# THE FACTORS DRIVING EMPLOYEE SALARIES: DETERMINING THEIR WEIGHTS ACROSS INDUSTRIES

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# ABSTRACT

This thesis seeks to understand the relationships between salary, non-monetary factors, and job satisfaction in the labor market. It applies lessons from both economic theory and sociological research as it contextualizes and studies these different aspects of the labor market. In a regression comparing salary and non-monetary factors, only two out of 16 dummy variables are statistically significant. Both are positive work conditions, but Benefits (Positive) decreases salary and Long Hours (Positive) increases salary. In a regression comparing salary and job satisfaction, no statistical significance is found, despite sociological research connecting the two aspects of work. Issues relating to limited sample size, subjective coding methodology, and the possibility of salary acting as an independent variable are discussed when explaining the lack of statistical significance. However, in line with the hypothesis and sociological research, six out of 16 dummy variables for non-monetary factors are found to be statistically significant with job satisfaction, with five of them at the 1% significance level. The implications of these statistically significant variables are discussed for both employees and employers. Opportunities for further research are identified in the use of personal employee information, the impact of management, and the distinct categories of happiness.

# ACKNOWLEDGEMENTS

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# I. INTRODUCTION

Work is as multi-faceted as life. A 40-hour workweek with three weeks of vacation annually translates to 1,960 hours at work each year, or over a third of an individual's waking time during that year. Despite the seeming monotony of those 1,960 hours with the same tasks and the same co-workers, the same job can bring wildly different feelings and experiences at different moments. A sense of accomplishment, competition, boredom, satisfaction, helplessness, anger, and camaraderie are only some of the feelings that employees describe in relation to their jobs. The same individual often uses multiple words from that list. Thus, with its ups and downs, work may be a natural extension of outside life or it may even be significant enough to take on a life of its own.

However, in a major departure from life, work is meant to be captured in one number – an employee's salary. It is undeniable that an individual takes away much more from those 1,960 hours than a salary. Just think of the feelings above. Studies have shown that many employees count at least one of their co-workers as one of their close friends[1]. Many individuals intentionally strive to create a positive impact through their work or to find some sort of meaning from those 1,960 hours other than a salary. Nonetheless, in an economic sense, an employee's salary should respond to all of the examples above and, in that way, capture the entirety of work. Viewed as a price for labor, an employee's salary is flexible based on the forces of supply and demand in all their forms.

## Context of Salaries Among Different Aspects of Work

But how is an employee's salary determined in the real world? On what factors does it depend? A college student may accept a first job with a low salary for its learning opportunities or for its networking potential in order to build a successful career. A new parent may place a premium on family time and may demand a higher salary through negotiations if that employee is required to

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[1] Azar, Beth. "Friends and Co-Workers."

work late nights. An individual nearing retirement may continue working in a marginally unsatisfying job due to the postretirement benefits available. Thus, employees each bring a different perspective on work and on their salaries. These differences are not restricted to age or stage in life. They may also appear by industry, geography, culture, and personal goals. Despite these differences, this thesis argues that universal factors that drive employee salaries exist. It attempts to use a cross-section of contemporary data on salaries and work conditions in order to identify these universal factors.

Previous research in this field has viewed employee salaries and different aspects of work through both a theoretical economic and an empirical sociological lens. Economic theory tends to consider salary as the dependent variable of supply and demand, while empirical sociology tends to consider it as an independent variable impacting other aspects of work such as job satisfaction, work hours, and quit rate. The relationships between these different aspects of work are difficult to pin down, due to the multitude of aspects themselves and to the multitude of jobs and situations which they are meant to represent. Without a consensus framework to use, this thesis attempts to build on both fields in its study of employee salaries. Thus, this thesis retains the core relationship of economic theory in that it considers salary as the dependent variable of different aspects of work, though these aspects have largely been identified through empirical sociology.

## *Relevance of Research Question*

This thesis has been motivated by the choices of my fellow undergraduate students to accept certain post-graduation jobs over others. At NYU Stern, the top jobs for graduating students seem to be investment banking, sales and trading, and accounting. These students pass up seemingly similar opportunities to apply their business knowledge in fields such as management consulting, venture capital, and entrepreneurship. In trying to understand the value that these students place on certain jobs, I realized that an employee's salary most likely has a direct relationship with that value.

An employee's salary should respond to all the other aspects of a job that contribute to its value and could be a valuable tool to investigate that value. Aligning with the economic theory above, this viewpoint led to the choice of salary as the dependent variable of these different aspects.

Thankfully, this research has applications beyond NYU Stern. By understanding the impact of different aspects of work on employee salaries, this research can apply in some form to all employees and employers. Employees who want to earn higher salaries may be better equipped to understand the requisite changes in other aspects of work such as job satisfaction, work hours, and quit rate necessary to achieve that goal. Employees who want to change any of those aspects may be able to predict the effect of those changes, if any, on their salaries. Employers who want to reduce labor expenses may be able to predict which changes in other aspects of work will be able to achieve that goal. And of course, this research will impact academics and others who are broadly interested in labor economics. For this reason, this thesis attempts to identify universal factors that may drive employee salaries and to determine their weights. However, stated in a broader sense, this thesis seeks to understand the relationships between salary, non-monetary factors, and job satisfaction, building on the extensive economic theory and sociological research related to these topics.

# II. HYPOTHESIS

Traditional labor economics tends to focus on salary as the primary form of utility for work. Some allowances are made for non-monetary factors, such as the prestige of working for a brand-name company or the learning opportunities afforded by a job. However, non-monetary factors seem to be mentioned only in passing by traditional labor economics. They are not seriously considered in the context of utility maximization, salary determination, or job choice.

I hypothesize that these non-monetary factors are a significant form of utility for employees. If these factors are present, employees are, by definition, better off. In the examples above, employees gain either prestige or learning opportunities. If these factors are absent, employees are worse off and will demand utility in another form. By this logic, salary and non-monetary factors should become substitutes for each other since they both represent different forms of utility. Thus, I hypothesize that an inverse relationship will be observed between salary and each non-monetary factor. If a non-monetary factor is present in a job, an employee will accept a lower salary. If a non-monetary factor is absent from a job, an employee will demand a higher salary.

I hypothesize that job satisfaction is highly correlated with the non-monetary factors above. Due to this high correlation, this part of the hypothesis essentially replaces the non-monetary factors above with job satisfaction. I hypothesize that an inverse relationship will be observed between salary and job satisfaction, similar to the inverse relationship between salary and non-monetary factors. If an employee is satisfied with all other aspects of a job, he/she will accept a lower salary. If an employee is not satisfied with those other aspects, he/she will demand a higher salary. This part of the hypothesis will be harder to observe due to the way in which job satisfaction is reported, but the high correlation with non-monetary factors should allow similar logic to apply.

# III. RELATED ECONOMIC THEORY

Through the lens of traditional labor economics, the labor market operates as any other economic market. It follows the laws of supply and demand. Price, or wages in this market, is set at the point of convergence, or equilibrium point, between the supply and demand curves. To conceptualize the labor market in relation to other economic markets, it is important to remember that labor is the product being sold. Individuals who provide labor are the suppliers so they are reflected on the upward-sloping supply curve. Firms that employ labor are the buyers so they are reflected on the downward-sloping demand curve. These trends can be seen in Figure 1.

**Figure 1: Supply and Demand Curves for the Labor Market**
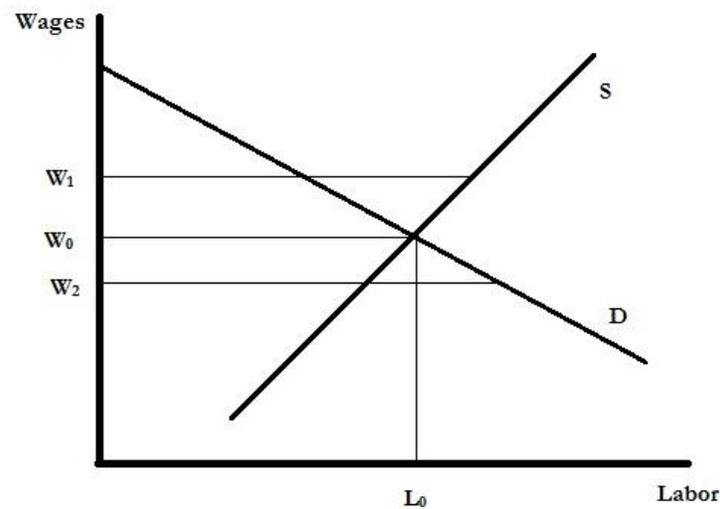


It is useful to cover briefly some of the market forces that promote labor market equilibrium. If offered wages exceed the equilibrium wage (e.g. at $W_1$), excess supply of labor will occur. Firms can react either by raising hiring standards or by decreasing wages. If firms raise standards, the same wages are being paid for presumably more productive individuals, which implies lower wages in a relative sense. Through either of these mechanisms, wages will be pushed down towards the equilibrium point at $W_0$. If the equilibrium wage exceeds offered wages (e.g. at $W_2$),

excess demand of labor will occur. Following the case above, individuals can react through analogous mechanisms that will push up wages, again to the equilibrium point at $W_0$.

According to economic theory, this equilibrium point equates wages to the marginal product of labor. Thus, individuals are compensated the exact amount of value that they provide for firms. More productive workers are able to earn higher wages since they provide more value for firms, while less productive workers are only able to earn lower wages. Nonetheless, all individuals should be able to find work as long as they demand wages in line with their productivity and value to firms. Unemployed individuals may be advised to demand lower wages.

However, traditional labor economics does not adequately account for the labor market, as many economists have demonstrated. The labor market is not one singular market. Instead, studies have shown that the labor market is largely fragmented, both geographically and by skill set or education level[2]. Traditional labor economics assumes perfect labor mobility, meaning that individuals should be willing to move in order to find work. However, social, familial, and other obligations prevent the realization of this theory for many individuals. Thus, some labor markets should be studied locally since barriers to entry and to exit for individuals may exist. Moreover, not all parts of the labor market are available to all individuals. Without the requisite skills or education, individuals are not qualified for certain professions such as treating patients as a doctor or teaching students as a professor. Thus, the study of labor markets should distinguish between broad groups of professions which would be difficult for any individual to span. Both geographically and by skill set or education level, traditional labor economics does not adequately account for the labor market.

Other complicating factors also exist in reality. Economic theory, though not the traditional labor economics above, has attempted to account for these multiple factors. First, unions prevent individual negotiations and may force firms to accept non-equilibrum wages based on the unions'

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[2] Freeman, Richard B. *Labor Economics*. Chap. Five. 72-98.

monopoly power. However, studies have shown that the influence of collective bargaining is not as

significant as is often claimed[3]. Second, other cases of monopoly or monopsony may exist in certain

local labor markets for certain professions. However, economic theory with modified supply and

demand curves is available to account for this complicating factor. Third, structural unemployment

may leave some individuals unable to find work due to the mismatches identified in the paragraph

above. This type of unemployment can have ramifications, both social and political, that extend

beyond the realm of economic theory. Though these examples, it becomes clear that traditional

labor economics is not a perfect representation of the labor market.

Nonetheless, most variants of traditional labor economics that have attempted to account

for some of these examples acknowledge the basic tenet of supply and demand. These variants may

change the slopes of the supply and demand curves, or they may factor in new transaction costs that

weaken perfect labor mobility, but they do not stray unrecognizably far from economic theory.

For the purposes of this thesis, traditional labor economics will form the underlying

framework, though some of its assumptions and conclusions will be questioned. For example, one

point of difference will be the use of "utility" rather than "wages" on the y-axis of Figure 1. Studies

have shown that individuals perceive compensation for their jobs to come in the multiple forms of

real wages, fringe benefits with an idenitifiable monetary value, and non-monetary factors[4]. As

described in the Hypothesis section, this thesis aims to show that salaries, or equivalently wages, are

explained by not only supply and demand but also these non-monetary factors. In that sense, the

distinction between utility and wages becomes important since utility may adhere to traditional

economic theory, even though salaries and wages may diverge from it. I hypothesize that this

divergence is caused by these fringe benefits and non-monetary factors.

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[3] Polachek, S.W., and W.S. Siebert. *The Economics of Earnings*. Chap. 10. 278-329.
[4] Clark, Andrew. "What Makes a Good Job? Evidence from OECD Countries."

# IV. RELATED SOCIOLOGICAL RESEARCH

Since this thesis seeks to understand the relationships between salary, non-monetary factors, and job satisfaction at its core, an extensive body of sociological research is related. Of these three variables, more research has explicitly been conducted on salary and job satisfaction. However, nearly all of this related research considers non-monetary factors to some extent. Though this section will provide only a cursory glance at the related research, it will attempt to highlight the milestone research and some of the prevailing thoughts in labor economics.

## Context of Job Satisfaction Among Different Aspects of Work

In 1977, Richard Freeman wrote a milestone paper titled "Job Satisfaction as an Economic Variable". It was one of the first economics papers to study job satisfaction, which had previously been considered too subjective to be a research topic. Much as I attempted to contextualize salaries among different aspects of work in the Introduction section, Freeman attempted to contextualize job satisfaction in this paper. He studied it as both an independent and a dependent variable.

As an independent variable, job satisfaction had a statistically significant impact on employees' quit rate with coefficients up to five times the standard error. Using a sample of over 8,500 employees, job satisfaction had a comparable level of predictive power as salary on the quit rate. As a dependent variable, job satisfaction behaved differently than a standard economic variable. Though unionism and tenure reduced the quit rate, they had little effect on job satisfaction, calling into question the standard linear relationship between job satisfaction and the quit rate that advocates of the variable perceived to exist. Other factors such as the ability to compare alternatives and the willingness to voice discontent factor into an employee's reported level of job satisfaction. Thus, Freeman concluded that though job satisfaction contains significant predictive power, economists must beware when they study it since it does not act like a standard economic variable.

This thesis draws on Freeman's research since it similarly contextualizes job satisfaction. It places job satisfaction as an independent variable that may contain predictive power on salary through an inverse relationship. However, it also places job satisfaction as a dependent variable that may be correlated with non-monetary factors. Recognizing Freeman's research, I have chosen to study job satisfaction though I must beware the subjective way in which this variable is reported.

## Factors Driving Job Satisfaction

Traditional labor economics, with its focus on salary as the primary form of utility for work, has been limited in its ability to explain job satisfaction. Andrew Clark took an alternative approach in "What Makes a Good Job? Evidence from OECD Countries." He used 1997 data collected by the International Social Survey Programme on 14,000 employees across 19 OECD countries to identify factors that drive job satisfaction and to determine their weights.

**Table 1: Regression Output Comparing Job Satisfaction and Driving Factors**

| Measure of Variable | Subjective | Objective |
|---|---|---|
| Salary | 0.298 | 0.051 (monthly earnings in USD) |
| Work Hours | -0.294 | -0.003 (weekly hours) |
| Promotion Opportunities | 0.301 | - |
| Job Security | 0.239 | - |
| Difficulty of Work | 0.145 | - |
| Intrinsic Value of Work | 0.524 | - |
| Interpersonal Relationships | 0.744 | - |

Job satisfaction was statistically significant with all the variables in the first column of Table 1 at the 1% level. Most of the variables are self-explanatory. Difficulty of work relates to exhaustion, physical labor, and stress. Intrinsic value of work relates to whether the job was interesting, whether it was useful to society, and whether the employee could work independently. To be pedantic, salary, like the other variables in the first column, was an independent variable in this paper. Of the subjective measures, interpersonal relationships and intrinsic value of work had the largest weights with coefficients of 0.744 and 0.524, respectively. Difficulty of work and job security had the

smallest weights with coefficients of 0.145 and 0.239, respectively. Thus, this paper showed that

labor economics may be overlooking factors other than salary, such as interpersonal relationships

and intrinsic value of work, that have a strong impact on job satisfaction.

Clark distinguished between subjective and objective measures of two independent variables,

salary and work hours. For example, for salary, the objective measure was absolute salary, as

measured by monthly gross earnings in PPP-converted US dollars and the subjective measure was

relative salary, as measured by a dummy variable (0, 1) for the level of agreement with the statement,

"My income is high". Both measures were statistically significant at the 1% level, but the subjective

measure had a larger coefficient of 0.298 (versus a coefficient of 0.051). Though it is difficult to

compare coefficients, this result highlights the potentially subjective nature of job satisfaction and

relates to Freeman's warning about the use of job satisfaction as a standard economic variable.

As mentioned in the Introduction section, employees each bring a different perspective on

work and may place different values on different factors. This paper found that employees tend to

self-select into jobs that provide factors that they value. For example, 31.0% of employees who

value promotion opportunities work in jobs with high promotion opportunities, while only 17.7% of

employees who do not value promotion opportunities work in such jobs. Similar results were seen

for interest level, usefulness to society, and independent work but not for salary or job security.

This thesis draws on Clark's research since it tests similar non-monetary factors in its

regression analysis. Interestingly, this thesis reverses the relationship between job satisfaction and

salary, treating salary as the dependent variable. In the way that Clark showed that job satisfaction

should respond to and capture the six variables, I hypothesize that salary is able to perform a similar

function for non-monetary factors. In its test of the high correlation between job satisfaction and

non-monetary factors, this thesis hopes to update some of Clark's results using a new data set.

## *Impact of Salary on Happiness*

Another area of sociological research has been happiness. Ed Diener, Weiting Ng, James Harter, and Raksha Arora wrote a milestone paper titled "Wealth and Happiness Across the World: Material Prosperity Predicts Life Evaluation, Whereas Psychosocial Prosperity Predicts Positive Feeling" in 2010. Building on prior research on distinct categories of happiness, it was one of the first sociological papers to apply these distinct categories of life evaluation and day-to-day experience to the labor market. Diener et al used 2005 data collected by The Gallup Organization on over 136,000 employees across 132 countries to identify factors that drive each category of happiness.

Life evaluation involves a reflective, long-term analysis of a person's ambitions and accomplishments. Day-to-day experience is a more instantaneous assessment of a person's feelings. Job satisfaction, which can be viewed as the equivalent of happiness in the context of the labor market, involves both life evaluation and day-to-day experience; employees consider both their long-term career progress and their instantaneous feelings about their current work. Logged annual salary and logged annual national per-capita GDP had the largest weights for life evaluation, both with coefficients of 0.44 and measured in PPP-converted US dollars. Psychological needs (such as being able to learn something new and to spend time as desired) and satisfaction with standard of living had the largest weights for a positive day-to-day experience with coefficients of 0.45 (-0.28 for a negative day-to-day experience) and 0.24 (-0.20 for a negative day-to-day experience), respectively. Thus, Diener et al concluded that material prosperity through salary and per-capita GDP can predict life evaluation, while psychosocial prosperity can predict day-to-day experience.

Daniel Kahneman and Angus Deaton contributed to this area of research through their paper titled "High Income Improves Evaluation of Life but Not Emotional Well-Being". They used 2008 data collected by The Gallup Organization on 450,000 US employees. Though this paper found similar results to Diener et al, it focused more exclusively on salary. Emotional well-being,

which is synonymous to positive feeling and day-to-day experience, did not increase for employees with salaries above $75,000. However, life evaluation continued to increase for employees with salaries above that threshold, which further differentiates these distinct categories of happiness.

Due to lack of available data, this thesis does not distinguish between the distinct categories of happiness in its attempt to understand job satisfaction. However, this thesis still draws on this area of sociological research since it serves as a valuable reference point to understand my work. In the following sections, this thesis will not observe the predicted relationship between salary and job satisfaction, and this area of research may offer a source of explanation for this phenomenon.

## *Summary of Related Sociological Research*

In contrast to traditional labor economics, which tends to focus on salary, the related sociological research tends to focus on job satisfaction. Salary is often treated as an independent variable with predictive power on job satisfaction, as seen in Clark's research. In turn, job satisfaction may be used to predict other measures such as quit rate and productivity, as seen in Freeman's research. Nonetheless, this sociological research acknowledges the multiple aspects of work and the multiple relationships between them. For this reason, Diener et al even introduced psychosocial variables, while Kahneman and Deaton attempted to use salary to explain happiness.

This thesis will depart from the related sociological research in that it will treat salary as a dependent variable. In the way that job satisfaction has been shown to respond to and capture different aspects of work, I hypothesize that salary is able to perform a similar function for non-monetary factors. And since job satisfaction should be highly correlated with these non-monetary factors, I hypothesize that salary also responds to and captures job satisfaction through an inverse relationship. The related sociological research has not extensively studied salary and its driving factors so I hope to fill some of this void by combining the lessons of economic theory.

# V. RELATED TEXT AND REVIEW MINING

In order to identify the presence and to evaluate the impact of non-monetary factors, this

thesis will employ text mining techniques. Prior research on reviews of consumer products, hotels,

and movies has applied similar text mining techniques in an attempt to identify and to rank

consumer preferences for various features. Any product or service has a number of features. For

example, even a digital camera can be classified in terms of its picture quality, size, ease of use,

design, and other features[5]. Preferences for each of these features are measured by their impact on

observable dependent variables such as sales prices and, in the case of movies, movie ratings.

Similarly, this thesis attempts to identify employee preferences in terms of non-monetary factors and

to determine weights for these factors through the use of salary as its observable dependent variable.

Text mining can be pursued in a number of ways. First, it can be conducted manually, semi-

automatically, or automatically. A human's ability to discern subtle preferences in a review makes the

manual technique the most accurate, albeit the most time-consuming, available technique. For

consistency across reviews, only one human should be involved throughout the text mining process.

A semi-automatic technique can take the form of crowd-sourcing through a system such as Amazon

Mechanical Turk. Using this technique, multiple humans are assigned the same text mining task, and

answers, pertaining to either identification or evaluation of features, are utilized only if more than

one human agrees on the same identification or evaluation. Automatic methods such as machine

learning systems are improving through more nuanced understanding of natural language[6].

Second, text mining can assign different weights to each feature and its evaluation. For

example, if a review says that a digital camera lens is fantastic and bright, a weight of 0.5 can be

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[5] Archak, Nikolay, Anindya Ghose, and Panagiotis G. Ipeirotis. "Driving the Pricing Power of Product Features by
　　　Mining Consumer Reviews."
[6] Ghose, Anindya, and Panagiotis G. Ipeirotis. "Estimating the Helpfulness and Economic Impact of Product
　　　Reviews: Mining Text and Reviewer Characteristics."

assigned to each category, since only one feature is being evaluated, or a weight of 1.0 can be assigned to each category, since the consumer is able to evaluate the feature in two different ways. This example demonstrates how different researchers may measure the intensity of each evaluation differently. Third, text mining and the subsequent regression analysis can consider only a finite number of features. Other features may be omitted, but the interaction of omitted features should be considered and minimized through appropriate groupings of features. Researchers may also differ in the groupings that they select in order to account for omitted features.

Despite these ambiguities, text mining on reviews has proven to be a successful practice. Prior research has found this textual content to have significant predictive power on consumer behavior, over and above the predictive power of numerical information. For example, Nikolay Archak, Anindya Ghose, and Panagiotis Ipeirotis found that the 20 most popular opinion phrases for digital cameras and the 10 most popular opinion phrases for camcorders on www.amazon.com are statistically significant at the 1% level in predicting sales rank, a proxy for consumer demand. Their results are available in a paper titled "Deriving the Pricing Power of Product Features by Mining Consumer Reviews". Similar results have been found for hotels and movies.

In the context of this thesis, the textual content will take the form of non-monetary factors as detected through employee reviews. I will use the manual method of text mining by reading each employee review in order to determine the presence of each non-monetary factor. The evaluation will not account for intensity; only the positive and negative states of each non-monetary factor will be recorded. More details on the non-monetary factors and the coding methodology can be found in the following Research Methodology section. After the text mining process, the weight of each non-monetary factor will be determined through regression analysis of its relationship with salary.

# VI. RESEARCH METHODOLOGY

In order to test all parts of the hypothesis, I need comparable data on salary, non-monetary factors, and job satisfaction. In theory, I would use data on an individual level across industries, where individuals reported their current salary, indicated the presence or absence of various non-monetary factors in their job, and reported their current job satisfaction. However, such data is not available so I compiled a data set that represented each variable and that was still comparable.

## Data Collection

My primary source of data was www.glassdoor.com, a website that aggregates anonymous salary information and company reviews. The website's 3 million+ anonymous records are stored and searchable by the company and job title of the employee's position. In order for users to view www.glassdoor.com for over a month, they must contribute at least one salary, company review interview review, or workplace photo. This model is intended to foster the employee-generated content and insight into the labor market that www.glassdoor.com hopes to embody.

Though users of www.glassdoor.com report their current salary, these individual records are not available. Only the average, minimum, and maximum salaries by company and job title are available so I used the average salary by company and job title for the regression. For the record, this salary information does not include bonuses or other pay. Individual reviews are available, and they include both text comments and a rating on a scale of one to five. I used the manual method of text mining by reading the text comments of each review in order to determine the presence of each non-monetary factor, as indicated by a dummy variable (0, 1) for the regression. The identification and text mining process for these non-monetary factors will be explained later in this section. I used the rating within the reviews as a proxy for job satisfaction in the regression. Sample salary information and a sample review can be seen in Exhibits 1 and 2, respectively, in the Appendix.

## Data Processing for Comparability

Since each user is not required to contribute both salary information and a company review, these records cannot be matched up on an individual level. Instead, I matched them up by company and job title, or by unique identifier. The salary information is only available in this format. For each non-monetary factor, I created a dummy variable (-1, 0, 1). If the review mentioned the absence or presence of the non-monetary factor, a -1 or 1 was coded, respectively. If the review didn't mention the non-monetary factor, a 0 was coded. This unconventional use of a dummy variable was intended to distinguish between a review that criticized the absence of a non-monetary factor (coded -1) and a review that didn't mention the absence or presence of that factor (coded 0).

However, these individual reviews needed to be condensed by identifier in order to be comparable to the salary information. I averaged the dummy variables for each non-monetary factor by identifier. This average was then disaggregated into two dummy variables (0, 1), one dummy variable indicating the non-monetary factor's absence and one dummy variable indicating the non-monetary factor's presence. If the average was between -1 and -0.5, inclusive, a 1 was coded into the dummy variable indicating absence and a 0 was coded into the other dummy variable. If the average was between -0.5 and 0.5, a 0 was coded into both dummy variables indicating absence and presence. If the average was between 0.5 and 1, inclusive, a 1 was coded into the dummy variable indicating presence and a 0 was coded into the other dummy variable. Two dummy variables were used for each non-monetary factor in order to follow the (0, 1) convention. This process left 197 observations for non-monetary factors out of an original set of 450 observations, as seen in Table 2.

This process was simpler for ratings. I averaged the ratings by identifier. Since the ratings represent a continuous variable in terms of job satisfaction, I did not round these averages to integers. However, for classification purposes, I will analyze the ratings in ranges.

The difficulty of comparability is evident in Table 2. The original set included 748 reviews for 748 employees, each with its own rating. Some employees worked for the same company with the same job title, meaning that only one average salary was available among them. For this reason, only 340 observations on salary were available. I read the text comments and manually coded the dummy variables for each non-monetary factor. Due to time limitations, I was able to categorize only 450 reviews, leading to 450 observations. The difference between the two columns for each variable is the number of reviews in the original set that related to the same company and job title. These multiple reviews were condensed by identifier, as explained earlier in this section.

If salary is included in the regression analysis, the identifier-condensed set is used for both variables since salary information is only available in this format. When two variables are being compared, the minimum number of observations is used since additional data for the limiting variable is not available. Using these two rules, 197 observations are available when comparing salary to non-monetary factors, 340 observations are available when comparing salary to job satisfaction, and 450 observations are available when comparing job satisfaction to non-monetary factors.

**Table 2: Number of Observations by Variable**

| Variable | Original Set | Identifier-Condensed Set |
|---|---|---|
| Salary | 340 | 340 |
| Rating | 748 | 340 |
| Non-Monetary Factors | 450 | 197 |

## Identification of Non-Monetary Factors

The absence or presence of 10 non-monetary factors, as listed in Table 3, was determined for each of the 450 reviews that I categorized. These non-monetary factors are intentionally stated in the negative, keeping the hypothesis in mind that their presence should increase salary.

These non-monetary factors were identified through both the related sociological research and the reviews on www.glassdoor.com. These factors seemed to be the buzzwords throughout the two sources, indicating their likely significance in driving employee salaries. Key differences between the related sociological research and this list include Insufficient Communication, Incompetent Management, and Poor Systems. The reviews on www.glassdoor.com are divided into Pros, Cons, and Advice to Senior Management sections. These divisions may influence employees to reflect and to comment on senior management, leading to this thesis's use of Insufficient Communication and Incompetent Management as non-monetary factors. Similarly, many users referenced IT or technology in their reviews, leading to the use of Poor Systems. Most of the other non-monetary factors are mentioned to some extent in the related sociological research, often by Andrew Clark.

Unfortunately, the text mining process of coding reviews into dummy variables was not an objective one. I read each review in an attempt to understand the writer's perception. Even if the employee perceived a non-monetary factor to exist when it didn't, economic theory would argue that that perception should be reflected in the employee's salary negotiations and job satisfaction. Thus, I coded the dummy variables based on my reading of the writer's perception of the non-monetary factor, making this process vulnerable to my subjective judgment. Table 3 includes sample phrases that indicate the absence or presence of each non-monetary factor.

Due to the use of 10 non-monetary factors, 20 dummy variables were created. Two dummy variables were created for each non-monetary factor, one to indicate its absence and one to indicate its presence. Multicollinearity occurs between variables if they are correlated and can impact the statistical significance of all variables within the regression analysis. Multicollinearity, above a threshold of 0.25, was observed between four pairs of dummy variables, as seen in Table 4. The dummy variables in the first column of Table 4 were removed to avoid multicollinearity, leaving 16 dummy variables for the regression analysis in the following Discussion of Results section.

**Table 3: List of Sample Phrases for Non-Monetary Factors**

| Factor | Positive (Absence) | Negative (Presence) |
|---|---|---|
| Political Environment | • "Everyone treated as equal"<br>• "Treats employees very fairly" | • "Corrupt promotion practices"<br>• "Favoritism within silos" |
| Unfriendly Co-Workers | • "Part of a family"<br>• "Strong spirit of teamwork" | • "Colleagues are whiners"<br>• "Bankers can be brutal" |
| Insufficient Communication | • "Great system to review performance and to keep tabs"<br>• "Open door policy" | • "Listen to your associates"<br>• "Lack of transparency"<br>• "Unrealistic expectations" |
| Long Hours | • "Good working hours"<br>• "Very flexible schedule" | • "Work many weekends"<br>• "Overworked analysts" |
| Incompetent Management | • "Continue to be visionaries"<br>• "Excellent senior leadership" | • "Focus on long-term growth"<br>• "Has trouble seeing big picture" |
| Poor Benefits | • "Pension plan. Paid education"<br>• "Great benefits package" | • "Health benefits too narrow"<br>• "Ease up on expense controls" |
| Not a Brand-Name Company | • "Great global company"<br>• "Looks great on your resume" | • "Become a thought leader"<br>• "Reputation remains tarnished" |
| Poor Systems | • "Good IT services"<br>• "Bleeding edge of technology" | • "Slow and outdated technology"<br>• "Systems not user-friendly" |
| Few Learning Opportunities | • "Strong knowledge workforce"<br>• "Lots of possible training"<br>• "Can tap smart co-workers" | • "Decentralized without knowledge sharing or real training"<br>• "Pigeon-holed into one thing" |
| Slow Promotions | • "Advancement opportunities"<br>• "Room to move around if desired" | • "Lay-offs and pay freezes"<br>• "Limited opportunities to transfer" |

**Table 4: Pairs of Non-Monetary Factors with Correlations Greater Than 0.25**

| First Non-Monetary Factor | Second Non-Monetary Factor | Correlation |
|---|---|---|
| Political Environment (Positive) | Poor Systems (Positive) | 0.3187 |
| Insufficient Communication (Positive) | Insufficient Communication (Negative) | -0.2739 |
| Incompetent Management (Positive) | Not a Brand-Name Company (Negative) | 0.2597 |
| Slow Promotions (Positive) | Slow Promotions (Negative) | -0.275 |

# VII. DISCUSSION OF RESULTS

## *Relationship between Salary and Non-Monetary Factors*

An inverse relationship between salary and each non-monetary factor, as the hypothesis predicted, was not observed.  Before delving into potential reasons for this phenomenon, the unlikelihood of the hypothesis can be seen in the summary statistics of Table 5.

**Table 5: Summary Staistics Comparing Salary and Non-Monetary Factors**

| | | Observations (197) | Mean | Difference Between Means | Standard Deviation |
|---|---|---|---|---|---|
| Political Environment | Positive | 5 | $84,026 | -$17,184 | $16,606 |
| | Negative | 15 | $66,842 | | $21,437 |
| Unfriendly Co-Workers | Positive | 80 | $74,495 | -$15,203 | $28,339 |
| | Negative | 11 | $59,292 | | $32,737 |
| Insufficient Communication | Positive | 10 | $63,534 | $8,030 | $19,837 |
| | Negative | 115 | $71,564 | | $26,700 |
| Long Hours | Positive | 39 | $79,891 | -$15,407 | $29,304 |
| | Negative | 18 | $64,484 | | $19,232 |
| Incompetent Management | Positive | 26 | $70,642 | $2,103 | $28,072 |
| | Negative | 53 | $72,744 | | $26,624 |
| Poor Benefits | Positive | 84 | $67,208 | -$2,495 | $21,733 |
| | Negative | 7 | $64,713 | | $13,562 |
| Not a Brand-Name Company | Positive | 68 | $71,724 | $6,968 | $24,131 |
| | Negative | 2 | $78,692 | | $28,720 |
| Poor Systems | Positive | 15 | $80,135 | -$17,326 | $20,682 |
| | Negative | 8 | $62,809 | | $28,360 |
| Few Learning Opportunities | Positive | 92 | $72,870 | $2,594 | $25,218 |
| | Negative | 13 | $75,464 | | $36,772 |
| Slow Promotions | Positive | 22 | $73,712 | $2,035 | $35,711 |
| | Negative | 74 | $75,746 | | $25,560 |

The Mean column computes the average salary among all reviews that indicate the presence (Negative) or absence (Positive) of the non-monetary factor in the first column. The Difference Between Means column is computed by the equation, x = (average negative salary) – (average positive salary). According to the hypothesis, this difference, or x, should be positive since the average negative salary should be greater than the average positive salary to compensate for the fact

that the employee is worse off with the presence of the non-monetary factor. However, only five out

of 10 differences are positive, indicating that the sign of these differences may be the result of

chance and making it unlikely that the hypothesis will be observed for each non-monetary factor.

The $13,000+ standard deviations are large and tend to exceed the $2,000 – $17,000 magnitude of

the corresponding differences. Thus, nine out of 10 average negative salaries fall within one standard

deviation of the corresponding average positive salaries. It is interesting to note that the magnitude

of the negative differences is much higher than the magnitude of the positive differences. The lack

of support for the hypothesis can be further seen in the regression output of Table 6.

**Table 6: Regression Output Comparing Salary and Non-Monetary Factors**

| Source | SS | df | MS | | Number of obs = | 197 |
|---|---|---|---|---|---|---|
| | | | | | F( 16, 180) = | 1.32 |
| Model | 1.3833e+10 | 16 | 864554120 | | Prob > F = | 0.1861 |
| Residual | 1.1745e+11 | 180 | 652515140 | | R-squared = | 0.1054 |
| | | | | | Adj R-squared = | 0.0258 |
| Total | 1.3129e+11 | 196 | 669824445 | | Root MSE = | 25544 |

| salaryavg | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| politics_neg | -4272.047 | 7544.708 | -0.57 | 0.572 | -19159.5 | 10615.4 |
| coworker_pos | 2240.067 | 4110.072 | 0.55 | 0.586 | -5870.055 | 10350.19 |
| coworker_neg | -9542.724 | 8515.601 | -1.12 | 0.264 | -26345.97 | 7260.522 |
| comm_neg | -275.6872 | 4120.064 | -0.07 | 0.947 | -8405.524 | 7854.149 |
| hours_pos | 9500.204 | 4920.267 | 1.93 | 0.055 | -208.6192 | 19209.03 |
| hours_neg | -4711.572 | 6678.198 | -0.71 | 0.481 | -17889.2 | 8466.053 |
| mgmt_neg | 522.231 | 4452.328 | 0.12 | 0.907 | -8263.239 | 9307.701 |
| benefits_pos | -8815.422 | 3946.957 | -2.23 | 0.027 | -16603.68 | -1027.164 |
| benefits_neg | -9351.768 | 10146.43 | -0.92 | 0.358 | -29373.03 | 10669.49 |
| brand_pos | 768.4135 | 3995.966 | 0.19 | 0.848 | -7116.549 | 8653.376 |
| brand_neg | 2893.153 | 18954.11 | 0.15 | 0.879 | -34507.68 | 40293.99 |
| systems_pos | 6126.87 | 7184.278 | 0.85 | 0.395 | -8049.368 | 20303.11 |
| systems_neg | -9530.485 | 9744.844 | -0.98 | 0.329 | -28759.31 | 9698.341 |
| learning_pos | 3723.54 | 3990.225 | 0.93 | 0.352 | -4150.094 | 11597.17 |
| learning_neg | 9587.233 | 8131.686 | 1.18 | 0.240 | -6458.461 | 25632.93 |
| promote_neg | 5994.983 | 3956.684 | 1.52 | 0.131 | -1812.467 | 13802.43 |
| _cons | 69111.61 | 5145.396 | 13.43 | 0.000 | 58958.56 | 79264.67 |

According to the hypothesis, positive dummy variables should have a negative impact on

salary as seen through a negative coefficient, since employees should be willing to accept lower

salaries in order to enjoy the absence of the non-monetary factor. On the other hand, negative

dummy variables should have a positive impact on salary as seen through a positive coefficient. Only

one out of six positive dummy variables has a negative coefficient, and only four out of 10 negative dummy variables have a positive coefficient. However, all of these dummy variables are not statistically significant. In fact, only Long Hours (Positive) and Poor Benefits (Positive) are statistically significant at the 10% level. Though Poor Benefits (Positive) has a negative coefficient of -$8,815, in line with the hypothesis, Long Hours (Positive) has a positive coefficient of $9,500, contrary to the hypothesis. This result means that employees who report that they do not work long hours tend to earn $9,500 more than employees who report that they work long hours.

The R-squared for this regression is 10.54%, but the adjusted R-squared falls to 2.58% even though the four dummy variables most responsible for multicollinearity have been removed. Given this low adjusted R-squared and the fact that only two of 16 dummy variables are statistically significant, it doesn't seem like a relationship, much less an inverse relationship, between salary and each of the non-monetary factors can be observed through the regression analysis.

There are several potential explanations for this phenomenon. First, the sample size for this regression is limited to only 197 observations. The related sociological research uses thousands of observations, ranging from 8,500 by Richard Freeman to 136,000 by Diener et al. This limited sample size may concentrate users of www.glassdoor.com who may not be representative of the labor market population. Second, the coding methodology is vulnerable to my subjective judgment. Based on my experiences and personal perspectives on employment, I could have interpreted a review to indicate the absence or presence of a non-monetary factor when the writer didn't perceive such a condition. Without the employee's perception, little pressure would be exerted on salary, through negotiations, the threat of quitting, or the willingness to accept a pay cut.

Even if this phenomenon is indicative of the labor market population without relating to issues of data or methodology, it may be colored by salary. Employees with a high salary may paint a rosier picture of other factors in their reviews, while employees with a low salary may take out their

frustration about their salary by complaining about other factors in their reviews. For this reason, Richard Freeman contextualized job satisfaction as both a dependent and independent variable of other aspects of work. This thesis applied Freeman's idea of a balance to salary, but the balance may be closer towards independent variable than the hypothesis implied. This explanation would explain the widespread occurrence of opposite signs – only one out of six positive dummy variables has a predicted negative coefficient and only four out of 10 negative dummy variables have a predicted positive coefficient – even though most of these dummy variables are not statistically significant.

However, Long Hours (Positive) is an outlier with an opposite sign and statistical significance at the 10% level. A potential explanation may be that employees who do not work long hours earn a higher salary because they are more productive than employees who work long hours. This explanation is not limited to long hours; it may also apply to the other four positive dummy variables with positive coefficients. Positive work conditions such as friendly co-workers and learning opportunities may breed productivity, leading to higher salaries.

For the six negative dummy variables with negative coefficients, this phenomenon may be caused by frictions within the labor market. Employees may be unwilling to exert pressure on salary since they may be unable to find other work – through restrictions of geography, skill set, or education level. These restrictions may force employees to accept negative work conditions without being compensated for them since the labor market does not function as a singular market. The assumption of labor mobility by traditional labor economics would need to be weakened in this case.

## Relationship between Salary and Job Satisfaction

An inverse relationship between salary and job satisfaction, as the hypothesis predicted, was also not observed. This regression was even weaker than the previous one, and the unlikelihood of the hypothesis can again be seen in the summary statistics of Table 7.

**Table 7: Summary Statistics Comparing Salary and Rating**

| Rating | [1.0, 1.5) | [1.5, 2.5) | [2.5, 3.5) | [3.5, 4.5) | [4.5, 5.0] | Total |
|---|---|---|---|---|---|---|
| Observations | 14 | 55 | 128 | 110 | 33 | 340 |
| Mean | $61,871 | $65,657 | $71,734 | $73,291 | $71,220 | $70,799 |
| Change from Previous Mean | - | $3,786 | $6,076 | $1,557 | -$2,070 | - |
| Standard Deviation | $21,755 | $26,936 | $30,105 | $26,947 | $22,171 | $27,624 |

According to the hypothesis, the average salary should decrease as the rating, which serves as a proxy for job satisfaction, increases. Employees are better off with higher ratings and should be willing to accept lower salaries in return for this increased level of job satisfaction. However, this predicted change in average salary is only seen between [3.5, 4.5) and [4.5, 5.0], where the average salary decreases by $2,070. Otherwise, the average salary increases at each step between [1.0, 1.5) and [3.5, 4.5). The average salary for the bottom range is lower than the average salary for all ratings and the average salary for the top range is higher than the average salary for all ratings, which calls into question the hypothesis's prediction of an inverse relationship between salary and job satisfaction. It is interesting to note the high standard deviation for each rating. The $20,000+ standard deviations overwhelm the $1,000 – $6,000 differences between average salaries. Thus, these differences could simply arise by chance since all the average salaries lay within one standard deviation of each other. The lack of support for the hypothesis can be further seen in the regression output of Table 8.

According to the hypothesis, rating should have a negative impact on salary as seen through a negative coefficient since employees are better off with higher ratings. However, rating has a positive coefficient of $2,200, even though it is not statistically significant. This result means that an employee who reports a rating one point higher than other employees is likely to earn $2,500 more in salary than other employees, with a linear relationship. The R-squared for this regression is 0.58%, and the adjusted R-squared falls to 0.29%. Figure 2 reveals the reason for such a low R-squared. High and low salaries occur at all ratings, making it difficult for any regression based on rating to

explain the variation within salary. Given the low R-squared and the lack of statistical significance, it

doesn't seem like a relationship, much less an inverse relationship, between salary and job

satisfaction, for which rating serves as a proxy, can be observed through the regression analysis.

**Table 8: Regression Output Comparing Salary and Rating**

| Source | SS | df | MS | | Number of obs = | 340 |
|---|---|---|---|---|---|---|
| | | | | | F( 1, 338) = | 1.98 |
| Model | 1.5045e+09 | 1 | 1.5045e+09 | | Prob > F = | 0.1606 |
| Residual | 2.5717e+11 | 338 | 760872390 | | R-squared = | 0.0058 |
| | | | | | Adj R-squared = | 0.0029 |
| Total | 2.5868e+11 | 339 | 763065980 | | Root MSE = | 27584 |

| salaryavg | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| rating | 2199.925 | 1564.472 | 1.41 | 0.161 | -877.4026 | 5277.253 |
| _cons | 63773.68 | 5214.883 | 12.23 | 0.000 | 53515.97 | 74031.4 |

**Figure 2: Scatter Plot Comparing Salary and Rating**
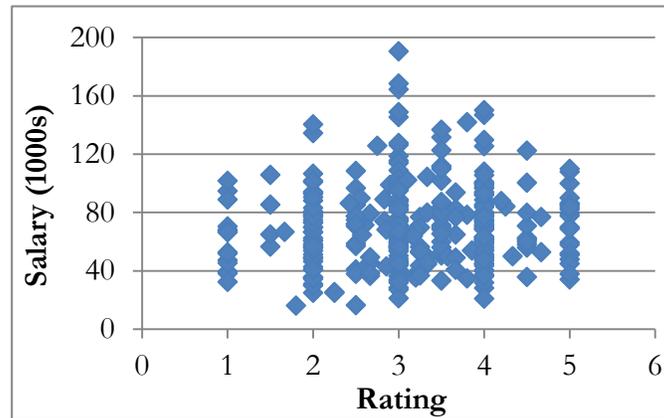


There are several potential explanations for this phenomenon. First, as explained earlier in

this section, the limited sample size of 340 observations for this regression may concentrate users of

www.glassdoor.com who may not be representative of the labor market population. Second, rating

may not be a good proxy for job satisfaction. Writers of reviews may award a high rating if they like

the company and support its management even if they are not satisfied with their own job within the

company. On the other hand, writers of reviews may award a low rating if their company is not

performing well financially even if they are satisfied with their own job. Unlike the regression above,

this regression is not vulnerable to my subjective judgment since all writers of reviews provide a rating that can be matched up through the company and job title to an average salary.

Even if this phenomenon is indicative of the labor market population without relating to issues of data, it may be colored by salary like the regression above. Employees with a high salary may rate their jobs strongly due to their salary, while employees with a low salary may take out their frustration about their salary with a poor rating, reversing the relationship predicted by the hypothesis. Andrew Clark found this exact result at the 1% significance level in "What Makes a Good Job? Evidence from OECD Countries." Again, this result relates to Freeman's idea of a balance between treating variables, especially in the labor market, as a dependent variable and an independent variable. This thesis attempts to reverse Clark's relationship by treating salary as the dependent variable and job satisfaction as the independent variable, but the relationship between the two variables is complex. In theory, I would use some sort of non-salary rating that excludes the effects of salary on job satisfaction. However, such a rating is empirically difficult to find.

Other sociological research is also applicable to this phenomenon. When explaining happiness in "High Income Improves Evaluation of Life but Not Emotional Well-Being", Kahneman and Deaton identified a $75,000 salary threshold, beyond which salary continues to improve life evaluation but not day-to-day experience. The mean salary for all 340 observations for this regression is $70,799. Thus, a significant portion of users of www.glasssdoor.com who earn above $75,000 may have experienced the effects identified by Kahneman and Deaton. Depending on their rating's reliance and weights on the distinct categories of life evaluation and day-to-day experience, employees may rate their jobs differently than otherwise predicted. Due to lack of available data, this thesis does not distinguish between the distinct categories of happiness in its attempt to understand job satisfaction. However, it is a worthy opportunity for further research.

## Relationship between Job Satisfaction and Non-Monetary Factors

A high correlation between job satisfaction and the non-monetary factors, as the hypothesis predicted, was observed to some extent. A significant minority of the dummy variables for non-monetary factors were highly correlated with rating, which served as a proxy for job satisfaction. The summary statistics of Table 9 provide some indications of this relationship within the data.

**Table 9: Summary Statistics Comparing Rating and Non-Monetary Factors**

| Rating | | Mean | Difference Between Means | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Observations | | | | 8 | 38 | 120 | 201 | 83 | 450 |
| Political Environment | Positive | 4.11 | 0.64 | 0 (0%) | 1 (3%) | 1 (1%) | 3 (1%) | 4 (5%) | 9 |
| | Negative | 3.47 | | 0 (0%) | 8 (21%) | 21 (18%) | 24 (12%) | 6 (7%) | 59 |
| Unfriendly Co-Workers | Positive | 3.81 | 0.53 | 2 (25%) | 12 (32%) | 35 (29%) | 79 (39%) | 34 (41%) | 162 |
| | Negative | 3.28 | | 2 (25%) | 4 (11%) | 17 (14%) | 15 (7%) | 2 (2%) | 40 |
| Insufficient Communication | Positive | 4.13 | 0.63 | 0 (0%) | 0 (0%) | 7 (6%) | 26 (13%) | 13 (41%) | 46 |
| | Negative | 3.50 | | 8 (100%) | 37 (97%) | 99 (83%) | 126 (63%) | 42 (2%) | 312 |
| Long Hours | Positive | 3.69 | -0.11 | 2 (25%) | 4 (11%) | 28 (23%) | 42 (21%) | 14 (16%) | 90 |
| | Negative | 3.80 | | 0 (0%) | 5 (13%) | 19 (16%) | 30 (15%) | 15 (51%) | 69 |
| Incompetent Management | Positive | 4.16 | 0.81 | 0 (0%) | 1 (3%) | 11 (9%) | 41 (20%) | 26 (31%) | 79 |
| | Negative | 3.35 | | 5 (63%) | 29 (76%) | 56 (47%) | 78 (39%) | 12 (14%) | 180 |
| Poor Benefits | Positive | 3.71 | 0.10 | 2 (25%) | 14 (37%) | 49 (41%) | 74 (37%) | 33 (40%) | 172 |
| | Negative | 3.61 | | 1 (13%) | 3 (8%) | 7 (6%) | 12 (6%) | 5 (6%) | 28 |
| Not a Brand-Name Company | Positive | 3.61 | 0.28 | 3 (38%) | 16 (42%) | 39 (33%) | 62 (31%) | 24 (29%) | 144 |
| | Negative | 3.33 | | 0 (0%) | 3 (8%) | 3 (3%) | 5 (2%) | 1 (1%) | 12 |
| Poor Systems | Positive | 3.94 | 0.27 | 1 (13%) | 2 (5%) | 5 (4%) | 15 (7%) | 10 (12%) | 33 |
| | Negative | 3.67 | | 0 (0%) | 3 (8%) | 11 (9%) | 13 (6%) | 6 (7%) | 33 |
| Few Learning Opportunities | Positive | 3.84 | 0.61 | 3 (38%) | 13 (34%) | 42 (35%) | 106 (53%) | 43 (52%) | 207 |
| | Negative | 3.22 | | 2 (25%) | 13 (34%) | 28 (23%) | 25 (12%) | 4 (5%) | 72 |
| Slow Promotions | Positive | 4.01 | 0.61 | 0 (0%) | 1 (3%) | 17 (14%) | 34 (17%) | 20 (24%) | 72 |
| | Negative | 3.40 | | 2 (25%) | 20 (53%) | 41 (34%) | 66 (33%) | 6 (7%) | 135 |

The Mean column computes the average rating among all reviews that indicate the presence (Negative) or absence (Positive) of the non-monetary factors in the first column. The Difference Between Means column is computed by the equation, x = (average positive rating) – (average negative rating). According to the hypothesis, this difference, or x, should be positive since the average positive rating should be greater than the average negative rating to reflect the fact that the employee is better off with the absence of the non-monetary factor. Nine out of the 10 differences

are positive, indicating that the data may support a high correlation between job satisfaction and non-monetary factors. It is interesting to note that the magnitude of the negative difference is much smaller than the magnitude of the positive differences, which supports the hypothesis.

The other columns list how many employees from each rating indicated the presence (Negative) or absence (Positive) of the non-monetary factors in the first column. The percentages are computed by the equation, x = (number of employees indicating condition) / (number of observations for that rating). For example, the 11% figure for Unfriendly Co-Workers (Negative) among employees who provided a rating of 2 is computed by the equation, x = 4/38.

According to the hypothesis, as the rating increases, this percentage, or x, should decrease for negative conditions and increase for positive conditions. Lower percentages of employees will report negative conditions if they rate the company highly in their review, while higher percentages of employees will report positive conditions if they rate the company highly in their review. Since such few observations exist in the (1.0, 1.5) column, I will exclude it from this preliminary analysis. Looking across the other four columns for ratings, eight out of 10 trends for negative work conditions and six out of 10 trends for positive work conditions are in line with the hypothesis. Further, albeit limited, support for the hypothesis can be found in the regression output of Table 10.

According to the hypothesis, positive dummy variables should have a positive impact on job satisfaction as seen through a positive coefficient, since employees are better off with the absence of the non-monetary factor. On the other hand, negative dummy variables should have a negative impact on job satisfaction as seen through a negative coefficient. Five out of six positive dummy variables have a positive coefficient, and nine out of 10 negative dummy variables have a negative coefficient, in line with the hypothesis. However, all of these dummy variables are not statistically significant. Five dummy variables are statistically significant at the 1% level, and one additional

dummy variable is statistically significant at the 10% level. All six of these statistically significant

dummy variables are in line with the hypothesis in terms of the sign of their coefficients.

**Table 10: Regression Output Comparing Rating and Non-Monetary Factors**

```
      Source |       SS       df       MS              Number of obs =     450
-------------+------------------------------           F( 16,   433) =   10.45
       Model | 107.296437      16  6.70602729           Prob > F      =  0.0000
    Residual | 277.994674     433  .642020033           R-squared     =  0.2785
-------------+------------------------------           Adj R-squared =  0.2518
       Total | 385.291111     449  .858109379           Root MSE      =  .80126
```

```
      rating |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
politics_neg |  -.1105956       .1167   -0.95   0.344    -.3399645    .1187733
 coworker_pos |   .0904894    .0828471    1.09   0.275    -.0723431    .2533219
 coworker_neg |   -.547332    .1405046   -3.90   0.000    -.8234878   -.2711762
    comm_neg |  -.4543931    .0865792   -5.25   0.000     -.624561   -.2842253
   hours_pos |   .0976331    .0994564    0.98   0.327    -.0978444    .2931105
   hours_neg |   -.023662    .1099167   -0.22   0.830    -.2396987    .1923747
    mgmt_neg |  -.5352324    .0798739   -6.70   0.000    -.6922212   -.3782435
 benefits_pos |   .1441383     .083483    1.73   0.085    -.0199441    .3082207
 benefits_neg |  -.2356548    .1619053   -1.46   0.146    -.5538728    .0825632
   brand_pos |   -.034788    .0862684   -0.40   0.687    -.2043449    .1347689
   brand_neg |  -.2722636    .2377986   -1.14   0.253    -.7396467    .1951195
 systems_pos |    .237742     .149185    1.59   0.112    -.0554748    .5309587
 systems_neg |   .0043194    .1485001    0.03   0.977    -.2875513    .2961901
learning_pos |   .0943259     .085958    1.10   0.273     -.074621    .2632728
learning_neg |  -.3209177    .1195804   -2.68   0.008    -.5559479   -.0858876
 promote_neg |   -.414509    .0853058   -4.86   0.000    -.5821741    -.246844
       _cons |   4.331893    .1130166   38.33   0.000     4.109764    4.554022
```

The R-squared for this regression is 27.85%, and the adjusted R-squared is 25.18%. Even

though the statistically significant dummy variables are able to predict the rating well, there may be a

large amount of randomness in determining the rating. This randomness may arise from the

employee's personality, their mood at the time of making the rating, and other factors. It helps to

explain the relatively low-R squared despite the statistical significance of particular dummy variables.

These results confirm Andrew Clark's research in "What Makes a Good Job? Evidence from

OECD Countries" to some extent. Both pieces of research show that job satisfaction is correlated to

a number of different variables, which also relates to Richard Freeman's assertion on the difficulty

of understanding and using job satisfaction as a standard economic variable. Using 1997 data on

14,000 employees, Clark found a statistically significant relationship between job satisfaction and

various variables including salary, work hours, promotion opportunities, job security, difficulty of

work, intrinsic value of work, and interpersonal relationships at the 1% level. Given this list, it is not surprising that Unfriendly Co-Workers (Negative), Few Learning Opportunities (Negative), and Slow Promotions (Negative) are statistically significant in Table 10. Clark's research did not focus on the impact of management. However, the Advice to Senior Management section of the reviews on www.glassdoor.com may have caused users to adjust their rating when prompted to reflect and to comment on management. This adjustment may have caused both Insufficient Communication (Negative) and Incompetent Management (Negative) to be significant in Table 10.

Poor Benefits (Positive), the last statistically significant variable, is also worthy of notice. Along with Long Hours (Positive), it was one out of only two dummy variables that were statistically significant at the 10% level in the regression comparing salary and non-monetary factors. Thus, Poor Benefits (Positive) impacts both salary and job satisfaction. A potential explanation is the quasi-monetary status of a benefits package. Relative to other non-monetary factors such as a political environment or poor systems, the monetary value of a benefits package can be much more objectively compared to other companies and jobs. In employees' minds, this objective monetary value may help justify the decrease in salary found by the regression comparing salary and non-monetary factors and the increase in job satisfaction for the safety of mind provided by the benefits.

However, it is interesting to note that Long Hours is not statistically significant since it should be similar to Clark's work hours and since it was the other dummy variable that was statistically significant in the regression comparing salary and non-monetary factors. Barring the data or methodology issues mentioned earlier in this section, this difference could be caused by a decreasing standard of work-life balance in a globalizing world and the acceptance of long hours as a normal part of work. Long Hours (Positive) has a positive coefficient and Long Hours (Negative) has a negative coefficient, in line with the hypothesis, but this non-monetary factor, as a whole, may have taken on less significance for employees due to the potential explanation above.

# VIII. IMPLICATIONS OF RESEARCH

This thesis set out to show that salary should respond to and capture non-monetary factors and job satisfaction through an inverse relationship. In economic terms, I hypothesized that non-monetary factors and job satisfaction, by representing different forms of utility, should both become substitutes for salary. The data did not support these parts of the hypothesis. Despite this setback, much knowledge and opportunities for further research can still be gained from this thesis.

## *Potential Implications for Employees*

Since only Poor Benefits (Positive) and Long Hours (Positive) were statistically significant in the regression comparing salary and non-monetary factors, there may not be universal factors that drive employee salaries. At a minimum, this thesis has not provided such proof. As described in the Introduction section, employees each bring a different perspective on work and on their salaries. Based on age, industry, geography, culture, and personal goals, employees may place different values on learning opportunities, networking potential, family time, postretirement benefits, or any of the numerous other aspects of work. Andrew Clark found that employees tend to self-select into jobs that provide factors that they value. Despite the potential transaction costs, this self-selection is important for employees to maximize the utility that they receive from a set of factors that constitute a job since their utility will most likely be different than other employees' utility.

Using the few statistically significant variables, a few recommendations for employees emerge. First, a strong benefits package decreases salary and increases job satisfaction, potentially due to its relatively objective monetary value. However, this trade-off may not be equivalent for all employees so it becomes important to compare the personal value of a benefits package, which increased job satisfaction will reflect, to the average value, which the decreased salary will reflect. This trade-off depends on the individual perspective above. Second, contrary to the hypothesis,

work-life balance increases salary, potentially due to the increased productivity that it breeds. Employees may not want to think in terms of sacrificing work-life balance for salary since the data does not support that result. Third, unfriendly co-workers, insufficient communication from management, incompetent management, few learning opportunities, and slow promotions decrease job satisfaction. Out of that list, unfriendly co-workers and incompetent management have the strongest negative impact on job satisfaction. Employees should avoid jobs with such non-monetary factors, even though they have not been shown to have a significant impact on salary.

Employees should also beware any changes in the factors that constitute their job. As seen in Freeman's research and this thesis, any change in a non-monetary factor can have multiple, unpredicted effects on salary, job satisfaction, and other non-monetary factors. These effects may not be linear, as seen in Kahneman and Deaton's research on the $75,000 salary threshold for distinct categories of happiness. Individual circumstances play a large role in this regard.

## *Potential Implications for Employers*

The same knowledge is useful for employers, only from the opposite perspective. For example, they can use it in an attempt to reduce labor expenses. Using the few statistically significant variables, a few recommendations for employers emerge. First, employers should provide a strong benefits package in order to decrease salary and increase job satisfaction. Unlike employees, employers should consider the cost of providing that benefits package. They should provide the benefits package most suited to their employees since it will be able both to increase job satisfaction and to decrease salary. The regression comparing salary and job satisfaction does not indicate a relationship between the two variables, but it seems reasonable to assume that the two effects will balance each other out. Given the relatively objective monetary value of a benefits package, the inverse relationship between salary and job satisfaction may exist in this limited case. Second, work-life balance seems to be a multi-faceted non-monetary factor with multiple effects on other aspects

of work. While the data shows that work-life balance increases salary at a 10% significance level, this effect may be caused by the increased productivity of employees who do not have to work long hours. For this reason, employers should be careful to weigh the benefits of productivity and potential, albeit not statistically significant, job satisfaction against the salary costs shown by the data.

Employers may also want to increase job satisfaction in order to motivate employees. They should follow similar recommendations as the employees. Employers should avoid creating environments with unfriendly co-workers, insufficient communication with management, incompetent management, few learning opportunities, and slow promotions. The absence of these non-monetary factors does come at a cost for employers, but they're all statistically significant at the 1% level so it could be a good investment rather than reducing politics or relying on the brand to retain employees. Those choices may have other benefits but will have limited impact for employees.

Employers should also recognize the different perspectives that employees bring. Although the two paragraphs above apply in terms of the users of www.glassdoor.com in my sample, they may not apply for all ages, industries, geographical areas, or cultures. Instead, employee surveys and feedback may provide the best route to structure salary, benefits, and other aspects of work. Such actions would also reduce employee perceptions of insufficient communication from management and the negative impact on job satisfaction that that factor can have.

# IX. CONCLUDING THOUGHTS

With its ups and downs, work is incredibly multi-faceted. Despite the seeming monotony of working in the same job with the same tasks and the same co-workers, work can bring wildly different feelings and experiences at different moments. In order to understand the multiple aspects of work, an extensive body of economic theory and sociological research has been developed. Though this thesis was unable to identify multiple universal factors that drive employee salaries at a statistically significant level, it still serves as another reference point within that body of literature.

This thesis was able to find several statistically significant variables, in line with some prior research and other potential explanations, as described in the Discussion of Results section. In fact, employees and employers can take advantage of some of the real-life effects of these results, as described in the Implications of Research section. Beyond that specific knowledge, this thesis, like any study, also faced research limitations and identified potential opportunities for further research.

## *Research Limitations*

The potential opportunities for further research will build on this thesis's research limitations. Future researchers may be able to find more nuanced data sets that overcome these limitations and that are able to test, more cleanly, the relationships that I tested between different aspects of the labor market. I was limited by the lack of personal information for the employees in the data set. Users of www.glassdoor.com tended to be younger employees, often in the business and technology industries. Average salaries in the data set ranged from $16,240 to $190,600 so minimum-wage part-time employees and corporate-suite officials may not have been represented.

Despite these trends, some older and non-business or non-technology employees were certainly included in the data set. I was unable to control for differences between employees such as age, location, race, number of dependents, and even emotional characteristics. These controls may

have helped the regressions test the relationships between salary and non-monetary factors, between salary and job satisfaction, and between job satisfaction and non-monetary factors more cleanly. The regressions would not have incorporated the effects of other personal information of the users and may have resulted in greater statistical significance for the first two parts of the hypothesis.

## *Opportunities for Further Research*

Building off of this research limitation, the first opportunity for further research comes from potential groupings of employees. With personal information like age, location, race, number of dependents, and even emotional characteristics of employees, the regressions comparing non-monetary factors to other aspects of work may be able to identify groupings of employees where these non-monetary factors are more statistically significant. This opportunity for further research relates to the different perspectives on work that employees bring. Employees within a certain grouping may value certain factors like learning opportunities and fast promotions over others like competent management and work-life balance. A relevant example was discussed in the Introduction section. Though such work is informally done by managers, it may be interesting to identify the characteristics of such groupings and to recommend certain work conditions for certain groupings from an academic perspective, much as this thesis attempted for the entire labor market.

Second, this thesis helped identify the impact of management in the labor market through the use of Insufficient Communication and Incompetent Management as dummy variables. The negative forms of both dummy variables were statistically significant with job satisfaction at the 1% level. The related sociological research has not extensively considered management in terms of its impact on salary and job satisfaction. It often considers management only in terms of company growth and profits. I would expect job satisfaction to be higher in well-managed companies, but the impact on management on salaries is harder to determine. Nonetheless, through objective variables such as years of related experience for top managers and subjective variables such as employee

ratings on the quality of management, the impact of management is an accessible opportunity for further research. Like other aspects of work, it deserves such research.

Third, the distinct categories of happiness can be better applied to job satisfaction. Kahneman and Deaton's research on these categories and on the $75,000 salary threshold is relatively new since their paper, "High Income Improves Evaluation of Life but Not Emotional Well-Being", was published only in 2010. Job satisfaction may mirror happiness in that its weights on the distinct categories of life evaluation and day-to-day experience may vary by salary, so it may be interesting to further expand that research in the direction of the labor market. It may be necessary to survey and to test for two different measures of job satisfaction, with one measure based on life evaluation or long-term career progress and the other measure based on day-to-day experience or instantaneous feelings about current work. This division of job satisfaction remains a worthy opportunity for further research for its potential to better understand different groups of employees who may vary in their salaries and weights for job satisfaction.

As evident, there are great opportunities for further research. Despite the extensive body of related economic theory and sociological research that is already available, this field is of key interest to all employees and employers. This interest will sustain much further research in this field, and I hope to see this thesis's research limitations overcome and its questions answered in coming years.

# APPENDIX

## Exhibit 1: Sample Salary Information from www.glassdoor.com



| 7 Salaries: **1–1** of **1** Job Title | | Sort by | # of Reports (high to low) ▼ |
|---|---|---|---|
| Salaries in USD 🇺🇸 | Avg. Salary | $65k | $75k |
| **Senior Programmer Analyst**<br>7 American Airlines Salaries | $72,429 | $63k ▇▇▇▇▇▇▇ $80k | |
| Salaries in USD 🇺🇸 | | $65k | $75k |

Salaries: **1–1** of **1** Job Title   < Prev | 1 | Next >

Key: ▇ = Salary Range  ▨ = Anonymous Salary Range [?]  ▮ = Average Salary  </> Embed

Note: Salary may vary based on location, years of experience, and/or other factors.

## Exhibit 2: Sample Review from www.glassdoor.com



**American Airlines Senior Programmer Analyst**: (Current Employee)  06-Mar-2012

### "Was good, but diversity within IT is decreasing."  3.0 ▪▪▪▫▫ Details

**Pros**
Complex IT systems provides food for thought
Work life balance not bad

**Cons**
Pay raises are hard to come
Flight benefits are not so attractive as we are seeing increased load factors
Lot of good people in IT left/leaving the company since middle of 2010

**Advice to Senior Management**
Pl. pay attention to who you convert as full time in IT. It is possible some contractors who have faked their resumes in the past have found a way to legitimize their experience and join as full time. It is a question of integrity than qualification. This trend has slowly increased since beginning of 2011. These are people who are no different than an ADEPT candidate at the time of joining, but AA ends up paying at least 30K more per year to the contracting company for their "experience". Also some teams have the same kind of people with no diversity at all and end up speaking in their native language that can be very annoying sometimes.

✔ Helpful Review?  Yes | No    💬 Comment    🖇 Inappropriate?

# REFERENCES

Archak, Nikolay, Anindya Ghose, and Panagiotis G. Ipeirotis. "Deriving the Pricing Power of Product Features by Mining Consumer Reviews." *Management Science* 57.8 (2011): 1485-509. Print.

Azar, Beth. "Friends and Co-Workers." American Psycohological Association, Jan. 2012. Web. 20 Mar. 2012. <http://www.apa.org/gradpsych/2012/01/relationships.aspx>.

Beynon, H., and R. M. Blackburn. *Perceptions of Work: Variations within a Factory*. Vol. 3. Cambridge: Cambridge UP, 1972. Print. Cambridge Papers in Sociology.

Clark, Andrew. "What Makes a Good Job? Evidence from OECD Countries." *Job Quality and Employer Behavior*. Ed. Stephen Bazen, Claudio Lucifora, and Wiemer Salverda. New York: Palgrave Macmillan, 2005. 11-30. Print.

Diener, Ed, Weiting Ng, James Harter, and Raksha Arora. "Wealth and Happiness Across the World: Material Prosperity Predicts Life Evaluation, Whereas Psychosocial Prosperity Predicts Positive Feeling." *Journal of Personality and Social Psychology* 99.1 (2010): 52-61. Web.

Edgell, Stephen. *The Sociology of Work: Continuity and Change in Paid and Unpaid Work*. London: SAGE Publications, 2006. Print.

Fleisher, Belton M. *Labor Economics: Theory and Evidence*. Englewood Cliffs, NJ: Prentice-Hall, 1970. Print.

Freeman, Richard B. "Job Satisfaction as an Economic Variable." *American Economic Review* 68.2 (1978): 135-41. Web.

Freeman, Richard B. *Labor Economics*. Englewood Cliffs, NJ: Prentice-Hall, 1972. Print. Foundations of Modern Economics Ser.

Ghose, Anindya, and Panagiotis G. Ipeirotis. "Estimating the Helpfulness and Economic Impact of Product Reviews: Mining Text and Reviewer Characteristics." *IEEE Transactions on Knowledge and Data Engineering* 23.10 (2011): 1498-512. Print.

Kahneman, Daniel, and Angus Deaton. "High Income Improves Evaluation of Life but Not Emotional Well-Being." *Proceedings of the National Academy of Sciences* 107.38 (2010): 16489-6493. Web.

Polachek, S. W., and W. S. Siebert. *The Economics of Earnings*. Cambridge: Cambridge UP, 1993. Print.

Stebbins, Robert A. *Between Work & Leisure: The Common Ground of Two Separate Worlds*. New Brunswick: Transaction, 2004. Print.