

RELATIVE UTILITY AND REFERENCE GROUP:
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 tests of relative utility hypothesis. With survey information on workers' expectations of their peers' wages, we confirm the hypothesis. On the other hand, a traditional approach in the literature constructs relative wages from Mincer equations, thus presuming that individuals infer their peers' wages the way econometricians do. We show that this traditional method may not support the hypothesis, unlikely to previous studies. We then disentangle the discrepancy between those two results to reveal an "glass ceiling" emotion among Japanese women working for top-ranked companies.

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JEL classifications: C25; D00; J28.

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1 Introduction

Ever since the publication of Duesenberry (1949), economists has thought that more than their own consumption and income *absolute* levels, individuals care about how much they earn and consume *relative to* their peers. The seminal empirical work of Easterlin (1974) supported Duesenberry’s relative utility hypothesis in a framework of happiness study. Nonetheless, the profession has remained skeptical of Easterlin’s results and the literature 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 while despite the lack of empirical supports, the relative utility hypothesis has given motivations in addressing keeping-up-with-the-Joneses effect in macroeconomic studies such as Gali (1994) and Futagami and Shibata (1998).

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.¹

In spite of the upsurge in the number of happiness studies in economics,

¹Thorough 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, see Clark, Frijters, and Shields (2008) for a survey of empirical tests on the relative utility hypothesis.

there is still room for improvement. For example, one issue among studies on the relative utility hypothesis which has received criticisms and which is common in the literature is the use of imputed peers' wages from Mincer equations as a measure of the individual's reference income.² 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 also hold in other regions of the world. This paper utilizes survey data of Japanese union workers to address these two issues and provides new insights to tests of relative utility hypothesis, which is still one of the main topics in the happiness and economics literature.³

One of the features of our analysis is the use of data on workers' actual perceptions of their peers' wages in addition to imputed wages from Mincer equations, in testing the relative utility hypothesis. Our results show that individuals report higher levels of job satisfaction, when their individual absolute income levels are higher. More importantly 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. Taking features of our data set into consideration, we will attempt to explain away this discrepancy.

The paper is organized as follows. In Section 2, we introduce our data

²Studies on the relative utility hypothesis with econometrically-predicted comparison income include, for example, Clark and Oswald (1996), Sloane and Williams (2000) and Levy-Garboua and Montmarquette (2004).

³Recent developments about the relative utility hypothesis include Blanchflower, Oswald, and van Landeghem (2008) and Clark, Kristensen, and Westergaard-Nielsen (2007).

and explain how it differs from previous data sets on job satisfaction and happiness. Section 3 presents empirical framework we will follow in order to investigate the connection between SWB and comparison income. 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. Section 4 concludes the paper.

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.⁴ 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. 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

⁴In the working paper version of this manuscript (de la Garza, Sannabe, and Yamada (2008)), the Appendix provides a full list of question categories.

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 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. Also, 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. Finally, we confine our attentions on white-collar workers in order to let our analysis-sub-sample-group sharing homogenous type of job characteristics.

After cleaning the data set and getting rid of the aforementioned inconsistencies, we are left with 62,395 individual observations.

It is important to highlight the potential sample selection issues that are at hand. In particular, respondents are white-collar union workers who work for listed and well-known Japanese companies. The survey does not collect any information from unemployed people or employees in high management positions in those companies.⁵ Later we will argue that this potential sample selection is a key to disentangle the difference between the result when we rely on the traditional Mincer-type approach and the result when we utilize our survey information about peers' wages.

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 27% of the whole sample. Their average and median ages are 29 and 27, while those of men are 35 and 34 years, respectively. There is a considerable contrast between the proportion of married men and women in the sample. While two thirds of male workers are married, married women only account for one fourth of all females. Regarding workers' educational attainment, an approximate 2% of the sample completed middle school, 32% has a high school degree, 39% completed their college education, and 10% pursued more advanced studies. The remaining 17% of the sample holds other degrees, including technical and 2-year college programs. The in-sample distribution of employees' occupations is as follows: 21% work in sales/marketing, 36% have low-level office or clerical positions, and 43% are in research/design departments.

⁵Union 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.

2.2 Subjective-Well Being and Income Data

Each respondent is asked to provide information on his own level of job satisfaction from a list of 5 categories, where 1 corresponds to “least satisfied” and 5 denotes “most satisfied.” As can be observed in Table 3, about half of both male and female union members report to be “moderately satisfied” (category 3). 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.⁶

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).⁷ Figure 1 shows that “poorer” workers in Japan tend to report lower levels of satisfaction relative to those who report higher income levels. Namely, 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

⁶While we have information about life happiness in addition to job satisfaction, in this paper we do not provide empirical results when we proxy SWB with the life happiness. Curious readers are encouraged to refer to the working paper version of this article, which contains empirical results with SWB of life happiness. The paper shows that qualitative results are robust against the changes in dependent variables.

⁷In 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.

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 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 corporate employees who are your age and doing the same job, 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 observe two distinct patterns, which are highlighted in Figure 2.⁸ 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.⁹ 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. It will be interesting to observe how this alleged pessimism or optimism of workers impacts their self-reported job satisfaction levels.

⁸For curious readers, the complete distribution of SRI for each income category is shown in Table 2.

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

3 Empirical Analysis:

Testing the Relative Utility Hypothesis

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

$$\text{SWB}_i = y_i \cdot \alpha + y'_i \cdot \beta + h_i \cdot \gamma + \varepsilon_i, \quad (1)$$

where SWB_i is our measure of job satisfaction reported by worker i , y_i is the log of individual income, y'_i is the log of reference income for worker i , h_i corresponds to log average monthly overtime hours worked, and ε_i is the stochastic disturbances. This specification can be thought of as the reduced form empirical investigation for testing a standard keeping-up-with-the-Joneses type utility function of the form:

$$u = u(c, \tilde{c}, h), \quad (2)$$

where c is own consumption, \tilde{c} is others' consumption, and h is labor work hours.¹⁰

While our specification looks legitimate and acceptable to most of economists, the literature of happiness studies considered an ordered logit specification that takes the form:

$$\text{SWB}_i = y_i \cdot \alpha + y'_i \cdot \beta + h_i \cdot \gamma + X_i \cdot \delta + \varepsilon_i, \quad (3)$$

¹⁰Theoretical studies such as Cole, Mailath, and Postlewaite (1992), Corneo and Jeanne (1998), and Corneo and Jeanne (1999) will provide a validity for happiness studies to address the keeping-up-with-the-Joneses effect. 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 or peers' consumption level 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. Corneo and Jeanne (1997) and Yamada (2008) provide similar arguments in their models of conspicuous consumption, where the level of conspicuous consumption does not affect utility directly.

where a vector of covariates of individual characteristics, X_i , are also included. Typically, X_i will include age, job tenure, and dummies for gender, educational attainment, marital status, and job change. We do not incorporate these individual characteristics in this manuscript because the apparent lack of a theoretical framework that would support the empirical relationship described in Equation (3) would concern theorists and structural economists. Moreover, If we incorporate X_i in job satisfaction regressions, we then have imputed peers' wages from Mincer wage equations, TRI, and individual characteristics which are already included in TRI at the same time. But then, we also have log real wages, which are also explained by all of these individual characteristics. Hence, in order not to overwhelm readers from various fields of economics and in order to achieve maximum clarity of the paper, we address Equation (1) instead of Equation (3).¹¹

3.1 Effects of Individual Income and SRI

The first relationship we explore is that between job satisfaction, SWB_i , and both absolute and relative income, y_i and y'_i . In the next section we will explore these same relationships when we utilize the TRI measure imputed 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. The question in the survey is phrased as "What do you think the average wage of corporate employees who are your age and doing the same job, is?". Given the question, respondents will visualize their rivals and infer their wages subjectively. For later reference, here remember

¹¹Nonetheless, in the working paper version of this manuscript we followed the literature and examined with specifications with individual characteristics including female dummy, age, square of age, tenure, square of tenure, marital status, experience of job change and educational attainment. AIC for our preferred specification is 165259.8 while the one for the augmented specification is 164769.9. Hence, from the comparison of AIC, those two specifications do not show significant difference. Also, it is shown that the augmented specification does not change the results shown in this paper.

that the question does not ask the respondents to take gender difference into consideration explicitly.

As shown in the first column of Table 3, 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. The first finding should not surprise us as it is in agreement with standard economic theory.¹² 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. The second column of Table 3 shows that the above result is robust even when we use the percentage deviations of reference income from one's own income, $(y'_i - y_i)/y_i$, for the comparison term.

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 to compute the "average" wage earned by workers of the same gender, age, education level, and other individual traits. Nonetheless, underlying this

¹²Most 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.

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 may not be the case.

In the construction of our TRI measure, the first step is to estimate our Mincer equations. Table 4 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, and the log of overtime hours worked, as well as birth year and year fixed effects.

The results are not surprising: for instance, we observe a greater effect of higher education on log real wages, as well as positive effects of age and experience. Married workers earn higher wages while women earn less by about 18% relative to men with similar characteristics. For now, we do not discuss these results any further for the sake of brevity and proceed to re-estimate our job satisfaction regressions. For now, we follow Kapteyn and van Herwaarden (1980) and our TRI measure is based on the first Mincer equation in Table 4, in which we control for gender.

As shown in the first column of Table 5, an increase in the worker's own wage is associated with an increase in job satisfaction as in the case of Table 3. However, 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 although the effect is not significant.¹³ The first obvious source of concern is that the relative utility hypothesis cannot be supported

¹³Column 2 of Table 5 shows the result with percentage deviations of TRI from one's own income, $(y'_i - y_i)/y_i$, as a proxy of comparison term.

with our TRI while we followed the traditional and pervasive procedure. Another source of concern is that 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, given that the coefficient on wages decreases considerably once TRI is introduced. At this point, the criticism against TRI by Manski (1993), Sloane and Williams (2000), and Lydon and Chevalier (2002) seems to apply to our case. Finally, we note that the effects of overtime work hours on job satisfaction are about the same, irrespective of the comparison income measure employed.

3.3 Discussion

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? In order to disentangle the discrepancy between those two results, we focus on a subsample of workers who have smaller differences between SRI and TRI. This is because we can expect that our estimates using both TRI and SRI converge, 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. 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 20% band around their own wage.¹⁴ The results with a subgroup of good forecasters whose sample size is 36,982 are shown in Table 6.

¹⁴Because of the terminology, good forecasters may be supposed to be those with SRI reflecting the market average conditions correctly: they are those who can make subjective inference of peers' wages just like econometricians construct TRI. However, the truth is that good forecasters are those with TRI close to SRI so that the causality is opposite to the intuition from the terminology. Actually, we may call expedient forecasters rather than good forecasters.

As it can be seen from the second and fourth columns, our estimates using both TRI and SRI converge and the convergence is to the favorable direction for the relative utility hypothesis: now we can confirm the relative utility hypothesis even with TRI.¹⁵ This result, of course, does not guarantee that the traditional procedure to test the relative utility hypothesis is appropriate: we just picked up a sub group of “good forecasters” so that the traditional procedure would work. Instead, given that the job satisfaction regression with TRI also worked, here we can investigate the difference in distributions of SRI and TRI for both whole sample and “bad forecasters”, who are not good forecasters, in order to see if there is a systematic difference in the way of making predictions of peers’ wages between the two groups. Thus we define new variables of

$$df_s \equiv \log(\text{Own Income}) - \log SRI$$

and

$$df_m \equiv \log(\text{Own Income}) - \log TRI.$$

From the construction, df_s reflects *subjective* optimism (pessimism) about income when $df_s > 0$ ($df_s < 0$) while df_m shows *objective* optimism (pessimism) when $df_m > 0$ ($df_m < 0$). Figures 3 and 4 show the distributions of df_m for whole sample and bad forecasters, respectively. As apparent from the manner in which TRI is constructed, those two distributions look like normally distributed. Similarly, Figures 5 and 6 show the distributions of df_m for whole sample and bad forecasters, respectively. Figure 5 shows that the distribution of df_m is slightly right skewed, which reflects *subjective* pessimism among workers. On the other hand, Figure 6 illustrates that subjective pessimism gets even stronger among bad forecasters. By comparing Figures 3 and 5, and Figures 4 and 6, we can see that in the case of bad forecasters the distributions of SRI and TRI are too apart each other so that TRI did

¹⁵This result does not depend on the choice of accuracy band of TRI (or SRI): when we change the accuracy band of good forecasters to be 15% or more, the effects of TRI and SRI on job satisfaction remained significantly negative.

not work as a proxy of SRI. Moreover, given the right skewed distribution of SRI, we can see that the subjective pessimism brought the negative sign of reference income term in the job satisfaction regressions.

With those observations, we can see the reason why TRI did not work as follows: with respect to SRI, there is a tendency that workers become pessimistic, which brought the negative sign of the reference income term in the job satisfaction regressions. Given the difference in distributions between TRI and SRI, we can see that TRI did not work because TRI could not pick up the pessimism which appeared in SRI by construction.

3.4 A Hypothesis

After we found why TRI did not work, it is also interesting that who are the “bad forecasters” who brought the unfavorable result to the relative utility hypothesis. Table 7 compares means for various categories such as age, tenure, educational attainments, marital status, and gender between whole sample and bad forecasters. From Table 7, we can see that the female tend to be bad forecasters, or equivalently, be too pessimistic subjectively.¹⁶ With this finding, we provide the following modern woman hypothesis.

In our previous Mincer equation, we controled for gender with the female dummy following Kapteyn and van Herwaarden (1980). This specification implies that the rivals of women are women. However, as we documented in section 2, our dataset comprises potential sample selection bias: our dataset comprises data on white-collar workers of good companies in Japan. Working in those companies, a woman may have established social status as an independent person, thus changing her reference group to all workers, including men. With new reference group, women would be pessimistic subjectively since on average females’ wages are 17.7% lower than those of males’ as it can be seen from Table 4 and because the question about reference income

¹⁶Although not shown, when we regress dummy variable of being bad forecasters on these categories, we find female dummy to be positive and strongly significant.

in the survey does not stipulate that the rivals of women must be women. So, if we can let our Mincer-type reference income measure reflect females' perceptions of who their competition is, perhaps these Mincer-imputed wages would work just as SRI. With this modern woman hypothesis, we re-estimate TRI measure without controlling for gender and re-estimate the job satisfaction equation. The new Mincer equations is shown in the second column of Table 4 and the Table 8 shows the results.

According to Table 8, we can see that even in the case where TRI is estimated without controlling for gender, relative utility hypothesis does not hold. This outcome will imply that not all women think that their rivals are workers of either gender. However, given that our original job satisfaction regression with TRI did not work either, we argue that at least some women do feel as though they compete with men too. Above results suggest "emotional glass ceiling" effect amongst women, meaning that some of them perceive both male and female workers as being their professional rivals, while others do not consider men to be their competitors.

As a final test we provide Table 9 which shows the job satisfaction regressions with just males' sample. From the table we can confirm the relative utility hypothesis both with TRI and SRI, which validates our earlier conjecture that women are "bad forecasters".¹⁷ With this result, we can say that the criticism by by Manski (1993), Sloane and Williams (2000), and Lydon and Chevalier (2002) do not stand. However, importantly, the fact that our data on white-collar female workers did not support the hypothesis highlights the difficulty of constructing correct reference income with Min-

¹⁷Given the difference in means with respect to educational attainment dummy variables in Table 7, we investigate a rivalry between those with higher educational attainment and those with lower educational attainment along the line we developed with female to male rivalry. However, we found no evidence that those with lower educational attainments are too pessimistic about income compared to the better educated. This result may suggest that workers can accept the wage differences stemming from differences in educational attainment, which is a choice variable for a worker, while they cannot accept wage discrimination because of inborn characteristics of gender.

cer equations. Hence, we argue that relying just on the traditional reference income measure is inadequate in happiness studies of this sort.

4 Conclusions

The role of relative income in individuals' utility functions has gathered enormous attentions in the economics literature. This paper provides 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: the impact of subjective reference income on job satisfaction is robustly negative, which adheres to the economic theory furthered by Duesenberry and others. 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' objections to the standard methodology. When we utilize imputed wages as a proxy for comparison income, the effect of this variable on job satisfaction may not capture the relative utility effects. We then disentangled the discrepancy by investigating the difference in distributions of SRI and TRI. Taking potential sample selection bias problem into account, we partly reveal an "emotional glass ceiling" effect amongst women, meaning that some of them perceive both male and female workers as being their professional rivals, while others do not consider men to be their competitors.

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Figure 1: Shares of Workers Reporting Low and High Job Satisfaction by Income Level

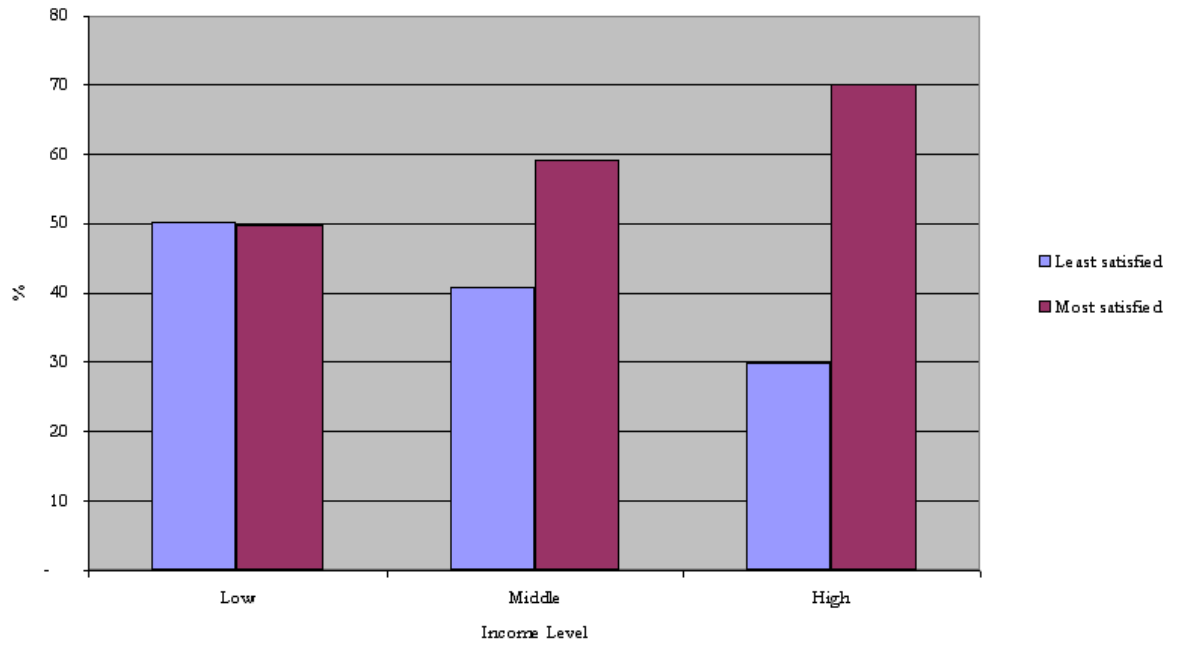


Figure 2: Shares of Workers Reporting SRI One Category Above and Below Their Own Income Levels

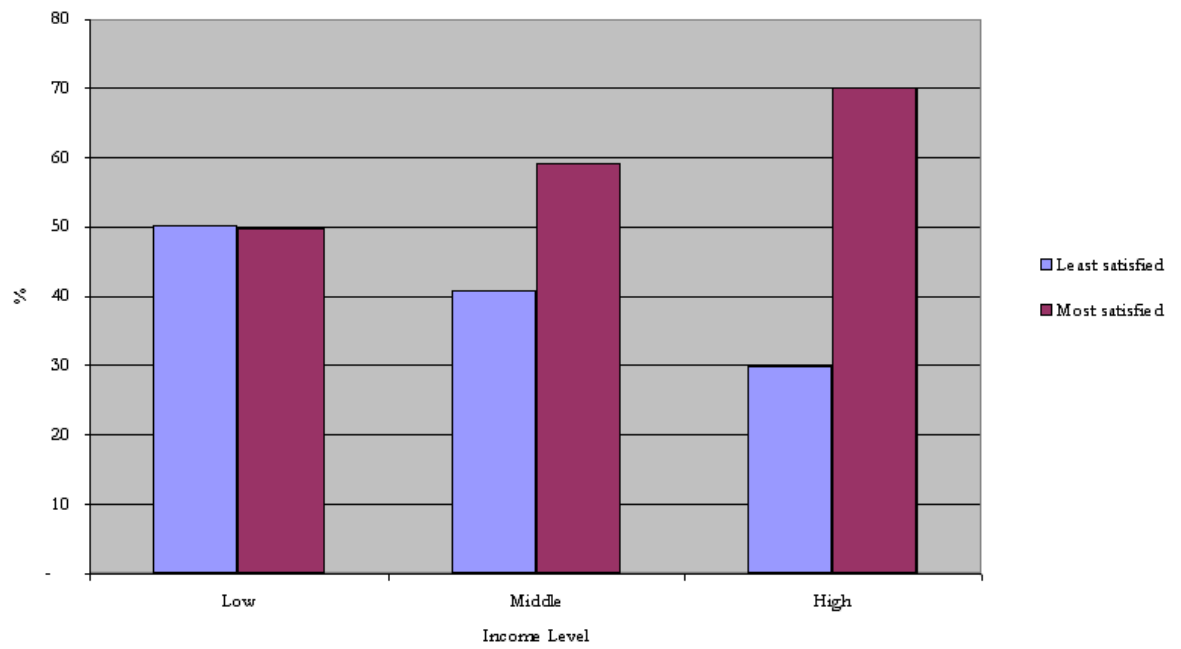


Figure 3: Difference between the distributions of df_s and df_m : whole sample

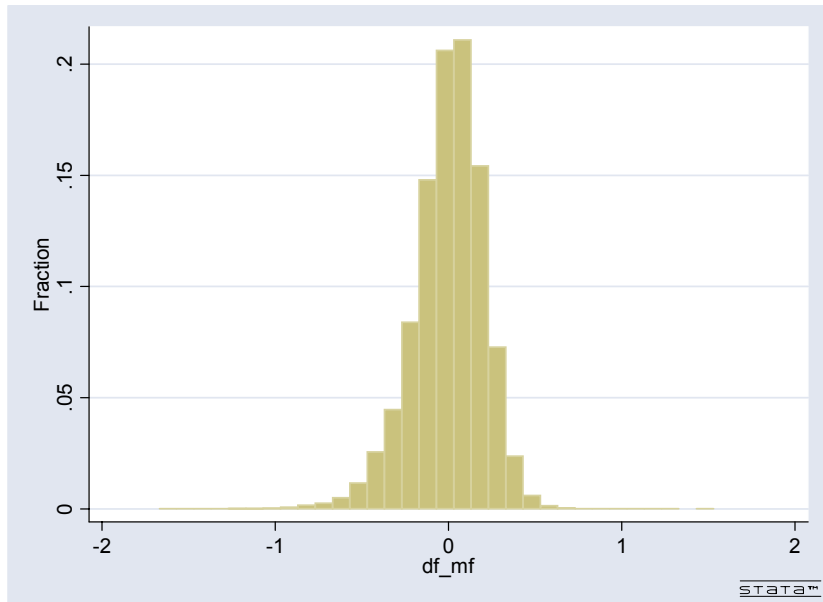


Figure 4: Difference between the distributions of df_s and df_m : bad forecasters

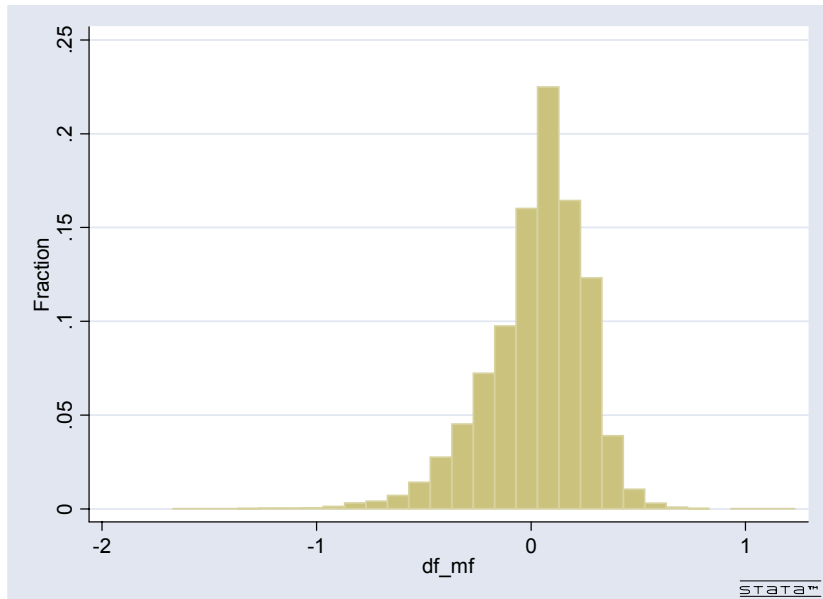


Figure 5: Difference between the distributions of df_s and df_m : whole sample

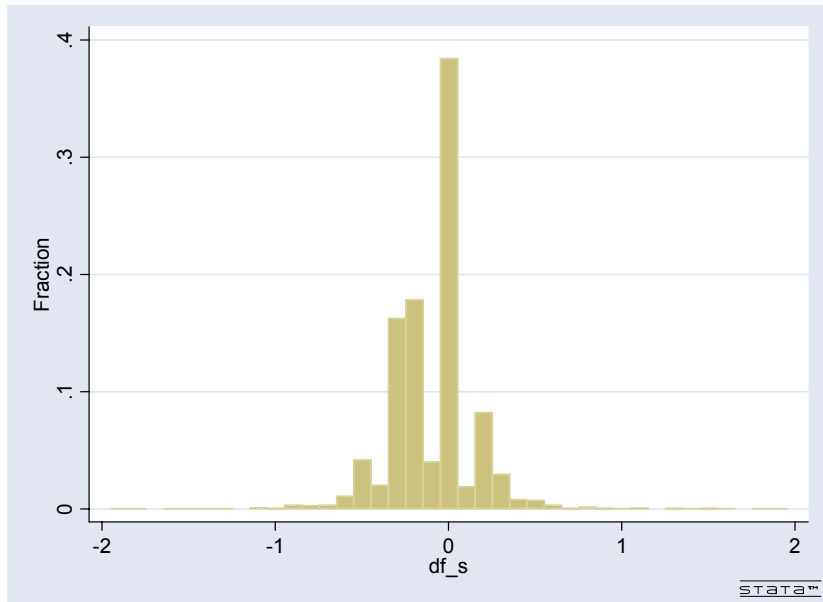


Figure 6: Difference between the distributions of df_s and df_m : bad forecasters

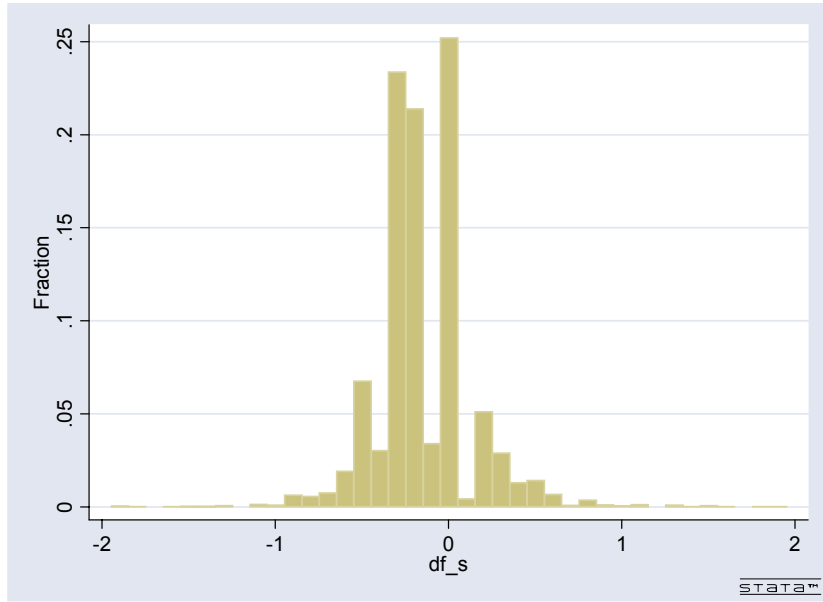


Table 1: Descriptive Statistics

Descriptive Statistics		
	Frequency	%
<u>Gender</u>		
male	45,847	73.5
female	16,548	26.5
<u>Marital status</u>		
single	28,121	45.1
married	33,856	54.3
divorced/widowed	418	0.7
<u>Education</u>		
middle school	1,439	2.3
high school	20,141	32.3
technical school	1,462	2.3
2-year college	8,263	13.2
4-year college	24,515	39.3
graduate	6,156	9.9
other	419	0.7
<u>Occupation</u>		
sales/marketing	13,107	21.0
designer/researcher	27,084	43.4
office work	22,204	35.6
<u>Age</u>		
under 22	2,414	3.9
22 -- 29	21,286	34.1
30 -- 39	24,130	38.7
40 -- 49	9,571	15.3
50 -- 59	4,994	8.0
<u>Income (in million yen)</u>		
less than 2	1,345	2.2
2-3	7,641	12.2
3-4	10,608	17.0
4-5	10,023	16.1
5-6	10,868	17.4
6-7	8,295	13.3
7-8	6,616	10.6
8-9	5,885	9.4
more than 10	1,114	1.8

Table 2: Distribution of Subjective Reference Income by Income Level

Distribution of Subjective Reference Income by Income Level (%)										
Income (in million yen)	1	2	3	4	5	6	7	8	9	Number of obs.
less than 2	38.74	48.25	9.59	1.19	0.59	0.52	0.22	0.3	0.59	1345
2-3	1.83	50.39	39.21	6.48	1.45	0.31	0.17	0.09	0.07	7641
3-4	0.17	6.37	48.91	33.14	8.78	1.62	0.58	0.31	0.12	10608
4-5	0.16	1.03	10.49	35	36.62	12.46	2.75	1.16	0.34	10023
5-6	0.17	0.32	2.25	11.35	32.63	32.75	14.84	4.94	0.76	10868
6-7	0.19	0.13	0.92	2.92	16.37	27.91	30.09	18.95	2.52	8295
7-8	0.06	0.17	0.51	1.06	7.77	17.73	27.91	38.98	6.53	6616
8-9	0.07	0.1	0.46	0.36	3.33	8.85	18.81	45.69	22.33	5885
more than 10	0.18	0.09	0.27	0.63	0.99	4.04	11.49	33.48	48.83	1114

Table 3: Ordered Logit Regressions of Job Satisfaction

Ordered Logit Regressions of Job Satisfaction		
	Dependent Variable:	
	Job satisfaction	
Log of real wage	0.913 (26.15)***	0.401 (25.84)***
Log of real reference wage (Survey)	-0.565 (15.57)***	
Percent deviations of peers' wages from own income		-0.086 (15.47)***
Log overtime	-0.03 (3.62)***	-0.03 (3.63)***
Observations	62395	62395
Pseudo R2	0.01	0.01
Log likelihood	-82622.88	-82624.87
Robust z statistics in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 4: Reference Income Levels from Mincer Equations

	Dependent Variable: Log real wage	
	(1)	(2)
Age in years	0.065 (22.62)***	0.077 (26.55)***
Age squared	-0.001 (29.29)***	-0.001 (32.78)***
Tenure in years	0.019 (24.24)***	0.017 (20.75)***
Tenure squared	0.000 (15.51)***	0.000 (11.29)***
Education variables:		
Middle school	0.161 (53.91)***	0.184 (57.86)***
Undergraduate degree	0.21 (49.49)***	0.246 (55.48)***
Graduate degree	-0.097 (6.60)***	-0.119 (7.32)***
Married	0.075 (36.41)***	0.097 (45.01)***
Log overtime	0.042 (40.09)***	0.07 (65.75)***
Female	-0.177 (65.50)***	
Constant	13.424 (123.42)***	13.057 (123.20)***
Birthyear FE	Yes	Yes
Year FE	Yes	Yes
Observations	62395	62395
R-squared	0.77	0.75
Robust t statistics in brackets		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 5: Job Satisfaction Regressions Using Traditional Reference Income

Ordered Logit Regressions Using Reference Income from Mincer Equation		
	Dependent Variable:	
	Job satisfaction	
Log of real wage	0.434 (11.98)***	0.451 (22.35)***
Log of real reference wage (Mincer)	0.014 (-0.33)	
Percent deviations of peers' wages from own income		0.004 (-0.66)
Log overtime	-0.031 (3.70)***	-0.031 (3.74)***
Observations	62395	62395
Pseudo R2	0.00	0.00
Log likelihood	-82759.04	-82758.88
Robust z statistics in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		

Table 6: Job Satisfaction Regressions with Subgroup of Good Forecasters

Job Satisfaction Regressions Using TRI vs SRI for Workers Making Small Prediction Errors				
	Dependent Variable:			
	Job satisfaction			
		GOOD	GOOD	GOOD
Log of real wage	0.434 (11.98)***	0.781 (14.51)***	0.913 (26.15)***	0.976 (18.18)***
Log of real reference wage (Mincer)	0.014 (-0.33)	-0.378 (-6.22)***		
Log of real reference wage (Survey)			-0.565 (15.57)***	-0.605 (-10.34)***
Log overtime	-0.031 (3.70)***	-0.029 (-2.69)***	-0.03 (3.62)***	-0.03 (-2.75)***
Observations	62395	36982	62395	36982
Pseudo R2	0.00	0.01	0.01	0.01
Log likelihood	-82759.04	-48448.28	-82622.88	-48412.44

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

Table 7: Means by Categories: Whole Sample and Bad Forecasters

Mean by Categories: Bad Forecasters								
	Age	Tenure	Educational Attainment				Married	Female
			juniorhigh	high school	under graduate	graduate		
whole sample	33.89852	12.17252	0.0200638	0.2992807	0.4179601	0.1130009	0.5714672	0.2264886
bad forecasters	33.49612	11.93802	0.0274269	0.357022	0.3564317	0.0777948	0.5006099	0.3215677
Total	33.73463	12.07701	0.0230627	0.3227983	0.3929001	0.0986618	0.5426076	0.2652136

Table 8: Job Satisfaction Regressions: Modern Woman Hypothesis

Job Satisfaction Regressions Using Two Types of Reference Income from Mincer Equations			
	Dependent Variable:		
	Job satisfaction		
		Trad. Women	Modern Women
Log of real wage	0.913 (26.15)***	0.434 (11.98)***	0.403 (11.71)***
Log of real reference wage (Survey)	-0.565 (15.57)***		
Log of real reference wage (Mincer: 1)		0.014 (-0.33)	
Log of real reference wage (Mincer: 2)			0.056 (-1.39)
Log overtime	-0.03 (3.62)***	-0.031 (3.70)***	-0.032 (3.83)***
Observations	62395	62395	62395
Pseudo R2	0.01	0.00	0.00
Log likelihood	-82622.88	-82759.04	-82758.14
Robust z statistics in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			

Table 9: Job Satisfaction Regressions with Males' Sample

Job Satisfaction Regressions Using Male's Samples			
	Dependent Variable:		
	Job satisfaction		
Log of real wage	0.596 (13.04)***	0.538 (11.81)***	0.984 (22.48)***
Log of real reference wage (Survey)	-0.706 (15.66)***		
Log of real reference wage (Mincer: 1)		-0.265 (4.68)***	
Log of real reference wage (Mincer: 2)			-0.168 (3.19)***
Log overtime	-0.038 (3.85)***	-0.034 (3.40)***	-0.045 (4.59)***
Observations	45847	45847	45847
Pseudo R2	0.00	0.00	0.00
Log likelihood	-60882.87	-61015.37	-61021.25
Robust z statistics in parentheses			
* significant at 10%; ** significant at 5%; *** significant at 1%			