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Monetary rewards and hierarchy level as drivers of employees' self-evaluations

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Abstract

We explore the relation between job characteristics and employees' self-evaluations of performance in comparison to their colleagues' performance. Using unique individual panel data from ten large firms in Germany's chemical industry, we focus on monetary rewards (wage increases and bonus payments) and the level of the hierarchy as well as interactions with gender and tenure as possible drivers of self-evaluations. Our results hint for a positive relation of both monetary rewards and hierarchy level with self-evaluations. We find less evidence for our hypotheses regarding interaction effects of gender and tenure.

Keywords Self-evaluations · Bonus payments · Wage increases · Level of hierarchy

JEL Classification J3 · M5

1 Introduction

Do you consider yourself to be among the worse half of car drivers in your community? Most likely, your answer will be “no”. Individuals often evaluate their own performance in a very positive way. The “better-than-average effect” expresses how the majority of people evaluate their own performance in a specific task or domain as better than the performance of half of the population (Benoît et al. 2015). For some people, a high self-evaluation is justified if it represents their actual high performance accurately. Yet for some people this is not the case. The self-serving bias leads to perceiving oneself as having higher abilities than other people (Fiedler 1996). Individuals derive utility from this perception (Bénabou

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and Tirole 2002). This phenomenon can also be relevant in employment relationships if the majority of employees report above average self-evaluations regarding work performance which by definition cannot coincide with the real performance distribution in total. If employees' self-evaluations are better than their evaluations from a third party, e.g. supervisors, this can have negative consequences for organizations. For instance, Yammarino and Atwater (1997) reveal insufficient willingness to participate in training activities and high absenteeism rates. In addition, Brett and Atwater (2001) find that employees with inaccurate self-evaluations are less receptive to feedback and Betzer et al. (2023) identify overconfidence of managers to be related to the failure of investment projects.

In light of the negative outcomes of high self-evaluations, an understanding of the factors influencing self-evaluations in the job context is of great importance to organizations. Therefore, the general objective of this study is to provide a first step towards a deeper understanding regarding the relation between job-related factors and self-evaluations.

Past research focuses on individual factors and analyzes characteristics such as age or gender for explaining self-evaluations (e.g. Beyer 1990; Ostroff et al. 2004; Sturm et al. 2014; Vecchio and Anderson 2009). With regard to job characteristics, scholars often explore the relation between task difficulty or tenure and self-evaluations (e.g. Lane and Herriot 1990; Moore and Healy 2008).

Self-evaluations can either be reported in absolute terms by assessing the performance in general or in relative terms by using reference points for the performance evaluation. Relative performance evaluations have been used in experiments during which participants were asked to evaluate their own performance in relation to the performance of other participants (Burks et al. 2013; Moore and Healy 2008). In the employment context, the perceived performance of colleagues can act as an obvious reference point.

Our contribution to the literature is twofold. First, we analyze previously neglected factors which potentially influence employees' self-evaluations of performance. In this study, self-evaluations are made by employees comparing their performance to the performance of their colleagues. Clark and Senik (2010) find that colleagues are the most important reference group when rating one's own performance in comparison to others, which underlines the relevance of our research for practice. More specifically, we assume that employees evaluate themselves by comparing their performance relative to the performance of colleagues who work at the same hierarchy level. Supporting this, Lawrence (2006) states that employees tend to compare themselves with employees at the same career level. Assuming a relative nature of self-evaluations in practice is reasonable, since many decisions within firms are relative as well. For example, decisions about promotions or the amount of pay are made by distinguishing between different individuals. Second, we make use of a real-life setting instead of experimental designs which are dominating in previous research. We focus on job-related factors, an area which has not been extensively addressed so far. In particular, we examine monetary rewards (wage increases and bonus payments) and the level of the hierarchy as potential drivers of performance self-evaluations. Since we use longitudinal data, changes in the hierarchical level of individuals can be interpreted as promotions. Overall, we aim to answer the question which factors in the job context influence employees' self-evaluations.

High self-evaluations can either be based on some rationales or on biases. The amount of wage increases or bonus payments can ex ante act as incentives for employee motivation. Ex post employees will interpret those factors as rewards for own individual performance which may affect self-evaluations in a rational way.

If employees' self-evaluations do not match their performance, then high self-evaluations are not justified. The potential negative consequences of unjustified high self-evaluations might be particularly problematic at higher levels of the hierarchy. One reason is that employees in high positions often have many responsibilities (Kaiser et al. 2011). Moreover, biased self-evaluations can lead to biased decision-making (Malmendier and Tate 2005; Thoma 2016). Therefore, exploring the role of hierarchy levels for employees' self-evaluations is an important base for investigating strategies to prevent possible detrimental effects of inaccurate self-evaluations.

To accomplish our research aim, we make use of unique panel data from an annual income survey in the German chemical sector. Participants had to evaluate their own performance in comparison to that of their colleagues. The dataset also offers information on monetary rewards and hierarchy level. We derive hypotheses for the positive relations between these job characteristics and self-evaluations, respectively: First, the amount of monetary rewards can, at least to some extent, usually be influenced by performance appraisals of supervisors. We therefore consider these rewards as indicators for performance appraisals made by supervisors. Second, differences in the amount of feedback for individuals across hierarchies are supposed to be relevant for employees' self-evaluations of performance.

We also consider firm tenure and gender in our analysis. Previous research finds mixed results regarding tenure (Lane and Herriot 1990; Lindeman et al. 1995) and gender (Beyer 1990; Lindeman et al. 1995; Vecchio and Anderson 2009). We extend the literature by focusing on interaction effects with hierarchy level and the two mentioned facets of monetary rewards. Possible variations between high and low tenure employees or men and women regarding factors influencing their self-evaluations might require different actions for these groups to avoid negative outcomes for companies as described beforehand. As we do not have any data on the actual performance evaluations made by supervisors, we use monetary rewards as indirect measures of these evaluations. Our assumption is that the amount of wage increases and bonus payments could act as signals about performance appraisals made by supervisors and therefore could influence employees' self-evaluations. We use a rich set of controls which have been shown to be relevant for self-evaluations in previous empirical research.

2 Theoretical considerations and hypotheses

In his work about the self-concept, Gecas (1982) describes how individuals process self-evaluative information and consequently evaluate themselves based on three parts: (i) reflected appraisals, (ii) social comparisons, and (iii) self-perceptions. *Reflected appraisals* refer to individuals reflecting and incorporating appraisals other individuals make about them to obtain self-relevant information. *Social comparisons* relate to individuals' comparisons with a reference group as a

source of self-relevant information and an assessment of own abilities. Similarly, Bandura (1978) states that individuals evaluate their performance by comparing it to a personal standard as well as to the performance of others. For comparison, one particular individual or a reference group that the person interacts with on a regular basis could be used. Festinger (1954) already formulates this mechanism in his theory of social comparison and states that individuals compare themselves with people who are similar to them, which can obviously be colleagues in the job context. *Self-perception* implies that individuals learn about themselves by observing their own behavior (Bem 1972). The self-concept is a meaningful base for understanding self-evaluations and provides the conceptual overarching framework for the present study.

As mentioned before, we aim to shed light on factors influencing self-evaluations in the job context. In particular, we derive hypotheses for relationships between self-evaluations of performance and received monetary rewards as well as hierarchy level. Past research finds higher self-evaluations among males than among females and mixed results regarding firm tenure (see Lane and Herriot 1990; Lindeman et al. 1995). We complement our analysis with interaction effects to analyze possible influences of gender and tenure on the relationship between (i) monetary rewards and self-evaluations and (ii) hierarchy level and self-evaluations.

When employees evaluate their performance as high, this can either be based on rationality or on some biases. On the one hand, signals sent by the organizational environment, e.g. in the form of performance evaluations, may induce rational high self-evaluations, for instance. On the other hand, there can be reasons for upward biases in self-evaluations due to personality and socialization reasons. Besides, there can be interrelations in the sense that signals from the past can have (intertemporal) spillover effects to future self-evaluations even if performance needs not to be correlated over time in different jobs or hierarchy levels within the firm. In the following, we try to disentangle both facets of (overly) high self-evaluations – rationality and biases – in our argumentation wherever possible.

Signals sent by the (organizational) environment may affect evaluations of employees' own performance. Received monetary rewards can be relevant for reflected appraisals as part of the self-concept here. Employees can use these rewards as signals to infer conclusions about a supervisor's appraisal regarding their performance. Higher monetary rewards signal higher performance evaluations made by supervisors, whereas lower rewards signal the opposite. Therefore, our conjecture is that there is a rational relation between monetary rewards and self-evaluations based on the link between performance appraisals and the amount of monetary rewards. The strength of this relationship may depend on the pay policy of firms, though. Companies may differ regarding the dispersion of individuals' wage increases (Grund and Westergaard-Nielsen 2008). If there is a meaningful heterogeneity of wage increases, employees can possibly interpret their particular large increases as positive signals about performance appraisals made by their supervisors. Furthermore, there may be differences regarding contingent pay such as bonus payments (Grund and Hofmann 2019). The transparency of these differences determines whether a higher than expected or an average reward may influence self-evaluations of one's performance. Therefore, we formulate:

Hypothesis 1: The relative amount of received monetary rewards is positively related to employees' self-evaluations of performance in comparison to their colleagues' performance.

It is important to note that monetary rewards can differ both across and within levels of the hierarchy (Grund and Hofmann 2019). Taking the role of monetary rewards into account, the employees' level of hierarchy itself may also be related to self-evaluations. Feedback can play a role here in two regards: (i) spillover effects of previous positive feedback received at lower levels of the hierarchy and (ii) lack of feedback at higher levels.

Employees who have climbed up the hierarchy of a firm received recognition in the past. This could have been given directly, for example through direct praise by supervisors. It also could have been indirect through the level of hierarchy itself, since promotions and related higher pay lead to increased perceived career success (Turban and Dougherty 1994). This is because employees interpret achieving a higher hierarchy level as positive feedback about their abilities (Ostroff et al. 2004). We assume that employees will have the perception of being enabled to fulfill the requirements at the next highest job position because of their former promotion, which leads to positive self-evaluative information in the sense of the self-concept by Gecas (1982). However, decisions about a promotion are usually made based on an employee's past performance and not fully on the basis of considering whether the employee can fulfill the requirements at the higher position (Kaiser et al. 2011). Nevertheless, we presume that a promotion's positive signal for having a high performance will continue to have an effect at the next highest hierarchy level. Relying on the (direct and indirect) recognitions that employees have received through one or several promotions in the past could lead to unjustified high self-evaluations due to two reasons: First, these high self-evaluations might be unjustified if employees are not able to meet the requirements the new job position entails. Second, employees' actual performance is relatively lower compared to their new reference group, i.e. colleagues at the higher hierarchy level recently reached, than it has been before.

In addition, feedback intensity is likely to differ across levels of the hierarchy. In general, feedback increases the accuracy of self-evaluations (Ashford and Cummings 1983). Employees use feedback for their self-perceptions as it helps them to gain information about their performance (Williams and Johnson 2000). Those who do not receive feedback are more likely to have inaccurate self-perceptions (Yammarino and Atwater 1997). Sala (2003) states that employees at higher levels have few opportunities to receive feedback. The author mentions as possible reasons that there may be no employees at the hierarchy level above who could provide feedback or that those who are too busy to do so. In addition, research finds that employees at higher hierarchy levels seek less feedback than those at lower levels (Ashford et al. 2003). A possible reason is that employees in senior positions in particular fear negative feedback (Morrison and Milliken 2000). The lack of feedback about one's actual performance at the higher hierarchy level could result in particularly high self-evaluations. This lack of feedback may even enhance the tendency towards unjustifiably high self-evaluations which stem from positive self-perceptions through previous promotions, leading us to:

Hypothesis 2: The level of the hierarchy is positively related to employees' self-evaluations.

The relation between monetary rewards and self-evaluations as well as hierarchy levels and self-evaluations may be positive in general but could differ across subgroups of individuals. Lindeman et al. (1995) find gender differences regarding self-evaluations in the sense that men in particular overestimate their performance. There are two possible explanations for gender differences regarding self-evaluations as such: First, personality differences are important here. Burks et al. (2013) identify the desire to dominate others as a reason for overly high self-evaluations, and Luxen (2005) reveals that the trait of dominance is more present among men than among women. Further, Tang et al. (2000) show that males are more achievement-oriented than females. Second, gender differences in socialization are relevant: Lindeman et al. (1995) find that people who tend to overrate themselves have a high self-esteem. Females are taught by society to rather underestimate their abilities and to be modest.¹ They tend to be more anxious, to be less confident, and to worry more than men (Fletcher 1999). Males instead are educated to be more self-confident (Beyer 1990; Ludwig et al. 2017). Already at a young age, men have a higher self-esteem than women (Wimmer-Puchinger et al. 2016). As self-esteem is part of a dominant personality (Gough et al. 1951), the way in which males are nurtured may even enhance their dominant personality described above and in turn their self-evaluations. To derive hypotheses regarding possible gender differences in the relation between (i) monetary rewards and (ii) hierarchy level with self-evaluations, we elaborate more on the above described gender differences regarding personality and socialization in the following.

With regard to monetary rewards, personality differences may play a role for self-evaluations: Employees could interpret high rewards (as signals about positive performance appraisals) as achievements. These reflected appraisals could be used to generate self-evaluative information which will be more relevant for males because of their higher achievement-orientation described above. Gender specific socialization is also relevant with regard to general attitudes towards money: Males show higher aspirations regarding their remuneration and place greater importance on money overall (Desmarais and Curtis 1997). Women instead tend to value non-monetary factors, such as interpersonal relationships (Crosby 1982). This means that salary increases and bonus payments will probably be less important for women's self-evaluations than they are for men's. In this vein, gender differences regarding achievement-orientation and preferences for money could indicate that men will have higher self-evaluations than women, leading us to:

Hypothesis 3a: The positive relation between the relative amount of monetary rewards and employees' self-evaluations is particularly relevant for males.

Gender differences may not only be relevant regarding the link between self-evaluations and monetary rewards but also regarding the employees' level of

¹ This tendency towards "femininity" is dependent on national cultures, though (Hofstede 2011).

hierarchy. With regard to personality differences, men's higher achievement-orientation is relevant here as well: As a promotion can be perceived as a career success (Turban and Dougherty 1994), reaching a higher hierarchy level can be more relevant for men's self-evaluative information than for females', leading to higher self-evaluations of men. Additional relevant gender differences can stem from the trait of dominance, which is more present for males than it is for females (Luxen 2005). Contexts that give power to an individual, such as belonging to a high hierarchy level (Brass and Burkhardt 1993), increase the probability of showing dominant behavior (Hossiep and Ringelband 2014). Employees at high hierarchy levels are better able to influence and control others (Maner and Case 2016). Influencing and controlling others both characterize a dominant personality (Gough et al. 1951). Accordingly, Hossiep and Ringelband (2014) find top-managers to be more dominant and status-oriented. One explanation could be that holding a high social rank is accompanied by greater respect being paid (Maner and Case 2016). For the employee at the higher rank, this increased respect results in enhanced opportunities to dominate others (Maner 2017). Consequently, if men reach a higher hierarchy level, their already dominant behavior will likely be reinforced, which can lead to even higher self-evaluations (Burks et al. 2013).

Due to socialization differences, including women's aforementioned tendency to be less confident and to worry more than men (Fletcher 1999), women have the need to receive affirmation (Sturm et al. 2014). Sherman et al. (1997) state that women's locus of control lies more externally than men's. Therefore, they seek more external feedback than men do (Fletcher 1999). To satisfy this need, females presumably consider information from reflected appraisals more than males do and use relationships with others to obtain self-evaluative information. Because feedback is less frequent at higher hierarchy levels (Sala 2003; van der Rijt et al. 2013), women's demand for external feedback cannot always be fulfilled. This could possibly result in lower self-evaluations by females. In contrast, men are more internally focused when evaluating their own performance (Schwalbe and Staples 1991). They rely more on their self-perceptions, which will probably lead to high self-evaluations (Josephs et al. 1992). This emerging gap between the sexes in their self-evaluations would become smaller if there were more feedback, such that women's need for it could be satisfied. Related to that, research shows that self- and other-ratings are more congruent when employees receive feedback about their performance (Hazucha et al. 1993). Together with men's higher achievement-orientation and dominance, the following hypothesis is derived:

Hypothesis 3b: The positive relation between the level of the hierarchy and employees' self-evaluations is particularly relevant for males.

As previously described, monetary rewards could be seen as positive signals about an employees' value for the company (Gardner et al. 2004). It can be argued that firm tenure moderates the above described relation between monetary rewards and self-evaluations. As aforementioned, empirical results regarding a possible direct relation between firm tenure and self-evaluations are mixed:

Lindeman et al. (1995) find no effect of firm tenure on self-evaluations. In contrast, Lane and Herriot (1990) find that organizational tenure is positively correlated with self-evaluations. Experience with performance evaluations plays an important role for subordinates' trust in the accuracy of supervisors' performance appraisals, which in turn will determine the amount of monetary rewards (Fulk et al. 1985). Firm tenure can be seen as a proxy for trust, as an employee's relationship with the organization is developing over time (Gibbs et al. 2004). Through trust, acceptance of subjective performance evaluations is increasing. Acceptance refers to employees' belief that the feedback accurately represents their actual performance (Ilgen et al. 1979). As contingent pay is often positively correlated with subjective performance evaluations (Frederiksen et al. 2017), we assume that the amount of monetary rewards can be seen as a more reliable signal about employees' performance appraisal if trust, measured through tenure, is high. High tenure then will lead to employees being better able to interpret their monetary rewards as signals about the value supervisors ascribe to them. Hence, these employees will probably have lower self-evaluations in comparison to colleagues with lower tenure, who are not able to interpret these signals accurately and therefore might have (distorted) higher self-evaluations.

In addition to little knowledge about their company's reward system in general, low tenure employees also have less knowledge about the job as a whole and its requirements. In particular, they may also lack information about colleagues with whom they might compare themselves (Kulik and Ambrose 1992; Mumford 1983). For example, this lack of information could imply missing reference points for salaries and bonus pay, impeding the generation of self-evaluative information through social comparisons. Accordingly, Bertoni et al. (2020) state that making evaluations of relative performance is difficult when the comparison group is not known. For instance, employees new to a company do not know much about their own probability of receiving a pay increment (Luft 1994). With increasing tenure, employees will know the job requirements better (Kolz et al. 1998). For that reason, they will be better able to assess their own reward probabilities (Luft 1994). Furthermore, high tenure employees will have more information about their colleagues (Kulik and Ambrose 1992). In consequence, increased experience leads to employees who are better able to evaluate their own performance (Paloniemi 2006) which results in lower self-evaluations compared to employees who have more inaccurate, higher self-evaluations. Due to the enhanced experience with the reward system as a whole and the ability to better evaluate one's own and others' amount of monetary rewards for high tenure employees, we derive the following hypothesis:

Hypothesis 3c: The positive relation between the relative amount of monetary rewards and employees' self-evaluations is decreasing with firm tenure.

Similar to our reasoning regarding monetary rewards, we presume that firm tenure can moderate the relation between employees' hierarchy level and self-evaluations. As mentioned before, we expect self-evaluations to be higher at higher levels

of the hierarchy due to direct and indirect positive feedback that employees have received in the past and the lack of feedback at higher levels. High tenure employees, though, have already received more feedback regarding their job during their time working for the organization. Therefore, we presume that the hypothesized positive relationship between higher hierarchy level and self-evaluations is particularly relevant for low tenure employees, as they rely solely on former (in-)direct positive feedback, possibly leading to overly positive and inaccurate self-perceptions. In contrast, high tenure employees' self-evaluations will be lower due to the higher amount of feedback they can use to adjust their performance evaluations. We derive the following hypothesis:

Hypothesis 3d: The positive relation between the level of the hierarchy and employees' self-evaluations is decreasing with firm tenure.

3 Data, variables, and methodology

3.1 Dataset

The sample is based on data from an annual income survey among professionals and managers from the chemical sector in Germany, which is an important industry with overall around 467,000 employees (Bundesministerium für Wirtschaft und Klimaschutz 2021). It is conducted in collaboration with the German Association of Employed Academics and Executives in the Chemical Industry (Verband angestellter Akademiker und leitender Angestellter der chemischen Industrie e.V. (VAA)). According to the VAA, about 10 percent of employees working in the German chemical industry are engaged in a job which is relevant to the VAA and VAA members are representative for respective employees in the sector. The questionnaire is sent on an annual basis to all of the approximately 18,000 members of the VAA, which cover about 40 percent of employees with jobs pertinent to the VAA. The survey period starts at the beginning of February and ends by the end of April of each year. The response rate is between 21 and 23 percent in every year and the group of respondents is representative in terms of gender and age in relation to all VAA members. Since 2020, the survey contains a question about self-evaluation of one's performance in comparison to colleagues' performance.

As the information regarding self-evaluations acts as our dependent variable, we are using data from the survey years 2020 to 2022, during which the question about self-evaluation was part of the questionnaire. Since the data are collected retrospectively, we have data for the years 2019, 2020, and 2021 with dependent and independent variables each originating from the survey year. Our sample consists of employees from ten large companies with each more than 100 observations. HR relevant mechanisms differ across companies. By applying firm fixed effects, we avoid major parts of unobserved heterogeneity, which is oftentimes a problem of rather broad surveys. To obtain a homogenous sample, we only consider employees with a

STEM university degree in western Germany who work fulltime.² We exclude top managers (level 1), since they have very different compensation contracts than middle managers (level 2–4) and often do not have many colleagues to whom they might compare their performance. We exclude employees who do not receive any bonus payment in a particular year.³ In addition, we delete few observations with an unreasonable increase of more than 60 percent in fixed salaries between two consecutive observation years, which are most probably caused by input errors (e.g. reporting monthly instead of annual compensation). We eliminate observations of participants who have changed their employer or who have tenure of less than one year. This is because we assume that income components of these subjects are less comparable to those who have worked throughout an entire year. This leads to an unbalanced panel with a sample size of 2,599 observations from 1,663 individuals.

3.2 Variables

Our dependent variable is the self-evaluation of employees' job performance in comparison to the performance of their colleagues. The question in the survey is "How would you rate your work performance in [year] compared to your colleagues?". It is assessed by an ordinal variable with five categories: *much lower* (1), *somewhat lower* (2), *similar* (3), *somewhat higher* (4) and *much higher* (5). This categorization refers to the social comparison component of the self-concept by Gecas (1982) and the theory of social comparison by Festinger (1954) as explained above. We cannot control or observe exactly to which group of colleagues the participants of the survey compare their performance. Bandura (1978) states that people with whom one interacts with on a regular basis are relevant for setting a reference standard. For example, comparisons of wages are found to be made with similar colleagues who work at the same firm (Godechot and Senik 2015). As mentioned above, Lawrence (2006) describes employees' tendency to compare themselves to others who are similar regarding their career level. Therefore, we assume that participants are comparing themselves with colleagues at the same firm and at the same hierarchy level.

Figure 1 shows the distribution of employees' self-evaluations regarding their performance. Only a very small share evaluate themselves as having a much lower or somewhat lower performance than colleagues (3 percent). In contrast, more than half of the employees consider themselves to perform better than their colleagues: 38 percent report having a somewhat higher performance and an additional 16 percent a much higher performance. 42 percent of participants assess their performance as similar to those of their colleagues.

Compensation of employees in our sample consists of fixed salaries (about 81 percent), bonus payments (about 16 percent), and other compensation components (e.g. compensations for inventions, stocks and stock options, or supplementary

² Therefore, we exclude participants who are older than 67 years, as this is the current statutory retirement age in Germany.

³ In our sample, employees without bonus payment make up only about 2.6 percent which underlines the prevalence of bonus payments in our sample.

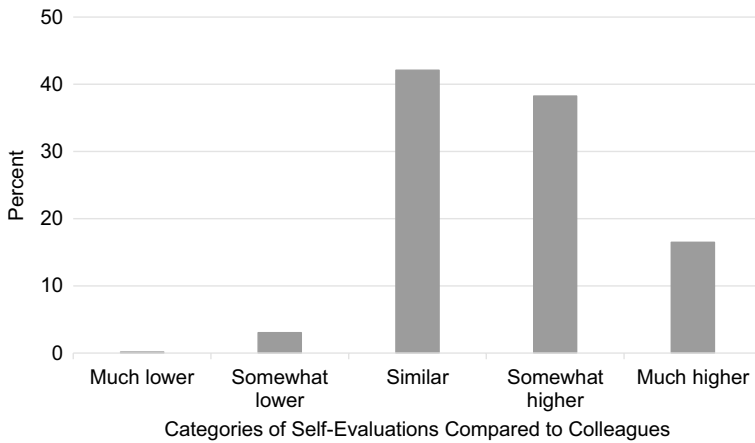


Fig. 1 Distribution of Self-Evaluations ($N=2,599$)

payments for anniversaries; about 3 percent). Although all firms in our sample have collective wage agreements for regular employees, there is much more scope for individual adaptations regarding managers addressed by our study.

The present data do not include information about employees' actual performance evaluations made by their supervisors. As described above, we consider two dimensions of monetary rewards as possible signals for performance evaluations: Wage increases and bonus payments. More precisely, we use residuals of relative increases in fixed salary and bonus share residuals for our estimations and explain both of them in the following.

First, we calculate relative increases in fixed salaries between two observation periods t and $t-1$ expressed by

$$\left[\frac{\text{fixed salary}_{i,t} - \text{fixed salary}_{i,t-1}}{\text{fixed salary}_{i,t-1}} \right] * 100.$$

In each year t of the survey, fixed salary is assessed for both t and the previous year $t-1$. Therefore, we have information on both points of time for each observation in the sample.

Second, we consider bonus shares as calculated as the individual bonus payment divided by total compensation. The amount of bonus payments in observation period t reactively results from performance indicators of the previous period. This temporal structure actually leads to the bonus share variable referring to the previous period ($t-1$) and, hence, reduces possible endogeneity concerns due to reversed causality. Previous research reveals that bonus shares can considerably depend on job-related characteristics such as hierarchy level, tenure, and the functional area of the job (Grund and Kräkel 2012). We consider these factors for both of our facets of monetary rewards by running estimations in which fixed salary increases and bonus share act as dependent variables, respectively. We know from discussions with managers of the chemical industry that compensation schemes and particularly bonus

systems considerable differ between firms. As we want to ensure that our results are not biased by heterogeneity between different firms, we run firm-wise estimations. The aforementioned factors (hierarchy level, tenure, tenure squared, and functional area of the job) are included as independent variables in addition to year dummies. Results of these estimations show that these characteristics identified by Grund and Kräkel (2012) are relevant for both increases in fixed salaries and bonus shares. We then use the individual residual of these estimations as our two dimensions of monetary rewards (fixed salary increase residual and bonus share residual). A positive residual can be interpreted as a higher salary increase/bonus share than expected, for a particular individual with corresponding hierarchy level, years of firm tenure, and functional area in a certain firm.

We consider these two monetary rewards as possible signals induced by firms for employees about their performance, which in turn could influence their self-evaluations: A positive residual could be interpreted as a reward for high performance in the past. For both residuals, the informative value of the signal depends on the compensation system of the company. If the system is based on employees' individual performance, the residuals can be seen as an approximation for employees' performance evaluations made by their supervisors: If the estimated coefficient of the residual is positive (negative), the salary increase/bonus share is higher (lower) than expected, which the employee could interpret as signal for high (low) past performance appraisals.

Furthermore, we consider hierarchy level as another possible factor that influences self-evaluations. In the survey, participants were asked to rank themselves into one of four hierarchy levels: We exclude the top management (level 1) and focus on level 4 (lowest management level) to level 2 (senior management). As aforementioned, level 1 is excluded here to ensure a homogenous sample. Additional explanations in the survey ensure that firm size categories are comparable at least across large firms which are part of this study.

We extend our estimation by additionally interacting monetary rewards and hierarchy level with both gender and firm tenure. Firm tenure is measured by counting the years the individual has been employed by a company. It is the time spent with a company, regardless of the job position held.

We add dummies for having gained a doctoral degree and year dummies in all of our models. Moreover, we account for heterogeneity between firms by adding dummies for the ten companies in our sample. We control for employees' field of study by adding corresponding dummy variables. As mentioned above, we only consider participants with a STEM university degree.

Table 1 shows descriptive statistics for our independent variables. We aggregate employees with somewhat higher and much higher self-evaluations compared to colleagues' performances and refer to these employees as "High-Performance-Self-Evaluation-employees" (HPSE-employees, see column (2)). We use the variable for HPSE-employees to get an impression about particularly high self-evaluations.

The fixed annual salary is 117,787€ on average. Relative increases in fixed salary are about 3.2 percent. Bonus payments account for 16 percent of total compensation and are 25,500€ per year, on average. Most participants work at level 3 (59 percent). The sample is male-dominated with 88 percent males. Tenure is 19 years on average

Table 1 Descriptive statistics for independent variables ($N = 2,599$)

Variables	(1) Mean (Standard Deviation)/Share ^a	(2) Share of HPSE- employees ^b	(3) Spearman Rank Correlation to Self- Evaluations (p -value)
Full sample		0.547	
Monetary rewards			
Fixed salary [in €]	117,787 (27,739)		0.017 (0.399)
Fixed salary increase	0.032 (0.043)		0.056 (0.004)
Fixed salary increase residual	0.000 (3,951)		0.041 (0.037)
Bonus [in €]	25,500 (20,344)		0.020 (0.306)
Bonus share of total compensation	0.159 (0.071)		0.009 (0.644)
Bonus share residual	0.000 (0.041)		0.054 (0.006)
Level of hierarchy			
Level 2	0.052	0.632	
Level 3	0.591	0.552	
Level 4	0.357	0.526	
Gender			
Female	0.125	0.520	
Male	0.875	0.551	
Tenure (years)	19.2 (9.530)		-0.046 (0.020)
Field of study			
Chemistry	0.499	0.554	
Engineering	0.318	0.563	
Biology	0.044	0.544	
Physics	0.027	0.443	
Medical science	0.019	0.375	
Pharmaceutics	0.056	0.510	
Other natural science	0.037	0.536	
Doctoral degree	0.711	0.553	
No doctoral degree	0.289	0.533	
Companies			
Company A	0.298	0.566	
Company B	0.184	0.542	
Company C	0.129	0.516	
Company D	0.076	0.535	
Company E	0.076	0.629	
Company F	0.066	0.503	
Company G	0.044	0.544	
Company H	0.043	0.522	
Company I	0.043	0.473	
Company J	0.041	0.579	
Year			
2019	0.389	0.532	

Table 1 (continued)

Variables	(1) Mean (Standard Deviation)/Share ^a	(2) Share of HPSE- employees ^b	(3) Spearman Rank Correlation to Self- Evaluations (<i>p</i> -value)
2020	0.324	0.536	
2021	0.287	0.580	

^aWe checked the relevance of the between and within person standard deviation of our variables which reveals that the between dominates the within variation, e.g. regarding bonus share residuals: standard deviation_between=0.0385, standard deviation_within=0.0215

^bHPSE-employees=High-Performance-Self-Evaluation-employees (evaluating self-performance to be somewhat higher or much higher than that of peers)

expressing the dominating long-term employment relationships in the sector. Most of the employees have a degree in chemistry (50 percent), followed by engineering (32 percent). About 71 percent of the sample hold a doctoral degree.

First bivariate analyses presented in Table 1 show that there is a low, but positive (Spearman rank) correlation between self-evaluations and fixed salary increase residuals ($\rho=0.041$, p -value=0.037) as well as bonus share residuals ($\rho=0.054$, p -value=0.006). Self-evaluations increase with the level of the hierarchy: The share of HPSE-employees is more than 63 percent at level 2, whereas at level 4, the share is ten percentage points lower. Regarding gender, males report slightly higher self-evaluation than females (0.55 vs. 0.52 of HPSE-employees). Previous studies (e.g. Beyer 1990; Lindeman et al. 1995) report much higher differences regarding gender. We have to take into account the specific selection of individuals with a STEM degree self-selecting in the male-dominated German chemical industry, though. Tenure is slightly negatively correlated with self-evaluations ($\rho=-0.046$, p -value=0.020).

In our empirical analysis, we apply linear individual fixed effects panel estimations. A possible cross-section analysis would not account for unobserved heterogeneity such as personality traits. We also consider firm fixed effects.

4 Results

Applying individual fixed effects panel estimations, we analyze changes *within* individuals.⁴ In the analysis, we consider our independent variables, namely fixed salary increase residual, bonus share residual, and hierarchy level. Year dummies are included in all models. Time-invariant variables (gender, doctoral degree, field of study, and company dummies) are omitted, leading to the results shown in model

⁴ Corresponding pooled cross-section estimations are reported in Table 3 in the Appendix. The results of the ordered probit estimation do not differ from the OLS model. Reported average marginal effects of binary probit estimations using the HPSE-employee variable produce rather similar results to those found in the ordered probit estimations. We also checked that results of corresponding fixed effects ordered logit show qualitatively the same results as the linear estimations (available upon request).

Table 2 Individual fixed effects panel estimations on self-evaluation (including interaction terms with gender and tenure)

Variables	(1)	(2)
Fixed salary increase residual	0.0113** (0.0052)	0.0100 (0.0097)
Bonus share residual	0.8712* (0.4681)	0.6594 (1.0738)
Level of hierarchy (base: level 3)		
Level 2	0.3203** (0.1572)	0.1712 (0.4457)
Level 4	-0.0068 (0.1060)	0.0300 (0.1997)
Tenure	-0.0132 (0.0115)	-0.0125 (0.0132)
Fixed salary increase residual * Female		-0.0117 (0.0102)
Bonus share residual * Female		4.9773** (2.4603)
Level 2 * Female		-0.4074** (0.2061)
Level 4 * Female		-0.5635 (0.3796)
Fixed salary increase residual * Tenure		0.0003 (0.0005)
Bonus share residual * Tenure		-0.0016 (0.0457)
Level 2 * Tenure		0.0075 (0.0184)
Level 4 * Tenure		0.0005 (0.0080)
2020	0.0449 (0.0331)	0.0433 (0.0332)
2021	0.1278*** (0.0419)	0.1253*** (0.0421)
Intercept	3.8659*** (0.2183)	3.8781*** (0.2565)
Number of observations	2,599	2,599
R ² (overall)	0.0089	0.0093

Dependent variable: self-evaluation of performance. Robust standard errors clustered at the individual level (in parentheses). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

(1) of Table 2. First, we test our hypothesis 1 and 2 regarding the relation between monetary rewards and self-evaluations as well as hierarchy level and self-evaluations: Hypothesis 1 states that employees' self-evaluations are positively related to the amount of monetary rewards. This relation has indeed already been shown in

the bivariate correlations as described above. Model (1) shows that both monetary reward variables are significantly related to self-evaluations in a positive way, confirming hypothesis 1. Therefore, we find hints for the conjecture that both salary increases and bonus shares provoke some signals about performance appraisals. Changes in these monetary rewards compared to colleagues seemingly lead to adaptations in individuals' self-evaluations.

To analyze the robustness of our results, we conduct several re-estimations of our model: First, we use bonus share instead of the bonus share residual as well as fixed salary increase instead of its residual as independent variables in our fixed effects estimations. The results are quite similar to those using the residual variables, though the coefficients of bonus share and fixed salary increase are less significant. In a further estimation, we add fixed salary in absolute terms as an additional variable. Results regarding the relation of the fixed salary increase residual with employees' self-evaluations remain unchanged. The statistically insignificant coefficient of absolute fixed salary shows that there is no relation between fixed salary in absolute terms and self-evaluations. In order to check if the results for the bonus share residual are symmetric, we split the sample into participants with a bonus share residual above and below its average (which is equal to 0). Estimations reveal that results do not differ between these two sub-samples, showing that the relation of bonus share residuals with employees' self-evaluations is symmetric. Using the lag of self-evaluations, i.e. from period $t-1$, as a possible instrument, we find qualitatively analogous patterns compared to the fixed-effects panel estimations. Significance levels somewhat decrease due to the reduced sample size as a consequence of the lagged model and resulting missing data (see model (4) of Table 3 in the Appendix). We argue above that it is sensible to use bonus share residuals of the current period, because bonuses are determined based on some indicators of the previous year. Nevertheless, we check the robustness of our results by making use of the lag of our bonus share residual variable to tackle possible concerns regarding reversed causality. The estimation yields quite similar results compared to those with the bonus share residual from time period t . This comes along with a considerably decrease of sample size and a slight decrease of significance levels, though. Detailed results of the described robustness checks are available from the authors upon request.

As coefficients in fixed effects panel estimations are identified by within-person changes in our independent variables and self-evaluations, results regarding hierarchy levels can be interpreted as the role of promotions. Hypothesis 2 states that the level of the hierarchy is positively related to employees' self-evaluations. Indeed, model (1) of Table 2 shows that individuals promoted to level 2 have significantly higher self-evaluations. The coefficient of level 4 is negative, as expected, but far from being significant. Differences seem to be relevant for senior executives (level 2) only. Therefore, these results are partly in line with hypothesis 2.

Regarding our control variables, self-evaluations become more positive every year, with the highly significant coefficients in 2021 being more than two times as large as those in 2020. The same has been found across participants in the descriptives. Firm tenure is not significantly related to self-evaluations. We also thought of controlling for other factors such as weekly working hours. Working hours show a

strong positive correlation to self-evaluations ($\rho = 0.331$, p -value < 0.001). However, we abstain from adding working hours to our estimations in Table 2 as this leads to additional endogeneity concerns. Results regarding monetary rewards and the level of the hierarchy are robust when using weekly working hours as an additional control, though (results available upon request).

To analyze our independent variables in more detail, we include interaction terms. As described above, we assume a moderating effect of gender and tenure on the relation between (i) monetary rewards and self-evaluations and (ii) hierarchy level and self-evaluations. Model (2) in Table 2 shows the results of the corresponding estimations including the interaction terms.

In order to reveal possible differences in self-evaluations of performance between males and females, we examine the moderating role of gender on the relation between monetary rewards and self-evaluations as well as hierarchy level and self-evaluations: Hypothesis 3a presumes that the positive relation between the amount of monetary rewards and employees' self-evaluations is more important for males than it is for females. The evidence does not support our hypothesis (see model (2)): While the coefficient of the corresponding interaction term regarding fixed salary increase residual is at least negative as expected (though not significantly), the interaction with the bonus share residual is even significantly positive. In contrast to our hypothesis, women's self-evaluations are particularly affected by receiving unexpected amounts of bonus payments.

Hypothesis 3b assumes that the positive relation between hierarchy level and employees' self-evaluations will be more pronounced for males. This can be partly confirmed by the estimation results in model (2): Indeed, the corresponding interaction effect for level 2 is highly significant. In line with our theoretical considerations, the possibility of expressing a pronounced trait of dominance and to rely solely on one's own perceptions seems to be particularly relevant for males at this senior management level.

With regard to potential differences between employees with low and high firm tenure, we consider the hypothesized moderating role of tenure on the relation between (i) monetary rewards and (ii) hierarchy level with self-evaluations. In contrast to our argumentation regarding hypothesis 3c, firm tenure does not moderate the relation between the amount of monetary rewards and employees' self-evaluations, since the corresponding interaction terms are far from significant.

Lastly, we analyze the role that tenure has on the link between hierarchy level and self-evaluations. In hypothesis 3d, we assumed a negative relation. Model (2) shows that our assumption seemingly does not apply to participants at level 2, as the coefficient of the interaction term is positive. Thus, we cannot confirm hypothesis 3d.

5 Discussion, limitations, and conclusion

We used panel data from a longitudinal annual income survey with employees in the German chemical sector to explore the potential relation between two job characteristics and employees' self-evaluations of performance, i.e. the amount of monetary

rewards and employees' level of hierarchy. We also took possible interaction effects with gender and firm tenure into account.

Accounting for unobserved heterogeneity through individual fixed effects panel estimations, we present evidence for a positive relation of monetary rewards as well as level of the hierarchy and self-evaluations of own performance relative to others.

We used two variables to capture *monetary rewards*, i.e. residuals of fixed salary increases and bonus share residuals and reveal evidence for a positive relation to self-evaluations. In this sense, we find support for our conjecture that employees interpret these rewards as signals about performance appraisals made by supervisors.⁵ Therefore, this study contributes to the literature regarding the relevance of employees' social comparisons with coworkers' wages for employee outcomes. In this respect, Mohrenweiser and Pfeifer (2023) show that employees' wage comparisons to their coworkers' wages in the same firm affect job satisfaction. In addition, Pohlan and Steffes (2022) describe that feedback on employees' performance relative to their colleagues is related to employees' turnover intentions. In practice, the informativeness of monetary rewards as signals of performance appraisals can be firm and context specific: Both measures can also depend on other factors, such as tenure or firm performance. One advantage of our approach is that – in contrast to more broad surveys – we can control for firm effects. However, bonus policies of firms or the regularities to adapt wages can change even within firms. Bonus policies do indeed differ across firms (see also Grund and Hofmann 2019).⁶ The informational value of the signals sent through the amount of monetary rewards is higher in companies which considerably differentiate monetary rewards for employees, for example on the basis of subjective performance evaluations by supervisors. In organizations using company-wide measures for setting employees' compensation – such as company success – the amount of monetary rewards will possibly be a less informative signal about performance appraisals made by supervisors, limiting the generalizability of the results found in this study.

The employees' *level of the hierarchy* is also positively related to employees' self-evaluations. Employees probably receive feedback directly and indirectly through a promotion to a higher level. In addition, results hint for a particular relation for males in senior management positions.

We find less evidence for our interaction hypotheses. Data limitations and possible biases in self-evaluations may contribute to explanations for these findings as follows:

Having assumed that monetary rewards play a greater role for generating self-relevant information for men than for women when making self-evaluations, the result that the influence of bonus share residuals is larger for women than for men is contrary to our expectations (results regarding salary increase residuals are far

⁵ We know from discussions with members of the association conducting the underlying survey, that employees' performance is indeed evaluated subjectively by supervisors in firms.

⁶ We also estimated firm-wise estimations based on our sample (available from the authors upon request) to explore potential differences in factors influencing employees' self-evaluations between companies with different compensation policies/structures. These estimations do not provide any additional insights, though.

from being significant). This may occur for several reasons: First, as we argued in the beginning, bonus payments may not only be perceived as a monetary reward but also as general feedback in terms of a positive appraisal (e.g. Fuchs 2015). This can be relevant for women in particular, as they seek external feedback more than men do (Fletcher 1999). Second, we argued above that differences in personality and socialization of males and females could be reasons for higher self-evaluations by males in particular. In our sample, we have a specific selection of employees: Women who self-select in the STEM area and in the traditionally male-dominated German chemical industry. Hardies et al. (2013) and Nekby et al. (2008) find that women in male-dominated environments have personality traits similar to those of men. This is also likely to be relevant in our sample of employees. In consequence, gender differences will not be pronounced or may even be reversed in our specific sample. A limitation of our study is that we do not have any information about the trait of dominance in our data. This makes it difficult to verify this possible explanation and calls for further research on this topic, which may include samples in other industries in which men and women differ more regarding their personality traits and/or behaviors. In this respect, we provide a conservative test in the sense that gender differences are expected to be larger in other relevant contexts. Still, personality differences regarding gender appear to be more pronounced at higher hierarchy levels even in our sample, as our results show that the link between a higher hierarchy level and self-evaluations is stronger for males.

In our empirical analysis, we do not find meaningful results regarding a moderating role of tenure on the relationship between monetary rewards or hierarchy level and self-evaluations. Regarding monetary rewards, our reasoning of a positive relation of (firm) tenure and the ability to evaluate monetary rewards for oneself and one's colleagues may therefore not come to light to the extent that we assumed. Sørensen (2000) states that an employee's attachment to a group changes over time. Accordingly, attachment will be lower when group composition changes often. Then, comparisons with colleagues and hence, accurate self-evaluations relative to others, are difficult even for employees with many years of tenure.

Regarding the moderating role of tenure on the relation between hierarchy level and self-evaluations, we argued that tenure negatively influences the link between higher hierarchy levels and self-evaluations, as employees with high tenure received a higher amount of feedback. Due to that, their self-evaluations should become more accurate and in consequence, lower. Accordingly, Mabe and West (1982) describe that the ability to make accurate self-evaluations improves with practice. We do not find evidence for this assumption in our data. One explanation could be that climbing up the hierarchy is often accompanied by higher task complexity (Zhou 2013) and more responsibilities (Kaiser et al. 2011). As a result, employees at higher levels cannot necessarily rely on previously received feedback because it might concern tasks which are no longer in their area of responsibility. Hence, it might not be useful for evaluating one's current performance. Even when employees possess much relevant information, they often neglect or do not consider it (Dunning et al. 2004). In addition, we argued that the amount of past feedback is important for accurate self-evaluations and that employees at higher hierarchy levels receive less feedback than it is the case at lower levels. However, we lack information about the frequency

and amount of feedback in our data. This information would be helpful to check our reasoning for the corresponding hypotheses. Thus, future research could consider the amount and frequency of feedback that employees receive, as this could be a relevant factor for self-evaluations.

Besides the previously mentioned reasons for the interactions of (i) monetary rewards with tenure and (ii) hierarchy level with tenure, there are arguments which are relevant for both interactions with tenure in a similar vein. These arguments refer 1.) to the role of long-term employment relationships, and 2.) to the relevance of the supervisor-subordinate relationship for employees' self-evaluations.

Regarding the first argument, our reasoning of increased trust in the accuracy of performance evaluations and higher amounts of feedback at higher levels seems not to be relevant to the extent that we expected. First, this may be due to the relevance of long-term relationships in the German chemical sector. The average firm tenure of individuals in our sample is almost 20 years and we have only few observations of employees with only few years of hitherto firm tenure. Our considerations could be particularly relevant for employees who have just started their career with a company and less for those who have been working there for a longer period of time because of decreasing marginal effects of receiving feedback on self-evaluations. To analyze possible non-linearities over the career, we made a sample split based on the median firm tenure (20 years) and re-estimated our fixed effects estimations.⁷ The results do not reveal such non-linearities concerning fixed salary increase residuals as the coefficients are significantly positive for both sub-samples. However, bonus share residuals seem to be less relevant regarding self-evaluations of employees with a firm tenure above the median. Therefore, bonus payments appear to be particularly informative for employees with lower tenure who seem to rely on feedback given through the amount of bonus payments.

Considering the second argument, a possible reason for the finding that tenure does not moderate the relation between monetary rewards and self-evaluations could be that it is not trust in an organization, but rather trust in a specific supervisor, that is important for increasing employees' beliefs that performance evaluations are a reliable signal of their performance. Indeed, Bol (2011) and Duarte et al. (1994) find that length of the relationship between supervisor and subordinate is relevant for supervisors' performance evaluations. Concerning feedback differences across hierarchy levels, its reliability rather than its pure amount might be more relevant. Accordingly, the supervisor-subordinate relationship is supposed to be important here as well. We do not have information about the length of the supervisor-subordinate-relationship in our data. Future research could try to explore its relevance in more detail by considering the role of job tenure and/or the duration of the supervisor-employee-relationship in our context.

Nevertheless, employees' self-evaluations might be affected by a different aspect: The concept of person-job fit expresses how well employees' abilities fit to the requirements of their jobs. The quality of person-job fit is positively related to tenure (Kristof-Brown et al. 2005). Therefore, high tenure employees assumingly assess their person-job fit as favorable which in turn positively affects their self-evaluations. For high tenure employees, the possibly increased self-evaluations due

⁷ Corresponding results are available from the authors upon request.

to high person-job fit can trade-off and balance out our assumptions for lower self-evaluations described in the derivation of our hypotheses. This trade-off may explain the non-existent relation of tenure on the link between monetary rewards as well as hierarchy level with self-evaluations we find in the empirical analysis.

As mentioned before, some of our findings do not confirm our (interaction) hypotheses. Further research is needed to investigate if the potential reasons for these outcomes as we described above, apply. Another avenue for future research pertains to the dependent variable of this study – employees' self-evaluations: The survey underlying this study asks participants to assess their performance in comparison to their colleagues. Relying on previous literature, we assumed that employees compare their performance to the performance of colleagues at the same hierarchy level and at the same company for determining their self-evaluations. However, we cannot rule out that some employees actually use other groups as a reference. It might be conceivable that some employees compare themselves to colleagues at other hierarchy levels or even at other firms. Considering the case of promotions, employees might either compare themselves with colleagues at their previous hierarchy level or with those at the hierarchy level they just reached. Not knowing the reference group for setting employees' self-evaluations poses a limitation to our study. Lawrence (2006) describes that different reference groups might lead to different information an individual receives and interprets. This could result in varying self-evaluations depending on which reference employees use. In order to examine if results regarding self-evaluations differ depending on the reference group chosen, future research in this field might be complemented with experiments in which the reference group ideally can be clearly and exogenously defined.

We pointed possible negative consequences that overly high self-evaluations can have for organizations, reaching from employees' unwillingness to join training activities (Yammarino and Atwater 1997) to lack of receptiveness to feedback (Brett and Atwater 2001) or biased decision-making (Malmendier and Tate 2005; Thoma 2016). Results of this study regarding factors influencing employees' self-evaluations can be applied to generate further conclusions which then could be used to derive implications for human resource practices.

Festinger (1954) states that if the performance of individuals improves, their aspiration level increases. As we find a positive relation between monetary rewards and self-evaluations, employees interpret monetary rewards as signals for performance improvements. Therefore, the aspiration level of employees towards future monetary rewards is likely to be increasing with self-evaluations. It is a demanding challenge for companies to implement incentive systems which provide employees with ongoing rewards. In addition, we described that supervisors are at least in part responsible for setting the amount of bonus payments. Our result that monetary rewards can be a driver of self-evaluations and seemingly act as signals of employees' performance appraisals made by supervisors might therefore serve as a call for caution when determining those rewards: Possible biases in performance evaluations made by supervisors might result in even more distorted self-evaluations by employees if they misinterpret the signals being sent through the amount of their monetary rewards. Consequently, supervisors should be made aware of these potential misinterpretations in order to prevent negative consequences related to distorted self-evaluations.

Related thereto, carefulness in interpreting the results of our study is advised due to possible interrelations of biases in self-evaluations and those made by the supervisor. Bonus payments may suffer from rater biases in performance evaluations, as bonus payments are significantly correlated with subjective performance evaluations (Frederiksen et al. 2017). For example, evaluations could be distorted due to the likeability bias which means that evaluations are shifted upwards or downwards, depending on social ties between subordinates and supervisors (Bauch et al. 2021; Breuer et al. 2013). In addition, employees who have performed well in the past are likely to receive positive evaluations again in the future, even if they do not perform accordingly (Bauch et al. 2021). Furthermore, Grund and Przemek (2012) show in their theoretical results that leniency and centrality bias play a role in performance appraisals. Indeed, there is evidence in practice for the occurrence of these biases (e.g. Bol 2011; Trapp and Trapp 2019) so that the link between bonus payments and performance can then be disrupted (Prendergast 1999). These could lead to problems if employees misinterpret the signals sent through performance evaluations. There are first hints that leniency bias is particularly relevant when ratings are used to allocate bonus payments (Kusterer and Sliwka 2022). Exploring possible interdependencies between biases in self-evaluations and those of subjective performance appraisals by supervisors as well as considering fairness perceptions towards performance appraisal systems (Taneja et al. 2023) can be a challenging, but promising task for future research. Target agreements (Kampkötter et al. 2017) can eventually mitigate possible inconsistencies.

Another aspect which needs to be considered when interpreting the results of this study is the impact of the COVID-19 pandemic. In the first quarter of 2020, the pandemic reached Germany. Since then, many employers have enabled their employees to work from home (Naumann et al. 2020). In consequence, remote work has become relevant for a large part of survey participants. Therefore, possible influences of the pandemic on the outcomes of the survey might occur in the observation years 2020 and 2021. Working from home hampers social interaction with colleagues. Face-to-face interaction is important for building social connections with colleagues. In addition, working from home hinders employees from informal learning or sharing and receiving work-related information (Cooper and Kurland 2002). Because of the necessity to work from home for many employees due to the COVID-19 pandemic, it is conceivable that participants' self-evaluations in our sample are distorted due to a lack of opportunities and information to compare their own performance with those of their colleagues. Related to that, Chambers et al. (2003) state that individuals tend to overvalue information that they have about themselves and to undervalue information that they have about others. Moreover, Grant et al. (2013) reveal in their qualitative study that employees evaluate their own productivity as having increased since working from home. Reasons are working without being interrupted and better concentration, for example. Such factors could be relevant for participants in our sample as well, possibly leading to higher self-evaluations for those who primarily work from home. We cannot control for the relevance of remote work, but the highly significant dummy for the year 2021 hints at the relevance of this consideration. Future research could therefore explore whether the amount of individuals' usage of remote work is an influencing factor for self-evaluations.

In sum, we consider our study as a starting point for further research to gain a more precise understanding of self-evaluations of own performance in relation to peers in employment relationships.

Appendix

Table 3 Pooled cross-sectional estimations on self-evaluation

Variables	(1) Ordered probit	(2) Binary probit (1 = HPSE) ^a	(3) OLS	(4) OLS
Lag of Self-Evaluation				0.6436*** (0.0311)
Fixed salary increase residual	0.0130** (0.0052)	0.0060** (0.0025)	0.0094** (0.0037)	0.0172* (0.0090)
Bonus share residual	1.4014** (0.5514)	0.8100*** (0.2521)	1.0190*** (0.3939)	0.9349* (0.5098)
Level of hierarchy (base: level 3)				
Level 2	0.2636** (0.1145)	0.1037** (0.0487)	0.1891** (0.0823)	0.0367 (0.1149)
Level 4	-0.1168* (0.0624)	-0.0548** (0.0275)	-0.0795* (0.0446)	0.0227 (0.0562)
Female (1 = yes)	-0.0412 (0.0692)	-0.0165 (0.0335)	-0.0375 (0.0498)	-0.0559 (0.0739)
Tenure	-0.0072** (0.0030)	-0.0046*** (0.0013)	-0.0051** (0.0021)	-0.0033 (0.0027)
Doctoral degree (1 = yes)	0.1204 (0.0756)	0.0297 (0.0333)	0.0884 (0.0543)	-0.0989 (0.0748)
Field of study dummies (7)	Yes	Yes	Yes	Yes
Company dummies (10)	Yes	Yes	Yes	Yes
2020	0.0252 (0.0430)	0.0010 (0.0203)	0.0222 (0.0308)	
2021	0.1338*** (0.0470)	0.0463** (0.0213)	0.1001*** (0.0337)	0.0556 (0.0473)
Intercept			3.7276*** (0.0867)	1.5290*** (0.1642)
(Pseudo) R ²	0.0102	0.0185	0.0235	0.4033
Number of observations	2,599	2,599	2,599	806

Dependent variable: self-evaluation of performance. Robust standard errors clustered at the individual level (in parentheses). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. ^aAverage marginal effects for the binary variable indicating High-Performance-Self-Evaluation-employees (evaluating self-performance to be somewhat higher or much higher than that of peers)

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Data availability The data of this study are not publicly available as individual and firm privacy could be compromised. Interested scholars may contact the authors regarding requests concerning the data and are invited to work on the data at a stand-alone computer at RWTH Aachen University.

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