Status, Relative Wage, and Pay: Evidence from M&A

Illoong Kwon   And   Eva M Meyersson Milgrom

SUNY at Albany   Stanford University

October 31, 2006

Abstract

We use evidence from workers' voluntary separation choices following M&A activity to establish that those choices depend on changes in workers' *relative* standing in terms of wage and rank separately from the absolute levels of those variables. Little of this preference is explained by pecuniary theories (in which current rank predicts future income). The "social value," varies qualitatively depending on the nature of the comparison group. When workers' expected relative standing within a group of co-workers in the same occupation increases after M&As, they are *less* likely to quit. However, when workers' expected relative standing compared to all workers within the same firm increases, they are *more* likely to quit. Moreover, workers who gain in social value have lower future wage growth, suggesting a market for social status.

Contact Information:
Illoong Kwon, Department of Economics, State University of New York at Albany, 1400 Washington Ave., Albany, NY 12222, ikwon@albany.edu.
Eva M Meyersson Milgrom, Stanford Institute for Economic Policy Research (SIEPR) Room 150, 579 Serra Mall at Galvez, Stanford University, Stanford CA94305, eva@meyersson.com.

1. Introduction

One of the most basic social phenomena in society is that people compare their circumstances and attributes with others'. For example, they compare relative standing with respect to wage, authority, or beauty, with co-workers, neighbors, or friends. The outcome of this comparison can lead to frustration or satisfaction, which in turn can affect job performance in such dimensions as turnover, cooperation, or effort choice. Economists often ignore this effect[1], possibly due to a lack of empirical evidence[2].

To bridge this gap, we set out to answer four empirical questions in this paper: (1) Do workers' turnover choices depend on their relative standing ("status") with respect to wage (or occupation rank) independent of absolute pay level?; (2) If so, what theory of status best accounts for their choices?; (3) Are they willing to sacrifice some of their absolute income to gain higher relative rank with respect to wage?; (4) With whom do people compare their wages?

If status matters for people's utility (called *social preference*) and their behavior, that has immediate implications for personnel policy, organization structure, and market strategy (Martin 1981). Status-seeking behavior can not only affect aggregate consumption (Duesenberry 1949), wage compression (Frank 1985), involuntary unemployment (Akerlof and Yellen 1990), saving and growth (Fershtman et al. 1996), and income distribution (Becker et al. 2005), but it also requires rethinking measures of social welfare and economic growth. For example, in an extreme case where people only care about their relative wage, GDP growth may have nothing to do with the people's welfare (Townsend 1979).[3]

---

[1] Important exceptions include Akerlof and Yellen (1990), Baxter (1988), Duesenberry (1949), Gylfason and Lindbeck (1984), Frank (1985), Solow (1990), Veblen (1949), and Wood (1978).

[2] The importance of relative wage also brings serious technical difficulties to economic models. For example, the equilibrium may not exist in many models once they allow the effect of relative wage.It can unravel in a most disadvantage way. Another reason could be the individualism behind neoclassical economics (Kjosavik 2003). For instance assumption in the neoclassical models rely on my happiness being dependent on my wage, my consumption etc.and not on how I perceive my standing relative to others.

[3] Already Durkheim argued that happiness may decline even as a person's wealth increases because happiness arises from comparison with others [1987] (1964) from Jasso (1990), who gives an insightful introduction to the field of comparison theories

Although recent developments in experimental economics provide some evidence for social rewards or social preference, such as concerns for status and fairness, it is hard to create significant social rewards (status) in a laboratory experiment. (For and excellent survey see Sobel 2005). Field evidence is needed to assess the empirical impacts of status on job-related decisions.

In this paper we first investigate whether changes in relative standing with respect to wages and occupation ranks affect workers' turnover decisions, controlling for changes in absolute pay. The analysis is based on more than 300 mergers and acquisitions (M&A) in Sweden with more than 130,000 workers involved. We argue that an M&A event—a merger or acquisition—provides a natural experiment to study the effect of relative wage (or status) and comparison process. When an M&A event occurs, workers are introduced to a large pool of new co-workers, which changes each worker's relative rank with respect to pay and occupation positions significantly. Furthermore, M&A decisions are mostly independent of an individual worker's (unobserved) characteristics. Thus, M&As generate large and exogenous variations in relative wage, which allows us to identify its effects, especially on worker turnover decisions (i.e. "choosing the pond").

In contrast, previous studies either do not control for absolute income (e.g. Pritchard, Dunnette, and Jorgenson 1972, Valenzi and Andrews 1971) or make simple cross-individual comparisons ignoring the potential endogeneity problem (e.g. Clark and Oswald 1996, Martin 2003)[4]. Also most of these studies analyze the effect of relative wage on subjective satisfaction (happiness) ratings, not on the turnover decision. However, it is well known that people often report relative satisfaction ratings instead of absolute satisfaction ratings in such surveys or experiments, which potentially undermines the purpose of these studies.(reference?)

There are several alternative hypotheses concerning how and why people might react to *changes* in relative standing. First, people may positively value having a high relative wage/occupation hierarchical rank within a certain group. Sociological foundations for such a preference include local social status theory (Sorenson 1979, Jasso

---

[4] A potential exception includes Neumark and Postlewaite (1998) which shows how married women's labor market participation is affected by the wage of a sister-in-law.

2001), equity theory (Adams 1963, 1965), relative deprivation theory (Stouffer et al. 1949), and social exchange theory (Blau 1955, Homans 1961)[5]. Frank (1985) and Fershtman and Weiss (1998) also provide evolutionary justification for such a preference, comparing with others make people more competitive and hence more likely to survive.

Second, people may *negatively* value their relative standing within their group independent of current or future absolute pay. For example, when a society assigns status to a worker based on the (relative) quality of the firm that s/he belongs to, a worker may prefer to work with higher-quality (so better-paid) co-workers, which could show up empirically as a preference for lower relative pay. This effect is variously referred to as "group status" (Weber 1922 [reprinted, 1978], Ridgeway 1991), "halo effect" (Frank 1985), or "second-order status" (Jasso 2001).

Third, workers may positively value their relative standing even independent of current income, because high relative wage can make high future income more likely. For example, high relative wage can be a signal of the worker quality, which can raise future absolute income (Stiglitz 1987), or it may imply a greater likelihood for promotion.

Fourth, a standard economic model can also argue that people may negatively value their relative standing independent of current income, especially in the context of M&As, because wages in the comparison group may predict future wages, so a high relative way today could foreshadow lower future wages.[6] Alternatively, workers may prefer to work with high-quality (high-paid) co-workers to enhance their own learning.(learning, signaling, group status effect/halo effect, mentioned above, generating prestige).[7]

With all this variety, whether a higher relative standing increases or decreases a worker's utility or turnover decision, it can be difficult to distinguish social rewards-based explanations (the first and the second) from pecuniary (the third and the fourth) based on how relative wage may affect future income. In this paper, we attempt to

---

[5] See Akerlof and Yellen (1990) for a nice summary.
[6] When united bought a smaller airline, with what the pilots considered less experienced and hence less paid pilots, they objected to the acquisition because of fear of their own wage growth.
[7] Although occupation hierarchical rank may generate clearer visibility and hence a stronger signal than wages, henceforth we will mostly focus on relative standing with respect to wages.

distinguish among the social reward based, status and pecuniary explanations by controlling for the effect that the exogenous change in a worker's relative wage has on the worker's wage growth rate in the merged company.

The quantitative relation between relative wage and absolute wage is interesting by itself, as it addresses an interesting concept of 'market for status'. For example, if workers are willing to sacrifice future income for higher relative wages (or local status), and if different workers value the status differently, then there can be a market for status where workers can trade status for higher absolute income. Frank (1985) and Becker et al. (2005) assume such a market in their theoretical models in order to explain the puzzles in wage compression and income distribution, but there has been little empirical evidence.[8]

In reality, we will find that the seemingly opposite explanations/mechanisms outlined above can appear together in an interesting way. For example, when a worker compares with competitors in the same occupation, s/he might prefer having a higher relative wage either for social status or as a signal of higher quality. However, when a worker compares with complementary coworkers with whom s/he does not directly compete, the worker might prefer having higher-quality (so better-paid) co-workers, that is, having lower relative wage either for global status or learning. These opposite effects can, in principle, coexist because the worker has different kinds of reference groups.

Therefore, we distinguish two reference groups in this paper: workers in the same occupation within the firm, and workers in the other occupations within the same firm. Then, we study how the relative wages in different groups affect workers behavior.

Most previous theoretical and empirical studies, in contrast, make the *ad hoc* assumption that there is just one reference group[9], ignoring the possibility that different mechanisms can be operating for different reference groups. For example, Akerlof and Yellen (1990) assume that workers in the same firm form a single reference group, while Summers (1988) assumes comparable workers in other firms are the reference group.

---

[8] Zizzo and Oswald (2001) provide experimental evidence that subjects are willing to sacrifice their payoff to decrease others' payoffs.
[9] For an exception, see Frank (1985), where different roles of various reference groups are discussed. However, it does not include empirical analysis.

A quick preview of our findings is as follows; (i) when a worker's expected relative wage increases compared to coworkers in the same firm and occupation, the worker is *less* likely to quit; but (ii) when a worker's expected relative wage rises compared to all employees in the same firm, the worker is *more* likely to quit. These findings are consistent with our predictions that a worker may have different reactions to different kinds of status, based on substitutability and complementarity of coworkers. The results also highlight the importance of controlling for different reference groups in theoretical or empirical studies. We also find that (iii) when workers' expected relative wages within occupation increase, their wage growth rates in the near future are lower, as if they were paying for higher relative wages, but (iv) when workers' expected relative wages within firm increase, their wage growth rates in the near future are higher, as if they are being compensated for having low-quality (worse-paid) co-workers. As discussed above, these findings are consistent with preference for social rewards such as local social status, fairness, and group status, but they are difficult to reconcile with standard economic explanations of signaling, tournament, or learning. These findings also suggest the existence of a market for status (or relative wage).

The rest of the paper is organized as follows: In section 2, we discuss different economic and sociological explanations of why people might care about relative wage and derive testable empirical implications. In section 3, we describe our measurement of relative wage and reference group. Section 4 describes the dataset. Then, section 5 presents the empirical results. We conclude in section 6.

2. Theories and Empirical Hypotheses

In this section, we study different theories from economics and sociology of why people care about their relative standing, especially in terms of wages, and derive empirical hypotheses for our analyses.

2.1 Relative Wage and Social Rewards

The relative standing of an individual, especially relative wage, can affect social *rewards* (such as status, equity, or relative deprivation), independent of monetary rewards.

For example, in social status theory, the relative wage (along with relative rankings of other individual traits) within a particular group can determine the (local) social status of an individual within the group. Therefore, the members of the group positively value the relative wage because it signifies prestige, honor, esteem, or respect. (e.g. see Goode 1978, Sorensen 1979, Jasso 2001)

In equity theory, the relative wage can represent an individual's perceived inequity of monetary compensation. In particular, holding everything else constant, a lower relative wage decreases the utility of the individual. When a person attempts to restore equity in other dimensions (such as effort), the relative wage affects her behavior and welfare. (Adams 1963, Akerlof and Yellen 1990)

Similarly, in relative deprivation theory, the utility of an individual decreases when his/her wages are relatively lower than those of comparable others. (Stouffer 1948) For other theories and evidence, see Akerlof and Yellen (1990).

One unique aspect of social rewards, often ignored in economics, is that peoples' concern for social rewards and relative wages change depending on the social/informational context. For example, consider a worker in a particular company. When the worker interacts with people outside the firm, the firm's group status within the whole society (or industry) may matter more than the worker's local status (or relative wage) within the firm, especially when people outside the firm do not observe the relative wage within the firm.

In this social context, a worker may prefer a *lower* relative wage, holding everything else constant, in order to work with relatively higher-quality (and better-paid) co-workers who can raise the group status. This idea is captured by the concept of 'status group' in Weber 1922 [reprinted, 1978], or the 'halo effect' in Frank (1985.

Similarly, in equity theory and relative deprivation theory, different social contexts offer different reference points. That is, when workers interact with people

outside the firm, they may care about equity or fairness in terms of their firm's relative standing with respect to other firms.

2.2 Relative Wage and Future Income

An economist, however, can explain concerns about relative wages without relying on the concepts of social rewards. For example, people may positively value relative wages because they serve as a signal of the worker's unobserved quality, especially when the market only observes the relative wage, not the absolute wage. Then, a higher relative wage can signal higher quality and lead to larger future monetary income. (see e.g. Stiglitz 1987) Also, one can easily build a tournament model where the continuation payoffs increase as one gets promoted to higher levels. Then, a worker will positively value the relative wage (or relative standing within the promotion hierarchy) not because of the social rewards, but because of the future monetary (expected) income.

People may also negatively value their relative wages not because of group status, but because of lower future income. For example, a high relative wage or high relative standing within the hierarchy could mean that there is no more opportunity for future promotions or wage increases. Then, workers, holding everything else constant, would prefer lower relative wages. Also, one can learn from higher quality (i.e. better paid) co-workers. This is another reason why people would prefer lower relative wages. (Frank 1985)

Therefore, people's positive and negative valuations of relative wages can be explained both by social rewards and by pecuniary rewards. The following table summarizes these theories.

Table 1   Theory of Relative Wages
(r_i = relative wage; s_i = social rewards; w_i = wage)

	Social Rewards	Pecuniary Rewards
Utility Function	$U_i(w_i, s_i(r_i))$	$U_{it+1}(w_{it+1}(r_{it}))$
$\dfrac{\partial U_i}{\partial r_i} > 0$	Local status theory Equity theory	Signaling model Tournament model

$\dfrac{\partial U_i}{\partial r_i} < 0$	Group status theory (Halo effect)	Dead-end effect Learning effect

2.3 Empirical Hypotheses

As Table 1 summarizes, the fact that people positively (or negatively) value their relative wages even after controlling for their current absolute pay does not necessarily imply that people have preferences for social rewards such as social status or equity. Somewhat surprisingly, few previous empirical studies have recognized this possibility.

In order to distinguish between social reward-based and pecuniary explanations we investigate how future income responds to an exogenous change in relative wage, holding current pay constant.

If the social rewards matters for workers they have to be compensated for lower expected status. Therefore, we expect a negative correlation between the change in relative wage and the change in wage growth rate. In contrast, if workers positively value their relative wages because they are positively correlated with future income, then there will be positive correlation between the change in relative wage and the change in wage growth rate.

Note that we can distinguish social reward-based and pecuniary explanations by analyzing how an exogenous change in relative wages affects the future wage growth rates of those who remain after the change.

Similarly, suppose that workers negatively value their relative wages. Then, when the relative wages increase exogenously, they will be more likely to quit their firms either because of fewer social rewards or because of less pecuniary rewards.

For those who remain, however, if the relative wages stand for social rewards (such as group status), when the relative wage increases exogenously (holding everything else constant), their group status decreases, and they need to be compensated by a faster wage growth rate. Therefore, there should be positive correlation between the change in relative wage and the change in wage growth rate. In contrast, if workers negatively value their relative wage because it is negatively correlated with pecuniary rewards, then there

should be a negative correlation between the change in relative wage and the change in wage growth rate.

Table 2 summarizes these different predictions that we will bring to the empirical analysis.

Table 2   Predictions of Alternative Theories

Measure	Effect	Theory	Turnover	Wage Growth
$r_i = $ Relative Wage	$\dfrac{\partial U_i}{\partial r_i} > 0$	Social Rewards (Status, Equity)	-	-
		Pecuniary Rewards (Signaling, Tournament)	-	+
	$\dfrac{\partial U_i}{\partial r_i} < 0$	Social Rewards (Group Status)	+	+
		Pecuniary Rewards (Dead-end, Learning)	+	-

3. Measurement

In order to estimate the effect of relative wage on worker turnover and the future wage growth rate, we first need to define the reference group and the measurement of relative wage.

3.1 Changes in Relative wage

In order to measure the effect of relative wage, there should be exogenous variation in the relative wage that is independent of workers' unobserved characteristics. As discussed above, it is very difficult to find such exogenous variation in the field data. Most previous studies based on field data have used cross-individual variation. However, it is well-known that such variation is likely to be correlated with individual unobserved characteristics. One could use time variation in the relative wage within individuals, but such variations are typically too small.

An important innovation of our paper is the use of M&A as an exogenous shock to relative wage. As discussed above, M&As provide natural experiments for studying

the effect of relative wage. In studying the effect of relative wage on worker turnovers, however, we cannot observe the actual change in relative wage for those who leave the firm during M&A. Since those who leave are likely the workers who care about the relative wage most, ignoring them can cause selection bias. Therefore, we estimate the effect of the *expected* change in relative wage. More specifically, we measure a worker's *expected* post-merger relative wage based on the wages of all the workers right before the merger. Then, we define the expected change in relative wage as the difference between this expected post-merger relative wage and the worker's actual relative wage right before the merger.

Expected change in relative wage
= Expected post-merger relative wage - Actual pre-merger relative wage (1)

This measure allows us to use all the workers prior to the merger, avoiding potential selection bias.

3.2 Reference Group

As discussed above, the reference group for social rewards (such as status or equity) changes depending on the social/informational context. Since we cannot determine *a priori* which reference group is relevant in a given situation, we need to control for the relative wages within different groups simultaneously and let the data speak to us.

In this study, we focus on two reference groups: an occupation within the firm, and the whole firm. While other reference groups, such as the same occupation in other firms, are also important, an M&A does not change the relative wage in a group that does not belong to the merging firms. Moreover, the two groups we focus on are possibly the two most important reference groups in the workplace (see Kwon and Meyersson Milgrom 2006). In contrast, previous theoretical and empirical studies have used only relative standing in an ad hoc reference group.

3.3 Relative wage

Within each reference group, we measure each individual's relative wage by the relative ranking of wages. In particular, we define the relative wage as follows:

$$\text{Relative standing} = \ln(\frac{N+1}{N+1-i}) \approx \ln(\frac{1}{1-r}) \tag{2}$$

where N denotes the number of workers in the group, r (0≤r≤1) denotes the relative rank of wage (= CDF of wage) and i denotes the raw rank (with 1 assigned to the lowest wage and N assigned to the largest wage). This particular functional form has been widely used in sociology (e.g. Sørensen 1979, Jasso 2001), and based on the observation that "prestige payments rise steeply" (Goode 1978, p.142).

This formula captures two important aspects of status. First, relative standing is a convex function of relative wage. Therefore, workers with high relative wage cares more about their relative wage than workers with low relative wage. Second, for the workers with the highest relative wage, for example, their relative standing will increase with N. Thus, it captures the idea that high status in a large group values more than high status in a small group.

We also have used alternative measures such as the relative rank of wage itself and the deviation of absolute wage from the average wage. However, we find no qualitative changes.

4. Data

To use M&A as the basis for empirical research on relative wage, one needs detailed personnel records of both firms before and after the merger. Because personnel records are typically confidential, it is difficult to get personnel records from one company, and even more difficult to get personnel records from two companies especially both before and after the merger.

Thus, Swedish employer-employee match data are ideal for this study. These data are essentially the collection of personnel records of white-collar workers in *virtually all the firms* in the private sector of Sweden from 1970 to 1990 (except banking and insurance). The data served as the input to the centralized wage negotiations and were gathered from personnel records by The Swedish Federation of Employers and monitored by the labor unions. Thus, the data is of very high quality. For each worker, the data contain *annual* information on wage, age, education, geographic region, work-time relative wage, firm ID, plant ID, industry ID, occupation ID, and rank. Because all the IDs are comparable across firms, occupations, and time, we can track each individual worker across firms and occupations throughout his/her career.

Occupation code (called BNT code) is a four-digit code, where the first three digits (occupation ID) describe types of tasks and the fourth (rank ID) describes the degree of skill needed to fulfill the tasks. (It reflects the number of employees and type of skill needed for decisions at this level). The white-collar workers' occupations cover 51 three-digit occupation groups such as construction, design, and management. For more details, see appendix A. Within each occupation, the fourth digit rank code runs from 2 (highest) to 8 (lowest).

In this study, we focus on the firms involved in mergers and acquisition. Unfortunately, the data do not have a firm's ownership information. Therefore, we identify mergers and acquisition based on the changes in worker's firm ID. That is, if more than 50% of workers change firm ID, say from A to B, and if the old firm ID, A, disappears from the data, then we say "B has acquired A".[10] We also refer to B as 'acquirer' and A as 'acquired'. We also restrict our attention to firms with more than ten white-collar workers[11].

This sample contains 351 M&A cases and 133,192 workers. Figure 1 shows these numbers by year.

[Figure 1 here]

---

[10] Some less clear cases (e.g. where B is a new firm or where A does not disappear) are excluded.
[11] Focusing on firms with more than 100 workers does not change the qualitative results of the paper.

Table 3 also provides the summary statistics of selected variables during the first three years after the acquisition and in the year previous to the acquisition. Firm size is measured by the number of white-collar workers in the firm[12]. On average, the acquirer is much larger than the acquired. On average, the size ratio (acquired/acquirer) is 0.66. However, there are cases where the acquired firm is larger than the acquirer. The wage is measured by the real monthly earnings in 1970 Kronor (SEK).

[Table 3 here]

The firm size shows very little change after acquisition. Thus, mass layoffs after M&A do not appear to be common in Sweden. However, the number of total workers from the acquired firms seems to decrease slightly faster over time. Table 3 also shows that the average wage of the acquired firms is slightly lower than that of the acquiring firms. Otherwise, there is no obvious systematic difference between acquiring firms and acquired firms.

Relative wages are computed based on equation (2) both within each occupation inside a firm and within the whole firm. The changes in relative wage are also computed according to equation (1). Table 4 shows the sample distribution of these variables, and the correlation matrix. Not surprisingly, the wage, relative wage within firm, and relative wage within occupation are all highly correlated. However, more importantly, the correlation between the changes in relative wage within firm and the changes in relative wage within occupations is not high enough to cause a multicolinearity problem, but high enough to introduce omitted variable bias if one fails to control for both.

[Table 4 here]

---

[12] Even though we have information on blue-collar workers, it is difficult to merge two datasets because they use different firm IDs. Ekberg and Salabasis (2001) has attempted to merge two dataset and used the sum of white-collar and blue-collar workers as an alternative firm size measure, but found no change in effects on wages.

Also note that the turnover rate during M&A is 10%, which is similar to the average turnover rate in Sweden. For more details on the data and the institution, see Kwon and Meyersson Milgrom (2004, 2005).

5. Relative Wage and Turnover

Workers experiencing a negative change in relative wage can respond by changing firms. Alternatively, these workers can stay and be compensated by higher wages. Therefore, we first analyze the effect of a change in relative wage on the firm turnover decision and on future wage growth in next section.

5.1   Expected Change in Relative Wages and Turnover

In this section, we analyze the effect of the *expected changes* in relative wage both within an occupation (denoted by Δstatus_fo) and within a firm (denoted by Δstatus_f) controlling for the pre-merger wage, and the pre-merger relative wage both within an occupation (status_fo) and within a firm (status_f).

In Table 5, we estimate the probit regressions for workers' turnovers within two years after the acquisition.

[Table 5 here]

In Table 5 [1], we control for only the relative wage within the firm and its change, and find that the change in relative wage within a firm has no significant effect on worker turnovers. However, Table 5 [2] shows that the changes in relative wage within an occupation have a negative and significant effect on turnover probability. In Table 5 [3], we control for both the changes in relative wage within a firm and within an occupation. Then, the change in relative wage within a firm has positive and significant effect on turnovers, but the change in relative wage within an occupation has negative and significant effect on turnovers.

15

In columns [1]-[3], we have not controlled for the expected change in wages, because it is difficult to measure. Thus, in column [4], we estimate the turnover probability using the actual change in wage and the actual change in relative wage for those who still remain right after M&As. We also control for the potential selection bias using the Heckman two-step procedure. The selection regression in column [4] includes all the same control variables except that the expected changes in relative wage are used instead of the actual changes in relative wage. Also, the change in wage is not included in the selection regression. The qualitative results do not change from column [3].

From column [3], we can also gain some estimates of the value of relative wage. For example, a one standard deviation increase in our relative wage measure is equivalent to a wage increase of 213 SEK (or 7% increase in the median wage). Also if the highest paid worker within a 100-worker occupation becomes the median-paid worker within a 200-worker occupation, the change is equivalent to the wage loss of 403 SEK (or 14% decrease in the median wage). The value of the relative wage within a firm is almost double the value within an occupation, with the opposite sign.

There are at least three noteworthy findings. First, an expected increase in relative wage within an occupation (Δrelative wage_fo) decreases the turnover probability. This effect is consistent with the social status or fairness explanation. Because workers within the same occupation perform similar tasks and because workers in the same occupation are substitutable, social status can be formed on the basis of relative wage. Then, a higher relative wage implies higher social status and causes workers to stay in the firm. However, this finding is also consistent with the signaling explanation. The higher relative wage among substitutable workers could mean higher quality and increase the future absolute income.

Second, somewhat surprisingly, an expected increase in relative wage within a firm (Δstatus_f) increases turnover probability. This result is consistent with global status (or reputation) effect. If workers do not directly compete with other workers in different occupations, and if workers in different occupations perform complementary tasks, then workers would prefer working with higher quality (and better paid) co-workers for better

group reputation or global social status. Since higher relative wage after the merger could mean the introduction of low-quality co-workers, it can cause the workers to leave the firm. However, this finding is also consistent with the expected wage compression after a merger.

Third, notice the importance of distinguishing two reference groups. Without controlling for the changes in relative wage within occupation, we find that the changes in relative wage within firm are not significant. Thus, it demonstrates that the failure to control for different reference groups can cause significant bias in estimating the effect of relative wage.

5.2 Specification and Robustness Tests

To confirm our estimation results, we perform various specification and robustness tests in Table 6.

[Table 6 here]

■ Hypothetical M&A

If two firms are not merging, then there is little reason workers would care about their relative wage against workers in other firms, especially those in other occupations as well. Therefore, as a specification test, we repeat the same analysis in Table 5 for hypothetical M&A that have not actually happened.

More specifically, to control for unobserved firm characteristics, we focus on each pair of firms involved in actual M&A, and look at their data five years before the actual M&A. Because workers would not expect M&A with a specific firm five years later, they would not care about relative wage against workers in the other firm at that time. In Table 6 [1], we repeat the same analysis as in Table 5 [3], pretending firms are merging five years before the actual M&A. If our specification and interpretation are correct, the expected changes in relative wage both within occupation and within firm should not be significant in these hypothetical M&A. Indeed, table 6 [1] shows that the

expected (hypothetical) changes in relative wage both within occupation and within firm are not significant.

■ Rational Expectations

When we compute the expected change in relative wage in equation (2), an implicit assumption is that workers expect all those working prior to M&A to stay after M&A or that workers will leave firms randomly, independent of changes in relative wage. However, rational workers will understand workers' turnover patterns as illustrated in Table 6. Then, workers can predict the expected change in relative wage based on rational expectations of who will leave and who will stay.

Thus, we re-compute the expected change in relative wage assuming that workers can correctly predict who will leave and who will stay after M&A. For each worker who actually leaves the firm, we compute his/her expected change based on the worker's expected post-merger relative wage if s/he would stay (assuming all the others would not change their turnover decisions).

Table 6 column [2] shows that there are no changes in the qualitative results when we use rational expectations to compute the expected changes in relative wage.

■ Relative Rank in Hierarchy

So far, we have measured workers' relative wage within an organization based on relative ranking of wage. However, workers may care more about their relative standing in the hierarchy of a firm. Also, suppose that, like the group reputation effect, relative wage matters due to the perception of outsiders (e.g. friend, neighbors, or business partners outside the firm). Then, the relative standing within the hierarchy of a firm would be a better measure of workers' relative wage because it is much more visible to outsiders than the relative wage is.[13]

One of the unique features of the Swedish data is that it contains accurate information on the rank within each occupation, ranging from 2 (highest) to 8 (lowest).

---

[13] Organizations often have a policy of secrecy in regard to wages.

The ranks are determined based on the required skill levels and responsibility and are comparable across firms. However, not surprisingly, the ranks across different occupations are not exactly comparable. Thus, we focus on the workers' relative standing and its changes within the hierarchy of an occupation inside a firm, denoted by status_for, and computed as follows:

$$\text{Status\_for} = \frac{\text{number of workers below one's own rank}}{\text{total number of workers in the occupation}} \qquad (4)$$

In Table 6 [3], we use this relative rank and its changes within occupation instead of the relative wage and its changes within occupation, and show no changes in the qualitative results.

■ Controlling for Tenure

It is well-known that firm tenure has a significant effect on turnover decisions. Unfortunately, the Swedish data do not contain firm tenure information. However, given the long span and the expansive nature of the data, we can observe workers' firm tenure if they enter a firm after 1970. In particular, for over 85% of workers between 1986 and 1988, we can observe their firm tenures. Thus, we repeat our analysis of firm turnovers using this sub-sample, adding tenure and tenure-squared as control variables. Table 6 column [4] shows that controlling for tenure does not change the qualitative results.

■ Involuntary Turnover

An alternative explanation for our findings is that workers are fired in a systematic way during an M&A. For example, workers with high expected post-merger relative wage within firms are more likely to be fired during an M&A, perhaps because they become redundant. On the other hand, workers with high expected post-merger relative wage within occupations can be less likely to get fired, perhaps because they have high skills.

To control for this possibility, we repeat our analysis after excluding involuntary turnovers. We define turnovers as involuntary if the real wage of a worker decreases after

turnover or if a worker does not show up in the dataset for at least one year before showing up again (= temporary unemployment). [14] About 20% of turnovers are involuntary according to our definition. This is relatively high given that it is very difficult for firms to fire workers in Sweden. Thus, probably we are over-estimating the number of involuntary turnovers.

In Table 6 column [5], we show that the qualitative results do not change even after we exclude involuntary turnovers. Furthermore, as we discuss below, the wage growth patterns after acquisition are not consistent with the involuntary turnover explanations either.

6. Wage Growth and Market for Status

As discussed in section 2, we can distinguish different explanations, especially between those based on social preference and those based on standard selfish preference, by analyzing how the future wages respond to an exogenous change in relative wage.

Recall that when the relative wages within occupations increase, the workers are less likely to leave. It implies that workers positively value their relative wages within their occupations. If workers positively value relative wages as a good itself (e.g. status or prestige), they will be willing to pay for higher relative wages with a smaller wage growth rate. Or, they need to be compensated for lower relative wages with a larger wage growth rate. Therefore, the change in the relative wage within occupation will be negatively correlated with the subsequent wage growth rate.

However, if workers positively value relative wages as a means to gain larger future income, the change in the relative wage within occupation should be positively correlated with the wage growth rate.

[Table 7 here]

---

[14] We also have used alternative definitions (e.g. when wage does not increase as much as the predicted wage in the M&A firm) and found no change in the qualitative results.

Table 7 reports the results of a wage growth rate regression where the dependent variable is the average annual wage growth rate between right before M&A and two years after M&A. From column [1], when the relative wages within occupation increase, the workers experience a lower wage growth rate. For example, a one standard deviation increase in the relative wage within occupation is associated with a 1.7% decrease in the annual real wage growth rate. As discussed above, this finding is consistent with the social preference based explanation where people care about their relative wages as a good itself.

Also recall that when the relative wages within firms increase, the workers are more likely to leave. It implies that workers negatively value their relative wages within their firms. If workers negatively value their own relative wages (or positively value co-workers' quality and pay) within firms as a good itself (for global status or group reputation), they will be willing to pay for lower relative wages (=higher global status) with smaller wage growth rates. Then, the change in the relative wage within firms will be positively correlated with the subsequent wage growth rate.

However, if workers negatively value their relative wages within firms because higher relative wages imply lower future absolute income, then there will be negative correlation between the change in relative wage within firms and the subsequent wage growth rate.

Table 7 column [1] also shows that an increase in relative wages within firms raises the subsequent wage growth rate. For example, a one standard deviation increase in the relative wage within firm is compensated for by a 3.4% increase in real wage growth rate. This finding is consistent with the social preference based explanation where people care about the global or group status as a good itself.

In column [2], we also estimate the Heckman two-step regression. Since the wage growth rate is observable only for those who didn't quit within two years after M&As, there are potential concerns about selection bias. Thus, we first estimate the selection equation that includes additional control variables such as the ratio of regional change (the ratio of workers that change their regional code, that moves i.e., workers that move

from one plant in a region to another plant in another region, the ratio of firm size change (firm size before and after the M&A, and the ratio of occupation size change the difference between the occupation size before and after the M&A), and then correct for the selection bias. Column [2] shows, however, no qualitative changes in the results.

These findings are important for several reasons. First, to our knowledge, this is the first empirical evidence based on large field data showing that people care about their relative wages as a good itself, instead of as a means to gain future absolute income. These results suggest that we need to model a utility function to capture such a social preference, and provide empirical support for recent theoretical studies of social preference.

Second, to our knowledge, this is also the first empirical evidence to show that, depending on the complementarity or substitutability of co-workers within a group, people care more (or less) about their local status with respect to co-workers within the group than about the group status with respect to people outside the group. These results have obvious implications for organization design and personnel policy. For example, a relatively-low-paid worker within an isolated department of substitutable co-workers will not be happy about his/her status within the department, which can lead to poor motivation and bad performance. However, if the same worker is allowed to interact with better-paid (higher quality) workers who have complementary skills or tasks in other teams, the worker will be happy about his global status and better-motivated.

Third, our findings suggest the existence of a market for relative wages (or status), where workers with different tastes for status can trade their relative wages for larger absolute wages. Though we don't directly observe such trades among workers, the workers' willingness to pay for higher local (or global) status strongly suggests the possibility of such a market. These findings also provide empirical support for Frank (1985) or Becker et al. (2005) which assume such a market. Furthermore, our results also suggest that it is possible to pay for higher local status with lower global status, or vice versa. For example, a worker would be willing to work with lower-quality co-workers

within the company as long as s/he is the highest paid person in his/her occupation, and vice versa.

7. Discussions

7.1   Alternative Explanations

Previous analyses show that the combination of turnover and wage regressions can distinguish various alternative explanations. However, if co-workers' wages affect people's objective perception of their own productivity (or value), the distinction between social preference (such as social status or fairness) and standard pecuniary preference is far more difficult both conceptually and empirically.

For example, suppose that some workers are not certain about how much their skills (or services) are objectively worth in the market. Then, they could potentially update the value of their skills based on how much other similar co-workers are paid. In this case, the changes in relative wages (especially within occupation) during M&A could update workers' expected value of their skills and affect their turnover decisions. In particular, those who experience a decrease in relative wages (or an increase in mean wages) are likely to believe that they are underpaid and leave the firm, unless the firm increases their wages fast enough. Thus, this model can explain our findings without relying on social preference.

However, one important difference from a social preference-based explanation (such as social status or fairness) is that under the above alternative explanation, workers quit because they believe they can receive higher wages in other firms. However, under the social preference-based explanation, workers quit because they are less happy in the merged firm due to unfairness or lower social status.

Therefore, under the alternative explanation above, if workers expect lower relative wage (within occupation) and quit the firm, they must get, on average, larger absolute wages in the new firm. In other words, the wage change from the turnover should be *negatively* correlated with the expected change in relative wages within

23

occupation if they had stayed in the merged firm. On the other hand, under the social preference-based explanation, there is no clear prediction on how the wage changes from turnovers should depend on the expected changes in relative wages because workers may change firms to get higher relative wage within occupation (or lower relative wage within firm) as well as larger absolute wage.

Unlike typical personnel records, our data allow us to track workers cross firms. In Table 8, we analyze how the wage changes of those who left the merged firms depend on the expected change of relative wages if they had stayed in the merged firms.

[Table 8 here]

From the first column of Table 8, those who expect positive change of relative wage (or negative change of average wage) receive larger wage increase than others. This refutes the alternative explanation's prediction. Even when we look at voluntary turnovers or when we use more rational expectation, the expected change in relative wages within occupation has no significant effect on the wage changes from turnovers. Therefore, the alternative explanation does not receive the empirical support.

7.2   Turnover and Wage Growth

Previous analyses suggest that firms can mitigate the effect that changes in the relative wage have on turnovers by adjusting absolute wage growth. In other words, if some firms do not adjust the wage growth in response to the change in relative wage, the relative wage would have larger effect on turnovers.

In order to test this hypothesis more directly, we estimate the turnover and the wage growth regressions in Table 5 and 7 by each M&A. Then, we regress the coefficients of 'change in status_f' in turnover regressions on the coefficients of 'change in status_f' in wage regressions. We also repeat the regression for the coefficients of 'change in status_fo' as follows:

$$coef\,[\Delta\text{status\_f}]_{it}^{turnover} = \alpha_f + \beta_f * coef\,[\Delta\text{status\_f}]_{it}^{wageG} + \varepsilon_{it}$$
$$coef\,[\Delta\text{status\_fo}]_{it}^{turnover} = \alpha_{fo} + \beta_{fo} * coef\,[\Delta\text{status\_fo}]_{it}^{wageG} + \upsilon_{it}$$

$$(5)$$

As predicted by the hypothesis, Table 9 shows that both β_f and β_{fo} are negative and significant. That is, in M&As where absolute wages are not compensated by a change in relative wages, workers are more opt to leave the firm.

[Table 9 here]

Obviously, these regressions suffer from endogeneity problem. That is, in some M&As where people care less about their relative wages, both the coefficients in turnover regression and wage regression would be smaller. Note, however, that this endogeneity would generate positive bias. Thus, given that β_f and β_{fo} are already negative, the correction of the bias would still yield negative estimates, and would not alter the qualitative interpretation of the regressions.

This finding further confirms that workers care about their relative wages independent of absolute wages. If workers care about their relative wages simply because they are correlated with future absolute wages, then both β_f and β_{fo} would have been positive.

7.3 Who Cares about Relative Wages ?

Do younger workers care more or less about their relative wages? Do male workers care more or less about their relative wages? Answers to these questions are important not only in analyzing the social comparison process of different groups of workers but also in developing personnel policy of a firm.

This section describes how the concerns for relative wages depend on individual characteristics. In Table 10, we repeat our turnover analysis, including interaction terms between status variables and individual characteristics. The variables of particular interest

are the interaction between individual characteristics and the change in status_f and the interaction between individual characteristics and the change in status_fo.

[Table 10 here]

■ Age

The first column shows that regardless of ages, workers respond to the status within firm or the change in the status within the firm in the same way. In other words, the extent to which workers care about the quality of co-workers is the same regardless of workers' ages.

Generally, workers with higher status within occupation are more likely to leave the firm. However, older workers are less sensitive to their status within occupation than younger workers.

Also, when workers' status within occupation increases, they generally like it and are more likely to stay. However, older workers are less sensitive to the change in status within occupation.

■ Gender

The second column shows that workers with high status within the firm are more likely to leave. Although female workers with high status within the firm are less likely to leave the firm than male workers, when M&As increase their status, female workers are more likely to leave.

In other words, women are more sensitive to the change in status within firm. One interpretation is that women may have higher cost of signaling their ability and rely more on the reputation of the company they work in signaling their ability. Then, they would respond more sensitively to the merger with low quality workers.

Female workers with high status within occupation are more likely to leave the firm than male workers with high status, although their response to the change in status within occupation is not different from male workers'.

■ Total Pay

In the third column, we study whether workers with higher absolute income care more or less about the relative wage. However, neither the interactions with within firm or within occupation changes in relative wages are significant. Thus, we find no systematic pattern regarding absolute income.

■ Relative Wages within Firm and Occupation

In the fourth and the fifth columns, we also ask whether workers who already have higher relative wages care more or less about the relative wages. Recall that our relative wage formula in (2) already captures the idea that workers with higher relative wages care more about relative wages. Thus, interaction terms with the changes in relative wages also provide a specification test for our formula in (2).

As the fourth and the fifth columns show, the interactions between our relative wage measures and the changes in relative wages are not significant. This implies that workers with different relative wages, measured by (2), respond to the changes in relative wages to the same extent.

Thus, as we specified in (2), workers with higher relative wages respond more sensitively to the change in relative wages.

8. Conclusion

Our paper provides strong evidence that people care about social values derived from relative standing, that is, status. Furthermore they care more about social than pecuniary rewards. In the case of a merger or acquisition, workers compare their present status with their expected status in determining whether to exit or stay. Workers derive their social

values from more than one reference group. In particular, our results suggest that workers care about their relative standing both within two distinct groups—competing workers and partners—in the firm. Higher status among competing workers is preferred to lower status, but in lower status among partners is preferred, perhaps identifying a preference to have high quality partners. Finally, our results imply a market for status: the loss of status can be compensated by pecuniary rewards.

Our empirical results beg new questions. A more immediate one concerns how status impacts post merger integration. Another extension of our research involves how and when people care about other social values than status such as fairness for us and for others? How do people's social incentives interact with monetary incentives? And finally what are the implications for allocation of decision rights, job design and personnel policies?

Appendix   Three-Digit Occupation Codes

BNT Family	BNT Code	Levels	
0			**Administrative work**
	020	7	General analytical work
	025	6	Secretarial work, typing and translation
	060	6	Administrative efficiency improvement and development
	070	6	Applied data processing, systems analysis and programming
	075	7	Applied data processing operation
	076	4	Key punching
1			**Production Management**
	100	4	Administration of local plants and branches
	110	5	Management of production, transportation and maintenance work
	120	5	Work supervision within production, repairs, transportation and maintenance work
	140	5	Work supervision within building and construction
	160	4	Administration, production and work supervision within forestry, log floating and timber scaling
2			**Research and Development**
	200	6	Mathematical work and calculation methodology
	210	7	Laboratory work
3			**Construction and Design**
	310	7	Mechanical and electrical design engineering
	320	6	Construction and construction programming
	330	6	Architectural work
	350	7	Design, drawing and decoration
	380	4	Photography
	381	2	Sound technology
4			**Technical Methodology, Planning, Control, Service and Industrial Preventive Health Care**
	400	6	Production engineering
	410	7	Production planning
	415	6	Traffic and transportation planning
	440	7	Quality control
	470	6	Technical service
	480	5	Industrial, preventive health care, fire protection, security, industrial civil defense

5			**Communications, Library and Archival Work**
	550	5	Information work
	560	5	Editorial work – publishing
	570	4	Editorial work – technical information
	590	6	Library, archives and documentation
6			**Personnel Work**
	600	7	Personnel service
	620	6	The planning of education, training and teaching
	640	4	Medical care within industries
7			**General Services**
	775	3	Restaurant work
8			**Business and Trade**
	800	7	Marketing and sales
	815	4	Sales within stores and department stores
	825	4	Travel agency work
	830	4	Sales at exhibitions, spare part depots etc.
	835	3	Customer service
	840	5	Tender calculation
	850	5	Order processing
	855	4	The internal processing of customer requests
	860	5	Advertising
	870	7	Buying
	880	6	Management of inventory and sales
	890	6	Shipping and freight services
9			**Financial Work and Office Services**
	900	7	Financial administration
	920	6	Management of housing and real estate
	940	6	Auditing
	970	4	Telephone work
	985	6	Office services
	986	1	Chauffeuring

Reference

Adams, J.S., 1963, "Toward an Understanding of Inequity," *Journal of Abnormal and Social Psychology*, LXVII, 422-36

Adams, J.S., 1965, "Inequity in social exchange," in: L. Berkowitz. ed., Advances in experimental social psychology, vol. 2, Academic Press, New York and London

Akerlof, G.A., and J.L. Yellen, 1990, "The Fair Wage-Effort Hypothesis and Unemployment," Quarterly Journal of Economics, 105, 225-284

Baxter, J.L., 1988, Social and Psychological Foundations of Economic Analysis, Harvester Wheatsheaf, New York

Becker, G.S., Murphy, K.M., and I. Werning, 2005, "Equilibrium Distribution of Income and the Market for Relative Wage," Journal of Political Economy, 113, 282-310

Blau, P. M., 1955, *The Dynamics of Bureaucracy: A Study of Interpersonal Relations in Two Government Agencies*, Chicago University Press, Chicago

Bolton, G., 1991, "A Comparative Model of Bargaining: Theory and Evidence," American Economic Review, 81, 1096-1136

Cappelli, P. and K. Chauvin, 1991, "An Inter-plant Test of the Efficiency Wage Hypothesis," Quarterly Journal of Economics, 106, 56-73

Clark, A.E. and A.J. Oswald, 1996, "Satisfaction and Comparison Income," Journal of Public Economics, 61, 359-381

Duesenberry, J.S., 1949, Income, saving and the theory of consumer behavior, Harvard University Press, Cambridge, MA.

Eaterlin, R., 1973, "Does Economic Growth Improve the Human Lot? Some Empirical Evidence." In Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz, Paul David and Melvin Reder, eds. Palo Alto, Calif. : Stanford University Press

Ekberg, J. and M. Salabasis, 2001, The Firm Size Effect: fact or artifact? SSE/EFI Working Paper Series in Economics and Finance No. 462

Fershtman, C., Murphy, K.M., and Weiss, Y., 1996, "Social Status, Education, and Growth," *Journal of Political-Economy*, 104(1): 108-32

Fershtman, C., and Weiss, Y., 1998, "Social Rewards, Externalities and Stable Preferences," *Journal of Public Economics*, 70(1): 53-73

Frank, R. H., 1984, "Are workers paid their marginal products?," *American Economic Review*, 15, 510-520

Frank, R.H., 1985, *Choosing the right pond: Human behaviour and the quest for relative wage*, Oxford University Press, London and New York.

Goode, W.J., 1978, *The Celebration of heroes: Prestige as a Control System*, University of California Press: Berkeley, CA

Guth, W., R. Schmittberger and B. Schwartz, 1982, "An Experimental Analysis of Ultimatum Bargaining," *Journal of Economic Behavior and Organization*, 3, 367-388

Gylfason, T. and A. Lindbeck, 1984, "Union Rivalry and Wages: An Oligopolistic Approach," *Economica*, 51, 129-139

Homans, G.C., 1961, *Social Behavior: Its Elementary Forms*, Harcourt Brace Jovanovich, New York

Jasso, G., 1990, Methods for the theoretical and empirical analysis of comparison processes, in *Sociological Methodology* (Ed.) Clifford C. Clogg Washington DC: American Sociological Association, 1990

Jasso, G., 2001, "Studying Relative Wage: An Integrated Framework." *American Sociological Review*, 66, 96-124

Kjosavik, D.J., 2003, "Methodological Individualism and Rational Choice in Neoclassical Economics: A Review of Institutional Critique," Forum for Development Studies, 2, 205-245

Kwon, I. and E. M. Meyersson Milgrom, 2004, "Boundary of Internal Labor Market: Firm or Occupation," *mimeo*

Kwon, I. and E. M. Meyersson Milgrom, 2005, "Cohort Effect and Catch-up in Wages and Promotions," *mimeo*

Marin, C., 2003, "Explaining Labor Turnover: Empirical Evidence from UK Establishments, *Labour*, 17 (3), 391-412

Martin, J., 1981, "Relative Deprivation: A Theory of Distributive Injustice for an Era of Shrinking Resources," in Larry L. Cummings and Barry M. Staw, eds., *Research in*

Organizational Behavior: An Annual Series of Analytical Essays and Critical Reviews, volume 3, Greenwich, CT: JAI Press

Milgrom, P, 1988, "Employment Contracts, Influence Activities, and Efficient Organization Design," *Journal of Political Economy*, 96, 42-60

Neumark, D., and Postlewaite,A., 1998, "Relative Income Concerns and the Rise in Married Women's Employment," *Journal of Public Economics*, 70(1): 157-83

Pritchard, R.D., Dunnette, M.D., Jorgenson, D.O., "Effects of Perceptions of Equity and Inequity on Worker Performance and Satisfaction," *Journal of Applied Psychology Monograph* 56, 65-94

Ridgeway, C. L., 1991, "The Social Construction of Status Value: Gender and Other Nominal Characteristics," *Social Forces*, 70, 367-86

Smith, V.L., 1994, "Economics in the Laboratory," *Journal of Economic Perspectives*, 8, 113-132

Sobel, J., 2005, " Interdependent Preferences and Reciprocity", *Journal of Economic Literature Vol. XLIII (June), pp. 392-436.*
Solow, R.M., 1990, *The Labor Market as a Social Institution*, Basil Blackwell, Oxford

Sørensen, A.B., 1979, "A Model and a Metric for the Analysis of the Intragenerational Relative Wage Attainment Process," *American Journal of Sociology*, 85, 361-384

Stiglitz, J.E., 1987, "The Causes and Consequences of the Dependence of Quality on Price," *Journal of Economic Literature*, XXV, 1-48

Stouffer, S.A., et al., 1949, *The American Soldier*, Princeton University Press, Princeton

Summers, L.H., 1986, "Why Is the Unemployment Rate So Very High Near full Employment?," *Brookings Papers on Economic Activity*, 1986:2, 339-83

Townsend, P., 1979, "The Development of Research on Poverty," In Social Security Research: *The Definition and Measurement of Poverty*, Dept. of Health and Social Research, London: HMSO

Valenzi, E.R., and Andrews, I.R., "Effects of Hourly Overpay and Underpay Inequity When Tested with a New Induction Procedure," *Journal of Applied Psychology*, LV, 22-27

Veblen, T., 1949*, The Theory of the Leisure Class, George Allen and Unwin*, London, Originally published in 1899 by Macmillan, New York.

Weber, M., 1922, *Economy and Society*, Translated and reprinted, University of California Press, Berkeley, 1978

Wood, A., 1978, *A Theory of Pay*, Cambridge University Press, Cambridge

Zizzo, D.J., and Oswald, A.J., 2001, "Are People Willing to Pay to Reduce Others' Incomes?," *Annales d'Economie et de Statistique*, 0(63-64): 39-65

Table 1   Theory of Relative Wages

(r_i = relative wage; s_i = social rewards; w_i = wage)

	Social Rewards	Monetary Rewards
Utility Function	$U_i(w_i, s_i(r_i))$	$U_{it+1}(w_{it+1}(r_{it}))$
$\dfrac{\partial U_i}{\partial r_i} > 0$	Local status theory Equity theory	Signaling model Tournament model
$\dfrac{\partial U_i}{\partial r_i} < 0$	Group status theory (Halo effect)	Dead-end effect Learning effect

Table 2   Predictions of Alternative Theories

Measure	Effect	Theory	Turnover	Wage Growth
r_i = Relative Wage	$\dfrac{\partial U_i}{\partial r_i} > 0$	Social Rewards (Status, Equity)	-	-
		Future Income (Signaling, Tournament)	-	+
	$\dfrac{\partial U_i}{\partial r_i} < 0$	Social Rewards (Group Status)	+	+
		Future Income (Dead-end, Learning)	+	-

Table 3   Summary Statistics I

Period		0	1	2	3
firm size	total	411.00	418.33	414.61	416.34
	acquirer	362.20			
	acquired	48.80			
# of workers	total	162344	165239	161283	164455
	acquirer	143068	127776	112233	105607
	acquired	19276	16210	13591	11763
	outside	.	21253	35459	47085
wage	total	3143.73	3158.47	3200.36	3218.30
	acquirer	3163.99	3239.17	3325.36	3358.36
	acquired	2993.41	3071.56	3158.60	3241.99
	outside	.	2739.55	2820.72	2898.24
age	total	40.36	40.54	40.84	41.26
	acquirer	40.37	41.49	42.52	43.42
	acquired	40.32	41.46	42.84	43.75
	outside	.	34.13	34.73	35.78
female	total	0.25	0.25	0.25	0.25
	acquirer	0.24	0.24	0.23	0.23
	acquired	0.27	0.25	0.24	0.24
	outside	.	0.34	0.32	0.30
rank	total	5.51	5.49	5.45	5.43
	acquirer	5.50	5.41	5.32	5.27
	acquired	5.64	5.56	5.50	5.46
	outside	.	5.92	5.83	5.76
part time	total	0.08	0.08	0.09	0.10
	acquirer	0.08	0.08	0.08	0.10
	acquired	0.08	0.09	0.10	0.10
	outside	.	0.11	0.11	0.12

Note: Period 0 is the year right before the acquisition. Firm size is measured by the number of white-collar workers. Wage is the monthly real wage in 1970 Kronor. Rank =2 is the highest, and rank=8 is the lowest.

Table 4   Summary Statistics II

(a)

	Mean	Std. Dev.	Percentile				
			1%	25%	50%	75%	99%
status_f	0.988284	0.9607888	0.0117353	0.2968283	0.6984032	1.371323	4.438722
Δstatus_f	0.0034894	0.077151	-0.2158557	-0.0058361	0.0004922	0.0099642	0.2336149
status_fo	0.9693487	0.9086649	0.0176996	0.2932222	0.6931472	1.369487	4.053523
Δstatus_fo	0.0045052	0.115982	-0.3504288	-0.0050103	0	0.0093423	0.3986392
turnover1	0.1067474						
turnover3	0.2966522						

*Not*e: status_f measures the relative wage within firm right before the acquisition. Δstatus_f measures the expected change in the relative wage within firm right after the acquisition. Status_fo measures the relative wage within an occupation inside a firm right before the acquisition. Δstatus_fo is similarly defined.

(b) Correlation Matrix

	wage	status_f	Δstatus_f	status_fo	Δstatus_fo
wage	1				
status_f	0.9265	1			
Δstatus_f	0.0998	0.0318	1		
status_fo	0.6854	0.7419	0.0107	1	
Δstatus_fo	0.0981	0.072	0.5052	0.0175	1

Table 5   Relative wage and Turnover: Probit Analysis

(dependent variable = 1 if quit the firm within two years after M&A, = 0 otherwise)

	expected change			Heckman 2-step actual change
	[1]	[2]	[3]	[4]
Acquired	0.0327**	0.0324**	0.0348***	0.0666***
	(0.0128)	(0.0128)	(0.0128)	(0.0141)
Status_f	-0.0130		0.0478***	0.04202***
	(0.0118)		(0.0131)	(0.0153)
Change in status_f	0.0093		0.0995**	0.1156***
	(0.0400)		(0.0471)	(0.0292)
Status_fo		-0.0631***	-0.0740***	-0.0563***
		(0.0065)	(0.0072)	(0.0081)
Change in status_fo		-0.0916***	-0.1246***	-0.05207***
		(0.0281)	(0.0331)	(0.0126)
wage (before-merger)	-4.63E-06	2.47E-05***	-1.42E-06	-0.00002**
	(1.04E-05)	(7.55E-06)	(1.03E-05)	(1.25E-05)
Change in Wage				-0.00022***
				(2.63E-05)
age	-0.1836***	-0.1823***	-0.1819***	-0.17941***
	(0.0023)	(0.0023)	(0.0023)	(0.0028)
age squared	0.0021***	0.00216***	0.00215***	0.002132***
	(2.60E-05)	(2.65E-05)	(2.66E-05)	(3.29E-05)
female	-0.085***	-0.08165***	-0.0802***	-0.1044***
	(0.0117)	(0.0117)	(0.0117)	(0.0128)
part time	0.2977***	0.2894***	0.278***	0.2712***
	(0.0152)	(0.0150)	(0.0153)	(0.0171)
firm size (post-merger)	-0.00014***	-0.00014***	-0.00014***	-0.00016***
	(8.05E-06)	(8.04E-06)	(8.05E-06)	(8.69E-06)
firm size squared	8.82E-09***	9.12e-09 ***	8.89e-09***	9.70e-09***
	(9.66E-10)	(9.65E-10)	(9.66E-10)	(1.05E-09)
firm size change	-0.016*	-0.0187**	-0.01529*	-0.00961
	(0.0088)	(0.0087)	(0.0088)	(0.0104)
occup. size change	-2.321***	-2.322***	-2.322***	-1.5705***
	(0.0353)	(0.0354)	(0.0354)	(0.0800)
geo change ratio	0.348***	0 .3473***	0.3463***	0.1816***
	(0.0153)	(0.0153)	(0.0153)	(0.0210)
Number of Observations	133192	133192	133192	133192
Pseudo R squared	0.1394	0.1398	0.1399	

***: significant at 1%, **: significant at 5%, *: significant at 10%

Standard errors are in parentheses and adjusted for clustering within acquisitions.

Note: Each regression includes rank dummies, occupation dummies, industry dummies, year dummies, and region dummies. Firm size change measures the ratio of the firm size right after acquisition against the sum of the firm sizes of merging firms. Occupation size change is defined similarly. Geo change ratio measures the ratio of workers who have changed the regional code right after the acquisition.

The selection regression in column [4] includes all the same control variables except that the expected changes in relative wage are used instead of the actual changes in relative wage. Also, the change in wage is not included in the selection regression.

Table 6   Robustness

	Hypothetical Merger	Rational Expectation	Use Status_for	With Tenure	Voluntary
	[1]	[2]	[3]	[4]	[5]
Acquired	0.0994***	0.0745***	0.0177	-0.0628**	-0.0495***
	(0.0238)	(0.0138)	(0.0134)	(0.0254)	(0.0181)
Status_f	0.0768***	0.0871***	-0.019	0.1267***	-0.0124
	(0.0253)	(0.0143)	(0.0126)	(0.0293)	(0.0167)
Change in status_f	0.0594	0.1256***	0.1259***	0.4147***	0.1274**
	(0.0785)	(0.0337)	(0.0445)	(0.0953)	(0.0648)
Status_fo	-0.0773***	-0.1062***		-0.0650***	-0.0836***
	(0.0121)	(0.0080)		(0.0164)	(0.0087)
Change in status_fo	-0.02	-0.0913***		-0.2372***	-0.1122***
	(0.0590)	(0.0236)		(0.0765)	(0.0407)
Status_for			-0.0285***		
			(0.0087)		
Change in status_for			-0.0936**		
			(0.0400)		
Change in Wage					
Tenure				-0.0337***	
				(0.0046)	
Tenure squared				0.0025***	
				(0.0003)	
Number of Observations	40012	124643	133192	23771	117954
Pseudo R squared	0.1242	0.1239	0.1394	0.1899	0.1652

***: significant at 1%, **: significant at 5%, *: significant at 10%
Standard errors are in parentheses and adjusted for clustering within acquisitions.

Note: Each regression includes the same set of control variables as in Table 3. Column [1] is based on hypothetical M&A five years before the actual M&A. Column [2] is based on rational expectation of changes in relative wage. Column [3] uses the relative occupational rank within occupation instead of the relative wage. Column [4] controls for tenure and tenure-squared while restricting the sample to between 1986 and 1988 where tenure variables are available for most observations. Column [5] excludes the turnovers where workers experience a real wage reduction in the new firm or do not find a new firm.

Table 7   Relative wage and Pay

(dependent variable = average annual wage growth rate between right before M&A and two years after M&A)

	OLS	Heckman 2-step
Acquired	0.0091***	0.0096*
	(0.0016)	(0.0052)
Status_f	0.0313***	0.0284***
	(0.0018)	(0.0053)
Change in status_f	.0432***	0.0416***
	(0.0055)	(0.0096)
Status_fo	-.009***	-0.0086***
	(0.0007)	(0.0013)
Change in status_fo	-0.0201***	-0.0198***
	(0.0029)	(0.006)
ρ		0.02145
		(0.01504)
λ		0.00278
		(.00196)
Number of Observations	93681	133192
R-squared	0.1286	

***: significant at 1%, **: significant at 5%, *: significant at 10%
Standard errors are in parentheses and adjusted for clustering within acquisitions.

Note: Each regression includes age, gender, part time dummy, occupation dummy, firm size, industry dummy, year dummy, and region dummy. Heckman first-stage (selection) regression includes all the same control variables and change in firm size, change in occupation size, and ratio of location change.

Table 8   Wage Change of Leavers

(dependent variable = change in real wage of those who change firms within 2 years after M&As)

	Naïve Expectation		Rational Expectation	
	All Turnover	Voluntary Turnover	All Turnover	Voluntary Turnover
Acquired	1.1847	14.992	-0.6944	8.006
	(14.248)	(16.0480)	(15.989)	(16.877)
Status_f	61.206**	118.238***	111.324***	144.251***
	(30.48)	(30.1690)	(42.114)	(34.748)
Change in status_f	14.775	148.396***	132.39**	266.539***
	(55.5380)	(51.623)	(73.672)	(45.435)
Status_fo	-.7475	-4.5813	-17.735	-20.264
	(9.447)	(9.216)	(16.271)	(15.234)
Change in status_fo	64.75*	15.563	-62.228	-54.328
	(35.29)	(33.335)	(45.286)	(44.420)
umber of Observatioɪ	16448	11636	10811	7972
R-squared	0.1977	0.2367	0.1954	0.2165

***: significant at 1%, **: significant at 5%, *: significant at 10%
Standard errors are in parentheses and adjusted for clustering within acquisitions.

Note: Each regression includes age, gender, part time dummy, occupation dummy, firm size, industry dummy, M&A year dummy, firm change year dummy, and region dummy. Naïve expectation is based on the expectation that all workers will remain after M&A. Rational expectation is based on the ex-post correct expectation on who will remain after M&A. See section 5.2 for more details. Voluntary turnovers are those who experience positive real wage change during the turnovers.

Table 9   Turnover and Wage Growth

	dependent variable			
	coef[Δstatus_f] (turnover)		coef[Δstatus_fo] (turnover)	
	OLS	Weighted	OLS	Weighted
coef[Δstatus_f] (wageG)	-3.3210***	-4.2407***		
	(0.2576)	(0.1745)		
coef[Δstatus_fo] (wageG)			-1.6580***	-1.5718***
			(0.4638)	(0.4019)
constant	-1.4874	-3.2633	-0.4528	-0.4095
	(1.1986)	(1.2927)	(0.6769)	(0.4469)
N	227	227	227	227
R-squared	0.4249	0.7242	0.0537	0.0595

***: significant at 1%, **: significant at 5%, *: significant at 10%

Note: Variables are the estimated coefficients from the turnover and wage growth analyses in Table 5 and 7. Weighted regressions use the size of M&A (measured by the total number white collar employee right before M&A) as the weights.

Table 10   Who Cares about Relative Wage?: Probit Analysis
(dependent variable = 1 if quit the firm within two years after M&A, = 0 otherwise)

	X				
	Age	Female	Total Pay	Status_f	Status_fo
X	-0.0020***	-0.0826***	-0.00004***		
	(0.0024)	(0.0155)	(0.0000)		
Status_f	0.1253***	0.0609***	0.0053	-0.0502***	-0.0323*
	(0.0305)	(0.0135)	(0.0201)	(0.0189)	(0.0182)
Change in status_f	0.4211**	0.0770	0.2665**	0.1917**	0.1989**
	(0.2127)	(0.0487)	(0.1264)	(0.0821)	(0.0860)
Status_fo	-0.3558***	-0.0861***	-0.1050***	-0.0796***	-0.0826***
	(0.0280)	(0.0077)	(0.0195)	(0.0118)	(0.0145)
Change in status_fo	-0.6356***	-0.1201***	-0.1517*	-0.1683***	-0.2116***
	(0.1490)	(0.0359)	(0.0922)	(0.0550)	(0.0663)
Status_f * **X**	-0.0008	-0.1030***	0.000008**	0.0162***	0.0326***
	(0.0006)	(0.0257)	(0.000004)	(0.0047)	(0.0053)
Change in status_f * **X**	-0.0059	0.4205**	-0.00003	-0.0472	-0.0581
	(0.0048)	(0.1957)	(0.00003)	(0.0303)	(0.0378)
Status_fo * **X**	0.0054***	0.0766***	0.000009**	0.0086	-0.009**
	(0.0006)	(0.0161)	(0.000005)	(0.0055)	(0.0046)
Change in status_fo * **X**	0.0110***	-0.0381	0.000006	0.0256	0.0466
	(0.0033)	(0.0920)	(0.00002)	(0.0271)	(0.0301)

***: significant at 1%, **: significant at 5%, *: significant at 10%
Standard errors are in parentheses and adjusted for clustering within acquisitions.

Note: Each column shows the probit analysis controlling for the interaction term between status variables and a variable X, where X represents Age, Female, Total Pay, Status_f, and Status_fo in each column.. Each regression includes all the variables in Table 5 as well.

Figure 1   # of M&A and # of Workers Involved