Impression Management in the Principal-Agent Relation: An Experimental Examination of Productivity and Planning Benefits

Linwood Waitus Kearney
IMPRESSION MANAGEMENT IN THE PRINCIPAL-AGENT RELATION: 
AN EXPERIMENTAL EXAMINATION OF PRODUCTIVITY AND 
PLANNING BENEFITS

By 
LINWOOD WAITUS KEARNEY

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The members of the committee approve the dissertation of Linwood Waitus Kearney defended on October 30, 2009.

Douglas E. Stevens  
Professor Directing Dissertation

Robert Mark Isaac  
University Representative

Gregory J. Gerard  
Committee Member

William A. Hillison  
Committee Member

Approved:

Caryn Beck-Dudley, Dean, College of Business

The Graduate School has verified and approved the above-named committee members.
For my family and friends
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ABSTRACT

This dissertation describes an experimental study of impression management in the principal-agent relation. First, I utilize agency theory and efficiency wage theory to hypothesize productivity and planning benefits to the principal. Second, I predict workers will utilize impression management and gain excess surplus from the manager. Third, using rational expectations theory, I predict managers will detect the level of honesty in the workers’ reporting and forecast errors will decrease. Next, I present an experimental setting in which to test my hypotheses. The results indicate workers acted opportunistically and used impression management to achieve increased rewards. Managers did not detect the workers’ dishonesty and share in the surplus. By incorporating impression management into the traditional principal-agent setting, this study expands our understanding of organizational control.

Keywords: impression management, gift-exchange, reciprocity, experimental markets

Data availability: contact the author (for reproduction purposes)
CHAPTER 1

INTRODUCTION

1.1 Overview of Research Question

This dissertation examines whether impression management can yield increased production and planning benefits in a principal-agent setting. In particular, the study tests whether impression management by the agent helps the principal and agent attain better outcomes than predicted by traditional agency theory. Also tested are planning benefits gained if the principal anticipates the effort type of the agent. In the study, a manager (the principal) and worker (the agent) contract for multiple periods in a production environment. Production is based upon effort provided by the worker. During the contracting phase, the ability of the worker to signal their intended effort (effort type) to the manager is varied (absent versus present). Also varied is the length of the manager-worker interaction (single-period versus multi-period). The ability to signal intended effort over multiple periods provides a setting conducive for impression management on the part of the worker. This dissertation investigates the outcome effects of the effort signal and the multi-period interaction between manager and worker. More specifically, this study examines how the effort signal and multi-period interaction affect the wage offers, effort levels signaled by the worker, the effort levels provided by the worker, as well as the manager’s expectations of effort and bonus earned.

1.2 Contribution of Research

Investigating the effects of impression management in the principal-agent relation is important for several reasons. First, it adds to the literature in economics by investigating norms that violate the assumptions of agency theory (e.g., Rabin 1993; Fehr and Schmidt 2000; Fehr and Falk 2002). Norms discussed in this dissertation are impression management, reciprocity, reputation and honesty. The effect of impression management in the economics literature is limited. Murnighan, Oesch and Pillutla (2001) argue impression management can explain player’s behavior in dictatorship games. In their experiments, the dictator makes all the
decisions. But in this study, impression management is examined in a setting where the manager and worker make decisions that affect each other. The manager decides the wage for the worker, and the worker decides the effort level to provide during production. Impression management can encourage reciprocal behavior between the manager and worker. Reciprocity occurs when people reward kind acts with kindness and unkind acts with revenge (Rabin 1993; Fehr, Gachter and Kirchsteiger 1997). Efficiency wage theory assumes a reciprocal behavior between the manager and worker. Prior studies utilizing efficiency wage theory either did not consider or attempted to control for the effects of impression management (Akerlof 1982; Hannan, Kagel and Moser 2002; Hannan 2005). This study extends earlier work by examining impression management in a setting where efficiency wages may develop.

Impression management is the process by which individuals attempt to control the impressions others form of them (Leary and Kowalski 1990). Motivations for engaging in impression management are related to increasing the likelihood that one will obtain desired outcomes in the future and acquiring social approval (Leary and Kowalski 1990). In Hannan, Rankin and Towry (2006), the authors note there are benefits of appearing honest and benefits of misrepresenting private information. Impression management is a broader construct than reputation because individuals may be motivated to engage in impression management as a means to gain social approval, even if there are no economic gains from doing so (Hannan, Rankin and Towry 2006). Impression management can be ex ante, such as a worker providing a signal before the worker acts, whereas reputation must be ex post as the result of actions over time. In this study, the benefits of appearing honest include higher wage offers in the future and the benefit of misrepresenting private information is to gain surplus this period.

Several researchers have investigated reputation in a principal-agent setting. Brown, Falk and Fehr (2004) found agents provided higher effort when identification numbers were assigned to all participants. The identification numbers allowed reputations to develop during the experiment and long term relationships to form. There was an excess supply of agents competing for the payments from the principals. After each period, managers made wage offers that were either public so all agents were eligible to accept or that were private where only one agent was eligible to accept. Thus, long term relationships were possible. Along with the payment amount, principals specified a desired performance level. In contrast to this study, the managers do not specify a desired performance level. The workers in this dissertation provide an
effort signal and the managers respond with a wage offer. Brown, Falk and Fehr (2008) modified the experiment utilized in their 2004 study to include an excess of principals. They found fixed identities outperformed random identities. The identities allowed reputations to develop although the number of long term relationships was smaller. In this dissertation the manager and worker are paired so there is no excess supply of wage offers or workers.

Fehr and Zehnder (2008) investigated reputation formation where the exact performance of the agent is not known. In their study, there was an excess supply of borrowers compared to lenders. The borrowers invested in either low-risk or high-risk projects. A random device determined if the project was a success or failure. If the project was a failure, the borrower could not repay the loan. They found borrowers with fixed identities were successful and traded throughout the experiment, whereas borrowers with random identities only achieved a few trades in the final period. In the Fehr and Zehnder study, the contract offers were either public or private. With public offers, all participants observed the contract offers. In my study, all wage offers are private, and the manager does not know for certain the effort provided by the worker. And since there is no competition for wage offers, the workers in this study do not feel public pressure when making decisions. Impression management encompasses reciprocity and reputation. Therefore, this study answers the call to examine how impression management may generate incentives for selfish individuals to meet their contractual obligations (Fehr, Brown and Zehnder 2009).

Second, the study extends the accounting literature in the area of managerial reporting. The studies by Evans, Hannan, Krishnan and Moser (2001) and Hannan, Rankin and Towry (2006) investigate the social norm of honesty in managerial reporting. In the study by Evans, Hannan, Krishnan and Moser (2001), the participants assume the role of managers reporting to headquarters. The managers knew any dishonesty could not be detected which diminished reputational effects. In Hannan, Rankin and Towry (2006), the worker reported to a different manager each period. The rotation of worker and manager limits the effects of impression management because reputations are precluded from developing. In this study, the rotation of the worker and manager is manipulated so the effects of impression management are better accessed. In the Evans, Hannan, Krishnan and Moser (2001) and Hannan, Rankin and Towry (2006) studies, the principal could not penalize the agent if the principal suspected dishonesty on the part of the agent, but in this study, the manager can reduce the worker’s wage offer if
dishonesty is suspected. Incorporating impression management into agency theory adds to the literature on the usefulness of socially-mediated rewards in motivating and controlling employees (Sprinkle 2003). The study helps answer the many calls in the accounting literature for an integration of economic and psychological factors in accounting research (Eisenhardt 1985; Kachelmeier 1996; Luft 1997; Bonner and Sprinkle 2002; Sprinkle 2003).

This study adds to the impression management literature by investigating impression management using an experimental economics methodology. Studies of impression management often use experiments (e.g., Conway, Schooler, Preacher, Radvansky, von Hippel, and von Hippel 2005), surveys (e.g., Bommer, Shore and Shore 2008) or field experiments (e.g., Bratton, Carlson, Kacmar, Witt and Zivnuska 2004). To my knowledge, this is the first study of impression management using an experimental economics methodology. My dissertation also adds to our knowledge of ingratiation by employees. For example, Wayne and Ferris (1990) found that the use of ingratiation by employees was positively associated with supervisor liking and performance ratings. A better knowledge of the techniques employees use when ingratiating their employer will aid employers in the control process. Understanding how workers and managers behave when there is information asymmetry regarding the effort level provided by the worker can help managers plan and control costs.

1.3 Overview of Method and Results

The dissertation utilized an experiment designed to investigate impression management in a principal-agent setting as well as the planning benefits gained by the principal by anticipating the level of effort the agent will provide. Factors manipulated included the ability of the worker to signal intended effort (no signal, signal) and the number of periods of interaction (single period, multi-period) between the manager and worker. The experimental setting was a production environment where a manager and worker contract for effort. During the contracting phase, some workers signaled their effort type before the manager made a wage offer. After the production phase, part of the workers rotated to a different manager while some workers interacted with the same manager the entire experiment. Interacting with the same partner multiple periods allowed reputations to develop.
In general, results of my experiment indicate workers successfully used impression management and opportunistically extracted high wage offers from the manager. Only workers in the no signal, single-period condition experienced decreasing wage offers. Workers in the signal, single-period condition used impression management to gain increasing earnings as the experiment progressed. Their managers believed their signals and rewarded them with higher wage offers even though workers acted opportunistically and provided less effort. Workers in the signal, multi-period condition increased their effort signal more than their provided effort. These workers traded off the benefits of misrepresentation with the benefits of appearing honest.

Results also indicate managers in the signal, single-period condition did not adjust their effort expectations based upon the production output and suffered increasing forecast errors. These managers increased their effort forecast even though their workers were providing less effort as the experiment continued. Hence, these managers earned declining bonuses. In the no signal, single-period condition, the managers detected the declining effort provided by the workers and responded by declining their wage offers. In the no signal, multi-period condition, managers could not infer the effort provided by their workers. The confusion was illustrated by a declining effort forecast yet increasing wage offers. In summary, the earnings of managers in all conditions were relatively flat because they could not detect the effort provided by their workers.
1.4 Organization of Dissertation

The remainder of the dissertation is organized as follows: Chapter 2 reviews relevant literature and develops the hypotheses. Chapter 3 presents the experiment and methodology utilized. Chapter 4 discusses the results as well as additional analyses. Chapter 5 concludes the dissertation with a summary of the findings and a discussion of the contributions, limitations, and avenues of future research.
CHAPTER 2
BACKGROUND AND HYPOTHESES DEVELOPMENT

The first part of this chapter reviews relevant literature and closes by developing the hypotheses to be tested. Sections 2.1, 2.2, 2.3, and 2.4 evaluate relevant literature on agency theory, efficiency wage theory, accounting literature, and impression management, respectively. Section 2.5 presents the hypotheses and Section 2.6 provides a summary of the chapter.

2.1 Agency Theory

An organization can be described as a set of contracts between agents and principals (Sunder 2002). Agency theory is an economic theory that studies the relationship between a principal and an agent in the firm (Jensen and Meckling 1976). An agency relationship exists when one party (the principal) engages another party (the agent) to perform some service on the principal’s behalf which involves delegating some decision making authority to the agent (Jensen and Meckling 1976). Agency relationships are found in many disciplines such as accounting (e.g., Webb 2002), economics (e.g., Charness, Frechette and Kagel 2004), finance (e.g., Fama 1980), organizational behavior (e.g., Eisenhardt 1985), and sociology (e.g., Eccles 1985). When the principal delegates work to the agent, two problems can occur (Eisenhardt 1989). First, an agency problem can arise if the goals of the principal and agent are different. In agency models, individuals are assumed to be motivated solely by self-interest (Baiman 1990). Each individual’s actions are based on preferences and beliefs, and preferences typically include only wealth and leisure (Baiman 1990). Information asymmetry is also an assumption of most agency models (Baiman 1990). The agent holds private information which is costly for the principal to gain. The principal can mitigate the significance of the private information by providing incentives for the agent and by incurring monitoring costs designed to limit the agent’s self-interested behavior (Jensen and Meckling 1976).

The second problem arises because of differences in risk preferences. Agency theory assumes an agent is more risk averse than the principal because the agent is unable to diversify his risk of employment (Eisenhardt 1989). The differences in risk preferences may cause
differences in preferred actions, as the principal is able to diversify her investments and prefers risk-neutral actions.

Since the principal cannot observe the agent’s behavior or skill, two agency problems can occur. First, moral hazard refers to the lack of effort on the part of the agent (Eisenhardt 1989). If the agent does not provide the agreed-upon effort, the agent is shirking (Eisenhardt 1989). Second, adverse selection occurs when the principal cannot verify the skills or abilities of the agent during the contracting process (Eisenhardt 1989). To mitigate moral hazard and adverse selection, the principal can invest in information systems such as budgeting systems, reporting procedures and additional layers of management to reveal the agent’s behavior or the principal can contract on the outcome of the agent’s behavior (Eisenhardt 1989).

2.2 Efficiency Wage Theory

Akerlof (1982, 1984) proposes that norms of fairness and reciprocity can affect wages and effort in a competitive labor market. Akerlof’s model was the first sociological model leading to the efficiency wage hypothesis (Yellen 1984). The efficiency wage hypothesis states that some firms willingly pay employees wages in excess of the market-clearing wage in exchange for greater effort (Yellen 1984). Akerlof (1982) views the labor contract as a “partial gift exchange.” Akerlof proposes a worker acquires utility by exchanging “gifts” with the firm. The amount of utility depends upon the so-called “norms” of gift exchange. The worker’s gift is effort provided in excess of the minimum standard, and the firm’s gift is a wage in excess of the market-clearing wage (Akerlof 1982). The concept of fairness is important in the efficiency wage hypothesis. A worker compares the current wage with a reference wage. The reference wage can be past wages or the wage of a similar worker, both employed and unemployed (Akerlof 1982). Danthine and Kurmann (2006) argue the reference point location generates different wage rigidity in the efficiency wage model. If the reference point is external to the firm, such as proposed by Akerlof (1982), the efficiency wage model fails to generate wage rigidity because external wages are falling due to a reduction in labor demand. It is possible for firms to lower their wages without severe consequences on effort (Danthine and Kurmann 2006). In contrast, if the reference point is internal, firms avoid large wage reductions following reduced
labor demand shifts because the cost savings would be less than the decrease in labor productivity (Danthine and Kurmann 2006).

Akerlof (1984) provides four paradigms where paying more than the market-clearing wage is supported. Akerlof refers to these four paradigms as dual labor markets, the theory of bureaucracy, the theory of work groups, and equity theory. The dual labor market hypothesis proposes there are two type of jobs—those in the primary sector and those in the secondary sector. Primary sector jobs are stable, have low quit rates, good working conditions, opportunities for promotion, and good pay. In contrast, secondary sector jobs have high quit rates, harsh working conditions, little chance of promotion, and low pay. The wages at the secondary sector jobs are the market-clearing wages. Primary sector firms pay wages in excess of market-clearing. The theory of bureaucracy proposes there is a hierarchical organization in which officials follow career paths according to the organization’s promotion ladder. There is a personal loyalty of the employees to the goals of the bureaucracy. The theory of work groups proposes workers treat production as a game. Workers produce more output than standard production to make the time go by faster and relieve the boredom of their jobs. Lastly, equity theory proposes workers produce better quality work if they believe they are overpaid. Recent findings cast doubt on the equity theory. Charness and Kuhn (2007) find while workers’ effort choices are highly sensitive to their own wages, effort is not affected by coworkers’ wages.

Yellen (1984) identifies four benefits of efficiency wages: reduced shirking, reduced labor turnover, improved quality of job applicants, and improved morale. Earning wages in excess of the market-clearing wage gives employees an incentive to not shirk. Employees caught shirking risk the chance of being fired and losing the excessive wages. Labor turnover is reduced because workers are more reluctant to quit employment and give up the excessive wages. The problem of adverse selection will be reduced because excessive wages will attract high-quality workers. Lastly, employee morale is improved because receiving excessive wages gives employees an incentive to provide increased effort raising the work group norm. Workers gain job satisfaction by providing increased effort in exchange for a gift wage.

Several studies find support for the efficiency wage hypothesis. Fehr, Kirchsteiger and Riedl (1993) found buyers offered prices that were substantially above the market-clearing level. The sellers reciprocated by offering effort levels above the minimum permitted even though there was no pecuniary incentive to do so. Fehr, Kirchler, Weichbold and Gachter (1998) also
find support for the efficiency wage hypothesis. In their experiments, the workers’ provided effort level varies positively with the wage payments. Firms anticipate workers’ reciprocal responses and offer higher wages than the market required. Hannan, Kagel and Moser (2002) find support for the gift exchange hypothesis, a version of the efficiency wage hypothesis. Workers provide more effort at higher wages although the study finds undergraduates provide substantially less effort than MBAs which the authors attribute to prior work experience. The findings by Charness, Frechette, and Kagel (2004) question the robustness of the results of the Hannan, Kagel and Moser (2002) study. The participants in Hannan, Kagel and Moser were given a comprehensive payoff table relating wages and effort levels to worker’s payoffs and manager’s incomes. It appears the comprehensive table may have introduced subtle framing/presentation format effects that impacted behavior. Charness, Frechette and Kagel (2004) conducted a study and manipulated the presence or absence of a payoff table. Surprisingly, they find substantial and significant reductions in both wages and worker effort when a payoff table is provided. Maximiano, Sloof and Sonnemans (2007) find gift exchange appears to be robust to increases in the size of the workforce. They compare a bilateral gift exchange game with a treatment in which each employer has four workers and find effort levels in the latter treatment are only marginally lower.

Hannan (2005) investigated whether paying higher wages motivates employees to provide higher effort and whether firm profit moderates this relation. Her study was motivated by the growing interest in reciprocity in the experimental economics literature. The experiment contained three stages. In stage one, firms publicly posted wage offers and workers accepted or declined the wage offers. If the worker accepted a wage offer, the worker privately selected an effort level. At the end of stage one, a random profit shock was revealed to both firm and worker. In stage two, a firm was permitted to revise its wage offer and the worker was required to accept it. The worker then selected an effort level for stage two. In stage three, the firm learned the effort level provided by the worker. Earnings for both firms and workers were based on the stage two wage and the stage two effort levels. Consistent with gift exchange (Akerlof 1982) and reciprocity models (Rabin 1993), Hannan found workers provided more effort when they were paid higher wages even though there was no ex post financial reward for doing so. The profit shocks affected worker behavior. Workers provided higher effort when firm profit
decreased compared to when it increased. However, workers responded asymmetrically to firm profit. In particular, workers expect to share in firm profit increases but not decreases.

2.3 Social Norms

A growing area of experimental research in accounting incorporates social norms and personal values. Below, I discuss studies examining fairness, honesty, reputation, and reciprocity. Luft and Libby (1997) studied how fairness concerns affect negotiated transfer prices. In their experiment, experienced managers were assigned the role of buyer or seller. Participants could trade in an external market at market prices or negotiate a transfer price. In the experiment, the outside market prices were $50 and $70. Participants were asked to estimate the seller’s reservation price and the final negotiated price that would satisfy both parties. The transfer price affected the profits of the buyer and seller. At a market price of $50, the buyer and seller have equal profits, whereas a market price of $70 provided much higher profit to the seller than to the buyer. The authors found that while market price did affect managers’ reservation and transfer prices, its influence was significantly less when market price resulted in a more unequal (“unfair”) distribution of profits between divisions (Luft and Libby 1997).

Kachelmeier and Towry (2002) also studied how fairness concerns affected transfer pricing. Their study extends Luft and Libby (1997) by examining if fairness-based price concessions extend to actual prices that result from real-cash negotiations. Kachelmeier and Towry manipulated how participants communicated during the negotiation of transfer prices. The means of communication were face-to-face and a computer network. Their results indicate that expectations of fairness-based price concessions do not survive actual negotiations using a computer network, but both expectations and actual negotiated outcomes do reflect fairness-based price concessions when participants negotiate in a face-to-face setting.

Evans, Hannan, Krishnan and Moser (2001) studied honesty in a principal-agent setting. In their study, divisional managers possessed superior information unknown to corporate headquarters. The manager knew for certain the accurate production cost for the coming period. The manager submitted a budget request to headquarters and received, in full, the resources requested. The manager kept any differences between the actual production cost and the resources received. The researchers conducted three experiments and varied the amount of
payoffs and how the surplus was divided between the manager and headquarters. The authors found managers often sacrificed wealth to make honest or partially honest budget requests. They also found managers do not lie more as the payoff to lying increases, but found less honesty under a contract that provides a smaller share of total surplus to the manager than under one that provides a larger share. This suggests the level of honesty is affected by how the surplus is divided between the manager and headquarters.

Webb (2002) examined the impact of reputation and variance investigations on the creation of budget slack. Participants were told to assume they received a favorable transfer within the company based on their reputation. The task utilized was calculating financial ratios. The dependent variable was budgetary slack defined as the difference between performance expectations and submitted budget performance. The two variables manipulated were reputation and variance investigation. Participants were told their reputation was based on either achievement of high levels of output or achievement of high levels of output and ability to set reliable budgets. The experimental materials indicated the administrator of the experiment would conduct a review of results at the end of the period, and if actual results exceeded budget by a significant amount, variance investigations might occur (would not occur). Results show concern for maintaining a favorable reputation leads to lower budgetary slack as does the existence of a variance investigation policy. Budget reliability affected reputation resulting in lower slack as did a policy to investigate significant favorable variances.

Stevens (2002) examined how information asymmetry affects reputation and ethical concerns and tested the effects of these concerns on budgetary slack. In Stevens’ experiment, he manipulated information asymmetry between the subordinate and the superior regarding the subordinate’s productive capability. Stevens found participants’ concern for reputation and ethics reduced budgetary slack. Ethical concerns, however, were not diminished with increases in information asymmetry. Stevens concluded reputation is a socially mediated control whereas ethics is an internally mediated control for opportunistic self-interest.

Schatzberg and Stevens (2008) investigated budget and effort behavior in a participative budgeting experiment. The parameters were set such that the producer receives the largest share of surplus from the manager by publicly setting the budget at zero and privately providing low effort. The authors manipulated whether the manager had the power to reject the producer’s budget and whether the producer/manager pairs rotate each period. The authors found that when
the manager cannot reject the producer’s budget, budgetary slack is higher than when the manager can reject the producer’s budget. But giving the manager rejection power also generated reciprocity expectations from the producer. When the manager allowed more budgetary slack, the manager expected and received higher effort from the producer on average.

2.4 Impression Management

Impression management refers to the process by which individuals attempt to control the impressions others form of them (Leary and Kowalski 1990). Some authors distinguish a difference between impression management and self-presentation. Schlenker (1980) defines impression management as the “attempt to control images that are projected in real or imagined social interactions” and Baumeister (1982) defines self-presentation as the “use of behavior to communicate some information about oneself to others.” Impression management encompasses more than self-presentation. Companies often hire public relations firms to help improve the image of the company, especially during negative events such as the Exxon Valdez oil spill. Since most researchers use the terms interchangeably (Leary and Kowalski 1990), this dissertation also uses the terms interchangeably.

In 1959, Erving Goffman published The Presentation of Self in Everyday Life. Goffman’s book is often credited as the first significant publication devoted to the study of impression management in the social sciences (Schlenker 1980). Goffman used the analogy of a stage and described people as social actors that decide their stage and props. Goffman described the basic differences between life and theater. The stage is make-believe, but life is real. In a stage environment, the three parties involved are the actor, other actors and the audience. In life, the only parties are the actor and the audience. Jones (1965) described the behaviors actors use to create a favorable impression on others. Jones referred to these behaviors as ingratiation tactics and describes four such techniques: other-enhancement, opinion conformity, self presentation, and rendering favors. Other-enhancement means flattery. This is often successful because people tend to like others that think highly of them. Opinion conformity is where an individual will agree with the views of the target person. Self-presentation is when the ingratiate displays attributes that the target would approve and like. Rendering favors is where the ingratiate performs favors for the target. Scott and Lyman (1968) introduced accounts as a
form of impression management. Accounts include excuses and justifications designed to neutralize an act or its consequences. Cialdini, Borden, Thorne, Walker, Freeman and Sloan (1976) introduced an indirect impression management technique called basking, which is impression management by association. People want to be associated with people that have been successful. Schneider (1981) introduced verbal and nonverbal tactics people use to appear more favorable. Gilmore and Ferris (1989) found applicants use a variety of impression management techniques, such as emphasizing positive traits and claiming responsibility for positive events. Varma, Toh and Pichler (2006) found ingratiation in cover letters led to higher ratings of applicants.

Impression management literature contains many tactics used by individuals and organizations to manage impressions. Various researchers created taxonomies to classify impression management tactics (e.g., Jones and Pittman 1982; Cialdini 1989; Wayne and Ferris 1990). Andrews (1999) merged four taxonomies to create a taxonomy covering most of the impression management tactics described in the literature. The most appropriate impression management tactic appropriate for this study’s experiment is ingratiation (Jones 1965). As stated previously, two ingratiation tactics are conformity and self presentation.

Recently, experimental researchers in accounting have begun to examine impression management in their studies. Hannan, Rankin and Towry (2006) investigated how the precision of an information system affects manager’s reporting behavior. They propose that a manager’s reporting behavior is affected by his or her trade-off of the benefits of appearing honest against the benefits of misrepresentation. In their experiment, the manager possessed private information regarding the actual production cost for the next period. The manager requested resources from the owner, and the owner provided all the resources requested. The manager kept any excess resources after production is completed. They manipulated information asymmetry between a manager and an owner at three levels: no information system, a coarse information system and a precise information system. In the no information condition, the owner did not receive any signal of the actual cost. In the coarse and precise information system, both the owner and manager knew the information system provided 70 percent accuracy. The estimated cost range was 4.00-6.00 lira. In the coarse information system, the range was provided as 4.00-4.50 lira, 4.55-5.00 lira, 5.05-5.50 lira, or 5.55-6.00 lira. In the precise information system, the cost range provided was 4.00-4.25 lira, 4.30-4.50 lira,…5.80-6.00 lira. The experiment was
designed so the only benefit to the manager of appearing honest is an intrinsically motivated desire for social approval. The authors found that, although the existence of an information system increased managerial honesty, honesty was lower under a precise than under a coarse information system. The authors conclude as the information system becomes more precise, the manager must forgo greater benefits of misrepresentation in order to achieve the same appearance of honesty.

2.5 Hypotheses Development

There are five hypotheses and two research questions in the dissertation. The first hypothesis tests the agency theory prediction. The second hypothesis examines efficiency-wage theory. The third hypothesis is composed of two parts and predicts when the manager will be induced to offer a higher wage based upon impression management of the worker. The fourth hypothesis is also composed of two parts and predicts when the worker will be induced to provide higher effort. The fifth hypothesis tests the learning gained by the managers during the experiment.

2.5.1 Agency Theory Prediction

Agency theory assumes the principal and agent are self-interested and motivated only by wealth and leisure (Eisenhardt 1989). Both parties pursue their self-interest within the scope of the contractual relationship. In a setting with asymmetric information between the principal and agent regarding the effort provided by the agent, agency theory predicts the agent will behave opportunistically and provide low effort.

In my study, the principal is the manager and the agent is the worker in a production environment. While the manager and worker both have utility for wealth, agency theory assumes the worker has disutility for effort (Eisenhardt 1989) which is common knowledge to the worker and manager. Therefore, the manager will assume the worker will shirk the contracted obligation and provide low effort. Furthermore, the contract used in the experiment is a fixed-wage contract which provides no incentive for the agent to provide any level of effort. Since the manager knows the worker is effort averse and will behave opportunistically, the
manager will assume the worker will provide low effort for production. Therefore, the manager will reduce the fixed-wage offers to a level where the worker will be indifferent to work for the manager or another employer. Based on the aforementioned arguments, the wage offer will be a wage where the worker will be indifferent to work for the manager or seek another employer. A stark economic prediction based on agency theory leads to Hypothesis 1:

\[ H_1 : \text{The manager will offer the worker a minimal salary based on the worker’s outside opportunity cost and the worker will provide low effort in return.} \]

2.5.2 Efficiency Wage Theory Prediction

Efficiency wage theory explains why firms pay fixed wages that are higher than the market-clearing wage (Akerlof 1984). Akerlof (1982) views the labor contract as a “partial gift exchange” between the firm and the worker. In the model, a firm pays a worker more than the market-clearing wage and, in exchange, the worker reciprocates by providing higher effort than a worker paid the market wage. Several studies find support for the exchange of higher wages for higher effort (e.g., Fehr, Kirchsteiger and Riedl 1993; Fehr, Kirchler, Weichbold and Gachter 1998; Hannan, Kagel and Moser 2002). The parameters in this study permit an efficiency wage to develop because both the manager and worker can earn more than an outside opportunity cost. In this study, the outside opportunity cost is equivalent to a market-clearing wage for the workers. Thus, consistent with efficiency wage theory, both parties can be better off if the manager pays above the market wage and the worker reciprocates by providing more than low effort in return.

In this study, effort is operationalized by an effort charge which is often used in research studies (e.g., Hannan, Kagel and Moser 2002; Hannan 2005). The effort charge is a convex function that reflects an increasing marginal disutility for effort. In Hannan (2005) and Hannan, Kagel and Moser (2002), the cost of the effort level .2, .4 and .8 was 1, 4, and 12, respectively. In this dissertation, the cost of low, medium, and high effort is $0.50, $1.00, and $2.00, respectively. The effort charge is subtracted from the wage. Given that output is determined by the effort level provided during production, increased effort level increases the probability of higher output. Based on efficiency wage theory, the aforementioned arguments lead to the following hypothesis:
The manager will offer the worker a salary that is above the worker’s outside opportunity cost and the worker will provide more than low effort in return.

2.5.3 Impression Management

Specific motivations for engaging in impression management are related to increasing the likelihood that one will obtain desired outcomes in the future (e.g., such as promotions, wage increases, or favorable treatment by others) and acquiring social approval (Leary and Kowalski 1990). An impression management technique often used to help one foster a desired outcome or acquire social approval is ingratiation (Jones 1965). One ingratiation technique commonly used is conformity. Baumeister (1982) distinguishes two kinds of conformity. There is the conformity to the expectations of a person and the conformity to general social norms. A social norm can be formal or informal (Bicchieri 2006). Some examples of social norms are honesty and reciprocity.

Two factors that may affect an individual’s conformity to social norms are the presence of communication and the number of interactions between an individual and the audience. When one expects repeated interactions with the same party, it may affect the individual’s behavior this period as concerns arise for honesty, reciprocity and reputation. Impression management, as used in this study, is a broader construct than reputation because impression management encompasses individual’s behavior in single-period interactions as well as multi-period interactions.

In this study, the manipulations include the ability of the worker to signal intended effort (effort signal or no signal) and the number of interactions (single-period or multi-period) between the manager and worker. In the effort signal condition, the worker signals his intended production effort to the manager before the manager makes a wage offer. In the no signal condition, the manager makes a wage offer without the worker’s effort signal. In the single-period condition, the manager-worker pair interacts for one period and then rotates to an anonymous partner for the next period. In the multi-period condition, the manager-worker pair remains together throughout the experiment. As the number of interactions between the manager-worker pair increase, reputations develop. When constructing and maintaining the public self, most people conform to social norms because it is undesirable to build a negative reputation (Baumeister 1982). Baumeister (1982) describes a public self and a private self.
One’s behavior can be motivated by the desire to look favorable to public viewers or as a means of self-fulfillment (Baumeister 1982).

Communication between the manager and worker can affect a worker’s behavior (e.g., Brandts and Cooper 2007). The worker has private information unknown by the manager. The private information in this dissertation is the level of effort the worker provides during production. Communication is one avenue available to the worker to convey this private information. The worker can use the impression management technique of conformity and signal to the manager that the worker is a high-effort type regardless of the effort level provided during production. Gaining rewards by displaying traits favorable to the audience is “pleasing the audience” (Baumeister 1982). The worker wants to be viewed as an honest and high-effort type in hopes of receiving high wage offers from the manager. If the manager believes the worker’s signal is honest, the manager’s expectation for high effort will increase and the manager will offer the worker a higher wage, which may benefit both the manager and worker. The worker benefits by receiving an increased wage and the manager benefits if the worker provides increased effort. However, if the worker signals one effort level to the manager and the manager responds with a high wage, the worker can provide a lower level of effort during production. The motivation for impression management is to maximize expected rewards and minimize expected punishments (Schlenker 1980). In this setting, the worker has an incentive to employ impression management to encourage high wage offers.

In the single-period condition, the manager-worker pair is rematched after each period which controls for reputation effects. In the multi-period condition, the manager-worker pair remains together throughout the experiment allowing reputations to develop. Many studies (e.g., Evans, Hannan, Krishnan and Moser 2001; Hannan, Kagel and Moser 2002; Hannan 2005; Hannan, Rankin and Towry 2006) that utilized principal-agent pairs rematched the participants after each period to prevent reputational effects. This study extends our knowledge of impression management in the principal-agent relation by examining the effects of a signal of intended effort and reputations developed over time.

Brown, Falk and Fehr (2004) provide evidence of the benefits of extended interactions. In their study, participants were identified by fixed identification numbers. There was an excess supply of agents competing for the principals’ offers. The principals could make their offers in public for all to view or make the offers in private where only one agent could accept. They
found agents with fixed identities provided more effort than agents with random identities and engaged in more long term relationships. Brown, Falk and Fehr (2008) extend their earlier study by having an excess supply of principals competing for the agents’ performance. Consistent with their earlier study, they found agents with fixed identities outperformed agents with random identities. Fehr and Zehnder (2008) conduct an experiment where the exact performance of the agent is not known to the principal. In their study, the agents were borrowers that selected either a high-risk or low-risk project. Even a low-risk project could fail, so if the borrower did not make a repayment to the lender, the lender did not know for certain which project the borrower selected. They found participants with fixed identities successfully traded throughout the experiment while participants with random identities experienced a failing market with fewer trades each period as the experiment progressed. The authors attribute reputation formation in long term relationships as the source of the successful trades. These studies indicate extended interactions allow reputations and long term relationships to develop. The studies where agents can be identified provide evidence that better performance can be achieved if reputations are allowed. In the current study, reputations are permitted because manager-worker pairs remain intact throughout the experiment. Based on the previously discussed studies, my hypotheses relating to impression management effects are as follows:

**H3a:** When the worker can signal intended effort, the manager will be induced to offer a higher wage than when the worker cannot signal intended effort.

**H3b:** When the manager-worker interaction is extended to multiple-periods, the manager will be induced to offer a higher wage than when the manager-worker interaction is single period.

**H4a:** When the worker can signal intended effort, the worker will be induced to provide higher effort than when the worker cannot signal intended effort.

**H4b:** When the manager-worker interaction is extended to multiple-periods, the worker will be induced to provide higher effort than when the manager-worker interaction is single period.

2.5.4 Manager’s Planning Accuracy

The rational expectations hypothesis (REH) assumes that individual economic agents use current available and relevant information in forming their expectations and do not rely purely
upon past experience (Shaw 1984). It also assumes that this information is then processed and analyzed in an optimal and efficient manner in order to arrive at an intelligent estimate or expectation (Shaw 1984). The REH was proposed by John Muth in 1961. Muth saw the REH as a ‘positive’ hypothesis not because he believed the REH described how individuals actually formed expectations, but because the REH could yield useful predictions capable of explaining two phenomena observed in studies of expectations: averages of expectations in an industry are more accurate than naïve models and reported expectations generally underestimate the extent of changes that actually take place (Muth 1961). All that is required is that individuals form expectations ‘as if’ they knew the ‘true’ model (Pesaran 1988).

The concept of rational expectations asserts that outcomes do not differ systematically from what people expected them to be (Sargent 2009). Individuals learn from past outcomes and adjust their current expectations. REH does not deny people often make forecasting errors, but it does suggest that errors will not persistently occur on one side or the other (Sargent 2009). In my study, the manager and worker learn as the experiment progresses. The manager observes the production output and assesses the effort level provided by the worker. In the communicate conditions, the manager may compare the effort signal with the production output and assess the worker’s level of honesty regarding the effort signal. Based upon the REH, managers’ forecast error should improve as the workers’ behavior is revealed during the experiment. This expectation leads to the following hypothesis and research questions:

H₃: As the number of periods increase, the manager’s ability to predict the worker’s effort level will increase.

RQ1: When the worker can signal intended effort, will the manager’s ability to predict the worker’s effort increase?

RQ2: When the manager-worker interaction is extended to multiple-periods, will the manager’s ability to predict the worker’s effort increase?
2.6 Summary of Chapter 2

The topics contained in this dissertation draw on different fields. To motivate hypotheses, the dissertation includes a literature discussion of agency theory; efficiency wage theory; social norms, and impression management. Hypothesis 1 tests the traditional agency theory prediction, i.e., that the manager will offer the worker a minimum wage based on the worker’s outside opportunity cost and the worker will provide low effort in return. Hypothesis 2 tests the efficiency wage theory prediction, i.e., the manager will offer the worker a salary above the worker’s outside opportunity cost and the worker will provide more than low effort in return. Hypothesis 3 tests the following impression management hypothesis: When the worker can signal intended effort, the manager will be induced to offer a higher wage than when the worker cannot signal intended effort. Hypothesis 3 tests the following impression management hypothesis: When the manager-worker interaction is extended to multiple-periods, the manager will be induced to offer a higher wage than when the manager-worker interaction is single period. Hypothesis 4 tests the following impression management hypothesis: When the worker can signal intended effort, the worker will be induced to provide higher effort than when the worker cannot signal intended effort. Hypothesis 4 tests the following impression management hypothesis: When the manager-worker interaction is extended to multiple-periods, the worker will be induced to provide higher effort than when the manager-worker interaction is single period. Hypothesis 5 tests the following rational expectations hypothesis: As the number of periods increase, the manager’s ability to predict the worker’s effort level will increase. Research Question 1 tests the following rational expectations hypothesis: When the worker can signal intended effort, will the manager’s ability to predict the worker’s effort increase? Research Question 2 tests the following rational expectations hypothesis: When the manager-worker interaction is extended to multiple-periods, will the manager’s ability to predict the worker’s effort increase?
CHAPTER 3
EXPERIMENT AND METHODOLOGY

3.1 Participants

Participants were 120 students attending Wichita State University. Fifty participants were male and seventy were female. Participants were mostly accounting majors (68%) with finance majors (3%) and “other” majors (29%) comprising the remainder of the sample. Primarily all the participants were undergraduates (8% were freshman level, 7% were sophomore level, 33% were junior level, 44% were senior level, and 8% were in the “other” category). On average, participants had 6 years of work experience (standard deviation 5.65). Since there was a large standard deviation for work experience, I included experience as an independent variable in the regressions. The only regression where experience affects responses is the regression for worker’s provided effort.

3.2 Research Design

3.2.1 Experimental Procedures

The experiment was conducted in two phases. In Phase 1, participants were sent via email an ID number and a testcode for the Jackson Personality Inventory-Revised questionnaire (JPI-R). The JPI-R is comprised of 300 true/false questions designed to measure fifteen personality traits. Participants earned $10 to complete the JPI-R. Upon completing the JPI-R, participants scheduled an experimental session for Phase 2. Phase 2 was conducted in an experimental economics laboratory. Figure 1 shows a timeline of Phase 1 and 2 including the manipulations.

Phase 2 was conducted over thirteen sessions with 6-14 participants in attendance at each session. The lab contained private workstations and participants randomly selected an available workstation. The workstations were networked so participants could interact with each other. The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007). The experimenter read aloud the instructions (see Appendix A) and explained that the
experimental setting was a production environment. The experimenter provided the common knowledge regarding how roles were assigned, how production outcomes were determined, and how workers’ earnings were determined. Participants were told managers’ earnings were a function of production and the workers’ wages. At this point, participants were not told that managers could earn a bonus based on their effort forecast. After all questions were answered, the experimenter told the participants to refrain from talking until the experiment ended. If participants had questions during the experiment, the participant and experimenter left the room to resolve the issue. When the experimenter started the software, half the participants were randomly assigned the role of manager and half were assigned the role of worker. Participants kept the same role throughout the experiment. For the manager, the opening screen explained how a bonus could be earned. Each period, the manager offered the worker a wage in exchange for production effort. The production effort levels were high, medium, and low effort. If the worker declined the wage offer, both the worker and manager earned an outside opportunity cost. The experiment continued until at least 10 periods were completed. After 10 periods, there was a 50% chance an additional period would occur. If Period 11 occurred, there was a 50% chance an additional period would occur until the experiment stopped. Seven sessions ended after 10 periods; 2 sessions ended after 11 periods; 3 sessions ended after 12 periods and one session lasted 14 periods. The procedure that determined if an additional period occurred was common knowledge. This feature is commonly included to avoid “end of game” effects that may arise in multi-period experiments. The data analyzed and discussed in this dissertation examines Periods 1-10. When all periods were included in the regressions, the results did not materially change.

In the experiment, there were two manipulations: intended effort signal and extended interaction. In the effort signal condition, the worker provided the manager with a signal of intended effort before the manager offered a wage during the contracting process. In this way, the worker could signal the worker’s effort type and possibly influence the wage offer using impression management techniques. If the worker signaled one effort level, however, the worker could provide a different effort level for production. In the no effort signal condition, the worker did not provide a signal before the wage offer was made. Thus, in a single period with no effort signal, the worker could not engage in impression management.

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1 If workers knew managers could earn a bonus, they might use the bonus as justification for misreporting production effort.
FIGURE 1. Overview of the Phases of the Experiment

Phase 1

If Period 1 or in Rotate Condition, manager and worker are paired.

If signal condition, worker sends effort signal to manager.

Manager sends wage offer to worker.

Worker accepts wage offer?

Yes

Worker provides production effort. Manager selects effort forecast.

Production is revealed. Period earnings are calculated.

Last Period?

Yes

Exit questionnaire completed. Participants are paid in private.

No

Manager and worker earn $2.00.

Phase 2

Participants complete the JPI-R questionnaire.
In the single-period interaction condition, participants were randomly assigned another partner after each period was completed. Thus, a manager interacted with a different worker each period. In the extended interaction condition, the manager and worker remained partners until the experiment ended. Interacting with the same partner allowed reputations to develop, learning to occur, and thus another form of impression management to exist.

3.2.2 The Principal-Agent Production Setting

Parameters were selected to generate the traditional principal-agent production setting. In particular, the worker’s pay function assures that worker pay is maximized if the worker contracts for a high wage and provides low effort for production. The wage offer ranges from $0.00-$6.00. To operationalize production effort, the worker is charged an effort cost. The cost of effort is $0.50 for low effort, $1.00 for medium effort, and $2.00 for high effort. The worker earns each period the wage less the cost of effort. The worker may decline the manager’s wage offer and earn a $2.00 outside wage. The outside wage represents the worker’s opportunity cost for working for the firm (manager)\(^2\). If the worker declines the wage offer, the manager also earns $2.00 that period as an outside opportunity cost. The outside opportunity to earn $2.00 is common knowledge. The manager knows the effort charge for the worker; however, the worker does not know the manager’s pay function includes a bonus opportunity. The manager’s pay function is withheld from the worker to limit fairness concerns. The worker’s pay for each period is:

\[
\text{Worker pay} = \text{wage} - \text{effort charge}
\]

where,

wage is $0.00-$6.00 and the effort charge = $0.50, $1.00, and $2.00 for low, medium, and high production effort, respectively

\(^2\) Hannan, Kagel and Moser (2002) establish a market-clearing wage by having an excess supply of labor each period. Workers not accepting a wage offer from the firm earned nothing for that period. Also, firms were randomly assigned a new identification number each period to avoid reputation formation. Since I want reputations to develop, I allow the worker to decline the manager’s wage offer and earn $2.00 at an outside opportunity.
For example, if the worker contracts for $5.25 and submits high effort for production, the worker’s pay is $5.25 - $2.00 = $3.25, but if low effort is submitted, the worker’s pay is $5.25 - $0.50 = $4.75. Again, the parameters were chosen so that it was always optimal for a worker to provide low effort in a single period.

The manager’s pay is a function of the production output, the worker’s wage, and a forecast bonus. For each period, the manager earns $1.00 per unit of output less the worker’s wage for that period. The production output is determined by a probability function which depends on the worker’s production effort (See Table 1). The probability function for output was common knowledge. The production output is limited to 4 or 12 units with the probability of the higher production output increasing from .25 to .50 to .75 as the effort level goes from low to medium to high, respectively. The expected output also increases from 6 to 8 to 10, respectively.

**TABLE 1**
Production Output Probabilities

<table>
<thead>
<tr>
<th>Effort level</th>
<th>Output 4 units</th>
<th>Output 12 units</th>
<th>Expected Output*</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>.25</td>
<td>.75</td>
<td>10</td>
</tr>
<tr>
<td>Medium</td>
<td>.50</td>
<td>.50</td>
<td>8</td>
</tr>
<tr>
<td>Low</td>
<td>.75</td>
<td>.25</td>
<td>6</td>
</tr>
</tbody>
</table>

*The expected output is calculated as follows:

- High effort: \(4(.25) + 12(.75) = 10\)
- Medium effort: \(4(.50) + 12(.50) = 8\)
- Low effort: \(4(.75) + 12(.25) = 6\)

If the manager anticipates the production effort, the manager can plan accordingly. To operationalize planning benefits, the manager earns a forecast bonus if the manager anticipates the worker’s production effort. For the forecast bonus, the manager places 10 chips into three buckets. The buckets are labeled “high effort,” “medium effort,” and “low effort.” After the worker accepts the wage offer and before production is revealed, the manager expresses her effort expectation by placing chips in the bucket(s) labeled for the effort level(s) she expects the
worker to provide for production. The manager earns $0.10 per chip placed in the correct effort bucket. Specifically, the manager’s pay each period is:

\[
\text{Manager pay} = \frac{\text{production output}}{\text{worker’s wage}} + \text{forecast bonus}
\]

where,

- production output = 4 or 12 depending on production output
- worker’s wage = contract amount between manager and worker
- forecast bonus = $0.10(number of chips in correct effort bucket)

For example, suppose the manager contracts with the worker for $3.25 and places 6 chips in the “medium effort” bucket and 4 chips in the “low effort” bucket. If the worker provides low effort for production and production output is 4 units, the manager earns \(\frac{1.00(4 \text{ units}) - 3.25 + 0.10(4 \text{ chips})}{4 \text{ units}} = 1.15\). It is important to note that the manager did not learn the amount of bonus earned until after the experiment, and then only in total. If the manager learned the bonus immediately after a given period, the manager could detect the production effort and retaliate the following period by reducing the wage.

Given the experimental parameters selected, the pay of the manager is maximized by correctly forecasting the effort provided by the worker during production and having the worker provide high effort for production. The production output the manager and worker experienced based upon the worker’s provided effort level during the experiment is shown in Table 2.

**TABLE 2**
Production Output by Effort Level by Period

<table>
<thead>
<tr>
<th>Period</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>12</td>
<td>20%</td>
</tr>
<tr>
<td>Medium</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>Low</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>60%</td>
</tr>
</tbody>
</table>

\(4 \text{ units} 12 \text{ units}\)

27
The experimental earnings the manager and worker accumulated during the 10 production periods were deflated by a factor of 2.5, which was common knowledge at the beginning of the experiment.

At the end of the experiment, participants were debriefed as recommended by Dearman and Beard (2009). Participants were told their behavior during the experiment did not necessarily mean that they would behave the same way out of the laboratory setting. Dearman and Beard (2009) criticize accounting and economics research studies (e.g., Evans, Hannan, Krishnan and Moser 2001; Hannan 2006) where the participants are given incentives to misrepresent the current state based on private information to earn a greater reward. Dearman and Beard (2009) claim researchers are in effect rewarding and reinforcing deliberately fraudulent behavior. Participants in this dissertation then completed an exit questionnaire (see Appendix B) and were paid all compensation in private (fee for completing JPI-R, show-up fee and deflated production earnings) before leaving the experimental laboratory. The average compensation was $31.01. The compensation by condition was $31.60 in the no signal single-period condition, $30.58 in the effort signal single-period condition, $31.07 in the no signal multi-period condition, and $30.79 in the effort signal multi-period condition. The participant ID number was used to merge the JPI-R data, the exit questionnaire data and the experimental data.

3.3 Summary of Chapter 3

This chapter of the dissertation describes the research method employed to collect the data. The experiment consisted of two phases. In the first phase, participants completed the Jackson Personality Inventory-Revised questionnaire before coming to the experimental session. In the second phase, participants attended an experimental session where they were assigned the role of manager or worker. The experimental setting was a production environment where the worker provides effort in exchange for a wage from the manager. The manager makes a wage offer to the worker, and the worker selects an effort level for production (high, medium or low effort). The worker earns the wage offer less an effort charge. The manager’s pay is a function of production, wage offer, and bonus earned. Chapter 4 provides the statistical techniques used to test the hypotheses and the results of the tests.
CHAPTER 4
RESULTS

This chapter describes the statistical techniques employed to test the manipulation checks and hypotheses along with the results. When determining significance, an $\alpha$ level of .05 was selected for the dissertation. All numbers are rounded to the nearest hundredth except p-values.

4.1 Manipulation Checks

The manipulations were tested using data collected during an exit questionnaire. Participants responded to questions using a Likert scale from 1 *Strongly Disagree* to 7 *Strongly Agree* with 4 being neutral. One sample t-tests were used to test if the mean response was different from the neutral response of 4. To test the effort signal manipulation, the following question was asked: “During the contracting process, the worker offered the manager an effort level BEFORE the manager offered the worker a wage.” For the 60 workers in the signal condition, the mean response was 5.93 (std. dev. 1.96) and the p-value was $p<.001$. For the 60 workers in the no signal condition, the mean response was 2.27 (std. dev. 2.02) and the p-value was $p<.001$. All mean responses are in the expected direction and significantly different from a neutral response, indicating the signal condition manipulation was successful.

To test the single-period versus multi-period manipulation, the following question was asked: “After each period, the worker interacted with a different manager.” For the 60 participants in the rotation condition, the mean response was 5.12 (std. dev. 1.50) and the p-value was $p<.001$. For the 60 participants in the multi-period condition, the mean response was 2.50 (std. dev. 1.72) and the p-value was $p<.001$. All mean responses are in the expected direction and significantly different from a neutral response, indicating the multi-period manipulation was successful.
4.2 Descriptive Statistics

The experimental design in this study contained two manipulations. The worker provided an effort signal or no signal to the manager before the manager offered a wage to the worker. The length of interaction was also varied. In the single-period interaction, the manager and worker were rematched after each period. In the multi-period interaction, the manager and worker remained partners throughout the experiment. The 2 x 2 design creates four cells. Cell1, cell2, cell3 and cell4 represent the no signal single-period; signal single-period; no signal multi-period; and signal multi-period conditions. Tables 3 and 4 contain the descriptive statistics for Periods 1-10 and Periods 8-10, respectively. The mean, standard deviation and number of observations are presented by condition.

Figures 2, 3, 4 and 5 present the manager’s wage offer, manager’s effort expectation, worker’s production effort and manager’s forecast error, respectively, by condition and by period.

<table>
<thead>
<tr>
<th>TABLE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive Statistics by Condition for Periods 1-10</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Effort Signal</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>Single-Period</td>
</tr>
<tr>
<td>Wage (all offers)</td>
</tr>
<tr>
<td>Wage (accepted offers)</td>
</tr>
<tr>
<td>Effort expectation</td>
</tr>
<tr>
<td>Production effort</td>
</tr>
<tr>
<td>Forecast error</td>
</tr>
<tr>
<td>Multi-Period</td>
</tr>
<tr>
<td>Wage (all offers)</td>
</tr>
<tr>
<td>Wage (accepted offers)</td>
</tr>
<tr>
<td>Effort expectation</td>
</tr>
<tr>
<td>Production effort</td>
</tr>
<tr>
<td>Forecast error</td>
</tr>
</tbody>
</table>
TABLE 4
Descriptive Statistics by Condition for Periods 8-10

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cell 1</th>
<th>Cell 2</th>
<th>Cell 3</th>
<th>Cell 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std Dev</td>
<td>Obs</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Effort Signal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-Period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage (all offers)</td>
<td>4.04</td>
<td>0.96</td>
<td>45</td>
<td>4.63</td>
</tr>
<tr>
<td>Wage (accepted offers)</td>
<td>4.24</td>
<td>0.85</td>
<td>39</td>
<td>4.71</td>
</tr>
<tr>
<td>Effort expectation</td>
<td>1.99</td>
<td>0.58</td>
<td>39</td>
<td>2.32</td>
</tr>
<tr>
<td>Production effort</td>
<td>1.46</td>
<td>0.72</td>
<td>39</td>
<td>1.73</td>
</tr>
<tr>
<td>Forecast error</td>
<td>0.58</td>
<td>0.34</td>
<td>39</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Multi-Period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage (all offers)</td>
<td>4.47</td>
<td>1.19</td>
<td>45</td>
<td>4.92</td>
</tr>
<tr>
<td>Wage (accepted offers)</td>
<td>4.72</td>
<td>1.07</td>
<td>39</td>
<td>5.04</td>
</tr>
<tr>
<td>Effort expectation</td>
<td>1.92</td>
<td>0.52</td>
<td>39</td>
<td>2.48</td>
</tr>
<tr>
<td>Production effort</td>
<td>1.56</td>
<td>0.64</td>
<td>39</td>
<td>2.10</td>
</tr>
<tr>
<td>Forecast error</td>
<td>0.63</td>
<td>0.29</td>
<td>39</td>
<td>0.65</td>
</tr>
</tbody>
</table>

FIGURE 2. Manager’s Wage Offers by Condition
FIGURE 3. Manager’s Effort Expectation by Condition

FIGURE 4. Worker’s Production Effort by Condition
4.3 Tests of Hypotheses and Research Questions

The data in this dissertation is panel data because it contains cross-sectional and time series components. The cross-sectional component is the individual participants (120 participants) and the time series component is the periods (10 periods) of time that data was collected. The total data set contained 1,200 rows. Unless otherwise noted, all regressions performed were random effects regression models. When t-tests were used, I calculated the mean and standard deviation of the variable of interest for Cell1, Cell2, Cell3 and Cell4.

To conduct statistical tests, variables were created. Table 5 defines the variables used in the statistical analyses in this dissertation.

4.3.1 Hypothesis 1

Based upon agency theory, H$_1$ predicts the manager will offer a minimal salary based on the worker’s outside opportunity cost and the worker will provide low effort. Given the effort
charges, a wage below $2.50 provides no incentive for the worker to provide any effort level. When the low-effort charge of $0.50 is subtracted from a wage of $2.50, the worker is indifferent towards declining the wage offer and earning the outside opportunity cost of $2.00 or accepting the wage offer. To test \( H_1 \), a one sample t-test was used to test if the mean wage offer in Periods 1-10 was $2.50. Table 6, Panel A presents the means, standard deviations, and sample size by condition for Periods 1-10.\(^3\) Table 6, Panel B presents the means, standard deviations, and sample size by condition for Periods 8-10. Table 6, Panel C contains the results of the t-test performed for \( H_1 \) for Periods 1-10. The mean wage offer of $4.45 for Periods 1-10 is significantly different from $2.50 (\( p<.001 \)). Additional analysis tested the mean wage in Periods 1-10 by condition to confirm the mean wage was different from $2.50 in all conditions (See Table 6, Panel C). I also tested if the mean wage offer for Periods 8-10 was different from $2.50 (See Table 6, Panel D) for the sample and by condition. In Periods 8-10, the mean wage offer of $4.52 is significantly different from $2.50 (\( p<.001 \)). Further tests confirmed the mean wage offer was significantly different from $2.50 in all conditions. These results do not support that managers offered a minimal salary based on the worker’s outside opportunity cost. Thus, \( H_1 \) is not supported.

4.3.2 Hypothesis 2

Hypothesis 2 predicts the manager will offer the worker a salary that is above the worker’s outside opportunity cost and the worker will provide more than low effort in return. To test if the mean wage offer is above the worker’s outside opportunity cost, I use a t-test and test if the mean of the accepted wage offers are above $2.50. If the mean wage offer is greater than $2.50, the wage is an efficiency wage. The mean and standard deviation of the accepted wage offers for Periods 1-10 are in Table 7, Panel A. The results of the t-tests are in Table 7, Panel B. The mean wage of accepted offers for Periods 1-10 and by condition for Periods 1-10 are all above $2.50. \( H_2 \) is supported. Table 7, Panel C contains the mean and standard deviation of the accepted wage offers for Periods 8-10. The results of the t-tests testing if the mean of the accepted wage offers are above $2.50 for Periods 8-10 are in Table 7, Panel D.

\(^3\) The data in Table 6 include all wage offers. When only accepted wage offers are tested, the results are unchanged.
## TABLE 5
Variable Definitions

<table>
<thead>
<tr>
<th>Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>signal</td>
<td>1 = effort signal, 0 = no effort signal</td>
</tr>
<tr>
<td>multi-period</td>
<td>1 = multi-period interaction, 0 = single-period interaction</td>
</tr>
<tr>
<td>time</td>
<td>time trend for the control condition (no signal, single period): Periods 1-10</td>
</tr>
<tr>
<td>cell1</td>
<td>1 = control condition (no signal, single period), 0 = cell2, cell3, cell4</td>
</tr>
<tr>
<td>cell2</td>
<td>1 = incremental effect of adding signal to the control condition, 0 = cell1, cell3, cell4</td>
</tr>
<tr>
<td>cell3</td>
<td>1 = incremental effect of adding multi-period to the control condition, 0 = cell1, cell2, cell4</td>
</tr>
<tr>
<td>cell4</td>
<td>1 = incremental effect of adding multi-period interaction to the control condition, 0 = cell1, cell2, cell3</td>
</tr>
<tr>
<td>timecell2</td>
<td>incremental learning effect of adding signal to the control condition: time x cell2</td>
</tr>
<tr>
<td>timecell3</td>
<td>incremental learning effect of adding multi-period to the control condition: time x cell3</td>
</tr>
<tr>
<td>timecell4</td>
<td>incremental learning effect of adding signal and multi-period interaction to the control condition: time x cell4</td>
</tr>
<tr>
<td>wage</td>
<td>manager’s wage offer to the worker</td>
</tr>
<tr>
<td>experience</td>
<td>the number of years of work experience</td>
</tr>
<tr>
<td>production effort</td>
<td>the effort the worker provides during production (1 = low effort, 2 = medium effort, 3 = high effort)*</td>
</tr>
<tr>
<td>effort signal</td>
<td>in the effort signal condition, the worker signals an effort level to the manager before the manager offers a wage during contracting process (1= low effort, 2 = medium effort, 3 = high effort)*</td>
</tr>
<tr>
<td>effort forecast</td>
<td>the manager’s forecast is a weighted measure computed as the following: [3(number of high-effort chips) + 2(number of medium-effort chips) + 1(number of low-effort chips))/10</td>
</tr>
<tr>
<td>bonus</td>
<td>manager’s forecast bonus for predicting production effort; the manager could earn a bonus up to $1.00 per period</td>
</tr>
<tr>
<td>forecast error</td>
<td>manager’s lost bonus per period measured as $1.00 – bonus</td>
</tr>
<tr>
<td>worker honesty</td>
<td>production effort – effort signal</td>
</tr>
</tbody>
</table>

*Effort is coded 1, 2, and 3 for low, medium, and high effort, respectively. The effort charge is a convex function where $0.50, $1.00, and $2.00 are the effort charges for low, medium, and high effort, respectively.
TABLE 6
Wage Mean and Standard Deviation by Condition

Panel A: Wage Mean, Standard Deviation and Sample Size by Condition for Periods 1-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All Mean</th>
<th>No Signal Mean</th>
<th>Signal Mean</th>
<th>No Signal Std. Dev.</th>
<th>Signal Std. Dev.</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Period</td>
<td>4.45</td>
<td>4.22</td>
<td>4.56</td>
<td>4.32</td>
<td>4.69</td>
<td>600</td>
</tr>
<tr>
<td>Multi-Period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.97</td>
<td>.88</td>
<td>.77</td>
<td>1.09</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td>600</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Wage Mean, Standard Deviation and Sample Size by Condition for Periods 8-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All Mean</th>
<th>No Signal Mean</th>
<th>Signal Mean</th>
<th>No Signal Std. Dev.</th>
<th>Signal Std. Dev.</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Period</td>
<td>4.52</td>
<td>4.04</td>
<td>4.63</td>
<td>4.47</td>
<td>4.92</td>
<td>180</td>
</tr>
<tr>
<td>Multi-Period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>1.01</td>
<td>.96</td>
<td>.62</td>
<td>1.19</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td>180</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

Panel C: Results of t-tests for H1 Testing if Wage = $2.50 for Periods 1-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All t-stat</th>
<th>No Signal t-stat</th>
<th>Signal t-stat</th>
<th>No Signal p-value</th>
<th>Signal p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>49.21*</td>
<td>24.01*</td>
<td>32.82*</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Panel D: Results of t-tests for H1 Testing if Wage = $2.50 for Periods 8-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All t-stat</th>
<th>No Signal t-stat</th>
<th>Signal t-stat</th>
<th>No Signal p-value</th>
<th>Signal p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.67*</td>
<td>10.77*</td>
<td>23.22*</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

The data in Table 6 contain all wage offers. *denotes significance at 1% level.
To investigate if the workers provided, on average, effort above low effort for production, I use a t-test and a Wilcoxon signed-rank test to test if the provided effort was greater than 1.0, which is the coding for low effort. Table 7, Panel E contains the means and standard deviations of the provided effort for Periods 1-10. Table 7, Panel F contains the results of the t-tests and signed-rank tests testing if the provided effort was above low effort. Both the t-tests and sign-rank tests provide support that the provided effort level is above the level of low effort for Periods 1-10 for all conditions (p<.001). Table 7, Panel G contains the means and standard deviations of the provided effort for Periods 8-10. Table 7, Panel H contains the results of the t-tests and signed-rank tests testing if the provided effort was above low effort for Periods 8-10. The results of the t-tests and sign-rank tests support that the provided effort level is above the level of low effort for Periods 8-10 (p<.001). Both the t-tests and sign-rank tests support H\textsubscript{2} for Periods 1-10 and 8-10. Managers offered a salary above the worker’s outside opportunity and the worker provided more than low effort in return.

4.3.3 Hypotheses 3a and 3b

The opportunity for impression management occurs when the worker can signal the worker’s effort type or interact with the manager over extended periods and create an impression upon the manager. If the worker’s signal is successful, it will increase the likelihood the worker will obtain a desired outcome, a higher wage. Hypothesis 3a predicts that when the worker can signal intended effort, the manager will be induced to offer a higher wage than when the worker cannot signal intended effort. To test Hypothesis 3a, a t-test was used to test if the mean wage offer for the signal condition is higher than the mean wage offer for the no signal condition. The mean wage offer in the signal condition was $4.62 (std. dev. .91) and the mean wage offer in the no signal condition of $4.27 (std. dev. .99). The result of the t-test confirms the mean wage offer in the signal condition is higher than the mean wage offer in the no signal condition (t-stat -4.59, p<.001). This supports Hypothesis 3a. When the worker signals intended effort, the manager offers higher wages than when the worker does not signal intended effort. Further analysis using data from Periods 8-10 reveals the same conclusion for H\textsubscript{3a}. Worth noting is the mean wage offer of $4.77 in the signal condition for Periods 8-10 is higher than the mean wage offer of $4.62 in the signal condition for Periods 1-10. The effects of the workers’ signaling intended effort was more pronounced in the later periods.
TABLE 7  
Mean and Standard Deviation for Accepted Wage Offers and Provided Effort for Total Sample and by Condition

Panel A: Mean, Standard Deviation and Sample Size of Accepted Wages by Condition for Periods 1-10

<table>
<thead>
<tr>
<th></th>
<th>All Treatments</th>
<th>No Signal Single-Period</th>
<th>Signal Single-Period</th>
<th>No Signal Multi-Period</th>
<th>Signal Multi-Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.60</td>
<td>4.35</td>
<td>4.70</td>
<td>4.52</td>
<td>4.84</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.88</td>
<td>.80</td>
<td>.70</td>
<td>.98</td>
<td>.94</td>
</tr>
<tr>
<td>Sample size</td>
<td>523</td>
<td>133</td>
<td>127</td>
<td>132</td>
<td>131</td>
</tr>
</tbody>
</table>

Panel B: Results of t-tests for H2 Testing if Wage > $2.50 for Periods 1-10

<table>
<thead>
<tr>
<th></th>
<th>All Treatments</th>
<th>No Signal Single-Period</th>
<th>Signal Single-Period</th>
<th>No Signal Multi-Period</th>
<th>Signal Multi-Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-stat</td>
<td>54.67*</td>
<td>26.78*</td>
<td>35.56*</td>
<td>23.79*</td>
<td>28.38*</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Panel C: Mean, Standard Deviation and Sample Size of Accepted Wages by Condition for Periods 8-10

<table>
<thead>
<tr>
<th></th>
<th>All Treatments</th>
<th>No Signal Single-Period</th>
<th>Signal Single-Period</th>
<th>No Signal Multi-Period</th>
<th>Signal Multi-Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.68</td>
<td>4.24</td>
<td>4.71</td>
<td>4.72</td>
<td>5.04</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.90</td>
<td>.85</td>
<td>.56</td>
<td>1.07</td>
<td>.89</td>
</tr>
<tr>
<td>Sample size</td>
<td>160</td>
<td>39</td>
<td>40</td>
<td>39</td>
<td>42</td>
</tr>
</tbody>
</table>

Panel D: Results of t-tests for H2 Testing if Wage > $2.50 for Periods 8-10

<table>
<thead>
<tr>
<th></th>
<th>All Treatments</th>
<th>No Signal Single-Period</th>
<th>Signal Single-Period</th>
<th>No Signal Multi-Period</th>
<th>Signal Multi-Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-stat</td>
<td>30.73*</td>
<td>12.71*</td>
<td>25.14*</td>
<td>12.99*</td>
<td>18.54*</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
TABLE 7 - continued
Mean and Standard Deviation for Accepted Wage Offers and Provided Effort for Total Sample and by Condition

Panel E: Mean, Standard Deviation & Sample Size of Effort by Condition for Periods 1-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All</th>
<th>No Signal</th>
<th>Signal</th>
<th>No Signal</th>
<th>Signal</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Single-Period</td>
<td>Single-Period</td>
<td>Multi-Period</td>
<td>Multi-Period</td>
</tr>
<tr>
<td>Mean</td>
<td>1.76</td>
<td>1.62</td>
<td>1.93</td>
<td>1.52</td>
<td>1.97</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>.77</td>
<td>.71</td>
<td>.85</td>
<td>.61</td>
<td>.80</td>
</tr>
<tr>
<td>Sample size</td>
<td>523</td>
<td>133</td>
<td>127</td>
<td>132</td>
<td>131</td>
</tr>
</tbody>
</table>

Panel F: Results of t-tests and Rank-Sum tests for H2 Testing if Provided Effort > Low Effort (1.0) for Periods 1-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All</th>
<th>No Signal</th>
<th>Signal</th>
<th>No Signal</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>Single-Period</td>
<td>Single-Period</td>
<td>Multi-Period</td>
<td>Multi-Period</td>
</tr>
<tr>
<td>t-stat</td>
<td>22.46*</td>
<td>9.95*</td>
<td>12.36*</td>
<td>9.83*</td>
<td>13.81*</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Signed-rank stat</td>
<td>16.72*</td>
<td>7.92*</td>
<td>8.58*</td>
<td>7.77*</td>
<td>9.06*</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Panel G: Mean, Std Dev. and Sample Size of Effort by Condition for Periods 8-10

<table>
<thead>
<tr>
<th>Treatments</th>
<th>All</th>
<th>No Signal</th>
<th>Signal</th>
<th>No Signal</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Single-Period</td>
<td>Single-Period</td>
<td>Multi-Period</td>
<td>Multi-Period</td>
</tr>
<tr>
<td>Mean</td>
<td>1.72</td>
<td>1.46</td>
<td>1.73</td>
<td>1.56</td>
<td>2.10</td>
</tr>
<tr>
<td>Std. Dev.</td>
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<td>.78</td>
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<td>.79</td>
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<td>40</td>
<td>39</td>
<td>42</td>
</tr>
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</table>

Panel H: Results of t-tests and Sign-rank tests for H2 Testing if Provided Effort > Low Effort (1.0) for Periods 8-10

<table>
<thead>
<tr>
<th>Treatments</th>
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<th>No Signal</th>
<th>Signal</th>
<th>No Signal</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-stat</td>
<td>Single-Period</td>
<td>Single-Period</td>
<td>Multi-Period</td>
<td>Multi-Period</td>
</tr>
<tr>
<td>t-stat</td>
<td>22.46*</td>
<td>4.00*</td>
<td>5.84*</td>
<td>5.50*</td>
<td>8.98*</td>
</tr>
<tr>
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<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Signed-rank stat</td>
<td>9.03*</td>
<td>3.59*</td>
<td>4.52*</td>
<td>4.33*</td>
<td>5.35*</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

The data in Table 7 contain accepted wage offers. * denotes significance at 1% level.
Hypothesis 3b predicts that when the manager-worker interaction is extended to multiple-periods, the manager will offer higher wages than when the manager-worker interaction is single-period. To test $H_{3b}$, a t-test was used to test if the mean wage offer for the multiple-period condition differs from the mean wage offer for the single-period condition. The mean wage offer in the multiple-period condition was $4.50$ (std. dev. $1.08$) and the mean wage offer in the single-period condition of $4.39$ (std. dev. $.84$). The result of the t-test confirms the mean wage offers do not differ (t-stat $1.44$, $p=.151$). If however, you perform t-test using only the accepted wage offers, there is support for $H_{3b}$. The mean accepted wage offer in the multiple-period condition was $4.68$ (std. dev. $.97$); the mean accepted wage offer in the single-period condition was $4.52$ (std. dev. $.77$). The result of the t-test shows the mean accepted wage offers do differ (t-stat $2.02$, $p=.044$) for Periods 1-10. When using all wage offers in Periods 8-10, $H_{3b}$ is also supported. The mean wage offer in the multiple-period condition for Periods 8-10 was $4.70$ (std. dev. $1.13$) and the mean wage offer in the single-period condition for Periods 8-10 was $4.33$ (std. dev. $.85$). A t-test confirms the mean wage offers do differ (t-stat $2.41$, $p=.017$). A possible explanation is that reputations had developed by Period 8. Thus, the wage offers in the later periods were higher than the overall wage offers during Periods 1-10. Overall, the support for $H_{3b}$ is mixed.

4.3.4 Hypotheses 4a and 4b

$H_{4a}$ predicts when the worker can signal intended effort, the worker will be induced to provide higher effort than when the worker cannot signal intended effort. To test $H_{4a}$, a t-test was used to compare the mean effort provided in the signal condition to the mean effort in the no signal condition. The mean effort in the signal condition was $1.95$ (std. dev. $.82$) with 258 observations, and the mean effort in the no signal condition was $1.57$ (std. dev. $.67$) with 265 observations. In order for the worker to provide effort, the wage offer must be accepted. A Wilcoxon rank-sum test was also used to compare the effort provided in the signal condition to the effort provided in the no signal condition. The result of the t-test confirms the mean effort provided differs between the signal and no signal conditions (t-stat $5.81$, $p<.001$). This supports $H_{4a}$. For Periods 1-10, the rank-sum test also supports that the effort provided by the two populations are different ($p<.001$). The result of using a t-test for Periods 8-10 yields the same conclusion as using Periods 1-10. $H_{4a}$ is supported using Periods 8-10. When Periods 8-10 are
tested using the rank-sum test, the conclusion is the same (p<.002). When the worker can signal intended effort, the worker is induced to provide higher effort than when the worker cannot signal intended effort.

$H_{4b}$ predicts when the manager-worker interaction is extended to multiple-periods, the worker will be induced to provide higher effort than when the manager-worker interaction is a single period. To test $H_{4b}$, a t-test was used to compare the mean effort provided in the multiple-period condition to the mean effort in the single-period condition. The mean effort in the multiple-period condition was 1.75 (std. dev. .75) with 263 observations, and the mean effort in the single-period condition was 1.77 (std. dev. .80) with 260 observations. The Wilcoxon rank-sum test was also conducted to determine if the effort provided in the multi-period condition differs from the effort provided in the single period condition. The result of the t-test confirms the mean effort provided does not differ between the multiple-period and single-period conditions (t-stat .36, p=.722). This does not support $H_{4b}$. Result of the rank-sum test also does not support that the effort provided was different in the multiple-period condition compared to the single period condition (p<.860). When the manager-worker interaction is extended to multiple-periods, the worker is not induced to provide higher effort than when the manager-worker interaction is a single period.

A difference was found for $H_{4b}$ when Periods 8-10 are examined. The mean effort provided in the multiple-period condition for Periods 8-10 was 1.84 (std. dev. .77), and the mean effort provided in the single-period condition for Periods 8-10 was 1.59 (std. dev. .76). A t-test confirms the mean effort provided in the two conditions does differ (t-stat 2.03, p=.044). The Wilcoxon rank-sum test also concludes that the effort provided in the multi-period condition differs from the effort provided in the single-period condition (p<.033). $H_{4b}$ is supported when analyzing Periods 8-10. Interacting with the same manager for seven periods allows the worker to create an impression upon the manager. To support the impression, workers may provide higher effort compared to workers that did not interact with the same manager.
4.3.5 Hypotheses 5

H_5 predicts as the number of periods increase, the manager’s ability to predict the worker’s effort level will increase. If the manager correctly predicts the effort level provided by the worker, the manager can earn up to $1.00 as a bonus. Forecast error is measured as the amount of bonus foregone because the manager placed effort chips in the incorrect effort bucket. More specifically, forecast error is $1.00 less the bonus earned. Figure 5 shows a chart of the forecast error by condition for Periods 1-10. I expressed the forecast error as a percentage.

To test H_5, I used regression Model 1. I included independent variables to capture the effects of the effort signal, the multi-periods, an interaction term for effort signal and multi-period, and a time term to capture the baseline trend effects of the model. To better assess the trend effects of each condition, I also include trend variables to capture the incremental effect of time on the different conditions. These variables were defined in Table 5. I include timecell2 which captures the trend effects for cell2 (signal single-period condition), timecell3 captures the trend effects for cell3 (no signal multi-period condition), and timecell4 captures the trend effects for cell4 (signal multi-period condition). My dependent variable is forecast error. In the model, the notation “i’t” represents participant i in period t for all regression models. My model is as follows:

\[
\text{Forecast error}_{it} = \beta_0 + \beta_1 \text{cell2}_{it} + \beta_2 \text{cell3}_{it} + \beta_3 \text{cell4}_{it} + \beta_4 \text{time}_{it} + \beta_5 \text{timecell2}_{it} + \beta_6 \text{timecell3}_{it} + \beta_7 \text{timecell4}_{it} + \epsilon_{it} + \nu_i
\]

where,

Forecast error is the dependent variable. \( \beta_0 \) is the intercept term representing the baseline control condition of no signal, single period. \( \beta_1 \) is the coefficient for cell2. \( \beta_2 \) is the coefficient for cell3. \( \beta_3 \) is the coefficient for cell4. \( \beta_4 \) is the coefficient for time. \( \beta_5 \) is the coefficient for timecell2. \( \beta_6 \) is the coefficient for timecell3. \( \beta_7 \) is the coefficient for timecell4. \( \epsilon \) is the random error specific to an observation and \( \nu_i \) is the random error specific to an individual participant. \( \nu_i \) is assumed to be constant over time.

The results of the regression examining forecast error are contained in Table 8. The estimated manager’s forecast error in the control condition of no signal, single period was .67. Cell2 is marginally significant meaning the manager’s forecast error in the signal, single period condition is .16 less than the manager’s forecast error in the control condition of no signal, single
period. The variable timecell2 is significant (p=.008), which represents the time trend in the signal, single-period condition. The manager’s forecast error increased an estimated 3 cents per period above the manager’s forecast error in the control condition of no signal, single period. The forecast error in the other conditions remained constant. Results of the regression do not support H5. As the number of periods increased in the experiment, the manager’s forecast error did not improve. Contrary to the prediction, the manager’s forecast error increased by 3 cents per period in the signal, single-period condition and remained constant in the remaining conditions. During the experiment, workers in the signal, single period condition used the signal for impression management and their managers’ forecast errors increased.

<table>
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<th>p-value</th>
</tr>
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</tr>
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</table>

N = 523; R² = .025

4.3.6 Research Questions 1 and 2

Research Question 1 examines when the worker can signal intended effort, will the manager’s ability to predict the worker’s effort increase? To test RQ1, a t-test was used to test if the mean forecast error in the signal condition was less than the mean forecast error in the no signal condition. The mean forecast error in the signal condition was .64 (std. dev. .28) with 258 observations, and the mean forecast error in the no signal condition was .64 (std. dev. .29) with 265 observations. For the manager to supply a forecast, the wage offer must be accepted and
production occurred. The result of the t-test confirms the mean forecast error in the signal condition is not less than the mean forecast error in the no signal conditions (t-stat .066, p=.474).

In Periods 1-10, managers in the signal condition are not any better at forecasting effort level than managers in the no signal condition. For Periods 8-10, the mean forecast error in the signal condition was .68 (std. dev. .30) with 82 observations, and the mean forecast error in the no signal condition was .61 (std. dev. .32) with 78 observations. The result of the t-test for Periods 8-10 confirms the mean forecast error in the signal condition is not less than the mean forecast error in the no signal conditions (t-stat -1.40, p=.918). The manager’s forecast error is actually more in the signal condition compared to the no signal condition. A possible explanation is workers in the signal condition use the signal for impression management and create a favorable impression on the manager. The manager does not detect the dishonesty of the worker, and thus, the forecast error increases.

Research Question 2 investigates when the manager-worker interaction is extended to multiple-periods, will the manager’s ability to predict the worker’s effort increase? To test RQ2, a t-test was used to test if the mean forecast error in the multi-period condition is less than the mean forecast error in the single-period condition. The mean forecast error in the multi-period condition was .65 (std. dev. .29) with 263 observations, and the mean forecast error in the single-period condition was .62 (std. dev. .29) with 260 observations. The result of the t-test shows the mean forecast error in the multi-period condition is not less than the mean forecast error in the single-period conditions (t-stat 1.34, p=.910). In Periods 1-10, managers in the multi-period condition cannot forecast effort any better than managers in the single-period condition. For Periods 8-10, a t-test was used to test if the mean forecast error in the multi-period condition was less than the mean forecast error in the single-period condition. The mean forecast error in the multi-period condition for Periods 8-10 was .64 (std. dev. .31) with 81 observations, and the mean forecast error in the single-period condition for Periods 8-10 was .65 (std. dev. .30) with 79 observations. For Periods 8-10, the result of the t-test shows managers in the multi-period condition are not any better at forecasting effort than managers in the single-period condition (t-stat -.176, p=.430).
4.4 Additional Analysis

To better understand how time affected different measures, I ran a series of regressions to capture the effects of time on several variables of interest.

4.4.1 Manager’s Wage Offers

Figure 2 shows the wage offers by condition. To better assess how the managers’ wage offers were changing over time, I used regression Model 2 with wage offers as the dependent variable. Regression Model 2 was the following:

\[
\text{Wage offer}_{it} = \beta_0 + \beta_1 \text{cell2}_{it} + \beta_2 \text{cell3}_{it} + \beta_3 \text{cell4}_{it} + \beta_4 \text{time}_{it} + \beta_5 \text{timecell2}_{it} + \beta_6 \text{timecell3}_{it} + \beta_7 \text{timecell4}_{it} + \varepsilon_{it} + \nu_i
\]  

where,

- Wage offer is the dependent variable. $\beta_0$ is the intercept term representing the baseline control condition.
- $\beta_1$ is the coefficient for cell2. $\beta_2$ is the coefficient for cell3. $\beta_3$ is the coefficient for cell4. $\beta_4$ is the coefficient for time. $\beta_5$ is the coefficient for timecell2. $\beta_6$ is the coefficient for timecell3. $\beta_7$ is the coefficient for timecell4. $\varepsilon$ is the random error specific to an observation and $\nu_i$ is the random error specific to an individual participant. $\nu_i$ is assumed to be constant over time.

Table 9 contains the result of the regression on manager’s wage offers. The baseline wage offer in the control condition of no signal, single period was $4.46. During the experiment, the estimated wage decreased $.05 per period ($p=.048$) in the control condition. In the signal, single period (cell2) condition, the wage offer increased an estimated $.07 per period ($p=.025$) above the control condition. In the no signal, multi-period (cell3) condition, the wage offer increased an estimated $.09 per period above the control condition ($p=.004$). In the signal, multi-period (cell4) condition, the wage offer increased an estimated $.10 per period over the control condition ($p=.003$). Since the wage offers in the signal conditions increased during the experiment, this supports $H_{3a}$. When workers can signal intended effort, the manager offers higher wage offers. Furthermore, the wage offers in the no signal, multi-period (cell3) condition
also increased during the experiment. The opportunity to signal intended effort or develop a reputation by interacting with the same manager allowed the workers to use impression management and gain increasing wage offers. When only accepted wage offers are analyzed, the conclusion does not change.

### TABLE 9
Wage Offers

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<tr>
<th>Variable</th>
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<th>p-value</th>
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</thead>
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<td>.172</td>
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</tr>
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<td>timecell3</td>
<td>.09</td>
<td>.03</td>
<td>.004</td>
</tr>
<tr>
<td>timecell4</td>
<td>.10</td>
<td>.03</td>
<td>.003</td>
</tr>
</tbody>
</table>

N = 600; $R^2 = .054$

4.4.2 Manager’s Effort Expectations

Figure 3 shows the manager’s effort expectation by condition. To investigate how the managers’ effort expectations changed during the experiment, I ran a regression using effort forecast as the dependent variable. Regression Model 3 was the following:

$$\text{Effort forecast}_{it} = \beta_0 + \beta_1 \text{cell2}_{it} + \beta_2 \text{cell3}_{it} + \beta_3 \text{cell4}_{it} + \beta_4 \text{time}_{it} + \beta_5 \text{timecell2}_{it} + \beta_6 \text{timecell3}_{it} + \beta_7 \text{timecell4}_{it} + \beta_8 \text{wage}_{it} + \epsilon_{it} + \nu_i$$

where,

Effort forecast is the dependent variable. $\beta_0$ is the intercept term representing the baseline control condition. $\beta_1$ is the coefficient for cell2. $\beta_2$ is the coefficient for cell3. $\beta_3$ is the coefficient for cell4. $\beta_4$ is the coefficient for time. $\beta_5$ is the coefficient for timecell2. $\beta_6$ is the coefficient for timecell3. $\beta_7$ is the coefficient for timecell4. $\beta_8$ is the coefficient for wage. $\epsilon$ is the random error specific to an
observation and $\nu_i$ is the random error specific to an individual participant. $\nu_i$ is assumed to be constant over time.

The results of regression Model 3 are shown in Table 10. The baseline effort forecast of the signal, single period condition is .83, which means managers expected, on average, effort of .83 in the absence of a wage offer. The wage coefficient of .27 indicates managers’ effort expectations increased by .27 for every $1.00 increase in the wage offer ($p = .000$). Managers’ effort expectations in the no signal, multi-period condition (timecell3) declined as estimated .05 above the control condition of no signal, single period. Managers’ effort expectations in the other conditions remained relatively flat.

TABLE 10
Effort Expectation

<table>
<thead>
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<th>Variable</th>
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<td>.000</td>
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</table>

$N = 523; R^2 = .266$

4.4.3 Worker’s Production Effort

Figure 4 shows the worker’s production effort by condition. To investigate how the production effort changed during the experiment, I ran regression Model 4 using production effort as the dependent variable. Model 4 differs from previous models because the variable experience is added. This model is the only model where experience is significant.
Production effort_{it} = \beta_0 + \beta_1 cell2_{it} + \beta_2 cell3_{it} + \beta_3 cell4_{it} + \beta_4 time_{it} + \beta_5 timecell2_{it} + \\
\beta_6 timecell3_{it} + \beta_7 timecell4_{it} + \beta_8 exp_{it} + \epsilon_{it} + \nu_i \tag{4}

where,

Production effort is the dependent variable. \( \beta_0 \) is the intercept term representing the baseline control condition of no signal, single period. \( \beta_1 \) is the coefficient for cell2. \( \beta_2 \) is the coefficient for cell3. \( \beta_3 \) is the coefficient for cell4. \( \beta_4 \) is the coefficient for time. \( \beta_5 \) is the coefficient for timecell2. \( \beta_6 \) is the coefficient for timecell3. \( \beta_7 \) is the coefficient for timecell4. \( \beta_8 \) is the coefficient for the experience variable. \( \epsilon \) is the random error specific to an observation and \( \nu_i \) is the random error specific to an individual participant. \( \nu_i \) is assumed to be constant over time.

Results of the regression in Table 11 show a baseline production effort of 1.80 for the control condition, a level below medium effort. The baseline production effort in the no signal, multi-period condition marginally declined .42 below the control condition (p=.072). During the experiment, the provided effort decreased an estimated .05 per period in the control condition (p=.021). In the signal, multi-period (cell4) condition, the production effort increased an estimated .07 per period above the control condition (p=.018). This is the only regression in the dissertation where experience was significant (p=.048). For each year of work experience, the worker increased provided effort an estimated .02 per period (p=.048). In the no signal, single-period condition, workers did not have to balance the benefits of appearing honest and the benefits of misrepresentation since the interaction with their managers were one-time events. Those workers could provide less effort and gain rewards this period. However, workers in the signal, multi-period condition had to balance the benefits of appearing honest with the benefits of misrepresentation because those workers interacted with their manager multi-periods and providing less effort this period could reduce future wage offers. Therefore, the effort provided in the signal, multi-period condition increased over time.
TABLE 11  
Production Effort

Regression Model 4 for Worker’s Production Effort  
Dependent Variable: Worker’s Production Effort

<table>
<thead>
<tr>
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</table>

N = 523; R² = .185

FIGURE 6. Worker’s Effort Signal by Condition
4.4.4 Worker’s Effort Signal

Impression management can occur when the worker signals intended effort to the manager. Figure 6 shows the effort signals of the signal, single-period and signal, multi-period conditions for Periods 1-10. Both effort signals are trending upward. To determine the effects of effort signal over time, regression Model 5 was performed using the worker’s effort signal as the dependent variable.

Effort signal = $\beta_0 + \beta_1\text{cell4}_i + \beta_2\text{time}_i + \beta_3\text{timecell4}_i + \varepsilon_i + \nu_i$ \hspace{1cm} (5)

where,

Effort signal is the dependent variable. $\beta_0$ is the intercept term representing the baseline control condition of signal, single period. $\beta_1$ is the coefficient for cell4. $\beta_2$ is the coefficient for time. $\beta_3$ is the coefficient for timecell4. $\varepsilon$ is the random error specific to an observation and $\nu_i$ is the random error specific to an individual participant. $\nu_i$ is assumed to be constant over time.

Table 12 presents the results of the regression on the worker’s effort signal. The baseline effort signal of 2.49 represents the effort signal in the signal, single-period condition ($p=.000$). For the signal, multi-period condition (cell4), there was no incremental effect above the baseline effort signal. The baseline effort signal increased an estimated .04 per period ($p=.010$). Workers successfully used impression management in the signal, single-period condition by increasing the effort signal and received higher wage offers.

<table>
<thead>
<tr>
<th>TABLE 12</th>
<th>Effort Signal</th>
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Panel A: Regression Model 5 for Worker’s Effort Signal  
Dependent Variable: Worker’s Effort Signal

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N = 300; $R^2 = .040$
4.4.5 Worker’s Honesty

In the signal conditions, workers can use a positive signal to create a favorable impression upon the manager. As shown previously, the wages in both signal conditions increased during the experiment. In the signal, single-period condition, a worker has no economic incentive to report truthfully because he reports to a different manager in the future. In the signal, multi-period condition a worker must tradeoff the benefits of appearing honest and the benefits of misrepresentation. The benefits of appearing honest are the increased likelihood of higher future wage offers, and the benefits of misrepresentation are higher earnings in the current period by signaling one effort level but providing a lower effort level for production. Figure 7 shows the worker’s honesty in the signal conditions.

![Worker's Honesty by Condition](image)

**FIGURE 7. Worker’s Honesty by Condition**

Regression Model 6 was used to test the worker’s honesty during the experiment. The dependent variable was worker honesty defined as production effort – effort signal. The results are presented in Table 13.

Worker honesty \( y_{it} = \beta_0 + \beta_1 cell4_{it} + \beta_2 time_{it} + \beta_3 time cell4 + \varepsilon_{it} + v_i \)  \( (6) \)
where,

Worker honesty is the dependent variable. $\beta_0$ is the intercept term representing the control condition of signal, single period. $\beta_1$ is the coefficient for cell4. $\beta_2$ is the coefficient for time. $\beta_3$ is the coefficient for timecell4. $\epsilon$ is the random error specific to an observation and $\nu_i$ is the random error specific to an individual participant. $\nu_i$ is assumed to be constant over time.

The constant of -.39 represents workers in the signal, single-period condition signaled less than half an effort level higher than selected for production. In other words, those workers in the control group misrepresented their effort type by less than half an effort level. Additionally, the control group further misrepresented their effort type by an estimated .08 per period over time (p=.005). In the signal, multi-period condition (cell4), the level of misrepresentation decreased an estimated .07 per period (p=.005). In other words, workers in the signal, multi-period condition were more honest as the experiment continued because they traded off the benefits of appearing honest with the benefits of misrepresentation. In the signal, single-period condition, workers received higher wages during the experiment even though their level of honesty decreased during the experiment. While workers in the signal, multi-period condition also received higher wage offers during the experiment, they provided more effort as they traded off the benefits of appearing honest with the benefits of misrepresentation.

| Table 13 |
| Worker’s Honesty |

Regression Model 6 for Worker’s Honesty
Dependent Variable: Worker’s Honesty*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.39</td>
<td>.15</td>
<td>.007</td>
</tr>
<tr>
<td>cell4</td>
<td>-.23</td>
<td>.21</td>
<td>.259</td>
</tr>
<tr>
<td>time</td>
<td>-.08</td>
<td>.02</td>
<td>.000</td>
</tr>
<tr>
<td>timecell4</td>
<td>.07</td>
<td>.03</td>
<td>.005</td>
</tr>
</tbody>
</table>

N = 258; $R^2 = .062$

*Worker’s honesty is defined as production effort – effort signal, where effort equals 1, 2, and 3 for low, medium, and high effort, respectively.
4.4.6 Worker’s Earnings

To assess if workers were successful using impression management to receive higher wage offers, regression Model 7 was used. The dependent variable is worker’s earnings per period for Periods 1-10. Figure 8 shows the workers’ average earnings per period.

\[
\text{Worker earnings}_{it} = \beta_0 + \beta_1 \text{cell2}_{it} + \beta_2 \text{cell3}_{it} + \beta_3 \text{cell4}_{it} + \beta_4 \text{time}_{it} + \beta_5 \text{timecell2}_{it} + \\
\beta_6 \text{timecell3}_{it} + \beta_7 \text{timecell4}_{it} + \varepsilon_{it} + \nu_i
\]  

(7)

where,

Worker earnings is the dependent variable. \(\beta_0\) is the intercept term representing the baseline control condition of no signal, single period. \(\beta_1\) is the coefficient for cell2. \(\beta_2\) is the coefficient for cell3. \(\beta_3\) is the coefficient for cell4. \(\beta_4\) is the coefficient for time. \(\beta_5\) is the coefficient for timecell2. \(\beta_6\) is the coefficient for timecell3. \(\beta_7\) is the coefficient for timecell4. \(\varepsilon\) is the random error specific to an observation and \(\nu_i\) is the random error specific to an individual participant. \(\nu_i\) is assumed to be constant over time.

Table 14 contains the results of Model 7. The baseline earnings in the control condition of no signal, single period were $3.33. The time trend variable for the workers in the signal, single-period condition (cell2) increased an estimated $.07 per period over the control group while workers in the other conditions experienced relatively flat earnings.

![Worker's Earnings](image)

**FIGURE 8. Worker’s Earnings by Condition**
### TABLE 14
Worker’s Earnings

Regression Model 7 for Worker’s Earnings
Dependent Variable: Worker’s Earnings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.33</td>
<td>.21</td>
<td>.000</td>
</tr>
<tr>
<td>cell2</td>
<td>-.37</td>
<td>.30</td>
<td>.208</td>
</tr>
<tr>
<td>cell3</td>
<td>-.06</td>
<td>.30</td>
<td>.837</td>
</tr>
<tr>
<td>cell4</td>
<td>-.15</td>
<td>.30</td>
<td>.624</td>
</tr>
<tr>
<td>time</td>
<td>-.00</td>
<td>.02</td>
<td>.838</td>
</tr>
<tr>
<td>timecell2</td>
<td>.07</td>
<td>.03</td>
<td>.035</td>
</tr>
<tr>
<td>timecell3</td>
<td>.05</td>
<td>.03</td>
<td>.124</td>
</tr>
<tr>
<td>timecell4</td>
<td>.05</td>
<td>.03</td>
<td>.105</td>
</tr>
</tbody>
</table>

N = 600; R^2 = .026

#### 4.4.7 Manager’s Earnings

To measure how managers’ earnings changed during the experiment, regression Model 8 was used. The manager’s earnings do not include any bonuses accumulated during the experiment. The bonuses were excluded when examining managers’ earnings during the experiment because managers did not learn their bonus amount until after the experiment was completed. The average bonus earned was $3.15, and t-tests confirmed there were no differences in the bonus earned across conditions.

Manager earnings_{it} = \beta_0 + \beta_1 \text{cell2}_{it} + \beta_2 \text{cell3}_{it} + \beta_3 \text{cell4}_{it} + \beta_4 \text{time}_{it} + \beta_5 \text{timecell2}_{it} + \beta_6 \text{timecell3}_{it} + \beta_7 \text{timecell4}_{it} + \epsilon_{it} + \nu_i \tag{8}

where,

Manager earnings is the dependent variable. \beta_0 is the intercept term representing the baseline control condition of no signal, single period. \beta_1 is the coefficient for cell2. \beta_2 is the coefficient for cell3. \beta_3 is the coefficient for cell4. \beta_4 is the coefficient for time. \beta_5 is the coefficient for timecell2. \beta_6 is the coefficient for timecell3. \beta_7 is the coefficient for timecell4. \epsilon is the random error specific to an observation and \nu_i is the random error specific to an individual participant. \nu_i is assumed to be constant over time.
The results of the regression for managers’ earnings are in Table 15. The baseline earnings for managers in the control condition are $4.55 per period. No other variables were significant meaning there were no incremental changes to managers’ earnings in the other conditions. Manager earnings were relatively flat during the experiment.

**TABLE 15**
Manager’s Earnings

Regression Model 8 for Manager’s Earnings
Dependent Variable: Manager’s Earnings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>4.55</td>
<td>.76</td>
<td>.000</td>
</tr>
<tr>
<td>cell2</td>
<td>.58</td>
<td>1.07</td>
<td>.590</td>
</tr>
<tr>
<td>cell3</td>
<td>-.27</td>
<td>1.07</td>
<td>.803</td>
</tr>
<tr>
<td>cell4</td>
<td>-.09</td>
<td>1.07</td>
<td>.936</td>
</tr>
<tr>
<td>time</td>
<td>-.18</td>
<td>.12</td>
<td>.139</td>
</tr>
<tr>
<td>timecell2</td>
<td>-.12</td>
<td>.17</td>
<td>.499</td>
</tr>
<tr>
<td>timecell3</td>
<td>-.03</td>
<td>.17</td>
<td>.838</td>
</tr>
<tr>
<td>timecell4</td>
<td>-.01</td>
<td>.17</td>
<td>.967</td>
</tr>
</tbody>
</table>

\[ N = 600; \, R^2 = .022 \]

4.4.8 Wage Offers Accepted

Figure 9 shows the percentage of offers accepted by condition by period. During the experiment, 87% of wage offers were accepted by the workers. To measure how workers responded to wage offers, I ran a logit regression using acceptance or no acceptance as my dependent variable. As an explanatory variable, I also included the wage offer. Table 16 presents the result of the logit regression. The constant of -4.80 is negative and highly significant (p<.001) which corresponds to a probability of .81% of acceptance with no wage offer. As expected, wage is highly significant (p<.001). The wage coefficient of 1.74 corresponds to an 85% increase in probability of acceptance if the wage offer increases a dollar.
No other variables were significant. The model supports the hypothesis that higher wage offers increase the likelihood of acceptance.

![Percentage of Offers Accepted](image)

FIGURE 9. Percentage of Offers Accepted by Condition

Acceptance \(_{it} = \beta_0 + \beta_1 \text{wage}_{it} + \beta_2 \text{cell2}_{it} + \beta_3 \text{cell3}_{it} + \beta_4 \text{cell4}_{it} + \beta_5 \text{time}_{it} + \beta_6 \text{timecell2}_{it} + \beta_7 \text{timecell3}_{it} + \beta_8 \text{timecell4}_{it} + \epsilon_{it} + \nu_i \quad (9)

where,

Acceptance or no acceptance of the wage offer is the dependent variable. \(\beta_0\) is the intercept term representing the baseline control condition of no signal, single period. \(\beta_1\) is the coefficient for wage. \(\beta_2\) is the coefficient for cell2. \(\beta_3\) is the coefficient for cell3. \(\beta_4\) is the coefficient for cell4. \(\beta_5\) is the coefficient for time. \(\beta_6\) is the coefficient for timecell2. \(\beta_7\) is the coefficient for timecell3. \(\beta_8\) is the coefficient for timecell4. \(\epsilon\) is the random error specific to an observation and \(\nu_i\) is the random error specific to an individual participant. \(\nu_i\) is assumed to be constant over time.
TABLE 16
Accepted Offers

Regression Model 9 for Acceptance of Offers
Dependent Variable: Acceptance of Offers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-4.81</td>
<td>1.00</td>
<td>.000</td>
</tr>
<tr>
<td>wage</td>
<td>1.74</td>
<td>.21</td>
<td>.000</td>
</tr>
<tr>
<td>cell2</td>
<td>-.47</td>
<td>.85</td>
<td>.577</td>
</tr>
<tr>
<td>cell3</td>
<td>.77</td>
<td>.93</td>
<td>.408</td>
</tr>
<tr>
<td>cell4</td>
<td>-.70</td>
<td>.87</td>
<td>.422</td>
</tr>
<tr>
<td>time</td>
<td>.05</td>
<td>.10</td>
<td>.597</td>
</tr>
<tr>
<td>timecell2</td>
<td>-.13</td>
<td>.13</td>
<td>.342</td>
</tr>
<tr>
<td>timecell3</td>
<td>-.12</td>
<td>.14</td>
<td>.408</td>
</tr>
<tr>
<td>timecell4</td>
<td>.01</td>
<td>.15</td>
<td>.966</td>
</tr>
</tbody>
</table>

4.5 Exit Questionnaire Analysis

Table 17 contains data from the exit questionnaire. Questions 1-8 were answered by both managers and workers. Questions 9-12 were answered by workers only and Questions 13-15 were answered by managers only. The Likert scale ranged from “1 Strongly Disagree” to “7 Strongly Agree.” T-tests were conducted to test if the mean responses were different from the neutral response of 4 and in the expected direction. Presented are the means of the overall sample and the means by condition. Some interesting findings are discussed next.

In Question 6, participants felt it was unethical for a worker to contract for one effort level, but provide a different effort level during production. Although not shown, t-tests were conducted for the managers and the workers separately and no differences were found. Even though workers may consider it unethical to shirk responsibilities, the workers did not feel obligated to provide the same effort level as contracted (See Question 12).

In Question 9, the workers in the no signal condition did not find the wage offers to be fair, while workers in the signal condition did view the wage offers as fair. This is
understandable because the wage offers in the no signal conditions were less than the wage offers in the signal conditions.

The presence of impression management is found in Question 13. The managers in the signal conditions regarded the effort provided by the worker as fair given the wage offer. In reality, even though the wage offers were increasing for workers in the signal, single period and signal, multi-period conditions, the amount of effort provided was not increasing in signal, single-period condition.

Individual measures were calculated for the managers and workers. The measures for the manager were the mean forecast effort, mean forecast error and mean wage offer. The worker measures were effort signal, actual effort and honesty. The measures were used as dependent variables in regressions that included explanatory variables from the JPI-R questionnaire. Personality variables were not very successful at explaining participant behavior. The variables that helped explain the forecast effort of managers were cooperativeness (p=.047) and being in the signal condition (p=.005). Cooperativeness describes someone who is compliant, agreeing, adapting, accommodating, cooperative or emulating (Jackson 1994). The baseline forecast effort was 1.80 which is approaching medium effort. For the managers in the signal condition, the estimated average forecast increased .39 above the baseline. For managers described as cooperative, their forecast effort increased .003 which is a marginal increase.
<table>
<thead>
<tr>
<th>Worker and Manager Questions</th>
<th>Cell1 No Signal Single Period</th>
<th>Cell2 Signal Single Period</th>
<th>Cell3 No Signal Multi-Period</th>
<th>Cell4 Signal Multi-Period</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Each period, the manager knew for certain the effort level the worker provided for production.</td>
<td>2.70 (2.23)</td>
<td>3.30 (2.22)</td>
<td>3.20 (2.19)</td>
<td>4.13 (2.36)</td>
<td>3.33 (2.28)</td>
</tr>
<tr>
<td></td>
<td>.002</td>
<td>.048</td>
<td>.028</td>
<td>.621</td>
<td>&lt;.001#</td>
</tr>
<tr>
<td>2. Based upon the production outcome, the manager could easily infer the effort level the worker provided for production.</td>
<td>4.27 (1.78)</td>
<td>4.80 (1.47)</td>
<td>4.43 (1.73)</td>
<td>4.40 (1.98)</td>
<td>4.48 (1.90)</td>
</tr>
<tr>
<td>3. The cost of high effort motivated the worker to provide low effort during production, regardless of the wage offered by the manager.</td>
<td>5.20 (2.07)</td>
<td>4.13 (1.80)</td>
<td>5.20 (1.50)</td>
<td>4.17 (1.98)</td>
<td>4.68 (1.90)</td>
</tr>
<tr>
<td></td>
<td>.002</td>
<td>.344</td>
<td>&lt;.001</td>
<td>.325</td>
<td>&lt;.001##</td>
</tr>
<tr>
<td>4. The manager was always better off (i.e., earned more money) when the worker provided high effort for production.</td>
<td>4.57 (1.94)</td>
<td>5.23 (1.85)</td>
<td>4.50 (2.22)</td>
<td>5.20 (1.79)</td>
<td>4.88 (1.96)</td>
</tr>
<tr>
<td></td>
<td>.061</td>
<td>&lt;.001</td>
<td>.115</td>
<td>&lt;.001</td>
<td>&lt;.001##</td>
</tr>
<tr>
<td>5. The manager could induce higher effort from the worker for production by offering a higher wage.</td>
<td>4.83 (2.15)</td>
<td>4.63 (1.88)</td>
<td>4.70 (1.91)</td>
<td>5.23 (2.05)</td>
<td>4.85 (1.99)</td>
</tr>
<tr>
<td></td>
<td>.022</td>
<td>.038</td>
<td>.028</td>
<td>.002</td>
<td>&lt;.001##</td>
</tr>
<tr>
<td>6. It was unethical for a worker to contract for one effort level with the manager but provide a different effort level during production.</td>
<td>n/a</td>
<td>5.10</td>
<td>n/a</td>
<td>4.70</td>
<td>4.90</td>
</tr>
<tr>
<td></td>
<td>n/a</td>
<td>(1.73)</td>
<td>n/a</td>
<td>(1.78)</td>
<td>(1.75)</td>
</tr>
<tr>
<td>7. The worker could provide either high, medium or low effort levels during the production process, regardless of the effort level offered to the manager.</td>
<td>5.60 (1.48)</td>
<td>6.50 (1.82)</td>
<td>5.43 (1.65)</td>
<td>6.20 (1.06)</td>
<td>6.35 (0.95)</td>
</tr>
<tr>
<td></td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001##</td>
</tr>
<tr>
<td>8. In a given period, the worker could reject the wage offer from the manager and still earn $2.00.</td>
<td>6.47 (1.28)</td>
<td>6.63 (1.85)</td>
<td>5.97 (1.88)</td>
<td>6.10 (1.60)</td>
<td>6.29 (1.46)</td>
</tr>
<tr>
<td></td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001##</td>
</tr>
</tbody>
</table>

#Testing if mean < 4, ##testing if mean > 4
<table>
<thead>
<tr>
<th>Worker Only Questions</th>
<th>Cell1</th>
<th>Cell2</th>
<th>Cell3</th>
<th>Cell4</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Signal</td>
<td>Single</td>
<td>No Signal</td>
<td>Single</td>
<td>Multi-</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>Multi-</td>
<td>Period</td>
<td>Period</td>
<td></td>
</tr>
</tbody>
</table>
| 9. In a given period, the wages offered to me by the manager were generally fair. | 4.07  
(2.09) | 5.07  
(1.23) | 4.13  
(1.92) | 5.47  
(1.60) | 4.68  
(1.80) | .452  
.003  
.397  
.002  
<.003## |
| 10. In a given period, I was concerned the manager could detect if I contracted for one effort level but provided a different effort level during production. | n/a  
n/a  
n/a  
n/a  
.260# | 3.67  
(1.95) | n/a  
(2.07) | n/a  
(2.02) | 4.10  
## | 4.10  
## |
| 11. When the manager offered a higher wage, I felt compelled to provide higher effort for production. | 5.20  
(1.93) | 4.93  
(1.87) | 4.80  
(1.78) | 5.20  
(1.21) | 5.03  
(1.69) | .016  
.037  
.052  
<.001  
<.001## |
| 12. If I contracted for one effort level with the manager, I felt obligated to provide the same effort level for production. | n/a  
n/a  
n/a  
n/a  
.336# | 3.80  
(1.78) | n/a  
(1.64) | n/a  
(1.72) | 4.17  
# | 4.17  
# |
| Manager Only Questions | 3.60  
(2.03) | 4.93  
(1.67) | 5.07  
(1.49) | 5.00  
(2.00) | 4.65  
(1.87) | .229#  
.024  
.008  
<.037  
<.005## |
| 13. In a given period, the effort the worker provided during production was generally fair given the wage I offered. | n/a  
n/a  
n/a  
n/a  
.008  
.008  
.008  
<.008## |
| 14. In a given period, the worker was generally honest about the effort that he intended to provide. | 5.20  
(1.70) | n/a  
(1.96) | n/a  
(1.83) | .453  
4.87  
## | 4.87  
## |
| 15. In a given period, I offered a lower wage if I suspected that the worker was dishonest when reporting the intended effort level. | n/a  
(1.54) | 4.67  
(1.54) | n/a  
(1.68) | n/a  
(1.62) | 5.33  
5.00  
## | .059  
.059  
.059  
.059  
<.001## |

#Testing if mean < 4, ##testing if mean > 4
4.6 Summary of Chapter 4

In this chapter, the statistical procedures used to test the hypotheses were discussed. H₁ predicted the manager will offer the worker a minimal salary based on the worker’s outside opportunity cost and the worker will provide low effort in return. H₁ was not supported. H₂ predicted the manager will offer the worker a salary that is above the worker’s outside opportunity cost and the worker will provide more than low effort in return. H₂ was supported. H₃a predicted when the worker can signal intended effort, the manager will be induced to offer a higher wage than when the worker cannot signal intended effort. H₃a was supported. H₃b predicted when the manager-worker interaction is extended to multiple-periods, the manager will be induced to offer a higher wage than when the manager-worker interaction is a single period. H₃b was not supported for Periods 1-10. However, H₃b was supported for Periods 8-10. H₄a predicted when the worker can signal intended effort, the worker will be induced to provide higher effort than when the worker cannot signal intended effort. H₄a is supported for Periods 1-10 and 8-10. H₄b predicts when the manager-worker interaction is extended to multiple-periods, the worker will be induced to provide higher effort than when the manager-worker interaction is a single period. H₄b was not supported for Periods 1-10. However, H₄b is supported for Periods 8-10. H₅ predicts as the number of periods increase, the manager’s ability to predict the worker’s effort level will increase. H₅ was not supported. RQ1 examines when the worker can signal intended effort, will the manager’s ability to predict the worker’s effort increase? For Periods 1-10 and 8-10, managers in the signal condition were not any better at forecasting effort than managers in the no signal condition. RQ2 investigates when the manager-worker interaction is extended to multiple-periods, will the manager’s ability to predict the worker’s effort increase? For Periods 1-10 and 8-10, managers in the multi-period condition were not any better at forecasting effort than managers in the single-period condition.
CHAPTER 5
CONCLUSION

This chapter concludes the dissertation with a summary of the results in Section 5.1, a discussion of the contributions in Section 5.2, and the limitations and avenues for future research in Section 5.3.

5.1 Summary of Results

Impression management may allow workers to earn excess rents when reporting to their managers. Workers have an incentive to gain a positive reputation if future rewards are available. In this dissertation, workers that did not signal intended effort level to their managers acted opportunistically and provided less effort as the experiment continued. Workers that interacted with a different manager each period provided less effort than signaled to their manager. The workers that signaled their effort type or interacted with the same manager throughout the experiment successfully used impression management and received increasing wages during the experiment. Workers employed impression management by increasing their signal throughout the experiment. Workers in the signal, single period condition experienced increasing earnings during the experiment.

In this dissertation, managers could earn a bonus if they correctly forecasted the workers’ production effort. Managers were not able to adjust their effort expectations based upon the feedback provided by the production output and the effort signal for those managers in the signal conditions. Consequently, the earnings of managers in all conditions were relatively flat during the experiment. Perhaps more interactions or different output probability distributions would have helped the managers better detect the workers’ level of honesty.

5.2 Contributions

This study expands our understanding of the potential issues of impression management in an agency setting. The effects of impression management yielded positive results for the
agent at the expense of the principal. A fixed wage contract was ineffective at encouraging the worker to provide high effort and not shirk responsibilities. Understanding how workers behave when there is information asymmetry between contracted effort and the effort provided can aid managers in planning and control processes.

This dissertation increases our knowledge of the level of honesty in reporting in the accounting literature. Evans, Hannan, Krishnan and Moser (2001) found agents often sacrifice wealth to make honest or partially honest reports, and the level of honesty did not diminish as the payoff to lying increased. In this dissertation, workers’ level of honesty diminished when the workers interacted with their manager a single period. However, the social norm of honesty curtailed shirking when the worker-manager interaction was multi-period.

Hannan et al. 2006 discuss how agents must trade off the benefits of appearing honest against the benefits of misrepresentation. A contribution of my dissertation is evidence that workers do make tradeoffs when deciding whether to gain rewards in the present versus gaining rewards in the future. Workers in the no signal, single-period condition could not use impression management to gain future rewards. Therefore, the only benefits of appearing honest were social approval. The benefits of misrepresentation were the wage offers. The wage offers and effort provided both declined during the experiment. Workers in the signal, single-period condition had the opportunity for impression management by providing an effort signal. These workers experienced increasing wages while providing no increase in effort. The workers enjoyed the benefits of misrepresentation by increasing their effort signal and increasing their earnings. Workers in the multi-period condition could develop a reputation, and therefore had to tradeoff the benefits of appearing honest with the benefits of misrepresentation. The workers in the no signal, multi-period condition gained increasing wage offers while providing no increase in effort. Workers in the signal, multi-period condition experienced the highest wage offers of any group in the experiment. These workers traded off the benefits of appearing honest with the benefits of misrepresentation and received increasing wage offers in exchange for providing increasing effort and reporting more honestly.

Socially-mediated concerns did control workers’ opportunistic behavior. In the single-period condition, workers had no incentive to provide more than low effort. In the no signal, single-period condition, the mean effort provided was 1.56 (std. dev. .70), which is above the
level of low effort. In the signal, single-period condition, the mean effort provided was 1.94 (std. dev. .85).

Studies of impression management using an experimental economics methodology are limited. To my knowledge, this is the first of its kind. The study increases our knowledge of the impression management technique of ingratiation. Workers in the single-period condition ingratiate themselves with the managers by signaling a higher effort level than the effort provided during production.

5.3 Limitations and Suggestions for Future Research

The parameters used in the experiment may have affected outcomes. Had different parameter levels been used, the results might be different. Since Charness, Frechette, and Kagel (2004) found framing/presentation format effects in the study by Hannan, Kagel and Moser (2002), the robustness of this study’s results are questioned because, like Hannan, Kagel and Moser (2002), the participants in this study were given a comprehensive payoff table relating wages and effort levels to worker’s payoffs and manager’s incomes. One must also use caution when applying the findings to a real production setting.

Studies suggest that communication between parties influences change (e.g., Ford and Ford 1995). Participants in this study communicated anonymously via computer network. Results have shown the method of communication affects outcomes (Kachelmeier and Towry 2002; Drolet and Morris 2000). If the participants in this study had communicated face-to-face, the results of this study might have changed. Another future study could examine the effects of allowing the manager to communicate to the worker the manager’s desire for high effort before the worker selects an effort level. Brandts and Cooper (2007) find communication is a more effective tool than incentive changes for leading organizations out of performance traps. The most effective communication strategy for managers was to request high effort, communicate the mutual benefits of high effort and imply employees are being paid well (Brandts and Cooper 2007).

In the experiment, managers learned the bonus earned at the end of the experiment. Future research can explore if the manager’s behavior changes if the manager learns the bonus
earned before the experiment ends. Knowing the bonus earned from past periods can help the manager determine the level of honesty in the worker’s reporting.

Also the worker never knew a bonus opportunity existed for the manager. An interesting question remains if the worker’s actions would change if the bonus opportunity was common knowledge. Workers may view the bonus as justification for being untruthful to the manager.

Another avenue for future research could test if public reputation increases the workers’ provided effort. In this dissertation, workers gained a reputation if they interacted with the same manager throughout the experiment, and the manager learned the worker’s reporting behavior. When the worker rotates to a different partner, the worker’s past behavior is not known to the new manager. In the business world, employers may require letters of reference from previous employers. In this experiment, the past effort levels provided by the worker could be made known to future managers. Having a reputation for providing low effort would probably not be desired and would affect one’s exerted effort this period.
APPENDIX A

EXPERIMENTAL INSTRUCTIONS
Welcome. You are participating in an experiment in decision-making behavior. Before entering the computer room, you were given an envelope with an ID number in the top corner. At the end of the experiment, you will need that ID number. After the data from this experiment and your responses from the personality questionnaire are merged, your name will be deleted from the data file and replaced by the randomly assigned ID number. The envelope contains four items: an experimental consent form (white page), a copy of the experimental consent form for you to keep (blue page), information regarding the experimental session (yellow page), and extra paper if needed. At this time, please remove all contents in the envelope. Read the experimental consent form (white page) and sign it if you agree to participate in this experiment. The collected experimental consent forms will be kept on file for 3 years.

PAUSE

COLLECT THE WHITE EXPERIMENTAL CONSENT FORMS

You must complete this experimental session to receive your compensation for completing the JPI-R questionnaire. During this session, you will earn money based on the decisions you make. If you understand the instructions and make careful decisions, you may earn a considerable amount of cash, which will be paid to you at the end of the experiment. Important: The amount of money earned during today’s experiment will be divided by a factor of 2.5. For example, if you earn $50.00 in today’s experiment, you will collect $20.00 at the end of the experiment. The earnings from today’s experiment will be added to the $5.00 show-up fee and the $10.00 for completing the personality questionnaire.

Today’s experiment will last approximately 1 to 1½ hours. During the session, you will make decisions and interact with another participant using a computer program. You will be randomly assigned the role of manager or worker in a production environment. The manager will offer the worker a wage in exchange for the worker providing effort during production. Important: You will keep the assigned role throughout the experiment.

[No rotation condition: You will also interact with the same partner throughout the experiment. For example, a worker will interact with the same manager throughout the experiment]

[Rotation condition: After each period, you will be randomly assigned another partner. For example, each worker will be randomly assigned a different manager after each period].

At the beginning of the experiment, the computer program will randomly determine your role and present it to you on the computer screen. The computer will also display the current decision period on the computer screen.

The computer program will take you through several decision-making periods, in which you will be prompted to enter your decisions. The experiment will not continue until everyone has entered their decisions so please wait patiently for everyone to respond. At the end of each period, a new period will begin until there are no more periods to complete. We will have at least 10 periods.
After period 10, there is a 50% chance Period 11 will occur. If Period 11 occurs, then there’s a 50% chance another period will occur and so on. Does anyone have any questions?

At the beginning of each period, the manager and worker will attempt to form a contract. [Communication condition: During this contracting phase, the worker will offer to the manager an effort level. There are three effort levels: high, medium, and low. The manager will then offer the worker a wage between $0-6.00. The worker decides to accept or decline the wage offer. If the wage offer is accepted, the worker selects an effort level for production. The worker may select a different effort level for production than was offered to the manager during contracting. If the wage offer is declined, both the worker and manager earn a payment for the period of $2.00.]

[No communication condition: The manager offers the worker a wage between $0-6.00. The worker decides to accept or decline the wage offer. If the wage offer is accepted, the worker selects an effort level for production. There are three effort levels: high, medium, and low. If the wage offer is declined, both the worker and manager earn a payment for the period of $2.00.]

HAVE PARTICIPANTS LOOK AT YELLOW SHEET. POINT OUT WAGE RANGE AND PAYMENT IF NO AGREEMENT IS REACHED

Each period the worker incurs a charge for the level of effort provided. If the worker provides high effort for production, there is an effort charge of $2.00. This $2.00 is subtracted from the worker’s wage to calculate net earnings for that period. The effort charge for medium effort is $1.00 and the effort charge for low effort is $.50. This reflects the fact that providing high effort is generally more costly to the worker than providing low effort. Does any one have a question regarding the effort charge which will be subtracted from the worker’s wage?

HAVE PARTICIPANTS LOOK AT YELLOW SHEET. POINT OUT EFFORT CHARGE

The worker’s pay each period = wage offer less effort charge

The manager will be paid $1.00 for each unit of output produced during production less the wage paid to the worker.

The manager’s pay each period = $1.00(production outcome) less wage offer

There are only 2 possible production outputs from the worker’s effort. Either 4 or 12 units will be produced. The production output is determined by probabilities based upon the effort level provided by the worker during production. See the expected output for each effort level:

POINT OUT THE PRODUCTION PROBABILITY ON YELLOW SHEET

<table>
<thead>
<tr>
<th>Effort Level</th>
<th>Probability (Units)</th>
<th>Expected Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>High effort</td>
<td>75%(12 units) + 25%(4 units)</td>
<td>10 units</td>
</tr>
<tr>
<td>Medium effort</td>
<td>50%(12 units) + 50%(4 units)</td>
<td>8 units</td>
</tr>
<tr>
<td>Low effort</td>
<td>25%(12 units) + 75%(4 units)</td>
<td>6 units</td>
</tr>
</tbody>
</table>
Since there is an effort charge and an opportunity to make $2.00 if an agreement is not reached, there is a threshold wage that the manager must offer to motivate the worker to provide various levels of effort. The threshold wages for high, medium and low effort are $4.00, $3.00, and $2.50, respectively. The effort charges are shown on your screen throughout the experiment. These threshold wages are required so that the worker makes more than the $2.00 when an agreement is not reached. View the numbers below to see how these thresholds are calculated:

**POINT OUT THRESHOLD WAGES FOR HIGH, MEDIUM AND LOW EFFORT AND THE CALCULATIONS FOR EACH**

<table>
<thead>
<tr>
<th>Effort</th>
<th>Wage</th>
<th>Effort Charge</th>
<th>Calculated Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>$4.00</td>
<td>$2.00</td>
<td>$2.00</td>
</tr>
<tr>
<td>Medium</td>
<td>$3.00</td>
<td>$1.00</td>
<td>$2.00</td>
</tr>
<tr>
<td>Low</td>
<td>$2.50</td>
<td>$0.50</td>
<td>$2.00</td>
</tr>
</tbody>
</table>

HAVE PARTICIPANTS LOOK AT YELLOW SHEET. POINT OUT HOW THE WORKER AND MANAGER GET PAID (WAGE FUNCTIONS), ALONG WITH THE MINIMUM WAGE NEEDED TO INDUCE AN EFFORT LEVEL

I have provided paper for you to use if needed. Does anyone need a pen or calculator? If there are no more questions, please refrain from talking until you leave the experimental session. If you have a question, raise you hand. We can go outside and discuss your question.

START EXPERIMENT

Everyone must click on “Continue” for the experiment to progress. Please wait patiently for other participants to make their decisions.

[Insert the paragraph presented the managers explaining the planning bonus opportunity.]

AFTER EXPERIMENT IS COMPLETED

The decisions you made today were chosen in an experiment. This does not mean you would have made the same decisions at a job in the real world.

You will now answer some final questions regarding the experiment. When you are completed, please wait until I call your name. When your name is called, please come to the window for your payment.

Please do not discuss the experiment with anyone after you leave the computer room. If you want a copy of the final paper, please contact me. Thanks for participating.

START EXIT QUESTIONNAIRE
APPENDIX B

EXIT QUESTIONNAIRE
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.

Demographic:
1. ID Number (from the cover of the envelope): ________
2. Sex: M F
3. Major (accounting, economics, finance, etc.): ____________________________
4. Year in school (freshman, sophomore, junior, senior, other): ________________
5. Work experience: _________________ years.

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

6. After each period, the worker interacted with a different manager.
7. During the contracting process, the worker offered the manager an effort level BEFORE the manager offered the worker a wage.
8. Each period, the manager knew for certain the effort level the worker provided for production.
9. Based upon the production outcome, the manager could easily infer the effort level the worker provided for production.
10. The cost of high effort motivated the worker to provide low effort during production, regardless of the wage offered by the manager.
11. The manager was always better off (i.e., earned more money) when the worker provided high effort for production.
12. The manager could induce higher effort from the worker for production by offering a higher wage.
13. It was unethical for a worker to contract for one effort level with the manager but provide a different effort level during production.
14. The worker could provide either high, medium or low effort levels during the production process, regardless of the effort level offered to the manager.

15. In a given period, the worker could reject the wage offer from the manager and still earn $2.00.

Worker Questions:
16. In a given period, the wages offered to me by the manager were generally fair. (worker only statement)

17. In a given period, I was concerned the manager could detect if I contracted for one effort level but provided a different effort level during production. (worker only question)

18. When the manager offered a higher wage, I felt compelled to provide higher effort for production. (worker only statement)

19. If I contracted for one effort level with the manager, I felt obligated to provide the same effort level for production. (worker only question)

Manager Questions:
16. In a given period, the effort the worker provided during production was generally fair given the wage I offered. (manager only statement)

17. In a given period, the worker was generally honest about the effort that he intended to provide. (manager only question)

18. In a given period, I offered a lower wage if I suspected that the worker was dishonest when reporting the intended effort level. (manager only question)
APPENDIX C

HUMAN SUBJECTS COMMITTEE APPROVALS

FLORIDA STATE UNIVERSITY
Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8573 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 2/28/2007

To: Linwood Kearney
502C Hillcrest Street
Tallahassee, FL 32308

Dept.: ACCOUNTING

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Impression Management in the Principal-Agent Relation: An Experimental Examination of Productivity and Planning Benefits

The forms 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 Expedited per 45 CFR § 46.110(b) 7 and has been approved by an accelerated 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 the project has not been completed by 2/27/2008 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing 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 of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

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

Cc: Douglas Stevens
HSC# 2007.172
REAPPROVAL MEMORANDUM

Date: 2/13/2008

To:
Linwood Kearney
6430 N. Rico Road
Wichita, KS 67204

Dept.: ACCOUNTING

From: Thomas L. Jacobson, Chair

Re: Reapproval of Use of Human subjects in Research:
Impression Management in the Principal-Agent Relation: An Experimental Examination of
Productivity and Planning Benefits

Your request to continue the research project listed above involving human subjects has been approved
by the Human Subjects Committee. If your project has not been completed by 2/12/2009 please request
renewed approval.

You are reminded that a change in protocol in this project must be approved by resubmission of the
project to the Committee for approval. Also, the principal investigator must report to the Chair promptly,
and in writing, any unanticipated problems involving risks to subjects or others.

By copy of this memorandum, the Chairman of your department and/or your major professor are
reminded of their responsibility for being informed concerning research projects involving human
subjects in their department. They are advised to review the protocols of such investigations as often as
necessary to insure that the project is being conducted in compliance with our institution and with DHHS
regulations.

Cc: Douglas Stevens
HSC No. 2008.0123-R
APPENDIX D

HUMAN SUBJECTS COMMITTEE APPROVAL

WICHITA STATE UNIVERSITY
Date: September 19, 2008
Name: Linwood Kearney
Department: Accountancy
RE: IRB #1255

The University Institutional Review Board (IRB) has reviewed your research project application entitled:

"Impression Management in the Principal-Agent Relation: An Experimental Examination of Productivity and Planning Benefits"

and approved the project as provided in the Federal Policy for the Protection of Human Subjects. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please keep in mind the following:

1. Any significant change in the experimental procedure as described should be reviewed by the IRB prior to altering the project.
2. When signed consent documents are required, the principal investigator must retain the signed consent documents for at least three years past completion of the research activity.
3. At the completion of the project, the principal investigator is expected to submit a final report; the form is attached.

Thank you for your cooperation. If you have any questions, please contact me at ext. 5742.

Sincerely,

Alicia Huckstadt, RN, Ph.D.
Chairperson, IRB

Attachment
APPENDIX E

LETTER OF CONSENT

FLORIDA STATE UNIVERSITY
Dear Participant:

I am a doctoral student under the direction of Professor Douglas Stevens in the Department of Accounting in the School of Business at Florida State University. I am conducting a research study to investigate decision-making behavior. The study is partial requirements to complete my Ph.D. in Accounting.

You were selected as a participant in this study because you registered at CLEER Recruiter. Participants are students at Wichita State University and approximately 100 students will participate in the experiment.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, and it will not affect your treatment or future relations with Wichita State University. The results of the research study may be published, but your name will not be used. Information obtained during the course of the study will remain confidential, to the extent allowed by law.

Your participation involves completing an online personality questionnaire and participating in an experimental session in a lab located in the basement of Clinton Hall. It will take approximately 45 minutes to complete the personality questionnaire. The experimental session should last no more than 1-1.5 hours. You will be compensated $10.00 for completing the online personality questionnaire and an additional $5.00 for arriving at the experimental session on time. You will also have the opportunity to earn additional compensation during the experimental session and will be paid all compensation earned before you leave the experimental session.

There are no foreseeable risks or discomforts if you agree to participate in this study.

The benefits of participating in the experiment include learning which personality traits you possess, as well as the opportunity to earn significant compensation.

If you have any questions concerning this research study, please contact Linwood Kearney, School of Accountancy, Wichita State University, Wichita, KS 67260, telephone (316) 978-6270, e-mail linwood.kearney@wichita.edu or Dr. Douglas Stevens, Florida State University, Tallahassee, FL 32306, telephone (850) 644-7855, e-mail dstevens@cob.fsu.edu. If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, contact the Institutional Review Board at Florida State University located at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, telephone (850) 644-8633 or the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. Your signature indicates that you have read the information provided above and have voluntarily decided to participate.

You will be given a copy of this consent form to keep.

____________________________________   _________________________
Signature                      Date
APPENDIX F

E-MAILED LETTER OF CONSENT

WICHITA STATE UNIVERSITY
Dear Participant:

I am conducting a research study to investigate decision-making behavior. More specifically, my research study examines how workers respond to wage offers from managers. Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, and it will not affect your treatment or future relations with Wichita State University. The results of the research study may be published, but your name will not be used. Information obtained during the course of the study will remain confidential, to the extent allowed by law.

Your participation involves completing an online personality questionnaire and participating in an experimental session in a computer lab located in the basement of Clinton Hall. The online questionnaire is all true/false questions and it will take approximately 45 minutes to complete. Some example questions on the questionnaire include, “I am very interested in politics” and “I dislike eating alone.” The experimental session should last no more than 1 hour. At the experimental session, you will be randomly assigned the role of manager or worker. The manager offers the worker a wage and the worker accepts or declines the wage offer. If the worker declines the wage offer, both the worker and manager earn compensation as it is assumed both have outside opportunities. If the worker accepts the wage, production occurs.

You will be compensated $10.00 for completing the online personality questionnaire assuming you participate and complete the experimental session. Plus you will receive $5.00 for arriving at the experimental session on time. You will also have the opportunity to earn additional compensation during the experimental session. All money earned will be paid before you leave the experimental session.

There are no foreseeable risks or discomforts if you agree to participate in this study.

The benefits of participating in the experiment include learning which personality traits you possess, as well as the opportunity to earn significant compensation.

If you have any questions concerning this research study, please contact Linwood Kearney, School of Accountancy, Wichita State University, Wichita, KS 67260, telephone (316) 978-6270, e-mail linwood.kearney@wichita.edu or Dr. Douglas Stevens, Florida State University, Tallahassee, FL 32306, telephone (850) 644-7855, e-mail dstevens@cob.fsu.edu. If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, contact the Institutional Review Board at Florida State University located at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306, telephone (850) 644-8633 or the Office of Research Administration at Wichita State University, Wichita, KS 67260, telephone (316) 978-3285.

You are under no obligation to participate in this study and have voluntarily decided to participate. If you request a test code to complete the online questionnaire, you are indicating you have read the information above and have voluntarily decided to participate. When you arrive at the experimental session, you will sign a consent form and a copy of the consent form will be provided to you.
APPENDIX G

LETTER OF CONSENT

WICHITA STATE UNIVERSITY
Dear Participant:

I am a doctoral student under the direction of Professor Douglas Stevens in the Department of Accounting in the School of Business at Florida State University. I am conducting a research study to investigate decision-making behavior. More specifically, my research study examines how workers respond to wage offers from managers. The study is partial requirements to complete my Ph.D. in Accounting.

You were selected as a participant in this study because you registered at CLEER Recruiter. Participants are students at Wichita State University and 120 students will participate.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, and it will not affect your treatment or future relations with Wichita State University. The results of the research study may be published, but your name will not be used. Information obtained during the course of the study will remain confidential, to the extent allowed by law.

Your participation involves completing an online personality questionnaire and participating in an experimental session in a computer lab located in the basement of Clinton Hall. The online questionnaire is all true/false questions and it will take approximately 45 minutes to complete the personality questionnaire. Some example questions on the questionnaire include, “I am very interested in politics” and “I dislike eating alone.” The experimental session should last no more than 1 hour. At the experimental session, you will be randomly assigned the role of manager or worker. The manager offers the worker a wage and the worker accepts or declines the wage offer. If the worker declines the wage offer, both the worker and manager earn compensation as it is assumed both have outside opportunities. If the worker accepts the wage, production occurs.

You will be compensated $10.00 for completing the online personality questionnaire assuming you participate and complete the experimental session. Plus you will receive $5.00 for arriving at the experimental session on time. You will also have the opportunity to earn additional compensation during the experimental session and will be paid all compensation earned before you leave the experimental session.

There are no foreseeable risks or discomforts if you agree to participate in this study.

The benefits of participating in the experiment include learning which personality traits you possess, as well as the opportunity to earn significant compensation.

If you have any questions concerning this research study, please contact Linwood Kearney, School of Accountancy, Wichita State University, Wichita, KS 67260, telephone (316) 978-6270, e-mail linwood.kearney@wichita.edu or Dr. Douglas Stevens, Florida State University, Tallahassee, FL 32306, telephone (850) 644-7855, e-mail dstevens@cob.fsu.edu. If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, contact the Institutional Review Board at Florida State University located at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306, telephone (850) 644-8633 or the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. Your signature indicates that you have read the information provided above and have voluntarily decided to participate.

You will be given a copy of this consent form to keep.

_________________________________________ ________________
Signature Date

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REFERENCES


BIOGRAPHICAL SKETCH

Linwood W. Kearney is currently an Assistant Professor of Accounting at Wichita State University where he teaches introduction to individual income taxation. In addition, he has taught courses in financial accounting, managerial accounting, and cost accounting. His research interests are in the area of judgment and decision making, including managerial accounting and income taxation. He also has several years of teaching experience and working in private industry.

Linwood W. Kearney is a licensed CPA in the state of North Carolina. He holds a Bachelor of Business Administration and a Master of Business Administration from East Carolina University and a Master of Accounting degree from North Carolina State University.