

# Do Internal Controls Mitigate Employee Theft in Chain Organizations?

Clara Xiaoling Chen  
University of Illinois at Urbana-Champaign  
cxchen@uiuc.edu

Tatiana Sandino  
University of Southern California  
sandino@marshall.usc.edu

July 2008

**Acknowledgements:** We thank Rashad Abdel-Khalik, Paul Adler, Nerissa Brown, David Huelsbeck, Sunghan (Sam) Lee, Yvonne Lu, Tatiana Melguizo, John Matsusaka, Ken Merchant, Mina Pizzini, Theodore Sougiannis, Wim Van der Stede, Mark Young, and workshop participants at the 2007 EIASM 4<sup>th</sup> Conference on Performance Measurement and Management Control, Erasmus University, and 2008 Management Accounting Section Midyear Meeting for their valuable comments. We thank David Huelsbeck for capable research assistance.

# Do Internal Controls Mitigate Employee Theft in Chain Organizations?

## Abstract

Employee theft is a major problem affecting most U.S. businesses every year. This problem is particularly severe for the retail industry, as it results in an estimated \$26 billion in losses every year. In this study, we examine the extent to which internal controls mitigate employee theft. Specifically, we investigate the effectiveness of two types of internal controls: formal monitoring and mutual (peer) monitoring. We analyze store-level and chain-level data from the convenience store industry and find that: Mutual monitoring alleviates employee theft directly, whereas formal monitoring mitigates employee theft indirectly by reducing the strength of the relationship between employee turnover and employee theft. We also find a complementary effect between formal and mutual monitoring. Our study adds to a stream of literature that examines the effects of control mechanisms in reducing agency problems.

**Keywords:** Management control systems; Internal control; Mutual monitoring; Employee theft; Employee turnover; Chain organizations; Retail industry

# Do Internal Controls Mitigate Employee Theft in Chain Organizations?

## 1. Introduction

Employee theft is a non-trivial problem in many organizations, especially chain organizations.<sup>1</sup> Following Greenberg (1990), in this study, we refer to employee theft as "any unauthorized appropriation of company property by employees either for their own use or for sale to others." Previous studies have documented that employee theft causes as much as 30% of all business failures, and that businesses in the United States lose more than \$40 billion a year due to employee theft (e.g., Greenberg 1997; Taylor and Prien 1998; Association of Certified Fraud Examiners 2002, 2006). In the retail industry alone, the losses amount to \$26 billion a year (Taylor and Prien 1998).

Despite an increasing utilization of technology-based controls to prevent theft in most organizations, the number of employees stealing from their companies keeps increasing (Hollinger and Davis, 2001; National Retail Security Survey, 2003; Annual Theft Survey, 2007). This puzzling result has led some researchers and practitioners to question the effectiveness of internal controls (e.g., Taylor and Prien, 1998; Rickman and Witt, 2007).

Our study seeks to shed light on this issue by investigating the relationship between two types of internal controls—formal monitoring and mutual monitoring—and employee theft in chain organizations, specifically, in convenience store chains. **Figure 1** summarizes our predictions.

---

<sup>1</sup> We define chain organizations as in Baum, Li and Usher (2000), who describe chains as collections of organizations, doing essentially the same thing, linked together into larger super-organizations.

First, we predict that formal monitoring (such as point-of-sale scanning systems, security cameras, security guards, etc.) will deter employee theft by increasing the expected costs from stealing. Higher expected costs result from an increase in the probability that an employee who has stolen company property will be caught and sanctioned (Nagin, Rebitzer, Sanders and Taylor 2002). Based on this argument, formal monitoring should mitigate employee theft. This prediction is less obvious than it appears though since previous researchers have questioned the effectiveness of formal controls. For example, researchers have argued that although formal security controls can reduce shoplifting by customers, employees may be able to circumvent these types of controls due to their familiarity with the systems. In addition, excessive formal controls may have a negative effect on the relationship between employees and their supervisors, leading to lower morale and a higher likelihood of retaliation by the employees (Hollinger and Clark 1983; Greenberg and Scott 1996; Greenberg and Barling 1996; Applebaum et al. 2006).

An alternative type of internal control is mutual monitoring (co-workers checking on each others' behavior). We expect that overall this internal control will also deter theft. While managers often find it difficult to uncover employee theft, co-workers are sometimes likely to detect and prevent this problem. Thus, mutual monitoring is likely to decrease an employee's odds to steal through two mechanisms: the threat that co-workers will observe the misconduct and report it to management (Greenberger et al. 1987; Victor et al. 1993); and the fear of suffering an informal sanction from co-workers (Hollinger and Clark 1983, Towry 2003). In fact, prior research has suggested that the impact of "co-worker influence" on employee theft can be greater than the impact of formal sanctions (Hollinger and Clark 1983). However, previous literature has also presented counter-arguments to this prediction. Researchers have found that co-worker influence can go either way, depending on whether or not employees encourage or

discourage their coworker's theft (Hollinger and Clark 1983). Prior research, however, has not yet examined the net effect of mutual monitoring on employee theft.

In addition to examining the main effects of formal monitoring and mutual monitoring on employee theft, we predict interaction effects between these two types of internal controls and employee turnover. This is because formal and mutual monitoring should reduce the opportunities to misbehave for new employees as well as for outgoing employees, thus mitigating the negative relationship between employee turnover and employee theft.

We use 2003 and 2004 store-level and chain-level data from the National Association of Convenience Stores (NACS) to test our hypotheses. We use store-level multivariate analyses, clustering by store and by chain, to examine the relation between employee theft (measured as cash shortages) and the explanatory variables of interest, that is, the two internal controls, employee turnover, and an interaction between the two internal controls and employee turnover. The first internal control, formal monitoring, is measured by the amount of security spending as a percentage of total operating expenses in the chain. The second internal control, described as the potential for mutual monitoring, is measured by the total labor hours in the store, serving as a proxy for the number of employees that work simultaneously in a given shift. Employee turnover is measured by the annual hourly employee turnover in the store.

Our results indicate that, mutual monitoring alleviates employee theft directly. Specifically, a one standard deviation increase in the number of labor hours put into a store decreases employee theft by 25.7%. However, we find no evidence of a direct mitigating effect of formal monitoring on employee theft. In addition, we find evidence suggesting that formal monitoring (but not mutual monitoring) mitigates the relationship between employee turnover and employee theft. Overall, the results suggest that both internal controls—formal and mutual monitoring—alleviate

the agency problem of misappropriation in chain organizations either directly or indirectly. Finally, our results suggest that formal and mutual monitoring are complements, not substitutes.

This study contributes to two lines of research: First, our research adds to a stream of empirical studies that examines the role of internal controls in alleviating agency problems (e.g., Rajan 1992, Lambert 2001). We extend this research by exploring the extent to which formal monitoring and mutual monitoring mitigate the agency problem of employee theft. Our study is the first one to document net effects of mutual monitoring on employee theft, and the first to find that formal controls mitigate theft in firms with high levels of employee turnover. More specifically, our research contributes to the literature that examines the role of control mechanisms in mitigating agency problems in chain organizations. For example, Berger and DeYoung (2002) find that distance-related agency costs in bank chains have decreased over time, consistent with the idea that technological advances (a form of formal monitoring) have mitigated the negative effects of geographic distance (a proxy for agency problems) on performance. Brickley and Dark (1987) and Campbell et al. (2007) find that retail chains are more likely to decentralize decision rights and franchise stores in areas that are more difficult to monitor by the headquarters (i.e., stores that are in more remote locations, and that serve different customers than those typically served by the chain). Second, our study documents the importance of mutual monitoring in deterring employee theft, contributing to an emerging literature that investigates the use of mutual monitoring in reducing agency problems (e.g., Kandel and Lazear 1992; Barron and Gjerde 1997; Towry 2003). Prior studies have shown that mutual monitoring can mitigate agency problems in team settings where co-workers have clear incentives to monitor each other (Kandel and Lazear 1992; Barron and Gjerde 1997; Towry 2003). Our study complements these studies by showing that a team setting is not a necessary

condition for mutual monitoring. Even in settings where co-workers lack explicit incentives to monitor each other, they may have implicit incentives to do so. Our study also has important practical implications for organizations that seek to minimize employee theft. The results provide useful insights to managers and internal auditors in the design and assessment of internal controls. The results also provide useful insights to CPAs, who are increasingly expected to play a more active role in helping their clients prevent and detect internal fraud and theft (Wells 2001). For example, small businesses often find it impractical to install formal monitoring mechanisms that are sometimes too expensive (Snyder, Broome, and Zimmerman 1989). Our results suggest that managers can consider encouraging mutual monitoring in these circumstances by making their employees more aware that employee theft is a serious matter and implementing devices (e.g., anonymous reporting systems) that encourage or enhance mutual monitoring. Our results also suggest the use of formal monitoring in retail chains where employee turnover is a severe problem.

The remainder of this paper is organized into four sections. In Section 2, we review the prior literature on employee theft and internal controls and develop our hypotheses. Section 3 discusses the data and research design. Section 4 presents the empirical analyses and results. Section 5 concludes.

## **2. Literature Review and Hypothesis Development**

*Mitigating effects of internal controls on employee theft.* Employee theft has been on the rise and poses a serious problem to U.S. businesses. It transfers billions of dollars each year from businesses to their employees and accounts for a large percentage of business failures each year (Dickens et al. 1989). This problem is especially serious in the retail industry. Hollinger and Clark (1983) find that 35% of employees in retail stores admit to stealing from their company

(this percentage can be interpreted as a minimum estimate of employee theft, as not all employees that steal can be expected to admit such behavior). For example many retail employees interviewed by Hollinger and Clark (1983) indicated that there were some instances (e.g., misusing discount privilege cards, taking store merchandise, getting paid for more hours than were worked, and under-ringing a purchase) where employee theft was widespread.

According to national retail security surveys targeted at the 200 largest retail chains conducted in 1992 and 2001, executives estimate that employee theft accounts for 37.8% and 45.9% of all retail inventory shrinkage in 1991 and 2000, respectively (Hollinger and Hayes 1992; Hollinger and Davis 2001).<sup>2</sup> As a result, employee theft has received high priority in the retail industry. However, despite the perceived prevalence of employee theft in the retail industry, executives admit that they do not have good measures and keep poor records of employee theft (Hollinger and Clark 1983). Specifically, security reports, inventory shrinkage, and cash shortages only indicate the level of theft suspected in an organization, not the actual number of employee thefts.

Of all retail organizations, employee theft is most serious for chains. Chain organizations expand into different geographic areas to derive economic rents from their brand name, take advantage of economies of scale, and exploit the benefits of risk diversification (Berger and DeYoung 2001). However, expansion can result in an increase in agency conflicts leading to higher employee theft. Monitoring store managers in highly dispersed locations is a challenging task, and as such, it impairs the headquarters' ability to limit opportunistic store managers and employees from engaging in shirking or stealing (Jensen and Meckling 1976, Brickley and Dark 1987, Campbell et al. 2007).

---

<sup>2</sup> This problem is most severe in the supermarket and grocery store industry (the retail segment in the survey that includes convenience stores), where executives estimate that employee theft accounts for 62% of all inventory shrinkage.



Theory suggests that internal control can potentially mitigate employee theft. Opportunistic employees will steal as long as the expected benefits from stealing exceed the expected costs. *Ceteris paribus*, an increase in monitoring is likely to increase the expected costs from stealing by increasing the probability that an employee who has stolen company property will be caught and sanctioned either formally by the firm or informally by co-workers (Hansen 1997; Nagin, Rebitzer, Sanders and Taylor 2002). Based on this argument, the level of monitoring should mitigate employee theft.

Internal controls can be based on formal monitoring, which consists of asset control and loss prevention systems such as POS scanning, controlled access to cash-handling area, alarms, security guards and surveillance cameras (Hollinger and Davis 2001), or could instead rely on more informal mutual monitoring, where employees monitor each other.

The first type of internal control we examine is formal monitoring, used to implement “asset control and loss prevention systems” as described in the previous paragraph. For example, managers can use hidden surveillance cameras to catch workers in the act of stealing (Dumaine 1988). Managers can also use POS scanning systems to reduce theft of cash in stores (Hollinger and Clark 1983; Weber and Kantamneni 2002). Previous literature provides weak evidence of the benefits of using formal monitoring. For example, using a self-report survey of corporate executives, Hollinger and Clark (1983) find that security departments receive high priority in the retail industry, are very professional and sophisticated, and are geared toward identifying internal theft. However, their data analysis suggests an insignificant correlation between the size, sophistication, and priority of security departments and the rate of employee theft in the retail industry.

Even though most companies rely on formal monitoring to deal with employee theft, these controls may present problems. First, although surveillance cameras can reduce shoplifting by customers, employees may be able to circumvent the cameras due to their familiarity with the store (Greenberg and Barling 1996), similarly employees may learn to get around other types of formal controls as they learn how they operate, making them less effective in reducing employee theft. Second, excessive formal monitoring may have a negative effect on the relationship between employees and their supervisors, thus leading to lower morale and productivity (Hollinger and Clark 1983; Greenberg and Barling 1996; Appelbaum et al. 2006). In fact, Greenberg and Scott (1996) suggest that excessive control systems may antagonize some employees, making them more likely to steal to retaliate against their employers. Hollinger and Clark (1983)'s interviews with employees shed some light on this issue:

*“Before I came here I worked at a place that made electric fans over in St. Paul. I’m not kidding, they searched us every night when we left work. They searched our lunch boxes and our clothes for tools and those little motors. It used to piss me off. That’s why I came here. I don’t like being treated like a thief all the time. I heard [present employer] was pretty good about that type of thing. They seem to be more worried about tardiness and not showing up for work than anything else.” [Maintenance technician, p. 107]*

Whether or not formal monitoring effectively deters employee theft is an empirical question, which we explore in the following hypothesis:

**H1a:** *The extent of formal monitoring is negatively associated with employee theft.*

An alternative control mechanism to reduce employee theft is mutual monitoring. Mutual monitoring refers to the ability of co-workers to observe the behaviors of each other. Reducing employee theft has been challenging largely because it is very difficult for managers to be aware

of employee theft. However, co-workers are more likely than managers to detect employee theft. Mutual monitoring decreases an employee's odds to steal through two mechanisms: 1) the threat that his or her co-workers will observe the misconduct and report it to management (Greenberger et al. 1987; Victor et al. 1993); and 2) the fear that s/he will suffer informal sanctions from his or her co-workers (Hollinger and Clark 1983), for example, co-workers may avoid interactions with the person committing theft or explicitly condemn his/her acts. In fact, previous studies have shown that informal sanctions by co-workers can be more important than formal sanctions by rules and regulations in deterring different types of deviant activity such as theft and drug use (Tittle 1980).

Based on the alleged effectiveness of mutual monitoring, many firms have established anonymous reporting mechanisms that would allow employees to report co-workers committing theft and/or awareness programs to talk with employees about theft. Holtfreter (2004) provides evidence that over half (52.1%) of public companies and 18.8% of private businesses use anonymous reporting mechanisms. When employees are rewarded for anonymous reporting of coworkers' theft, they have a clear incentive to monitor their co-workers. However, even in the absence of a reward system, there is an implicit incentive to report for self-protection ("if I don't report, my boss may blame me for my co-worker's theft").

However, co-worker influence can be problematic and may not always deter employee theft as expected. While it is relatively easy for co-workers to detect employee theft, they may collude against management and encourage "covering for each other" (Greenberger et al. 1987). In that case, the potential for mutual monitoring would be lost.

Empirical evidence on mutual monitoring as a potential control mechanism in reducing employee theft is limited and mixed. Holtfreter (2004) documents a negative correlation between

the use of anonymous reporting and losses from employee fraud, but her results rely on univariate tests. Hollinger and Clark (1983) find that “co-worker influence” could result in either an increase or a decrease in employee theft, depending on whether or not employees encourage or discourage their co-workers’ theft.<sup>3</sup> Our study extends previous literature by examining whether the presence of co-workers (which we refer as potential for mutual monitoring) effectively discourages employee theft. Thus we test the following hypothesis:

**H1b:** *The extent of mutual monitoring is negatively associated with employee theft.*

***Mitigating effects of internal controls on the relation between employee turnover and theft.***

Chain organizations are also subject to some of the highest employee turnover rates in the United States (Landier et al. 2006). Prior research predicts a positive relation between employee turnover and employee theft (Boye 1991, Hollinger and Hayes 1992, Thoms et al. 2001) primarily for two reasons: First, higher employee turnover results in difficulty of monitoring because both supervisors and coworkers have less knowledge of employees’ habits and work style and thus are less able to judge employees’ character. Difficulty of monitoring leads to greater opportunities for employees to misbehave, which potentially increase employee theft (Hollinger and Clark 1983). Second, employees who expect to leave their jobs are more likely to steal from the firm because the cost of being caught is lower given the imminent termination of their jobs (Hollinger and Clark 1983, Boye 1991).<sup>4</sup> On the other hand, there are also arguments

---

<sup>3</sup> Note that Hollinger and Clark’s study relies on self-reports of both the attitude of the co-workers and the magnitude of employee theft, which leads to noisy measures as well as the potential problem of common method bias.

<sup>4</sup> One alternative explanation for the positive association between employee turnover and employee theft is that employees will get fired when they are caught stealing, resulting in employee turnover. However, research has shown that only a very small percentage of employees who steal from the company are ever caught. For example, Hollinger and Clark (1983) document that the average percentage of employees who get caught stealing is only 5% of the workforce in the retail sector, although 35% of employees in the retail sector admit to stealing according to their survey. These findings suggest that employment termination due to theft accounts for only a small fraction of

that support a negative relation between employee turnover and theft. Employees who have been around for a longer period of time are probably better at circumventing the control system. In addition, when there is low turnover, there is a greater familiarity between coworkers, which may create opportunity for collusion among the employees. Empirical evidence on the relation between turnover and employee theft is limited and indirect. One exception is a study by Thoms et al. (2001), which uses turnover and theft data from a large fast-food chain as well as a laboratory study to document a positive relationship between employee turnover and theft. However, their archival study relies on univariate analyses without controlling for potential correlated omitted variables.

We evaluate the relationship between employee turnover and theft in our setting by testing the following hypothesis, while controlling for potential correlated omitted variables:

**H2:** *Employee turnover rates are positively associated with employee theft.*

Assuming that higher turnover leads to greater theft, we expect internal controls to reduce theft indirectly by reducing the strength of the relationship between employee turnover and employee theft. As mentioned above, prior research has argued for a positive relation between employee turnover and employee theft because: (1) higher employee turnover results in greater difficulty of monitoring current employees; and (2) employees who expect to leave their jobs are more likely to steal. Formal and informal monitoring will improve the level of monitoring and reduce opportunities for both current and outgoing employees to steal; thus formal and informal monitoring should reduce the strength of relation between employee turnover and employee theft. Our prediction is consistent with empirical research documenting that control systems make a difference in the relationship between employee turnover and organizational performance. For

---

employee turnover, and hence, alleviate the concern of the potential reverse causality between employee theft and employee turnover.

instance, Arthur (1994) finds that under “commitment human resource systems”, which emphasize developing employees’ goal alignment with the organization, employee turnover has a less negative impact on manufacturing performance than under “control human resource systems”, which emphasize cutting costs, improving efficiency, and ensuring employee compliance with company policies.

In a laboratory study, Thoms et al. (2001) test the prediction that employees planning to leave their jobs within two weeks are less likely to steal in situations with tighter controls. However, they do not find support for their prediction. This is likely due to their reliance on self-reported measures of theft intent by the participants (undergraduate students) in the experiment. Due to the sensitive nature of this subject, participants may underreport the likelihood that they would steal. To overcome the limitations of self-reported measures of theft or intention to steal, we use archival data from the field to test the following hypotheses:

**H3a:** *The extent of formal monitoring reduces the strength of the relationship between employee turnover rate and employee theft.*

**H3b:** *The extent of mutual monitoring reduces the strength of the relationship between employee turnover rate and employee theft.*

### **3. Data and Research Design**

To test the hypotheses, we obtain both proprietary and publicly available data from four major sources, including: (1) 2004 and 2005 chain-level and store-level survey data (reporting annual data from 2003 and 2004, respectively) from the National Association of Convenience Stores (NACS); (2) 2004 convenience store data from TDLinx’s Channel Database; (3) Property crime data from the Federal Bureau of Investigation ([www.fbi.gov/ucr/03cius.htm](http://www.fbi.gov/ucr/03cius.htm)); (4) Unemployment data from the Bureau of Labor Statistics (<http://www.bls.gov/lau/home.htm>).

We focus on the convenience store industry for various reasons. First, the NACS survey provides a unique opportunity to explore our research questions as it gathers information for more than 30 firms and 400 stores related to their internal controls, management and employee turnover, cash shortages and location, among other data. Second, the heterogeneity of markets, employee turnover, and employee theft varies widely across stores and chains. Third, convenience store chains essentially compete on location and are relatively undifferentiated in other dimensions, reducing the number of factors to be considered for empirical analysis. Additionally, focusing on a relatively homogeneous industry allows us to control for any other industry-specific conditions. Fourth, in most cases, hourly employees in convenience store chains do not receive any incentive pay. The lack of such incentive pay allows us to conduct a clean test of the effect of internal controls on employee behavior. Finally, while employee theft accounts for almost half of all retail losses, it can account for as much as 70% of all losses in the convenience store industry (Dwyer, 1992). This is partly due to the low percentage of customer shoplifting as a result of the small store size and store layout. This makes the convenience store industry a good setting to study employee theft.

According to the vice-president of research from NACS who was in charge of the surveys in 2004 and 2005, store-level surveys were completed through the board of directors of NACS, which includes retail members from all different areas across the U.S. These members were asked to report store-level survey data from a random sample of stores within their convenience store chains. About 75% of the board members approached responded to this request. Although statistics were not provided, according to the then vice-president of research, this sample was representative of the different types of convenience store chains and the different states in the

U.S. Whenever a state was over/under represented, the staff at NACS adjusted the survey sample. The resulting sample included 489 stores from 43 chains.

Table 1 indicates that only 321 stores from 29 chains completed all the survey responses required for the analyses. We were able to match crime and unemployment data to 294 of these stores corresponding to 27 chains, resulting in a final sample of 412 store-years for most of our analyses. The rest of our analyses (examining formal monitoring) also utilize chain-level data from the “State of the Industry” survey conducted by NACS, which was directed to all NACS members. We focused on the chains for which we also had complete store-level data. As indicated in Table 1, we were able to match chain level data for 21 out of the 27 chains, resulting in a sample of 315 store-years for those analyses.

To test the hypotheses we run regression model (1) at the store level, including years 2003 and 2004, as described below. We utilize robust standard errors double-clustered by store and by chain to address heteroskedasticity concerns as well as error correlation problems from same-store observations across years, and observations related to stores from the same chain (Rogers 1993; Petersen 2006).

$$\begin{aligned} \text{Employee Theft}_{it} = f(\text{Monitoring}_{it}, \text{Employee Turnover}_{it}, \\ \text{Employee Turnover}_{it} * \text{Monitoring}_{it}, \text{Controls}_{it}) \end{aligned} \quad (1)$$

Our dependent variable, employee theft, is measured as cash shortages in the store scaled by store sales. Prior research has documented that cash is the most frequent target of employee theft (Association of Certified Fraud Examiners 2002, 2006; Center for Retail Research 2005). Although this is the best measure available to capture employee theft, we acknowledge this measure is likely to understate employee theft since it does not capture employee theft arising



from the employees' misappropriation of merchandise (inventory shrinkage)<sup>5</sup> or other company property, and is likely to be affected by noise (employees' mistakes recording transactions). Thus our tests are conservative.

Our main independent variables include Employee Turnover and Monitoring. Employee Turnover is measured by the annual employee turnover rate (Total number of hourly employee terminations / Total number of hourly employees at year end) of each store. We capture formal and mutual monitoring as follows:

Formal monitoring is measured at the chain level and is equal to corporate security spending divided by the total direct operating expenses across all the stores of the chain. Security spending typically, but not always, includes monitors, alarms, security personnel, and armored-car pickups. Our decision to measure formal monitoring at the chain-level instead of at the store-level is to address a specific endogeneity concern: While we expect store-level formal monitoring to mitigate Employee Theft, it is possible that management would increase security investments precisely in the stores where there are more employee theft problems (resulting in a positive association between theft and formal monitoring at the store-level). Thus, we measure formal monitoring at the chain-level.

Mutual monitoring is measured at the store level. We use the total labor hours in a year to capture the potential for mutual monitoring in a given store. Labor hours are a proxy for the

---

<sup>5</sup> According to the 2005 report of the Center for Retail Research in the U.K., 52% of employee theft in the retail industry involves cash, while only 26% involves merchandise, suggesting cash theft is a greater problem than inventory theft. Similarly, the 2006 report of the Association of Certified Fraud Examiners in the U.S. documents that 87.7% of employee theft involves the misappropriation of cash. On the other hand, according to the National Retail Security Survey of 2001 (Hollinger and Davis 2001), inventory shrinkage in the grocery retail sector accounts for 1.42% of sales, and in turn, 62% of this inventory shrinkage (i.e., 0.88% of sales) is attributed to employee theft. This suggests both cash and inventory theft are significant problems in the convenience store industry (considered part of the grocery retail sector in Hollinger and Davis 2001). Even if we do not capture all forms of theft, our objective is to provide insights that could potentially uncover the roots of the problem. According to interviews with executives in the retail sector described in Hollinger and Clark (2003), even the most experienced executives find it challenging to estimate internal theft.

number of employees that work simultaneously in a given shift. It is not unusual for convenience stores to be staffed by only one employee. When this happens, mutual monitoring does not exist. Since convenience stores usually operate for similar hours, large number of labor hours for a given store indicates that the store is often staffed by more than one employee and thus may be less likely to suffer from employee theft.

We control for store management turnover, wage, property crime, and unemployment rates in the area. Store management turnover is likely to exacerbate monitoring difficulties and lower employee morale, eventually leading to higher theft. In fact, previous research has suggested that store management turnover is associated with higher inventory shrinkage (Hollinger and Hayes 1992). We control for management turnover by measuring the rate of management turnover (Total number of store manager terminations / Total number of store managers) per year.

The labor economics literature suggests that companies paying higher wages may increase employees' desire to remain with the company (e.g. Dickens et al. 1989; Hansen 1997), and thus may reduce employees' propensity to steal. Greenberg (1990) finds that lower wages lead to significantly higher theft rates. Similarly, Hollinger and Hayes (1992) find that inventory shrinkage as a percentage of sales decreased in firms that pay employees 15% or more than their local competitors. Starting wage is measured as the starting hourly wage for the entry-level employees at each store.

We also control for property crime rates. We argue that cash shortages are likely to be higher in high crime areas either because employees have a higher propensity to steal and/or stores are more likely to be exposed to burglary. Property Crime is measured as the number of property crimes that occurred in 2003 in the same county as the store.

Finally, we control for unemployment rate because prior literature suggests that it potentially affects employee theft. For example, Rickman and Witt (2007) argue that when unemployment rate is high, the chance of re-employment is low if people get fired due to theft. They predict a negative relation between unemployment rate and employee theft, and their empirical evidence based on regional data on employee theft in the U.K. is consistent with their prediction. On the other hand, unemployment rate can be an indicator of general economic condition. When the general economic condition is unfavorable, employees are more likely to be concerned about their financial situation, and thus, may be more likely to steal. Hollinger and Clark (1983), for instance, document a positive association between employees' financial concern and the rate of employee theft. Thus, we do not provide a prediction for the direction of the relationship between unemployment rate and employee theft. We use the 2004 unemployment rate reported by the U.S. Bureau of Labor Statistics for the state where the store is located.

## **4. Empirical Results**

### **4.1. Descriptive statistics**

Table 2 provides descriptive statistics on our main variables. On average, the sample convenience stores have \$3,730 in cash shortages (standard deviation = \$6,394), or 0.3% (standard deviation = 0.8%) of sales revenue. The average convenience store has an employee turnover rate of 117%, a store manager turnover rate of 28%, and uses 18,900 total labor hours in a year. The average starting hourly wage for entry-level employees is \$7.09. The average chain spends 0.65% of total operating expenses on security-related expenditures (formal monitoring). The average annual property crime rate for the sample is 16,990 crimes per county.

Table 3 presents the correlations between the main variables. Consistent with prior literature and our hypotheses, we find that cash shortages are positively related to employee turnover, property crime rates, and unemployment, but negatively correlated with mutual monitoring, and starting wage. However, we find no significant mitigating effects of formal monitoring on cash shortages, indeed formal monitoring is positively related to cash shortages scaled by sales, perhaps due to the positive association between formal monitoring and property crimes. We also find a positive correlation between formal monitoring and (a) employee and store manager turnover, and (b) starting wages. This contrasts with Hansen (1997), which has argued that efficiency wages and monitoring are substitutes.<sup>6</sup>

#### 4.2. Direct effects of internal controls and employee turnover on employee theft

To test H1a, H1b, and H2, we regress cash shortages scaled by sales on the internal control mechanisms, employee turnover, and control variables. We estimate model (2) at the store level with standard errors clustered by store and by chain. A general specification of the model is described by the following equation:

$$\begin{aligned}
 \text{Cash Shortages Scaled by Sales}_{it} = & \beta_0 + \beta_1 \text{Monitoring}_{it} + \beta_2 \text{Employee Turnover}_{it} \\
 & + \beta_3 \text{Store Manager Turnover}_{it} + \beta_4 \text{Starting Wage}_{it} \\
 & + \beta_5 \text{Property Crime}_{it} + \beta_6 \text{Unemployment}_{it} + \varepsilon_{it} \quad (2)
 \end{aligned}$$

where Monitoring stands for our two monitoring variables: Formal Monitoring and Mutual Monitoring. Table 4 presents the results of estimating model (2).

Column 1 of Table 4 presents an insignificant effect of Formal Monitoring on Cash Shortages. Thus we find no evidence that formal monitoring mitigates employee theft (H1a is not

---

<sup>6</sup> Hansen (1997) notes that the substitution between efficiency wage and the level of monitoring depends on the assumption that the firm cannot commit to a monitoring strategy.

supported). Column 2 of Table 4 indicates that, consistent with H1b, the coefficient on Mutual Monitoring ( $\beta_1 = -0.010$ ,  $p = 0.058$ ) is significantly negative. This suggests that employee theft is less severe for stores that have greater potential for mutual monitoring. The mitigating effects of mutual monitoring on employee theft also are economically significant: *ceteris paribus*, a one standard deviation (about 10,000 hours) increase in labor hours leads to a 26% decrease in cash shortages.

The coefficient on employee turnover  $\beta_1$  is positive, consistent with H2. The significance of this result is strong in Column 2 ( $p$ -value=0.058) but weak in Column 1 ( $p$ -value=0.137). The relationship between employee turnover and employee theft is economically significant: in Column 1 (Column 2), a one standard deviation increase in employee turnover (106.7%) is associated with a 16% (38%) increase in cash shortages.

The estimated value of  $\beta_4$  is  $-0.164$  ( $p$ -value = 0.010) in Column 1 and  $-0.155$  ( $p$ -value = 0.052) in Column 2, which supports the argument that higher wages are associated with lower levels of employee theft. The estimated value of  $\beta_5$  is significantly positive, consistent with stores in areas with high property crime rates suffering from higher cash shortages. Store manager turnover and unemployment are insignificantly related to employee theft.

These results support our prediction that mutual monitoring is negatively associated with employee theft, but provides no support of a direct relationship between formal monitoring and theft. One possible explanation for the lack of results for formal monitoring is that endogeneity concerns are not fully addressed by our measurement specification at the chain rather than the store level (see description in p.17). It may be the case that endogeneity also exists at the chain level, where only chains experiencing high employee theft invest in formal controls. Our results

also indicate that employee theft is more severe for stores with high turnover rates and/or in higher crime areas and less severe for stores that offer higher starting wages.

Next, we examine the moderating effects of internal controls on the relationship between employee turnover and employee theft.

### **4.3. Moderating effects of internal controls on the relationship between employee turnover and employee theft**

To test H3a and H3b, we regress cash shortages on the internal controls, employee turnover, an interaction between the two, and control variables. We estimate model (3) at the store level with store-clustered standard errors. A general specification of the model is described by the following equation:

$$\begin{aligned}
 \text{Cash Shortages Scaled by Sales}_{it} = & \beta_0 + \beta_1 \text{Monitoring}_{it} + \beta_2 \text{Employee Turnover}_{it} \\
 & + \beta_3 \text{Employee Turnover}_{it} \times \text{Monitoring}_{it} \\
 & + \beta_4 \text{Store Manager Turnover}_{it} + \beta_5 \text{Starting Wage}_{it} \\
 & + \beta_6 \text{Property Crime}_{it} + \beta_7 \text{Unemployment}_{it} + \varepsilon_{it} \quad (3)
 \end{aligned}$$

where Monitoring stands for our two monitoring variables: Formal Monitoring and Mutual Monitoring.

Following Hartmann and Moers (1999), we include both main effects and interaction effects in the regression. Main-effect terms and interaction terms are mean-centered to mitigate multicollinearity concerns (Aiken & West, 1991), which can make regression coefficients unstable and difficult to interpret. Table 5 presents the results of estimating model (3). The coefficients and t-statistics reported are based on store- and chain-clustered standard errors. A negative coefficient on the interaction term between Employee Turnover and Monitoring ( $\beta_3$ )

would be consistent with H3, which predicts that monitoring mechanisms reduce employee theft by attenuating the relationship between employee turnover and employee theft.

As shown in Column 1 of Table 5, consistent with H3a, the coefficient on  $\beta_3$  is significantly negative ( $\beta_3 = -10.64$ ,  $p = 0.009$ ). This indicates that formal monitoring reduces the strength of the relationship between employee turnover and employee theft. **Figure 2** illustrates the moderating effects of formal monitoring on the relationship between employee turnover and employee theft.

Column 2 of Table 5 shows that the coefficient on  $\beta_3$ , although negative, is insignificant for Mutual Monitoring ( $\beta_3 = -2.02E-6$ ,  $p = 0.432$ ). These results suggest that mutual monitoring, as measured by labor hours, has no significant mitigating effect on the relationship between employee turnover and employee theft. Thus, H3b is not supported.

The estimates of coefficients on Employee Turnover, Store Manager Turnover, Monitoring, Starting Wage, Property Crime, and Unemployment are largely consistent with those of model (2). As expected, Employee Turnover and Property Crime are positively related to theft (and significant in all but one case), and Starting Wage is significantly negatively related to theft. The Monitoring coefficients are similar to those reported for model (2), but Mutual Monitoring becomes weakly negatively related to employee theft. Finally Store Manager Turnover and Unemployment remain insignificant in all but one case where Store Manager Turnover is positively related to employee theft (as expected).

These results support our prediction that formal monitoring mitigates employee theft by weakening the relationship between employee turnover and employee theft, but do not support the prediction that mutual monitoring would have a similar effect.

#### 4.4. Additional robustness checks and analyses

As a robustness check, we estimate our regression models without using the Aiken and West (1991) adjustment. The results are qualitatively similar to the results we discussed above.

In addition, we estimate our regression models using different proxies for our constructs:

First, we measure employee theft as cash shortages scaled by total operating expenses instead of total sales. This alternative specification does not substantively change the results. Second, we adjust the Starting Wage by the Minimum Wage reported for each state based on the statistics provided on the website of the Bureau of Labor Statistics (<http://stats.bls.gov/bls/blsminwagedata.htm>). This specification does not change our main results, but results in insignificant coefficients for our wage variable.

To explore whether formal monitoring and mutual monitoring are complements or substitutes, we include the main effects of both types of monitoring as well as an interaction term between the two in the regression equation (2). As shown in Table 6, the coefficient on the interaction term between mutual monitoring and formal monitoring is negative, suggesting a complementary effect between the two types of monitoring mechanisms. The coefficients on the main effects remain the same as in Table 4, i.e. insignificant in the case of formal monitoring and significantly negative in the case of mutual monitoring.

In summary, our empirical results provide support for several of our hypotheses. The evidence suggests that stores with weaker internal controls have greater agency problems, and thus, suffer from higher levels of employee theft. This finding is consistent with internal controls playing an effective role in reducing the agency problem and curbing employee theft.



## 5. Conclusion

Employee theft is a major problem affecting most U.S. businesses every year. This problem is particularly severe for the retail industry, as it results in \$26 billion in losses every year. In this study, we examine the extent to which internal controls mitigate employee theft. Specifically, we investigate the effectiveness of two types of controls: formal monitoring and mutual monitoring. We analyze store-level and chain-level data from the convenience store industry and find that: 1) Employee turnover is positively associated with employee theft; 2) Mutual monitoring alleviates employee theft directly; and 3) Formal monitoring mitigates employee theft indirectly by reducing the strength of the relationship between employee turnover and employee theft. The results suggest that internal controls alleviate theft in chain organizations, either directly or indirectly through employee turnover.

This study has several implications for both research and practice in management accounting. From a theoretical perspective, our research adds to a stream of empirical studies that examine agency problems in various settings as well as the roles of different control mechanisms in alleviating agency problems. We extend this research by exploring the extent to which formal and mutual monitoring mitigates employee theft. In addition, by documenting the importance of mutual (peer-based) monitoring in mitigating employee theft, our study contributes to the emerging literature that examines the use of social controls to reduce agency problems.

From a practical perspective, this study highlights the importance of formal monitoring in organizations experiencing high levels of employee turnover. It also provides evidence on the usefulness of mutual monitoring as an alternative to traditional formal monitoring in reducing employee theft. This is consistent with a recent report released by the Association of Certified Fraud Examiners, which indicates that occupational frauds (including employee theft) are more

likely to be detected by tips from co-workers than by internal audits, external audits, or internal controls (Association of Certified Fraud Examiners 2006). Firms may benefit by exploiting the potential for mutual monitoring that exists whenever various employees can monitor each other. For example, organizations may consider implementing anonymous reporting mechanisms, or rotating work teams while raising the employees' awareness about cash and inventory theft.

The results of our study should be interpreted with caution for several reasons. First, prior literature documents the impact of job dissatisfaction on employees' opportunistic behavior in organizations (e.g., Hollinger and Clark 1983; Nagin et al. 2002), but we were unable to control for the effect of job dissatisfaction due to the unavailability of data. Nevertheless, to the extent that wage is a major determinant of employees' job satisfaction (Lee and Wilbur 1985; Chevalier and Lydon 2001; Niederman and Sumner 2004), we partially control for job dissatisfaction by including starting wage in our tests. Second, prior studies suggest that both employee theft *per se* and the effectiveness of mutual monitoring are affected by incentive schemes (Hollinger and Hayes 1992; Towry 2003). The limited use of performance-based incentives for hourly employees in the convenience store industry allows us to test the effects of monitoring on employee theft without having to consider incentive pay. However the advantage of ignoring incentive pay also limits the generalizability of our results to other contexts where performance-based incentives are significantly relevant. Future studies can examine the effect of incentives on the relationship between internal controls and employee theft.

## References

- Aiken, L. S., and S. G. West. 1991. Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage Publications.
- Akerlof, G. A. 1982. Labor Contracts as Partial Gift Exchange. *Quarterly Journal of Economics* 97: 543-569.
- Akerlof, G. A. and J. Yellen. 1986. Efficiency Wage Models of the Labor Market. Cambridge: Cambridge University Press.
- Akerlof, G. A. and J. Yellen. 1990. The Fair Wage-Effort Hypothesis and Unemployment. *Quarterly Journal of Economics* 105(2): 255-283.
- Appelbaum, S. H., J. Cottin, R. Pare, and B. T. Shapiro. 2006. Employee Theft: From Behavioral Causation and prevention to Managerial Detection and Remedies. *Journal of American Academy of Business* 9(2): 175-182.
- Arthur, J. B. 1994. Effects of Human Resource Systems on Manufacturing Performance and Turnover. *Academy of Management Journal* 37(3): 670-687.
- Association of Certified Fraud Examiners. 2006. *Report to the Nation*. Austin, TX.
- Association of Certified Fraud Examiners. 2002. *Report to the Nation*. Austin, TX.
- Barron, J. M. and K. P. Gjerde. 1997. Peer Pressure in an Agency Relationship. *Journal of Labor Economics* 15(2): 234-254.
- Baum, J.A., Li, S.X. and J.M. Usher. 2000. Making the Next Move: How Experiential and Vicarious Learning Shape the Locations of Chains' Acquisitions. *Administrative Science Quarterly* 45 (4): 766-801.
- Berger, A. and R. DeYoung. 2001. The Effects of Geographic Expansion on Bank Efficiency. *Journal of Financial Services Research* 19 (2,3): 163-184
- Boye, M. W. 1991. Self-reported employee theft and counterproductivity as a function of employee turnover antecedents. Doctoral dissertation, De Paul University, Chicago.
- Boye, M. W. and J.W. Jones. 1997. Organizational culture and employee counterproductivity. In R. A Giacalone and Greenberg, J. (Eds.), *Antisocial behavior in organizations*: 172-184. Thousand Oaks, CA: Sage..
- Brickley, J.A. and F.H. Dark. 1987. The Choice of Organizational Form. The case of Franchising. *Journal of Financial Economics* 18: 401-420.

- Campbell, D., Datar, S. and T. Sandino. 2007. Franchising and Control Across Multiple Markets: The Case of the Convenience Store Industry. Working Paper. Harvard Business School and University of Southern California.
- Center for Retail Research. 2005. *Fighting Retail Crime*. Nottingham: Center for Retail Research.
- Chevalier, A. and R. Lydon. 2001. Estimates of the Effect of Wages on Job Satisfaction. Working Paper.
- Dickens, W. T., L. F. Katz, K. Lang, and L. H. Summer. 1989. Employee Crime and the Monitoring Puzzle. *Journal of Labor Economics* 7(3): 331-347.
- Dumaine, B. 1988. Beating Bolder Corporate Crooks. *Fortune* 117(9): 193-196.
- Dwyer, S. 1992. Internal C-Store Theft: Stopping the Profit Drain. *National Petroleum News* 84(1): 40-42.
- Fama, E.C. and M.C. Jensen. 1983. Separation of Ownership and Control. *Journal of Law and Economics* 26 (2): 301-326.
- Gordon, D. 1994. Bosses of Different Stripes: A Cross-National Perspective on Monitoring and Supervision. *American Economic Review Papers and Proceedings of the Hundred and Sixth Meeting*: 375-379.
- Greenberg, J. 1990. Employee Theft as a Reaction to Underpayment Inequity: The Hidden Cost of Pay Cuts. *Journal of Applied Psychology* 75(5): 561-568.
- Greenberg, J. 1997. The STEAL Motive: Managing the Social Determinants of Employee Theft. In R. A. Giacalone and J. Greenberg (Eds.), *Antisocial Behavior in Organizations*. (pp. 85-108). Thousand Oaks, CA: Sage.
- Greenberg, J. 2002. Who Stole the Money, and When? Individual and Situational Determinants of Employee Theft. *Organizational Behavior and Human Decision Processes* 89: 985-1003.
- Greenberg, L. and J. Barling. 1996. Employee Theft. *Journal of Organizational Behavior* (1986-1998): 46-64.
- Greenberg, J. and K. S. Scott. 1996. Why Do Workers Bite the Hands that Feed Them? Employee Theft as a Social Exchange Process. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior* (pp. 111-156). Greenwich, CT: JAI Press.
- Greenberg, D. B., M. P. Miceli, and D. J. Cohen. 1987. Oppositionists and Group Norms: The Reciprocal Influence of Whistle-Blowers and Co-Workers. *Journal of Business Ethics* 6: 527-542.

- Hansen, S. C. 1997. Designing Internal Controls: The Interaction between Efficiency Wages and Monitoring. *Contemporary Accounting Research* 14(1): 129-163.
- Hartmann, F. G. H. and F. Moers. 1999. Testing Contingency Hypotheses in Budgetary Research: An Evaluation of the Use of Moderated Regression Analysis. *Accounting, Organizations and Society* 24: 291-315.
- Hollinger, R. C., and J. P. Clark. 1983. *Theft by Employees*. Lexington, Mass: Lexington.
- Hollinger, R. C., and J. L. Davis. 2001. *2001 National Retail Security Survey*. Gainesville, FL: University of Florida.
- Hollinger, R. C., and R. Hayes. 1992. *1992 National Retail Security Survey*. Gainesville, FL: University of Florida.
- Holtfreter, K. 2004. Fraud in US Organizations: An Examination of Control Mechanisms. *Journal of Financial Crime* 12(1): 88-95.
- Jensen, M.C. and W.H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305-360.
- Kandel, E. and E. P. Lazear. 1992. Peer Pressure and Partnerships. *Journal of Political Economy* 100(4): 801-817.
- Lambert, R. 2001. Contract Theory and Accounting. *Journal of Accounting and Economics* 32: 3-87.
- Landier, A., Nair, V.B. and J. Wulf. 2006. Tradeoffs in Staying Close: Corporate Decision Making and Geographic Dispersion. Working Paper. Stern School of Business. New York University.
- Lee, R. and E. Wilbur. 1985. Age, Education, Job Tenure, Salary, Job Characteristics, and Job Satisfaction: A Multivariate Analysis. *Human Relations* 38(8): 781-791.
- McClurg, L. A. and D. S. Butler. 2006. Workplace Theft: A Proposed Model and Research Agenda. *Southern Business Review* 31(2): 25-34.
- Muir, J. 1996. Theft at Work. *Work Study* 45(1): 27-29.
- Murphy, K. R. 1993. *Honesty in the Workplace*. Pacific Grove, CA: Brooks/Cole.
- Nagin, D. S., J. B. Rebitzer, S. Sanders, and L. J. Taylor. 2002. Monitoring, Motivation, and Management: The Determinants of Opportunistic Behavior in a Field Experiment. *The American Economic Review* 92(4): 850-873.

- Niederman, F. and M. Sumner. 2004. Effects of Tasks, Salaries, and Shocks on Job Satisfaction among MIS Professionals. *Information Resources Management Journal* 17(4): 49-72.
- Osterman, P. 1994. Supervision, Discretion, and Work Organization. *American Economic Review Papers and Proceedings of the Hundred and Sixth Meeting*: 380-384.
- Petersen, M. A. 2006. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. Working Paper, Northwestern University.
- Rajan, M. V. 1992. Management Control Systems and the Implementation of Strategies. *Journal of Accounting Research* 30 (2): 227-248.
- Rickman, N. and R. Witt. 2007. The Determinants of Employee Crime in the UK. *Economica* 74: 161-175.
- Rogers, W. 1993. Regression Standard Errors in Clustered Samples. *Stata Technical Bulletin* 13: 9-23.
- Snyder, N. H., O. W. Broome, and K. Zimmerman. 1989. Using Internal Controls to Reduce Employee Theft in Small Businesses. *Journal of Small Business Management* 27(3): 48-55.
- Taylor, R. R. and K. O. Prien. 1998. Preventing Employee Theft: A Behavioral Approach. *Business Perspectives* 10(4): 9-13.
- Thoms, P., P. Wolper, K. S. Scott, and D. Jones. 2001. The Relationship between Immediate Turnover and Employee Theft in the Restaurant Industry. *Journal of Business and Psychology* 15(4): 561-577.
- Tittle, C. R. 1980. *Sanctions and Social Deviance: The Question of Deterrence*. New York: Praeger.
- Towry, K. L. 2003. Control in a Teamwork Environment – The Impact of Social Ties on the Effectiveness of Mutual Monitoring Contracts. *The Accounting Review* 78(4): 1069-1095.
- Victor, B., L. K. Trevino, and D. L. Shapiro. 1993. Peer Reporting of Unethical Behavior: The Influence of Justice Evaluations and Social Context Factors. *Journal of Business Ethics* 12(4): 253-263.
- Weber, M. M. and S. P. Kantamneni. 2002. POS and EDI in Retailing: An Examination of Underlying Benefits and Barriers. *Supply Chain Management* 7(5): 311-317.
- Wells, J. T. 2001. Enemies Within. *Journal of Accountancy* 192(6): 31-35.
- Wells, J. T. 2002. Control Cash-Register Thievery. *Journal of Accountancy* 193(6): 88-92.

**Table 1**  
**Sample Description**

This table describes the number of observations available for the analyses.

	<b>Store-level Survey</b>		
	<b># of chains</b>	<b># of stores</b>	<b># of store-years</b>
a. Total number of store-level surveys	43	489	690
b. Total number of store-level surveys with complete responses	29	321	448
c. Total number of store-level surveys with <ul style="list-style-type: none"> <li>• complete responses</li> <li>• crime &amp; unemployment data available</li> </ul>	27	294	412
d. Total number of store-level surveys with <ul style="list-style-type: none"> <li>• complete responses</li> <li>• crime &amp; unemployment data available</li> <li>• chain-level data available</li> </ul>	21	215	315

**Table 2**  
**Summary Statistics for Main Variables**

This table presents descriptive statistics for the main variables. *Cash Shortages Scaled by Sales* is cash shortages divided by total sales revenue of the store, multiplied by 100. *Employee Turnover* is measured by number of employment terminations divided by total number of employees of the store. *Mutual Monitoring* is total labor hours of the store (in thousands). *Formal Monitoring* is measured by the amount of security spending as a percentage of total direct store operating expenses of the chain that the store belongs to. *Starting wage* is measured as the starting hourly wage for the entry-level employees of the store. *Property Crime* is measured as the number of property crimes (in thousands) that occurred in the area in the same county as the store in 2003. *Unemployment* is the rate of unemployment in the state as of 2004.

<b>Variable</b>	<b>Number of observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Minimum</b>	<b>Maximum</b>
<i>Cash Shortages(\$)</i>	412	3,730	6,394	-10,686	52,314
<i>Sales(\$)</i>	412	1,537,388	873,755	278,577	5,276,282
<i>Cash Shortages Scaled by Sales</i>	412	0.32	0.85	-1.95	14.81
<i>Employee Turnover</i>	412	117.3%	106.7%	0%	777%
<i>Mutual Monitoring</i>	397	18.90	10.02	0.18	52.29
<i>Formal Monitoring</i>	309	0.65%	0.65%	0%	1.90%
<i>Store Manager Turnover</i>	377	27.7%	54.0%	0%	300%
<i>Starting Wage(\$)</i>	412	7.09	0.70	5.25	8.63
<i>Property Crime</i>	412	16.99	28.26	0.006	178.65
<i>Unemployment</i>	412	5.71	1.05	3.70	8.90



**Table 3**  
**Correlations**

This table presents Pearson correlations between the main variables as defined in Table 2. Correlations with a p-value smaller than 10% are shown in boldface.

	V1	V2	V3	V4	V5	V6	V7
<i>V1: Cash Shortages Scaled by Sales</i>	1.000						
<i>V2: Employee Turnover</i>	<b>0.108</b>	1.000					
<i>V3: Mutual Monitoring</i>	<b>-0.125</b>	-0.069	1.000				
<i>V4: Formal Monitoring</i>	<b>0.105</b>	<b>0.306</b>	<b>-0.239</b>	1.000			
<i>V5: Store Manager Turnover</i>	0.026	<b>0.278</b>	<b>-0.133</b>	<b>0.151</b>	1.000		
<i>V6: Property Crime</i>	<b>0.108</b>	0.032	0.024	<b>0.378</b>	0.049	1.000	
<i>V7: Starting Wage</i>	<b>-0.143</b>	-0.005	<b>0.148</b>	<b>0.141</b>	<b>0.102</b>	<b>0.181</b>	1.000
<i>V8: Unemployment</i>	0.082	-0.023	<b>0.182</b>	-0.008	<b>-0.120</b>	<b>0.224</b>	<b>-0.138</b>

**Table 4**  
**Direct Effects of Formal Monitoring, Mutual Monitoring, and Employee Turnover on Employee Theft**

These results present an analysis of the association between employee theft and formal and mutual monitoring, based on the following regression model:

$$\text{Cash Shortages Scaled by Sales}_{it} = \beta_0 + \beta_1 \text{Monitoring}_{it} + \beta_2 \text{Employee Turnover}_{it} + \beta_3 \text{Store Manager Turnover}_{it} + \beta_4 \text{Starting Wage}_{it} + \beta_5 \text{Property Crime}_{it} + \beta_6 \text{Unemployment}_{it} + \varepsilon_{it}$$

where *Monitoring* is Formal Monitoring in Column 1 (measured at the chain level), and Mutual Monitoring in Column 2 (measured at the store level). Variables are defined in Table 2.

This table presents results with store and chain-clustered standard errors. The p-values reported are one-tailed for our directional predictions, two-tailed otherwise. Significant coefficients are highlighted in bold-face if the p-values are lower than 0.10.

	Predicted	Cash Shortages Scaled by Sales Coefficients (p-values)	
		Column 1	Column 2
<i>Constant</i>		<b>0.973</b> <b>(0.060)</b>	1.210 (0.149)
<i>Formal Monitoring</i>	-	5.873 (0.704)	
<i>Mutual Monitoring</i>	-		<b>-0.010</b> <b>(0.058)</b>
<i>Employee Turnover</i>	+	0.049 (0.137)	<b>0.114</b> <b>(0.056)</b>
<i>Store Manager Turnover</i>	+	0.060 (0.110)	-0.023 (0.604)
<i>Starting Wage</i>	-	<b>-0.164</b> <b>(0.010)</b>	<b>-0.155</b> <b>(0.052)</b>
<i>Property Crime</i>	+	<b>0.003</b> <b>(0.065)</b>	<b>0.004</b> <b>(0.052)</b>
<i>Unemployment</i>	?	0.047 (0.223)	0.038 (0.180)
<i>Clustered by Store</i>		Yes	Yes
<i>Clustered by Chain</i>		Yes	Yes
<i>R-squared</i>		0.166	0.066
<i>Number of Observations</i>		274	373

**Table 5**  
**Moderating Effect of Formal and Mutual Monitoring on the Relationship between Employee Turnover and Employee Theft**

This table presents an analysis of the moderating effect of internal controls on the relationship between employee turnover and employee theft based on the following regression model:

$$\text{Cash Shortages Scaled by Sales}_{it} = \beta_0 + \beta_1 \text{Monitoring}_{it} + \beta_2 \text{Employee Turnover}_{it} + \beta_3 \text{Employee Turnover}_{it} \times \text{Monitoring}_{it} + \beta_n \text{Controls} + \varepsilon_{it}$$

where *Monitoring* is Formal Monitoring in Column 1 (measured at the chain level), and Mutual Monitoring in Column 2 (measured at the store level). Variables are defined in Table 2.

This table presents results with store and chain-clustered standard errors (Rogers 1993). We mean-center the interaction variables to alleviate multicollinearity problems (Aiken and West 1991). The p-values reported are one-tailed for our directional predictions, two-tailed otherwise. Significant coefficients are highlighted in bold-face if the p-values are lower than 0.10.

	Predicted	Cash Shortages Scaled by Sales Coefficients (p-values)	
		Column 1	Column 2
<i>Constant</i>		<b>0.924</b> ( <b>0.043</b> )	1.230 (0.227)
<i>Formal Monitoring</i>	-	5.888 (0.708)	
<i>Mutual Monitoring</i>	-		-0.007 (0.161)
<i>Employee Turnover</i>	+	<b>0.106</b> ( <b>&lt;0.001</b> )	0.148 (0.252)
<i>Employee Turnover × Formal Monitoring</i>	-	<b>-10.64</b> ( <b>0.009</b> )	
<i>Employee Turnover × Mutual Monitoring</i>	-		-0.000 (0.432)
<i>Store Manager Turnover</i>	+	<b>0.065</b> ( <b>0.085</b> )	-0.022 (0.604)
<i>Starting Wage</i>	-	<b>-0.143</b> ( <b>0.018</b> )	<b>-0.157</b> ( <b>0.064</b> )
<i>Property Crime</i>	+	<b>0.003</b> ( <b>0.066</b> )	<b>0.004</b> ( <b>0.058</b> )
<i>Unemployment</i>	?	0.049 (0.189)	0.038 (0.184)
<i>Clustered by Store and by Chain</i>		Yes	Yes
<i>R-squared</i>		0.187	0.066
<i>Number of Observations</i>		274	373

**Table 6**  
**Joint Effect of Formal and Mutual Monitoring on Employee Theft**

In this table we examine whether formal and mutual monitoring are complements or substitutes, using the following regression model:

$$\begin{aligned} \text{Cash Shortages Scaled by Sales}_{it} = & \beta_0 + \beta_1 \text{Formal Monitoring}_{it} + \beta_2 \text{Mutual Monitoring}_{it} \\ & + \beta_3 \text{Formal Monitoring}_{it} \times \text{Mutual Monitoring}_{it} + \beta_4 \text{Employee Turnover}_{it} + \beta_5 \text{Starting Wage}_{it} \\ & + \beta_6 \text{Property Crime}_{it} + \varepsilon_{it} \end{aligned}$$

This table presents results with store-clustered standard errors (Rogers 1993). The p-values reported are one-tailed for our directional predictions, two-tailed otherwise.

		<i>Cash Shortages Scaled by Sales</i> Coefficients (p-values)	
	Predicted	<i>Column 1</i>	<i>Column 2</i>
<i>Constant</i>		<b>0.014</b> (<0.001)	<b>0.014</b> (<0.001)
<i>Formal Monitoring</i>	-	0.019 (0.668)	0.044 (0.804)
<i>Mutual Monitoring</i>	-	<b>-0.000</b> (0.042)	<b>-0.000</b> (0.036)
<i>Formal Monitoring x Mutual Monitoring</i>	?		<b>-0.00001</b> (0.098)
<i>Employee Turnover</i>	+	0.0003 (0.146)	0.0002 (0.186)
<i>Starting Wage</i>	-	<b>-0.002</b> (<0.001)	<b>-0.002</b> (<0.001)
<i>Property Crime</i>	+	<b>0.000</b> (0.019)	<b>0.000</b> (0.016)
<i>Clustered by Store</i>		Yes	Yes
<i>R-squared</i>		0.144	0.163
<i>Number of Observations</i>		294	294

**Figure 1**  
**Conceptual Framework**

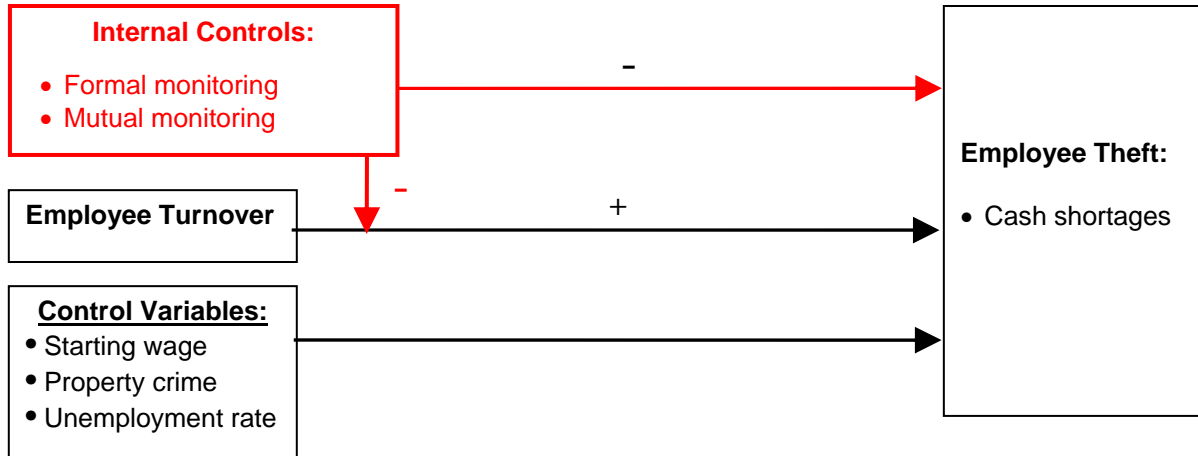


Figure 2  
Moderating Effects of Formal Monitoring on the Relationship Between Employee  
Turnover and Employee Theft

