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Do Higher Wages Pay for Themselves? An Intra-firm Test of the Effect of Wages on Employee Performance

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ABSTRACT

This study uses field data from 490 hotels in a single lodging chain to investigate three questions related to the efficiency-wage hypothesis. (1) Does paying workers higher relative wages *ex ante* result in better *ex post* actual performance, either by motivating workers to exert greater effort or by attracting higher quality workers? (2) Is the magnitude of the relation between performance and wages the same when workers are overpaid versus underpaid? (3) Do the overall benefits of paying higher wages outweigh the costs? The data enable us to perform powerful tests of wage-performance relations because exogenous factors that likely affect employee behavior are standardized across hotels. Our results suggest that actual performance (measured by customer satisfaction, revenues, and profit) is increasing in the relative wage, and that higher performance is the result, and not the cause, of higher wages. We find that the magnitude of the wage-performance relation is at least as large for workers who are overpaid compared to those who are underpaid. This result, which differs from the results of experimental studies, suggests that overpaid workers do not rationalize away wage premiums. Finally, our results indicate that increases in wages do, in fact, pay for themselves. A $1,000 increase in the general manager's relative wage results in a $1,080 increase in profit for the mean hotel. This research contributes to a series of studies that investigates the extent to which wages influence performance (*e.g.*, Levine, 1992; Fehr and Falk, 1999; Hannan, Kagal, and Moser, 2002; Hannan, 2005), and whether the marginal benefit of wage increases justifies their costs (Levin, 1993).

Key Words: efficiency wages, implicit contracts, relative wages

Data Availability: The confidentiality agreement with the firm that provided data for this study precludes revealing its identity and disseminating data without its written consent.

1. Introduction

The efficiency-wage hypothesis posits that when the productivity of workers is determined by wages, employers will increase wages until the marginal benefit of higher wages offsets the increase in the wage bill. Implicit in this hypothesis is the assumption that paying workers higher wages *ex ante* results in higher productivity *ex post* by motivating employees to exert greater effort or by attracting higher quality workers. Explicit in the hypothesis is the conjecture that increases in wages pay for themselves through increased productivity. Efficiency-wage assumptions and implications have been investigated at length in the economics, sociology, and accounting literatures; however, there have been relatively few attempts to empirically test the link between wages and actual performance with field data.

Using data on 490 hotels in the same lodging chain, we address three fundamental questions proposed by the efficiency-wage hypothesis. The first question is: do higher wages lead to better performance? Several archival studies link relative wages to self-reported effort, job satisfaction, commitment, and intentions to quit (Akerlof *et al*., 1988; Levine, 1993; Peffer and Langton, 1993); however, few investigate actual performance because it is difficult to empirically establish whether higher wages are the cause or the result of better performance (Wadhwani and Wall, 1991; Levine, 1992).[1] Second, is the magnitude of the hypothesized positive relation between performance and relative wages the same when workers are underpaid versus overpaid? Sociological theories contend that workers who are overpaid tend to increase their own psychological evaluations of their inputs until they equal their wages; those who are underpaid tend to quit or decrease effort levels until they are commensurate with their wages. Experimental evidence generally supports this prediction; however, the few archival studies that

[1] Several laboratory experiments that control for selection and performance incentives find that employees choose higher effort levels when they are paid higher than expected wages (e.g., Fehr and Gachter, 2000, Hannan *et al*., 2002, Hannan, 2005).

address this asymmetry find that the wage-performance relation is stronger for overpaid workers. The third question we address is: do the overall benefits of paying higher wages outweigh the costs? In equilibrium, the benefits should equal the costs, yet there is little empirical support for this premise because prior research has not been able to determine the total cash value of increases in performance (Levine, 1992; Capelli and Chauvin, 1992; Chen and Sandino, 2012). Within-firm data enable us to overcome many of the limitations encountered in cross-firm tests of efficiency-wage predictions. Accordingly, this research contributes to a series of studies that investigate the extent to which compensation influences performance in the absence of explicit pay-for-performance incentives (*e.g.*, Levine, 1992; Fehr and Falk, 1999; Hannan, Kagal, and Moser, 2002; Hannan, 2005).

We investigate our research questions using a proprietary data set containing detailed compensation and performance information on 490 individually-managed hotels in a single domestic U.S. lodging chain. The data enable us to perform powerful tests of wage-performance relations because exogenous factors that likely affect employee behavior are standardized across hotels. The hotel general managers (GMs) in this study perform the same job, receive the same training and benefits, are subject to the same compensation and personnel policies, and are evaluated using the same metrics. A key GM performance indicator, controllable profit, enables us to quantify any cash benefit associated with higher levels of GM remuneration. The GMs in our study are paid a standard salary and housed in a small rent-free apartment in the hotel, thus total remuneration for each GM is the sum of her salary and the rental value of the apartment. Differences in rental housing costs across hotel locations give rise to significant variation in the total value of GM remuneration. We exploit this variation to test efficiency-wage predictions.

Consistent with the fundamental assumption underlying relative-wage theories, our results indicate that hotel performance is positively associated with the relative wage received by the GM. Customer satisfaction, revenue per available room, and controllable profit are significantly ($p < 0.05$, one-tailed) increasing in the relative wage. Consistent with prior research, the likelihood that the GM quits (or is dismissed) is negatively and marginally significantly ($p < 0.10$, one-tailed) associated with the relative wage. Our second research question asks whether the wage-performance relation is symmetric for workers who are underpaid compared with those who are overpaid. We find that changes in customer satisfaction and turnover in response to wage changes are significantly larger ($p < 0.05$, two-tailed) for workers who are overpaid relative to those who are underpaid; changes in revenue and controllable profit per room in response to wage changes do not differ significantly between underpaid and overpaid workers. Thus, our results do not support variants of equity theory contending that overpaid workers are more likely to reassess the value of their inputs than underpaid workers. Finally, our results indicate that increases in the marginal benefit of paying higher wages is at least as large as the marginal cost of paying higher wages. A $1,000 increase in GM compensation is associated with a $1,080 net increase in profit. This is the first study of which we are aware that demonstrates that the incremental benefit derived from paying higher wages is at least as large as the incremental cost, and thus provides strong support for the efficiency-wage hypothesis.

The remainder of this paper is organized into four sections. In the next section we develop our hypotheses. Section 3 discusses our data and the research design. Section 4 presents the empirical analyses and results. The last section concludes the paper.

2. Literature Review and Hypotheses

2.1 Relative Wages and Performance

The efficiency wage hypothesis posits that when the productivity of observable identical workers is determined by wages, employers will increase wages until the marginal benefit of higher wages offsets the increase in the wage bill. Accordingly, firms that pay high wages are predicted to have better performance arising from higher worker output and lower turnover. Implicit in the hypothesis is the assumption that paying workers higher wages *ex ante* results in higher productivity *ex post.* Below we discuss three different justifications for this premise (see Yellen, 1984 for a review).

Economic models (*e.g.*, Shapiro and Stiglitz, 1984) show that above-market wages deter shirking because they make workers' jobs more valuable. In these models, workers exercise some discretion in the amount of effort they put forth because performance measures do not perfectly capture employee effort, and it is costly for employers to monitor a worker's every action. In such settings, paying wage premiums above the market-clearing wage may be an effective way for firms to provide workers with the incentive to exert more effort and engage in less shirking.

Adverse selection provides a second rationalization for efficiency wage predictions (Weiss, 1980). Selection models assume that workers are heterogeneous in their ability, that the firm has imperfect information on applicants' abilities, and that ability and reservation wages are positively correlated. In this setting, firms offering higher wages will attract more capable applicants who will exhibit higher levels of performance. Conversely, those offering relatively low wages will attract less capable applicants.

A third justification for efficiency wages is rooted in sociological theories on gift exchange and reciprocity. These theories posit that relative wage levels determine employees' perceptions of whether they are being treated fairly, which in turn, influence employees' effort levels (Akerlof, 1982 & 1984, Akerlof and Yellen, 1990; Fehr and Gachter, 2000). Workers develop a conception of what constitutes a fair wage by comparing their wages to the wage received by workers in the same or similar jobs. Workers who perceive that they are being paid more than what constitutes a fair wage will reciprocate with their employer by worker harder. When workers are not receiving a wage they think is fair, they adjust their production downward to correspond to the pay received.

Both experimental and archival researchers have investigated the proposed effects of higher wages. Sociological experiments on gift exchange and reciprocity generally support the premise that workers who are paid higher wages reciprocate by choosing higher effort levels, even though they could not be rewarded *ex post* for the incremental effort (*e.g.*, Fehr and Falk, 1999, Hannan *et al*., 2002, Hannan, 2005). These experiments do not, however, address the effects of shirking or selection. Several archival studies support (although not unanimously) a positive association between wages and perceptual measures related to performance, including higher levels of self-reported effort and commitment (Levine, 1993), worker satisfaction (Akerlof, Rose, and Yellen, 1988, Pfeffer and Langton, 1993, Levin, 1993), and performance ratings (Holzer, 1989). Yet, few studies have investigated whether paying above-market wages improves *actual* performance because it is difficult to establish whether higher wages are the cause or the result of better performance (Capelli and Chauvin, 1992, p. 770). Moreover, identifying and controlling for exogenous, nonwage factors that affect worker productivity, such as differences in worker and job characteristics, is problematic.

Two relevant studies investigate the link between relative wages and actual productivity by augmenting a standard production function with measures of the average relative wage for a firm or business unit. In a cross-firm study of 219 U.K. manufacturing firms, Wadhwani and Wall (1991) regress changes in sales on changes in relative wages and a set of production-related variables (number of employees, capital stock, *etc.*), and they find that changes in sales are positively correlated with changes in relative wages. Levine (1992) obtains similar results in a sample of 369 business units. Neither study can conclusively determine whether wage increases drive sales growth or whether sales growth causes wages to increase. The later will be the case if firms share the proceeds of greater productivity with workers or firms use incentive contracts to reward performance. Wadhwani and Wall (1991) calculate an average wage for each firm by dividing remuneration for all employees by the number of employees without attempting to address differences in worker skill, job characteristics, or wage-productivity relationships within or across firms. Levine (1992) obtains the average wage for a business unit relative its top three competitors in the same product market; however, averaging across workers and jobs, even within the same product market, is still problematic. A third firm-level study by Leonard (1987) regresses sales levels on wage levels and finds no relation. We address many of the limitations of cross-firm studies by conducting intra-firm tests of managers performing the same job, within the same company, but receiving different levels of remuneration.

Although theoretical and experimental research suggests a positive relation between wages and performance, we may not observe a positive relation in practice for two reasons (Chen and Sandino, 2012, p. 973). First, employees may not actively benchmark their wages against those of comparable employees, and thus, they may not perceive themselves as being over- or undercompensated. Benchmarking may be particularly difficult for the hotel mangers in our

study because part of their remuneration is housing. Second, prior studies show that employees rationalize wage deviations over time as they reassess the value of their inputs. Still, given the strong theoretical and experimental support for efficiency-wage prediction, we predict that relative wages will be positively correlated with actual performance as stated in H1a.

H1a: Relative wages are positively associated with performance.

Higher wages also have positive implications for turnover. The economic reasoning underlying labor turnover is similar to that for shirking (Salop, 1979). Higher wages make workers' jobs more valuable; therefore, they will be more reluctant to quit or engage in dysfunctional behavior that could get them fired. Sociological theories also support a negative relation between relative wages and turnover. When people perceive that they are not receiving a fair wage they may quit rather than adjust production downward. Empirical research provides strong support for a negative relation between relative wages and turnover (*e.g.*, Akerlof *et al*., 1988, Holzer, 1990, Levin, 1993) and disciplinary dismissals (Capelli and Chauvin, 1992). Accordingly, we predict that GM terminations will be decreasing in the relative wage, as stated in H1b.

H1b: Relative wages are negatively associated with the likelihood that a manager quits or is terminated.

2.2 The Performance Effects of Being Overpaid versus Underpaid

We also investigate whether the magnitudes of the wage-performance and wage-turnover relations are the same when manager compensation is above and below the median. Theories on adverse selection and shirking predict no difference in the magnitudes. The correlation between relative wages and the ability of the job applicant pool should be constant across all wage levels. Similarly, the value of a worker's job is directly proportional to the relative wage. Income

effects have the potential to weaken the wage-performance more when individuals are overpaid versus underpaid because income effects are increasing in wages.

In contrast to economic models that assume humans are exclusively self-interested, some sociological research suggests that wage-performance and wage-turnover relations will be smaller for workers who are overpaid compared with those who are underpaid (Akerlof and Yellen, 1990; Gneezy and List, 2006). If workers perceive that their inputs are not equal to the value of their remuneration, they may reassess the value of their own inputs rather than adjusting actual inputs. It is more likely that overpaid workers will adjust their own psychological evaluations of their labor inputs upward than underpaid workers will adjust their evaluations downward (Hatfield and Sprecher, 1984).

Experiments generally show a stronger performance response for underpaid workers relative to overpaid workers, while archival studies find the opposite. In a study of 52 U.S. firms, Levin (1993) finds no evidence that overpayment leads workers to reevaluate their inputs, or that underpayment leads them to report lower job satisfaction, pay satisfaction, or commitment. In fact, the relation between wages and outcome variables is at least as strong for workers who are overpaid than for those that are underpaid. Chen and Sandino (2012) find a similar result in their study of the effects of relative wages on theft. Employee theft decreased significantly in the magnitude of the overpayment, but theft was not significantly associated with the magnitude of the underpayment. Given mixed results of experimental and archival research on responses to underpayments and overpayments, we pose the following research question.

> *RQ 1: Is the magnitude of the relation between relative wages and performance (turnover) the same for managers who make less than the median wage compared with those who make more?*

3. Data and Research Design

3.1 Data

To test our hypotheses, we obtained internal data from a U.S. lodging chain. These data included income statements, customer satisfaction scores, property characteristics and employee demographics for the year 2010. In addition, we gathered local unemployment, wage, and rental housing data for each hotel. The county-level unemployment rate was obtained from the Bureau of Labor Statistics at http://www.bls.gov. Housing rent data came from Zillow at http://www.zillow.com/research/data. After matching hotel data to local area demographic variables, our final sample consisted of 497 observations for most regression models. Before describing the research tests and variables, we begin with a brief description of the research site.

A typical property has 110 rooms and is staffed by a general manager (GM), a head housekeeper, a maintenance worker, six housekeepers and four front desk attendants.[2] GMs, who live in an apartment on-site, have a high degree of autonomy over property management, including recruitment, sales and marketing, and scheduling employee hours. GMs recommend pricing strategy with corporate marketing and conduct sales calls with local businesses. The GM identifies and selects local contractors (e.g., resurfacing the parking lot, landscaping and snow removal) and makes recommendations for major repairs. A good GM routinely inspects the property, engages with his/her employees, trains front desk staff and interacts with customers. In short, management believes the right person in the GM position makes all the difference; that is, a poorly-performing property can be turned around by a good manager and, similarly, a bad manager results in lost sales, higher costs and more customer complaints.

Our setting—an economy lodging chain—offers an empirically powerful setting for tests

[2] While the typical property is 108 rooms in size, the firm operates a limited number of large properties (160+ rooms). Since these properties have the potential differ in many ways (e.g., resort locations with larger staff), they were excluded from our data set.

of the efficiency-wage hypothesis for several reasons. First, as mentioned above, GM decisions and actions directly affect hotel profitability. The efficiency-wage hypothesis is relevant only when employees can exercise significant discretion in the choice of effort levels and their effort levels can materially affect performance (Shapiro and Stiglitz, 1984; Yellen, 1984).

Second, properties are highly similar in size and operation, but spread throughout the country in urban, suburban and rural areas. The production and delivery of services is identical for each hotel. The size of the relationship between wages and performance should not differ across hotels. To limit heterogeneity in service production, we focus on the economy properties operating in a single country and offering only one product: the provision of rooms.[3]

Third, corporate management cannot easily monitor GM actions. Many properties are geographically dispersed and the Regional Managers who oversee GMs typically visit each property only once per month. Customer feedback (e.g., online survey forms, guest cards, social media and complaints), revenue, profit and internal audit ratings are used to evaluate GM performance, but these are imperfect measures of GM effort.

Finally, GMs are bonus-eligible, but these performance-based rewards are small and do not appear to provide much of an incentive. Bonuses, as we will show, are not significantly correlated with GM performance measures, the average (maximum) bonus being just 5.5 (11.5) percent of GM salary. We include the bonus in our tests to control for its effect on performance and to control for GM ability.

3.2 Testing H1a: Relative Wages and Performance

To test Hypothesis 1a, we estimate three models to capture different dimensions of managerial performance. The first model predicts a positive association between relative wages

[3] The firm operates in all segments of the industry, but midscale, upscale and luxury properties offer a larger array of services such as food and beverage outlets, business centers, gift shops, and meeting spaces.

and the first dimension of performance, customer satisfaction:

$$\begin{aligned} \textit{Customer Satisfaction} = \; & \beta_0 + \beta_1 \textit{ Relative Wages} + \beta_2 \textit{ Experienced GM} + \beta_3 \textit{ Skill:Bonus} \\ & + \beta_4 \textit{ Span of Control} + \beta_5 \textit{ Property Size} \\ & + \beta_6 \textit{ Capacity Utilization} + \beta_7 \textit{ Property Age} + \beta_8 \textit{ Renovated} + \varepsilon \end{aligned}$$

Each variable is described below.

Customer Satisfaction is the mean response by customers to an online survey's item regarding their overall guest experience. While the survey encompasses multiple items, the overall experience score is the only item that matters regarding employee compensation.[4] The measure is also highly correlated (r = -.71) with customer complaints, a measure of customer dissatisfaction, hence the negative relationship. The item is a 10-point, Likert-type measure anchored by "Extremely Satisfied" and "Extremely Dissatisfied". *Customer Satisfaction* exhibited a skewed distribution since a small proportion of properties had low scores. To linearize the relationship with the predictor variables, we applied a cube root transformation.

The main variable of interest in our study is *Relative Wages*. This measure is calculated as the sum of the GM's annual salary, annual bonus compensation and the median housing rental value for the zip code divided by the BLS median wage for lodging managers in the property's core-based statistical area (CBSA). We include rental values in calculating total GM remuneration, the numerator, because the GM lives rent-free in a small apartment at the hotel. A value greater (less) than 1.0 for the measure indicates that a particular GM's total compensation is above (below) that of the median lodging manager in his/her area.

Several control variables are included in the model. With *Experienced GM*, we control for a manager's experience at the property. This measure is a dummy variable equal to one if a

[4] This is not unlike many teaching evaluations where Deans and department chairs usually focus on the overall classroom experience.

manager has been at the property for more than one year. We chose to model this as dummy variable rather than use GM tenure because it takes time to become familiar with the challenges of running a particular property but, after a period of one year, additional time on the job doesn't increase one's skill level.

We include bonus expense as a control for GM performance and ability. *Skill: Bonus* equals bonus expense as a proportion of the GM's annual salary. The mean (median) annual salary was $33,264 ($32,647) and the corresponding bonus expense was $1,820 ($1,813). The mean bonus is 5.5% of annual salary.

Our third variable controls for monitoring by regional managers. *Span of Control* is calculated as the number of properties supervised by a property's regional manager. Closer supervision is possible when a regional manager has fewer properties (GMs) to supervise. In more heavily populated regions properties are closer together and the company naturally responds by assigning regional managers more properties.

The fourth control variable, *Property Size*, captures the greater complexity and challenges of running a larger property versus a smaller one. *Ceteris paribus*, guests should be more satisfied at a smaller property. To linearize the relationship with the dependent variable, *Property Size* equals the square root of the number of rooms available at the property.

Capacity Utilization controls for the average annual occupancy at a property. It is calculated as rooms rented divided by rooms available during the year. Evaluation of monthly quality scores indicates a decline in customer satisfaction (and corresponding rise in complaints) during the summer months when occupancy rates in the hospitality industry are high. Problems with noise, check-in/check-out speed, and staffing are at their highest levels when hotels are near capacity.

Our last two control variables control for the physical characteristics of each property. *Property Age* is the square root of the number of years since the hotel has been in operation with the company.[5] *Renovated* is a dummy variable equal to one if the property has been renovated in the last three years. Many hotels undergo renovations at five- to seven-year intervals; therefore, a property renovated within three years in the "newer half" of its expected life cycle. Properly renovated hotels can expect very long lives. Accordingly, we expect customer satisfaction scores to be higher for recently renovated hotels.

The second model predicts a positive relation between relative wages and financial performance, as measured by revenues and by profit:

$$\begin{aligned}\text{Financial Performance} = {} & \beta_0 + \beta_1 \textit{ Relative Wages} + \beta_2 \textit{ Experienced GM} + \beta_3 \textit{ Skill:Bonus} \\ & + \beta_4 \textit{ Span of Control} + \beta_5 \textit{ Property Age} + \beta_6 \textit{ Renovated} \\ & + \beta_7 \textit{ Unemployment} + \beta_8 \textit{ Market Conditions} + \varepsilon\end{aligned}$$

Revenue is measured as the revenue per available room (known as REVPAR). This measure captures the manager's ability to maximize both sales price (known as 'average daily rate') and capacity utilization (i.e., occupancy). Both are key metrics in the lodging industry and are closely monitored by company management. Accordingly, REVPAR is a good measure of GM performance. Since REVPAR exhibits a positive skew, we use a square root transformation.

Profit is our final dependent variable for performance and is measured as the square root of a property's total revenues minus total controllable expenses. Controllable expenses include, among other items, labor costs, supplies, repairs and maintenance, local advertising and utilities. As with other variable transformations, the square root transformation was chosen as interactive scatterplots indicated this transformation provided the most linear relationship between *Profit*

[5] This measure is imperfect as some hotels were acquired and the measure does not reflect the actual age of the building.

and the model's predictor variables.

In these two models we remove the *Property Size* and *Capacity Utilization* variables used in the customer satisfaction model and incorporate two different controls. The first of these, *Unemployment*, is the 2010 county-level unemployment rate. Unemployment increases the penalty associated with being fired, inducing higher effort at any given wage (Shapiro and Stiglitz 1984). Therefore, *Unemployment* should be positively associated with performance. The second variable controls for differences in market conditions. We compute *Market Conditions* as average REVPAR for each hotel's local market area using data for each hotel's "competitive set." The competitive set is comprised of similar economy hotels within close proximity of the company's hotel. *Market Conditions* is the sum of the property and competitor revenues divided by the sum of the property and competitor available rooms. Higher values indicate better market conditions (i.e., higher rates and/or higher occupancy levels).

3.3 Testing H1B: Relative Wages and GM Termination

To test Hypothesis H1b, which predicts a negative relation between relative wages and GM turnover, we estimate the following logistic regression model:

$$GM\ Termination = \beta_0 + \beta_1\ Relative\ Wages + \beta_2\ Skill{:}Bonus + \beta_3\ Span\ of\ Control + \beta_4\ Unemployment + \beta_5\ Rooms\ Rented + \varepsilon$$

The dependent variable, *GM Termination* is a binary variable whose value is one if a manager was terminated during 2010. *Relative Wages* is defined above. The control variables in this model are *Skill:Bonus*, *Span of Control*, *Unemployment* and *Rooms Rented*. *Rooms Rented*, the only control variable not yet defined, is the number of rooms rented during the year. GMs with greater skill are more likely to be successful and, therefore, have a lower likelihood of termination. We do not have a prediction for span of control: GMs with greater autonomy may

feel a greater sense of achievement and entrepreneurialism and may be more likely to remain with the firm. On the other hand, closer supervision may result in greater levels of support and, therefore, higher levels of performance. As mentioned above, unemployment raises the penalty associated with being fired so we expect a negative association between *Unemployment* and *GM Termination*.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 provides descriptive statistics on all variables. For our main variable of interest, *Relative Wages*, the mean (median) ratio of relative wages is 0.985 (0.984); that is, the typical GM's total compensation is slightly below that of comparable lodging managers.

-Insert Table 1 about here-

In Table 2 we present Pearson and Spearman correlations for our variables. Consistent with our hypotheses, we observe significant, positive correlations between *Relative Wages* and each of the three performance measures: *Customer Satisfaction*, *Revenue* and *Profit*.

-Insert Table 2 about here-

4.2 Results for H1a: Relative Wages and Performance

Our first hypothesis posits that relative wages are positively associated with performance. The results show strong support for H1 (see Table 3). The relative wage is positively and significantly ($p < 0.05$, one-tailed) associated with *Customer Satisfaction* ($\beta_1 = 0.119$), *Revenue* ($\beta_1 = 0.079$) and *Profit* ($\beta_1 = 0.102$).

-Insert Table 3 about here-

Many of the control variables have signs consistent with our predictions, although only about half of these are statistically significant. Properties with experienced GMs ($\beta_2 = 0.106$, $p <$

0.01), smaller properties (β_5 = -0.068, $p < 0.10$) and recently renovated properties (β_8 = 0.126, $p < 0.01$) exhibit higher levels of customer satisfaction. Market conditions significantly influence property revenue (β_8 = 0.477, $p < 0.01$) and profit (β_8 = 0.444, $p < 0.01$). Not surprisingly, renovated hotels have higher revenue (β_6 = 0.186, $p < 0.01$) and higher profits (β_6 = 0.173, $p < 0.01$), while properties receiving less attention by regional managers (i.e., a larger span of control) have significantly lower levels of revenue (β_4 = -0.083, $p < 0.05$) and profit (β_4 = -0.102, $p < 0.01$).

4.3 Results for H1b: Relative Wages and GM Termination

The final column of Table 3 reports results of tests of H1b, which posits that the likelihood of GM termination is lower when relative wages are higher. Consistent with our prediction, the odds ratio for *Relative Wages* is less than 1.0 (b_1 = 0.401, $p < 0.10$ one-tailed), which indicates that increasing relative wages *lowers* the probability of GM termination. In this model, all control variables are significant, with odds ratios consistent with our expectations. In particular, more skilled GMs, as measured by *Skill:Bonus*, are less likely to be terminated (b_2 = 0.832, t = -2.56). Consistent with efficiency-wage predictions, higher levels of unemployment significantly reduce the likelihood of GM termination, as managers will have difficulty finding alternative employment (b_4 = 0.319, t = -2.72). A higher level of rentals (*Rooms Rented*) decreases the likelihood of GM termination (b_5 = 0.999, t = -1.40). Lastly, a greater span of control reduces the likelihood of GM termination (b_3 = 0.903, t = -1.96); less scrutiny may enhance job autonomy that improves job satisfaction.

4.4 Results for RQ1: Asymmetries in Wage-Performance Relation

Research question 1 asks whether the positive wage-performance and wage-termination relations identified in Table 3 are equal when the relative wage is negative versus positive. We

test RQ 1 by partitioning the sample based on whether the relative wage is below or above the BLS median wage and running the performance and turnover regression models for each sub-sample separately. Approximately 55 percent of sample observations are below the median wage, thus, sub-samples are of comparable size.

Results are contained in Table 4. The *Relative Wage* coefficients are significantly ($p <$ 0.05, two-tailed) larger in the above-median sub-samples for *Customer Satisfaction* and *GM Termination.* For these two measures, the above-market wage sub-samples drive the positive relations between relative wages and performance/terminations identified in Table 3. In fact, when the relative wage is below the market, there is no significant relation between relative wages and *Customer Satisfaction* or *GM Termination.* There is no significant difference in coefficient sizes for the *Revenue* and *Controllable Profit* sub-samples. These results suggest that overpaid workers do not reassess the value of the inputs any more so than underpaid workers and run counter to experimental tests of equity theory. Our results are consistent with archival, inter-firm studies conducted by Levin (1993) and Chen and Sandino (2012). One explanation for the difference in archival and experimental results is that, in practice, wages have a much larger impact on shirking and employee selection than they do on actions motivated by perceived inequity (Gneezy and List, 2006). More field studies on the symmetry of the wage-performance relation are warranted to better understand workers' reactions to actual under- and overpayments.

4.5 Do Higher Wages Pay for Themselves?

Having established that relative wages are significantly and positively associated with performance, we test whether the marginal cost of paying higher wages is equal to the marginal benefit. Our results indicate that a $1,000 increase in the GM's relative wage results in a $1,087 increase in controllable profit for the average hotel in the sample. After adjusting for social

security taxes on wages, the increase is $1,080. This likely underestimates the total cash impact of higher wages because it does not take into consideration the increase in customer satisfaction and the decrease in turnover associated with higher wages. Current levels of customer satisfaction can affect future profits (Ittner and Larcker, 1998, Anderson *et al*., 2004) and in untabulated tests, we find that GM turnover is negatively associated with controllable profit. This is the first study of which we are aware that demonstrates that the incremental benefit derived from paying higher wages is at least as large as the incremental cost, and thus shows support for the efficiency-wage hypothesis. Prior studies have generally found that the costs of paying higher wages far exceed the benefits; however, these studies have not calculated the total cash impact related to wage increases (Cappelli and Chauvin, 1991; Levin, 1992; Chen and Sandino, 2012).[6]

5. Conclusion

We use field data to address the following questions stemming from the efficiency-wage hypothesis: (1) Is performance increasing in the relative wage paid to employees; (2) Is the relation between performance and wages the same when workers are overpaid versus underpaid; and, (3) Do the overall benefits of paying higher wages outweigh the costs?

We investigate our research questions using a proprietary data set containing detailed compensation and performance information on 490 individually-managed hotels in a single domestic U.S. lodging chain. The data enable us to perform powerful tests of wage-performance relations because exogenous factors that likely affect employee behavior are standardized across hotels. Turning to our first research question, our results indicate that hotel performance (as measured by customer satisfaction, revenue per available room, and controllable profit) is

[6] In a cross-firm study, Levine (1992) finds that increasing relative wages improves productivity as much as if the firm had used the incremental wages to hire more workers. This result, however, is not robust to measuring the change in wages over one-year increments rather a three-year increment.

positively and significantly associated with the relative wage. The small performance-based bonuses available to GMs provide negligible performance incentives, thus, we can reasonably conclude that higher performance is the result, and not the cause, of higher wages. To investigate the second research question concerning asymmetries in the wage-performance relation, we partition the sample according to whether the relative wage is negative or positive. The performance response to wage changes is significantly larger (*Customer Satisfaction, Profit, GM Termination)* or the same size (*Revenue)* for workers who are overpaid compared with those who are underpaid. These results contrast prior experimental studies that suggest overpaid workers are more likely to reassess the value of their inputs than underpaid workers. Our results are, however, consistent with prior cross-firm archival studies by Levine (1993) and Chen and Sandino (2012). The differences in results between experimental and field research suggests that more research is needed in this area. Evidence on our third research question indicates that increases in wages do, in fact, pay for themselves through higher profits. A $1,000 increase in the GM's relative wage results in a $1,080 increase in profit for the mean hotel, after deducting social security wage taxes.

Numerous studies have found positive correlations between relative wages and measures related to performance; however, few measure *actual* performance. Moreover, most studies find rather small elasticities of performance, and none is able to determine the total cash value of performance increases. Even if high wages lead to better performance, companies are not paying efficiency wages if the wage-performance relation is weak. Accordingly, our study contributes to the economics and accounting literature by providing some of the first field evidence that paying higher wages *ex ante* leads to better actual performance *ex post*; and, that the marginal benefit of wage increases justifies their costs.

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Table 1
Descriptive Statistics

Variable	*N*	Mean	Std Dev	Min	Median	Max
Relative Wages	514	0.985	0.198	0.528	0.984	1.534
Customer Satisfaction	551	7.445	0.641	3.000	7.501	10.000
Revenue	551	26.655	7.614	11.358	25.582	87.350
Profit	551	11.910	6.187	-2.893	11.033	61.298
GM Termination	551	0.207	0.405	0.000	0.000	1.000
Experienced GM	551	0.891	0.312	0.000	1.000	1.000
Skill: Bonus	551	5.496	1.550	0.002	5.538	11.452
Span of Control	533	17.987	2.418	11.000	18.000	25.000
Unemployment	551	10.032	3.029	3.600	9.400	29.700
Property Size	551	108.887	22.305	42.000	110.000	158.000
Capacity Utilization	551	62.304	10.341	27.395	61.881	92.444
Property Age	551	23.118	10.312	1.000	21.000	48.000
Renovated	551	0.102	0.302	0.000	0.000	1.000
Market Conditions	551	28.373	4.874	16.019	28.010	55.857
Rooms Rented	551	24,546.374	5,878.834	11,146.000	24,131.000	43,808.000

Table 2
Correlation Matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1. *Customer Satisfaction*		0.06	**0.13**	**-0.26**	**0.12**	**0.15**	**0.09**	-0.02	**0.11**	0.01	0.02	-0.02	**0.13**	0.08	-0.01
2. *Revenue*	**0.09**		**0.92**	-0.04	**0.16**	0.04	-0.04	-0.02	**0.09**	**-0.25**	**0.72**	0.07	0.08	**0.53**	**0.26**
3. *Profit*	**0.14**	**0.94**		**-0.09**	**0.19**	**0.09**	-0.03	-0.06	0.04	-0.05	**0.65**	0.05	0.06	**0.48**	**0.39**
4. *GM Termination*	**-0.25**	-0.07	**-0.12**		-0.05	**-0.30**	**0.14**	-0.04	**-0.12**	-0.03	-0.06	-0.01	0.02	-0.05	-0.04
5. *Relative Wages*	**0.15**	**0.14**	**0.16**	-0.04		**0.13**	-0.03	**-0.31**	**0.12**	0.09	**0.10**	-0.06	**-0.10**	**0.14**	**0.12**
6. *Experienced GM*	**0.11**	0.04	0.07	**-0.30**	**0.10**		0.02	-0.01	0.05	0.03	0.03	0.07	0.02	0.02	0.04
7. *Skill: Bonus*	0.04	-0.04	-0.03	**-0.12**	-0.03	0.05		-0.06	0.07	0.08	0.05	0.01	-0.03	-0.02	**0.12**
8. *Span of Control*	-0.06	-0.03	-0.06	-0.03	**-0.30**	-0.03	-0.05		**-0.15**	-0.04	**-0.24**	**0.16**	**0.20**	0.07	**-0.16**
9. *Unemployment*	**0.12**	0.03	-0.01	**-0.10**	**0.12**	0.03	**0.09**	-0.07		-0.02	-0.01	**0.12**	**-0.22**	**0.22**	-0.08
10. *Property Size*	-0.04	**-0.27**	-0.08	-0.03	**0.07**	0.02	0.04	-0.04	-0.01		**-0.26**	**-0.21**	0.02	**-0.17**	**0.70**
11. *Capacity Utilization*	0.03	**0.73**	**0.68**	-0.05	0.08	0.04	0.02	**-0.26**	-0.05	**-0.26**		-0.05	0.05	**0.20**	**0.43**
12. *Property Age*	-0.03	**0.09**	0.07	-0.01	**-0.10**	0.03	-0.01	**0.20**	**0.12**	**-0.25**	-0.04		0.02	**0.18**	**-0.22**
13. *Renovated*	**0.10**	**0.15**	**0.14**	0.01	**-0.09**	0.02	-0.04	**0.21**	**-0.18**	0.03	0.07	0.04		-0.06	0.08
14. *Market Conditions*	**0.09**	**0.48**	**0.44**	-0.04	**0.14**	0.00	-0.02	0.06	**0.11**	**-0.17**	**0.19**	**0.19**	-0.05		-0.03
15. *Room Rented*	-0.02	**0.23**	**0.37**	-0.06	**0.11**	0.04	0.05	**-0.22**	-0.06	**0.72**	**0.46**	**-0.27**	0.07	-0.05	

Note. Pearson (Spearman) correlations below (above) the diagonal. Significant correlations ($p < .05$, 2-tailed) are shown in bold.

Table 3
Relation Between Relative Wage and Model Variables

		Dependent Variable			
Variable	Predicted sign	Customer Satisfaction	Revenue	Profit	GM Termination
Relative Wages	+/-	0.119 ***	0.079 **	0.102 **	0.401 *
		(2.55)	(1.92)	(2.41)	(-1.48)
Experienced GM	+	0.106 ***	0.010	.041	
		(2.37)	(0.25)	(1.02)	
Skill: Bonus	+/-	0.034	-0.020	-0.009	0.832 ***
		(0.76)	(-0.51)	(-0.23)	(-2.56)
Span of Control	-/?	-0.038	-0.083 **	-0.102 ***	0.903 **
		(-0.76)	(-1.99)	(-2.39)	(-1.96)
Property Size	-	-0.068 *			
		(-1.40)			
Capacity Utilization	-	-0.013			
		(-0.26)			
Property Age	-	-0.049	0.038	0.014	
		(-1.04)	(0.94)	(0.34)	
Renovated	+	0.126 ***	0.186 ***	0.173 ***	
		(2.75)	(4.65)	(4.23)	
Unemployment	?/-		0.012	-0.032	0.319 ***
			(0.30)	(-0.79)	(-2.72)
Market Conditions	+		0.477 ***	0.444 ***	
			(11.91)	(10.82)	
Rooms Rented	-				0.999 *
					(-1.40)
F-test/Likelihood Ratio		3.10	23.77	20.12	21.26
R-squared		0.048	0.280	0.249	0.042
N		497	497	494	497

Notes. Standardized coefficients. *t*-statistics in parentheses. For convenience, ***, **, and * indicate significance levels of 0.01, 0.05 and 0.10, respectively (1-tailed when there is a prediction). Coefficients in the logistic regression are odds-ratios. Under "Predicted sign", when there are multiple variables, the first "+" or "-" refers to the sign on the coefficient for the Customer Satisfaction, Revenue, and Profit regressions, the second sign refers to the GM Termination regression.

Table 4

Relation Between Relative Wage and Model Variables: Sub-Samples for Below and Above BLS Median Wage

	Customer Satisfaction		Revenue		Controllable Profit		GM Termination	
	Below	Above	Below	Above	Below	Above	Below	Above
Relative Wages	0.041 +	0.196 ***	0.123 ***	0.073	0.108 **	0.124 **	2.438 +	0.021 **
	(0.67)	(2.93)	(2.51)	(1.16)	(2.14)	(1.92)	(0.66)	(-2.17)
Experienced GM	0.092 *	0.133 **	-0.001	0.032	0.029	0.061		
	(1.51)	(2.02)	(-0.02)	(0.52)	(0.57)	(0.97)		
Skill: Bonus	0.072	-0.000	-0.039	0.022	-0.001	-0.013	0.818 **	0.837
	(1.19)	(-0.01)	(-0.80)	(0.36)	(-0.02)	(-0.21)	(-2.27)	(-1.41)
Span of Control	-0.050	-0.034	-0.090 **	-0.056	-0.093 **	-0.097 *	0.887	0.939
	(-0.77)	(-0.46)	(-1.78)	(-0.83)	(-1.79)	(-1.42)	(-1.75)	(-0.77)
Available Rooms	-0.046	-0.092						
	(-0.70)	(-1.24)						
Capacity Utilization	0.016	-0.035						
	(0.25)	(-0.47)						
Property Age	-0.034	-0.056	0.087	0.002	0.067	-0.023		
	(-0.54)	(-0.78)	(1.72)	(0.03)	(1.29)	(-0.34)		
Renovated	0.157 ***	0.097 *	0.193 ***	0.159 ***	0.177 ***	0.159 ***		
	(2.52)	(1.43)	(3.85)	(2.47)	(3.41)	(2.43)		
Unemployment			-0.032	0.051	-0.069 *	0.003	0.647	0.168 ***
			(-0.62)	(0.79)	(-1.31)	(0.05)	(-0.72)	(-2.95)
Market Conditions			0.557 ***	0.389 ***	0.540 ***	0.345 ***		
			(11.31)	(5.88)	(10.62)	(5.12)		
Rooms Rented							0.999	0.999
							(-0.22)	(-1.36)
F-test/Likelihood Ratio	1.53	2.08	20.18	5.69	17.14	4.58	9.18	21.10
Prob. > F	.15	.04	.00	.00	.00	.00	.10	.00
R-squared	0.044	0.072	0.380	0.174	0.345	0.145	0.032	0.097
N	272	225	272	225	269	225	272	225

Notes. Standardized coefficients. *t*-statistics in parentheses. For convenience, ***, **, and * indicate significance levels of 0.01, 0.05 and 0.10, respectively. Significance levels represent 1-tail probabilities with a directional hypothesis, otherwise a 2-tailed probability. A "+" between the *Relative Wages* coefficients for "Below" and "Above" indicate a significant ($p < 0.05$, two-tailed) difference in coefficients.