of this chapter, I discuss the implications of my results and present some future research directions that can build off of my dissertation.

6.2 Research Questions

The research questions in my dissertation relate to the theoretical constructs that generate efficiency under flat-wage contracts and the effects of contextual factors on the efficiency of flat-wage labor contracts. First, I examine the incremental effect of reciprocity concerns on workers’ effort levels in response to a firm’s wage offer. In order to isolate this incremental effect of reciprocity to other incentives, I manipulate if the firm has a choice in the wage offered to the
labor market or not. I expect that reciprocity concerns that arise under flat-wage contracts help these contracts to generate a positive effort level from workers.

Next, I examine the effect of two contextual factors on workers’ effort provisions in response to wage offers and if the effect of reciprocity is related to these contextual factors. The first contextual factor is how efficiently a worker’s effort is translated into output for the firm. The second contextual factor I examine is the source of this productive efficiency. To be specific, I examine if having the productive efficiency of worker’s effort be influenced by an endogenously-determined worker skill level instead of an exogenously-determined firm production technology. Since the use of flat-wage contracts is more commonly observed in high skill labor markets (MacLeod and Parent 1999), such as with many professionals, it is important to investigate the effect of worker skill in a high productive efficiency setting relative to other settings. As such, my ultimate research question relates to this high skill setting. Specifically, are concerns for reciprocity different in a high productive efficiency market when worker skill influences this productive efficiency?

6.3 Review of Method

I conducted a controlled, incentivized, laboratory experiment to examine the research questions posed in the previous subsection. Participants were students at Florida State University from the xs/fs subject pool. The experiment consisted of two phases. The first phase of the experiment was a performance task where participants had to identify how many times a given letter appeared in a 10x10 grid of letters. The second phase of the experiment was a gift-exchange labor market based on the instruments used in prior research (e.g. Fehr et al. 1993; Fehr et al. 1998; Hannan 2005; Kuang and Moser 2009). Finally, they answered a series of post-experimental questions regarding the experiment.
During the gift-exchange labor market phase of the experiment, participants are assigned to the role of either a firm or a worker. Firms offer flat-wage contracts to the market they are participating in. Workers see the wage offers from all firms and take turns choosing to accept a contract or reject all of the remaining contracts. Once a contract has been accepted, it is no longer available to other workers. The workers who accepted a contract then choose how much effort they wish to provide to the firm. The effort is costly to the worker but is beneficial to the firm. In this setting, I implement a 2x2x2 factorial design to investigate my theoretical factor (Reciprocity) and my two contextual factors (Worker Skill and Productive Efficiency). This yields eight experimental conditions that each participant only participated in one of. This was made by crossing Reciprocity (firm chooses wage offers vs. firms cannot choose wage offers), Worker Skill (productive efficiency determined exogenously vs. productive efficiency earned endogenously), and Productive Efficiency (high vs. low). There were 15 firms and 15 workers in each of these eight experimental treatments and each labor market was composed of five firms and five workers.

6.4 Summary of Results

I conduct a series of ordered Probit regressions to examine the effect of my theoretical and contextual factors on the effort-wage relation. I document that the effort-wage relation is more positive in the presence of reciprocity concerns than when they are absent. In the high productive efficiency market, allowing the productive efficiency to be influenced by worker’s skill levels leads to a less positive effort-wage relation due to workers’ equity concerns. However, the incremental effect of reciprocity is stronger in high skill labor markets. That is, I document that the increase in the effort-wage relation as a result of introducing reciprocity concerns is stronger in the high skill environment than for other workers. In the low productive
efficiency labor market, I document a reduction in the effort-wage relation when the productive efficiency is influenced by worker skill and no differential effect of reciprocity in this setting, unlike the high productive efficiency setting.

In supplemental analyses, I examine the impact of these factors on firm’s profit levels. I document that firm’s profit is increasing in the wage offered, but at a decreasing rate. Firms appear to be fairly adept at predicting the workers’ response to changes in wage offers and respond accordingly with their chosen wage offers. This is consistent with my theoretical model that suggests that an activated norm should influence the behavior and expectations of both the firms and workers in my setting. Responses to the post-experimental questionnaire indicate further support for the theory of social norm activation (Bicchieri 2006) used to help generate my hypotheses.

6.5 Discussion of Results and Future Research Directions

My results yield several important new insights and contribute to our understanding of the motivation for the use of flat-wage contracts and the results of using these contracts. First, I provide empirical support in a gift exchange labor market for theory that suggests flat-wage contracts are able to generate positive effort levels as a result of reciprocity-based incentives. While prior research suggests that reciprocity incentives are important determinants of effort under flat-wage contracts in a bilateral gift exchange setting where firms are workers are forced to contract (Charness 2004), my result provides evidence of these reciprocity incentives incremental impact on effort choices in a setting where workers and firms have a more dynamic decision environment. This is an important result for theorists who attempt to explain the prevalence of flat-wage contracts in practice by hypothesizing that social norms serve as a formal control (e.g. Akerlof 1982; Rabin 1993). Some of the social norms that predict a positive effort-
wage relation are more salient in laboratory settings than in practice (e.g. Douthit and Stevens 2014), while reciprocity is considered to be a salient and important norm in both laboratory settings and in practice (Rousseau 1995; Bicchieri 2006). Thus, the empirical results of my study support these theories.

My second primary result relates to the impact of flat-wage contracts on the effort-wage relation in the high productive efficiency setting. Theoretical research suggests that firms should use flat-wage contracts instead of performance-based incentive contracts for settings with high productive efficiency (Stevens and Thevaranjan 2010). In practice, firms are more likely to use flat-wage contracts in settings that require high levels of worker skill (Yang 2008). Thus, the use of flat-wage contracts in high productive efficiency environments is theoretically prescribed and empirically documented. However, self-selection theory suggests that high skill workers prefer the performance-based incentive contracts instead of flat-wage contracts (e.g. Sprinkle and Williamson 2007). The reason why firms use a contract form that is not economically-preferable to workers may be the result of differences caused by having a firm’s productive efficiency be the result of workers’ skill levels instead of the result of an exogenously-determined firm production technology. The effect of the source of productive efficiency is not considered in these theories. I document that high skill workers are more sensitive to the reciprocity-based incentives in flat-wage contracts than other workers. This provides a strong behavioral rationale for why firms choose to use flat-wage contracts in these high skill environments, despite workers preferences to self-select out of such contracts, and why these contracts are able to maintain their efficiency.

Finally, while the results of my paper and my experimental design provide valuable insights to the literature on incomplete contracts and the efficiency of social norm-mediated
contract forms, it also opens up potential directions for future research that could further our understanding. This study takes place in a labor market that only allows for flat-wage contracts. It is important for future research to investigate the effectiveness of traditional agency-based incentive contracts in high and low skill environments and compare which of these contract forms is more effective at motivating increased effort in such settings. As with most studies of flat-wage contracts in accounting, this study focuses on the effect of a contract in motivating increased effort intensity. Future research should investigate the effectiveness of flat-wage contracts and incentive contracts in high and low skill environments at motivating effort direction, effort duration, and strategy development as well. Finally, this study assigns workers as high or low skill based on performance in a task where performance is randomly assigned to control for individual differences. However, it may be informative to consider a setting where the effect of workers’ skill on productive efficiency is a continuous variable instead of just high or low. Additionally, it would be valuable for future research to allow workers to naturally determine their own skill level by using a performance task to determine effort instead of using a chosen effort task. Lastly, it would be useful to consider the effect of different contract forms on workers ability to develop their skill level endogenously over time.
APPENDIX A

SUMMARY OF EXPERIMENTAL PROCEDURES

Performance Task

Firms and workers perform letter-search task

Firms and workers assigned to high/low efficiency markets

If Worker Skill treatment, workers assigned based on letter-search.

Labor Market

Firms post wage offers to market

Workers accept or reject wage offers

Workers choose effort level

Firms learn effort level

If No Wage Choice treatment, firms must use wage offers chosen in Wage Choice treatment.

Figure 4: Summary of Experimental Procedures

Firms and workers anonymously interacted with their assigned market for 10 periods. The performance task and market assignment only occur before the first period.
APPENDIX B

HUMAN SUBJECTS APPROVAL MEMORANDUM

Florida State University

Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8873 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 02/15/2013
To: Jeremy Doubt
Address: 1513 Dowman Rd, Tallahassee, FL 32307
Dept.: ACCOUNTING

Re: Use of Human Subjects in Research
The Effect of Reciprocity and Skill on the Effort-Wage Relation under Flat-Wage Employment Contracts

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedit ed per 45 CFR §46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 02/13/2014, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date, however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to ensure that the project is being conducted in compliance with our institution and with IRB’s regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Douglas Stevens <dstevens@cse.fsu.edu>, Advisor
HSC No. 2013.9943
APPENDIX C

INFORMED CONSENT FORM

SUBJECT'S CONSENT FORM

PURPOSE
I am being invited to participate voluntarily in this research experiment to study the economics of decision-making.

SELECTION CRITERIA
I am a randomly recruited undergraduate student at Florida State University. Only persons 18 years of age or older may participate, and I affirm that I am 18 years of age or older.

PROCEDURE
This experiment will last up to 2 hours. I will be assigned to a computer terminal by chance (e.g. like the flip of a coin or random arrival). I will participate in a series of games with other subjects by interacting through a computer network. My payoffs will depend on my choices and the choice of the other participants in today’s session. I will be given detailed instructions on the rules of the games and how my payoffs will be determined. I will have the opportunity to ask any questions I have about the instructions.

PARTICIPATION COSTS AND SUBJECT COMPENSATION
In addition to the $10 for showing up on time and participating, I have the opportunity to earn additional compensation, which will be based upon my decisions, the decisions of others who are in the experiment, and the rules within which those decisions are made. I will be given detailed instructions about the about the rules as to how my compensation will be determined. I am free to ask any questions about these rules. Any compensation I receive as a result of my participation in this experiment may be reported for taxation purposes to appropriate federal and state [national] agencies, but the results of the study will remain confidential and will not be forwarded to tax authorities. I am free to withdraw from the experiment without additional compensation and without incurring the ill will of the experimenters at any time. If I do so, I may keep my $10 show-up fee. I understand that I may be asked to leave the experiment, following a verbal warning, if I engage in disruptive behavior such as talking with other subjects during the experiment or using electronic devices such as a cell phone or pager. If I am asked to leave the session, I will receive no experimental payoffs and a prorated portion of the $10 participation fee, but will bear no further penalties.

RISKS AND BENEFITS
There are no known health risks or health benefits for this experiment beyond those from any other typical activity in a Florida State University classroom or computer lab.

CONFIDENTIALITY
The confidentiality of any personal information will be protected to the extent allowed by law. To the extent allowed by law, our rule is that only the researcher and any research assistants conducting this experiment may know what my earnings are (subject to tax reporting requirements above) and only researchers affiliated with the experimental economics research groups at Florida State University may have access to the data with my name. My name will not be reported with any results related to this research.

CONTACTS
I can obtain further information from Jeremy Douthit at (XXX) XXX-XXXX or Professor Doug Stevens at (XXX) XXX-XXXX. If I have questions concerning my rights as a research subject, I should call the Human Subjects Committee office of Florida State University at [1-] 850-644-8836.

Before giving my consent, the methods, inconveniences, risks, and benefits have been explained to me and my questions have been answered. I may ask questions at any time and I am free to withdraw from the project at any time without causing bad feelings. My participation in this project may be ended by the investigator or by the sponsor for reasons that would be explained, but which will carry no bad effects beyond this experiment. Should new information become available during the course of this study about risks or benefits that might affect my willingness to continue in this research project, it will be given to me as soon as possible. This consent form will be filed in a locking file cabinet in the researchers office with access restricted to an authorized representative of the Florida State University accounting and economics department. I do not give up any of my legal rights by my consent. A copy of this consent form will be given to me upon request.

_________________________________________  ___________________________
Name (Please Print)          Date

_________________________________________
Signature
APPENDIX D

EXPERIMENTAL INSTRUCTIONS: PERFORMANCE TASK

Introduction

Welcome and thank you for participating in this experiment. Your pay today will depend on the
decisions you make during the experiment. At the end of today’s session, you will be paid in
private and in cash. It is important that you remain silent and do not look at other people’s work.
If you have any questions, or need assistance of any kind, please raise your hand and an
experimenter will come to you.

Today’s experimental session is comprised of two parts. Prior to beginning each part, you will be
given detailed instructions for that part. Please give both tasks your full attention.

Part 1

For the first task, you will be asked to identify the number of times a given letter appears in a
10x10 grid of letters. Each incorrect response will lock your computer and stop you from
inputting another answer for 5 seconds. Once you have correctly answered the number of times
that the given letter appears in the grid, you may move on to a different grid/letter combination.
You will have 5 minutes to complete as many of these grids as possible. You will be paid $0.10
for each correct response during this task. At the conclusion of the 5 minutes, you will be told if
the number of grids you completed was in the top or bottom half of your comparison group for
this task in this session.

An example grid is provided on the back of this page. In the example grid, you are asked how
many times the letter “W” appears in the 10x10 grid. The correct answer is 4. If you answered
“4”, you will be given a new letter and new grid to answer. If you put in another answer besides
“4,” the computer will lock, and you will have to wait 5 seconds before answering again. This
will continue until you correctly answer “4”, at which point a new letter and grid will be given to
you. At the end of 5 minutes, you will be told if the number of grids you completed was in the
top or bottom half of your comparison group for this task in this session; then this part of the
experiment will conclude. Instructions for part 2 of the experimental session will be handed out
at the conclusion of part 1 of the experiment.
Example Grid

How many times does the following letter appear in the grid below?  _______
Letter = \textbf{W}

<table>
<thead>
<tr>
<th>B</th>
<th>B</th>
<th>O</th>
<th>C</th>
<th>E</th>
<th>U</th>
<th>I</th>
<th>A</th>
<th>K</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>W</td>
<td>S</td>
<td>I</td>
<td>X</td>
<td>R</td>
<td>F</td>
<td>P</td>
<td>Q</td>
<td>U</td>
</tr>
<tr>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>X</td>
<td>X</td>
<td>T</td>
<td>A</td>
<td>G</td>
<td>U</td>
<td>T</td>
</tr>
<tr>
<td>D</td>
<td>Y</td>
<td>J</td>
<td>T</td>
<td>C</td>
<td>C</td>
<td>T</td>
<td>M</td>
<td>F</td>
<td>Q</td>
</tr>
<tr>
<td>T</td>
<td>L</td>
<td>A</td>
<td>T</td>
<td>R</td>
<td>M</td>
<td>Y</td>
<td>V</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>U</td>
<td>F</td>
<td>N</td>
<td>O</td>
<td>X</td>
<td>E</td>
<td>P</td>
<td>V</td>
<td>N</td>
</tr>
<tr>
<td>J</td>
<td>W</td>
<td>S</td>
<td>C</td>
<td>N</td>
<td>V</td>
<td>E</td>
<td>M</td>
<td>N</td>
<td>E</td>
</tr>
<tr>
<td>R</td>
<td>A</td>
<td>M</td>
<td>N</td>
<td>V</td>
<td>D</td>
<td>L</td>
<td>S</td>
<td>R</td>
<td>W</td>
</tr>
<tr>
<td>R</td>
<td>W</td>
<td>H</td>
<td>N</td>
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<td>I</td>
<td>X</td>
<td>M</td>
<td>M</td>
<td>E</td>
</tr>
<tr>
<td>O</td>
<td>Z</td>
<td>X</td>
<td>Q</td>
<td>E</td>
<td>X</td>
<td>G</td>
<td>S</td>
<td>O</td>
<td>Q</td>
</tr>
</tbody>
</table>
APPENDIX E

EXPERIMENTAL INSTRUCTIONS: LABOR MARKET

General Information

Please read these instructions carefully. It is important that you understand all the instructions because the amount of money you earn will depend on the choices you make in this part of the experiment.

In this study, you will be participating in one of two labor markets as either a worker or a firm. Whether you are a worker or a firm will be determined randomly by the computer and does not depend on your performance on part 1 of this experiment.

Those of you who are assigned the role of firms will be randomly assigned to one of the two markets regardless of your performance on the first task. Those of you who are assigned the role of workers will be randomly assigned to either a high or low productivity market regardless of your performance on the first task.* [will be assigned into either a high or low productivity market based upon your performance in the first part of the experiment]. The only difference between the two markets is the technology [skill] multiplier, which determines how efficient worker’s work levels are. This will be explained in more detail below.

How Each Labor Market Works

1. Prior to the first period, workers and firms will learn the production multiplier for their respective market. This multiplier will be constant for that market for the entire experiment. The average production multiplier is 1.

2. Each period, firms will choose a wage level to offer [firms will be required to offer a wage level which was determined prior to today’s experimental session] as an employment contract to the workers in their respective labor market. All wage offers will be posted on workers’ screens. Workers may accept or not accept a contract.

3. In each labor market, each firm can hire up to one worker each period, and each worker will be allowed to accept only one firm’s wage offer. The order for workers to accept contracts will be randomly determined each period and each worker will have the same

*Bold text indicates the Production Technology treatment while [bracketed italics] text indicates Worker Skill treatments. Bold text will not appear in the Worker Skill treatments and bracketed italic text will not appear in the Production Technology treatments. Bold underline text indicates the Wage Choice treatment while [bracketed underlined italics] indicates the No Wage Choice treatment. Only one of these sets of information will appear at a time.
number of opportunities to accept a contract first overall. Once a firm’s contract is accepted, it will no longer be available to other workers.

4. After a worker has accepted a firm’s contract, the worker will choose the level of work to perform. Possible work levels and their associated costs will be described shortly.

5. Each firm will then be informed of his/her worker’s work level. No firm will know the work levels performed by workers hired by other firms.

6. Workers and firms will be shown their income for the period.

7. A new period begins, repeating the procedures described in 2 through 6 above.

The experiment will last 10 periods, each consisting of the procedures described above. Your earnings from this part of the experiment will be your income from one randomly selected period. Your earnings will be calculated in “lira” (an experimental currency) during the experiment, and will be converted into dollars at the rate of 3 lira = $1. Your earnings from this part of the experiment, your earnings from part 1 of the experiment, and your show-up fee will be paid to your privately in cash at the end of the experiment.
Computation of Income of Workers and Firms

1. Any worker who does not accept a contract earns a payoff of 20 lira for that period.
2. Any firm who does not have his/her contract accepted earns nothing for that period.
3. Under the employment contract, the employer will offer a wage between 20 lira and 120 lira. If a worker accepts a contract, his/her income will be determined as:

   \[ \text{Income of the worker} = \text{Wage} - \text{cost of work level} \]

   Possible work levels and their associated costs are shown in the table below. Workers may choose a work level between 0.1 and 1.0. The higher the work level a worker chooses, the higher the cost of his/her work.

<table>
<thead>
<tr>
<th>Work Level</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (in Lira)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

4. The worker produces an output for the firm. The output is a function of the worker’s work level and their respective market’s technology [skill] multiplier. Output is determined as:

   \[ \text{Output} = 120 \times \text{Worker’s work level} \times \text{Production Technology} \times [\text{Skill}] \text{ multiplier} \]

   Then, the firm’s income is determined as:

   \[ \text{Income of the firm} = \text{Output} - \text{Wage} \times \text{Worker’s work level} \times \text{Production Technology} \times [\text{Skill}] \text{ multiplier} \]

   \[ = (120 - \text{Wage}) \times \text{Worker’s work level} \times \text{Production Technology} \times [\text{Skill}] \text{ multiplier} \]

   For example, suppose worker X is assigned to [earns his placement into] a market with a technology [skill] multiplier of 1.1. Assume that one firm chooses to offer [is required to offer] a wage of 40 lira which is accepted by worker X and he chooses a 0.6 work level.

   The income of the firm will be: \((120 - 40) \times 0.6 \times 1.1 = 52.8 \text{ lira}\);

   The income of the worker will be: \(40 - 8 = 32 \text{ lira}\).
Summary and Sequence of Events

In a moment you will be randomly assigned as either a worker or a firm. There will be an equal number of workers and firms. That is, half of you will be workers and the other half will be firms. All participants will retain their worker or firm assignments throughout the experiment. Firms and workers will be randomly assigned to one of two labor markets and will remain in this market throughout the entire experiment. [Those of you who are workers will be assigned to one of two markets based upon your performance in the first part of the experiment]. Each market has a production multiplier which is known to all participants in the market. The average production multiplier is 1.

Firms will choose a wage contract to offer [be required to offer a wage contract which was determined prior to today’s experimental session] to the workers in their market. Workers will take turns accepting a contract or rejecting all available contracts. Those workers who accept a contract will choose a work level to provide in order to produce output for the firm. The experiment will last for 10 periods.
APPENDIX F

POST-EXPERIMENTAL QUESTIONNAIRE QUESTIONS

DIRECTIONS: Please answer each question as accurately and honestly as you can. Remember, all answers are anonymous and cannot be traced back to you in any way. You will pick up your payment envelope after the questions are completed.

1. ID Number (provided to you): ___________
2. Sex:  M  F
3. Major: psychology economics finance accounting other
4. Year in school: freshman sophomore junior senior graduate school
5. Approximate GPA (this would be a check one type question):
   less than 2.0   2.0 – 2.3   2.3 – 2.6   2.6 – 3.0   3.0 – 3.3   3.3 – 3.6   3.6 – 4.0
6. Work experience (in months): ___________

For the following statements, select the number that best describes your level of agreement or disagreement, from (1) “Strongly Disagree” to (7) “Strongly Agree.”

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Neutral</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. The firm chose the wage offered to the labor market.
8. The wage offered to the labor market was generated outside of the experiment.
9. The market I participated in was a high productive efficiency market.
10. The market I participated in was a low productive efficiency market.
11. The workers earned their placement into their market based on their performance in the first half of the experiment.
12. The workers were randomly assigned into the market they participated in.
13. Workers could accept any contract not yet chosen or reject all remaining contracts.
14. Workers could choose any work level to provide between 0.1 and 1.0.
15. It was unethical for a worker to choose a low work level.
16. It was unethical for a firm to offer a low wage offer to the market.
17. I wanted to maximize my earnings.
18. I wanted to be seen as fair by the other party.
19. I wanted to maximize the combined payoffs of both parties.
20. I feel the firm’s offers to the labor market were fair.
21. I wanted both parties to have even payoffs.
22. I wanted to be fair to the other party.

Worker Questions:
23. I wanted to maximize the firm’s payoffs.
24. I felt entitled to a high wage offer.
25. I did not know which firm offered which contract to the market.
26. I was concerned the firm wanted to be treated fairly.
27. I wanted to treat the firm fairly.
28. I was concerned that the firm would reduce later offers if I provided a low work effort.
29. I felt obligated to provide a higher work level when I received a higher wage offer.
30. I felt the firm expected a higher work level when they offered a higher wage offer.
31. I felt that other workers provided a higher work level when they received a higher wage offer.
32. (For each of the given wage offers) how much work effort should you provide? (respond between 0.1 – 1.0)
   20 – 40 ___  41 – 60 ___  61 – 80 ___  81 – 100 ___  101 – 120 ___

Firm Questions:
23. I wanted to maximize worker payoffs.
24. I did not know which worker accepted the contract I offered to the market.
25. For a wage offer of 20, what work level would you expect (between 0.1 and 1.0)?
26. For a wage offer of 40, what work level would you expect (between 0.1 and 1.0)?
27. For a wage offer of 60, what work level would you expect (between 0.1 and 1.0)?
28. For a wage offer of 80, what work level would you expect (between 0.1 and 1.0)?
29. For a wage offer of 100, what work level would you expect (between 0.1 and 1.0)?
30. For a wage offer of 120, what work level would you expect (between 0.1 and 1.0)?
APPENDIX G

EXPERIMENTAL SCREENSHOTS FOR FIRMS

The following presents the screenshots as seen by the participants in the role of firms. Each participant only saw the screens related to the treatment they took part in.

Screen 1: Performance Task

![Performance Task Screen](image-url)
Screen 2: Market Assignment Screen

You are a **Firm**

Your performance on the letter search task was in the **Bottom half** of participants in your group.

Your role for this experiment is that of a **Firm**.

You have been randomly assigned into a **High Productivity** labor market. This market has a technology multiplier of **1.3**.

You will remain in this market for the duration of the experiment.

Please click **CONTINUE** when you are through viewing your results.

Screen 3: Wage Choice Screen (if **Wage Choice** treatment)

You are a **Firm**

Please select the wage you would like to offer to the labor market this period: [Blank]

Please click **SUBMIT** when you are through making your wage offer.
Screen 4: Wage Choice in Market Screen (if Wage Choice treatment)

You are a Firm

You selected to offer a wage of:

40

Wage Offers: 52  50  45  40  40

YOUR OFFER

Please wait while the other members of your labor market make their decisions.

Screen 5: Wage Offered in Market Screen (if No Wage Choice treatment)

You are a Firm

The wage you will offer to the labor market this period is:

52

Wage Offers: 40  50  52  45  55

YOUR OFFER

Please wait while the other members of your labor market make their decisions.
Screen 6: Effort Chosen by Worker Screen (if wage accepted by a worker)

You are a Firm

Your worker chose a work level of 0.5

Your payoff for the period is 44.20

Please click CONTINUE when you are through viewing your results.

Screen 7: Effort Chosen by Worker Screen (if wage rejected by workers)

You are a Firm

Your wage offer was not accepted by any worker.

Your payoff for the period is 0.00

Please click CONTINUE when you are through viewing your results.
Screen 8: Final Payoff Screen

Final Earnings Summary

The randomly selected period chosen for payment is Period 1.
Your payoff from that period is: $26.25

In addition to your earnings from the randomly chosen period, you will also be paid from the Letter Search Task.
You submitted 2 correct answers.
You payoff from the Letter Search Task: $0.20

Total Earnings: $8.95

Please click CONTINUE when you are through viewing your results.
APPENDIX H

EXPERIMENTAL SCREENSHOTS FOR WORKERS

The following presents the screenshots as seen by the participants in the role of workers. Each participant only saw the screens related to the treatment they took part in.

Screen 1: Performance Task

![Image of a grid with letters and a question asking for the frequency of a specific letter.]

You are in Comparison Group A.

How many times does the following letter appear in the grid below?

```
Letter = L

Z X D H P U R Z D O
U J Y D H J B B E L
C A A Z D O A J K O
C B U S G P M K A S
N I I P O L N K T J
P H K S X R X B K D
Q B R H T L O C B Q
K Y R O N X W M R T
F Q T V X D I C W E
Y N Y X G Z X N O P
```

Please enter your response: [Input field] Submit
Screen 2: Market Assignment Screen (if Production Technology treatment)

You are a Worker

Your performance on the letter search task was in the Top half of participants in your group.

Your role for this experiment is that of a Worker.

You have been randomly assigned into a Low Productivity labor market. This market has a technology multiplier of 0.7.

You will remain in this market for the duration of the experiment.

Please click CONTINUE when you are through viewing your results.

Screen 3: Market Assignment Screen (if Worker Skill treatment)

You are a Worker

Your performance on the letter search task was in the Top half of participants in your group.

Your role for this experiment is that of a Worker.

Based on your performance, you have earned a placement in a High Productivity labor market. This market has a skill multiplier of 1.3.

You will remain in this market for the duration of the experiment.

Please click CONTINUE when you are through viewing your results.
Screen 4: Wait for Firm Wage Choice Screen (if Wage Choice treatment)

You are a Worker

Please wait while the Firms in your labor market submit their wage offers.

Screen 5: Contract Choice Screen (if Wage Choice treatment and worker’s turn)

You are a Worker

The Firms in your labor market have chosen to offer the following wages:

<table>
<thead>
<tr>
<th>Wage Offers:</th>
<th>40</th>
<th>40</th>
<th>50</th>
<th>45</th>
<th>52</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accept</td>
<td>Accept</td>
<td>NA</td>
<td>Accept</td>
<td>NA</td>
</tr>
</tbody>
</table>

It is now your turn to select a wage offer.
Please select the wage offer you would like to accept or if you would like to reject all the remaining wage offers.
Screen 6: Contract Choice Screen (if Wage Choice treatment and not worker’s turn)

You are a Worker

The Firms in your labor market have chosen to offer the following wages:

Wage Offers: 40 40 50 45 52

Accept Accept NA Accept NA Reject All

Please wait until it is your turn to select a wage offer.

Screen 7: Contract Choice Screen (if No Wage Choice treatment and worker’s turn)

You are a Worker

The Firms in your labor market were required to offer the following wages:

Wage Offers: 40 50 52 45 55

Accept Accept NA Accept NA Reject All

It is now your turn to select a wage offer.

Please select the wage offer you would like to accept or if you would like to reject all the remaining wage offers.
Screen 8: Contract Choice Screen (if *No Wage Choice* treatment and not worker’s turn)

You are a Worker

The Firms in your labor market were required to offer the following wages:

<table>
<thead>
<tr>
<th>Wage Offers:</th>
<th>40</th>
<th>50</th>
<th>52</th>
<th>45</th>
<th>55</th>
</tr>
</thead>
</table>

Please wait until it is your turn to select a wage offer.

Screen 9: Effort Choice Screen (if accepting a wage offer)

You are a Worker

You have accepted a wage offer of 45.

Please select the work level you would like to provide for the firm using the table below. Click on the appropriate button once you have made your decision.

<table>
<thead>
<tr>
<th>Work Level</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>
Screen 10: Effort Choice Screen (if rejected all available wages)

You have rejected all of the wage offers.

Please wait while the other workers in your labor market make their decisions.

Screen 11: Period Payoff Screen

Your payoff for the period is: 49.00

Please click CONTINUE when you are through viewing your results.
The randomly selected period chosen for payment is Period 1.
Your payoff from that period is: $26.25

In addition to your earnings from the randomly chosen period, you will also be paid from the Letter Search Task.
You submitted 2 correct answers.
You payoff from the Letter Search Task: $0.20

Total Earnings: $8.95

Please click CONTINUE when you are through viewing your results.
REFERENCES


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Douthit, J. and D. Stevens. 2014. The Robustness of honesty effects on budget proposals when the superior has rejection authority: An experimental examination incorporating distributional and reciprocity concerns. Working paper, Florida State University and Georgia State University.


BIOGRAPHICAL SKETCH

Jeremy David Douthit was born in Monterey, California to Terry and Dawne Douthit. When he was still young, his family moved to Huntsville, Alabama, where Jeremy spent most of his life with his 4 siblings. Prior to entering the Ph.D. program at Florida State University, he completed his bachelor’s degree in accounting at Troy University (2008) and his masters of accounting at the Ohio State University (2009). He passed the CPA examine in 2009, but is not a currently licensed CPA. During his time at Florida State, he has had the opportunity to work with and learn from leading scholars in the fields of accounting and economics while developing his area of expertise in management accounting. Also, he has taught 2 sections of introductory management accounting and 7 sections of advanced cost accounting at Florida State, receiving a College of Business Doctoral Teaching Award for his efforts in 2013.