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ORIGINAL ARTICLE OPEN ACCESS

Optimism and Overconfidence of Strategic Decision Makers-Comparing Entrepreneurs and Managers With Employees

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ABSTRACT

Empirical evidence supports the conventional wisdom that entrepreneurs are more optimistic and overconfident than others. However, the same holds true for (top) managers. In a large incentivized survey ($n = 2404$), we directly compare entrepreneurs, managers, and employees on a comprehensive set of measures of optimism and overconfidence. We find that on average entrepreneurs and managers are more optimistic than employees in their dispositional optimism and their explanatory style of past events. However, they do not differ from each other in these respects. For two incentivized measures of overconfidence, we also find no differences between entrepreneurs and managers. Both are equally likely to overestimate their own abilities compared to employees. In terms of overestimating general economic prospects differences with employees are much less pronounced. Exploration of within-group heterogeneities shows that these observations hold true for various subgroups of entrepreneurs and managers. Together these findings tentatively suggest that optimism and overconfidence characterize strategic decision makers more generally, irrespective of whether they bear the full risk of their strategic decisions.

Optimistic individuals play a disproportionate role in shaping our lives. Their decisions make a difference. They are inventors, the entrepreneurs, the political and military leaders—not your average people.

—Daniel Kahneman (2011, p. 256)

1 | Introduction

Although many of us have a brighter view on life and on themselves than is justified by reality, quite some variation exists in how optimistic and overconfident different people are.

Regarding occupational differences the conventional wisdom is that entrepreneurs are among the more optimistic and overconfident types (Smith 1776; de Meza and Southey 1996). They earn less on average than paid employees despite facing more risk. A prominent explanation for this entrepreneurial earnings puzzle is that especially optimistic and overconfident people are drawn into—and persist in—entrepreneurship. Past comparisons with the population at large indeed indicate that entrepreneurs differ in these personality traits (see e.g., Puri and Robinson 2013; Dawson et al. 2014). The “hubris theory of entrepreneurship” developed by Hayward, Shepherd, and Griffin (2006) builds on this idea; overconfidence drives people to start a new business and subsequently harms allocative

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decision making once the venture is operating. Similar observations have been made for managers too, however. For various reasons the selection into managerial positions typically favors the more optimistic and overconfident people and these behavioral traits are indeed found to be prevalent among corporate managers and CEOs (see e.g., Graham, Harvey, and Puri 2013; Lounsbury et al. 2016). In line with the “managerial hubris hypothesis” of Roll (1986), these traits subsequently also explain managers’ imprudent strategic choices. This raises the question whether optimism and overconfidence are distinguishing characteristics of either entrepreneurs or managers, or rather traits that are common to strategic decision makers more broadly (as the opening quote suggests).

The relatively few empirical studies that shed light on this question by directly comparing the two occupational groups find that entrepreneurs are more overconfident than managers (see Section 2 for a more detailed literature review). The landmark study of Busenitz and Barney (1997) is cited so often that this finding has almost become like an empirical “stylized fact.” As valuable and insightful as these earlier empirical findings are, they exclusively focus on one particular manifestation of overconfidence—namely overprecision, the excessive confidence in the accuracy of one’s information or knowledge—leaving other important dimensions of optimism and overconfidence aside. The earlier results are also based on rather small sample sizes. Moreover, the focus in these studies is on a specific subset of entrepreneurs, viz. only those currently involved in the startup process, and they do not include regular employees in their comparison. Obtaining firmer empirical evidence on differences in optimism and overconfidence across occupational groups is thus warranted.

In this paper, we aim to provide such more encompassing empirical evidence. Our large incentivized survey ($n = 2404$), includes two distinct measures of optimism: dispositional optimism (Scheier and Carver 1985) and an optimistic explanatory style (Seligman 2000). The former taps generalized positive expectancies about the future, while the latter concerns how individuals evaluate past events and how this leads to a sense of agency in future behavior. Moreover, our survey also contains two incentivized measures of overconfidence: the (over)estimation of one’s own ability (Moore and Healy 2008) and the (over)estimation of a future stock market closing price (Bengtsson and Ekeblom 2014). In doing so, we contribute to the literature in multiple ways. First, we empirically distinguish and jointly consider several forms of optimism and overconfidence which have previously often been studied in isolation and used interchangeably (Åstebro et al. 2014; Heavey et al. 2022; Kraft et al. 2022). Second, to the best of our knowledge we are also the first to measure and compare the optimistic explanatory style between occupational groups. It has been postulated that entrepreneurs and managers require such a style to persist and overcome setbacks (Trevelyan 2008; Kahneman 2011; Lounsbury et al. 2016), but hard evidence on whether they are indeed different from employees in this respect is lacking. Our study is able to do so. Finally, we rely on a large sample of actual entrepreneurs, managers and employees. This produces more precise estimates and allows for studying heterogeneity within occupational groups, by creating meaningful

subsamples of (for instance, more successful) entrepreneurs and managers.

We highlight three results. We find that entrepreneurs and managers do not differ in terms of their dispositional optimism and their explanatory style. However, they are significantly more optimistic than employees. Second, in terms of overconfidence entrepreneurs and managers are also similar. They are equally likely to overestimate their own abilities, and they both have a realistic estimate of general economic prospects (viz. the future stock market closing price). Compared to employees, they overestimate their own abilities significantly more often, but for general economic prospects differences with employees are much less pronounced. Finally, these patterns generally also hold true when comparing relevant subsamples of entrepreneurs and managers. A notable exception occurs for managers that work in large firms ($>10,000$ employees) and entrepreneurial founders in the startup phase; the latter score higher on dispositional optimism, in line with the findings of Busenitz and Barney (1997). Overall, however, our findings suggest that optimism and overconfidence characterize strategic decision makers more generally, irrespective of whether or not they bear the full financial consequences of their strategic choices.

The remainder of this paper is organized as follows. In the next section we provide a literature review as to motivate our choice of measures and to explain more precisely how our measures and findings relate to previous studies. In Section 3 we discuss the design of our incentivized survey. Section 4 reports descriptive statistics while Section 5 contains our main results. The final section discusses and concludes.

2 | Literature Review

In this section, we motivate our choice of measures of optimism and overconfidence by discussing how they are rooted in the extant literature. We also review the literature on the relationship between optimism, overconfidence and employment status as to clarify our contribution.

2.1 | Optimism and Overconfidence

A variety of definitions of optimism and overconfidence is used in the social sciences literature. Broadly speaking, optimism reflects “the extent to which people hold generalized favorable expectancies for their future” (Carver, Scheier, and Segerstrom 2010, p. 879). This may be based on a pure expectation that is unspecific about how these favorable events will happen. It may also derive from a sense of agency, that is, people’s beliefs about how good things are brought about and affected (“caused”) by one’s own choices (Peterson 2000). Another distinguishing element is the extent to which the favorable expectations are justified. Some definitions of optimism refer more to a general view that “good things will happen,” remaining agnostic about whether or not such expectations are warranted. Other usages of optimism emphasize the unrealistic nature of the positive expectations (Weinstein 1980).

In general terms overconfidence can be defined as “the tendency for people to overestimate their knowledge, abilities and the precision of their information” (Bhandari and Deaves 2006, p. 5). Moore and Healy (2008) more specifically distinguish three forms of overconfidence: (i) *overestimation* of one’s actual ability, performance, level of control, or chance of success, (ii) *overplacement*, referring to one’s belief to be better than others, and (iii) *overprecision*, that is, excessive certainty regarding the accuracy of one’s beliefs or information. Especially the first two closely connect to the unrealistic optimism notion of Weinstein (1980). As a result, constructs of optimism and overconfidence are often observationally equivalent and used interchangeably (Åstebro et al. 2014, p. 58). Dawson et al. (2019) point at different practices across disciplines and clearly articulate that a major difference between the various existing definitions lies in how self-serving forecasting errors are classified:

Usage is not settled. Many economists (e.g. Hvide 2002), including us, consider optimism to be a self-serving bias in an estimate whilst excessive precision in the estimate (an overly narrow confidence interval) is overconfidence. Overconfidence sometimes covers both meanings. For some optimism is sometimes reserved for bias in the estimation of own ability as opposed to of favorable external events. [...] Psychologists typically do not regard optimism as a forecast error but an upbeat attitude or a belief that good things will happen (as in the LOT-R general optimism inventory). For some individuals, this is a rational expectation, in which case they are not optimists in the sense of making self-serving errors.

(Dawson et al. 2019, fn. 6 on p. 55)

Acknowledging that there is no commonly accepted definition of what optimism and overconfidence exactly are—and thus alternative classifications could well be made¹—for expositional clarity we here side with psychologists and put forecasting errors under the overconfidence header. This classification seems natural given the nature of the empirical measures that we employ. Our optimism measures are unincentivized questionnaire items more commonly employed in psychology. In contrast, the measures we group under the overconfidence umbrella explicitly ask for a quantitative estimate or forecast in an incentivized way; respondents earn more the closer they are to reality. These incentivized measures are thus “more economics” in nature and explicitly allow assessing the extent to which respondents make self-serving (upwardly) biased estimates.

Consider our psychology-based interpretation of optimism first. Carver, Scheier, and Segerstrom (2010, p. 880) discuss the theoretical grounding of optimism in expectancy value models of motivation. Such models assume that behavior results from the pursuit of valuable goals, and people will exert effort (and persevere in it) to reach those goals if they are sufficiently confident that these can be attained. They distinguish two ways to measure generalized expectancies. A first, direct way is to simply ask people whether they expect good or bad outcomes in their lives. Measures of dispositional optimism like the (revised) life orientation test LOT-R (Scheier and Carver 1985; Scheier,

Carver, and Bridges 1994) do so to capture the global expectation that good things will be plentiful in the future and bad things scarce. A second, more indirect way builds on the idea that expectancies about the future derive from how people interpret past successes and failures, in particular from how they attribute causes to past events. Individuals with an optimistic explanatory style (Buchanan and Seligman 1995) believe that good events will persist (i.e., are “permanent”) and will extend to other areas (i.e., are “pervasive”). Bad events are, by contrast, regarded as temporary and non-pervasive. Unsurprisingly, for pessimists the opposite is true: they believe good events to be nonpersistent (temporary) and non-pervasive, and bad events as permanent and pervasive. Carver, Scheier, and Segerstrom (2010) note that, although conceptually sharing the same theoretical grounding, the two types of measures (based on expectancies and attributions, respectively) capture different dimensions and are only modestly associated; therefore, they cannot be used interchangeably.² We thus incorporate both types of measures in our study.

Dispositional optimism was originally proposed as a unidimensional construct, with optimism and pessimism as polar opposites (Scheier, Carver, and Bridges 1994). This suggests that an individual can be either optimistic or pessimistic, but cannot be both. More recent research, however, suggests to rather treat the outcome of the LOT-R as a bidimensional construct to avoid losing information (e.g., Creed, Patton, and Bartrum 2002; Herzberg, Glaesmer, and Hoyer 2006). Carver, Scheier, and Segerstrom (2010, p. 881) conclude that the jury is still out on whether optimism and pessimism are opposites in a single bipolar dimension, or reflect two different dimensions. For our two psychological measures of optimism we therefore report our results both ways, that is, as single dimension score and separately for optimism (respectively good events) and pessimism (respectively bad events).

Our interpretation of overconfidence centers around self-servingly biased estimates. From the three types of overconfidence distinguished by Moore and Healy (2008), we specifically focus on overestimation. One justification for doing so is that overestimation (as well as overplacement) leads to positively biased, self-serving expectations, while for overprecision this need not be the case. Therefore, the effects of overprecision on, for example, entrepreneurial entry are a priori less clear (cf. Åstebro et al. 2014). Overestimation is arguably also relevant in a wider range of situations where individuals (implicitly) judge their own ability or chances of success, not only those where comparison to others is key. Similar to optimism, overestimation can operate at different levels of abstraction. It can either relate to an individual’s own characteristics or idiosyncratic chances of success, or more broadly to the likelihood of favorable external events occurring (see the earlier quote from Dawson et al. 2019, above). The former yields a more personal oriented measure of overconfidence, the latter an impersonal one that is unrelated to an individual’s own life or work situation. A final practical advantage is ease and clarity of measurement. For overestimation, there is no need for actual comparison with others and thus the determination of the appropriate reference group (with possible ambiguities therein), and neither a need to measure confidence intervals (which are conceptually more difficult for respondents to grasp). In our

study, we include one standard measure of overestimation based on assessing one's own performance (and thus ability) on a set of logical puzzles, as well as another one taken from Bengtsson and Ekeblom (2014) measuring (biased) perceptions of nation wide economic conditions. Although impersonal and broad, this measure is arguably a relevant context-specific measure for entrepreneurs and managers, as it relates to the broader business environment in which they operate and take their daily (strategic) decisions.³

Even when optimism and overconfidence are defined distinctively, they need not tap truly different constructs. Yet, empirical studies that shed light on this within the occupational domain suggest that they do. Åstebro, Jeffrey, and Adomdza (2007), for instance, find that inventor-entrepreneurs are both more overconfident (in terms of overestimation) and more optimistic (LOT-R style) than the general population, and that optimism and overconfidence are generally positively correlated. At the same time, more optimistic entrepreneurs stubbornly continue with their idea despite low chances of success, while more overconfident ones do not spend more time or money on the idea. Also for other measures of optimism and overconfidence typically either no positive correlation is found, or different relationships with behavior (see e.g., Barasal Morales 2022; Bernoster et al. 2018; Gudmundsson and Lechner 2013).

2.2 | The Relationship Between Optimism and Overconfidence and Occupational Status

An extensive literature exists that explores the relationship between occupational sorting and various individual preferences, personality traits, and cognitive biases. Among these, optimism and overconfidence are often hypothesized and found to be drivers into entrepreneurship and management, with potential harmful consequences in terms of suboptimal strategic choices for those who survive and persist. Take entrepreneurship first. Entrepreneurs self-select into a risky work environment with a high risk of failure, resulting in higher variance yet lower average earnings compared to paid employees (Åstebro et al. 2014; Hall and Woodward 2010; Hamilton 2000). This is often explained by personality traits, especially optimism and overconfidence (Bernardo and Welch 2001; Camerer and Lovo 1999; Hayward, Shepherd, and Griffin 2006; Puri and Robinson 2007).⁴ In the model of de Meza and Southey (1996), for instance, entrepreneurship widens the scope for prospects to be exaggerated, implying that especially optimists are attracted to it. Earlier empirical studies have indeed found that the likelihood of becoming an entrepreneur increases with one's level of optimism and overconfidence.⁵ Moreover, these traits have also been proposed as explanations for why people persist in entrepreneurship despite the lower and more risky earnings (Hamilton 2000; Moskowitz and Vissing-Jørgensen 2002; Chen et al. 2018). Hayward, Shepherd, and Griffin (2006) propose an encompassing “hubris theory of entrepreneurship” along these lines. Their theory postulates that overconfident individuals are more likely to start ventures and subsequently act on their overconfidence when (suboptimally) deciding on allocating resources. Overconfidence might thus be helpful to move people into

entrepreneurship, but at the same time could be harmful once the venture is operating.⁶

Along similar lines, in a different strand of literature also (top) managers have been found to be more optimistic and overconfident than others (Graham, Harvey, and Puri 2013; Lounsbury et al. 2016). Moreover, a number of empirical studies have shown that these behavioral traits can account for some of the heterogeneities in corporate policies (Bertrand and Schoar 2003; Malmendier and Tate 2005, 2009; Graham, Harvey, and Puri 2013). Various theories on the selection into managerial positions have been put forward to explain why managers are more optimistic and overconfident. These include overconfident employees being more likely to win the intra-firm tournament towards the CEO rank (Goel and Thakor 2008), overconfident managers being more attractive to firms because their larger commitment to exert effort to learn about projects (Gervais, Heaton, and Odean 2011), optimism to offset the impact of a manager's risk aversion on investment decisions (Campbell et al. 2011), and overconfident managers as an instrument to mitigate manager-shareholder conflicts (Hackbarth 2008). Furthermore, building on Roll (1986) a number of empirical studies have found evidence for the “managerial hubris hypothesis”; overconfidence pushes managers to take imprudent strategic decisions, like overpriced takeovers and negative M&A performance (Hayward and Hambrick 1997; Malmendier and Tate 2005, 2009), excessive trading (Barber and Odean 2001), and under-diversification of equity holdings (Goetzmann and Kumar 2008).⁷

Besides occupational sorting, the specific decision making environments and required tasks of entrepreneurs and managers—that is, the “contextual factors”—may also make those who sorted into it more optimistic per se. As strategic decision makers both are responsible for taking calculated risks when making complex strategic choices and both (potentially) bear the responsibility for hiring and directing personnel. These common tasks and responsibilities typically provide them much more decision autonomy than regular employees. This may boost their level of optimism. Van den Steen and den Steen (2004) develops a model of choice-driven overoptimism in which economic agents differ in their beliefs about which action is best, that is, have heterogeneous priors, but apart from that are fully Bayesian rational. The larger the set of actions an agent can choose from, the more overoptimistic she becomes, since the more convinced she is that her preferred action is truly a very good one. Van den Steen and den Steen's (2004) model thus predicts that “[a]n agent who can choose his own projects will be more optimistic than one who gets assigned his projects. This may be one reason why entrepreneurs often seem more overoptimistic than regular employees. It also implies that restricting a manager's degree of freedom may reduce her bias” (p. 1144).^{8,9} Moreover, it can also explain why people self-servingly attribute successes to their own choices and failure to exogenous factors, that is, an optimistic explanatory style (Van den Steen and den Steen 2004, proposition 6). And since updating is Bayesian rational within his framework, this optimistic style can well be maintained in the presence of feedback about the true outcome of one's choices. Intuitively, even after observing frequent failure a person can remain convinced of his optimal choice of action, as long as the underlying

cause—either own choice or some exogenous factor—is not perfectly observed. The latter seems quite realistic in practice where we typically do not observe the counterfactual.

Based on the above theorizing and empirical findings, one might well expect managers and entrepreneurs to be similar in their levels of optimism and overconfidence, but to clearly stand apart from employees. The relatively few empirical studies that directly compare entrepreneurs with managers (Busenitz and Barney 1997; Busenitz 1999; Forbes 2005; Arend et al. 2016), however, all find that entrepreneurs are more overconfident than managers. Busenitz and Barney (1997) is the seminal contribution in this field. They consider a sample of 124 entrepreneurs who are currently in the startup phase and compare these with 95 (middle and upper level) managers in large organizations with more than 10,000 employees. They focus on overprecision as a measure of overconfidence, using the procedure of Fischhoff, Slovic, and Lichtenstein (1977) in which respondents were asked, for each of five different questions, to choose one of two possible answers together with their level of confidence in being correct. Busenitz (1999) is based on the exact same data set. Forbes (2005) obtains a sample of 108 new venture managers and classifies these either as entrepreneur (founding manager, $n = 97$) or as non-founding manager ($n = 11$). He employs the same measure of overconfidence. Arend et al. (2016) replicate the empirical design of Busenitz and Barney (1997), with the single exception that managers in organizations with at least 100 employees are considered. Their sample consists of 102 entrepreneurs and 99 managers. As already noted in the Introduction, all these studies thus consider overprecision only, are based on rather small samples, predominantly focus on entrepreneurs in the start up phase and do not make comparisons to regular employees.¹⁰

In this paper, we address all these limitations. A particular noteworthy contribution in our view is that we measure and compare the optimistic or pessimistic explanatory style between occupational groups. Kahneman (2011, p. 256) observes that “[t]he main benefit of optimism is resilience in the face of setbacks.” Seligman and Schulman (1986) obtain evidence within an occupational context that an optimistic explanatory style promotes such resilience. They find that life insurance sales agents with a pessimistic explanatory style generate significantly lower sales and are more likely to quit. Intuitively, one would expect that also entrepreneurs and managers need such a style to persist (Trevelyan 2008; Kahneman 2011; Lounsbury et al. 2016).¹¹ Yet, only two empirical entrepreneurship studies that we know of include an optimistic explanatory style measure. Krueger Jr., Reilly, and Carsrud (2000) use a version of Seligman’s (2000) measure of learned optimism to explain entrepreneurial intentions among a total of 97 students. Askim-Lovseth and Feinberg (2012) confront a sample of 336 college students with hypothetical business scenarios envisioning they have started an entrepreneurial venture themselves that ended in failure. Students’ attributional style is measured beforehand, while after the scenarios they are confronted with statements about financial well-being, career opportunities, family relations and psychic well-being. In all these four outcome areas, students with a more optimistic explanatory style had more positive perceived outcomes. In contrast to these two studies, our sample consists of over 1500

established entrepreneurs and managers and more than 850 employees as a benchmark. Thus, our study neither relies on stated intentions nor hypothetical business scenarios while being a student, but on truly revealed preferences by actual occupational choices.

3 | Survey Design: Measurement and Sampling

3.1 | Measures of Optimism and Overconfidence Included in the Survey

Based on the motivation in the previous section, our survey contains two unincentivized measures of optimism. *Dispositional optimism* (Scheier and Carver 1985; Scheier, Carver, and Bridges 1994) captures the pure expectation aspect of optimism, while an *optimistic explanatory style* (Seligman 2000; Buchanan and Seligman 1995) taps attribution and agency. We also include two incentivized measures of overconfidence. *Overestimation of own ability* directly corresponds to the first form of overconfidence distinguished by Moore and Healy (2008). *Overestimation of general economic outlook* (Bengtsson and Ekeblom 2014) captures self-serving forecasting errors of favorable external events. We detail each of these measures in turn.

3.1.1 | Dispositional Optimism

We measure dispositional optimism using the 10-item self-report questionnaire of Scheier, Carver, and Bridges (1994), which is also referred to as the Revised Life Orientation Test (LOT-R). Appendix A depicts a screenshot from the survey that lists the 10 items (see Figure A1). Three items are associated with positive expectations (1, 4, and 10), three with negative ones (3, 7, and 9), and the remaining four statements are filler items (2, 5, 6, and 8). Each statement can be answered with either “Strongly disagree” (0 points), “Disagree” (1 point), “Neutral” (2 points), “Agree” (3 points), or “Strongly agree” (4 points). To obtain an overall score for optimism, the scores of all six non-filler items are added, where the items with negative expectations are reversely coded. Thus, a respondent’s dispositional optimism score lies between 0 and 24 points. Following the discussion in the literature that optimism and pessimism need not necessarily be polar opposites but may potentially reflect two separate dimensions (cf. Section 2.1), we also report them separately. For pessimism we sum the scores of the three items with negative expectations (3, 7, and 9), so that a higher score means a higher level of pessimism. In a similar vein a separate optimism score is obtained by summing the items with positive expectations (1, 4, and 10).

3.1.2 | Optimistic Explanatory Style

To measure the level of an optimistic explanatory style, we use the 32-item optimism test taken from Seligman (2000) (see Figure A2 in Appendix A for a screenshot of the first three items). The test generates scores on four variables: *PmG* (permanence of good events), *PvG* (pervasiveness of good

events), *PmB* (permanence of bad events) and *PvB* (pervasiveness of bad events). We use the same scoring rule as Seligman (2000). The sum of *PmG* and *PvG* (i.e., the score for good events) minus the sum of *PmB* and *PvB* (i.e., the score of bad events) serves as a general indicator of the level of optimism in one's explanatory style (range: -16 until 16). A high score is associated with optimism, as good events are believed to be caused by factors that are permanent and universal, whereas bad events are explained by temporary and specific causes. Conversely, low scores on explanatory style are associated with pessimism: pessimists believe bad events to be caused by factors that are permanent and universal, whereas good events are temporary and specific. Similar to dispositional optimism, we also consider the scores for good events and for bad events separately.

3.1.3 | Overestimation of Own Ability

As measure of overestimation we use the difference between participants' assessments of their own performance on solving 10 Raven puzzles (with varying levels of difficulty) and the actual number of correct answers. Participants were asked to solve 10 puzzles from the Raven Advanced Progressive Matrices (cf. Raven, Raven, and Court 2003); see Figure A3 in Appendix A for a screenshot from the survey with an example. There is only one correct answer per Raven puzzle and possible answers are shown in a multiple choice format. We explicitly mentioned that, if participants perceived a puzzle as too hard, they should feel free to guess and move to the next one. One of the main benefits of these puzzles for our study is that it is hard to find the correct solution on the Internet, which is a potential hazard when using an online survey. Moreover, performance on this task provides a proxy for cognitive ability, as Raven matrices are developed to serve as a "culture-free IQ test" (Herz, Schunk, and Zehnder 2014, p. 5). After all 10 questions had been answered, participants had to provide an estimate of the number of correct answers they gave. This estimate was incentivized: for the selected prize winners a correct answer was rewarded with €100 and an incorrect answer with €0 (see the next subsection for a description of the overall incentives in our survey).

The number of actually correct answers itself was also used as a proxy for intelligence in the set of control variables. This is possible because we selected as the first five Raven puzzles the ones prescribed by Bilker et al. (2012), which are shown to have a correlation of 0.95 with the actual score on the full 60-item Raven Standard Progressive Matrices test. The last five Raven puzzles were selected from the shortened 12-item Raven test of Arthur Jr. and Day (1994), which are somewhat harder and therefore create some extra dispersion across participant scores, especially at the high end.

3.1.4 | Overestimation of General Economic Outlook

Following Bengtsson and Ekeblom (2014), this measure is operationalized as follows. Respondents are requested to provide a

3-month forecast of the value of the AEX index, the Dutch stock market index composed of the largest companies trading on NYSE Euronext Amsterdam. To help participants, we disclosed the current rounded AEX closing price, which was 397. As an incentive, selected prize winners were rewarded with €100 if their estimate was within 10 points from the actual realized closing price 3 months later (equal to 414), and €0 otherwise. The comparison between the individual forecast and the actual realized closing price (viz. 414) yields two measures of overestimating general economic prospects: the absolute difference between the estimated and the actual closing price (Δ AEX forecast), and an indicator variable for the direction of the difference (Δ AEX sentiment). Allowing a 10 points range around 414, the indicator equals -1 for a too low estimation of the actual AEX closing price, 0 for an about correct estimation, and 1 for a too high forecast. Note that the sentiment variable indicates whether the respondent has more positive expectations than the actual sentiment (where the latter turned out to be positive).

3.2 | Sampling

For the data collection, we collaborated with several business partners in the Netherlands (similar to the setup used by Koudstaal, Sloof, and van Praag 2016, 2019). For reaching volume in the entrepreneur sample, we teamed up with "Synpact," a company with an active and up to date database of more than 15,000 entrepreneurs in the Netherlands. All of these entrepreneurs received an invitation to participate in the online research and a link to the incentivized questionnaire. The sample of managers was obtained from training center "De Baak," which is part of the largest and influential employers organization in the Netherlands ("VNO-NCW, MKB-Nederland"). We approached 4131 managers in their files. Finally, the same invitation and survey were sent to a sample of 7500 employees, recruited via a Dutch market research agency with access to over 70,000 Dutch employees. All invitations were sent out to all groups on the same day, with the explicit mentioning of a response time of 14 days at most. A reminder was sent out after 7 days. In total, 1041 entrepreneurs, 502 managers, and 861 employees completed the survey. The response rates were thus in the range of 7%–12% and in line with expectations of Synpact and De Baak who regularly send out qualitative surveys to their database on their own.

The qualifying characteristics for inclusion in the entrepreneur sample are as follows. "Entrepreneurs" are all people who have founded, inherited or taken over a company that they are currently (co-)managing. We also classified participants as "entrepreneurs" when they currently (co-)manage a company which they joined within 5 years after start-up and of which they have obtained at least 5% of the company shares.¹² "Managers" are those non-entrepreneurs who are employed by an organization and have at least two subordinates for whom they are directly responsible. Project managers also classify in case of overall project responsibility and at least two direct reporting lines. People belong to the group of "employees," finally, if they are employed by an organization and do not belong to the first two groups.¹³

Respondents were requested to first complete the two unincentivized parts on dispositional optimism and explanatory style and then fill out the two incentivized parts on overestimation (i.e., the 10 Raven test questions and the AEX 3 months forecast). All participants were first informed about the general setup of the survey and the incentives structure. Instructions also included an example and practice round to get acquainted with the Raven puzzles. Overall, an average respondent spent 23 min on the survey, including possible breaks. Ex ante, the estimated average earnings per winning respondent were around €300. Participants could earn a maximum of €450, which consisted of a fixed fee of €250 and two times €100 that could be earned in the two incentivized parts. Given budget limitations and the rather high income levels of the participants in our survey, we chose to pay out a substantial (instead of very small) amount to a few (instead of all) randomly selected participants. In doing so, we follow Charness, Gneezy, and Halladay (2016) who show that this should produce similar results as when paying smaller amounts to all participants. In total, we selected 25 prize winners. This was clearly communicated at the beginning of our survey. Hence, ex post the chance to be paid out was 1/83, but this was unknown to the participants (and ourselves) ex ante. To further foster trust and truthful reporting, we assigned the selection of prize winners, all random draws, and the payouts to a civil-law notary.

4 | Descriptive Statistics

Table 1 shows the descriptive statistics of the employed measures of optimism and overconfidence. Dispositional optimism measures include the unidimensional overall construct, as well as the sub-scores on optimism and pessimism. Explanatory style is reported for both the total score and for the two subdimensions of good and bad events, respectively. Our first measure of overconfidence is given by the overestimation of one's own ability. Finally, overestimation of general economic outlook as measured by the forecast of the 3-month AEX closing price is shown both as the difference between the forecast and the realized value of 414 (Δ AEX forecast), and as an indicator reflecting whether the estimation of the closing price was too low (−1), about correct (0), or too high (1) (Δ AEX sentiment). The means of the various constructs reveal that, on average, respondents are more optimistic than pessimistic and also

mildly overconfident with respect to their own ability and rather calibrated when it comes to their general economic outlook. However, from the dispersion measures we also observe that there is quite some variation among respondents. The correlations between the various measures are reported in Table B1. We find that—apart from the main constructs and their sub-dimensions—the correlation between measures is rather weak (albeit significant). This suggests that the four measures pick up complementary aspects of optimism and overconfidence (cf. Isaacowitz and Seligman 2001).

Table 2 provides an overview of professional background characteristics across occupations. Panel A shows the income distribution for each of the three samples, based on the income brackets used in the survey. Entrepreneurs are over-represented in both tails relative to managers and employees, consistent with previously obtained evidence (e.g., Hamilton 2000). The average level of entrepreneurial income is slightly lower than average managerial income and similarly so for median income. Panel B reports some specific entrepreneur and manager characteristics. 80% of the entrepreneurs are firm founders, 17% of the firms were acquired by takeover, and the remaining 3% of the entrepreneurs have joined an existing firm within 5 years after start-up (and acquired a minimum of 5% of its shares). Among managers, 12% are CEO, 71% are general managers, and 17% are project managers.

Panel C describes the type of firms that entrepreneurs, managers and employees work in. For entrepreneurs the categorization relates to various definitions of “an entrepreneur” in the literature. 13% (29%) of them are currently managing firms in the start-up (survival) phase, that is, firms of at most 2(5) years old (the definition of entrepreneurs used by, for instance, Brockhaus 1980 and Busenitz and Barney 1997), whereas the rest is beyond that phase (the definition of Holm, Opper, and Nee 2013). A total of 53% of the entrepreneurs are incorporated (cf. Levine and Rubinstein 2017). The right-hand side of Panel C depicts the age and size distributions of the firms that managers and employees work for. These are rather similar, but older and larger than the entrepreneurial firms. Finally, Panel D shows the distribution of the span of control of entrepreneurs (left) and managers (right) in our sample. For most this span is relatively modest, but 10% of managers and 12% of entrepreneurs direct more than 25 employees.

TABLE 1 | Descriptive statistics of the optimism and overconfidence measures.

	Observations	Mean	SD	Min	Max
Dispositional optimism	2404	16.94	4.09	0	24
Optimism score (LOT-R)	2404	8.61	2.25	0	12
Pessimism score (LOT-R)	2404	3.67	2.59	0	12
Explanatory style	2404	2.35	3.25	−15	13
Good events	2404	8.19	2.24	1	15
Bad events	2404	5.85	2.19	0	16
Overestimation of own ability	2404	0.46	1.74	−6	7
Δ AEX forecast	2404	−0.24	34.30	−406	386
Δ AEX sentiment	2404	−0.04	0.71	−1	1

TABLE 2 | Professional background characteristics across occupations.

Entrepreneurs (n = 1041)		Managers (n = 502)		Employees (n = 861)
<i>Panel A: Income</i>		<i>Panel A: Income</i>		
< €25,000	26%	< €25,000	1%	30%
€25,001–€50,000	21%	€25,001–€50,000	11%	51%
€50,001–€75,000	16%	€50,001–€75,000	32%	15%
€75,001–€125,000	22%	€75,001–€125,000	43%	4%
€125,001–€200,000	10%	€125,001–€200,000	9%	0%
€200,001–€300,000	2%	€200,001–€300,000	2%	0%
€300,001–€400,000	1%	€300,001–€400,000	1%	0%
> €400,000	2%	> €400,000	1%	0%
525 observations are missing		218 observations are missing		526 observations are missing
<i>Panel B: Entrepreneur characteristics</i>		<i>Panel B: Manager characteristics</i>		
Founder	80%	CEO	12%	—
Business taken over	17%	General Manager	71%	—
Joined within 5 years	3%	Project Manager	17%	—
<i>Panel C: Firm characteristics</i>		<i>Panel C: Firm characteristics</i>		
<i>Firm age</i>		<i>Firm age</i>		
Start-up phase (0–2 years)	13%	≤ 5 years	5%	6%
Survival phase (0–5 years)	29%	6–50 years	47%	55%
		> 50 years	48%	39%
<i>Legal structure</i>		<i>Firm size</i>		
Incorporated	53%	≤ 25 FTE	13%	16%
Sole proprietorship	37%	26–1000 FTE	49%	46%
Other	10%	> 1000 FTE	38%	38%
356 observations are missing		182 observations are missing		479 observations are missing
<i>Panel D: Management level (employees, FTE)</i>		<i>Panel D: Management level (direct reports)</i>		
0	16%			
1	25%			
2–5	25%	2–5	32%	—
6–10	10%	6–10	35%	—
11–25	12%	11–25	23%	—
26–50	5%	26–50	7%	—
51–100	4%	More than 50	3%	—
101–500	3%			
More than 500	0%			
374 observations are missing		182 observations are missing		

The professional background characteristics in Table 2 allow us to perform heterogeneity checks, to examine the robustness of our findings to alternative (more strict) definitions of entrepreneurs and managers that have been employed in previous

literature (e.g., as in Busenitz and Barney 1997). In Appendix C we also compare the general background characteristics age, gender, IQ, and education across occupations. Entrepreneurs and managers appear very similar, although the entrepreneurs

in our sample are slightly older and more often male than managers. Employees are on average younger, more likely to be female and have lower levels of education and IQ than both managers and entrepreneurs. These differences illustrate the importance of controlling for general background characteristics when comparing optimism and overconfidence levels between occupations.

5 | Results

5.1 | Main Results

We first look at the raw differences between occupational groups. The left-hand part of Table 3 shows the means of our measures of dispositional optimism, explanatory style, and overconfidence for each of the three groups of interest. The right-hand side reports the p values of ANOVA tests between all three occupations, as well as the bilateral group comparisons by means of two-sample t tests. For dispositional optimism we find that managers have the highest average score of all groups. Employees follow at some distance, while entrepreneurs end up in between. The difference between managers and entrepreneurs is not statistically significant, however.¹⁴ The average score for employees is close to the 14.33–15.15 interval reported by Scheier, Carver, and Bridges (1994). Examining optimism and pessimism separately, managers appear the least pessimistic, closely followed by the entrepreneurs who, in turn, are less pessimistic than employees. Prior research has shown that high levels of optimism are correlated with higher levels of career planning and exploration, being more decided about career decisions, and having more career-related goals, whereas high levels of pessimism lead to lower levels of career and decision-making knowledge and being more career indecisive (e.g., Creed, Patton, and Bartrum 2002). The lower optimism

and higher pessimism levels we observe for employees are in line with this.

Turning to explanatory style as measured by the Seligman (2000) test, entrepreneurs and managers score about the same on the main construct. The difference between groups as suggested by the ANOVA test arises from employees standing out; entrepreneurs and managers alike have a significantly more optimistic explanatory style of dealing with past events than employees have. The two subdimensions of explanatory style reveal that this difference is mostly driven by how employees cognitively handle bad events; here they score significantly higher than entrepreneurs and managers do (who have almost the same score). This indicates that employees tend to explain bad events with rather permanent and universal causes, whereas entrepreneurs and managers are more likely to believe that bad events are temporary and specific (not universal). In contrast, for good events that happened in the past employees are least inclined to attribute these to factors that permanent and universal (i.e., expand to other areas). The difference with managers is insignificant though, and so is the difference between managers and entrepreneurs. Together these findings indicate that strategic decision makers have a more optimistic explanatory style. Seligman (2000) suggests that they can leverage such an explanatory style in their future behavior, making them more resilient in the face of setbacks (see also Kahneman 2011).

The next line of Table 3 depicts the differences in group mean values of the incentivized overestimation measure in terms of own ability. Entrepreneurs overestimate their own ability most of all three groups, while managers and employees seem to be more similar in their overconfidence on average. None of the raw differences is statistically significant, however. The final two ΔAEX measures reflect our measures of

TABLE 3 | Raw differences in optimism and overconfidence between occupational groups.

	Mean			ANOVA	p values		
	Entrepreneurs ($n = 1,041$)	Managers ($n = 502$)	Employees ($n = 861$)		ENT versus MAN	ENT versus EMP	MAN versus EMP
Dispositional optimism	17.72	18.02	15.37	0.000	0.147	0.000	0.000
Optimism (LOT-R)	9.03	9.10	7.83	0.000	0.539	0.000	0.000
Pessimism (LOT-R)	3.30	3.07	4.47	0.000	0.088	0.000	0.000
Explanatory style	2.72	2.66	1.71	0.000	0.713	0.000	0.000
Good events	8.32	8.18	8.05	0.039	0.267	0.011	0.308
Bad events	5.59	5.52	6.35	0.000	0.537	0.000	0.000
Overestimation of own ability	0.52	0.43	0.41	0.352	0.328	0.175	0.838
ΔAEX forecast	−0.13	1.57	−1.44	0.292	0.263	0.434	0.153
ΔAEX sentiment ^a	−0.01	0.02	−0.12	0.000	0.504	0.000	0.000
AEX sentiment (−1)	0.23	0.23	0.35				
AEX sentiment (0)	0.54	0.52	0.41				
AEX sentiment (1)	0.23	0.25	0.24				

^aFor the comparison of frequencies of the three sentiment categories across occupational groups χ^2 tests are performed and corresponding p values are reported. The three bottom rows show the fractions of the ΔAEX sentiment variable by occupational group.

overestimation of general economic outlook, based on the difference between respondents' forecasts of the 3-months AEX closing price and its realized value. On average, all three groups expected the value of the stock market to increase, and their estimates were close to the actual realized value. Managers had the highest expectations about the development of the closing price, followed by entrepreneurs. Yet, the differences in forecasts are not statistically significant between any of the three groups. Solely focusing on the sentiment of the forecast—too low (−1), approximately correct (0) or too high (1)—as ΔAEX sentiment does, all groups on average had quite a realistic expectancy about the future economic situation. For this measure, which is less sensitive to outliers, we find that entrepreneurs and managers are more overconfident than employees. The last three rows show the fraction of individuals in each of the three occupational groups that underestimated, correctly guessed, or overestimated the general economic outlook. These fractions suggest that employees are more likely to underestimate the economic outlook as compared to entrepreneurs and managers.

To ensure that the observed raw occupational differences are not simply reflecting differences in general background characteristics, we report in Table 4 the results from standard regression analyses that includes these characteristics as controls. The two dummy variables “ENTrepreneur” and “MANager” are the main explanatory variables of interest, with employees serving as benchmark group. As controls we add: age, age squared, female, education, IQ, and $\ln(\text{income})$. The categorical education variable indicates the highest attained level of education: either high school or lower (0), vocational degree (1), higher professional degree (2), a university degree (3), or other degree (4). The originally categorical income variable has been converted into a continuous variable of which the natural log has been taken, using the midpoints of the categories (and 0.5 million euros for the upper category). IQ is measured by the number of correct answers to the 10 Raven puzzles. For missing controls observations, we use imputed values based on the respective occupational group means. For readability, the coefficients for the the control variables have been omitted from Table 4; the full regression results are included in Table C2 in Appendix C.

For most of our measures the results including control variables are similar to the raw comparison of means shown in Table 3. Consider dispositional optimism first. The estimated coefficients for the two occupational dummies indicate that both entrepreneurs and managers are more optimistic in terms of general expectations for the future compared to employees, while they do not differ from each other (see the p-value of the Wald test in the final row).¹⁵ Also when we decompose dispositional optimism into an “optimistic” part (Column 1a) and a “pessimistic” part (Column 1b), the results show that entrepreneurs and managers alike have more optimistic and less pessimistic expectations about future events than employees. For explanatory style, the findings from the raw comparisons are also fully confirmed (see Columns 2, 2a, and 2b). Entrepreneurs as well as managers have a more optimistic explanatory style compared to

TABLE 4 | Optimism and overconfidence of entrepreneurs, managers, and employees.

	(1)	(1a) Optimism (LOT-R) ordered probit	(1b) Pessimism (LOT-R) ordered probit	(2) Explanatory style ordered probit	(2a) Good events ordered probit	(2b) Bad events ordered probit	(3) Over- estimation of own ability ordered probit	(4a) ΔAEX forecast OLS	(4b) ΔAEX sentiment ordered probit
ENT	0.417*** (0.058)	0.394*** (0.059)	−0.314*** (0.057)	0.284*** (0.056)	0.135** (0.057)	−0.288*** (0.056)	0.257*** (0.061)	0.807 (2.050)	0.082 (0.063)
MAN	0.394*** (0.069)	0.346*** (0.068)	−0.313*** (0.069)	0.234*** (0.068)	0.076 (0.069)	−0.272*** (0.068)	0.233*** (0.070)	2.296 (2.449)	0.119 (0.076)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2404	2404	2404	2404	2404	2404	2404	2404	2404
Log lik.	−6516.004	−5086.127	−5351.100	−6188.596	−5325.224	−5211.074	−4169.965	−11902.916	−2496.717
ENT = MAN	0.681	0.390	0.981	0.364	0.293	0.781	0.677	0.345	0.549

Note: Robust standard errors in parentheses. The final row reports the p values of Wald tests on (Entrepreneur) = (Manager).
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

employees, and also when zooming in on dealing with negative past events. For positive past events, entrepreneurs are more likely than employees to evaluate these as persistent and pervasive, but we do not observe any significant differences between managers and entrepreneurs nor between managers and employees.

For overestimation of own ability a different result is found from the raw comparisons. The ordered probit results in Column 3 of Table 4 show that compared to employees, both entrepreneurs and managers are significantly more likely to overestimate their ability when estimating how many out of the 10 Raven puzzles they have solved correctly. The raw comparisons did not reveal such a difference. The main reason behind this is that IQ has a significantly negative effect on overconfidence (cf. Table C2 in Appendix C) and employees have a lower IQ on average. The raw comparisons are thus confounded by differences in IQ. As before, however, the difference between entrepreneurs and managers is also not statistically significant in the regression framework with controls (as they do not differ in their IQ). For the two AEX measures that we use as a measure of overestimation of general economic outlook, the results in Columns 4a and 4b reveal that, when controlling for background characteristics, there is no difference in the stock market forecast across groups (neither when looking at the absolute difference nor when comparing the sentiment categories). The raw differences in Δ AEX sentiment between occupations that we observed in Table 3 appear to be driven by gender composition; females have a significantly less positive sentiment than males have and are underrepresented among entrepreneurs and managers.

5.2 | Robustness Checks

To ensure that the ordered probit results presented in Section 5.1 are robust to other specifications, we also perform the analyses with a linear probability model and a Logit regression using binary variables for high levels of optimism and overconfidence. For each of our measures, we create a dummy variable for *high* Optimism (Overconfidence) based on the median sample split, which takes the value of one (1) for individuals with optimism (overconfidence) values above the median and zero (0) otherwise. The results of these analyses are shown in Tables B2 (OLS) and B3 (Logit) in Appendix B. The results of these robustness tests are mostly consistent with the findings presented in Table 4. The only difference can be found with regard to overestimation of general economic outlook. Here we find that, based on our binary measures, entrepreneurs and managers are typically different from employees, that is, strategic decision makers are more likely to have above median estimations of the stock market forecast. However, also in these robustness tests, we do not find any differences between entrepreneurs and managers in terms of their optimism or overconfidence.

Furthermore, in Table 1 the minimum and maximum values for Δ AEX forecast are very low at -406 (and similarly the maximum is very high at 386). To ensure that our findings are

not biased due to these extreme values, we winsorize the AEX forecast at the 1st and 99th percentile, and calculate the Δ AEX forecast and Δ AEX sentiment using these winsorized values. The results for this robustness test are largely similar as the results for overestimation of general economic outlook presented in Table 4 and are shown in Table B4 in Appendix B.

Overall, if anything, the robustness checks suggest that entrepreneurs and managers may also stand somewhat apart from employees in overestimating general economic prospects, but (if so) differences here are much less pronounced.

5.3 | Heterogeneity Checks

Making use of the professional background characteristics reported in Table 2, we examine the robustness of our findings to alternative definitions of both entrepreneurs and managers. We consider stricter definitions of entrepreneurs first. Panel A of Table B5 (see Appendix B) analyzes the occupational differences in optimism and overconfidence restricting the sample of entrepreneurs to either founders that are still in the early, “truly entrepreneurial” stage of their new venture (see ii and iii in Panel A), or those that are arguably more successful in terms of above median income or being incorporated (see i and iv). For managers and employees we employ the original samples. Each reported coefficient is obtained from a separate regression. Overall, Panel A shows a clear pattern. The highly significant differences between entrepreneurs and employees shown in Table 4 typically also hold for the more successful and the early stage entrepreneurs. More specifically, in regard to dispositional optimism and explanatory style the exact same results are obtained for the subsamples (i) to (iv) as for the overall sample of all entrepreneurs.¹⁶ The same holds true for the Δ AEX sentiment measure of overestimation of general economic outlook: the estimated entrepreneur dummy is close to zero and not significant in any of the subsamples. For overestimation of own ability we find that the difference between entrepreneurs and employees now becomes insignificant for incorporated entrepreneurs. By and large, however, the general conclusions from Table 4 are confirmed.

Panel B of Table B5 turns to stricter definitions of a manager (while using the complete samples of entrepreneurs and employees). These create subsamples of more successful or higher level managers, as well as of managers that have been considered in earlier studies (viz. the ones employed in very large organizations). Like in Panel A, the pattern in Panel B is mostly consistent with the results for the full sample; that is, also the specific subsamples of managers are typically more optimistic and more overconfident than employees. Only two deviations from the previous results are observed. First, for CEOs the difference with employees in Δ AEX sentiment is now significant, that is, CEOs are more likely to overestimate the general economic outlook compared to employees. Second, for managers in organizations with over 10,000 employees the differences in dispositional optimism and explanatory style are insignificant. These deviations

suggest that managers in very large firms are more comparable to employees.

Finally, in Panel C we compare specific subsamples of both entrepreneurs and managers. The first two comparisons focus on the arguably more successful ones. For both comparisons we find almost no differences in optimism and overconfidence (while they clearly stand out from employees), in line with the earlier findings for the overall samples. The only observed difference in these direct comparisons is in terms of Δ AEX sentiment, which is significantly higher for CEOs compared to incorporated entrepreneurs. The third comparison aims to replicate the findings of Busenitz and Barney (1997). They define entrepreneurs as firm founders currently involved in the startup process. This is operationalized by considering those who “...started their venture within the last two years and/or [were] currently planning on starting another venture within the next five years” (p. 17). Furthermore, they define managers in large organizations as (p. 18): “...individuals who have responsibility for at least two functional areas [...] and work for publicly owned organizations with more than 10,000 employees.”¹⁷ We thus compare our subsamples of entrepreneurial founders that are still in the startup phase (ii) with managers in very large firms (viii), see the last row of Panel C. These managers appear significantly less optimistic than founders in terms of dispositional optimism. For the other measures no significant differences are found, possibly because of the low number of observations.¹⁸ Nevertheless, together with the above finding that managers in large organizations are more comparable to employees than managers in general are, this tentatively suggests that the subset of managers in large firms might be somewhat special.

6 | Conclusion

In this paper, we have explored the empirical relationship between optimism, overconfidence, and employment status by means of a lab-in-the-field experiment among a substantial number of entrepreneurs, managers, and employees. We considered two distinct measures of optimism (dispositional optimism and explanatory style), thereby capturing different dimensions of this multidimensional construct. We also included two incentivized measures of overconfidence, namely, overestimation of one's own ability as well as overestimation of the general economic outlook (stock market forecast). Our findings reveal that both entrepreneurs and managers are more optimistic than employees. They are also both more prone to overconfidence than employees are. At the same time, we could not detect any differences between the two groups of strategic decision makers at large. Our heterogeneity checks demonstrate that these findings are largely insensitive to the occupational definitions used. A notable exception is that we do find some confirmation of the findings by Busenitz and Barney (1997); entrepreneurs defined as founders in the startup phase score significantly higher on dispositional optimism than managers in firms with more than 10,000 employees do. The latter managers are also more comparable to workers in their dispositional optimism and explanatory style, suggesting that managers in large firms might not be fully representative of the group of

managers at large. Overall, entrepreneurs and managers may thus well be more similar to each other than has been believed up till now, supporting a hubris theory for both managers (Roll 1986) and entrepreneurs (Hayward, Shepherd, and Griffin 2006).

As already noted in the Introduction, we believe our study offers several contributions to the existing literature, by providing a comprehensive comparison of various measures of optimism and overconfidence on a large sample that allows us to explore potential heterogeneity between different types of entrepreneurs and managers. Nevertheless, our study clearly also comes with several limitations. First and foremost, because our study is purely descriptive, it cannot identify cause and effect. However, a number of existing findings provide some guidance in how to interpret our results: longitudinal studies indicate that dispositional optimism, explanatory style and overestimation are relatively stable traits throughout adult life (see e.g., Burns and Seligman 1989; Carver, Scheier, and Segerstrom 2010; Dawson et al. 2014). Likewise, Dawson et al. (2014) explicitly study whether overestimation is a trait of future entrepreneurs, or whether it is developed during entrepreneurship. They find stronger evidence for overestimation being a cause rather than a consequence of entrepreneurship. These studies therefore suggest that more optimistic and overconfident people likely select into entrepreneurship and management, rather than that these traits are acquired during professional life.

Second, we examined only one (of three) forms of overconfidence, namely overestimation. There is some evidence that especially overplacement might be a driver into entrepreneurship (e.g., Camerer and Lovo 1999; Cain, Moore, and Haran 2015; Gutierrez, Åstebro, and Obloj 2020; Holm, Opper, and Nee 2013). Furthermore, Herz, Schunk, and Zehnder (2014) argue—and find evidence from an incentivized individual decision making experiment—that overprecision is negatively related to exploration and experimentation efforts. Overprecision has also been linked to the speed with which entrepreneurs update their beliefs post entry (Chen et al. 2018), with underprecision being associated to fast, and overprecision to slow, belief updating. Overprecision might thus reduce the incentives to become an entrepreneur and have a negative impact on success as well. Third, we have only studied optimism and overconfidence at the individual level. While entrepreneurs and managers are essential to their respective organizations (e.g., Hambrick and Mason 1984; Graham, Harvey, and Puri 2013; Gutierrez, Åstebro, and Obloj 2020), high rank general managers often work in management teams. The same may be true, although perhaps to a lesser extent, for entrepreneurs, as many startups are nowadays done in teams.

These limitations offer some immediate suggestions for future research. First, future studies could examine potential differences in optimism and overconfidence across the lifespan of entrepreneurs and managers. Second, given their potential importance for entry and performance, future research could take a closer look at the differences between entrepreneurs, managers, and employees in terms of overplacement and overprecision. Third, future research might

address the role of optimism and overconfidence of individuals working in teams and how a more pessimistic and less overconfident team member (for instance the CFO) might offset or strengthen the role of the CEO's optimism in team performance. Finally, as Koudstaal, Sloof, and van Praag (2019) suggest, the relationship between an intuitive ors contemplative decision-making style and optimism and overconfidence, also seems well worth to explore. In fact, Fossen and Neyse (2024) have recently done so for overconfidence. Extending this to optimism—and in particular an optimistic explanatory style—seems valuable.

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Data Availability Statement

The data that support the findings of this study will be made openly available through a public data repository upon publication.

Endnotes

¹For instance, in their review article of executive (over)confidence studies within the management literature, Heavey et al. (2022) reserve optimism for general expectancies, stating that “Critically, the focus is not on whether an individual can affect a favorable outcome...” (p. 1443). Beliefs about attribution and agency—and thus the optimistic explanatory style measure discussed below that we put under the optimism label—in their view capture (over)confidence.

²In a similar vein, Peterson (2000) argues that optimism can operate at different levels of abstraction. So-called “big optimism” relates to larger, unspecific expectations, while “little optimism” concerns specific expectations about specific positive outcomes. These types of optimism may function differently in facilitating desirable outcomes. Big optimism does so by producing “a general state of vigor and resilience,” while little optimism does so by predisposing “specific actions that are adaptive in concrete situations” Peterson (2000, p. 49). Although not one-to-one, Peterson portrays dispositional optimism as big optimism and explanatory style as a measure of little optimism, since the latter focuses on “specific causal explanations for concrete events” (p. 49).

³This context specificity may also have a drawback, however, because it allows for a larger scope for unobserved differences, for instance with regard to (financial) knowledge and skills.

⁴Alternative explanations include higher risk appetites (e.g., Hvide and Panos 2014), non-pecuniary benefits pertaining to higher levels of autonomy and control (e.g., Blanchflower and Oswald 1998; Hamilton 2000; Hurst and Pugsley 2011; Puri and Robinson 2013), different selection and treatment effects of personality traits (e.g., Hamilton, Papageorge, and Pande 2019), and status concerns (e.g., Parker and van Praag 2010). See also Åstebro et al. (2014) for an overview of the (behavioral) roots of entrepreneurship.

⁵For optimism, see for example, Krueger Jr., Reilly, and Carsrud (2000), Hmieleski and Baron (2009), and Puri and Robinson (2013). For overconfidence, see for example, Cooper, Woo, and Dunkelberg (1988), Busenitz and Barney (1997), Camerer and Lovallo (1999), Arabsheibani et al. (2000), Simon, Houghton, and Aquino (2000), Åstebro (2003), Crane and Crane (2007), Puri and Robinson (2007), Koellinger, Minniti, and Schade (2007), Trevelyan (2008), Landier and Thesmar (2009), Cassar (2010), Ucbasaran et al. (2010), Bengtsson and Ekelblom (2014), Dawson et al. (2014), and Dawson et al. (2019).

⁶Kraft et al. (2022) conduct a meta-analysis to study the role of the three different types of overconfidence (overestimation, overplacement and overprecision) in the three different phases of the

entrepreneurial process. They find that overconfidence (of each form) is positively related with both opportunity assessment and new venture creation. However, overprecision and new venture performance are negatively associated. In their Table 1 they also provide an informative overview of prior empirical studies and findings on the relationship between overconfidence and various entrepreneurial outcomes (including market entry, innovativeness, pioneering products, venture performance and firm failure/survival).

⁷Picone, Dagnino, and Minà (2014) and, more recently, Heavey et al. (2022) provide informative reviews of the managerial hubris literature. Table 1 in the latter gives a nice summary overview of the behavioral implications and outcomes of executive (over)confidence that have been empirically established. Besides a dark side, managerial hubris may also have a bright side. For instance, overconfident managers have been found to pursue (valuable) innovation more often, obtain more patents and patent citations, and achieve greater innovative success for given research and development expenditures (Hirshleifer, Low, and Teoh 2012; Galasso and Simcoe 2011).

⁸Santos-Pinto and Sobel (2005) obtain a closely related theoretical result showing that an individual's level of positive self-image increases with the number of different skills deemed to be important for one's overall level of ability. As both entrepreneurs and managers have to draw upon a larger set of different skills to perform their tasks, that is, must be generalists or jacks-of-all-trades (Lazear 2005), this could provide a similar cause for their overconfidence.

⁹Using a large data set of 2790 Chinese manufacturing firms, Li and Tang (2010) find empirical evidence that larger managerial discretion strengthens the positive relationship between CEO hubris and firm risk taking.

¹⁰Two studies compare entrepreneurs with managers using different, but more noisy proxies of overconfidence. Tommasi et al. (2024) employ the under/overconfidence component of the overall Adult Decision Making Competence measure in their survey. They find that entrepreneurs are more miscalibrated (i.e., both more overconfident and underconfident) than managers. Lee, Hwang, and Chen (2017) measure overconfidence using field data on the tone of CEO tweets, tone of statements in conference calls, management earnings forecasts and option-exercise behavior. For large S&P 1500 companies they find that, compared to professional CEOs, founder CEOs are more overconfident.

¹¹Kasouf, Morrish, and Miles (2015) develop a conceptual framework of the antecedents and outcomes of entrepreneurial self-efficacy. Based on this they hypothesize that explanatory style positively moderates the impact of both human and social capital on entrepreneurial self efficacy, and thereby ultimately on entrepreneurial action.

¹²The Dutch tax authority considers a five percent ownership to be a “substantial interest.”

¹³Participants who were eligible for multiple subsamples were instructed to select the one on which they spent most of their time.

¹⁴Further (unreported) descriptives reveal that 56% of entrepreneurs, 59% of the managers, and 32% of the employees can be classified as “very optimistic” (i.e., have a score of 18 or more). In the case of managers this is a slightly higher percentage than the 54% observed for European CEOs in Graham, Harvey, and Puri (2013). Note that these percentages still seem much lower than what is found for US CEOs (e.g., 80% in Graham, Harvey, and Puri 2013) and what seems to be the case for US entrepreneurs (Hmieleski and Baron 2009). Although Hmieleski and Baron (2009) do not report actual percentages, their average LOT-R score suggests that US entrepreneurs are more optimistic than the entrepreneurs who have participated in this study.

¹⁵Some of the coefficients of the control variables are significant, too (see Table C2 in Appendix C). For age, we find an inverse U-shaped relation with optimism which peaks at the age of 56. Furthermore, we find that women are on average more optimistic than men, and people with higher levels of IQ, a higher income and the ones with a university degree also tend to be more optimistic.

¹⁶For ease of presentation only the main constructs are depicted in Table B5. The heterogeneity checks for the subdimensions do not lead to different conclusions.

¹⁷Since we do not have information on managers' functional areas (such as marketing, finance, personnel, research and development, and manufacturing) in our sample, we run a robustness check using > 5 direct reports as a proxy for functional area. The results are very similar to the ones presented here.

¹⁸Comparing managers in large organizations (> 10,000 employees) with the entire sample of entrepreneurs, the same conclusions are obtained (with for dispositional optimism $p = 0.009$ in the Wald test). Enlarging the subsample of managers to those in firms with > 5000 employees ($n = 59$), not only differences for dispositional optimism are obtained (Wald test p value: 0.006), but then also for explanatory style (Wald test p value: 0.022). The latter seems to be mainly driven by differences in dealing with positive events (Wald test p value: 0.033).

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Appendix A

Screenshots of Survey

See Figures A1–A3.

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To what extent do you (dis)agree with the following 10 statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. In uncertain times, I usually expect the best.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. It's easy for me to relax.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. If something can go wrong for me, it will.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I'm always optimistic about my future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I enjoy my friends a lot.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. It's important for me to keep busy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I hardly expect things to go my way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I don't get upset easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I rarely count on good things happening to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Overall, I expect more good things to happen to me than bad things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

0% ☐ 100%

<< >>

FIGURE A1 | LOT-R.



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1. You and your spouse (boyfriend/girlfriend) make up after a fight. Which of the two statements do you find most applicable?

☐ A: I forgave him/her.

☐ B: I'm usually forgiving.

2. You forget the birthday of your spouse (boyfriend/girlfriend). Which of the two statements do you find most applicable?

☐ A: I'm not good at remembering birthdays.

☐ B: I was preoccupied with other things.

3. You get a flower from a secret admirer. Which of the two statements do you find most applicable?

☐ A: I am attractive to him/her.

☐ B: I am a popular person.

0%100%

<<

>>

FIGURE A2 | Seligman test.

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Example:

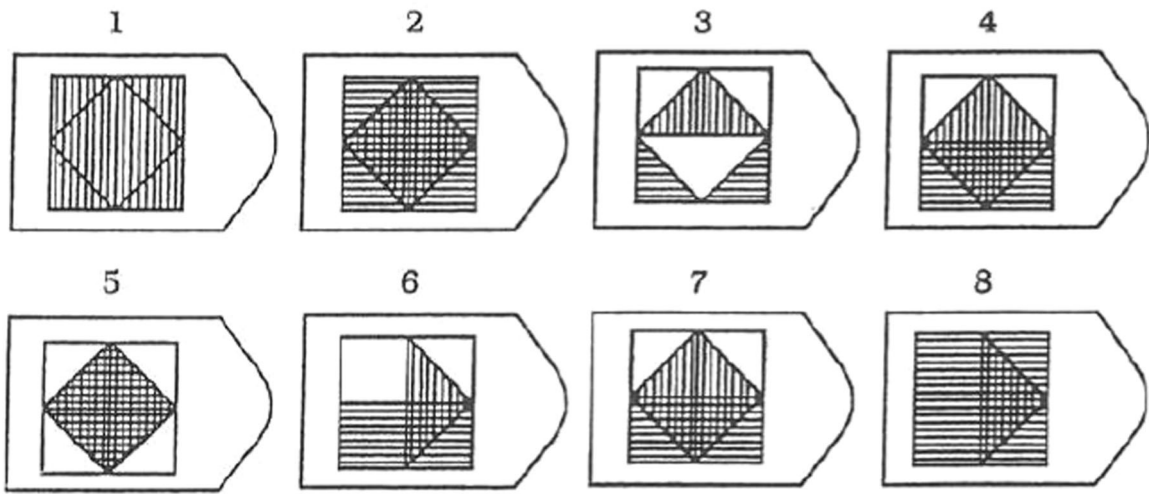
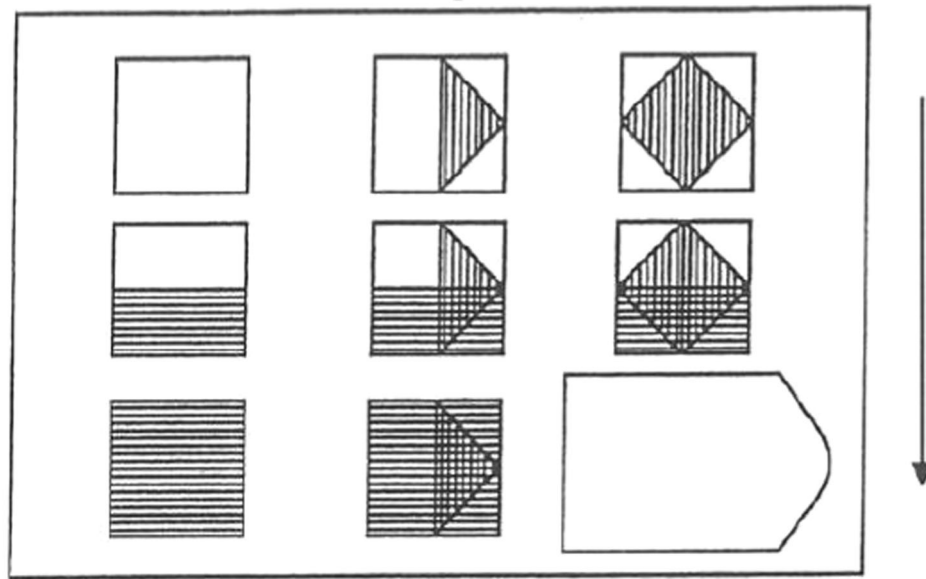


FIGURE A3 | Raven puzzle.

Appendix B

Additional Tables

See Tables B1–B5.

TABLE B1 | Correlations between measures.

		(1)	(1a)	(1b)	(2)	(2a)	(2b)	(3)	(4a)	(4b)
(1)	Dispositional optimism	1.00								
(1a)	Optimism (LOT-R)	0.82***	1.00							
(1b)	Pessimism (LOT-R)	−0.87***	−0.43***	1.00						
(2)	Explanatory style	0.23***	0.21***	−0.18***	1.00					
(2a)	Good events	0.09***	0.12***	−0.05**	0.74***	1.00				
(2b)	Bad events	−0.24***	−0.19***	0.22***	−0.72***	−0.07***	1.00			
(3)	Overest. own ability	−0.02	0.02	0.05***	0.05**	0.07***	−0.00	1.00		
(4a)	△ AEX forecast	0.07***	0.05**	−0.07***	0.04**	0.00	−0.06***	0.02	1.00	
(4b)	△ AEX sentiment	0.09***	0.07***	−0.09***	0.07***	0.02	−0.09***	0.05**	0.64***	1.00

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE B2 | Binary optimism and overconfidence measures-median split (OLS).

	(1) High Disp. Opt.	(1a) High Opt. (LOT-R)	(1b) High Pess. (LOT-R)	(2) High Expl. style	(2a) High Good events	(2b) High Bad events	(3) High Overest. ability	(4a) High △ AEX forecast	(4b) High △ AEX sentiment
ENT	0.152*** (0.027)	0.140*** (0.027)	−0.118*** (0.026)	0.129*** (0.027)	0.072*** (0.027)	−0.077*** (0.027)	0.103*** (0.023)	0.063** (0.028)	0.059** (0.025)
MAN	0.165*** (0.032)	0.150*** (0.033)	−0.137*** (0.033)	0.106*** (0.033)	0.040 (0.033)	−0.098*** (0.034)	0.085*** (0.029)	0.064* (0.034)	0.054* (0.030)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	2404	2404	2404	2404	2404	2404	2404	2404	2404
Log lik.	−1592.04	−1631.56	−1573.41	−1659.72	−1639.28	−1685.21	−1295.81	−1728.70	−1436.62
ENT = MAN	0.626	0.705	0.504	0.392	0.237	0.463	0.447	0.956	0.839

Note: Robust standard errors in parentheses. The final row reports the p -values of Wald tests on (Entrepreneur)=(Manager).

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE B3 | Binary optimism and overconfidence measures-median split (Logit).

	(1) High Disp. Opt.	(1a) High Opt. (LOT-R)	(1b) High Pess. (LOT-R)	(2) High Expl. style	(2a) High Good events	(2b) High Bad events	(3) High Overest. ability	(4a) High △ AEX forecast	(4b) High △ AEX sentiment
ENT	0.622*** (0.116)	0.562*** (0.114)	−0.567*** (0.125)	0.540*** (0.115)	0.313*** (0.116)	−0.328*** (0.116)	0.596*** (0.136)	0.252** (0.112)	0.281** (0.124)
MAN	0.682*** (0.145)	0.607*** (0.143)	−0.637*** (0.148)	0.439*** (0.140)	0.171 (0.141)	−0.410*** (0.140)	0.472*** (0.165)	0.258* (0.137)	0.251 (0.156)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	2404	2404	2404	2404	2404	2404	2404	2404	2404
Log lik.	−1515.73	−1554.62	−1496.670	−1582.52	−1563.08	−1606.55	−1230.61	−1650.26	−1377.83
ENT = MAN	0.629	0.716	0.546	0.393	0.231	0.476	0.373	0.957	0.825

Note: Robust standard errors in parentheses. The final row reports the p -values of Wald tests on (Entrepreneur)=(Manager).

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE B4 | Overestimation of general economic outlook-winsorized values.

	Δ AEX forecast	Δ AEX sentiment
ENT	0.780 (1.231)	0.087 (0.064)
MAN	1.520 (1.437)	0.127* (0.077)
Controls	Yes	Yes
N	2353	2353
Log lik.	-10590.167	-2424.515
ENT = MAN	0.534	0.517

Note: Robust standard errors in parentheses. The final row reports the p -values of Wald tests on (Entrepreneur) = (Manager).

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE B5 | Differences in optimism and overconfidence using stricter definitions of entrepreneurs and manager.

	(1) Dispositional optimism	(2) Explanatory style	(3) Overestimation of own ability	(4) Δ AEX sentiment
<i>Panel A: Subsets of Entrepreneurs</i>				
(i) Above median entrepreneurial income ($n = 716$)	0.377*** (0.077)	0.323*** (0.077)	0.266*** (0.080)	0.017 (0.087)
(ii) Founder in startup phase (i.e., firm age ≤ 2 years, $n = 87$)	0.486*** (0.129)	0.304*** (0.105)	0.353*** (0.133)	0.006 (0.121)
(iii) Founder in survival phase (i.e., firm age ≤ 5 years, $n = 191$)	0.484*** (0.090)	0.338*** (0.085)	0.227** (0.095)	0.007 (0.097)
(iv) Incorporated ($n = 366$)	0.367*** (0.086)	0.236*** (0.084)	0.134 (0.090)	0.003 (0.092)
<i>Panel B: Subsets of Managers</i>				
(v) Above median managerial income ($n = 253$)	0.321*** (0.085)	0.264*** (0.083)	0.218** (0.087)	0.064 (0.092)
(vi) CEO ($n = 61$)	0.453*** (0.109)	0.342*** (0.132)	0.414*** (0.158)	0.469*** (0.161)
(vii) Above median no. of direct reports ($n = 287$)	0.375*** (0.080)	0.252*** (0.077)	0.176** (0.080)	0.07 (0.086)
(viii) Manager in a firm with > 10.000 employees ($n = 39$)	0.029 (0.152)	0.045 (0.165)	0.355*** (0.129)	-0.021 (0.178)
<i>Panel C: Combinations of A & B</i>				
Incorporated entrepreneurs (iv) versus CEOs (vi)	0.621	0.538	0.229	0.009
Above median income entrepreneurs (i) versus managers (v)	0.282	0.761	0.405	0.944
Founders in startup phase (ii) versus managers with > 10.000 employees (viii)	0.004	0.168	0.696	0.966

Note: Robust standard errors in parentheses. Panel C shows the p -values of Wald tests for the comparison between the two groups.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Appendix C

General Background Characteristics and Full Regression Table

Table C1 compares entrepreneurs, managers and employees in terms of age, gender, and IQ. Entrepreneurs and managers are rather similar, although entrepreneurs appear to be slightly older and less likely to be female than managers. Employees are different from managers and entrepreneurs in all three dimensions: on average they are younger, more likely to be female, and have lower levels of IQ. Figure C1 compares the highest educational degrees between groups. Managers are on average better educated than entrepreneurs who, in turn, have higher education than employees. Kolmogorov–Smirnov tests between the groups show that the distributions of all three differ significantly ($p = .000$ for all three bilateral comparisons). Performing chi-squared tests to compare the highest educational degree between the groups yield differences at the 1% significance level as well. Table C2 reports the full regression results underlying Table 4, including the estimated coefficients for the background characteristics.

TABLE C1 | General background characteristics across occupations.

	Means			p values			
	Entrepreneurs (<i>n</i> = 1041)	Managers (<i>n</i> = 502)	Employees (<i>n</i> = 861)	ANOVA	ENT vs. MAN	ENT vs. EMP	MAN vs. EMP
Age	49.82	47.12	43.13	0.000	0.000	0.000	0.000
Female (dummy)	0.26	0.32	0.53	0.000	0.037	0.000	0.000
IQ (scale 1–10)	6.20	6.35	5.50	0.000	0.276	0.000	0.000

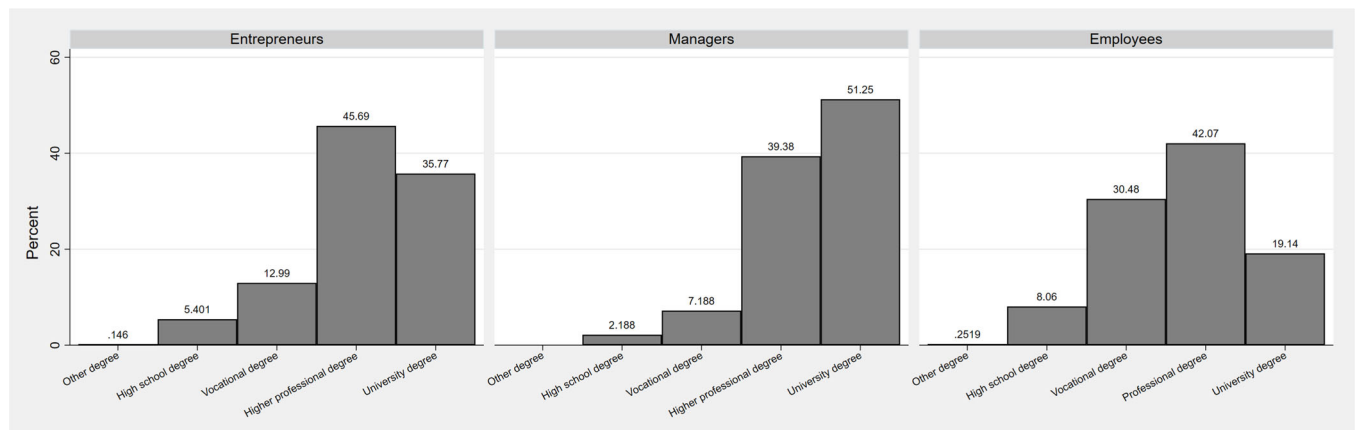


FIGURE C1 | Highest educational degree of entrepreneurs, managers and employees.

TABLE C2 | Optimism & overconfidence of entrepreneurs, managers, and employees.

	Dispositional optimism	Optimism (LOT-R)	Pessimism (LOT-R)	Explanatory style	Good events	Bad events	Over-estimation	Δ AEX forecast	Δ AEX sentiment
ENT	0.417*** (0.058)	0.394*** (0.059)	-0.314*** (0.057)	0.284*** (0.056)	0.135** (0.057)	-0.288*** (0.056)	0.257*** (0.061)	0.807 (2.050)	0.082 (0.063)
MAN	0.394*** (0.069)	0.346*** (0.068)	-0.313*** (0.069)	0.234*** (0.068)	0.076 (0.069)	-0.272*** (0.068)	0.233*** (0.070)	2.296 (2.449)	0.119 (0.076)
Age	0.055*** (0.018)	0.034* (0.020)	-0.057*** (0.018)	0.002 (0.018)	-0.018 (0.020)	-0.021 (0.017)	-0.005 (0.019)	0.117 (0.541)	0.023 (0.021)
Age ² /100	-0.055*** (0.019)	-0.032 (0.021)	0.058*** (0.020)	-0.002 (0.020)	0.023 (0.021)	0.025 (0.019)	0.019 (0.020)	-0.213 (0.592)	-0.024 (0.023)
Female	0.165*** (0.048)	0.092* (0.049)	-0.165*** (0.048)	0.059 (0.047)	0.093* (0.048)	0.009 (0.048)	-0.178*** (0.049)	-3.421* (1.859)	-0.207*** (0.054)
<i>Education (Baseline category "High School" omitted from the table)</i>									
Vocational	-0.092 (0.137)	0.019 (0.146)	0.189 (0.146)	-0.145 (0.151)	-0.099 (0.142)	0.133 (0.133)	0.082 (0.160)	-5.017 (4.501)	0.056 (0.162)
Higher prof.	0.160 (0.126)	0.101 (0.136)	-0.149 (0.136)	-0.019 (0.143)	-0.128 (0.131)	-0.098 (0.126)	0.080 (0.148)	0.716 (3.565)	0.096 (0.148)
University	0.288** (0.129)	0.190 (0.139)	-0.266* (0.139)	0.060 (0.146)	-0.236* (0.135)	-0.329** (0.129)	0.173 (0.150)	1.634 (3.608)	0.163 (0.151)
Other	-0.026 (0.126)	-0.039 (0.135)	0.037 (0.137)	-0.006 (0.144)	-0.126 (0.133)	-0.114 (0.126)	0.163 (0.149)	-0.159 (3.796)	0.024 (0.150)
IQ	0.057*** (0.011)	0.028*** (0.011)	-0.062*** (0.011)	-0.006 (0.011)	-0.042*** (0.011)	-0.034*** (0.011)	-0.377*** (0.013)	-0.015 (0.417)	0.003 (0.012)
Ln(Income)	0.168*** (0.039)	0.162*** (0.041)	-0.118*** (0.040)	0.055 (0.039)	0.068* (0.039)	-0.014 (0.038)	-0.003 (0.040)	-0.726 (1.979)	0.013 (0.043)
Constant	—	—	—	—	—	—	—	24.546 (22.364)	—
N	2404	2404	2404	2404	2404	2404	2404	2404	2404
Log lik.	-6516.00	-5086.13	-5351.10	-6188.60	-5325.22	-5211.07	-4169.96	-11902.92	-2496.72
ENT = MA-N	0.681	0.390	0.981	0.364	0.293	0.781	0.677	0.345	0.549

Note: Robust std. err. in parentheses. Mean imputed values for gender, income and age by occ. group.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.