Paper to be presented at

DRUID15, Rome, June 15-17, 2015

(Coorganized with LUISS)

Are Entrepreneurs More Optimistic Than Managers? Evidence From a Lab-in-the-Field Experiment

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Abstract

We study optimism among entrepreneurs, managers and employees using data from a large lab-in-the-field experiment. The results on two survey measures indicate that entrepreneurs are more optimistic than managers and employees in their dispositional optimism and their attributional style when bad events occur. Such optimism is not unique to entrepreneurs, though. More successful managers (e.g. CEOs) are similarly optimistic. Furthermore, examination of two incentivized measures of overestimation yields that both entrepreneurs and managers are more prone to overestimate their own ability or a future stock market closing price. On all four measures, however, employees are least optimistic.

Jelcodes:M13,C93

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Abstract

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Key words: Entrepreneurs, managers, dispositional optimism, attributional style, overestimation, overconfidence, lab-in-the field experiment, behavioral economics.

JEL codes: L26, C93, D03, M13.

"I am an optimist. I think you have to be, to be an entrepreneur." – Mark Zuckerberg

1. Introduction

This study aims at testing whether, in what respect, and to what extent entrepreneurs are more optimistic than others, in particular than managers and employees. Conventional wisdom has it that especially entrepreneurs are among the most optimistic types. One acclaimed reason for this is that optimistic beliefs are needed to self-select into entrepreneurship (e.g. Puri and Robinson, 2007; Landier and Thesmar, 2009; Puri and Robinson, 2013). Entrepreneurs have lower average earnings than comparable employees, while their earnings exhibit higher variance (see also Hamilton, 2000; Moskowitz and Vissing-Jorgensen, 2002). Why people enter and persist in entrepreneurship is thus puzzling from a standard expected utility point of view and (over-)optimism and/or overconfidence might be an explanation. Various studies have provided empirical evidence showing that entrepreneurs are indeed typically overconfident that their entrepreneurial project will succeed.[1]

Entrepreneurs are not the only occupational group considered to be overly optimistic; a number of empirical papers have documented that also managers hold too optimistic beliefs, see e.g., Malmendier and Tate (2005, 2009) and Graham et al. (2013). Various theoretical explanations have been put forward for this, including selection into and out of management, slightly optimistic managers leading to less manager-shareholder conflicts, and overconfident employees having a higher probability of being promoted to CEO (e.g., Goel and Thakor, 2008; Hackbarth, 2008; and Campbell et al., 2011). Based on their analysis, Goel and Thakor (2008, p. 2739) conclude that: "Thus, the analysis implies that overconfidence is likely to be a more prevalent attribute among CEOs than in the general population." Fims may even benefit from having somewhat biased CEOs, as moderate overconfidence may compensate for a manager's risk aversion and thus avoid underinvestment. In a similar vein, it may also be optimal for firms to hire overoptimistic managers when it wishes to commit to certain R&D or investment strategies (e.g., Englmaier, 2010, 2011; and Hirshleifer et al., 2012). Van den Steen (2004) provides an alternative reason why entrepreneurs and managers are more optimistic than regular employees. In his model, the overoptimism bias increases in the number of actions an agent can choose from. Therefore, "An 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).

All in all, both entrepreneurs and managers are expected to be more optimistic than the working population at large. Yet little is known about how their levels of optimism actually compare to each other. The only paper we are aware of that explicitly models the occupational choice beween entrepreneur, manager and employee is Lee (2014). In his model all individuals have the same

[1] Alternative explanations have also been put forward to explain this puzzle, including higher risk appetites (e.g., Hvide and Panos, 2014), non pecuniary benefits deriving from higher levels of autonomy and control (e.g., Blanchflower and Oswald, 1998; Hamilton, 2000; Hurst and Pugsley, 2011; and Puri and Robinson, 2013), and status concerns (e.g., Parker and Van Praag, 2010). See also Astebro et al. (2014) for an excellent overview of the roots of entrepreneurship.

preferences (and beliefs) and occupational choices follow from differences in managerial abilities, wealth, worker efficiency and the 'projects' (i.e. access to a production technology) they own.

This paper aims to provide an encompassing assesment of the level and kind of optimism of entrepreneurs relative to managers and employees. Our large lab-in-the-field experiment studies four different, well-defined measures of optimism: dispositional optimism (Scheier and Carver, 1985 and Scheier et al., 1994), attributional style (Seligman, 2000), overestimation of one's own ability (e.g., Moore and Healy, 2008) and overestimation of a future stock market closing price (cf. Bengtsson and Ekeblom, 2014). Of these four measures of optimism, the first two are subjective / survey-based, while the other two are objective / incentivized.

Our study has three distinguishing features relative to the literature. First and foremost, measuring entrepreneurs' (optimistic or pessimistic) attributional style and comparing it to others is novel, and we find it to be a key differentiating factor between entrepreneurs and managers. The only entrepreneurship study we know of that also includes the attributional style measure is Krueger et al. (2000). They use a version of Seligman (2000)'s measure of learned optimism to explain entrepreneurial *intentions* among 97 students. In contrast, our sample consists of 1,391 established entrepreneurs and managers, hence those individuals who have realized their intentions. A second distinguishing feature of our study is that, like in our earlier work on risk and uncertainty (Koudstaal et al., 2015), we compare entrepreneurs with two specific groups, i.e. managers and employees, rather than just the public at large. Entrepreneurs and managers may be more similar to each other, both taking strategic and complex decisions and bearing responsibility for directing their employees / subordinates. One might therefore perhaps expect that the behavioral traits of managers are reasonably similar to those of entrepreneurs. Also in terms of their background characteristics like age and education, the two groups might not be so different at all (and this is indeed what our data show). Employees on the other hand are expected to be quite different, both in their background characteristics as well as in their (optimistic) behavior. They are an interesting category to compare entrepreneurs and managers to, also to make our study more comparable to previous studies that compare entrepreneurs and 'others' (e.g. Puri and Robinson, 2013). Finally, the third distinctive aspect of our study is the large sample of entrepreneurs, managers and employees that we are able to collect, and for which we also measure a variety of background characteristics. This allows us to create meaningful subsamples of (more successful) entrepreneurs and managers and to test the robustness of our findings to alternative definitions of these occupational groups.[2]

Our final sample consists of 875 entrepreneurs, 516 managers and 667 employees (so $n = 2{,}058$).

[2]In our overall sample we take as 'entrepreneur' someone who founded, inherited or has taken over a company that s/he is currently (co-)managing and of which s/he has at least 5% of the shares. The stricter definitions of entrepreneurship we employ focus on those who are arguably more successful and thus more similar to the 'Schumpeterian' entrepreneur. These are the ones with an incorporated firm, earning above median income or having an above median number of employees. Managers in the overall sample are defined as employees in firms not started up by the respondent, and having at least two direct reports under their responsibility. Here stricter definitions are based on being the CEO, or having above median income or above median number of direct reports. Employees are the people who work in organizations and do not belong to the groups of entrepreneurs and managers.

We find that entrepreneurs differ from managers and employees in their dispositional optimism and in their attributional style. Regarding dispositional optimism, entrepreneurs are significantly more optimistic than managers, who in turn are more optimistic than employees. We further show that 58% of entrepreneurs and 54% of managers are very optimistic, while only 32% of the employees are so. In terms of attributional style, we also find that entrepreneurs are most optimistic. Entrepreneurs appear to be especially unique in their attitude towards dealing with bad events. They take these as more specific and less pervasive - thus a more optimistic approach - than managers and employees do. These findings confirm the stereotype that occupations with a high failure rate require an optimistic explanatory style to persist (Kahneman, 2011). In the area of overestimation, we find that entrepreneurs and managers are alike. They both overestimate their own abilities as well a future stock market closing price more than employees do, but they do not differ from each other.

The heterogeneity and other checks yield three additional notable findings. First, we find that the differences between entrepreneurs and managers in terms of their dispositional optimism and their attributional style become smaller or even disappear when limiting the sample of managers to the arguably more 'successful' ones (e.g. CEOs) or the more 'entrepreneurial' ones (e.g. the ones that work in young and/or small firms). More successful managers are found to be more optimistic than their peers in terms of their dispositional optimism and their attributional style. The relationship between optimism and success found for managers is less apparent for entrepreneurs. Second, we find that the results on overestimation are largely robust to the use of different samples of entrepreneurs, managers and employees, with two exceptions. First, when using comparable sample definitions of entrepreneurs and managers as in Busenitz and Barney (1997), i.e., business founders who recently started their businesses and managers in firms with more than 10,000 employees, respectively, we find different levels of overestimation between the two groups. This is consistent with Busenitz and Barney (1997), who hypothesized that overconfidence (i.e. overestimating the probability of being right) is more pronounced among entrepreneurs than managers, since the latter rely more on 'routines', while entrepreneurs face new complex early-stage technologies for which no data and routines are readily available. The second exception is found for the degree of overestimation of one's own ability when we compare entrepreneurs in young and small firms to managers in fairly identical firms with arguably similar information availability. Again we find that entrepreneurs are more prone to overestimate themselves than managers. Therefore, the question arises to what extent information availability really explains the differences (cf. Busenitz and Barney, 1997) or whether it is self-selection in the sample of entrepreneurs (cf. Landier and Thesmar, 2009 and Van den Steen, 2011). Third, and finally, we find some suggestive evidence that optimism might be linked to loss aversion. When comparing a measure of optimism in line with Andersen et al. (2014), we find that those who are more "probability optimistic" are less loss averse. In other words, loss aversion is lower among those individuals who view the probability of winning a positive amount more optimistically than the probability of losing a similar amount with a similar objective chance.

Unfortunately, our study does not allow answering this question of causality due to its descriptive nature. We thus cannot identify cause and effect, i.e., whether the differences in attributional style and dispositional optimism between entrepreneurs and managers have been developed during entrepreneurship and management spells, or already existed before. Similarly, little can be learned from our study about the potential causal relationship between optimism and (personal) success. A number of other existing studies are informative in this regard, though. Longitudinal studies suggest that both dispositional optimism and one's attributional style are relatively stable traits throughout adult life (see e.g. Burns and Seligman, 1989 and Carver et al., 2010). Regarding the potential impact on success, some studies find positive relationships whereas others find the relation to be non-monotonic. Segerström (2007) finds for a relatively small sample of 61 law students, that higher dispositional optimism before starting law school predicts higher income ten years later. For a larger sample of 2,189 first year undergraduates, Solberg Nes et al. (2009) report that students with a higher pre-college level of dispositional optimism were significantly less likely to drop out. There is also evidence suggesting that an optimistic attributional style improves job performance. Seligman and Schulman (1986) study a profession where workers repeatedly encounter failure, viz. cold call selling of life insurances. Those in the top half of the attributional style questionnaire (administered before the performance evaluation period) sold significantly more insurances and were significantly less likely to quit than those in the bottom half (see for similar results Corr and Gray (1996) and Tsuzuki et al. (2012)).[3] For the non-monotonous relationships between optimism and success, Puri and Robinson (2007) find that moderate optimism is related to more prudent financial decisions and greater self-control, while extreme optimism is associated with bad financial habits like having a short planning horizon and saving less. Experiments by Brown and Marshall (2001) indicate that performance increases with expectancies about likely success for difficult tasks, but only up to a point. Further increases in optimism reduce performance. For a sample of 201 new ventures, Hmieleski and Baron (2009) find that higher levels of entrepreneurs' dispositional optimism are negatively related to revenue and employment growth in the two years following the survey. Consistent with entrepreneurial overoptimism, Lowe and Ziedonis (2006) find that entrepreneurs tend to hold on to unsuccessful new commercialization opportunities longer than established firms do. Taken together, the evidence thus suggests that moderate levels of optimism are good, but extreme levels lower performance and success.

In what follows, we discuss the data, design and measurement choices in Section 2. In Section 3 we present the descriptive statistics, while we describe the empirical findings in Section 4. Section 5 provides a discussion and conclusion.

[3] Apart from better socioeconomic status (like education and income) and broader social networks, optimism has also been found to be positively associated with psychological well-being, better coping with adverse events and physical health. See Carver et al (2010) for an informative overview.

2. Design, measurement and sampling

2.1 Measurement of optimism

A variety of definitions and measures of optimism exist in the psychological and economic literature. In our study, we rely on four of them: dispositional optimism (Scheier and Carver, 1985 and Scheier et al., 1994), an optimistic attributional style (Seligman, 2000), overestimation of one's own ability (e.g. Moore and Healy, 2008), and overestimation of macro-economic circumstances (cf. Bengtsson and Ekeblom, 2014). The selection of the first two rests on the fact that these are among the main optimism measures within psychology (see Peterson, 2000, for an overview), and also among the main psychological measures of optimism used within economics (see e.g., Krueger et al., 2000; Puri and Robinson, 2006; Hmieleski and Baron, 2009; and Graham et al., 2013, for applications).[4] Furthermore, both dispositional optimism and an optimistic attributional style are found to be relatively stable over time as well as across situations, contexts, and cultures (see e.g. Burns and Seligman, 1989; Schulman et al., 1993; Scheier et al., 1994; Giltay et al., 2006; and Fisher and Chalmers, 2008). Finally, the attributional style test also bears the advantage of being hard to 'beat', i.e. test-takers cannot fake optimal responses (Schulman et al., 1987). The latter is important given that some entrepreneurs seem to fill out survey questions in line with what they view as being expected from entrepreneurs (see e.g., Koudstaal et al., 2015). We will now discuss each of the four measures in detail.

2.1.1 Dispositional optimism

Dispositional optimism is the global expectation that good things will be plentiful in the future and bad things will be scarce (e.g., Scheier and Carver, 1985; Scheier et al., 1994; and Peterson, 2000). It is measured using the brief 10-item self-report questionnaire of Scheier et al. (1994), which is also referred to as the Revised Life Orientation Test (LOT-R). Among the 10 items in the LOT-R, three of them are associated with positive expectations (1,4 and 10) and three with negative expectations (3,7 and 9). 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 a score for optimism, the scores of all six non-filler items are added, where the items with negative expectations are reversely coded. Overall, participants thus obtain a minimum score of 0 points and a maximum score of 24 points. A participant who answers "Neutral" on all items ends up with a score of 12.

[4] An exception is the comparative optimism measure used by Ucbasaran et al. (2010).

2.1.2 An optimistic attributional style

In contrast to dispositional optimism, focusing more on evaluations of future events, an optimistic attributional style measures an individual's explanatory style of past life events (Buchanan and Seligman, 1995). Optimists are referred to as those who 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 impermanent and non-pervasive. Unsurprisingly, for pessimists the opposite is true: they believe good events to be non-persistent (temporary) and non-pervasive and bad events as permanent and pervasive. Seligman (2000) further clarifies the aforementioned by considering an example with two accountants who are redundant in their firm (p. 90). Both are looking for a new job, but feel depressed due to their sacking. One of them, however, keeps on going to the gym, stays healthy and remains a loving family member at home, while the other falls apart and catastrophizes. The latter is what Seligman typifies as pessimistic behavior, while the former is what he deems the optimistic side of the same coin.

To measure the level of an optimistic attributional style, we use the 32-item optimism test from Seligman (2000). 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). Furthermore, following Seligman (2000), the sum of PmG and PvG minus the sum of PmB and PvB gives an indication of the level of optimism in one's attributional 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 attributional 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.

2.1.3 Overestimation of one's own ability

Our final two measures of optimism focus on overestimation, or the behavioral bias where one can be showed to be too optimistic (thanks to the availability of an objective 'right' estimate).[5] Both are based on actual behavior elicited while using incentives. Incentivized behavioral measures of (over)optimism about the future have been used before by e.g. Weinstein (1980), Dunning et al. (2004), Ben-David et al. (2013) and Bengtsson and Ekeblom (2014).

The third measure is measured as the difference between a participant's assessments of their own performance on ten Raven test questions with a varying level of difficulty and the actual number

[5]While the general term 'overconfidence' has often been used to describe this bias, Astebro et al. (2014) rightly point out that "multiple measures and definitions across empirical studies have made it hard to pin down the precise bias that may be behind entrepreneurship" (p. 58). In earlier work, Moore and Healy (2008) have therefore made a subtle distinction between overestimation, overplacement and overprecision, even though these terms might seem observationally equivalent. In this paper we will focus on overestimation, which refers to a misestimation of one's abilities or performance.

of correct answers. Trivia questions or Raven test questions are generally used to obtain a measure of overestimation (see e.g. Lichtenstein et al., 1982; Moore and Healy, 2008; and Herz et al., 2014). Before answering the 10 Raven test questions, we provided an example to get participants accustomed with the task. After all 10 questions had been answered, participants had to indicate the number of correct answers.[6] The incentive was as follows: a correct answer (i.e. forecasted = actual) was rewarded with €100 and an incorrect answer with €0.

The number of correct answers itself was also measured and 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 one 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 (RSPM) test. The last five Raven puzzles were selected from the shortened 12-item Raven test of Arthur and Day (1994), which are somewhat harder to answer correctly and therefore create - in combination with the first five - some extra dispersion across participant scores, especially at the high end.

2.1.4 Overestimation of a future stock market closing price

In line with Bengtsson and Ekeblom (2014), our fourth measure of optimism is based on forecasts of macro-economic situations. This measure is complementary to the previous measure in the sense that this one is uncorrelated with the individual's own life or work situation (Bengtsson and Ekeblom, 2014).

Participants are requested to provide a 3-month forecast of the value of the AEX index (the Dutch stock market index composed of companies that trade on NYSE Euronext Amsterdam). The measure of overestimation subtracts from this its actual value on the date for which the forecast was requested (September 1st 2014). To help participants, we disclosed the rounded AEX closing price of May 6th, which was 397. As an incentive, selected prize winners were rewarded with €100 if their estimate was within 10 points from the actual closing price, and €0 otherwise.

2.2 Sampling

The data collection uses the same approach as Koudstaal et al. (2015), which is a combination of a lab-in-the-field experiment and an online survey. The procedure to reach large samples of entrepreneurs, managers and employees was also similar. Again, for reaching volume in the entrepreneur sample, we teamed up with "Synpact", a company that has access to 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 questionnaire and experiments. The control group of managers was again drafted from the large and highly reputed training center De Baak, which is part of the

[6] A potential critique of this setup might be that more (less) able participants are less (more) likely to overestimate themselves. However, this criticism may be less relevant in our particular case. Only 31 out of 2,058 participants answered either zero or all questions correctly, and only 2 of these participants correctly forecasted that.

largest and influential employers organization in the Netherlands ("VNO-NCW, MKB-Nederland"). We approached 4,131 managers in their files. Finally, the same invitation and survey were sent to a sample of 7,500 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 May 7th 2014, with the explicit mentioning of a response time of 14 days at maximum. A reminder was sent out after 7 days. 875 entrepreneurs, 516 managers and 667 employees completed the survey. Similar to Koudstaal et al. (2015), the response rates were thus in the range of 5-15% and in line with expectations of Synpact and De Baak who regularly send out qualitative surveys to their database on their own. A comparison of respondents' background characteristics in this research wave and the one gathered in November 2013 (see Koudstaal et al., 2015) yields that the distributions of background variables among entrepreneurs, managers and employees are generally similar across the two rounds.

Incentives

Respondents were requested to first complete the two unincentivized parts (on attributional style and dispositional optimism) and then fill out the two incentivized parts (ten Raven test questions and the AEX 3 month forecast). All participants were first informed about the general setup of the survey and the incentives structure. Instructions also included examples and practice rounds to get acquainted with the experimental setup, which differed from many of the surveys that entrepreneurs and managers normally fill out. Overall, an average respondent spent 23 minutes 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 incetivized parts. Given our limited budget and the average 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 e.g. Gneezy and Rustichini (2000) and Laury (2006) 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 and all random draws in the experiments to a civil-law notary who also monitored a legitimate course of the payouts. The full survey is available upon request.

Definition of subsamples

The qualifying characteristics for inclusion in the entrepreneur sample were similar as in Koudstaal et al. (2015).. That is; '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.[7] 'Managers' are all people who are employed by an organization that they did not start up themselves 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. Participants who were eligible for multiple subsamples were instructed to select the one generating most of their income.

3. Descriptive statistics

Panel A of Table 1 outlines the descriptive statistics of the four measures of optimism we employ: dispositional optimism, attributional style, overestimation of own ability and the forecast of the 3-month AEX closing price (which was 414). Panel B shows the correlations between these measures. There is substantial variation in the individual scores on these measures (Panel A), that have positive but low correlations with each other (Panel B), see also Isaacowitz and Seligman (2001).[8] This suggests that the four measures pick up complementary aspects of optimism.

Table 1
Descriptive Statistics of the Optimism Measures.

Panel A: Means	Observations	Mean	Standard deviation	Minimum	Maximum
Dispositional optimism	2,058	16.96	4.08	0	24
Attributional style	2,058	2.02	3.35	-15	13
Overestimation					
- Own ability	2,058	0.74	1.65	-6	8
- AEX 3M closing price	2,058	1.92	32.79	-404	313

Panel B: Correlations	Dispositional optimism	Attributional Style	Overestimation *Own ability*
Attributional style	0.25 ***	-	
Overestimation			
- Own ability	0.01	0.05 *	-
- AEX 3M closing price	0.06 *	0.04	0.02

* Denotes statistical significance at the 10% level; ** at the 5% level; *** at the 1% level.

[7] The Dutch tax authority considers a five percent ownership to be a substantial interest.

[8] The only exception is the correlation between the attributional style measure and dispositional optimism (our value of 0.25 is equal to the 0.25 of Tomakowskya et al., 2001).

Table 2 shows the statistics of the background characteristics that will define stricter subsamples of entrepreneurs and managers (see also Koudstaal et al., 2015). The first Panel (A) shows the income distribution of each of the three samples, using the answer categories that were applied in the survey. One can observe that entrepreneurs are over-represented in both tails of the income distribution relative to managers and employees, consistent with previously obtained evidence, e.g. Hamilton (2000). We find no substantial differences between the average levels of entrepreneurial and managerial incomes. For both groups, the median income category is €50,001-€75,000, while the median employee income falls in the category €25,001-€50,000 (note that the modal income was €33,000 in The Netherlands in 2014).

Panel B further describes the sample of entrepreneurs and managers that participated in our experiment. 80% of the entrepreneurs are founders of their firms, while 17% of the firms have been acquired through a takeover. The remaining 3% of the entrepreneurs have joined the firm within 5 years after start-up and have obtained a minimum of 5% of the shares of the business they are currently (co-)managing. Since the entrepreneurship literature sometimes narrows the definition of an entrepreneur to a founder (e.g. Begley, 1995; Busenitz and Barney, 1997; Sandri et al., 2010; and Holm et al., 2013), we will restrict the sample of entrepreneurs to only business founders in later analyses. A similar kind of exercise can be performed for managers, who can be split up in either CEOs (14%), project managers (15%), or general managers (71%).

Panel C largely deals with the types of firm that entrepreneurs, managers and employees work in, based on which further relevant subgroups can be defined. We will further examine the impact of applying such definitions in the heterogeneity checks in Section 4.2. On the left side of the panel it shows that 15% (31%) of the entrepreneurs are currently managing firms in the start-up (survival) phase (the definition of entrepreneurs used by, for instance, Brockhaus, 1980; Busenitz and Barney, 1997) and that the rest is beyond that specific phase (the definition of Holm et al., 2013), We will also restrict the sample of entrepreneurs to those (52%) who are incorporated (see Levine and Rubinstein, 2012). The right handside of Panel C depicts the age and size distributions of the firms that managers and employees work for. They are rather similar, but different from the age and size distributions of entrepreneurial firms that are younger and smaller. As an additional heterogeneity check in Section 4.2 we will therefore limit the sample of managers to the ones of small and young firms, respectively. The idea behind this is that managers in smaller and younger firms are arguably more 'entrepreneurial' and may therefore be more similar to entrepreneurs.

Panel D of Table 2 shows the distribution of the span of control of entrepreneurs and managers in our sample. Seventeen percent of the entrepreneurs in our sample have zero employees and 43% have at most one. As a final heterogeneity check we shall therefore also limit the sample of entrepreneurs and managers to those with an above median span of control (cf. e.g. Tag et al., 2013).

Table 2
Descriptives of Variables to Define Sample Splits.

	Entrepreneurs (n = 875)		Managers (n = 516)	Employees (n = 667)
Panel A: Income		*Panel A: Income*		
< €25,000	24%	< €25,000	6%	24%
€25,001 - €50,000	21%	€25,001 - €50,000	22%	58%
€50,001 - €75,000	16%	€50,001 - €75,000	29%	13%
€75,001 - €125,000	23%	€75,001 - €125,000	32%	5%
€125,001 - €200,000	10%	€125,001 - €200,000	8%	0%
€200,001 - €300,000	3%	€200,001 - €300,000	1%	0%
€300,001 - €400,000	1%	€300,001 - €400,000	1%	0%
> €400,000	2%	> €400,000	1%	0%
Panel B: Entrepreneur characteristics		*Panel B: Manager characteristics*		
Founder	80%	CEO	14%	-
Business taken over	17%	General Manager	71%	-
Joined the firm within 5 yrs	3%	Project Manager	15%	-
Panel C: Firm characteristics		*Panel C: Firm characteristics*		
Start-up phase (0 - 3 yrs)	15%	Firm age ≤ 5 yrs	4%	3%
Survival phase (0 - 5 yrs)	31%	Firm age 6 - 50 yrs	54%	59%
		Firm age > 50 yrs	42%	38%
Incorporated	52%	Firm size ≤ 25 FTE	12%	14%
Sole propriotership	37%	Firm size 26 - 1000 FTE	54%	53%
Other	11%	Firm size > 1000 FTE	34%	33%
Panel D: Management level (FTE)		*Panel D: Management level (direct reports)*		
0	17%	2 - 5	41%	-
1	26%	6 - 10	28%	-
2 - 5	23%	11 - 25	17%	-
6 - 10	9%	26 - 50	5%	-
11 - 25	13%	More than 50	2%	-
26 - 50	4%			
51 - 100	4%			
101 - 500	3%			
More than 500	1%			

Table 3 compares the background characteristics of the three subsamples. As in Koudstaal et al. (2015), we find that entrepreneurs and managers are similar in terms of the most commonly used

background characteristics. The only exception this time is that managers now have a significantly higher average degree of education than entrepreneurs. Employees are again different in terms of all background characteristics.

Table 3
Background Characteristics of Entrepreneurs, Managers, and Employees.

	Entrepreneurs ($n = 875$)	Managers ($n = 516$)	Employees ($n = 667$)
Age	48.71 [a]	47.66 [c]	43.13 [a,c]
Female (dummy)	0.27 [a]	0.27 [c]	0.47 [a,c]
Education (highest degree):	[d,e]	[e,f]	[d,f]
- High School	6%	4%	7%
- Lower intermediate vocational degree	12%	12%	34%
- College education	45%	38%	39%
- University education	37%	46%	20%
IQ (scale 0-10)	5.93 [a]	5.93 [c]	5.24 [a,c]

a) Significant difference between entrepreneurs and employees at the 5% level (two-sample t-test)
b) Significant difference between entrepreneurs and managers at the 5% level (two-sample t-test)
c) Significant difference between managers and employees at the 5% level (two-sample t-test)
d) Significant difference between entrepreneurs and employees at the 5% level (Kolmogorov-Smirnov test)
e) Significant difference between entrepreneurs and managers at the 5% level (Kolmogorov-Smirnov test)
f) Significant difference between managers and employees at the 5% level (Kolmogorov-Smirnov test)

4. Results

4.1 Main results

Table 4 first shows the means of the four measures of optimism for each of the three groups of interest. Starting with dispositional optimism in the first column, we find that entrepreneurs have the highest average score of all groups. Employees follow at some distance, while managers end up in between (but closer to entrepreneurs). Note that the average score for employees is close to the 14.33 - 15.15 interval reported by Scheier et al. (1994). Further (unreported) descriptives reveal that 58% of entrepreneurs, 54% of the managers, and 32% of the employees can be classified as 'very optimistic' (i.e. have a score of 18 or more), which in the case of managers is comparable to the 54% observed for European CEOs in Graham et al. (2013).[9] All percentages are significantly different from each other at the 5% level in two-sample t-tests.

The second column of Table 4 shows the means of the attributional style measure, with a similar pattern, although managers now end up closer to employees than to entrepreneurs. Again, all

[9]Note however that these percentages still seem much lower than what is found for US CEOs (Graham et al., 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.

measured differences between the three groups are significant. Hence, entrepreneurs deal with past events in a significantly more optimistic way than managers, who in turn are more optimistic than employees. The last two columns of Table 4 show the means for our incentivized overestimation measures. Entrepreneurs overestimate themselves most of all three groups followed by managers and employees (3rd column). The difference between entrepreneurs and employees is significant (5% level), while the difference between entrepreneurs and managers is not. Note that on average all groups overestimate themselves. When examining the overestimation measure related to the stock market forecast, this picture is reinforced (4th column). Entrepreneurs and managers exhibit more overestimation than employees, but not than each other. Note that only here we discuss the result based on the winsorized part of the distribution (i.e. the 99% of the distribution which excludes the ends of the tails), to avoid a large role of outliers.[10]

Table 4
Raw Differences in Optimism of Entrepreneurs, Managers and Employees.

	Dispositional optimism	Attributional Style	Overestimation *Own ability*	Overestimation *AEX 3M closing price*
	(n = 2,058)	(n = 2,058)	(n = 2,058)	(n = 2,017)
Entrepreneurs	17.87 [a,b]	2.68 [a,b]	0.84 [a]	2.99 [a]
Managers	17.52 [b,c]	1.86 [b,c]	0.82 [c]	4.27 [c]
Employees	15.32 [a,c]	1.28 [a,c]	0.55 [a,c]	-0.39 [a,c]

a) Significant difference between entrepreneurs and employees at the 5% level (two-sample t-test)
b) Significant difference between entrepreneurs and managers at the 5% level (two-sample t-test)
c) Significant difference between managers and employees at the 5% level (two-sample t-test)

In Table 5 we analyze the differences in dispositional optimism and attributional style using standard regression analyses. We start discussing the results for dispositional optimism, the most widely used measure of optimism in academic economics research (see e.g. Krueger et al., 2000; Puri and Robinson, 2006; Hmieleski and Baron, 2009; and Graham et al., 2013). All differences between the three groups are significant; entrepreneurs are more optimistic than managers, who are in turn more optimistic than employees, similar to the raw differences in dispositional optimism. Hence, entrepreneurs are most inclined to be optimistic about the future and about the fact that bad events will be scarce. Managers on the other hand possess this attitude slightly less than entrepreneurs, but still more than employees. Some of the control variables show significant coefficients, too. For

[10]This effectively implied dropping all answers corresponding to a very unrealistic expected return of approximately (minus) 25% in 3 months.

Table 5
Ordered Probit Regressions on Dispositional Optimism and Attributional Style.

This table reports the results of running ordered probit regressions on dispositional optimism and attributional style. The variables 'Entrepreneur' and 'Manager' are dummy variables that are 1 if the specific (main) occupational category applies. The categorical variables 'education' and 'income' have been summarized into one variable instead of using a set of dummies. The categorical education variable takes on the value 0 if the highest attained level is high school or lower, 1 if secondary education is obtained at a higher level, 2 if a participant has college education and 3 if the participant has a university degree. The originally categorical income variable has been collapsed into a continuous variable of which the natural log has been taken, using the midpoints of the categories (and 0.5 million euro for the upper category). Experience measures the years of experience as entrepreneur, manager, and employee, respectively. IQ is the number of correct answers to the ten Raven puzzles. Significance at the 10% level is denoted by *, 5% by **, and 1% by ***, with t-statistics reported in parentheses. Standard errors are robust.

Dep. variable:	(1) Dispositional optimism	(2) Dispositional optimism	(3) Dispositional optimism	(4) Attrib. Style	(5) Attrib. Style	(6) Attrib. Style
	Total Score	*Optimism*	*Pessimism*	*Total score*	*Score on Good events*	*Score on Bad events*
Entrepreneur	0.442***	0.401***	0.326***	0.179**	0.046	-0.212***
	[5.88]	[5.31]	[4.35]	[2.49]	[0.65]	[-2.93]
Manager	0.279***	0.239***	0.188**	0.001	-0.036	-0.048
	[3.79]	[3.22]	[2.53]	[0.02]	[-0.48]	[-0.64]
Age	0.060***	0.032*	0.070***	0.016	0.003	-0.019
	[3.36]	[1.72]	[3.94]	[0.95]	[0.15]	[-1.09]
Age^2/ 100	-0.058***	-0.028	-0.067***	-0.012	0.004	0.019
	[-2.97]	[-1.42]	[-3.46]	[-0.63]	[0.20]	[1.04]
Female	0.203***	0.121**	0.219***	0.087	0.154***	0.024
	[3.59]	[2.14]	[3.88]	[1.53]	[2.71]	[0.43]
Education	0.143***	0.051	0.164***	0.035	-0.124***	-0.160***
	[4.34]	[1.53]	[4.96]	[1.07]	[-3.76]	[-5.01]
Experience	-0.002	-0.001	-0.004	-0.009***	-0.006*	0.007**
	[-0.59]	[-0.19]	[-1.26]	[-2.76]	[-1.78]	[2.02]
IQ	0.046***	0.017	0.059***	-0.007	-0.042***	-0.033**
	[3.24]	[1.17]	[4.12]	[-0.47]	[-2.87]	[-2.33]
Ln(income)	0.198***	0.177***	0.170***	0.134***	0.108***	-0.083**
	[5.90]	[5.26]	[4.97]	[4.09]	[3.26]	[-2.56]
constant	-1.089**	-0.159	-1.495***	1.369***	2.151***	4.659***
	[-2.03]	[-0.32]	[-3.12]	[2.62]	[4.47]	[10.09]
Obs.	1,691	1,691	1,691	1,691	1,691	1,691
Log lik.	-4,529.2	-3,573.0	-3,698.6	-4,346.0	-3,696.4	-3,758.9
ENT=MAN [1)]	<0.01 ***	<0.01 ***	0.03 **	<0.01 ***	0.18	<0.01 ***

[1)] This row reports the p-values of Wald tests on β(Entrepreneur) = β(Manager).

age, we find that people tend to become more optimistic until they reach the age of 52, after which it decreases again. Second, we find that women are more optimistic than men.[11] Finally, the coefficients of the other control variables indicate that education and IQ load up positively, while experience is insignificantly associated with dispositional optimism. When we decompose the dispositional optimism measure into an "optimistic" part (i.e. add the scores on items 1,4, and 10) and a "pessimistic" part (i.e. add the scores on items 3,7, and 9), it shows that the main results remain standing, see columns 2-3. In columns 4-6, the attributional style measure is further explored. As mentioned in Section 2, the total measure (column 4) is split up in four categories: the permanence of good events (PmG), the pervasiveness of good events (PvG), the permanence of bad events (PmB) and the pervasiveness of bad events (PvB). The sum of the first two factors adds up to the "Score on good events" (column 5), while the sum of the latter two factors establish "Score on bad events" (column 6). Column 4 shows that controlling for a large set of background characteristics in a probit regression does not change the picture painted in Table 4 (raw means). Entrepreneurs have the most optimistic attributional style and have a significantly higher score than managers and employees, all else equal. Managers and employees are not separable anymore when including controls. Interestingly, columns 5 and 6, when distinguishing between good and bad events, indicate that entrepreneurs are not so different in their scores on good events, but have a different attributional style related to bad events. Entrepreneurs are more optimistic than the other two groups when it comes to dealing with bad events. Unreported regressions show that the significant difference that we find in column 6 largely pertains to the difference in the score on PvB, or the pervasiveness of bad events. Hence, entrepreneurs are distinct in what Seligman (2000) describes as: "Some people can put their troubles neatly into a box and go about their lives even when one important aspect of it - their job, for example, or their love life, is crumbling" (p. 90).

The probit results in the first column of Table 6 show that both entrepreneurs and managers overestimate themselves significantly more than employees do. However, inconsistent with the findings of Busenitz and Barney (1997), we do not find that the difference between an 'average' entrepreneur and an 'average' manager reaches significance (the p-value of the Wald test $\beta_{ENT} = \beta_{MAN}$ is 0.62).[12] As this might still be the outcome of different samples of entrepreneurs and managers, we will explore this issue further in the heterogeneity checks in the next section.

In column 2 the regression output on stock market predictions is illustrated. Again we find that on average both entrepreneurs and managers overestimate the future stock market more than employees, but not significantly different from each other. In columns 3 and 4 we turn to the degree of 'realism' in the forecasts. In other words: which type of participant is more likely to have judged

[11] So far, evidence for a relationship between gender and optimism has been mixed. Many studies find no difference (e.g., Fischer and Leitenberg, 1986; Scheier et al., 1994; and Puskar et al., 1999), some more optimistic females like we do (e.g. Collard and Reynolds, 2004; Yazdipour, 2010), while the opposite is found by e.g. Stipek et al. (1981). Given that women are also more likely to experience a depression (see e.g. Piccinelli and Wilkinson, 2000, for a review), The Economist (2010) concluded that this either suggested that "women are more likely to experience more extreme emotions", or "that a few women are more miserable than men, while most are more cheerful".

[12] We obtain similar results when we use a different methodology that is more in line with e.g. Dawson et al. (2014), see Appendix A.

Table 6
Probit / OLS Regressions on Overestimation and Correctness.

This table reports the results of running (ordered) probit and OLS regressions on overestimation of own ability, overestimation of the 3M AEX closing price, the likelihood of being correct about one's estimate of one's own ability, and finally, the likelihood of being correct about one's estimate of the 3M AEX closing price (i.e. estimate stays which 10 points of the actual closing price). The variable 'Forecast' indicates one's estimate of one's own ability (0-10) in column 3 and one's estimate of the 3M AEX in column 4 (range: 316 - 511). All other variables have been specified before in Table 5. Significance at the 10% level is denoted by *, 5% by **, and 1% by ***, with t-statistics reported in parentheses. Standard errors are robust.

Dep. variable:	(1) Over-estimation	(2) Over-estimation	(3) Correct estimation (YES=1; NO=0)	(4) Correct estimation (YES=1; NO=0)
	Own ability	*AEX 3M closing price*	*Own ability*	*AEX 3M closing price*
Regression type:	ordered probit	OLS	probit	probit
Entrepreneur	0.398***	3.983**	0.211**	0.162*
	[5.53]	[2.53]	[2.08]	[1.79]
Manager	0.367***	4.409***	0.220**	0.072
	[4.77]	[2.78]	[2.14]	[0.76]
IQ	-0.337***	-0.301		
	[-20.39]	[-1.00]		
Forecast			-0.041**	-0.005***
			[-2.11]	[-3.51]
Age	-0.010	0.074	0.106***	0.003
	[-0.58]	[0.18]	[3.93]	[0.14]
Age^2 / 100	0.024	-0.173	-0.123***	0.008
	[1.21]	[-0.39]	[-4.18]	[0.35]
Female	-0.099*	-0.759	-0.084	-0.136*
	[-1.76]	[-0.59]	[-1.07]	[-1.90]
Education	0.095***	0.549	-0.005	-0.004
	[2.81]	[0.78]	[-0.03]	[-0.09]
Experience	0.003	0.089	0.001	-0.010**
	[0.90]	[1.23]	[0.23]	[-2.46]
Ln(income)	-0.059*	0.889	0.032	0.106**
	[-1.70]	[1.20]	[0.70]	[2.53]
constant	5.587***	-10.41	3.114***	0.449
	[10.06]	[-1.00]	[4.66]	[0.65]
Obs.	1,691	1,663	1,691	1,663
Log lik.	-2,903.0	-7,485.4	-1,123.0	-1,121.6
ENT=MAN [1)]	0.62	0.74	0.89	0.26

[1)] This row reports the p-values of Wald tests on β(Entrepreneur) = β(Manager).

his/her performance on the ten Raven puzzles correctly? And which type of the participants is more likely to have come up with a stock market forecast between 404 and 424 (i.e. less than 10 points off the realization of 414)? Interestingly, unreported percentage counts for each group indicate that 24% (51%) of the entrepreneurs, 26% (49%) of the managers and 19% (38%) of the employees made correct judgments of their own ability (the stock market prediction). Hence, while one might have expected based on columns 1 and 2 that entrepreneur and managers are less realistic in their forecasts, the opposite holds true. We measure entrepreneurs and managers to be the two best performing groups, while employees follow at some distance. Adding the control variables in columns 3 and 4 leads to the same conclusion: entrepreneurs and managers are more likely than employees to judge their own ability correctly. We will closer examine this relatively novel result in Section 4.3. We will now further explore the impact of using alternative definitions of entrepreneurs and managers.

4.2 Heterogeneity checks

We first rerun the main regressions of Tables 5 and 6 on a subsample of entrepreneurs and managers in young and small firms, see Table 7. This may account for the very different distributions within the two groups of firm size and age, see Table 2. Panel A (young firms), Panel B (small firms) and Panel C (start-ups) show that most of the main outcomes of Section 3.1 extend to entrepreneurs and managers in young and/or small firms, although for managers some of the p-values turn higher than 0.10, likely due to smaller samples. The only notable additional finding is that arguably 'entrepreneurial' managers generally do not differ from entrepreneurs in their attributional style, but they do in their lower overestimation of their own ability. We find this result in both Panels A and B, so apparently entrepreneurs in younger and/or smaller firms seem to be more prone to overestimation than a suitable control group of managers who work for comparable firms. In Panel C, we also compare founders of start-up firms (< 3 years old) with managers in firms with more than 10,000 employees, cf. Busenitz and Barney (1997). Contrary to our result in Table 6, the difference between entrepreneurs and managers in overestimation of own ability now becomes significant at the 5% level. Taken together with Table 7, the data seem to be consistent with the view that different types are attracted to entrepreneurship (cf. Landier and Thesmar, 2009) rather than information availability or feedback being the main driver of the difference (cf. Busenitz and Barney, 1997). Interestingly, we do not obtain different conclusions when we look at the probabilities of being correct (analogous to the second part of Table 6).

We further examine the impact of alternative definitions of entrepreneurs and managers in Table 8. Using the variation illustrated in Table 2, Panel A first works with the following definitions of entrepreneurs: (i) entrepreneurs with an incorporated firm, thereby mainly excluding the own-account self-employed, (ii) entrepreneurs with an above median number of fulltime equivalent employees in their company, (iii) entrepreneurs with above median incomes, (iv) entrepreneurs that have founded their business, instead of obtaining it through takeover or buy-in, and (v) entrepre-

Table 7
Optimism of Entrepreneurs and Managers in Young and/or Small Firms.

This table reports the results of running ordered probit and OLS regressions on dispositional optimism, attributional style, overestimation of own ability, and overestimation of the 3M AEX closing price. Samples are restricted to entrepreneurs and managers in firms $\leq$ 15 years and all employees (Panel A), entrepreneurs and managers in firms $\leq$ 25 FTE and all employees (Panel B), and entrepreneurs in firms $<$ 3 years, managers in firms $\geq$ 15 years and all employees (Panel C). Regressions and variables are similar to the ones reported in Tables 5 and 6. Significance at the 10% level is denoted by *, 5% by **, and 1% by ***, with t-statistics reported in parentheses. Standard errors are robust.

Dependent variable:	(1) Dispositional optimism	(2) Attrib. Style	(3) Over-estimation *Own ability*	(4) Over-estimation *AEX 3M closing price*
Panel A: Entrepreneurs and Managers in Firms $\leq$ 15 yrs, all Employees				
Entrepreneur ($n = 571$)	0.487***	0.320***	0.437***	4.901***
	[5.08]	[3.78]	[4.97]	[2.70]
Manager ($n = 90$)	0.264*	0.172	0.240*	6.048**
	[1.87]	[1.25]	[1.96]	[2.01]
ENT = MAN [1)]	0.09 *	0.26	0.09 *	0.70
Panel B: Entrepreneurs and Managers in Firms $\leq$ 25 FTEs, all Employees				
Entrepreneur ($n = 779$)	0.495***	0.276***	0.368***	3.541**
	[5.96]	[3.59]	[4.74]	[2.10]
Manager ($n = 40$)	0.153	0.209	0.066	-4.030
	[1.22]	[1.19]	[0.43]	[-1.31]
ENT = MAN [1)]	$<$ 0.01 ***	0.69	0.03 **	0.01 **
Panel C: Entrepreneurs in firms $\leq$ 2 yrs, Managers in firms $\geq$ 10,000 FTE, all Employees				
Entrepreneur ($n = 126$)	0.480***	0.602***	0.575***	4.044*
	[3.80]	[4.53]	[4.25]	[1.67]
Manager ($n = 56$)	0.156	0.231	0.185	2.064
	[0.98]	[1.44]	[1.23]	[0.62]
ENT = MAN [1)]	0.06 *	0.04 **	0.02 **	0.58

[1)] This row reports the p-values of Wald tests on β(Entrepreneur) = β(Manager).

neurs in the survival phase (firm age $\leq$ 5 years). For managers and employees we employ the original samples in Panel A. Its last line shows the result of Tables 5 and 6 again. Note that each

Table 8
Differences in Optimism using Stricter Definitions of Entrepreneurs and Managers.

This table reports the results of running the same regressions as in Tables 5 and 6 using different definitions of an entrepreneur and/or a manager. Panel A tests the impact of stricter definitions of an entrepreneur, while maintaining the same samples of managers and employees. Panel B tests the impact of stricter definitions of a manager, while maintaining all entrepreneurs and employees. Panel C tests some of the definitions of Panel A and Panel B against each other. Significance at the 10% level is denoted by *, 5% by **, and 1% by ***, with t-statistics reported in parentheses. Standard errors are robust.

Dependent variable:	(1) Dispositional optimism	(2) Attrib. Style	(3) Over-estimation *Own ability*	(4) Over-estimation *AEX 3M closing price*
Panel A: Subsets of Entrepreneurs				
i) Incorporated ($n = 461$)	0.472 [a,b]	0.196 [a,b]	0.412 [a]	3.647
	[4.90]	[2.27]	[4.66]	[1.85]
ii) Above median no. of employees ($n = 413$)	0.452 [a,b]	0.194 [a,b]	0.390 [a]	2.297
	[4.87]	[2.32]	[4.57]	[1.24]
iii) Above median ent. income ($n = 367$)	0.386 [a]	0.153 [a,b]	0.449 [a]	4.033
	[3.80]	[2.02]	[2.82]	[1.81]
iv) Founder ($n = 700$)	0.453 [a,b]	0.202 [a,b]	0.421 [a]	5.025 [a]
	[5.69]	[2.97]	[5.62]	[2.94]
v) In survival phase (firm age ≤ 5 yrs, $n = 277$)	0.609 [a,b]	0.227 [a,b]	0.542 [a]	2.320
	[5.44]	[3.16]	[5.15]	[0.67]
β(Entrepreneur) in Tables 5 & 6:	0.442 [a,b]	0.179 [a,b]	0.398 [a]	3.983 [a]
Panel B: Subsets of Managers				
vii) CEO or general manager ($n = 437$)	0.289 [b,c]	-0.003 [b]	0.384 [c]	3.925 [c]
	[5.74]	[-0.04]	[4.81]	[2.38]
viii) CEO ($n = 71$)	0.442 [c]	0.339 [c]	0.522 [c]	5.223
	[4.04]	[2.54]	[3.37]	[1.80]
ix) Above median no. of dir. reports ($n = 270$)	0.376 [c]	0.199 [c]	0.359 [c]	4.394 [c]
	[4.15]	[2.16]	[3.72]	[2.30]
x) Above median man. income ($n = 198$)	0.448 [c]	0.280 [c]	0.408 [c]	2.110
	[4.54]	[2.66]	[3.74]	[1.01]
xi) Manager in a firm that is > 15 yrs old ($n = 427$)	0.299 [b,c]	0.053 [b]	0.392 [c]	3.901 [c]
	[3.96]	[0.07]	[4.85]	[2.36]
β(Manager) in Tables 5 & 6:	0.279 [b,c]	0.001 [b]	0.367 [c]	4.409 [c]
Panel C: Combinations of A&B				
i) vs. viii); p-values Wald tests	0.56	0.87	0.18	0.51
ii) vs. ix); p-values Wald tests	0.10	0.21	0.52	0.50
iii) vs. x); p-values Wald tests	0.66	0.75	0.41	0.46
Control variables	YES	YES	YES	YES

a) Significant difference between (subset of) entrepreneurs and employees at the 5% level (Wald test)

b) Significant difference between (subset of) entrepreneurs and (subset of) managers at the 5% level (Wald test)

c) Significant difference between (subset of) managers and employees at the 5% level (Wald test)

coefficient is obtained in a separate regression. The panel shows a clear pattern consistent with the findings in Tables 5 and 6. Whatever definition of the entrepreneur is used, entrepreneurs assess themselves as more optimistic than both managers and entrepreneurs. Closer examination of the measures of attributional style and dispositional optimism shows that entrepreneurs - with a few exceptions - are more optimistic than both managers and employees. Also the overestimation measures reveal largely the same outcomes, except that most of the findings on overestimation of the AEX closing price only turn significant at the 10% level, largely due to higher standard errors.

Panel B of Table 8 shows the results when the definition of a manager is varied (while using the complete samples of entrepreneurs and employees). We restrict the sample of managers to (vii) CEOs or general managers (so without project managers), (viii) CEOs exclusively, (ix) managers with more than the median number of direct reports, (x) managers with above median managerial income, and (xi) managers in firms that are older than 15 years old. The stricter definitions create samples of more successful managers and managers that can reasonably be expected to be more different from entrepreneurs than average, such as the ones employed in older firms. Again, the last line of the panel shows the benchmark result for managers taken from Tables 5 and 6. In contrast to Panel A, we now find that the main results change when other definitions of managers are applied. Whereas focusing on (vii) CEOs and general managers or (xi) managers in older firms do not have a significant impact, the reverse holds true for (v) CEOs only, (vi) managers with above median direct reports, and (vii) managers with above average income. Here it shows that entrepreneurs and managers do not significantly differ from each other on any of the measures used. Hence, successful managers and entrepreneurs both stand out from employees in their higher level of optimism.

Finally, in Panel C we test alternative definitions against each other. We compare (i) entrepreneurs of incorporated firms with CEOs, (ii) entrepreneurs and managers with larger spans of control, and (iii) entrepreneurs and managers with higher than median incomes. Overall, we find no differences in optimism between successful entrepreneurs and managers.

5. Conclusion

Many of us have a brighter view of life than is warranted by reality. However, entrepreneurs are known to be even more optimistic than others. Why would one opt for entrepreneurship, with uncertain outcomes that are varying over time, and low on average? This choice may be explained by entrepreneurs holding (over-)optimistic beliefs. They would overestimate their probability of survival, neglect the quality of the competition, and overestimate the market for their product or service. In more direct tests between entrepreneurs and the population at large, the empirical evidence indeed suggests that entrepreneurs are not only more optimistic than others but also more prone to overconfidence. Yet, at the same time a different strand of literature shows that optimism is also a behavioral trait prevalent among corporate managers such as CEOs and CFOs.

We analyze the natural question to what extent optimism and overconfidence are unique traits of entrepreneurs, or whether these characteristics pertain to strategic decision-makers in general. In other words, might a certain degree of optimism not only be required for entrepreneurship but also to climb the corporate ladder?

We have explored this question by means of a lab-in-the field experiment among substantial groups of entrepreneurs, managers and employees (n = 2,058). We used two well-known measures of optimism adapted from the psychology literature, i.e. dispositional optimism and attributional style, and two well-known measures from the psychology and economics literature, i.e. overestimation of one's own ability and overestimation of a future stock market closing price. All four measures test for slightly different sides of optimism. In that sense, we aim to provide an encompassing assessment of differences in optimism between the three groups of interest. Besides that, we believe we contribute to the literature by being the first to test the attributional style of entrepreneurs and managers, and more in general by testing optimism among such large samples of entrepreneurs and managers. The benefit of such large samples proves to be particularly useful when we explore the impact of alternative (and stricter) definitions of an entrepreneur and/or a manager. In the entrepreneurship literature, for instance, there is a debate going on about the definition of an entrepreneur, and showing to what extent our results are sensitive to the definitions used can thus be valuable.

The results indicate that entrepreneurs are more optimistic than managers and employees in their dispositional optimism and their attributional style. Concerning the latter, we do not find that entrepreneurs are significantly more optimistic about the permanence and pervasiveness of good events, but we do find significant differences when we examine attitudes towards dealing with bad events. Here it shows that entrepreneurs are more optimistic than both managers and employees, thus suggesting that they are more resilient in the face of setbacks than the other two groups. Furthermore, the two measures of overestimation indicate that both entrepreneurs and managers are more prone than employees to overestimate their own ability or a future stock market closing price. Entrepreneurs are only found to overestimate their own ability more than managers (and employees) when we restrict the sample of entrepreneurs to those who are in the start-up phase. But in all other cases, these differences between entrepreneurs and managers do not turn significant.

Our heterogeneity and other checks yield three additional findings. First, we find that a higher dispositional optimism and a more optimistic attributional style when dealing with bad events are not necessarily unique to entrepreneurs. When we restrict the sample of managers to the arguably more 'successful' ones (e.g. CEOs) or the more 'entrepreneurial' ones (i.e. those who work for young and/or small firms), it shows that the gap between entrepreneurs and managers vanishes. One explanation for this might be that optimism and success are even more positively correlated within the sample of managers than within the sample of entrepreneurs, and this is indeed what we find in subsequent analyses. Second, when we compare the results on the overestimation measures to results in two other experiments with different degrees of time pressure, we again find that both entrepreneurs and managers are more likely to overestimate their own ability than employees.

Hence, the results presented here appear to expand to situations with different levels of time pressure. Moreover, we initially also find evidence that entrepreneurs and managers are more likely to be correct about their judgments as well, but the data from the other two experiments indicate that this only holds in the absence of time pressure. Finally, using the data of yet another related experiment, we find that entrepreneurs and managers also stand out in their "probability optimism". That is, they perceive an objective probability of winning an amount more optimistically than they perceive a similar probability of losing a similar amount. We also find suggestive evidence that this probability optimism is negatively linked to both loss aversion and risk aversion.

So do you have to be an optimist to be an entrepreneur, as Mark Zuckerberg suggested in the opening quote? The answer appears to be yes. However, our evidence also points out that entrepreneurs are not the only ones who are so optimistic. It is especially the more successful managers who are so, too.

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