Can Wages Buy Honesty?
The Relationship between Relative Wages and Employee Theft

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Abstract

In this study we examine whether, for a sample of retail chains, high levels of employee compensation can deter employee theft, an increasingly common type of fraudulent behavior. Specifically, we examine the extent to which relative wages (i.e., employee wages relative to the wages paid to comparable employees in competing stores) affect employee theft as measured by inventory shrinkage and cash shortage. Using two store-level datasets from the convenience store industry, we find that relative wages are negatively associated with employee theft, after we control for each store's employee characteristics, monitoring environment, and socio-economic environment. Moreover, we find that coworkers are less likely to collude to steal from their company when relative wages are high. Our research contributes to an emerging literature in management control that explores the effect of efficiency wages on employee behavior and social norms.

Keywords: Wages; employee compensation; management control; employee theft; antisocial behavior; reciprocity; gift exchange; social norms; chain organizations; retail industry.

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I. INTRODUCTION

Efficiency wage theories propose that higher levels of pay induce higher productivity through motivating employees to exert greater efforts (out of reciprocity or a desire to maintain high paying jobs) and/or through attracting higher quality employees (Malcomson 1981; Yellen 1984; Akerlof 1984; Shapiro and Stiglitz 1984; Akerlof and Yellen 1990; Fehr and Gachter 2000). Prior studies have tested the association between relatively higher wages and employee effort and turnover. For example, a series of laboratory experiments shows that employees exert higher effort when their employers choose to pay them relatively higher wages (e.g. Fehr, Kirchsteiger and Riedl 1993, Fehr and Falk 1999, Hannan, Kagel and Moser 2002, and Hannan 2005). A handful of field studies have also shown that relatively higher wages are associated with less shirking in the workplace, greater pay satisfaction, and lower likelihood to quit (Cappelli and Chauvin 1991 and Levine 1993). In this study, we complement the efficiency wages and management control literatures by examining the impact of relative wages on employee theft, an effect which has remained underexplored. Support for an association between relative wages and employee theft would suggest that employee compensation levels can provide an alternative mechanism to deter fraudulent behavior, beyond other honesty-inducing control mechanisms studied in the accounting and control literature (e.g., Chow, Cooper, and Waller 1988; Evans, Hannan, Krishnan, and Moser 2001; Hansen 1997; Hesford and Parks 2010; Webb 2002; Zhang 2008).

To the best of our knowledge, the only other empirical study that explores the relation between compensation and employee theft using field data is Greenberg (1990), who finds that for groups of employees who received a 15% pay-cut, the level of theft (measured by shrinkage rates) increased in the post-pay-cut period, and was higher than that of groups who did not receive the pay-cut. However, there is a substantial difference between reducing employees' pay levels and setting ongoing pay levels. Indeed, recent field studies suggest that the effect of pay cuts on employee performance is short-lived (Lee and Rupp 2007). Our study is the first to examine cross-sectional associations between employee theft and relative wages, where relative wages are estimated by comparing employee wages with the wages of comparable employees working for other similar organizations in the region. Using data from retail chain stores, we examine whether relative wages induce a reduction in the amount of employee theft (measured as cash shortage and inventory shrinkage as a percentage of sales).[1]

Employee theft is a major management control problem that results in up to $200 billion in losses in U.S. businesses every year (Murphy 1993). This problem is particularly severe in retail chains, where geographic dispersion leads to significant monitoring problems (Brickley and Dark 1987). According to the 2008 National Retail Security Survey, in the retail industry alone, inventory-related employee theft amounted to a loss of $15.9 billion (NRSS 2008). Indeed, a survey conducted by Hollinger and Clark (1983) indicates that 35% of U.S. retail store employees admit to stealing from their companies.

[1] Following Hollinger and Clark (1983), we refer to employee theft as any "unauthorized taking, control, or transfer of money and/or property of the formal work organization that is perpetrated by an employee during the course of occupational activity" (p.2).

Drawing on efficiency wage theories, we predict that relatively higher wages will discourage employee theft for two reasons: first, employees receiving relatively higher wages are less inclined to commit theft as they attempt to reciprocate positively to their employers and/or to retain their jobs, while employees receiving relatively lower wages are more inclined to commit theft due to a desire to retaliate against their employers for treating them unfairly and/or disregard for their jobs (motivation mechanism); second, firms that offer relatively higher wages may attract a higher proportion of honest workers (selection mechanism). While the efficiency wage theories suggest that relatively higher wages should deter theft, employees may have little awareness of the differences between their wages and those of other employees (Bewley 1999: 432). Also, previous research suggests that employees may overlook wage deviations in the long run as they reassess the value of their inputs over time (Gneezy and List 2006; Lee and Rupp 2007). Thus, the relation between relative wages and employee theft remains an empirical question.

In addition to examining the overall effect of relative wages on employee behavior, we examine whether relatively higher wages play an incremental role in discouraging theft among groups of employees in the workplace (that is, in stores that are staffed by more than one employee). Previous research on social norms finds that dysfunctional behavior can be mitigated or instigated by peers (Fischer and Huddart 2008; Jaworski and Young 1992; Robinson and O'Leary-Kelly 1998; Tayler and Bloomfield 2011). For example, in an ethnographic study of machine shop workers, Burawoy (1979) finds that higher wages led workers to play a collective game that increased productivity and benefited their firm, whereas lower wages led workers to play a collective game that reduced productivity and hurt their firm (Akerlof 1984). Applying these insights to the

problem of employee theft, we predict an interaction effect between relative wages and coworker presence, such that coworkers are more likely to monitor each other and reduce theft under relatively higher wages, but they are more likely to collude against their employer and increase theft under relatively lower wages.

We test our predictions primarily using two proprietary datasets from retail chains and supplement our analysis with insights from telephone interviews with store managers of nine convenience store chains in our sample. The first dataset contains cross-sectional data on cash shortage and inventory shrinkage as a percentage of sales from the 76 stores of a mid-sized convenience store chain (hereafter, CS Chain) for the year 1999. The second dataset includes data on the ratio of cash shortage to sales from a subsample of 251 stores (327 store-years) in 31 chains that completed a survey conducted by the National Association of Convenience Stores (hereafter, NACS) in the years 2003 and 2004. Using both the CS Chain dataset and the NACS dataset allows us to assess the generalizability of our findings across different samples. It also allows us to triangulate our tests against two different measures of employee theft, which, according to The National Retail Security Survey of 2005, are the two most important sources of financial loss in the retail industry: cash shortage accounts for losses of 0.25% of retail sales, and inventory shrinkage accounts for 1.60% of retail sales in the U.S. (NRSS 2005). Both measures have strengths and weaknesses. Inventory shrinkage accounts for a higher percentage of losses and, according to Dwyer (1992), 70% of inventory shrinkage can be attributed to employee theft because the small size of this industry's stores results in low incidence of customer shoplifting. Although cash shortage accounts for a lower percentage of losses, it is arguably a cleaner measure of employee theft than inventory

shrinkage because it is predominantly attributable to the workers' actions rather than to customer shoplifting. To control for the portion of inventory shrinkage and cash shortage that is due to incompetence or error of employees, we include employee skills and employee experience in our empirical tests.

We use store-level multivariate analyses to examine the relation between employee theft and the explanatory variables of interest, namely, relative wages and the interaction between relative wages and coworker presence. We calculate relative wages by estimating the difference between employee wages at a given store and median employee wages for cashiers for sales organizations in the Metropolitan Statistical Area (MSA) that the store is located in. We estimate coworker presence by dividing the total annual labor hours reported for a store by the total annual opening hours of the store.

As predicted, we find a negative association between relative wages and employee theft in both the CS Chain and NACS samples, after controlling for each store's socio-economic environment, monitoring environment, and employee characteristics. However, a cost-benefit analysis reveals that the benefits from reducing theft represent only 42% of the costs associated with wage increases. Thus, an increase in pay in an average store would only be justified if higher employee wages conveyed other significant benefits in addition to reducing theft (such as a reduction in turnover and training costs, decreased shirking, and increased sales). In subsequent analyses we show that employee theft decreases in the magnitude of overpayment but does not increase in the magnitude of underpayment. This finding is contrary to the argument in prior literature that underpaid workers retaliate against their employers in proportion to their underpayment but

overpaid workers rationalize the overpayment away (Akerlof and Yellen 1990; Bewley 1999: 432).

We also find our predicted interaction effect between relative wages and coworker presence. Specifically, we find that while coworker presence is associated with higher levels of inventory shrinkage, this association disappears when relative wages are higher. Our result suggests that relatively higher wages mitigate worker collusion to steal from the company. We do not find this interaction effect, however, when employee theft is measured with cash shortage.

One potential concern in our research design is that higher relative wages may be influenced by employees' characteristics that are correlated with their propensity to steal. We control for possible determinants of wages in our sample (identified through interviews with store managers): cashiers' experience, age, tenure and skills, which could affect employee theft. Our results are robust to the inclusion of these potential correlated omitted variables.

Our research contributes to the efficiency wage and management control literature that examines the effects of compensation premiums on employee behavior (e.g., Hannan 2005; Hannan et al. 2002; Kuang and Moser 2009; Matuszewski 2010) by showing that relatively higher wages not only affect employee effort but also discourage employee theft. Moreover, our results suggest that relatively higher wages not only have a direct effect curbing employee theft, but also promote an ethical environment among coworkers. In doing so, we also contribute to the literature on social norms and the influence of coworkers on the behavior of employees (Arya, Fellingham, and Glover 1997; Barron and Gjerde 1997; Fehr et al. 1998; Kandel and Lazear 1992; Hannan et al. 2011; Pierce

and Snyder 2008; Robinson and O'Leary-Kelly 1998, Tayler and Bloomfield 2011; Towry 2003; Victor, Treviño and Shapiro 1993; Zhang 2008). Consistent with the insights from Tayler and Bloomfield (2011)'s experimental study, we provide empirical evidence from the field that compensation practices can shape group norms, which, in turn, influence employee theft.

Our study has important practical implications. It sheds light on a heretofore underexplored mechanism through which a company can deter theft. The Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework, which the majority (82%) of U.S. CFOs use as the framework for internal control in their companies (Shaw 2006), emphasizes that adequate human resource practices such as "competitive compensation programs" (COSO 1994, p.29) play an important role in preventing fraud. Our results provide support for this guideline and offer useful insights to management accountants and CPAs, who are playing an increasingly active role in the prevention and detection of internal fraud and theft in firms (Wells 2001, 2002).

The remainder of this paper is organized into four sections. In Section II, we develop our hypotheses. Section III discusses our data and research design. Section IV presents our empirical analyses and results. Section V concludes.

II. HYPOTHESES DEVELOPMENT

Relative Wages and Employee Theft

Drawing on the efficiency wages literature, we predict that relatively higher wages should reduce employee theft for three reasons, the first two due to motivation

reasons and the third reason due to the selection/attraction of honest employees[2]:

(1) Relatively higher wages induce employees to reciprocate positively to their employers, making it less likely that employees will commit theft;

(2) Relatively higher wages increase employees' costs of being fired, increasing the cost of theft;

(3) Relatively higher wages attract more honest employees.

The first argument, which suggests that relatively higher wages lead to lower theft due to reciprocity considerations, relies on insights from efficiency wage theories based on sociological models, such as the "gift exchange" and "reciprocity" models. These theories suggest that employees judge the fairness of their employment by comparing their wages with those of comparable employees (Adams 1963; Akerlof 1982, 1984; Cappelli and Chauvin 1991). According to these theories, employees who believe they are overpaid are likely to reciprocate to their employers by working harder and developing a productive environment; in contrast, employees who believe they are underpaid are likely to feel entitled to shirk or, according to this study, commit theft, to retaliate against their employers.

The second argument is based on efficiency wage theories such as the "shirking model", which postulate that above-market wages deter employees from shirking due to the high costs of losing their jobs. It is argued that employees exert effort and avoid improper behavior so as to retain their jobs and continue earning above-market rents

[2] The efficiency wages literature assumes that different firms may offer different wages to employees with identical observable characteristics for a number of reasons (e.g. Brown and Medoff 1989, Cappelli and Cascio 1991). Yellen (1984) argues that "if the relationship between wages and effort differs among firms, each firm's efficiency wage will differ, and, in equilibrium, there will emerge a distribution of wage offers for workers of identical observable characteristics" (201).

(Baker, Murphy, and Jensen 1988; Shapiro and Stiglitz 1984).[3] According to these theories, firms might benefit from paying above-market wages due to increases in productivity and decreases in employee turnover and related turnover costs (Campbell III 1993; Krueger and Summers 1988; Stiglitz 1974; Yellen 1984).

The third argument is based on the selection model of efficiency wage theories, which posits that, when workers are heterogeneous in their abilities, firms have imperfect information about worker abilities, and there is a positive correlation between ability and workers' reservation wages, firms that offer higher wages attract a better pool of applicants with higher ability (Malcomson 1981; Weiss 1980; Yellen 1984). Even though the previous literature has built the selection argument primarily on the abilities of workers, the same argument could apply to the integrity of workers, implying that firms that offer higher wages can attract higher quality employees who behave more ethically. It is reasonable to expect a positive correlation between honesty and workers' reservation wages since dishonest workers are likely to have a lower reservation wage than otherwise comparable workers as they count not only on the wage offered by the employer but also on the cash and/or merchandise they could steal from the workplace if they accepted the job. The selection argument would not hold if: 1) employees stealing were consistently caught and terminated; or 2) firms were able to design screening devices to induce workers to reveal their honesty/integrity. However, it is often hard for firms to detect employee theft, and even though firms usually conduct background checks or

[3] If paying above-market wages were a profitable solution for all companies, then all companies would choose to pay such wages. However, employees' incentives not to shirk would continue to apply because the higher wages would result in unemployment. Thus, the employees' reservation wage is lower than the employment wage (Shapiro and Stiglitz 1984).

honesty/integrity tests before they hire employees (Bernardin and Cooke 1993), these tests are unlikely to provide accurate information about employees' honesty.

Both the academic and practitioner literature have led us to predict a negative relationship between relatively higher wages and employee theft. Field studies conducted by Bewley (1999), Hollinger and Clark (1983), Nagin et al. (2002), and Victor et al. (1993) find that employees behave opportunistically when they feel that their jobs are not worth keeping and/or when they have negative perceptions about the way their employers treat them. For example, one business owner interviewed by Bewley (1999) indicated: "I care about morale because, in the case of my secretary, she could embezzle money easily. We don't yet have good financial controls in place" (p. 48). Since employees' perceptions are influenced by relative wages (e.g., Levine 1993; Pfeffer and Langton 1993), we expect relatively higher wages to be negatively related to employee theft. A field study that is closer to ours, conducted by Greenberg in 1990 and followed up by two experimental studies (Greenberg 1993, 2002) shows a positive association between wage cuts (underpayment) and employee theft.[4] The practitioners' literature also offers examples that suggest a negative association between the level of employee pay and employee fraud. For example, an executive from BDO interviewed by the Wall Street Journal indicated that decreases in employees' benefits lead them to feel unfairly treated and to justify stealing from their companies (Needleman 2008). As an anti-shrinkage strategy, companies such as Trader Joe's and The Container Store offer wage premiums to their employees in order to induce employee loyalty and honesty (Speizer 2004).

[4] Wage cuts in this case are measured relative to the employee's own prior wage (in his field study Greenberg studies the effects of pay cuts on the compensation of airline pilots) or relative to the wage the workers were led to believe they would receive (in his experiments, Greenberg studies the effects of decreasing wages relative to the wage that the experimenters initially suggested to the workers).

Although the theoretical arguments provided above suggest a negative relationship between relative wages and employee theft, this relationship may not be observed in practice for two reasons. First, absent a salient event such as a pay cut (as studied by Greenberg), employees may not actively benchmark their wages against those of comparable employees. Second, prior studies show that, over time, employees may overlook wage deviations as they reassess the value of their own inputs. For example, using airline on-time performance as a proxy for unobservable pilot effort, Lee and Rupp (2007) examine the impact of a pay cut on airplane pilots' effort. They find that the effect of the pay cut on employee effort is short-lived and that no effect persists after one week. Similarly, using field experiments, Gneezy and List (2006) find that workers are more productive in the first few hours in a job where they are led to believe that they are overpaid, but this productivity declines to the level of non-overpaid employees after a few hours. Thus, whether or not a relationship exists between ongoing relative wages and employee theft remains an empirical question. Based on the above discussion, we posit that higher relative wages decrease employee theft. More formally:

Hypothesis 1: Relative wages are negatively associated with employee theft.

Effects of Relative Wages on Employees' Collective Behavior

Research in social psychology as well as economics suggests that individuals are influenced by social norms.[5] Social norms play an important role in individuals' behavior because failure to conform to social norms can lead to informal punishment, such as

[5] A social norm is defined as "1) a behavioral regularity; that is 2) based on a socially shared belief of how one ought to behave; which triggers 3) the enforcement of the prescribed behavior by informal social sanctions" (Fehr and Gachter 2000: 166). Tayler and Bloomfield (2011) draw on the psychology literature to distinguish between "personal norms" ("people's sense of what behaviors are appropriate in the setting) and "descriptive norms" ("people's tendency to conform to the behavior of those around them") (p. 1).

exclusion from the peer group. For example, Robinson and O'Leary-Kelly (1998)'s field study of 187 employees from 35 groups in 20 organizations documents a positive association between the antisocial behavior of employees and their coworkers' antisocial behavior. In our research setting, because it is easier for coworkers than for managers to detect employee theft, social norms can be an important determinant of employee theft.[6] Our second hypothesis explores the effects of relative wages on social norms and employees' group behavior.

The main effect of coworker presence on employee theft is ambiguous because it is unclear what kind of social norms are more likely to develop. A recent study by Tayler and Bloomfield (2011) argues that the degree of conformity to social norms will be influenced by the situation, which depends to a large extent on the control environment. Thus, the presence of coworkers may decrease employee theft if coworkers monitor each other and promote integrity in the workplace, but may increase theft if coworkers collude against the firm (Hollinger and Clark 1983).

Employee compensation is likely to shape the kind of social norms developed in the workplace through affecting the work group's perceived fairness of treatment by management (Akerlof 1982; Fischer and Huddart 2008). According to Feldman (1984), "…if the work group feels that management is supportive, group norms will develop that facilitate – in fact, enhance – group productivity. In contrast, if the work group feels that management is antagonistic, group norms that inhibit and impair group performance are much more likely to develop" (p.47). In line with the above arguments, gift exchange and

[6] Based on the 2008 Association of Certified Fraud Examiners (ACFE) report, tips provided by coworkers, customers, or other individuals represent by far the most frequent method of detecting occupational fraud: 46.2% of all occupational fraud cases were detected by tips, compared to 19.4% by internal audits and 23.3% by internal controls.

reciprocity models suggest that firms paying relatively high wages will induce worker loyalty, which, in turn, will lead employees to interact with their peers in ways that increase the quality and productivity of their output (Akerlof 1984; Fehr and Gachter 2000). For example, in a study of machine shop workers, Burawoy (1979) finds that workers who believe they are overpaid play competitive games with their coworkers leading to higher productivity, whereas workers who believe they are underpaid play destructive games leading to lower productivity.

In addition, the whistle-blowing literature suggests that an employee is more willing to blow the whistle on a coworker's deviant behavior if the employee perceives the employer to be fair (Miceli, Near, and Schwenk 1991). Consistent with this argument, an experimental study conducted by Zhang (2008) shows that, under a peer reporting system, the percentage of whistle-blowing on lying peers is higher when the agents perceive the principal as fair versus unfair. Similarly, using a field survey of 360 employees in 18 fast-food restaurants, Victor, Trevino, and Shapiro (1993) find that workers who perceive to be treated fairly by management (due to various factors, including pay), are more likely to blow the whistle on their coworkers (i.e., accuse them of taking or giving away food).

Drawing on previous literature on social norms, we conjecture that the association between relative wages and employee theft is more pronounced in firms with multiple coworkers. Under higher relative wages, we predict that workers will be more likely to show positive reciprocity to their employers, leading to norms of honesty and mutual monitoring that will reduce theft. For instance, under higher wages, workers should be more likely to monitor each other and to sanction employees who steal by avoiding interactions with them or condemning their acts (Hollinger and Clark 1983). Conversely,

we predict that relatively lower wages will induce negative reciprocity on the part of the employees, leading to norms of dishonesty and collusion that will increase theft. Under relatively lower wages, employees who observe their coworkers steal should be more likely to rationalize and cover up their coworkers' misconduct, or to steal from the company just like their coworkers.

In addition to the above argument based on the social norms literature, the "shirking model" also suggests an interaction effect between coworker presence and relative wages on employee theft. Under higher relative wages, coworkers do not want to lose their jobs, and therefore should be more inclined to report coworker theft to management to avoid being blamed (or fired) for theft committed by someone else. Conversely, under relatively lower wages, workers care less about losing their jobs, so they should be more permissive about coworkers' theft and less likely to monitor their coworkers in order to avoid being blamed for theft committed by someone else.

Based upon the discussion above, we conjecture that high relative wages will promote a more ethical environment among coworkers and reduce employee theft. Conversely, low relative wages will discourage peer monitoring and encourage collusion against the company, leading to higher levels of employee theft. More formally:

Hypothesis 2: Relative wages and coworker presence interact to affect employee theft, such that coworker presence reduces (increases) employee theft when relative wages are higher (lower).

III. DATA AND RESEARCH DESIGN

Data

To test our hypotheses, we obtain both proprietary and publicly available U.S. data from five main sources: (1) 1999 data for a medium-sized convenience store chain (CS Chain); (2) 2004 and 2005 store-level survey data (reporting annual data from 2003 and 2004, respectively) from the National Association of Convenience Stores (NACS); (3) property crime data from the Federal Bureau of Investigation (FBI) at http://www.fbi.gov; (4) wages and unemployment data from the Bureau of Labor Statistics (BLS) at http://www.bls.gov; and (5) data relating zip codes to metropolitan statistical areas from ZipCodeDownload at http://www.zipcodedownload.com. Using both datasets allows us to triangulate our tests against two different measures of employee theft as well as assess the generalizability of our findings across different samples.

The convenience store industry is particularly suitable for this study for several reasons. First, it suffers from a severe employee theft problem that can be adequately captured with inventory shrinkage and cash shortage. Since the convenience store industry is a low-margin, high-volume business, employee theft can cause significant damage to business performance (Bernardin and Cooke 1993). Second, due to the limited use of incentive compensation for hourly employees, we are able to conduct a clean test of the effects of relative wages. Third, the payoffs from stealing are fairly small, which makes the use of wages to mitigate employee theft less costly than it would be in other settings such as casinos or jewelry stores. Finally, convenience stores provide an ideal

setting to examine theories on collective behavior, as some convenience stores employ a single worker while others employ two or three workers in the same shift.

The CS Chain dataset provides information on average wages, cash shortage, inventory shrinkage, employee skills, labor hours, store manager turnover, and location (among other data) for all 76 stores in a medium-sized convenience store chain for the year 1999.[7] We were able to find benchmark wages and unemployment data for the year 1999 from the BLS website, as well as property crime per capita data from the FBI website, for each of these stores. Thus, this sample comprises 76 store-year observations.

The NACS dataset provides usable information on starting wages, cash shortage, labor hours, store manager turnover, and location (among other data) for 325 stores from 32 chains for the years 2003 and 2004 (a total of 428 store-years are available).[8] Members of NACS, which include retail members from all across the U.S., were asked to report store-level survey data from a random sample of stores within their convenience store chains. The survey's response rate was about 75%. Whenever a state was over- or under- represented, the staff at NACS adjusted the survey sample so that the NACS sample was representative of different areas across the U.S. We were able to obtain surveys with complete data for our study from an average of 8 stores per chain in 2003 and 11 stores per chain in 2004. The chains for which we obtained these data are relatively large, with an average (median) number of stores per chain equal to 222 (51)

[7] Under a confidentiality agreement, we have permission to use disguised company information to ensure the anonymity of the company.

[8] According to NACS, convenience stores are defined based on the following criteria: (1) store size is less than 5,000 sq ft; (2) off-street parking and/or convenient pedestrian access is available; (3) the store has extended hours of operation (many are open 24 hours, 7 days a week); (4) the store offers at least 500 stock keeping units (SKUs); and (5) the store's product mix includes grocery-type items and items from the following groups: beverages, snacks (including confectionery), and tobacco.

stores in 2003 and 278 (57) stores in 2004.[9] Matching these data with the BLS and FBI data for the years 2003-2004 yields a final sample of 327 store-years (corresponding to 251 stores from 31 chains) for most of our analyses.

Research Design – Testing Hypothesis 1

To test Hypothesis 1, which predicts a negative association between relative wages and employee theft, we estimate the following model:

$$Theft_{it} = \beta_0 + \beta_1 \, Relative\ Wages_{it} + \beta_2 \, Employee\ Skills_{it} + \beta_3 \, Store\ Manager\ Turnover_{it} + \beta_4 \, Property\ Crimes\ Per\ Capita_{it} + \beta_5 \, Unemployment_{it} + \beta_6 \, Year2004 + \varepsilon_{it} \quad (1)$$

We discuss each of the variables below (variable descriptions are also in the Appendix).

We use both inventory shrinkage and cash shortage measures to proxy for employee theft. More specifically, for the CS Chain dataset we measure *Theft* using both inventory shrinkage and cash shortage scaled by store sales and multiplied by 100.[10] Due to the lack of store-level inventory shrinkage information in the NACS dataset, we measure employee theft using cash shortage scaled by store sales in this sample.[11]

Our main independent variable is *Relative Wages*. This variable is measured differently for the CS Chain and NACS datasets. The CS Chain dataset provides *average* hourly wages for all employees for each store in the chain.[12] Since the BLS provides

[9] This figure is based on 28 of the 32 retail chains. Information on the number of stores per chain (i.e. chain size) was missing for 4 of the chains.

[10] Inventory shrinkage occurs when the physical inventory count is lower than the booked (invoiced) inventory (which is equal to beginning inventory plus purchases minus sales and adjustments); cash shortage occurs when the physical cash count at the end of the day is lower than the cash register tape (Greenberg 1990; NRSS 1992).

[11] Note that care should be taken in interpreting the results, as our inventory shrinkage measure may capture both employee theft and customer shoplifting, and our cash shortage measure does not capture the skimming form of cash theft (where cash is stolen before being recorded in the organization) and may capture both employee theft and employees' mistakes in recording transactions.

[12] The compensation of store managers is not included in this figure.

aggregate data on hourly wages for cashiers in all sales organizations for each Metropolitan Statistical Area (MSA), we are able to use the BLS data as a benchmark in calculating relative wages for the CS Chain dataset. Thus, for this dataset, *Relative Wages* is calculated as the difference between the average hourly wage for a store's employees and the median hourly wage for cashiers in sales organizations in the same MSA that the store is located in (this is a similar measure to that used by Cappelli and Chauvin 1991). The NACS dataset, in contrast, provides *starting* hourly wages for entry-level employees for each store included in the dataset.[13] Since the data in the Bureau of Labor Statistics (BLS) correspond to all employees rather than entry-level employees only, we had to adjust the BLS median hourly wage by multiplying it by 0.88 to make it comparable to starting wages.[14] Thus, for the NACS dataset, *Relative Wages* is calculated as the difference between the starting hourly wage in a store and 88% of the median hourly wage for cashiers in sales organizations in the same MSA that the store is located.[15]

[13] Ibid.

[14] We use 88% of the BLS median number as a benchmark to make the benchmark comparable to starting wages since average starting wages for all firms surveyed by NACS in a given MSA are 91.1% of the average of all the BLS wages and 84.2% of the median of all the BLS wages in the corresponding MSA.

[15] A potential reverse causality concern would arise if convenience stores rewarded employees with wage increases or bonuses if inventory shrinkage and cash shortages were found to be low at the end of a period. We do not believe that reverse causality could be a concern in our setting for three reasons: First, according to the National Association of Convenience Stores (NACS) Compensation Surveys for 2003 through 2005 (covering our sample period), cashiers' compensation is based exclusively on fixed hourly wages and does not include any form of bonuses. Second, interviews with two managers at CS Chain confirmed that no measure of honesty directly affected cashier wages or cashier wage increases. Third, our results hold even when we use starting wages in our NACS sample. We interviewed managers of nine different convenience store chains analyzed in our study to see whether starting wages could be affected by assessed honesty of new hires. Our interviews reveal that even though convenience stores chains conduct integrity or background checks, information from these checks is only used to determine employment eligibility, but not used to determine starting wages.

We include several controls in the model. First, we control for *Employee Skills* in the CS Chain sample to address a potential concern that relative wages might capture employee characteristics that could be related to an employee's likelihood to steal. If employee skills were positively correlated with honesty, we would expect a negative association between employee skills and employee theft. *Employee Skills* is the average performance rating of hourly employees. Each employee is rated by its store manager based on service and operations performance. The rating was elicited on a scale of 1 to 5, with the highest skills corresponding to a 5 and the lowest skills corresponding to a 1. CS Chain provided us with the average performance ratings across all the employees in each store. This variable is not available for the NACS sample, yet the need to control for employee skills is mitigated to some extent by the fact that we use *starting* rather than *average* wages to calculate relative wages in the NACS sample. Because starting wages are set at the same level for most starting employees working at a given convenience store, they should be less influenced than average wages by employee characteristics that could affect an employee's likelihood to steal.

Second, we control for store manager turnover, as it is likely to exacerbate monitoring difficulties leading to higher theft (Detert et al. 2007). Indeed, the National Retail Security Survey of 1992 reports that store manager turnover is associated with higher inventory shrinkage in the U.S. (NRSS 1992). *Store Manager Turnover* is calculated as the total number of store manager terminations divided by the total number of store managers per year multiplied by 100.[16]

[16] A potential problem with this control variable is that theft may lead to store manager turnover rather than the other way around. To alleviate this reverse causality concern, we reran our regressions after replacing the store manager turnover rate of year *t* with the store manager turnover rate of year *t-1*. We were able to

Third, we control for property crime per capita because both inventory shrinkage and cash shortage are likely to increase in areas with high crime rates—employees coming from high-crime areas may have a greater propensity to steal, and stores in high-crime areas face a higher risk of burglary. *Property Crimes Per Capita* is measured as the property crimes per capita in 1999 (for the CS Chain dataset) and 2004 (for the NACS dataset) in the MSA where the store was located, as reported by the FBI.

Our fourth control takes the unemployment rate into account. Prior literature provides mixed predictions on the relation between the unemployment rate and employee theft. On the one hand, high unemployment rates may lead to lower theft as they translate into few outside employment options for employees and thus low chances of re-employment if employees get fired due to theft (Stiglitz 1974; Shapiro and Stiglitz 1984). On the other hand, high unemployment rates indicate unfavorable economic conditions, which lead employees to be more concerned about their financial situation and thus more likely to steal. Hollinger and Clark (1983), for instance, document a positive association between employees' financial concerns and the rate of employee theft. Given these mixed predictions, we do not predict the direction of the relationship between the unemployment rate and employee theft. *Unemployment* is measured using the 1999 (for the CS Chain dataset) and 2004 (for the NACS dataset) unemployment rates reported by the BLS for the MSA in which a store is located.

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do this using a subsample of our NACS dataset (where we had 270 observations with two years of data available). All of the main results reported for NACS in our empirical results section (Section IV) are robust to utilizing a lagged variable for store manager turnover.

Finally, for the NACS dataset, we also use a year dummy to control for year fixed effects, and we use robust standard errors clustered by chain to address error correlation problems from same-chain observations (Petersen 2009).

Research Design – Testing Hypothesis 2

To test Hypothesis 2, which predicts an interactive effect between relative wages and coworker presence, we regress employee theft on relative wages, coworker presence, the interaction between the two, and control variables. Specifically, we estimate the following model:

$$\begin{aligned} Theft_{it} = {} & \beta_0 + \beta_1 \, Relative\ Wages_{it} + \beta_2 \, Coworker\ Presence_{it} + \beta_3 \, Relative\ Wages_{it} \times \\ & Coworker\ Presence_{it} + \beta_4 \, Employee\ Skills_{it} + \\ & \beta_5 \, Store\ Manager\ Turnover_{it} + \beta_6 \, Property\ Crimes\ Per\ Capita_{it} + \\ & \beta_7 \, Unemployment_{it} + \beta_8 \, Year2004 + \varepsilon_{it} \, . \end{aligned} \quad (2)$$

Based on the recommendations of Aiken and West (1991), we mean-center the continuous variables in the interaction terms before they are included in the analysis to facilitate interpretation of the main effects. As before, we use robust standard errors clustered by chain for the NACS dataset.

We use the number of employees per hour to capture coworker presence in a given shift in a store. This variable is calculated as the total annual labor hours divided by the total annual opening hours for each store. It is not unusual for convenience stores to be staffed by only one employee, in which case there is no coworker influence. As the number of employees per hour increases, influence from coworker presence increases.

IV. EMPIRICAL RESULTS

Descriptive Statistics

Table 1 provides descriptive statistics on our main variables. On average, cash shortage accounts for 0.33% of sales revenue in the CS Chain dataset (median = 0.26%) and for 0.36% in the NACS dataset (median = 0.17%). Inventory shrinkage accounts for 1.85% (median = 1.67%) of sales revenue in the CS Chain stores.

In the CS Chain sample, the average hourly wage for employees is $8.25 (median = $8.16). Relative wages range from an underpayment of $0.28 to an overpayment of $2.77, with a mean of $0.93 (median=$0.86). In the NACS sample, the average starting hourly wage for entry-level employees is $7.20 (median = $7.00). Relative wages range from an underpayment of $1.57 to an overpayment of $1.83, with a mean of $0.55 (median = $0.51). The average convenience store in the CS Chain (NACS) sample uses 1.81 (2.62) employees per hour and has a store manager turnover rate of 22% (25%). The average employee skill rating in the CS Chain sample is 3.36 out of 5 (median = 3.21). The average property crime per capita is 0.03 for the CS Chain sample in 1999 and 0.04 for the NACS sample in 2004. The average unemployment rate is 3.11% for the CS Chain sample in 1999 and 5.13% for the NACS sample in 2004. Generally speaking, the key variables are comparable across the two samples.

Panels A and B of Table 2 present the Pearson correlations between the main variables for the CS Chain sample and the NACS sample, respectively. Consistent with prior literature and our hypotheses, we find that both inventory shrinkage and cash shortage are negatively and significantly related to relative wages in the CS Chain, and that cash shortage is negatively and significantly related to relative wages in the NACS

sample. In the CS Chain sample, we also find that cash shortage is positively related to unemployment, while in the NACS sample, we find that cash shortage is negatively related to coworker presence and positively related to store manager turnover and property crimes per capita.

Relative Wages and Employee Theft

Table 3 presents the results for our test of hypothesis H1. H1 predicts a negative association between relative wages and employee theft, so we expect the coefficient on *Relative Wages* to be negative. Recall that our dependent variable, *Theft*, is measured by inventory shrinkage and cash shortage in the CS Chain sample, and by cash shortage only in the NACS sample. Consistent with H1, the coefficient on *Relative Wages* is significant and negative for all three measures of employee theft (β_1 = -0.452, t = -2.78 for CS Chain Inventory Shrinkage; β_1 = -0.116, t = -2.15 for CS Chain Cash Shortage; β_1 = -0.171, t = -2.13 for NACS Cash Shortage). These results provide strong support for H1.

Most of the coefficients on the control variables are consistent with our expectations. We find a significantly negative coefficient on *Employee Skills* (β_2 = -0.253, t = 1.43) in column 1, in line with our expectation that better-quality employees are less likely to steal. We also find a significantly positive coefficient on *Store Manager Turnover* (β_3 = 0.088, t = 1.57) in column 2, consistent with our expectation that higher store manager turnover would result in less monitoring and higher employee theft, and a significantly positive coefficient on *Unemployment* (β_5 = 0.327, t = 1.86 in column 1 and β_5 = 0.150, t = 2.57 in column 2), consistent with economic concerns leading to higher theft. Unexpectedly, when we use CS Chain inventory shrinkage as the dependent variable, we find a negative coefficient on *Property Crimes Per Capita* (β_4 = -55.5, t = -1.69). A

potential explanation for this result is that firms use better control systems (such as monitoring cameras) in areas with higher property crimes per capita, which mitigate both customer and employee theft.

We conduct a cost-benefit analysis to see whether the dollar savings from reductions in employee theft justify the costs of relatively higher wages. We first translate the reductions in inventory shrinkage and cash shortage attributable to relative wages into dollar amounts, and then compare the benefits (reductions in inventory shrinkage and cash shortage) with the costs (wage premiums). We use CS Chain as an example since this dataset includes both inventory shrinkage and cash shortage, thus allowing us to calculate the full benefits of relative wages in terms of reducing observable proxies for employee theft. Given the coefficients on *Relative Wages* in the CS Chain shrinkage regression (-0.452) and in the CS Chain cash shortage regression (-0.116) (see Table 3), and given the average annual sales of $1.12 million for a CS Chain store, ceteris paribus, a one-dollar increase in hourly wages (and hence relative wages) leads to annual benefits of $6,362 (= (0.452 + 0.116) /100 * $1.12 million). Given that a CS Chain store's average annual labor hours are 15,080, a one-dollar increase in hourly wages would cost $15,080. The benefit of reducing the amount of employee theft accounted by cash shortage and inventory shrinkage does not, by itself, outweigh the cost of paying a wage premium. Yet it accounts for 42% of the cost of a wage increase. Our proxies for employee theft may not capture all instances of theft, and they do not capture other benefits that higher employee wages may convey, such as higher employee effort or reductions in turnover costs. Therefore, our analysis is likely to underestimate the full benefit from higher wages. If the other benefits from wage increases translate into at least 58% of the cost of

the wage increase, an employer may find it economically beneficial to raise employee wages. Otherwise an employer may not recover all of its costs of raising wages.

Next, we explore whether the relationship between relative wages and employee theft is driven by the overpayment subsample, the underpayment subsample, or both. While the "reciprocity" model described by Fehr and Gachter (2000) suggests a role of overpayment in mitigating employee misbehavior due to employees' positive reciprocity to their employers, some researchers suggest that overpaid employees are more likely to adjust the perception of what they are worth upwards than to reciprocate to their firms (Akerlof and Yellen 1990, Gneezy and List 2006). Thus, a stronger effect of underpayment relative to overpayment on employee theft would be consistent with the argument that the link between relative wages and employee theft is primarily driven by employees' retaliation against their employers for inequitable compensation (as suggested by Greenberg's 1990 study). Conversely, a stronger effect of overpayment relative to underpayment on employee theft would suggest that the link between relative wages and employee theft is mainly driven by employees' desire to reciprocate to a fair and generous employer and/or to retain jobs where they feel valued. We run the following regression to explore whether overpayment and underpayment have different effects on employee theft:

$$Theft_{it} = \beta_1 Positive_{it} + \beta_2 Negative_{it} + \beta_3 Positive\ Relative\ Wages_{it} + \beta_4 Negative\ Relative\ Wages_{it} + \beta_5 Store\ Manager\ Turnover_{it} + \beta_6 Property\ Crimes\ Per\ Capita_{it} + \beta_7 Unemployment_{it} + \beta_8 Year2004 + \varepsilon_{it} \quad (3)$$

Positive is an indicator variable that is equal to "1" if *Relative Wages* is greater than zero, and "0" otherwise. *Negative* is an indicator variable that is equal to "1" if *Relative*

Wages is less than zero, and "0" otherwise.[17] Instead of using a default intercept, we include *Positive* and *Negative* in the regression to allow the intercept to differ across the overpayment and underpayment subsamples. *Positive Relative Wages* is the product of *Relative Wages* and *Positive*. *Negative Relative Wages* is the product of *Relative Wages* and *Negative*. *Positive Relative Wages* and *Negative Relative Wages* represent the magnitude of overpayment (with a positive sign) and underpayment (with a negative sign), respectively. We control for store manager turnover, property crimes per capita, unemployment, and a year dummy in the regression.

We are only able to run the above regression for the NACS dataset because there is only one observation in the underpayment subsample for the CS Chain dataset. The results from the above regression for the NACS sample are summarized in Table 4. We find a significantly negative coefficient on *Positive Relative Wages* (Coefficient = -0.304, t = -2.10) and a negative but insignificant coefficient on *Negative Relative Wages* (Coefficient = -0.221, t = -1.25). These results suggest that the link between relative wages and employee theft is predominantly driven by overpayment, not underpayment. Our CS Chain results are also robust to dropping the only case of underpayment in that sample. In contrast to the argument in prior literature that overpaid workers often rationalize away the overpayment, our results suggest that overpaid employees do reciprocate to their employers for generous compensation. A possible explanation for the lack of results for underpayment is that there is a ceiling to how much employees are willing to steal from their employers, i.e., employees may be willing to engage in petty theft to retaliate against their employers but they may be reluctant to steal a large amount

[17] Our sample did not include any cases where relative wages were equal to zero.

of money. Another possibility is that the employees' wages are close to minimum wages. This truncates the magnitude of underpayment, leading to low-powered tests and no results for underpayment.

Interaction Effects between Relative Wages and Coworker Presence

Hypothesis 2 posits an interaction effect between relative wages and coworker presence on employee theft. To test this hypothesis, we estimate Equation (2) for our three measures of employee theft. The results are summarized in Table 5. A negative coefficient on the interaction term between *Relative Wages* and *Coworker Presence* (β_3) would be consistent with H2, which predicts that the effect of co-worker presence on employee theft is contingent on relative wages.

As shown in Table 5, consistent with H2, the coefficient on the interaction term between *Relative Wages* and *Coworker Presence* (β_3) is significantly negative (β_3 = -0.453, t = -1.83) when we use inventory shrinkage as our measure of employee theft. We also find a significantly negative main effect of relative wages (β_1 = -0.455, t = -2.69). Interestingly, we find a significantly positive main effect of coworker presence (β_2 = 0.724, t = 2.94), suggesting that inventory shrinkage is higher when more coworkers are present. The inventory shrinkage results (illustrated in Figure 1) suggest that relatively higher wages promote more ethical environments, mitigating potential collusion among coworkers.

When we use cash shortage as our measure of employee theft, the main effect of relative wages on employee theft continues to be significantly negative. However, we do not find significant coefficients on the interaction terms between relative wages and coworker presence (β_3 = -0.039, t = -0.46 for CS Chain; β_3 = 0.040, t = 0.91 for NACS).

Instead, we find a significantly negative main effect of coworker presence in the NACS sample (β_2 = -0.098, t = -4.06). We conjecture that there are two possible reasons for this result: first, coworkers consider cash theft to be a more serious crime than inventory theft, and therefore exert stronger social incentives against cash theft than inventory shrinkage. This is consistent with findings from the marketing and psychology literature that people behave less honestly with respect to other mediums compared with money (e.g., Mazar, Amir, and Ariely 2008). This is explained by the idea that mediums other than money (e.g., inventory) allow people to reinterpret their theft in a more self-serving manner in order to maintain their self-concept.[18] Second, cash theft is more easily caught and employees are more likely to be held accountable at the end of the shift (when they close their cash registers). By contrast, inventory shrinkage is subject to less social sanction and is less visible, and therefore it is more heavily influenced by group norms that may emerge from relative pay than cash shortage.

Taken together, we find partial support for H2. Specifically, we find that relative wages moderate the effect of coworker presence on inventory shrinkage, but do not moderate the effect of coworker presence on cash shortage.

Robustness Checks

We conducted additional analyses to assess the sensitivity of our results.

First, in addition to the variables included in the main regressions, we add control variables that capture the socioeconomic and monitoring environment in the store, as well as employee characteristics. These variables are not included in the main regressions

[18] Consistent with this theory, Dubner (2004)'s tale of the economist-turned-bagel man documents an interesting statistic: "the same people who routinely steal more than 10 percent of his bagels almost never stoop to stealing his money box -- a tribute to the nuanced social calculus of theft."

because they are available for only one dataset or for only a fraction of the observations in both datasets (the Appendix provides descriptions of the variables considered). These results are presented in Table 6.

In both the CS Chain dataset and the NACS dataset, we add *Employee turnover* because: (1) higher employee turnover results in difficulty of monitoring and thus higher opportunities to misbehave, which may increase employee theft (Hollinger and Clark 1983); and (2) employees who expect to leave their jobs may be more likely to steal from the firm (Hollinger and Clark 1983, Thoms et al. 2001). Notice, however, employee turnover should be interpreted with caution for two reasons: (1) like employee theft, turnover is an outcome of relative wages (Stiglitz 1974; Campbell III 1993); (2) employees that are caught stealing will likely be asked to leave the firm, thus turnover might be endogenously related to theft.

We also control for *Employee experience* for two purposes: First, we use employee experience to control for the possibility that some inventory shrinkage and cash shortage were caused by mistakes due to inexperience. Second, we control for employee experience since our interviews revealed that this variable was a relevant determinant of wages in both samples. Interviews with two CS Chain managers reveal that, while starting wages at this chain are the same for all employees at any given store, wage increases are determined based on the employee's experience and performance (captured by the "employee skills" measure). A store manager explained: "*Their wages get higher the longer they have worked with us… We have performance evaluations for the cashiers every three months. If they get a bad performance evaluation, we will hold the raise, but even if they get good performance, it doesn't mean that they will get a raise because they*

will only get a raise every year." Interviews with store managers of convenience stores in our NACS sample reveal that most starting employees from a given store receive the same wage when they are first hired, but managers from some convenience stores indicated that they occasionally make small adjustments to the starting wage based on the employee's experience. To the extent employee experience is positively associated with honesty we expect experience to be negatively related with theft.

For both the NACS and the CS chain samples, we also control for *Income per capita* to account for economic pressures that may affect the behavior of employees. In the NACS Chain dataset, we also control for *Corporate monitoring spending* and *Employee age*. Monitoring spending should deter employee theft by increasing the probability of theft detection and in turn the expected costs of stealing (Nagin et al. 2002). Regarding employee age, Hollinger and Clark (1983) suggest that younger employees are more likely to steal. However, a recent study suggests that while younger employees are more likely to engage in merchandise theft, their older peers are more likely to steal cash based on financial needs (Fisher and Green 1998, p.298).

We obtain our employee turnover measure from internal records at CS Chain and the store-level survey from NACS, respectively. Our employee experience at CS Chain is obtained from their internal records on employee tenure. The income per capita measure comes from the 2000 U.S. Census. The corporate monitoring spending, employee experience and employee age measures used in the NACS sample come from a chain-level survey (rather than the store-level survey described above) from NACS. The addition of these controls results in a CS Chain sample of 76 stores, and a NACS sample of 133 store-years (128 store-years when we add coworker presence to the analyses).

As shown in Table 6, our main results for both the CS Chain sample and the NACS sample are robust to the inclusion of all of these variables, yet the effect of relative wages on cash shortage becomes insignificant in the CS Chain sample. Additionally, we find that there are significantly positive associations between employee turnover and both inventory shrinkage and cash shortage (in both the CS Chain and NACS samples). We find that employee experience and income per capita are insignificantly related to both inventory shrinkage and cash shortage (in both the CS Chain and NACS samples). In the NACS sample, we find a positive association between employee age and cash shortage, suggesting that older employees are more likely to steal than younger employees. We also find that corporate monitoring spending is significantly negatively related to cash shortage, consistent with our expectation that stronger corporate monitoring reduces employee theft.

Second, we estimate all the regression models (Tables 3 through 5) using alternative wage benchmarks. We consider two sets of alternative measures:

(a) We measure relative wages as the difference between the average hourly wage for a store's employees and the *mean* (instead of *median*) of the benchmark wages (hourly wages for sales cashiers in the same MSA for CS Chain and 88% of hourly wages for sales cashiers in the same MSA for NACS). These alternative specifications do not substantively change any of our results in Tables 3, 4 or 5.

(b) We consider an alternative benchmark for the NACS Chain sample, using the median starting hourly wages of all the convenience stores in the NACS dataset

that were in the same region as the store[19] rather than 88% of the median hourly wages of sales cashiers reported in the BLS website. Thus, for the NACS dataset, *Relative Wages* is calculated as the difference between the starting hourly wage in a store and the median starting hourly wage of all the convenience stores in the same NACS region that the store is located. Using this alternative benchmark does not change the results presented in any of the tables.

Third, we consider alternative definitions for our employee theft proxies. Instead of scaling cash shortages and inventory shrinkage by sales, we scale them by store size (measured as store square feet). The advantage of using store size rather than sales to scale our theft measures is that store size cannot be affected by employee behavior (while sales might be affected by employees, based on whether they receive higher or lower pay). Using this alternative definition of our dependent variable yields similar results to those presented in Tables 3 through 5.

Fourth, for both the CS Chain and the NACS datasets, we eliminate influential observations, that is, observations for which the Cook's Distance is higher than 4/N (where N is the number of observations in the sample). We obtain similar results in all of our regressions (equivalent to Tables 3 through 5), except that not only positive relative wages, but also negative relative wages become negatively associated to theft in Table 4.

Finally, for the NACS dataset, we use robust standard errors double-clustered by store and by chain to address correlation problems from same-store observations across years as well as same-chain observations (Petersen 2009). The results are qualitatively similar to those reported in Tables 3 to 5.

[19]The NACS compensation survey defines six regions based on geographical location in the U.S. (i.e., Northeast, Southeast, Midwest, Southwest, Plains, and West).

V. CONCLUSION

The objective of this study is to examine the extent to which relative wages mitigate employee theft. Using two complementary store-level datasets from the convenience store industry, we find that relative wages are associated with lower employee theft. We also find that employee theft decreases in the magnitude of overpayment but does not increase in the magnitude of underpayment. Finally, we find that relative wages and coworker presence interact to influence theft (as measured by inventory shrinkage) such that coworker presence is associated to lower inventory shrinkage when relative wages are higher. In summary, results of our study shed light on the impact of compensation practices on shaping employee honesty and ethical norms in organizations.

Our research contributes to the efficiency wage and management control literature by identifying an additional benefit of efficiency wages that has not been fully explored in prior literature. While previous studies have focused on the effect of relatively higher wages on employee effort and/or turnover, we document the effect of relatively higher wages on employee theft. In doing so, we provide an additional argument for why some employers offer wage premiums and suggest an alternative honesty-inducing mechanism to other internal control mechanisms studied in the accounting literature. Our study also contributes to the literature on social norms by showing that the presence of coworkers is more likely to promote ethical norms of behavior when employees are paid relatively higher wages. Consistent with insights from recent experimental studies conducted by accounting researchers (e.g., Tayler and Bloomfield 2011; Hannan et al. 2011), we show that compensation practices, as part of the formal control systems, can shape the social context of the work group, which, in turn, influences employee theft.

The results of our study have important practical implications for managers. Understanding the full benefits of wage premiums should help managers determine employee wage levels. However, previous research provides little guidance to managers regarding the benefit of wage premiums in curbing employee theft. Our research provides systematic empirical evidence that wage premiums do play a role in reducing employee theft and fostering more ethical norms within an organization. These results lend support to Pfeffer (1994)'s argument that paying higher-than-market wages helps companies effectively manage their employees as a way to produce sustainable competitive advantage. Takeaways from our study are likely to apply to other types of retailers (such as restaurants, department stores, drug stores, etc.), and to service or consumer products firms with similar monitoring environments, where the payoffs from stealing are not disproportionately high relative to potential wage premiums (e.g. casinos).

An interesting result of our study is that the benefit of reducing the amount of employee theft accounted by cash shortages and inventory shrinkage does not, by itself, outweigh the cost of paying a wage premium. Yet it accounts for 42% of the cost of a wage increase. An employer may find it economically beneficial to raise employee wages only if other benefits from wage increases (e.g. reduced employee turnover, greater effort) translate into at least 58% of the cost of the wage increases. Our finding also suggests that the benefits from increasing employee pay are likely to be greater if firms use multiple employees per shift to staff their stores because higher wages also induce more ethical norms among the coworkers.

The results of this study should be interpreted with some caveats in mind. As we mention above, neither inventory shrinkage nor cash shortages measure employee theft

without error. Moreover, both measures capture only the *suspected* level of theft, not the *actual* level of employee theft. Nevertheless, these measures provide reasonable proxies for employee theft in the convenience store industry and our study advances our understanding of the impact of employee pay on workplace honesty. Additionally, due to data restrictions, we obtained our relative wages measures using the prevailing wages in the store's MSA as a benchmark. If finer-grained data became available from government sources such as the U.S Bureau of Labor Statistics (e.g., prevailing wage at the zip code level), future research could examine more precise measures of relative wages.

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Table 1
Descriptive Statistics

	CS Chain						NACS					
	N	Mean	Std Dev	Min	Median	Max	N	Mean	Std Dev	Min	Median	Max
Cash Shortage (as % of sales)	76	0.33	0.29	0.01	0.26	2.06	327	0.36	0.48	0.00	0.17	2.58
Shrinkage (as % of sales)	76	1.85	0.87	0.22	1.67	4.89	-	-	-	-	-	-
Sales ($mil)	76	1.12	0.28	0.64	1.10	1.86	327	1.60	0.93	0.29	1.30	5.30
Wages ($)	76	8.25	0.63	6.85	8.16	10.17	327	7.20	0.59	6.00	7.00	8.63
Relative Wages ($)	76	0.93	0.59	-0.28	0.86	2.77	327	0.55	0.61	-1.57	0.51	1.83
Opening Hours Per Day	76	23.21	1.86	18	24	24	325	22.77	2.50	12.29	24	24
Coworker Presence	76	1.81	0.41	1.24	1.67	3.58	314	2.62	1.13	1.07	2.27	6.51
Employee Skills	76	3.36	0.53	2.35	3.21	4.78	-	-	-	-	-	-
Store Manager Turnover	76	0.22	0.57	0.00	0.00	3.39	327	0.25	0.50	0.00	0.00	3.00
Property Crimes Per Capita	76	0.03	0.00	0.02	0.03	0.04	327	0.04	0.01	0.00	0.04	0.06
Unemployment	76	3.11	0.69	2.10	3.00	6.10	327	5.13	0.88	3.40	5.10	7.60

This table presents descriptive statistics for the main variables for the CS Chain sample (n = 76) and the NACS sample (n = 419), respectively. *Cash Shortage (as % of sales)* is cash shortage divided by total sales revenue of the store, multiplied by 100. *Inventory Shrinkage (as % of sales)* is inventory shrinkage divided by total sales revenue of the store, multiplied by 100. *Sales* is annual sales revenue of the store in millions. *Wages* is average wage for all hourly employees for CS Chain and starting wage for entry-level employees for NACS. For CS Chain, *Relative Wages* is calculated as the difference between the average hourly wage for employees in a store and the median hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in. For NACS, *Relative Wages* is calculated as the difference between the starting hourly wage in a store and 88% of the median hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in (88% is the adjustment required to make median hourly wages in the MSA comparable to starting wages). *Opening Hours Per Day* is how many hours the store is open each day. *Coworker Presence* is calculated as total annual labor hours divided by total annual opening hours for each store. *Employee Skills* is the average rating of hourly employees in the store based on service and operations, with higher skills corresponding to higher ratings on a 1 to 5 scale. *Store Manager Turnover* is calculated as total number of store manager terminations divided by total number of store managers per year. *Property Crime Per Capita* is the number of property crimes per capita that occurred in 1999 (for the CS Chain dataset) and 2004 (for the NACS dataset) in the Metropolitan Statistical Area where the store is located as reported by the FBI. *Unemployment* is measured with the 1999 (for the CS Chain dataset) and 2004 (for the NACS dataset) unemployment rates reported by the U.S. Bureau of Labor Statistics for the Metropolitan Statistical Area that the store is located in.

Table 2
Correlation Matrices

Panel A: CS Chain

	V1	V2	V3	V4	V5	V6	V7	V8
V1: Cash shortage	1.000							
V2: Shrinkage	0.493***	1.000						
V3: Relative Wages	-0.252**	-0.292**	1.000					
V4: Coworker Presence	0.036	0.169	0.279**	1.000				
V5: Employee Skills	-0.068	-0.138	-0.010	0.016	1.000			
V6: Store Manager Turnover	0.160	0.131	0.023	-0.058	0.050	1.000		
V7: Property Crimes Per Capita	0.097	-0.035	-0.186	-0.145	-0.032	-0.151	1.000	
V8: Unemployment	0.285**	0.141	-0.130	-0.040	-0.000	-0.070	0.621***	1.000

Panel B: NACS

	V1	V2	V3	V4	V5	V6
V1: Cash shortage	1.000					
V2: Relative Wages	-0.206***	1.000				
V3: Coworker Presence	-0.268***	0.072	1.000			
V4: Store Manager Turnover	0.093*	0.075	-0.152***	1.000		
V5: Property Crimes Per Capita	0.167***	-0.072	-0.313***	0.158***	1.000	
V6: Unemployment	0.006	-0.086	0.240***	-0.068	-0.033	1.000

This table presents Pearson correlations between the main variables as defined in the Appendix. Panel A presents Pearson correlations for the CS Chain dataset and Panel B presents Pearson correlations for the NACS dataset. *, **, and *** indicate that the correlation is significant at the 0.10, 0.05, and 0.01 level, respectively.

Table 3
Relation between Relative Wages and Employee Theft

$$Theft_{it} = \beta_0 + \beta_1 \, Relative\ Wages_{it} + \beta_2 \, Employee\ Skills_{it} + \beta_3 \, Store\ Manager\ Turnover_{it} + \beta_4 \, Property\ Crimes\ Per\ Capita_{it} + \beta_5 \, Unemployment_{it} + \beta_6 \, Year2004 + \varepsilon_{it}$$

	Predicted	CS Chain Shrinkage	CS Chain Cash Shortage	NACS Cash Shortage
Intercept	?	3.587***	0.413	0.201
		(3.63)	(1.26)	(0.55)
Relative Wages	-	-0.452***	-0.116**	-0.171**
		(-2.78)	(-2.15)	(-2.13)
Employee Skills	-	-0.253*	-0.045	-
		(-1.43)	(-0.77)	
Store Manager Turnover	+	0.196	0.088*	0.086
		(1.16)	(1.57)	(0.96)
Property Crimes Per Capita	+	-55.489	-11.136	5.082
		(-1.69)	(-1.02)	(1.22)
Unemployment	?	0.327*	0.150**	-0.006
		(1.86)	(2.57)	(-0.12)
Year2004	?	–	–	0.096
				(1.07)
Number of Observations		76	76	327
Adjusted R-Squared		0.114	0.121	0.080

t-statistics are reported in parentheses. *, **, and *** denote the coefficients are significant at the 0.1, 0.05, and 0.01 levels, respectively, based on one-tailed tests for directional predictions and two-tailed tests otherwise. See the Appendix for variable definitions. For the NACS dataset, the estimates are based on chain-clustered standard errors (Petersen 2009). We include a year dummy (which is equal to "1" if the year is 2004, and "0" otherwise) for the NACS data to control for year fixed effect

Table 4
Effects of Positive Relative Wages and Negative Relative Wages on Employee Theft

$$Theft_{it} = \beta_1 Positive_{it} + \beta_2 Negative_{it} + \beta_3 Positive\ Relative\ Wages_{it} + \beta_4 Negative\ Relative\ Wages_{it} + \beta_5 Store\ Manager\ Turnover_{it} + \beta_6 Property\ Crimes\ Per\ Capita_{it} + \beta_7 Unemployment_{it} + \beta_8 Year2004 + \varepsilon_{it}$$

	Predicted	NACS Cash Shortage
Positive	?	0.226
		(0.72)
Negative	?	-0.066
		(-0.17)
Positive Relative Wages	-	-0.304**
		(-2.10)
Negative Relative Wages	-	-0.221
		(-1.25)
Store Manager Turnover	+	0.091
		(0.99)
Property Crimes Per Capita	+	5.048
		(1.28)
Unemployment	?	0.015
		(0.28)
Year2004	?	0.088
		(1.02)
Number of Observations		327
Adjusted R-Squared		0.432

t-statistics are reported in parentheses. *, **, and *** denote the coefficients are significance at the 0.1, 0.05, and 0.01 levels, respectively, based on one-tailed tests for directional predictions and two-tailed tests otherwise. *Positive* is an indicator variable that is equal to "1" if *Relative Wages* is greater than or equal to zero, and "0" otherwise. *Negative* is an indicator variable that is equal to "1" if *Relative Wages* is less than zero, and "0" otherwise. *Positive Relative Wages* is *Relative Wages* multiplied by *Positive*. *Negative Relative Wages* is *Relative Wages* multiplied by *Negative*. See the Appendix for definitions of the other variables. The estimates in the NACS sample are based on chain-clustered standard errors (Petersen 2009). We include a year dummy (which is equal to "1" if the year is 2004, and "0" otherwise) to control for year fixed effects.

Table 5
Effects of Relative Wages, Coworker Presence, and the Interaction Between Relative Wages and Coworker Presence on Employee Theft

$$Theft_{it} = \beta_0 + \beta_1 \, Relative\ Wages_{it} + \beta_2 \, Coworker\ Presence_{it} + \beta_3 \, Relative\ Wages_{it} \times Coworker\ Presence_{it} + \beta_4 \, Employee\ Skills_{it} + \beta_5 \, Store\ Manager\ Turnover_{it} + \beta_6 \, Property\ Crimes\ Per\ Capita_{it} + \beta_7 \, Unemployment_{it} + \beta_8 \, Year2004 + \varepsilon_{it}$$

	Predicted	CS Chain Shrinkage	CS Chain Cash Shortage	NACS Cash Shortage
Intercept	?	3.231***	0.301	0.128
		(3.52)	(0.94)	(0.33)
Relative Wages	-	-0.455***	-0.122**	-0.143*
		(-2.69)	(-2.07)	(-1.69)
Coworker Presence	?	0.724***	0.097	-0.098***
		(2.94)	(1.13)	(-4.06)
Relative Wages × Coworker Presence	-	-0.453**	-0.039	0.040
		(-1.83)	(-0.46)	(0.91)
Employee Skills	-	-0.300**	-0.050	-
		(-1.76)	(-0.83)	
Store Manager Turnover	+	0.178	0.088*	0.075
		(1.09)	(1.54)	(0.85)
Property Crimes Per Capita	+	-51.46	-10.172	2.519
		(-1.62)	(-0.92)	(0.58)
Unemployment	?	0.332*	0.148**	0.011
		(1.97)	(2.51)	(0.21)
Year2004	?	–	–	0.095
				(1.01)
Number of Observations		76	76	314
Adjusted R-Squared		0.198	0.112	0.120

t-statistics are reported in parentheses. *, **, and *** denote the coefficients are significant at the 0.1, 0.05, and 0.01 levels, respectively, based on one-tailed tests for directional predictions and two-tailed tests otherwise. See the Appendix for variable definitions. Variables used in the interaction terms are mean-centered before being included in the analysis (Aiken and West 1991). The estimates in the NACS sample are based on chain-clustered standard errors (Petersen 2009). We include a year dummy (which is equal to "1" if the year is 2004, and "0" otherwise) for the NACS data to control for the year fixed effect.

Table 6
Replication of Results in Table 3 (Test of H1) and Table 5 (Test of H2) After Including Additional Control Variables

Panel A: CS Chain

		Test of H1		Test of H2	
	Predicted	CS Chain Shrinkage	CS Chain Cash Shortage	CS Chain Shrinkage	CS Chain Cash Shortage
Intercept	?	2.871***	-0.157	2.826***	-0.203
		(2.63)	(-0.47)	(2.75)	(-0.61)
Relative Wages	-	-0.280*	-0.063	-0.315**	-0.064
		(-1.60)	(-1.17)	(-1.70)	(-1.06)
Coworker Presence	?			0.623***	0.035
				(2.58)	(0.44)
Relative Wages × Coworker Presence	-			-0.396**	-0.026
				(-1.66)	(-0.33)
Employee Skills	-	-0.226	-0.018	-0.282*	-0.022
		(-1.30)	(-0.34)	(-1.68)	(-0.39)
Employee Experience	-	0.001	0.002	0.003	0.002
		(0.18)	(0.89)	(0.39)	(0.90)
Store Manager Turnover	+	0.261*	0.084*	0.253*	0.083*
		(1.51)	(1.58)	(1.47)	(1.49)
Employee Turnover	+	0.208***	0.100***	0.183***	0.098***
		(3.11)	(4.82)	(2.81)	(4.64)
Property Crimes Per Capita	+	-54.169	-7.127	-53.246	-7.128
		(-1.69)	(-0.72)	(-1.71)	(-0.71)
Unemployment	?	0.329*	0.152***	0.343**	0.153***
		(1.94)	(2.91)	(2.09)	(2.88)
Income Per Capita		-0.005	0.001	-0.005	0.001
		(-0.75)	(0.63)	(-0.88)	(0.60)
Number of Observations		76	76	76	76
Adjusted R-Squared		0.210	0.323	0.269	0.305

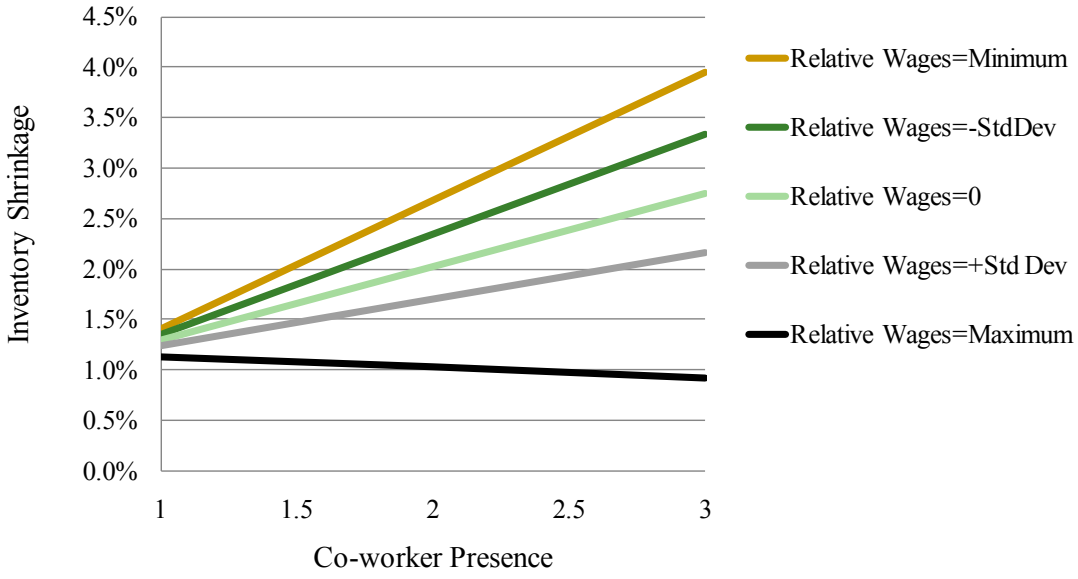
Table 6 (Cont.)

Panel B: NACS

	Predicted	Test of H1 NACS Cash Shortage	Test of H2 NACS Cash Shortage
Intercept	?	-0.389 (-1.13)	-0.239 (-0.66)
Relative Wages	-	-0.109** (-2.02)	-0.048 (-0.75)
Coworker Presence	?		-0.062*** (-2.69)
Relative Wages × Coworker Presence	-		0.006 (0.23)
Employee Experience	-	-0.161 (-0.85)	-0.127 (-0.70)
Employee Age	?	0.989** (2.28)	0.601* (1.34)
Store Manager Turnover	+	0.066 (1.04)	0.049 (0.87)
Employee Turnover	+	0.092*** (3.81)	0.094*** (5.20)
Corporate Monitoring Spending	-	-8.713 (-1.26)	-9.935** (-1.49)
Property Crimes Per Capita	+	-0.357 (-0.22)	-0.274 (-0.20)
Unemployment	?	0.005 (0.22)	0.009 (0.39)
Income Per Capita	-	-0.002 (-0.77)	-0.0002 (-0.08)
Year2004	?	0.035 (0.50)	0.028 (0.42)
Number of Observations		133	128
Adjusted R-Squared		0.256	0.313

t-statistics are reported in parentheses. *, **, and *** denote the coefficients are significant at the 0.1, 0.05, and 0.01 levels, respectively, based on one-tailed tests for directional predictions and two-tailed tests otherwise. See the Appendix for variable definitions. Variables used in the interaction terms are mean-centered before being included in the analysis (Aiken and West 1991). The estimates in the NACS sample are based on chain-clustered standard errors (Petersen 2009). We include a year dummy (which is equal to "1" if the year is 2004, and "0" otherwise) for the NACS data to control for the year fixed effect.

Figure 1
Interaction Effect of Relative Wages and Coworker Presence on Inventory Shrinkage



Appendix
Variable Definitions

Measures	CS Chain	NACS
Dependent Variables		
Theft • Shrinkage • Cash shortage	(1) Inventory shrinkage scaled by store sales and multiplied by 100 (2) Cash shortage scaled by store sales and multiplied by 100	Cash shortage scaled by store sales and multiplied by 100
Main Independent Variables		
Relative wages	***Main analysis:*** Difference between the average hourly wage in a store and the *median* hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in ***Robustness tests:*** Difference between the average hourly wage for employees in a store and the *mean* hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in	***Main analysis:*** Difference between the starting hourly wage in a store and 88% of the *median* hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in (88% is the adjustment required to make median hourly wages in the MSA comparable to starting wages). ***Robustness tests:*** • Difference between the starting hourly wage for employees in a store and 88% of the *mean* hourly wage for cashiers in sales organizations in the same Metropolitan Statistical Area that the store is located in. • Difference between the starting hourly wage in a store and the *median* starting hourly wage of all the convenience stores in the same region that the store is located (NACS defines six geographical regions: Northeast, Southeast, Midwest, Southwest, Plains, and West)
Coworker presence	Total annual labor hours divided by the total annual opening hours for each store	Total annual labor hours divided by the total annual opening hours for each store
Controls for employee characteristics		
Employee skills	Average rating of hourly employees in the store based on service and operations, with higher skills corresponding to higher ratings on a 1 to 5 scale	Not available
Employee experience *(Robustness test)*	Average number of months of experience (tenure) of the hourly employees in a store	Percentage of employees in the chain who have over one year of experience
Employee age *(Robustness test)*	Not available	Percentage of employees in the chain who are over 24 years old

Appendix
Variable Definitions (Cont.)

Measures	CS Chain	NACS
Controls for monitoring difficulty and monitoring spending		
Store manager turnover	Total number of store manager terminations divided by the total number of store managers per year multiplied by 100 for a given store	Total number of store manager terminations divided by the total number of store managers per year multiplied by 100 for a given store
Employee turnover *(Robustness test)*	Total number of hourly employee terminations divided by the total number of hourly employees at year end for a given store	Total number of hourly employee terminations divided by the total number of hourly employees at year end for a given store
Corporate monitoring spending *(Robustness test)*	N/A – This is only one chain. Thus, corporate monitoring spending is implicitly controlled for.	Corporate security spending divided by the total direct operating expenses across all the stores of the chain. Security spending typically includes monitors, alarms, security personnel, and armored-car pick-ups.
Controls for socioeconomic environment		
Property crimes per capita	Property crimes per capita that occurred in 1999 in the same Metropolitan Statistical Area where the store is located, as reported by the FBI.	Property crimes per capita that occurred in 2004 in the same Metropolitan Statistical Area where the store is located, as reported by the FBI
Unemployment	1999 unemployment rates reported by the U.S. Bureau of Labor Statistics for the Metropolitan Statistical Area where the store is located	2004 unemployment rates reported by the U.S. Bureau of Labor Statistics for the Metropolitan Statistical Area where the store is located
Income per capita *(Robustness Test)*	Income per capita in 2000 in the zip code where the store is located	Income per capita in 2000 in the zip code where the store is located