



# Discussion Papers In Economics And Business

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New Evidence from Japanese Union Workers

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JOB SATISFACTION AND HAPPINESS:  
NEW EVIDENCE FROM JAPANESE UNION WORKERS

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**Abstract**

This paper utilizes survey data of Japanese union workers to provide new insights to the “happiness and economics” literature. A crucial item that distinguishes our empirical analyses from previous studies is the use of data on workers’ expectations of their peers’ wages. With our data, we confirm that individuals report higher levels of subjective well-being (SWB) when they perceive that their wages are higher *relative to* their peers’. On the other hand, the traditional approach in the literature constructs relative wages from Mincer equations, thus presuming that individuals infer their peers’ wages the way econometricians do. We argue that this method may be inappropriate. Moreover, we address the issue of endogeneity of our subjective reference income measure employing an instrumental variables approach, and corroborate the causality from relative income to SWB. Additionally, we study the relationship between SWB measures and workers’ individual characteristics, and compare our results with standard findings in the literature for U.S. and European workers. In agreement with these studies, women and married individuals seem to be happier than their counterparts, men and single workers. However, we observe a U-shaped relationship between education and happiness, which contrasts with findings for U.S. and British workers. Finally, we attempt to explain these relationships in the context of the Japanese social background. **Keywords:** subjective well-being; relative utility; subjective reference income **JEL classifications:** C25; D00; J28.

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# 1 Introduction

Happiness research is not new in the economics literature. Ever since the seminal work of Easterlin (1974) was published, increasing empirical evidence, particularly in recent years, has reiterated that, more than their own consumption and income *absolute* levels, individuals care about how much they earn and consume *relative to their peers*.<sup>1</sup> Nonetheless, the profession has remained skeptical of happiness studies since the key variables measuring people's satisfaction levels come from self-reported assessments in surveys. As Freeman (1978) puts it, "economists [are] leery of what purport to be measures of individual utility," because they only measure what people say rather than what people actually do. Lacking any revealed preference evidence, Easterlin stood alone for about two decades in his empirical defense of Duesenberry's (1949) relative utility hypothesis.

In the last decade, however, happiness research in economics was revived. There seems to be a current consensus among economists that "[subjective well-being (SWB)] is a meaningful concept" as a measure for utility (McBride 2001) and that "the concept of utility as subjective well-being is [...] measurable from survey information with sufficient precision" (Hollander 2001). And, although sociologists and psychologists have agreed upon the validity of SWB measures for many years, economists' skepticism has only abated in the last ten years, bringing about an increasing interest in the topic.<sup>2</sup>

But in spite of the upsurge in the number of happiness studies in economics, there is still ample room for improvement. One issue that has received numerous criticisms and which is standard in the literature is the use of imputed peers' wages from Mincer equations as a measure of the individual's reference income. Underlying this approach lies the premise that people will infer peers' wages in the exact same way econometricians do. Several authors (Manski 1993, Sloane and Williams 2000, Lydon and Chevalier 2002) have argued that this may not be the case, although they have failed to present any conclusive evidence to support their claims. On the other hand, one further issue that remains pervasive in happiness research is that the vast majority of these studies utilize U.S. and European data, and there have been few efforts to corroborate whether the relevant empirical findings

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<sup>1</sup>For excellent surveys of the happiness and economics literature, see Frey and Stutzer (2001), Frey and Stutzer (2002), and Frey and Stutzer (2003).

<sup>2</sup>Thorough discussions of satisfaction and well-being measures in the sociology and the psychology literatures are found in Clark and Oswald (1996) and Alesina, di Tella, and MacCulloch (2004). For an excellent exposition of recent developments in the economics literature and the validity and applicability of happiness measures in economics research, see Kahneman and Krueger (2006).

also hold in other regions of the world.

This paper addresses these two issues by analyzing the relationship between self-reported job satisfaction measures of Japanese union workers and their individual characteristics. One of the novel elements of our analysis is the use of data on workers' actual perceptions of their peers' wages, rather than imputed wages from Mincer equations, in order to test the relative utility hypothesis. Our results show that individuals report higher levels of satisfaction, both at work and in life in general, when their individual absolute income levels are higher. More importantly, however, we observe that workers are happier when they perceive that their own wages are higher relative to their peers'. Moreover, we show that this result does not hold when we employ the standard reference income measure as imputed from Mincer equations, attempt to explain away this discrepancy, and argue that this traditional reference income measure is inadequate in happiness studies of this sort.

Even after corroborating that our preferred relative income measure is significant across various specifications of our job satisfaction and happiness equations, there is still the concern that comparison income may be endogenous. This issue has not been explored in the literature and we attempt to fill this gap by implementing an instrumental variables approach. Our IV estimates show that subjective reference income does have a causal impact on workers' levels of satisfaction at work, corroborating our previous findings.

In addition to our relative utility results, we compare the relationship between job satisfaction and workers' individual characteristics to the rest of the literature. Our findings confirm several results that seem to be standard in happiness research in the U.S. and Europe, e.g., that women and married workers tend to report higher levels of satisfaction than their respective counterparts, men and single individuals. Nonetheless, we also observe other relationships that differ sharply from findings in the U.S. and Europe. In particular, we observe a U-shaped relationship between SWB and educational attainment, which contrasts starkly with the monotonically increasing association found in previous studies. In a forthcoming paper, we attempt to explain away this relationship and conclude that our findings are consistent both with Clark's (1997) "aspiration hypothesis" and with the importance of social status and hierarchy in Japan, as suggested by Benedict (1946) and Reischauer (1950).

The paper is organized as follows. In Section 2, we introduce our data and explain how it differs from previous data sets on job satisfaction and happiness. Section 3 presents the model and empirical framework we will follow in order to investigate the connection between SWB and comparison income, as well as with workers' individual characteristics. In our regressions,

we first proxy reference income by our data on workers' expectations on their peers' wages. Then, we employ the traditional reference income measure obtained from Mincer equations, and compare our results. In Section 3.3 we explore the issue of endogeneity of workers' expectations of their peers' wages using an instrumental variables approach. This analysis shows that endogeneity is not a serious concern in our data and that our main results are preserved. Section 4 studies the relationship between workers' individual characteristics and their levels of satisfaction at work. Finally, Section 5 concludes.

## 2 Data Description

Our data set comes from the Comprehensive Survey of Labor Union Members, which was designed and applied by a group of psychologists at the International Economy and Work Research Institute. It comprises data on about 130,000 Japanese union members working in Japanese firms listed on the Tokyo Stock Exchange (TSE) from 1990–2004. The survey requests that respondents provide self-assessments on their individual well-being at work and in life in general. In addition to this, other questions attempt to obtain information on workers' perceptions of their work environment.<sup>3</sup> The data set also allows us to control for individual demographic and socio-economic characteristics, which include age, gender, educational attainment, tenure at the current firm, annual income level, overtime hours worked, and workers' expectations of their peers' wages.<sup>4</sup> It is important to note that the data set does not track down individual workers over time, that is, the data set is not a panel. As is usual, the survey is answered anonymously.

The survey contains 238 multiple-choice questions in total. This high number of questions may seem both as a blessing and as a source of concern. On the one hand, the benefit of having access to so much data on perceptions at the workplace of so many workers is evident. On the other hand, however, it is plausible to believe that, in their attempt to finish the questionnaire quickly, respondents answer the questions without care. Also, the order in which the questions are posed may affect the answers provided. For instance, a worker may initially state that he is very satisfied with his work; nonetheless, upon reflecting on his relationship with his superiors and remembering a few negative experiences, he may report a lower satisfaction level. Yet, one of the reasons behind the many questions in the survey is precisely to ensure that this does not happen. For example, one same question, though phrased

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<sup>3</sup>In Appendix 1 we provide a full list of question categories.

<sup>4</sup>A complete list and description of the variables is presented in Appendix 2.

differently, may be asked three or four times at different stages in the survey. This and other methods employed in organizational psychology validate the responses provided.

As is common in studies of this nature, we were unable to use the full data set of 130,000 individuals due to missing data in some of the key variables in our analysis, such as job satisfaction and income. Moreover, we uncovered a few inconsistencies that invalidated some of the answers provided. For instance, 306 union members reported to have worked for their current firm since before they were 14 years of age. Although this may very well be true, we believe it is unlikely given that Japanese law requires individuals to complete middle school, which in general occurs right after they turn 14. Similarly, 751 union members reported being in managerial positions, being under 30 years old, and having worked for the same company for less than 8 years. From our conversations with the survey administrators and firm leaders, we gathered that such situations are quite unlikely. Instead, it is possible that workers have been assigned to leadership positions in a few projects and have mistakenly taken such instances as “managerial experience.” We thus eliminated these observations from our data set. Finally, in accordance with the definition of economically active population under current Japanese law, we only include responses from workers who are between 15 and 60 years old. After cleaning the data set and getting rid of the aforementioned inconsistencies, we are left with 94,504 individual observations.

It is important to highlight the potential sample selection issues that are at hand. In particular, respondents are union members who work as secretaries, salespeople, clerks, or blue-collar workers in manufacturing plants, to name a few examples. The survey does not collect any information from unemployed people or employees in high management positions.<sup>5</sup>

## 2.1 Individual Characteristics

In most dimensions, respondent groups seem to be quite homogeneous over time. These descriptive statistics are shown in Table 1. Women represent about 23% of the whole sample. Their average and median ages are 30 and 27, while those of men are 36 and 34 years, respectively. There is a considerable contrast between the proportion of married men and women in

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<sup>5</sup>Union members are regular employees working in positions like the ones described above as well as people in assistant management positions, which correspond to the second lowest rank in the job ladder of corporate Japan. Under Japanese labor laws, workers in these two positions in the hierarchy are allowed to become union members. However, once they are promoted to assistant general manager, the next level in the chain of command, they are required to leave their union.

the sample. While two thirds of male workers are married, married women only account for one third of all females. Regarding workers' educational attainment, an approximate 7% of the sample completed middle school, 46% has a high school degree, 27% completed their college education, and 7% pursued more advanced studies. The remaining 13% of the sample holds other degrees, including technical and 2-year college programs.

As shown in Table 2, the industries with the highest representation in our sample are the electronics manufacturing sector (38%), other manufacturing companies (23%), the chemical/pharmaceutical industry (14%), and the food sector (10%). The remaining 15% of workers are employed in sales, banking, and other smaller industries. Finally, the in-sample distribution of employees' occupations is as follows: 14% work in sales/marketing, 24% have low-level office or clerical positions, 29% are in research/design departments, and 34% are blue-collar workers that work, for example, in manufacturing plants. It is important to note that this distribution of workers across industries as well as across occupations does not correspond to the actual distribution of workers employed in all of the more than 2,200 firms listed on the TSE. For this reason, we do not attempt to make any generalizations that would apply to all sectors of the Japanese economy. Nonetheless, given the large scope and size of our data set,<sup>6</sup> we believe that such lack of representativeness becomes a second-order issue. Moreover, as we will discuss later, most of our results hold even when we confine our attention to a sub-sample of our whole data set, which suggests that our results may be generalizable to the full set of firms under the TSE.

## 2.2 Subjective-Well Being and Income Data

Each respondent is asked to provide information on his own level of job satisfaction and the level of happiness in life from a list of 5 categories, where 1 corresponds to "least satisfied" and 5 denotes "most satisfied." As can be observed in Table 2, about half of both male and female union members report to be "moderately satisfied" (category 3). In the case of life happiness, both male and female workers report levels of happiness that are in general

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<sup>6</sup>With almost 100,000 observations and over 200 questions, our data set seems to be one of the most comprehensive ones compiled thus far. For instance, Clark and Oswald (1996) and Clark (1997) utilize about 5,000 observations in their studies; Blanchflower and Oswald (2004) analyze a data set containing 37,711 observations, which seems to be one of the largest out there. The majority of the papers in the happiness and job satisfaction literatures utilize sample sizes that vary within this range. One exception is Alesina, di Tella, and MacCulloch (2004), which studies the relationship between inequality and happiness in a sample of 123,668 individuals in U.S. and Europe.



higher than their level of satisfaction at work. This difference between satisfaction at work and in life is particularly stark among women: while only about 4% report to be “extremely satisfied” at work (category 5), 16% of female workers said to be “extremely happy” about their lives. This contrasts with findings for British workers by Clark and Oswald (1996), which show that about 50% of employees in the U.K. marked the highest job satisfaction category in their 7-category scale.

The survey also requests that workers mark down their own level of income from a list of 9 categories, where category 1 denotes annual income of under 2 million yen (about US\$17,000) and category 9 corresponds to annual income of over 10 million yen (about US\$85,000).<sup>7</sup> Table 3 shows the distribution of SWB for each one of the 9 individual income categories. Interestingly, this simple cross-tabulation shows that “poorer” workers in Japan tend to report lower levels of satisfaction relative to those who report higher income levels. This relationship is more easily observed in Figure 1. First, we group workers reporting job satisfaction levels of 1 and 2 into a “least satisfied” bin. We do the same for individuals marking categories 4 and 5 and add them into a “most satisfied” bin. We then create three broad income categories from the 9 different individual income levels: low (levels 1-3), middle (4-6), and high income (7-9). The figure confirms visually this positive correlation between income and SWB. This preliminary finding is akin to Alesina, di Tella, and MacCulloch (2004)’s result that, in the case of U.S. workers, “money buys happiness.” We shall explore these findings further in the empirical analysis below.

An item crucial to our analysis, and which distinguishes our study from most of the previous literature, is the information regarding the worker’s own expectation about his peers’ wages. The question of interest is phrased as follows, “What do you think the average wage of union members who are your age, doing the same job, but belonging to other companies, is?”. The answer to this question is also chosen from a list of 9 categories, and we refer to it as subjective reference income (SRI) in contrast to imputed wage levels estimated from Mincer equations that are standard in the literature and which are referred to as traditional reference income (TRI).

When plotting the distribution of SRI for each income category, we ob-

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<sup>7</sup>In the analysis that follows, we measure individual income as the mid-point in each of the 7 intermediate categories, and use *ad hoc* values close to the minimum and maximum income levels for the two extremes. Thus, respondents who reported categories 1, 2, . . . , 9 as their income level, were assigned annual wages of 1.5; 2.5; . . . ; 12 million yen, respectively. Alternative choices do not alter the main results. Additionally, we deflate this nominal measure using the Consumer Price Index to obtain real wages with 1990 as the base year.

serve two distinct patterns, which are highlighted in Figure 2.<sup>8</sup> The first thing to note is that workers tend to believe that their peers earn higher wages than they do. Although this effect seems to be prevalent across all income levels (with the obvious exception of the highest income class), it appears to be even more apparent for low income workers as suggested by the blue bars.<sup>9</sup> Thus, low income workers are pessimistic about how much they earn vis-à-vis their peers. Conversely, the opposite effect operates among the better paid. The red bars imply that, when compared to the low and middle income categories, a much higher proportion of workers in the highest income brackets believe that they earn more than their peers. This implies that richer individuals tend to be more optimistic about their earnings relative to their own reference group. Of course, other individual traits may be at play in this relationship, so it will be interesting to observe how this alleged pessimism or optimism of workers impacts their self-reported job satisfaction levels once we account for their personal characteristics.<sup>10</sup>

### 3 Empirical Analysis: Testing the Relative Utility Hypothesis

In order to examine the impact of absolute and relative income on workers' satisfaction levels, we follow the literature and consider an ordered logit specification that takes the form:

$$\text{SWB}_{i,t} = y_{i,t} \cdot \alpha + y'_{i,t} \cdot \beta + h_{i,t} \cdot \gamma + X_{i,t} \cdot \delta + \varepsilon_{i,t}, \quad (1)$$

where  $\text{SWB}_{i,t}$  is our measure of subjective well-being reported by worker  $i$  in year  $t$ ,  $y_{i,t}$  is the log of individual income,  $y'_{i,t}$  is the log of reference income for worker  $i$ ,  $h_{i,t}$  corresponds to log average monthly overtime hours worked, and  $X_{i,t}$  is a vector of covariates that include age, job tenure, and

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<sup>8</sup>For the curious reader, the complete distribution of SRI for each income category is shown in Table 4.

<sup>9</sup>A Marascuilo test comparing the differences among these proportions across income levels corroborates that these shares are statistically different from each other.

<sup>10</sup>One example of how other factors may explain the observed distribution of SRI by income level is the effect of the age-based remuneration system in Japan. As Lazear (1979) explains, under the current system, young workers are paid less than their marginal product, which may prevent them from quitting their jobs until they get back their "legitimate" rewards at a later stage of the tenure cycle. Of course, this would not explain why younger, low-paid workers would expect their peers to earn more than they do if they acknowledge that other workers in their reference group are also subject to the age-based remuneration system. However, if they are unaware of this fact, this may explain the aforementioned patterns in the data.

dummies for gender, educational attainment, marital status, job change, and managerial experience. We also include occupation and industry fixed effects in the regressions and allow the stochastic disturbances  $\varepsilon_{i,t}$  to be correlated within these two groups.

Before proceeding, a few remarks that will help us justify our chosen specification are in order. The happiness literature has traditionally relied on OLS, ordered probit, and ordered logit reduced-form specifications. Given the nature of our dependent variable, we believe that ordered probit or ordered logit specifications are more appropriate than OLS. Although there is no consensus in the happiness literature on which of the two ordered non-linear models is more appropriate, we stick with the logistic regression because the estimates are generally easier to interpret. In any case, all of our results still hold when a probit model is used instead.

A more subtle (and perhaps more important) point that would concern theorists and structural economists is the apparent lack of a theoretical framework that would support the empirical relationship described in Equation 1. The implied utility function from which such a relationship emerges is one that has consumption  $c$  and leisure  $l$  as its main arguments,  $u = u(c, l)$ . Even if we accept that our job satisfaction measures may act as proxies for utility, the question that arises then is, how do we justify the inclusion of variables such as  $y'_{i,t}$  and  $X_{i,t}$  in our regression equation? Theoretical studies such as Cole, Mailath, and Postlewaite (1992), Corneo and Jeanne (1998), and Corneo and Jeanne (1999) may provide an answer to this question. These papers analyze the role of social status under a general equilibrium framework and argue that, even though individuals may ultimately care only about consumption, other variables such as wealth rank in a society or facial beauty may be relevant to determine utility levels. Thus, the authors contend that, in such cases, these variables should be incorporated into reduced form models of utility.<sup>11</sup> While we do not pursue this issue any longer, we deemed necessary to address briefly these potential concerns before discussing our empirical results.

### 3.1 Effects of Individual Income and SRI

The first relationship we explore is that between job satisfaction,  $SWB_{i,t}$ , and both absolute and relative income,  $y_{i,t}$  and  $y'_{i,t}$ . In Section ?? we will explore these same relationships when we utilize the TRI measure imputed

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<sup>11</sup>Corneo and Jeanne (1997) and Yamada (2007) provide similar arguments in their models of conspicuous consumption, where the level of conspicuous consumption does not affect utility directly.

from Mincer equations. For now, however, our relative income measure corresponds to workers' self-reported perceptions about their peers' wages, also referred to as SRI.

As shown in Table 5, an increase in the worker's own wage is associated with an increase in job satisfaction. In contrast, an increase in the worker's expectation about his peers' wages, holding his own wage constant, is associated with a lower satisfaction level.<sup>12</sup> The first finding should not surprise us as it is in agreement with standard economic theory.<sup>13</sup> The latter result provides empirical support to Duesenberry's (1949) relative utility hypothesis and suggests that, irrespective of their own income level, workers are less satisfied when they perceive that their peers earn more than they do. Both income effects are preserved even after controlling for workers' individual characteristics such as age, job tenure, gender, education, and marriage status, as shown in Column (2). The inclusion of industry and occupation fixed effects, however, has a small impact on the estimate of the effect of the worker's own income on satisfaction, although both coefficients remain strongly significant, as observed in Columns (3) and (4). Finally, Columns (5) and (6) show that all of these effects are even stronger when we use life happiness as our SWB measure.

### 3.2 Measuring Comparison Income Under the Traditional Approach

We proceed now to test the relative utility hypothesis following the conventional method employed in the happiness literature. The comparison income measure commonly used is referred to as Traditional Reference Income (TRI) and is calculated by imputing peers' wages from Mincer equations to obtain a measure of what the "average" worker with given characteristics would earn. Since the work of Kapteyn and van Herwaarden (1980) on interdependent welfare functions, researchers have wondered what the adequate reference income measure should be, and the implicitly agreed-upon conclusion has been

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<sup>12</sup>Note that a positive (negative) estimate does not necessarily imply an unambiguous increase (decrease) in the *level* our SWB measure. Instead, a positive (negative) sign denotes an increase (decrease) in the *odds* that a given satisfaction category, out of the five available, is reported. The direction of the marginal effects of an increase in wages on the probability of reporting a satisfaction level will depend on the different cutoff points for the underlying latent variable. For further details, see Greene (2002) pp. 736-740. See also Clark (1997) p. 348.

<sup>13</sup>Most empirical studies support this positive association between income and utility. However, Clark and Oswald (1996) find weak empirical support for this relationship in their data of 5,000 British workers. Perhaps surprisingly, their results show that satisfaction is more strongly correlated with relative income than with absolute income.

to compute the “average” wage earned by workers of the same gender, age, education level, and other individual traits. Nonetheless, underlying this approach lies the premise that workers will infer their peers’ wages in the exact same way econometricians do. A few papers, notably Manski (1993), Sloane and Williams (2000), and Lydon and Chevalier (2002), have expressed concerns that this is indeed the case, although they have failed to provide evidence to the contrary. In what follows, we argue that, if individuals computed reference wages in accord with econometricians’ calculations, then the chosen measure of reference income should not matter and there should not be any discrepancies in our results. We demonstrate below that this is not the case.

In the construction of our TRI measure, the first step is to estimate our Mincer equations. Table 6 shows the corresponding regressions of log real wages on various individual characteristics commonly utilized in the literature, such as gender, age, age squared, tenure, tenure squared, marital status, educational attainment, the log of overtime hours worked, and managerial experience, as well as occupation and industry fixed effects. Additionally, we included a dummy that signals whether the worker has taken an administrative role in union activities, which we use later to identify the effect of imputed wages in our job satisfaction regressions.<sup>14</sup> The results are not surprising: for instance, we observe a greater effect of higher education on log real wages, as well as a positive and concave effect of experience. Married workers earn higher wages while women earn less relative to men with similar characteristics. To show that these coefficients have the expected signs, are strongly significant and quite stable across specifications, we report various specifications in Table 6. However, for the sake of brevity, we do not discuss these results any further and proceed to re-estimate our job satisfaction regressions.

The results showing the effect of absolute and relative income on job satisfaction and happiness appear in Table 7.<sup>15</sup> In order to ease the comparison

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<sup>14</sup>Given that both the wage and the SWB regressions contain mostly the same regressors, we need at least one additional independent variable in our wage equation to identify the effect of TRI on job satisfaction. In addition to this “union management” variable, we also use firm fixed effects. We tried different specifications including parents’ income and child status dummies. These last variables tell us what the worker’s last child’s school level is: no child, before elementary school, in elementary or middle school, in high school, or married. We did not include these variables in the reported specifications due to various limitations in the data. For instance, we only have child status information for about 55,000 observations. Nonetheless, all of our reported results are robust to these alternative specifications.

<sup>15</sup>The Mincer equation specification we utilized in order to construct our TRI measure corresponds to that of Column (5) in Table 6, which includes occupation, industry, and

between the SRI and TRI results, in Column (1) we display our preferred job satisfaction ordered logit specification from Table 5, utilizing SRI as our income measure and including occupation and industry fixed effects, as well as a time trend. Column (2) shows the exact same specification, except that our reference wage measure corresponds to wages for the “average” worker as imputed from Mincer equations, or TRI.

In comparing Columns (1) and (2), the most striking issue is the difference in size and magnitude between the two reference wage estimates. In contrast with the SRI coefficient, the TRI estimates suggest that a rise in a worker’s peers’ wages would translate into an *increase* in his own satisfaction at work. The first obvious source of concern is that, at an intuitive level, this result does not make sense. If a worker perceives (or, in the case of imputed reference wages, if he *estimates* the way econometricians do) that his peers’ wages have gone up, it would be unlikely that he would feel more satisfied. Another source of concern is that this coefficient is quite unstable across specifications. Moreover, given that the coefficient on wages decreases considerably once TRI is introduced, it is likely that these imputed wages are just picking up unobservable characteristics of workers that may have little to do with their perception of wages earned by their peers. Finally, we note that the effects of other variables on job satisfaction are about the same, irrespective of the comparison income measure employed. The one notable exception is the impact of age, which is U-shaped when TRI is utilized, akin to what Clark (1997) and Blanchflower and Oswald (2004) respectively find in the U.K. and in the U.S. Nonetheless, even this particular finding is not robust across specifications.

Why are the results regarding the impact of relative wages on job satisfaction so different depending on whether we rely on actual self-reported peers’ wages perceptions or wages constructed from standard Mincer equations? One possibility is that workers in our sample are “bad” forecasters and for whatever reason they are unable to predict wages the way econometricians do. Using Mincer equations, econometricians may be able to predict the wage of a worker with certain characteristics; but, what guarantees that individuals will make “correct” predictions? Similarly, workers may consider many other, perhaps unobservable, factors that econometricians don’t account for, which leads to “bad” forecasts. Thus, it should be the case that, if we focus our attention on workers that make small prediction errors, the SRI and TRI results should converge.

To test whether this is true, we re-estimate the job satisfaction regressions using a subsample of workers who make small prediction errors and display company fixed effects, and a time trend.

our results in Table 8. In this exercise, we consider “good” forecasters those workers for which the absolute difference between their reported SRI and the imputed TRI lies within a 25% band around their own wage. We utilize this conservative band as a first pass to see whether the estimates using either comparison income measure look more similar. Surprisingly, as shown in Column (1), the TRI coefficient remains positive but becomes insignificant even at the 10% confidence level. The SRI estimate shown in Column (4), on the other hand, remains strongly significant and stable at around -0.60. We take these results as an early indication of the instability of the TRI estimates and the robustness of our coefficients when we utilize SRI as our measure of comparison income.

To be sure, we then follow the same procedure and define “better” and “best” forecasters, except that the benchmark bands that we use to make these distinctions are 10% and 5%, respectively. The results confirm our early suspicions. First, the TRI estimates switch signs, although they remain insignificant at the 10% level. On the contrary, for the “better” forecasters, the impact of SRI on job satisfaction remains strongly significant at the 1% level. Even for the “best” forecasters, the SRI coefficient is still negative, although imprecisely estimated. This is not surprising given that, when focusing on this select group, we cut down the sample size by almost 90%, which increases the standard errors of our estimates significantly.

What have we learned from this exercise? As expected, our estimates using both TRI and SRI converge. This is not surprising given that the sole variable that differed between the two regressions was our proxy for reference income; when we focus on those observations for which the difference between SRI and TRI is small, the results should ultimately converge. The two more interesting conclusions have to do with the great reduction in sample size when we focus on the “best” forecasters and the instability of the results when we impute wages from Mincer equations. Given that our “best” forecasters comprise a little bit above 10% of the whole sample, the great reduction in sample size suggests that econometricians have traditionally measured reference income inadequately, focusing on a metric of relative income that is foreign to about 90% of our sample. Similarly, the instability of the TRI estimates only corroborates Manski’s (1993) and others’ criticisms about the validity of happiness studies that utilize imputed wages as comparison income measures.

### **3.3 Endogeneity of the SRI Measure**

One issue that we have not addressed is the possibility of endogeneity in our SRI measure. Studies that explore endogeneity issues in happiness equa-

tions have been scarce, with the exceptions of Lydon and Chevalier (2002), Brown and McIntosh (2003), and Gardner and Oswald (2007). However, these papers analyze the impact of other factors, such as absolute wages and hours worked, on satisfaction but are silent on the particular effects that comparison income has on this variable.

To our knowledge, no study has investigated the issue of endogeneity of relative income. Several possible explanations would justify such concerns. For instance, Freeman (1978) and Akerlof, Rose, Yellen, Ball, and Hall (1988) suggest that low satisfaction levels at work increase the probability of quitting. At the same time, when people have plans to change jobs, it is plausible to think that they would expect better paid positions elsewhere, keeping their hopes of finding a better job high. In addition to the reverse causality story, it is also possible to think that omitted variables related to labor conditions and that are hard to measure may be contaminating the estimated effect of relative income on job satisfaction. In this section, we attempt to fill this gap in the literature implementing an instrumental variable (IV) approach.

Our proposed instrument is union management experience. To be eligible as an adequate instrument, this variable should be correlated with our comparison income measure and uncorrelated with our outcome variable, job satisfaction. First, union management experience should clearly influence workers' expectations of what their peers earn elsewhere since they are better informed of the actual level of wages for different workers across firms. In Japan, union members participating in management positions within their union must attend *shunto*, a series of meetings held every spring in which union leaders meet and discuss labor issues including wages and other factors affecting the work environment.<sup>16</sup> Recalling that there is a tendency to report higher SRI than own individual wages across all income categories, we expect to see that workers in leadership positions within the union should report lower levels of relative income than workers without union management experience, which would reflect their better knowledge of actual labor market conditions.

Second, our instrumental variable should not be correlated with job satisfaction. We find no evidence that union management experience should directly affect subjective levels of well-being since union leadership appointments are rather random instead of voluntary. Union managers are required to step down after one or two years and there is no rent from such activities. Hence, we believe that union management experience is a good candidate as an instrument for SRI.

Table 9 shows the results of the first and second stages of our IV im-

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<sup>16</sup>For a detailed description of *shunto*, see Gordon (1982).



plementation. As expected, in the first stage union management experience is negatively correlated with SRI. In the second stage, we observe that the negative impact that SRI has consistently had upon job satisfaction remains. This corroborates our earlier findings that, in addition to absolute income, how much workers earn relative to their peers is an important determinant of job satisfaction.

## **4 The Impact of Individual Characteristics on Job Satisfaction**

The happiness literature that has emerged in the last decade has attempted to shed some light on the link between various SWB measures and individuals' personal characteristics including gender, age, race, education, marital status, among others. In this section, we investigate the effects of workers' individual traits on their reported levels of satisfaction, and compare our findings with the rest of the literature. Given that the great majority of these other studies have utilized European and/or U.S. data, we hope that our results will add to these studies and provide some insights regarding the generalization of these relationships to other cultures.

In the presentation of our findings, first we will comment on the results that are in general agreement with the literature. It is not our intention to exhibit these results as conclusive evidence of how these individual traits influence job satisfaction. However, given that these estimates are in accord with what other papers have found in the U.K., in the U.S., and in continental Europe, they are at least one step forward to become "stylized facts" in the happiness literature. Next, we will present our new results. These correspond to those individual characteristics that have not been explored in the literature before or whose relationship with SWB measures is different from that in other studies.

### **4.1 Results in Agreement With the Literature: Happier Women and Happier Married Workers**

Table 5 illustrates the results discussed in this section. The estimates in this table correspond exactly to regressions of the form of Equation 1, which we employed in our discussion of the impact of SRI on job satisfaction and happiness.

First, women are considerably more satisfied at work than men. This finding is much starker when we utilize life happiness as our SWB measure.

The results are robust across various specifications, even when we allow for industry and occupation fixed effects. Clark (1997) derives similar conclusions for Britain. He shows that British women tend to report higher levels of job satisfaction than men even though their jobs are generally worse in several respects—such as pay or compensation for the same type of job. To rationalize his finding, Clark recurs to his “aspiration hypothesis;” he argues that women’s expectations in their workplace are generally lower than men’s, which makes females happier, given that the gender satisfaction differential disappears for the young, the more highly-educated, and women working in male-dominated environments. Although there is no evidence of this in our data set of Japanese workers, we will come back to Clark’s aspiration hypothesis when we consider the relationship between job satisfaction and educational attainment.

One other result that is quite robust in the literature is that married individuals are more satisfied than unmarried ones. Again, this finding is much stronger when life happiness is utilized as our SWB measure. In fact, the coefficient for “married” in the life happiness regressions is the highest amongst all estimates, including those for the absolute and relative income effects. This positive association between being married and satisfaction has received support in Clark (1997) using British data, McBride (2001) using U.S. data, and Alesina, di Tella, and MacCulloch (2004) who utilize data from the U.S. and 12 European countries. However, a couple of studies in the psychology literature have found that, when individuals marry, happiness increases for a year or two, and then goes back to pre-marriage levels.<sup>17</sup> This transitory effect of ostensibly life-changing circumstances, like marriage, has been called the *hedonic treadmill*. Since our data set does not track one same individual over time, we are unable to see whether this positive impact of marriage on happiness is also temporary in Japan. Yet, irrespective of the duration of this effect, marriage is generally observed as providing a boost in satisfaction at work and in life.<sup>18</sup>

## 4.2 The Role of Age, Tenure, Occupation, and Education: Some New Evidence

Our results regarding the relationship between age and SWB are mixed. As shown in Table 5, age has a positive effect on job satisfaction but has

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<sup>17</sup>See Kahneman and Krueger (2006).

<sup>18</sup>To our knowledge, the only study that does not support this claim is Brown and McIntosh (2003). This paper does not find any statistically significant differences in satisfaction levels reported by married and unmarried individuals working in the low wage service sector in the U.K.

a negative impact on life happiness. These findings are quite stable across specifications, even after controlling for industry and occupation fixed effects. These two opposing effects of age on job satisfaction and life happiness are surprising given that most of our conclusions derived from job satisfaction regressions tend to be corroborated when we use happiness as our dependent variable instead. Perhaps even more puzzling, however, is the fact that we do not observe any non-linear effects of age on either SWB measure. This contrasts with the standard U-shaped relationship between age and satisfaction that others have found, mainly in the U.S. and Britain (Alesina, di Tella, and MacCulloch 2004, Blanchflower and Oswald 2004). Unfortunately, we have thus far been unable to uncover the reasons behind the discrepancies between our results and those found in the rest of the literature.

Job tenure shows a very robust negative impact on both job satisfaction and life happiness. However, this effect is non-linear, as suggested by the positive coefficient of the square of tenure. Workers that have stayed in the same company between 15 and 20 years experience the most dissatisfaction, but after this point the negative effect of tenure slowly fades away. In fact, for workers with more than 30 years of tenure, this effect becomes positive—although this group represents barely 10% of our sample.<sup>19</sup> Finally, it is a bit surprising that, in spite of this negative effect of job tenure on satisfaction, having changed jobs in the past also has a significantly negative effect.

Our regressions also shed some light on the relationship of SWB and other job characteristics such as overtime hours worked, occupation, and hierarchy in the company. As expected, longer workdays, reflected by a higher number of overtime hours worked, has a negative impact on workers' gratification in their workplace. This is consistent with a worker's utility function that is increasing in leisure. Regarding the worker's occupation, researchers/designers tend to report the highest satisfaction levels<sup>20</sup> while blue-collar workers are the most dissatisfied<sup>21</sup> These results hold even after controlling for income and workers' individual characteristics. Finally, workers with an assistant manager role are more satisfied both at work and in life. Given that we control for income and other individual characteristics, we interpret this positive effect as "positional utility" that workers derive from being in a higher

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<sup>19</sup>One other paper that briefly discusses the relationship between tenure and job satisfaction is Dolan and Gosselin (1998). The authors also find a U-shaped relationship between these two variables in a sample of 827 employees working in 34 car dealerships in Northern Quebec.

<sup>20</sup>Interestingly, workers in the electronics industry—several of whom are researchers and designers—report the lowest satisfaction levels.

<sup>21</sup>The occupation and industry dummies are not shown in Table 5 for the sake of brevity. The omitted occupation category in these regressions is sales/marketing.

echelon of the job ladder.

Finally, educational attainment seems to play an important role in SWB regressions. A priori, if we believe that education acts as a proxy for earnings, we should expect these two variables to covary positively. Controlling for income, however, the expected association is unclear. To explore this connection, we introduce six education dummies: middle school, technical degree, 2-year college, 4-year college, graduate degree, and other—with “high school” being the omitted category.<sup>22</sup> Our preferred specification, Column (4) in Table 5, shows a U-shaped relationship between job satisfaction and educational attainment. Workers with a high school diploma appear to be the most dissatisfied with their job conditions. In contrast, holding only a middle school degree has a positive impact on workers’ satisfaction levels in their workplace. This may seem a bit surprising given that workers with a middle school degree include high school dropouts whose families’ financial distress may have forced them to leave school early and take unwanted positions in the labor market. But the individuals with highest satisfaction levels are workers with 4-year college and graduate degrees, the latter being the happiest at work. How do we explain this U-shaped relationship between job satisfaction and educational attainment?

In the literature, the evidence regarding this relationship is mixed. For instance, Clark (1997) finds that more educated individuals in Britain tend to report lower levels of satisfaction. He then shows that SWB measures are negatively correlated with the gap between aspirations and actual achievements. Thus, Clark’s “aspiration hypothesis” conjectures that individuals with higher degrees have high expectations of themselves, which they later find hard to fulfill.<sup>23</sup> In contrast, Blanchflower and Oswald (2004) find that years of education are positively correlated with satisfaction levels in their sample of U.S. workers.<sup>24</sup>

Hence, the relationship between education and happiness seems to be far from a “stylized fact.” In our view, several opposing forces lie beneath this association, and which of these forces exert the most influence on satisfaction

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<sup>22</sup>In our tables, we only report estimates for the middle school, 4-year college, and graduate degree dummies. We believe that, together with high school, these three categories provide a nice coverage of the sequence followed in school by the typical Japanese worker. Re-estimating all of our regression equations with a sub-sample of workers holding any of these four degrees leave our results unchanged. These workers constitute more than 85% of the whole sample.

<sup>23</sup>For more details on the aspiration hypothesis, see also Ross and Reskin (1992) and Waldman (1994). In the psychology literature, Arvey, Carter, and Buerkley (1991) suggests that education diminishes job satisfaction by increasing occupational expectations.

<sup>24</sup>Oswald (1997) reports similar findings, although only by means of simple descriptive statistics.

will heavily depend on particular conditions of a country, such as the composition of the workforce by education level and even individual idiosyncracies and traditions. Our preliminary analyses suggest that at least two main forces coexist in Japanese labor markets and help to explain the association between education and satisfaction: the aspiration hypothesis (Clark 1997), on the one hand, and a strong emphasis on social status and hierarchy in Japanese culture (Reischauer 1950) on the other. Since we believe that these issues are too complex to cover satisfactorily in this article, we explore them in detail in a forthcoming paper.

## 5 Conclusions

The role of relative income in individuals' utility functions has not been researched thoroughly in the economics literature. Our results provide empirical support for Duesenberry's (1949) relative utility hypothesis, thus confirming that individuals care not only about what they earn in absolute terms, but about what they earn relative to their peers. Perhaps mainly due to the lack of available data, other studies that have attempted to investigate the role of comparison income in job satisfaction or happiness equations have traditionally calculated this reference metric as wages for the "average" worker with given individual characteristics, imputing them from standard Mincer equations. Our data on workers' actual perceptions about their peers' wages allows us to empirically corroborate the critics' numerous objections to the standard methodology. When we utilize imputed wages as a proxy for comparison income, the effect of this variable on job satisfaction becomes unstable across specifications. In contrast, the impact of subjective reference income on happiness is robustly negative, which adheres to the economic theory furthered by Duesenberry and others. Moreover, we conclude that only about 10% of our sample of almost 100,000 workers predicts wages close ( $\pm 5\%$ ) to what econometricians would forecast.

An additional contribution of our paper is to investigate the role of individual characteristics on job satisfaction and happiness among union workers in Japan. Since the extant literature focuses almost exclusively on the U.S., the U.K., and continental Europe, our study of Japanese workers complements these papers nicely and sheds some light on what findings may be considered generally applicable to other cultures and which ones deserve further attention. For instance, our estimates confirm that women and married individuals tend to be happier both at work and in life, results that are in agreement with what other studies have found in other countries. On the contrary, we observe a U-shaped relationship between education and satis-

faction, high school graduates being the most dissatisfied among the various education groups. Given the mixed evidence regarding the link between education and happiness in the literature, we believe that this issue needs to be studied further.

In conclusion, we hope that our analyses make other researchers aware of the need of collecting better data that allow us to investigate the factors that contribute to individuals' happiness. The possibility to amend old results and discover new ones should keep economists motivated to continue research in this area. Even after we have all agreed that certain factors, such as education or marital status, may have an important effect on happiness, we should make an effort to go beyond these simple associations and uncover the links that make these relationships work.

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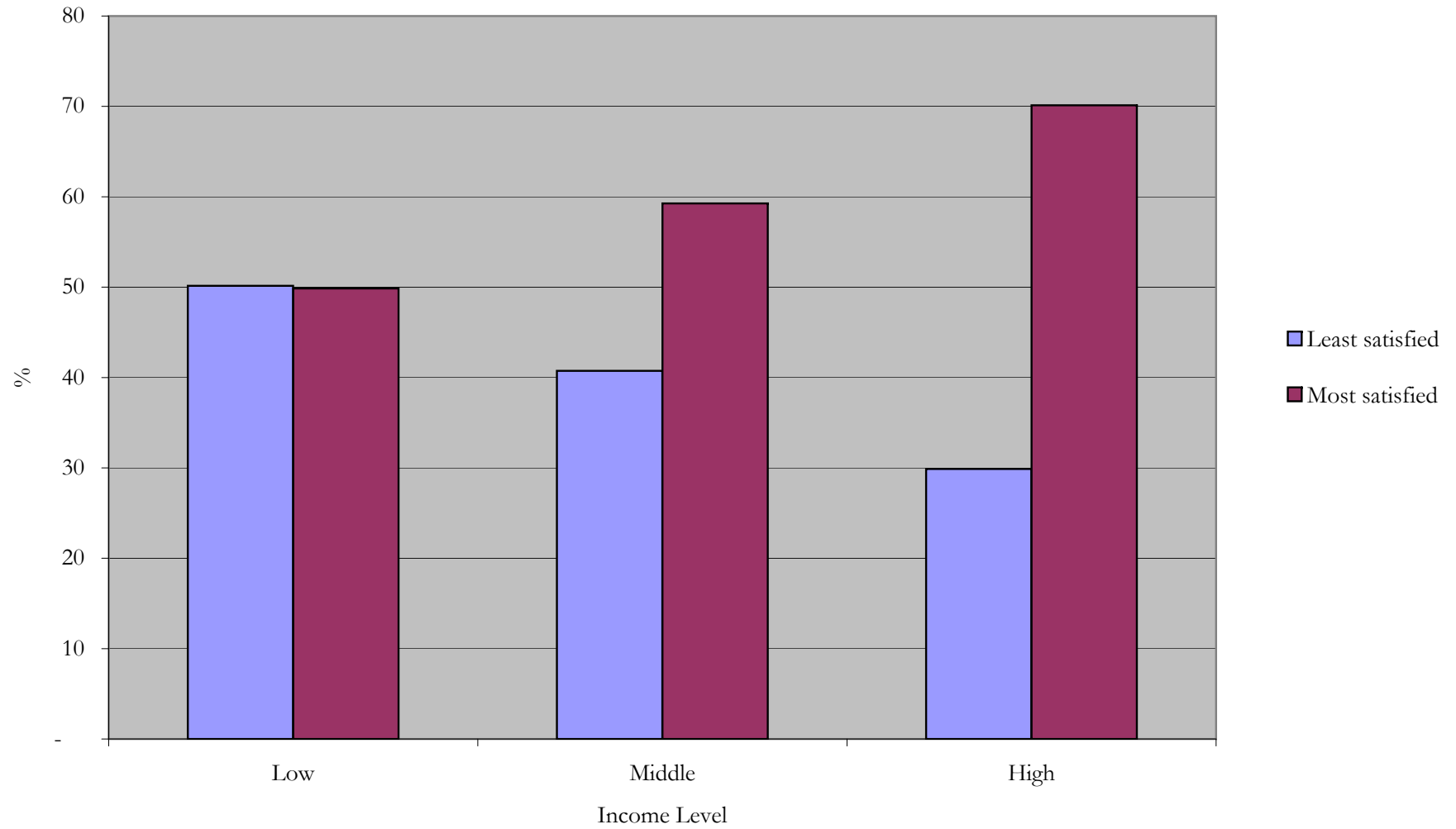
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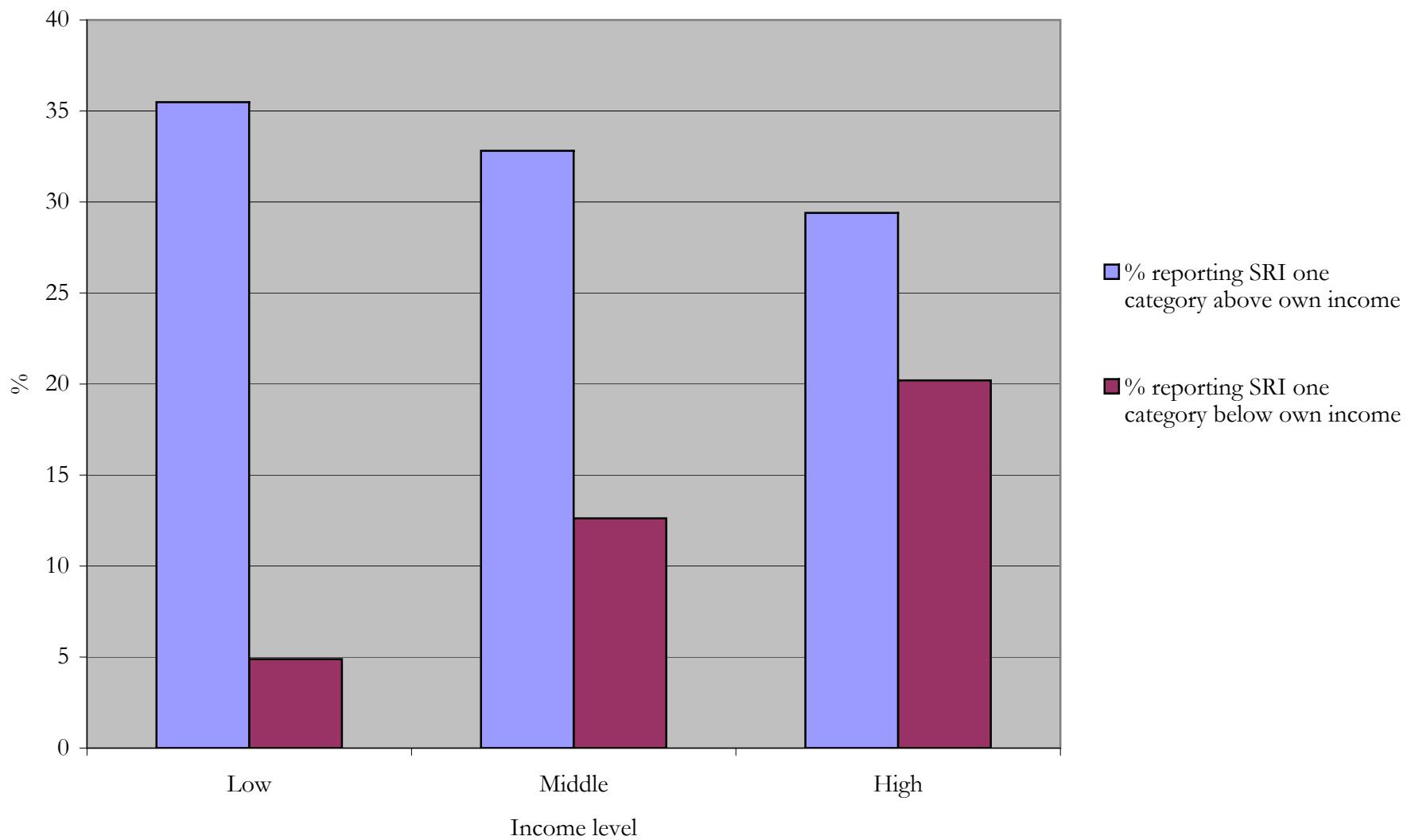
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**FIGURE 1**  
Shares of Workers Reporting Low and High Job Satisfaction by Income Level



**FIGURE 2**

Shares of Workers Reporting SRI One Category Above and Below Their Own Income Levels



**TABLE 1**  
Descriptive Statistics

	Frequency	%
<u>Gender</u>		
male	73,213	77.5
female	21,291	22.5
<u>Marital status</u>		
single	38,817	41.1
married	54,946	58.1
divorced/widowed	741	0.8
<u>Education</u>		
middle school	6,511	6.9
high school	43,741	46.3
technical school	2,240	2.4
2-year college	9,189	9.7
4-year college	25,423	26.9
graduate	6,350	6.7
other	1,050	1.1
<u>Industry</u>		
food	8,660	10.1
electronics	32,604	38.0
chemistry	11,582	13.5
other manufacturing	19,534	22.8
finance	2,951	3.4
sales	4,239	4.9
other	6,251	7.3
<u>Occupation</u>		
sales/marketing	13,107	13.9
designer/researcher	27,084	28.7
office work	22,204	23.5
blue collar	32,109	34.0
<u>Income (in million yen)</u>		
less than 2	2,213	2.3
2-3	11,327	12.0
3-4	15,827	16.8
4-5	15,428	16.3
5-6	16,832	17.8
6-7	12,604	13.3
7-8	9,964	10.5
8-9	8,787	9.3
more than 10	1,522	1.6

**TABLE 2**  
Subjective-Well Being Shares by Gender (%)

	<u>Job satisfaction</u>					Total
	less satisfied		more satisfied			
	1	2	3	4	5	
Male	7.0	14.6	46.1	27.9	4.5	100.0
Female	7.0	16.6	48.4	24.5	3.5	100.0

	<u>Life happiness</u>					Total
	less satisfied		more satisfied			
	1	2	3	4	5	
Male	10.0	12.8	33.7	33.6	9.9	100.0
Female	5.8	8.7	29.5	40.4	15.5	100.0

**TABLE 3**

Job Satisfaction Shares by Income Level (%)

Income (in million yen)	Job satisfaction					Total
	less satisfied			more satisfied		
	1	2	3	4	5	
less than 2	10.6	16.4	50.3	18.2	4.6	100.0
2-3	9.8	17.3	48.3	20.5	4.1	100.0
3-4	9.2	16.8	46.0	23.7	4.3	100.0
4-5	8.0	15.6	46.2	25.7	4.5	100.0
5-6	6.6	15.1	47.4	27.0	4.0	100.0
6-7	5.2	14.1	46.8	29.6	4.2	100.0
7-8	4.8	12.9	46.3	32.0	4.0	100.0
8-9	3.3	11.6	45.5	35.1	4.5	100.0
more than 10	4.1	11.2	39.1	41.7	4.0	100.0
Total	7.0	15.0	46.6	27.1	4.2	100.0

**TABLE 4**

Distribution of Subjective Reference Income by Income Level (%)

Income (in million yen)	1	2	3	4	5	6	7	8	9	Total
less than 2	39.2	44.3	9.9	1.6	0.9	0.5	0.3	0.5	0.6	100.0
2-3	2.2	49.0	37.9	7.1	1.7	0.4	0.2	0.1	0.2	100.0
3-4	0.3	6.8	47.3	32.5	9.0	1.8	0.6	0.3	0.2	100.0
4-5	0.2	1.1	11.0	33.5	35.9	12.0	3.0	1.3	0.3	100.0
5-6	0.2	0.3	2.8	11.4	31.8	32.2	14.8	5.1	0.7	100.0
6-7	0.2	0.2	1.1	3.5	16.2	28.4	29.8	18.1	2.3	100.0
7-8	0.1	0.2	0.7	1.3	8.3	18.3	27.6	37.4	5.9	100.0
8-9	0.1	0.1	0.6	0.5	3.7	9.6	19.8	45.0	20.3	100.0
more than 10	0.3	0.1	0.7	0.5	1.4	4.6	11.5	33.4	47.0	100.0

**TABLE 5**  
Ordered Logit Regressions of Job Satisfaction (1-4) and Happiness (5-6)

	Dependent Variable					
	Job satisfaction				Happiness	
	(1)	(2)	(3)	(4)	(5)	(6)
Log of real wage	0.870 [31.66]***	0.742 [23.53]***	0.606 [16.95]***	0.640 [18.57]***	0.896 [28.09]***	0.842 [24.28]***
Log of real reference wage	-0.473 [16.47]***	-0.522 [16.31]***	-0.515 [15.23]***	-0.517 [15.37]***	-0.563 [17.55]***	-0.555 [16.54]***
Female		0.091 [4.88]***	0.078 [3.63]***	0.076 [3.59]***	0.822 [44.21]***	0.775 [36.92]***
Age in years		0.024 [2.67]***	0.023 [2.38]**	0.021 [2.19]**	-0.029 [3.15]***	-0.030 [3.04]***
Age squared		0.000 [1.05]	0.000 [0.55]	0.000 [0.47]	0.000 [1.64]	0.000 [1.70]*
Tenure in years		-0.034 [7.24]***	-0.033 [6.63]***	-0.033 [6.63]***	-0.044 [9.40]***	-0.044 [8.85]***
Tenure squared		0.001 [6.59]***	0.001 [5.15]***	0.001 [5.16]***	0.001 [8.95]***	0.001 [7.74]***
Log overtime		-0.036 [4.65]***	-0.042 [4.90]***	-0.054 [6.54]***	-0.094 [12.46]***	-0.096 [11.95]***
Married		0.137 [8.51]***	0.150 [8.88]***	0.150 [8.85]***	1.014 [64.56]***	1.022 [61.97]***
Job change		-0.121 [7.11]***	-0.101 [5.61]***	-0.101 [5.62]***	-0.066 [3.84]***	-0.058 [3.16]***
Managerial experience		0.150 [8.64]***	0.155 [8.24]***	0.161 [8.66]***	0.013 [0.79]	0.025 [1.38]
Education variables:						
Middle school		0.046 [1.94]*	0.052 [1.92]*	0.071 [2.74]***	0.078 [2.98]***	0.123 [4.33]***
Undergraduate degree		0.206 [10.09]***	0.095 [4.07]***	0.090 [3.85]***	0.236 [11.87]***	0.188 [8.29]***
Graduate degree		0.574 [16.89]***	0.359 [9.25]***	0.360 [9.31]***	0.283 [8.99]***	0.281 [7.85]***
Time trend				0.017 [11.28]***		0.007 [4.57]***
Occupation FE	No	No	Yes	Yes	No	Yes
Industry FE	No	No	Yes	Yes	No	Yes
Year FE	No	No	Yes	No	No	No
Observations	94504	91896	83233	83233	91896	83233

Robust z statistics in brackets

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%



**TABLE 6**  
Mincer Equations

	Dependent Variable: Log real wage					
	(1)	(2)	(3)	(4)	(5)	(6)
Age in years	0.069	0.069	0.068	0.066	0.066	0.066
	[55.00]***	[53.28]***	[51.76]***	[54.96]***	[54.96]***	[54.96]***
Age squared	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	[46.34]***	[44.87]***	[44.24]***	[45.23]***	[45.23]***	[45.23]***
Tenure in years	0.022	0.021	0.022	0.018	0.018	0.018
	[33.01]***	[30.78]***	[32.15]***	[29.14]***	[29.14]***	[29.14]***
Tenure squared	0.000	0.000	0.000	0.000	0.000	0.000
	[16.80]***	[16.60]***	[18.53]***	[17.27]***	[17.27]***	[17.27]***
Education variables:						
Middle school	-0.089	-0.077	-0.081	-0.063	-0.063	-0.063
	[23.05]***	[19.35]***	[21.25]***	[17.14]***	[17.14]***	[17.14]***
Undergraduate degree	0.187	0.169	0.152	0.114	0.114	0.114
	[77.63]***	[62.67]***	[54.70]***	[44.51]***	[44.51]***	[44.51]***
Graduate degree	0.251	0.231	0.193	0.131	0.131	0.131
	[68.18]***	[57.41]***	[45.70]***	[33.23]***	[33.23]***	[33.23]***
Female	-0.230	-0.232	-0.242	-0.237	-0.237	-0.237
	[96.07]***	[89.30]***	[87.93]***	[91.87]***	[91.87]***	[91.87]***
Married	0.076	0.074	0.075	0.073	0.073	0.073
	[39.64]***	[37.16]***	[37.25]***	[40.59]***	[40.59]***	[40.59]***
Log overtime	0.029	0.025	0.033	0.042	0.042	0.042
	[32.18]***	[25.93]***	[34.36]***	[42.56]***	[42.56]***	[42.56]***
Managerial experience		0.070	0.091	0.099	0.099	0.099
		[33.65]***	[41.99]***	[50.31]***	[50.31]***	[50.31]***
Union management experience		0.005	-0.001	0.012	0.012	0.012
		[2.93]***	-0.660	[7.89]***	[7.89]***	[7.89]***
Time trend					-0.010	
					[8.00]***	
Constant	13.552	13.594	13.595	13.484	33.323	13.469
	[680.99]***	[660.29]***	[641.05]***	[521.95]***	[13.43]***	[417.21]***
Occupation FE	No	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	No
Company FE	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	No	No	Yes
Observations	94504	89214	80573	80573	80573	80573
R-squared	0.71	0.71	0.72	0.78	0.78	0.78
Robust t statistics in brackets						
* significant at 10%; ** significant at 5%; *** significant at 1%						

<b>TABLE 7</b>		
Job Satisfaction Regressions Using Traditional Reference Income		
	Dependent Variable: Job satisfaction	
	(1) SRI	(2) TRI
Log of real wage	0.640 [18.57]***	0.282 [8.51]***
Log of real reference wage	-0.517 [15.37]***	0.557 [6.86]***
Female	0.076 [3.59]***	0.230 [8.75]***
Age in years	0.021 [2.19]**	-0.025 [2.37]**
Age squared	0.000 [0.47]	0.000 [3.09]***
Tenure in years	-0.033 [6.63]***	-0.048 [9.23]***
Tenure squared	0.001 [5.16]***	0.001 [7.22]***
Log overtime	-0.054 [6.54]***	-0.074 [8.50]***
Married	0.150 [8.85]***	0.107 [5.96]***
Job change	-0.101 [5.62]***	-0.109 [5.92]***
Managerial experience	0.161 [8.66]***	0.124 [6.16]***
Education variables:		
Middle school	0.071 [2.74]***	0.130 [4.80]***
Undergraduate degree	0.090 [3.85]***	0.000 [-0.01]
Graduate degree	0.360 [9.31]***	0.252 [6.20]***
Time trend	0.017 [11.28]***	0.015 [9.79]***
Observations	83233	80573

Robust z statistics in brackets  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: All specifications include occupation and industry fixed effects.

**TABLE 8**

Job Satisfaction Regressions Using TRI vs SRI for Workers Making Small Prediction Errors

Dependent Variable:	TRI			SRI		
	(1)	(2)	(3)	(4)	(5)	(6)
Job satisfaction	Good	Better	Best	Good	Better	Best
Log of real wage	0.563 [11.44]***	0.797 [9.92]***	0.781 [6.74]***	0.798 [16.42]***	0.876 [11.26]***	0.843 [7.34]***
Log of real reference wage	0.033 [0.30]	-0.220 [1.22]	-0.145 [0.55]	-0.620 [9.21]***	-0.478 [3.18]***	-0.368 [1.48]
Female	0.147 [4.31]***	0.131 [2.49]**	0.119 [1.58]	0.053 [1.80]*	0.092 [1.86]*	0.082 [1.12]
Age in years	0.011 [0.79]	0.020 [0.94]	0.024 [0.78]	0.040 [3.03]***	0.032 [1.53]	0.035 [1.15]
Age squared	-0.000 [0.14]	-0.000 [0.25]	-0.000 [0.04]	-0.000 [1.89]*	-0.000 [0.70]	-0.000 [0.35]
Tenure in years	-0.051 [7.41]***	-0.061 [5.80]***	-0.065 [4.32]***	-0.043 [6.39]***	-0.058 [5.52]***	-0.062 [4.12]***
Tenure squared	0.001 [6.21]***	0.001 [4.92]***	0.001 [3.04]***	0.001 [5.46]***	0.001 [4.69]***	0.001 [2.92]***
Log overtime	-0.074 [6.88]***	-0.060 [3.76]***	-0.052 [2.26]**	-0.062 [5.89]***	-0.055 [3.46]***	-0.048 [2.09]**
Married	0.118 [5.24]***	0.093 [2.74]***	0.064 [1.32]	0.144 [6.60]***	0.105 [3.15]***	0.075 [1.56]
Job change	-0.113 [4.93]***	-0.144 [4.06]***	-0.166 [3.33]***	-0.111 [4.83]***	-0.144 [4.07]***	-0.166 [3.34]***
Assistant manager	0.161 [6.65]***	0.141 [3.91]***	0.204 [4.02]***	0.190 [8.30]***	0.157 [4.48]***	0.219 [4.35]***
Education variables:						
Middle school	0.126 [3.66]***	0.162 [3.03]***	0.268 [3.49]***	0.093 [2.77]***	0.145 [2.74]***	0.253 [3.31]***
Undergraduate degree	0.026 [0.82]	0.056 [1.15]	0.033 [0.48]	0.080 [2.64]***	0.080 [1.69]*	0.056 [0.83]
Graduate degree	0.300 [6.05]***	0.246 [3.33]***	0.233 [2.25]**	0.363 [7.55]***	0.274 [3.78]***	0.261 [2.54]**
Time trend	0.015 [7.31]***	0.015 [5.07]***	0.016 [3.74]***	0.016 [8.08]***	0.016 [5.39]***	0.017 [3.95]***
Observations	52460	23386	11821	52460	23386	11821

Robust z statistics in brackets

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: All specifications include occupation and industry fixed effects.

**TABLE 9**  
Instrumenting for Comparison Income

Dependent Variable:	Job satisfaction Original	SRI 1 <sup>st</sup> stage	Job satisfaction 2 <sup>nd</sup> stage
Log of real reference wage	-0.517 [15.37]***		
Linear prediction of log of real reference wage			-6.187 [3.09]***
Instrument: Union management experience		-0.007 [4.60]***	
Log of real wage	0.640 [18.57]***	0.512 [117.62]***	3.543 [3.45]***
Female	0.076 [3.59]***	-0.085 [32.26]***	-0.397 [2.34]**
Age in years	0.021 [2.19]**	0.034 [27.95]***	0.217 [3.15]***
Age squared	0.000 [0.47]	0.000 [20.13]***	-0.002 [2.91]***
Tenure in years	-0.033 [6.63]***	0.008 [13.73]***	0.012 [-0.71]
Tenure squared	0.001 [5.16]***	0.000 [13.24]***	0.000 [-1.04]
Log overtime	-0.054 [6.54]***	0.011 [11.18]***	0.008 [-0.35]
Married	0.150 [8.85]***	0.007 [3.80]***	0.187 [8.40]***
Job change	-0.101 [5.62]***	0.010 [4.63]***	-0.048 [1.73]*
Managerial experience	0.161 [8.66]***	0.005 [2.65]***	0.199 [9.31]***
Education variables:			
Middle school	0.071 [2.74]***	-0.022 [6.19]***	-0.040 [-0.81]
Undergraduate degree	0.090 [3.85]***	0.047 [17.50]***	0.349 [3.63]***
Graduate degree	0.360 [9.31]***	0.049 [11.82]***	0.627 [6.00]***
Time trend	0.017 [11.28]***	-0.003 [17.26]***	0.000 [-0.02]
Constant		12.769 [37.01]***	
Observations	83233	80573	80573

Robust z statistics (ordered logit) and t statistics (OLS) in brackets  
\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: All specifications include occupation and industry fixed effects.

# Appendix 1

## Question Categories in the Survey

### Individual characteristics

Individual characteristics that the survey requests from respondents include: sex, age, marital status, status of children, occupation, class of job, job tenure, job change, experience in union management positions, educational attainment, yearly income, households' yearly income, monthly overtime hours worked, and commuting time. In addition, workers are asked to distribute 100 points among five aspects of their lives according to the priority or importance they give to each of these aspects. The five options are: family, religion, work, friends/neighbors, hobbies and entertainment.

### Attitude towards group activities

About 11 questions deal with workers' attitudes towards group activities. Workers answer all of these questions by providing a number from 1 to 5, where 5 corresponds to being in complete agreement with the proposed statement. Examples of such questions are:

- I want to actively participate in various groups and organization activities.
- I enjoy activities in groups and organizations.

### Attitude towards union activities

This category includes about 10 questions asking respondents to evaluate their interest in union activities. Examples of these questions include:

- I am not interested in the labor union activities.
- The labor union is useful to me.

### Sense of belonging

About 3 questions are included in this category. Respondents provide information regarding their sense of belonging in their company, the union, and their own family.

## **Relationship between workers and their companies**

This category includes 3 questions and asks workers about their relationship with their company/factory and how much they care about the firm's productivity, efficiency and general success. Some questions in this category are:

- I always think about the productivity of the company/factory and the efficiency of the management.
- I dream about the future of my company/factory and its work.

## **Social environment at the workplace and happiness**

This category includes 9 questions on workers' perceptions of their relationships with their work colleagues and about how satisfied they are with their lives. For example,

- When I feel troubled, I can reach out to my co-workers for help.
- In general, I am currently very happy with my life.

This last question is what we employ as our life happiness measure.

## **Union's usefulness**

This category includes about 40 questions that ask respondent to evaluate the usefulness of the union with respect to (i) its ability to provide advice on various issues (legal, work-related, etc.); (ii) its ability to provide opportunities that showcase workers' skills; (iii) helping workers achieve their goals; and (iv) improving communication with management.

## **General impression on union activities**

About 9 questions in the survey request that respondents give their general impression regarding union activities. Questions include:

- The labor union activity is not active.
- The labor union doesn't have any influence on management's decisions.

## **Communication between company and union members**

This category, including 4 questions, deals with the relationship between workers and their firms, and how they feel about their company. For instance:

- Workers' opinions do not influence the company/factory's activities.
- The workers really follow the company/factory's management policy.

## **Communication between union and union members**

Four questions in this category ask respondents to assess the amount and quality of communication between union members and union management.

## **General impression of workers' activities in the workplace**

Questions in this category (about 22 of them) ask workers to provide their insights on their activities at their workplace, including the visibility of their achievements and their desirability to continue working for the same company in the long run. For example:

- My accomplishments at work are clearly visible to others.
- I want to be employed by this company/factory as long as possible.

## **Satisfaction**

This category contains about 17 questions that ask workers how satisfied they are with respect to: their supervisor's leadership skills; the level and quality of social interaction with their supervisor and colleagues; their assessments of their own work by supervisors and colleagues; the ability to work in groups with colleagues; general work environment; promotion prospects; their current wages; office equipment and infrastructure; working hours, benefit packages; social perceptions of the worker's occupation; social perceptions of the company. In addition, the survey asks workers to rate their general experience at work considering all work-related factors; we use the answers to this question as our measure of job satisfaction.

## **Self-evaluations**

About 7 questions in the survey ask workers to evaluate themselves and the work they do.

## **Fairness**

Four questions in this category deal with the sense of impartiality at the workplace and workers' assessments on fairness of their wages and promotion prospects. As our subjective-reference income measure, we utilize answers about workers' expectations of their peers' wages.

## **Transparency**

This category, including 3 questions, deals with transparency at the workplace in terms of the firms' evaluations of the workers' activities and the recruiting process. Questions include:

- I know the results of my company/factory's evaluations of my work.
- Through the labor union, I can opine on company's decisions about personnel changes and evaluations.