Three Experimental Studies on Entrepreneurship

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THREE EXPERIMENTAL STUDIES ON ENTREPRENEURSHIP

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HANDELSHØJSKOLEN

Three Experimental Studies on Entrepreneurship

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English Summary

Do entrepreneurs differ from others with regard to their behavioral traits, and can beliefs held by employers about these differences lead to self-employed workers being stigmatized in the labor market? Although central to the study of entrepreneurship, the literature does not provide a clear answer to these questions. This can partly be due to the inherent difficulty in answering them by resorting to observational studies. People can select into entrepreneurship because of their preferences for the non-pecuniary benefits of the occupation, but also because of opportunities that (only) they perceive. Based on the premise that reliance on multiple methodological approaches can contribute to the credibility of empirical results, this thesis explores the above questions by resorting to experimental techniques.

It first tests the hypothesis of whether entrepreneurs are more action-oriented than other occupational groups. Analyzing the playing strategies of 100s of entrepreneurs, managers and employees in an optimal stopping game suggests that entrepreneurs are indeed more action-oriented than others. It is theorized that this is driven by their lower levels of loss aversion and higher levels of curiosity. The empirical test results show that (i) entrepreneurs score indeed higher, on average, than managers and employees on curiosity and lower on loss aversion; (ii) the difference in action-orientedness between entrepreneurs and others vanishes when controlling for individual curiosity levels and (iii) an alternative treatment that provides subjects with counterfactual information (about what would have happened in case of continuing) increases their willingness to stop. Under some assumptions, the combination of these results leads to the conclusion that the higher action-orientedness of entrepreneurs can be linked to their greater curiosity, but not to their lower level of loss aversion. These findings support the intuitive idea that (curiosity driven) action-orientedness enhances the identification and/or exploitation of opportunities.

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The thesis then tests the hypothesis of whether entrepreneurs are more dishonest than non-entrepreneurs, or whether their dishonesty can be associated with imperatives relative to the environments in which they are evolving. For this purpose, a die-under-cup paradigm (where subjects must report on the roll of dice knowing that the experimenter cannot observe their scores) with two framings is employed: one is neutral and another evokes a business setting where the subject is a company CEO. The tendencies for subjects to report high scores on their rolls of the dice across treatments and occupations are compared. The results show that entrepreneurs report lower scores under the neutral framing, but higher scores under the business framing. These results provide little evidence in favor of entrepreneurs being more dishonest than others, but rather suggest that entrepreneurial dishonesty is more likely to manifest itself in business settings.

Finally, the thesis provides field experimental evidence on whether self-employed workers enjoy a wage premium or whether they are stigmatized when they transition back to paid work. Fictitious resumes are sent out to job openings and callbacks for interviews are recorded. It is found that those who transition out of self-employment are less likely to be called back than those who have never experienced self-employment. However, those who were self-employed in the past but have since accumulated experience in paid employment are not less likely to receive a callback. These results suggest that there is a wage penalty associated with self-employment, and are consistent with the idea of employers having preference for workers with specific (rather than general) skills.

Danish Summary

Er iværksætterens adfærd forskellig fra andres? Og kan arbejdsgiverens opfattelse af forskellene resultere i en stigmatisering af selvstændige på arbejdsmarkedet? Faglitteraturen giver ikke et klart svar på disse spørgsmål, hvilket til dels kan skyldes, at det generelt er vanskeligt at besvare dem ved hjælp af observationsundersøgelser. Folk kan vælge iværksætteri, hvis de sætter pris på de ikke-økonomiske fordele ved denne form for beskæftigelse, men også på grund af muligheder, som (kun) de selv ser. Baseret på den antagelse, at forskellige metodiske tilgange kan bidrage til troværdigheden af empiriske resultater, undersøger denne afhandling ovennævnte spørgsmål ved hjælp af eksperimentelle teknikker.

Først tester afhandlingen hypotesen om, hvorvidt iværksættere er mere handlingsorienterede end andre beskæftigelsesgrupper. Analyser af spilstrategier for hundredevis af iværksættere, ledere og medarbejdere i et optimalt stopspil tyder på, at iværksættere rent faktisk er mere handlingsorienterede end andre. Det teoretiseres, at denne handlekraft er drevet af stor nysgerrighed og lav tabsaversion. De empiriske testresultater viser, (i) at iværksættere faktisk scorer højere på nysgerrighed end ledere og medarbejdere og lavere på tabsaversion i gennemsnit, (ii) at forskellen på handlekraften mellem iværksættere og andre udligner sig, når man undersøger nysgerrighed på et individuelt plan, og (iii) at alternativt input, der giver testpersonerne kontrafaktuelle oplysninger (om hvad, der ville ske, hvis man fortsatte) øger deres villighed til at stoppe. I nogle antagelser leder kombinationen af disse resultater til den slutning, at iværksætteres store handlekraft kan kobles til det højere niveau af nysgerrighed, men ikke til den lavere tabsaversion. Disse resultater underbygger den intuitive forestilling om, at handlekraft (drevet af nysgerrighed) øger identifikationen og/eller udnyttelsen af muligheder.

Afhandlingen afprøver dernæst hypotesen om, hvorvidt iværksættere er mere uærlige

end ikke-iværksættere, eller hvorvidt denne uærlighed kan relateres til krav, der stilles i de miljøer, iværksætterne befinder sig i. Til dette formål er der anvendt et terning-under-bæger paradigme (hvor testpersonerne skal sige, hvad terningerne viser, vel vidende at de involverede parter ikke kan se, hvad terningerne viser) i to forskellige miljøer: Det ene er neutralt, og det andet skal forestille en arbejdssituation, hvor testpersonen er administrerende direktør for en virksomhed. Der sammenlignes på tværs af erhverv og input, om testpersonerne har tendens til at sige, at terningerne viser et højere antal øjne. Resultaterne viser, at iværksættere melder et lavere antal øjne i det neutrale miljø, men et højere antal øjne i arbejdssituationen. I disse resultater er der ikke meget, der tyder på, at iværksættere er mere uærlige end andre, men mere, at iværksætteres uærlighed sandsynligvis manifesterer sig mere i en arbejdssituation.

Til sidst påviser afhandlingen ved hjælp af feltundersøgelser, om selvstændige bliver stigmatiseret lønmæssigt, når de vender tilbage til lønmodtagerrollen. Fiktive CV'er er blevet sendt til virksomheder, og invitationer til jobsamtaler er blevet optaget. Det har vist sig, at dem, der har været selvstændige, sjældnere bliver inviteret til jobsamtaler end dem, der aldrig har været selvstændige. Det gælder dog ikke dem, der har været selvstændige tidligere, men derefter har fået erfaring fra lønmodtagerstillinger. Disse resultater tyder på, at selvstændige straffes lønmæssigt og er i tråd med opfattelsen om, at arbejdsgivere foretrækker specialister i stedet for generalister.

Contents

Introduction

Seminal contributions to economic literature have given a special place to the entrepreneur in the economy (Knight, 1921; Schumpeter, 1934; Kirzner, 1978; Casson, 1982). From being go-getters to crooks, popular culture has also created countless myths around entrepreneurs. Whether it is through government policies setting up training programs and subsidizing the development of small businesses, or from numerous articles appearing in news outlets, entrepreneurship is getting increasing attention within society (Parker, 2009; Oosterbeek et al., 2010; Fairlie et al., 2015). The frenzy also expresses itself in that owning a business is one of the most desired occupation in many countries (Blanchflower et al., 2001). Despite this importance to many aspects of life, entrepreneurship has eluded empirical study. One cannot convincingly explain why certain people would choose such an occupation when they are likely to have greater income by engaging in paid work (Hamilton, 2000), nor why they would invest in their own businesses when better financial alternatives are available out there (Moskowitz and Vissing-Jørgensen, 2002).

A venue that is often explored to answer the question of why people select into this occupation is related to the hypothesis that it is driven by behavioral differences between entrepreneurs and others. Given the great variance in the outcomes generally associated with business venturing, differences in terms of risk preferences has been an obvious consideration (Kihlstrom and Laffont, 1979; Brockhaus, 1980; Lindh and Ohlsson, 1996; Cramer et al., 2002). Overconfidence and overoptimism are two other behavioral characteristics that have also been extensively studied (Cooper et al., 1988; De Meza and Southey, 1996; Busenitz and Barney, 1997; Camerer and Lovallo, 1999; Arabsheibani et al., 2000; Åstebro, 2003; Koellinger et al., 2007; Landier and Thesmar, 2009). However, the empirical evidence in favor of there being behavioral differences between entrepreneurs and others is mixed

(Parker, 2009).

Against the backdrop of uncertainty regarding the accuracy of there being differences in these attributable characteristics, another important question remains unanswered: what are the consequences of selecting into entrepreneurship on future employment prospects? Indeed, failure being the most likely outcome in startups (Åstebro et al., 2014), one has to take into account for life after entrepreneurship before effectively selecting into it. While certain traits (such as being action-oriented) are generally well perceived in society, others (such as dishonesty) are more likely to be frowned upon. How entrepreneurs are perceived in society will thus affect how they can reintegrate the labor market in case of failure. Here again, a body of literature concerned with this question provides mixed results (Kaiser and Malchow-Møller, 2011; Manso, 2016; Failla et al., 2017).

One reason for discrepancies between studies that address the same question can be related to the difficulties associated with conducting observational studies. This difficulty is particularly salient in the study of entrepreneurship because entrepreneurs differ from other people on a multitude of demographic variables which turn out to correlate with behavioral characteristics as well. For instance, entrepreneurs are mostly men, and engage in the occupation after having accumulated experience on the job market (Evans and Leighton, 1989; Parker, 2009; Koudstaal et al., 2016). It turns out that both gender and age can be related to overconfidence, one of the traits most often attributed to entrepreneurs. This example illustrates the methodological difficulty being that a researcher can easily imagine a complex array of interconnected variables that are at play when it comes to determining selection into entrepreneurship without easily being able to imagine how to isolate the effect of one of them from the others. The threat of bias due to spurious correlation does indeed lurk around all observational studies.

One way to circumvent the resulting lack of credibility in empirical studies is to resort to a multitude of methodologies (Angrist and Pischke, 2010). By giving a level of control that cannot be met when resorting to observational techniques, experimental techniques are an increasingly popular choice for this purpose. Through controlled experiments, researchers can decide on the information and action set that are available to the subjects. This allows researchers to design experiments that will provide them with a rich set of variables that

can seldom be made available outside the controlled laboratory environment. Also, experimental settings allow researchers to randomly (and independently from observables and unobservables) assign subjects to different treatments, thereby uncovering the causal effects of various contexts on outcome variables of interest.

The experimental approach has been recently used by scholar to answer questions regarding behavioral differences between entrepreneurs and others. Holm et al. (2013) and Koudstaal et al. (2016) have tested the hypothesis of whether there are differences between entrepreneurs and others in terms of risk preferences. Burmeister and Schade (2007), Sandri et al. (2010), and Muehlfeld et al. (2017) test whether entrepreneurs are less likely to be prone to inertia than others. The experimental method has also been used to test the hypothesis of whether there is a penalty associated with self-employment in the labor market (Koellinger et al., 2015). Inspired by this growing body of research, the purpose of this thesis is to answer three questions related to the field of entrepreneurship that are difficult to answer through observational studies. Incidentally, these are some of the questions that are the most understudied.

The first question that is explored has to do with testing whether entrepreneurs are more likely than others to be actively seeking to bring change to the world, that is whether they are more action-oriented than others. Many popular accounts of the arch-typical entrepreneur are those of the go-getter and action-taker. This view is also shared by scholars. Keynes (1936) argued that enterprise and economic activity would not exist without the tendency to take action. Shane and Venkataraman (2000, p. 222) explicitly state that entrepreneurs "are less susceptible to inaction inertia". The 'opportunity creation' literature argues that business opportunities take life as a result of entrepreneurial action (Sarasvathy, 2001; Baker and Nelson, 2005; Alvarez and Barney, 2007).

Empirically testing this hypothesis can be difficult because the entry decision can be driven by a multitude of factors other than preferences for taking action. For instance, people could be willing to start a business because they perceive an opportunity without necessarily being action-oriented. The experimental setting, however, offers the possibility to test this proposition.

The "Showcase Showdown" is a game in which players compete against each other in

sequential fashion with the goal being that each player attempts to obtain, without going over a limit, the highest total score out of up to two spins of a wheel. By spinning the wheel a second time, players can either improve their total score or risk going over the limit. By choosing not to spin the wheel a second time, however, players will not run the risk of going over the limit (but will remain with a potentially lower total score). Players must therefore trade-off between the chance of going over the limit or obtaining a higher score when making the decision to spin the wheel a second time. For most scores obtained on the first spin, it is quite straightforward for one to figure-out which of the two options (spinning or not spinning) leads to the best outcome: one should spin again when obtaining small scores on the first spin and not spin when obtaining large ones. For a whole range of first-spin scores that are intermediate, however, this is more difficult to do, leading to players being hesitant between spinning and not spinning. In these situations, the psychic effects of the spin and not spin decisions can drive the decision to spin or not. This aspect of the game makes it similar to blackjack, and makes the spin decision analogous to taking action in real life.

For one thing, spinning the wheel involves actively bringing change to one's total score, making it similar to taking action. Moreover, undoing the effects of the spin decision is much easier than undoing the effects of the no spin decision: in the former, one has simply to imagine the effect of subtracting the score of the first spin whereas in the latter, one has to imagine the effect of all the possible scores that could have been obtained on the second spin. Following Kahneman and Miller (1986), this feature of the game makes not spinning appear more 'normal'. Finally, one is more likely to feel directly responsible for a loss if it occurs after a spin decision than after a no spin decision. In fact, players who go over the limit can easily envision that the loss could have been avoided by not spinning, whereas players who lose after not spinning can always escape blame by giving some weight to the possibility that the spin decision could have led to a loss anyways. Thus, greater tendency to spin the wheel a second time can be associated with greater tendency to take action in a variety of settings in real life.

Employing hundreds of subjects that are either entrepreneurs, managers or employees to play this game shows that entrepreneurs are more likely to spin the wheel a second

time than others, suggesting that they are indeed more action-oriented. By controlling for measures of individual loss aversion and curiosity, which were elicited independently from the optimal stopping game, one can observe that the difference between entrepreneurs and others in terms of spinning decreases. The decrease is also more pronounced for curiosity than for loss aversion. By further comparing entrepreneurs that are at different stages of their entrepreneurial spell, it appears that action-orientedness is more prevalent among young, but also less successful entrepreneurs. This result provides little evidence in favor of the argument that action-orientedness increases with the length of the entrepreneurial spells.

The second question that this thesis addresses has to do with the negatively perceived trait of dishonesty. Anecdotal evidence going from wrongdoings in the world of business to personal experiences can make one wonder whether entrepreneurship appears as an attractive career option for dishonest people. Empirical evidence can also be interpreted as providing support for this idea (Hurst et al., 2014; Åstebro and Chen, 2014; Levine and Rubinstein, 2017). Yet, it is possible that entrepreneurial dishonesty is induced in competitive environment (Shleifer, 2004) and becomes legitimate behavior (Berger and Luckmann, 1967; Shiller, 2017) in those settings.

This question is also difficult to answer through observational study because people are better off undertaking dishonest behavior when they are not likely to be caught. This empirical challenge is met by resorting to a die-under-cup experimental paradigm. Subjects are asked to report the score of two rolls of dice that themselves have to provide, and this behind the anonymity of an online experiment conducted through the intermediary of a crowd-sourcing platform. Subjects can therefore indulge in the utmost dishonest behavior and report the maximum possible scores without risking getting caught: after all, one cannot be accused of not having really obtained the highest possible score. This experimental paradigm allows for comparing tendencies for misreporting scores by comparing groups. Indeed, two groups that are honest (and go through the trouble of actually picking up and rolling dice) should, on average, obtain the same scores. Assuming that subjects do not misreport in their own disfavor, any difference between groups can be evidence of greater dishonesty at the group level.

To test whether entrepreneurs are generally more dishonest or whether entrepreneurial settings induce dishonesty, subjects (some of whom are real-life entrepreneurs) are randomly assigned to either of two treatments. In a "Neutral" treatment, subjects are told that their payoffs depend on how large the score of the rolls of dice are. In a "Priming" treatment, the same payoff function is applied, except that subjects are asked to imagine being company CEOs and that their payoffs depend on how much demand there is for the products of their business, which they should determine by rolling two dice.

The results are of an increase in the scores reported when going from the Neutral to the Priming treatment for the subset of subjects who are entrepreneurs, whereas the opposite is found for subjects who are not entrepreneurs. This result provides little evidence in favor of the proposition that entrepreneurs are generally more dishonest that others, but points instead towards the direction that entrepreneurial dishonesty is likely to manifest itself in business settings. Moreover, the fact that the Priming treatment leads to a decrease in dishonest behavior for non-entrepreneurs can be consistent with the idea that dishonesty in business is not legitimized in all spheres of society.

The third and final question of interest in this thesis has to do with the job market consequences of selecting into self-employment. This question is of both theoretical and practical importance. From a theoretical perspective, policy makers that envision to promote entrepreneurship as a way of tackling unemployment need to have a proper understanding of how an entrepreneurial spell is likely to affect a worker's employability if a transition back to paid employment were to subsequently occur. From a practical perspective, a forward looking worker who contemplates an entrepreneurial career will have to take into account whether there will be a wage premium (or penalty) when transitioning back to paid employment, especially if the entrepreneurial endeavor ends up in failure.

Much of what determines how an entrepreneurial spell will impact future employability in paid work has to do with the signals that will be sent to employers with regards to personality traits and human capital generality. In fact, depending on whether employers expect entrepreneurs to differ from others in terms of their personality traits, and if so, depending on whether those traits are appreciated or not in the workplace, self-employed workers who transition back to paid employment will either face a wage premium or penalty.

Similarly, depending on the type of skills (specific or general) employers are looking for, self-employed workers transitioning back to paid work will either fare better or worse than if they had never selected into self-employment.

Unfortunately, empirical studies do not unanimously estimate the sign of the combined effect of these various forces. While certain studies claim that there is a wage penalty associated with self-employment (Hyytinen and Rouvinen, 2008; Baptista et al., 2012; Failla et al., 2017; Koellinger et al., 2015), others argue that entrepreneurs will receive a wage premium when transitioning back to paid employment (Daly, 2015; Manso, 2016; Dillon and Stanton, 2017).

The discrepancy between these findings is met by resorting to an audit study that consists in sending three similar fictitious resumes to job openings with the difference that two of the resumes exhibit a self-employment spell whereas one of them does not. The resumes that exhibit a self-employment spell, in turn, differ on whether the spell is currently ongoing, or whether it has stopped seven years ago (with the person having reintegrated paid employment ever since). The observation that callback rates are the same between the two self-employed resumes would –assuming that employers believe that personality traits do not change over time– suggest that employers' beliefs about the entrepreneurial personality can drive the employability of self-employed workers who transition back to self-employment. On the other hand, differences between the two self-employed resumes in terms of callback rates would suggest that preferences for either specific or general human capital is likely to drive the wage premium or penalty associated with a self-employment spell.

Sending these tree types of resumes to "IT Project Manager" job openings in the Boston and Philadelphia areas in the US gives the following results. First, consistent with the idea that there is a wage penalty associated with transitioning out of self-employment, resumes that exhibit an ongoing entrepreneurial spell receive less callbacks than those that do not exhibit self-employment at all. Moreover, no significant difference between the callback rates between the never-self-employed and the previously-self-employed resumes can be found, providing little evidence in favor of there ever being a wage premium to self-employment. Taken together, these results suggest that there is a wage penalty associated

with self-employment, and that this could be linked to employers' preferences for human capital specific to the position that they are seeking to fill.

In sum, this thesis contributes to the entrepreneurship literature by exploring links between occupational choice, behavioral characteristics, and labor market outcomes. The main uptake seems to be that the relationship between entrepreneurship and behavioral traits is nuanced. When it can be found that entrepreneurs are more action-oriented than others, it appears that this relationship can be weak and confounded by individual curiosity. Whereas entrepreneurs can be dishonest in business, they can be more honest in other settings. Finally, personality traits do not seem to weight too much in the decision to hire workers that have experienced self-employment. What seems to matter most is whether a worker comes with skills specific to the task at hand.

Chapter 1

Entrepreneurship and Action-Orientedness: Evidence from the Showcase Showdown

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1.1 Introduction

Are entrepreneurs less plagued by indecisiveness and inertia than other people? Popular
and theoretical perspectives tend to answer this question with the affirmative. It seems un-
natural to believe that entrepreneurs would suffer from the same reluctance to act upon op-
portunities as the general population (McMullen and Shepherd, 2006; Shane and Venkatara-
man, 2000). In fact, it can be argued that business opportunities do not exist per se but arise
out of entrepreneurial action (Sarasvathy, 2001; Baker and Nelson, 2005).[1]

In general, when facing difficult choices, many people become hesitant and prefer not
to do anything (Samuelson and Zeckhauser, 1988). Inactivity may be attractive because it
gives the illusion that one is less responsible for harmful outcomes (Spranca et al., 1991).
Because inaction gives the feeling that blame can be evaded, it can serve as a reference
point from which actions are judged (Baron and Ritov, 1994). The tendency for inaction can
thus be explained by reference-dependent preferences: the disutility from blame for actions
with undesirable outcomes is larger than the utility from rewards for actions with desirable
outcomes as compared to the reference point of inaction. Despite these psychic benefits,
inaction also leaves one ignorant about potential outcomes that would have resulted from
taking action. This may induce people to take action just out of curiosity, even at the cost of
potentially finding out that a bad decision was made (Zeelenberg et al., 2002; Van Dijk and
Zeelenberg, 2007). Curiosity is thus an opposing force to blame avoidance and can lead to
taking more action.

One can therefore postulate that entrepreneurs are less prone to inaction because they
are more open to new experiences (Zhao et al., 2010; Frese and Gielnik, 2014), exhibit a
greater tendency for explorative search (Laureiro-Martínez et al., 2013), and are less loss
averse (Koudstaal et al., 2016) than others. Consequently, differences in action-orientedness
between entrepreneurs and others should become less prominent or even disappear when
controlling for individual levels of curiosity and loss aversion.

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[1]This idea is also pervasive in economic thought. Notably, Keynes (1936, p. 163) held the view that
"…human decisions affecting the future, whether personal or political or economic, cannot depend on strict
mathematical expectation, since the basis for making such calculations does not exist; and that it is our innate
urge to activity which makes the wheels go round …". He believed that little economic activity would occur
without "…animal spirits–a spontaneous urge to action rather than inaction …" (p. 161) and that if we were
"…to depend on nothing but mathematical expectation, enterprise will fade and die …" (p. 162).

Although the idea of associating entrepreneurship with action-orientedness is appealing, it has little empirical support. Measuring action-orientedness can be challenging. In the case of entrepreneurship, for example, one can start a new venture simply because an attractive opportunity is perceived without having any particular tendency to take action. On the contrary, it might also be that action-orientedness is related to opportunity recognition or the tendency to exploit opportunities. For this reason, biases towards inaction are mostly studied in hypothetical settings (Ritov and Baron, 1990; Patt and Zeckhauser, 2000; Tanner and Medin, 2004). Yet, selection into entrepreneurship can also be driven by profit motives, which suggests that hypothetical settings might not be fully representative of the relationship between action-orientedness and this particular occupation. More generally, measuring action-orientedness in a setting where the choice between remaining inactive and taking action has real monetary consequences would increase confidence in the external validity of the findings.

In this study, these challenges are met by resorting to an incentive-compatible controlled experiment inspired by Tenorio and Cason's (2002) study of the "Showcase Showdown" sessions of "The Price is Right" TV show. In our version of this optimal stopping game, two contestants compete over getting the highest score out of up to two spins of a wheel of fortune without going over a limit. Experimental subjects are real entrepreneurs, managers and employees. As in Tenorio and Cason (2002), people who have a tendency of spinning twice instead of once are, all else equal, viewed as being more action-oriented. Our hypothesis that entrepreneurs are more action-oriented than others can thus be tested by comparing entrepreneurs' likelihood of spinning twice to employees and managers, while controlling for background characteristics in regressions including age, gender, education, income and the like.

We further test the hypotheses that higher levels of action-orientedness are associated with higher curiosity and lower loss aversion by controlling for these two characteristics as well. For this purpose, individual levels of loss aversion are measured by replicating an incentive-compatible multiple price list (MPL) elicitation procedure from Koudstaal et al. (2016) and individual levels of curiosity are measured by employing the Curiosity and Exploration Inventory-II questionnaire in Kashdan et al. (2009).

Finally, the experiment includes, besides the baseline treatment, a counterfactual information treatment. In this treatment, the potential role of loss aversion and curiosity as the mechanisms behind action-orientedness is changed in opposite ways, enabling a test which of the two mechanisms is strongest. Half of the individuals are randomly assigned to this treatment, whereas the other half are assigned to the baseline treatment, thereby allowing a between-subject comparison. In the counterfactual information treatment participants learn the score of their (*would-be*) second spin regardless of their choice of whether to actually spin twice. That is, they get to know the outcome that would result from taking action even when they remain inactive. In this treatment, taking action has a less positive (or even no) effect on satisfying curiosity. A *lower* action-orientedness in the counterfactual information treatment as compared to the baseline would then identify curiosity as underlying driving force. In contrast, always providing information about the (would-be) outcome after taking action may shift the reference point towards taking action; loss aversion thus predicts a $higher$ action-orientedness in the counterfactual information treatment than in the baseline.

A large subject pool consisting of 1,441 professionals took part in the experiment. We show that entrepreneurs (who are more curious and less loss averse) are more likely than managers and employees to spin the wheel a second time. This finding of a distinct playing strategy of entrepreneurs provides evidence that entrepreneurs are more action-oriented than others. We also find that curiosity and loss aversion have the expected relationships with individuals' stopping strategies and controlling for these characteristics reduces the difference in the level of spinning between entrepreneurs and others to zero. This especially holds true for curiosity. We also find that participants are less likely to spin in the counterfactual information treatment than in the baseline. This provides further evidence that action-orientedness is driven by curiosity.

The results are largely in line with studies that dissociate entrepreneurship from inertia and indecisiveness (Burmeister and Schade, 2007; Dyer et al., 2008; Sandri et al., 2010; Muehlfeld et al., 2017). Our study contributes to this literature by employing a large scale, incentive compatible experiment among professionals from different occupational groups and by testing how action-orientedness may be driven by curiosity and loss aversion.

This study highlights the importance of behavioral traits in predicting action-orientedness and is thus related to the general research program regarding the economic importance of non-cognitive skills and personality traits (Borghans et al., 2008a; Heckman et al., 2006). More specifically, the study links entrepreneurial action, and therefore an important phenomenon in relation to economic outcomes, to certain individual characteristics. To the extent that personality traits can be cultivated during early childhood, these findings have ramifications in how policy can nurture entrepreneurially-minded individuals.

1.2   Conceptual Framework and Hypotheses

The Psychology of Inaction

Most people exhibit a preference for inaction when it is optimal to take action or when they should be indifferent between action and inaction (Samuelson and Zeckhauser, 1988; Spranca et al., 1991). Tendencies towards inaction are salient when the different options that the decision maker is facing can cause harm or when information about outcome probabilities is missing (Ritov and Baron, 1990; Frisch and Baron, 1988). In such settings, it can be observed that people judge harm resulting from inaction as being less bad than harm resulting from action. Sometimes, people judge harm resulting from action to be worse than even more harmful inaction (Baron and Ritov, 1994). Preferences for inaction are, however, not always the norm. People can feel like inaction is worse when they are in a responsible position or when it is not accepted as being "the right thing to do" (Ritov and Baron, 1990; Patt and Zeckhauser, 2000; Baron and Ritov, 2004; Tanner and Medin, 2004; Bar-Eli et al., 2007).

Causal discounting is a central mechanism behind preferences for inaction (Spranca et al., 1991). When harm occurs from inaction, believing that something other than our own decision is causing the outcome is more salient. This, in turn, leads to a less strong sense of responsibility for harmful outcomes. From this perspective, actions can allude to the illusion that a change in the state of the world has occurred as a result of our decision

and that the outcomes that we observe are due to that decision. When we take action, the causal link between the harm and our decision appears stronger and we are likely to believe that more blame can be attributed to ourselves. This account is consistent with norm theory, which implies that people feel worse when bad outcomes result from action than inaction because actions are more often seen as being "abnormal": it is easier to imagine abstaining from actions that were actually carried out than to imagine carrying out actions that were never carried out (Kahneman and Tversky, 1982; Kahneman and Miller, 1986; Baron and Ritov, 2004). As a result of this illusion, reactions to harm resulting from action are stronger.

Inaction can thus be viewed as an option that can be characterized as having a framing effect of allowing for the avoidance of blame (Ritov and Baron, 1995). This psychic benefit associated with not doing anything can lead to inaction being set as the reference point from which other options are judged (Baron and Ritov, 1994). Once inactions are set as reference points, good outcomes missed are seen as foregone gains whereas harms avoided would be seen as foregone losses (Ritov and Baron, 1990; Spranca et al., 1991).[2] Given that losses weigh larger than gains when people are loss averse, inactions will be preferred over actions.

While loss aversion can drive inaction, other mechanisms may have the opposite effect and rather drive action-orientedness. Curiosity is one such mechanism since it has the effect of "killing regret" by leading individuals to search for information even when the anticipation of regret would induce them to do otherwise (Van Dijk and Zeelenberg, 2007). An individual whose urge for knowing what would result out of action is stronger than the need for blame avoidance is more likely to take action.

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[2]In prospect theory, the reference point is usually taken from a set of payoffs (Kahneman and Tversky, 1979; Tversky and Kahneman, 1991). In our own framework, the reference point is taken from a set of options. The monetary payoff associated with that reference option will serve as the reference point. For simplicity, we use the term reference point throughout the text when referring to the payoff associated with the reference option.

Links to Occupational Choice

Entrepreneurs are less prone to engage in counterfactual thinking than managers and employees (Baron, 2000; Markman et al., 2002). As a result, they are expected to be less likely to feel regret for bad outcomes resulting from their decisions and thus less likely to seek the benefits of blame avoidance. Similarly, it is found that entrepreneurs are more tolerant towards losses than managers and wage employees (Koudstaal et al., 2016). Given greater openness to new experiences (Zhao et al., 2010; Frese and Gielnik, 2014) and a tendency to undertake explorative search (Laureiro-Martínez et al., 2013), entrepreneurs are also more likely to be driven by curiosity. Table 1.1 summarizes the main behavioral traits associated with action-orientedness and describes how individuals in different occupations are likely to score on these traits. Based on this framework, we hypothesize that:

Hypothesis 1. Entrepreneurs are more action-oriented than other occupational groups.

If differences in action-orientedness between entrepreneurs and others are indeed driven by differences in curiosity and loss aversion, then one should expect that differences in action-orientedness diminish once these two behavioral traits are accounted for. We thus have as a second hypothesis:

Hypothesis 2. The differences in action-orientedness between entrepreneurs and others should diminish once curiosity and loss aversion are controlled for.

Decision Feedback and Action-Orientedness

Not taking action may be attractive partly because it is more difficult to imagine what would have happened had we taken action instead. Under certain circumstances, however, the outcomes of our would-be actions are uncovered even if we stay inactive. In line with the literature, we label this as situations with 'decision feedback'. One example of such a setting is stock picking: whether people decide to change their stock portfolio or not, they can always find out about which one of the two options would have led to the best outcome. In such settings, people have been found to opt for options that they would have forgone if knowledge of the outcomes had not been available (Larrick and Boles, 1995; Zeelenberg et al., 1996).

With decision feedback, the respective effects of loss aversion and curiosity change. On the one hand, when feedback from both inaction and action is available, the blame evading benefit of inaction is diminished because the causal link between not doing anything and the potentially harmful outcome becomes more salient. As a result, the attractiveness of inaction diminishes and the reference point from which options are evaluated can shift from not taking action to actually taking action. Therefore, if loss aversion is the main driving force behind action-orientedness, people will be *more* inclined to take action when decision feedback is available. However, someone who takes action just because he or she is curious to find out what would happen in that case, will be less inclined to do so when this information is made available even when he or she chooses not to take action. In the stock picking example, people do not have to change their stock portfolio in order to find out whether this would have been beneficial or not. Hence, if curiosity is the main driving force behind action-orientedness, people will be *less* inclined to take action when decision feedback is available. We arrive at the following competing hypotheses:

Hypothesis 3a. With loss aversion as main driving force, action-orientedness will be higher when decision feedback is available.

Hypothesis 3b. With curiosity as main driving force, action-orientedness will be lower when decision feedback is available.

An additional way to test the two suggested underlying drivers of action-orientedness is to look at how the associations between action-orientedness and loss aversion and curiosity, respectively, *change* when decision feedback is available (relative to the baseline situation where one is not informed about the would-be outcomes of actions not taken). The effect of loss aversion is to make one stay with the reference point, whether it is to take action or not (Patt and Zeckhauser, 2000). As a result, loss averse individuals are less likely to take action when not taking action is the reference point, but they become more likely to take action when taking action is the reference point. And these effects become stronger the more loss averse a person is. Because decision feedback can shift the references point from inaction to action, the relationship between action-orientedness and one's level of loss aversion can thus be reversed. Curiosity can be viewed as an urge to fill an information gap (Loewenstein, 1994). The arousal of curiosity should therefore be expected to decrease

with the gap in the information one is seeking. With decision feedback, one can simply find out what would have happened in case of action while actually staying inactive. In other words, action is no longer needed to fill the information gap. As a result, one's curiosity is less likely to motivate one to take action just for the sake of finding out what would have happened then. The positive association between action-orientedness and curiosity is thus weakened (and may even be nullified) in the presence of decision feedback. This leads to our final set of hypotheses:

Hypothesis 4a. The negative association between action-orientedness and loss aversion becomes weaker (i.e. less negative) and may even reverse (i.e. become positive) when decision feedback is available.

Hypothesis 4b. The positive association between action-orientedness and curiosity becomes weaker (i.e. less positive) and may even vanish when decision feedback is available.

1.3 Experimental Design and Procedures

The experiment is conducted online using the Qualtrics platform and consists of four phases. In the first phase, participants are prompted with background questions. Background characteristics administered are age, gender, highest level of education and last year's income (in brackets). The second phase is the central part of the experiment where participants play the optimal stopping game to measure their level of action-orientedness. Half of the participants are confronted with the baseline situation without decision feedback, while the other half plays the optimal stopping game with decision feedback. In the third phase, participants answer a psychological questionnaire measuring their level of curiosity. Finally, in the fourth phase, we elicit individual levels of loss aversion in an incentive compatible fashion.

This design allows answering our research question using two distinct approaches. First, we can test whether entrepreneurs are more action-oriented than others when controlling for background characteristics (Hypothesis 1). We can also test the role of the underlying mechanisms of loss aversion and curiosity by including the individual measures of these characteristics as independent variables in these regressions (Hypothesis 2). The second

approach follows from comparing the situation with decision feedback to the baseline situation without decision feedback. If curiosity mainly drives action-orientedness, one would expect action-orientedness to decline moving from baseline to decision feedback, while loss aversion as main driver would predict the opposite (Hypotheses 3a and 3b). The associations between action-orientedness and loss aversion and curiosity also change when decision feedback becomes available, providing an alternative way to test for the underlying mechanims (Hypotheses 4a and 4b).

The optimal stopping game

We consider a simplified version of the Showcase Showdown game with only two players. Experimental subjects are all assigned the first player role; the second player role is played by the computer and subjects are informed about this. The players compete against the computer over getting the highest score out of up to two spins of a wheel of fortune, without going over a limit. The winner of the game earns a fixed prize of size $X > 0$ while the loser gets nothing. In our experiment the wheel is divided into $N = 9$ segments numbered from 1 to 9. Each spin results in an equal chance of getting one of those nine numbers. Contestants play sequentially and can opt out of spinning a second time. It is the computer's turn after the first player has taken her decision whether or not to spin a second time (knowing the first player's total score). The total score for a contestant who chooses to spin twice equals the sum of scores on her two spins. For a contestant who spins only once the total score equals the score of her first (and only) spin. Going over $N = 9$ results in immediate elimination from the game. In case of a draw, the first contestant wins by default. The latter tie-breaking rule deviates from the original version of the game, yet makes the rules easier for the participants and also simplifies the characterization of player 1's optimal strategy (see below).

The strategic situation for player 2 (the computer) is similar to the dealer role in blackjack. Its optimal strategy is simple: if player 1 eliminated herself by taking two spins, player 2 just spins once and wins for sure. If player 1 did not eliminate herself, let $T1$ be her total score. Player 2 should then take a second spin if and only if its first spin yields $T1$ or less. Participants in our experiment are informed of this optimal strategy used by computer-

player 2.

The optimal strategy for player 1 is more complicated. We fully characterize it for any positive integer N. Let t denote the outcome of player 1's first spin and $p_1(t)$ her probability of winning if she stops after her first spin (such that her total score equals t). Similarly so, let $p_2(t)$ denote the probability of winning if player 1 takes a second spin. Clearly, the optimal strategy for player 1 is then to spin again iff:

$$p_2(t) \geq p_1(t) \tag{1.1}$$

Now, based on Coe and Butterworth (1995), it can be derived that (see A):

$$
\begin{aligned}
p_1(t) &= \frac{t^2}{N^2} \\
p_2(t) &= \frac{1}{N^3}\left[\frac{N(N+1)(2N+1)}{6} - \frac{t(t+1)(2t+1)}{6}\right]
\end{aligned}
$$

It is worthwhile to point out that, although the optimal stopping game contains elements of risk, ordinary risk preferences are irrelevant for the choice between stopping and spinning twice. Given the binary outcome of the game (win and get fixed prize X, or lose and get nothing), player one should always choose the option that maximizes the probability of winning, independent of her level of risk aversion.[3] Thus, theoretically risk preferences should not matter.

Intuitively, $p_1(t)$ is increasing in the outcome of the first spin t while $p_2(t)$ is decreasing (see Figure 1.1). Roughly speaking, t can fall within three different ranges. First, it can be that low that it is rather obvious that player 1 should take a second spin. Second, it may be that high that it is clear that player 1 should *not* take a second spin. Third, t can be intermediate, such that it is unclear at first sight whether or not player 1 should take a second spin. Only the intermediate range is likely to yield insights about subjects' action-orientedness; for the 'obvious' extreme cases we will most likely find (too) little variation. With this in mind we have chosen the value of N as to maximize the relative size of this

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[3]To illustrate this formally, let $u(x)$ be a general utility function over monetary outcomes x, with $u'(x) > 0$ for all x. Risk aversion is then captured by utility curvature, i.e. how $-u''(x)$ compares relative to $u'(x)$. In our game with only two monetary outcomes ($x = 0$ and $x = X$), utility curvature does not play a role: the expected utility of action a with win probability p_a then equals $u(0) + p_a \cdot (u(X) - u(0))$, so one should always choose the action with the highest win probability p_a irrespective of how $u(x)$ looks like.

intermediate range, while at the same time keeping N as small as possible for simplicity reasons. With our choice of $N = 9$, the intermediate range arguably corresponds to $t \in \{3, 4, 5, 6\}$, where for $t = 5$ we have that $p_2(t) \approx p_1(t) \approx 0.31$.

Strategy Elicitation

Instead of letting subjects actually play the optimal stopping game a large number of times in a row, we elicited their *strategies* of playing this game. After playing two practice rounds of the actual game, they are asked to provide us with their playing strategies. A strategy corresponds to a switching point $\omega \in \{0, 1, 2, \ldots, 9\}$, such that the participant spins a second time if and only if $t \le \omega$. (A switching point of $\omega = 0$ thus means that the participant never spins twice, irrespective of the outcome of the first spin.) Strategy elicitation is conducted using a bisection method: subjects are first asked to indicate whether they would spin a second time if they obtain a score of 2 on their first spin. Those who indicate that they would, are then asked to indicate whether they would spin another time after a score of 8 on their first spin, whereas those who indicate that they would choose not to spin are asked to indicate whether they would spin on a score of 1 on their first spin. This process stops when subjects have revealed their switching points, that is, the highest score of their first spin for which they would spin the wheel a second time.[4]

As derived above, the optimal strategy specifies $\omega^* = 5$. Using this strategy, a participant wins in 51.67% of the cases. Note though that employing a suboptimal strategy does not necessarily lead to worse performance. This depends on the outcome of the first spin t. For instance, if a participant would never spin twice no matter what the score of her first spin is, i.e. her switching point equals $\omega = 0$, she actually still plays optimal for all $t \ge 6$. Only for $t \le 5$ her choice (of not spinning) is suboptimal and leads to lower expected performance. With this extreme strategy, player 1 still wins with probability $\frac{1}{9} \cdot \sum_{t=1}^{9} p_1(t)$, which corresponds to 39.09% of the cases. Figure 1.2 depicts the expected likelihood of winning for all strategies $\omega \in \{0, 1, 2, \ldots, 9\}$ at the wheel.[5] Differences in the percentage

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[4]A large literature on the elicitation of subjective expected utility argues that the bisection method has the potential of inducing risk neutrality (Harrison et al., 2013).

[5]For a switching point equal to ω the expected likelyhood of winning equals $100 \cdot \left(\frac{1}{N} \cdot \sum_{t=1}^{\omega} p_2(t) + \frac{1}{N} \cdot \sum_{t=\omega+1}^{N} p_1(t) \right) \%$.

of wins are indeed small in the intermediate range $\omega \in \{3, 4, 5, 6\}$. We take a participant's switching point as our measure of his or her level of action-orientedness.

External Validity

The optimal stopping game offers interesting prospects with regards to the external validity of our results. Not spinning can be similar to not acting for three main reasons. First, not spinning will result in having the same score one has obtained in the first spin, which gives the illusion that one is not willfully changing the state of world. This feature of the game makes it similar to the game of blackjack where a tendency for not 'hitting' can be observed for players (Carlin and Robinson, 2009). Second, it is much more difficult to imagine the outcome of spinning when it is decided not to spin than imagine the outcome of not spinning when it is decided to spin. From a norm theory perspective (Kahneman and Miller, 1986), spinning is therefore more abnormal: because not spinning leaves one ignorant about the counterfactual second spin, one feels as if blame can be evaded by opting not to spin. Third, not spinning offers the benefit of losing by being outscored rather than going bust, which can be viewed as the "normal" or the "right" thing to do.

For these reasons, not spinning can become the reference point, leading to a feeling that the possibility of winning with the score obtained on the first spin is lost every time the decision to spin results in going bust. Loss aversion will thus decrease spinning at the wheel. The game also interplays with curiosity in the following manner. Besides impacting one's total score, the decision to spin also provides information about the counterfactual second spin. That is, a curious person might spin simply to find out what might happen out of it. The effects of loss aversion and curiosity on the spin decision are thus similar to their effect on taking action in real life.

In the world of business venturing, the structure of the optimal stopping game resembles mostly the entry decision. In fact, it is quite easy for someone to imagine what one's income level would have been had that person not chosen to startup a business: that person's income would have probably been at the level of the previously held job. This easy undoing of the entry decision can lead to the person feeling more responsible for harms such as business failures. One would thus feel as if the income that was expected out of paid em-

ployment to have been lost. Curiosity, on the other hand could push someone to overcome that fear and actually seek to find out whether one can be a successful entrepreneur or not.

Incidentally, many daily decisions made by workers and managers are also structured in the same way. An obvious example has to do with changing jobs. While plenty of empirical findings support the idea that labor mobility can be linked with higher income levels, letting go of a position one has kept for a long time can be difficult especially when a new position can turn out not to be a good match. Our optimal stopping game thus has the advantage of having a neutral framing and having parallel with a broad set of decisions that have to do with bringing change in both entrepreneurial and non-entrepreneurial occupations.

It is yet possible that people who are accustomed to making such decisions – be it because of their professions – would behave differently than others. These differences can lead to discrepancies in the results that one can obtain in the lab (Dufwenberg et al., 2005; Levitt and List, 2007; Fréchette, 2015). To avoid that our results be sensitive to the type of subjects employed in our experiment, we favor a lab-in-the field approach in which we sample real-life entrepreneurs, managers, and employees.

Counterfactual Information Treatment

To be able to compare situations without and with decision feedback, our experiment contains two treatments: the baseline treatment without feedback and the counterfactual information treatment in which the score of one's second spin is revealed regardless of one's decision of spinning a second time. In the latter treatment, for players who opt not to spin, the value of the second score is not added to their total score. This implies that the additional information does not change the outcome of the game. Participants are randomly assigned to either the baseline or the counterfactual information treatment with equal probabilities.

While this manipulation does not have any effect on the optimal playing strategy when player one just wants to maximize her probability of winning, it could cause the reference point to shift towards spinning twice. Indeed, not spinning no longer allows one to avoid blame since imagining what the outcome of spinning would have been becomes easy. Subjects will therefore be confronted with situations where the total score would have been better by opting to spin twice. With the reference point shifting from not spinning to spin-

ning, the effect of loss aversion will be increased spinning. On the other hand, assignment to the counterfactual information treatment will lead to spinning the wheel less often for those whose spin decisions are driven by the urge to find out what the score of the second spin is. The counterfactual information treatment therefore provides an alternative way of testing the roles of curiosity and loss aversion in explaining action-orientedness.

Measurement of Behavioral Characteristics

Loss aversion

We replicate Koudstaal et al. (2016)'s incentivized measurement of loss aversion comparing entrepreneurs, managers and employees. It comes down to measuring loss aversion by means of the Multiple Price List (MPL) methodology applied by Fehr and Goette (2007) and Gaechter et al. (2010), which in essence is like the Holt and Laury (2002) price list but also includes negative payoffs. Eight decisions are presented to participants, each consisting of a choice between a sure and a risky gamble, where the risky gamble can also lead to a loss. The sure bet involves a gain of €0, while the risky gamble involves a 50% chance of winning €300 or losing an amount x that varies from €0 to €350 in each decision. Participants are asked to indicate the option for which they are indifferent between the sure and the risky gamble by going through the list using a bisection method. A benefit of the Gaechter et al. (2010) measure is that it is significantly correlated with loss aversion in riskless choices. Thus, it alleviates the potential issue that loss aversion might be confounded with risk aversion (Gaechter et al., 2010; Kahneman et al., 1990). B.3 provides a snapshot of the decisions presented to the participants.

Curiosity

Our theoretical framework posits that curiosity can potentially drive action-orientedness. Comparing spin decisions in the baseline to the counterfactual information treatment allows measuring whether curiosity plays a role. Moreover, we survey participants with personality questionnaires in order to elicit their level of curiosity. The Curiosity and Exploration Inventory-II questionnaire proposed by Kashdan et al. (2009) consists of 10 Likert

scale items. The questionnaire is an extension to an earlier popular measure of the individual quest for novelty and challenge (Kashdan et al., 2004). The 10 items are presented in B.2.

Sampling

Invitations were sent out per email on December 7, 2015 requesting responses to the survey questions and to play the games online. The invitations were sent to a large sample of Dutch entrepreneurs, managers and employees who were reached through the Amsterdam Center for Entrepreneurship (ACE), "De Baak" training center and a market research agency respectively. All invitees had 14 days to respond, and non-respondents received a reminder after seven days. To not overburden the participants, each session (including playing the game and answering survey questions) is designed to last approximately 15 minutes. B shows the details.

1,441 respondents completed the survey up to the second phase and 1,345 respondents, i.e. 93%, completed the entire survey[6] before the deadline on December 21. The median response time was 13 minutes. 729 (50.59%) of those participants were randomly assigned to the baseline treatment. Participants assigned to different treatments do not differ in their background characteristics (age, gender, education and income) indicating that the assignment process balanced out different demographic groups in a proper random way. Out of the 1,441 respondents, 777 qualify as being employees, 424 are entrepreneurs and 179 are managers. 32 respondents declared that they were unemployed while 29 did not fall in any of the other four categories. The remainder of the analysis will focus on those participants that fall within the three occupations of our interest. The descriptive statistics of background variables such as gender, age and education show that the sample is composed similarly as the earlier samples used by Koudstaal et al. (2016), who assess the representativeness of their sample as being good (as far as their data allow them to test this). In the final analyses, we will limit the sample to 1,057 observations in total (594 employees, 322 entrepreneurs, and 141 managers) due to the exclusion of outliers in the sense that the stop-

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[6]1,345 respondents (more than 93% of those who completed the second phase) completed all four phases of the questionnaire. We therefore believe that attrition is negligible.

ping decision is outside the reasonable range of $\{3, 4, 5, 6\}$, see Section 1.4.

Incentives

Everything about the payoff and payout rules is transparently communicated in the experiment. Given budget restrictions and the rather high average income levels of the population studied, we chose to pay out a substantial amount to only a few randomly selected participants (Gneezy and Rustichini, 2000; Laury, 2006; Koudstaal et al., 2016). To foster trust, the selection of prize winners and all random draws in the experiments were assigned to a civil-law notary who also monitored a legitimate course of the payouts. Twenty participants are randomly selected to actually receive their earnings. Participants are aware that this means a payout chance of one percent. Ex post, the payout rate was around two percent because the sample turned out smaller than in previous waves of the experiment. For those selected, payoffs will depend on their decisions in the second and fourth phase of the game. A flat payoff of €350 for answering the unincentivized questions in phases 1 and 3 is added to this.

Regarding phase two ("Showcase Showdown"), participants are informed that their switching point will be used to determine the spinning decision of a random game against the notary who will play exactly like the computerized player 2. In case of winning the match, the participant is awarded with €100 and zero otherwise for this phase of the experiment.

Regarding phase four (loss aversion), one out of the eight decisions from the Multiple Price List is randomly selected for payout. The participant's loss aversion score is used to determine whether she prefers the safe or the other option. In case of the safe option her earnings in this phase are zero. In case of the risky option, the participants' payoffs will vary between winning €300 and losing €350. Participants can thus lose all of the endowment that they obtain from answering the unincentivized questions in phases 1 and 3.

Definitions of Entrepreneurs, Managers and Employees

Measuring differences between entrepreneurs and others involves two complex judgmental decisions. The first is the definition of entrepreneurs. The second is the definition of 'others'. Consistent with Koudstaal et al. (2016), the qualifying characteristics for inclusion in the entrepreneur sample are: people who have founded, inherited or taken over a company (within 5 years after startup) they are currently (co-)managing. Because we use a large and diverse sample of entrepreneurs, we can later use more specific definitions of entrepreneurship and test whether that matters. A stricter definition of entrepreneurs aims at mimicking a sample of more 'Schumpeterian' entrepreneurs. The stricter measure we will use is entrepreneurs with above median incomes. Moreover, we are interested in the difference between entrepreneurs and others when defining entrepreneurs as the people owning and managing firms in the start-up phase, i.e. younger than 5 years old. Entrepreneurs can also be distinguished based on whether they are sole proprietors or owners of an incorporated business, the latter group often being associated with more successful entrepreneurs (Levine and Rubinstein, 2017). As a final subgroup of entrepreneurs viewed more successful, we consider entrepreneurs with above median numbers of direct reports.

The definition of 'others' (see also Koudstaal et al. (2016) for a discussion) is challenging too. Actually one would like a control group that is very similar to the group of entrepreneurs but different from them in only one respect: they are not entrepreneurs. Koudstaal et al. (2016) argue that a close as possible to ideal control group is a group of managers: they usually have the same age and education distribution and they do not differ by much in their daily responsibilities and activities from entrepreneurs (other than the responsibilities and activities associated with the pure act of entrepreneurship). Therefore, managers are the first control group. In our study, we define managers as those who are employed by an organization they did not start up themselves and have at least two subordinates with direct responsibility.

A second control group should make a comparison possible to most of the previous studies that compare entrepreneurs to 'others'. These studies have usually employed as control groups employees (Hartog et al., 2010; Van Praag et al., 2013; Shyti and Paraschiv,

2014) or the population at large (Holm et al., 2013). We use a sample of employees. We measure 'employees' as people who are employed by an organization and do not belong to the first two groups.[7]

1.4   Results

Distribution of Action-Orientedness and Descriptives

Figure 1.3 shows the distribution of action-orientedness ω under the baseline and the counterfactual information treatments. As we can see, $\omega \in \{3, 4, 5, 6\}$ for most participants. Moreover, the same patterns of play can be observed across all occupations in this range of action-orientedness: the share of 6s is greater than the share of 4s for the three occupations. For example, there are almost twice as many employees that would stop spinning on a 6 than on a 4 under the baseline treatment. But this difference between the share of those with $\omega \in \{4, 6\}$ balances out and gets much closer under the counterfactual information treatment. This pattern of a decreasing gap between the share of 6s and 4s in the counterfactual information treatment is observed across all three occupations. Although any level of action-orientedness could represent genuine preferences, we only consider the middle range of $\{3, 4, 5, 6\}$ as the range of switching decisions for analysis.

In our bisection method to elicit subjects' switching points, subjects were first asked whether they would spin again if they get a score of 2 on their first spin. If they answer by the affirmative, they are prompted about whether they would do the same for a score of 8. If a participant answers this question affirmatively by mistake, then the next question concerns a first spin score of 9 in which case the switching point will be extreme. Therefore, extreme levels of action-orientedness could be due to mistakes because participants did not have the possibility to go back to their earlier decisions in case they realized that they had made a mistake. Outliers are not over-represented in a particular profession or treatment (baseline or counterfactual). Table D.1 in D shows that our findings are robust to the inclusion of outliers. Table D.2 in the same shows the results from a Probit analy-

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[7]Participants who are both entrepreneurs and managers or employees, and therefore eligible for multiple subsamples, were instructed to select the category in which they generate most of their income.

sis where observations from outside the middle range of switching points $\{3, 4, 5, 6\}$ take on a value of one for the dependent variables and the other, less extreme, observations take on a value zero. Indeed, neither specific occupations nor specific treatments are non-randomly distributed across these groups. However, people with higher levels of education are under-represented in the group of 'outliers', which is consistent with the idea that these respondents are mistaken for one reason or the other. The remainder of the analyses are based on this smaller sample of 1,057 observations where the switching point lies in the $\{3, 4, 5, 6\}$-range.

Table 1.2 summarizes the background variables across occupations, where $\omega \in \{3, 4, 5, 6\}$. Consistent with empirical regularities, there is a smaller representation of females in entrepreneurial and managerial occupations, whereas males are even more over-represented in the group of entrepreneurs. The distribution of educational attainments across occupations is also consistent with previous findings (Parker, 2009; Koudstaal et al., 2016). Also consistent with empirical regularities (Evans and Leighton, 1989), our samples of entrepreneurs and managers are older than our sample of employees, whereas entrepreneurs are also older than managers. Employees are mostly represented by participants having a vocational degree, entrepreneurs are most likely to have a college degree and managers have obtained either a college or a university degree. Kolmogorov-Smirnov tests indicate that the distribution of educations attainment is significantly different for employees than for the other two occupations. Regarding income, our sample is also consistent with empirical regularities: employees have a right-skewed income distribution, entrepreneurs have the most dispersed income distribution and managers have higher average income levels. Kolmogorov-Smirnov tests show that all three occupations significantly differ in the distribution of their income levels.

Panel A of Table 1.3 summarizes the behavioral variables for the sample of $n = 1,057$ subjects. The first three columns show means per occupation, whereas the last one shows the means for the entire sample. The averages across treatment variations are shown in the rows. As expected, entrepreneurs score highest on action-orientedness, and curiosity and lowest on loss aversion. The differences in action-orientedness between the treatments are significant. Subjects are more likely to opt for a second spin in the baseline treatment

than in the counterfactual information treatment. This suggests, according to our theoretical predictions, that curiosity triumphs over loss aversion in the explanation of action-orientedness. However, we will only draw firm conclusions once we have used a multiple regression framework to explain action-orientedness.

Panel B in Table 1.3 establishes that the various behavioral characteristics are correlated in the expected ways: Action-orientedness is negatively correlated with loss aversion, whereas loss aversion and curiosity also show a negative correlation. The raw correlation between action-orientedness and curiosity is positive, as expected. However, it is low and insignificant.

Table 1.4 shows the descriptive statistics of the stricter definitions of entrepreneurs. As we can see, close to three quarters of entrepreneurs own companies that have survived the first 5 years. Also, a third of the entrepreneurs in our sample have incorporated their business whereas more than half of them are sole proprietors. Finally, more than 40% of entrepreneurs have more than 10 direct reports. In line with our intentions, these characteristics seem to indicate that we have over-sampled more successful entrepreneurs.

Action-Orientedness and Entrepreneurship

We now proceed with testing whether entrepreneurs are more action-oriented than managers and employees in a regression framework. The results are shown in Table 1.5. The dependent variable is action-orientedness measured in terms of the switching point at which a respondent (still) decides to spin a second time.

First, we establish whether there is a direct relationship between occupational categories and action-orientedness. In Model 1, we regress action-orientedness on occupational categories while controlling for background characteristics (age, gender, education and income). The results show that managers and employees are less action-oriented than entrepreneurs and thus provide evidence in favor of our first hypothesis. Second, we gradually add the behavioral characteristics of interest to the specification of the previous model. In Model 2, we add loss aversion as a control. This characteristic is significantly related to action-orientedness and renders the difference between entrepreneurs and managers less significant. By controlling for curiosity (Model 3), we find that the difference between en-

trepreneurs and others is no longer significant. In Model 4, we add both behavioral characteristics to the specification and find that each has a distinctive association with action-orientedness. Unsurprising, and consistent with the result described above and earlier findings, we show in Table 1.6 indeed that entrepreneurs are less loss averse than employees (Model 1) and more curious than both managers and workers (Model 2). These models regress loss aversion and curiosity respectively on occupations while controlling for background characteristics. All in all, the results are consistent with the idea that entrepreneurs are more action-oriented than others and that this difference is (partly) associated with a difference in curiosity and, to a lesser extent, loss aversion. These findings are evidence in favor of our second hypothesis.

We have further tested whether the above results differ when using stricter definitions of entrepreneurship. The results are shown in Table C.1 in C. Models in this table show the results of our main regression (c.f. Model 1 in Table 1.5) when we split the sample of entrepreneurs in terms of company age (lower or higher than 5 years), income (below or above the median), legal structure (sole proprietorship versus incorporated), and number of direct reports (at most 10 or more). Most of the differences between entrepreneurs and others seem to be associated with the younger, smaller and less successful group of entrepreneurs.

For instance, a significant difference can be found between entrepreneurs of companies younger than 5 years and others (Model 1), whereas the difference is not significant when considering entrepreneurs whose companies have lived for more than 5 years (Model 2). However, we do not find that the difference in the differences of action-orientedness between young-firm-owning entrepreneurs versus others and old-firm-owning entrepreneurs versus others is statistically significant. Furthermore, the difference between entrepreneurs and others when the definition of entrepreneurs is based on those with higher incomes is not different from what we found earlier (Models 3 and 4). While there is evidence that sole proprietors are more likely than incorporated entrepreneurs to differ from others (Models 5 and 6), the difference between sole proprietors versus others and incorporated entrepreneurs versus others is not significant. We also find that the difference between entrepreneurs and others is more likely to be driven by entrepreneurs with 10 or less employees (Models 7 and 8). Once again, this difference turns out to be insignificant.

In sum, the evidence when comparing stricter definition of entrepreneurs with others does not support the idea that more successful entrepreneurs (i.e. those with older firms, who are incorporated, or with more employees) are more action-oriented than others. In fact, the opposite is more likely to be (weakly) true. Moreover, the evidence provided by comparing stricter definitions of entrepreneurs does not seem to suggest that individuals become more action-oriented after having selected into entrepreneurship. Indeed, the more one stays in the entrepreneurial occupation, the less action-oriented one appears to be.

Action-Orientedness, Curiosity and Loss Aversion: Counterfactual Information Treatment

Our counterfactual information treatment is intended to intervene at the level of reference-dependent preferences and curiosity. Table 1.5 shows that the counterfactual information treatment has a negative impact on action-orientedness. Because giving information about the (would-be) outcome of the second spin reduces the likelihood of spinning, we conclude that curiosity has a stronger relationship with action-orientedness than loss aversion (the latter would lead to increased action-orientedness in the counterfactual information treatment). This is in line with Hypothesis 3b and in contrast to the alternative Hypothesis 3a. This conclusion is consistent with our conclusions based on the finding that the association between action-orientedness and entrepreneurship vanishes, once we control for one's individual level of curiosity (but to a much lesser extent when only controlling for an individual's level of risk aversion).

If different mechanisms drive the stop decision across occupations, then one should expect to find an interaction between the assignment to the counterfactual information treatment and occupation. If only a treatment (but no interaction) effect is found, then this would be evidence that the same mechanism drives action-orientedness across all occupations. To test for this, we run the same set of hierarchical regressions with the addition of interaction effects for the treatment and occupational categories. The results are shown in Table 1.7. The interactions between occupational categories and the counterfactual information treatment (c.f. Model 1) turn out to be insignificant. In other words, the overall effect of the

treatment is homogeneous across occupations, suggesting that the same mechanism drives action-orientedness across occupations.

Models 2-4 analyze the association between the counterfactual information treatment on the one hand, and loss aversion and curiosity on the other. We would expect that the counterfactual information treatment weakens the negative association between action-orientedness and loss aversion, i.e. we would expect a positive interaction effect between the counterfactual information dummy and loss aversion. Contrary to Hypothesis 4a, Model 2 shows that the negative effect of loss aversion is marginally stronger under the counterfactual information treatment. Model 3 shows that the positive effect of curiosity is not weaker, but marginally stronger under that counterfactual information treatment, which also rejects Hypothesis 4b. Golman and Loewenstein's 2015 theoretical framework can predict that there are indeed circumstances under which the counterfactual information treatment would not alleviate curiosity, and might even strengthen it. The intuition behind this result is as follows. The lack of information in the baseline treatment might cause a focus on the desire to know the outcome of the second spin and thereby, myopically, remove any curiosity about the remainder of the game. As soon as information is obtained about the outcome of the second spin, the cause of myopia is removed and the focus of a subject's curiosity is on wanting to know as soon as possible whether or not she wins the game. This knowledge is obtained sooner by spinning twice because it increases the probability of obtaining high overall scores, including 9, as well as the probability of going over it. The former leads to more clarity that a win is likely (and for an overall score of 9, clarity of a sure win), while the latter leads to immediate knowledge that the game is lost. Therefore, also in the counterfactual information treatment, higher levels of curiosity might lead to a higher likelihood of spinning twice. Theoretically, the association between curiosity and spinning twice might even be stronger in the counterfactual information treatment than in the baseline treatment.

1.5 Discussion and Conclusion

By analyzing the optimal stopping strategies of a large sample of professionals in an incentive compatible setting, we provide evidence that entrepreneurs are more action-oriented than managers and employees. This novel finding is consistent with common wisdom and theoretical predictions. The finding is furthermore in line with earlier empirical findings on related characteristics: entrepreneurs have also been found to have a lower status quo bias than managers. Furthermore, we predict that action-orientedness is associated with loss aversion (negatively) and with curiosity (positively). Moreover, as we demonstrate, like others did before, entrepreneurs have lower levels of loss aversion and higher levels of curiosity. Given all of this, the question arises: Could the higher action-orientedness of entrepreneurs be explained by their higher level of curiosity and their lower degree of loss aversion?

We find evidence that the curiosity of entrepreneurs is indeed an important factor for the explanation of their higher levels of action-orientedness than others. The higher willingness of entrepreneurs to take action seems not to be related to reference-dependent preferences or their lower level of loss aversion. Curiosity is the only control variable taking away the association between entrepreneurship and action-orientedness, whereas the differences between the main and counterfactual treatments point strongly into the same direction.

Action-orientedness, however, is unlikely to be positively associated with entrepreneurial success, based on our comparisons of stricter definitions of entrepreneurs. Our results indicate that entrepreneurs who score higher on various performance indicators are not more action-oriented than those who score lower. On the contrary, the difference between entrepreneurs and others is most likely to be driven by subgroups of entrepreneurs having younger firms, with fewer direct reports, and who act as sole proprietors instead of owner-managers of incorporated businesses. Action-orientedness is therefore unlikely to be associated with high growth entrepreneurship.

Some limitations pertain to our study. Besides loss aversion and curiosity, other behavioral traits might potentially explain action-orientedness as well. Risk aversion and overconfidence would be prominent candidates that come to mind. In the context of our study,

these traits are not taken into account. There are both theoretical and empirical reasons for this. For one thing, risk aversion, as defined by standard theory, does not come into play in the optimal stopping game (see Section 1.3). Moreover, other more psychological notions of risk tolerance will have a hard time explaining the difference between the counterfactual information treatment and the baseline that we observe, as the sheer availability of ex post information does not change risks. Regarding overconfidence, one should also not expect any difference between the baseline and counterfactual information treatment in the way people play at the wheel. Overconfidence can drive more spinning in both treatments. Overconfident people might think being more likely to obtain a favorable score on their second spin by overweighing scores that will lead to an improvement of the total score and underweighing scores that will lead to going bust. A 'by-product' of having such beliefs is the over-sampling of the wheel, independent of whether counterfactual information is provided, contrary to the case of curiosity.[8] As we do find a significant difference between our two treatments, this particular trait does not convincingly explain our results. Furthermore, empirical findings in experimental settings do not provide support for the idea that there are differences between entrepreneurs and others in terms of risk aversion and overconfidence. As a result, these traits can also not explain the observed differences in action-orientedness between entrepreneurs and others. Nevertheless, there may well be other behavioral traits that we have not considered that (partly) drive action-orientedness. Omitting these may be considered a limitation of our study design.

As always, there is a tradeoff between internal and external validity. In experimental settings, internal validity comes often at the cost of external validity. In this case, the internal validity may also be questioned, to some extent. For instance, we found the counterfactual information treatment to diminish the role of curiosity on average, as we expected. However, in fact the counterfactual information treatment might still trigger curiosity. According to the theoretical model and our empirical results, people with higher curiosity levels who experience the counterfactual information treatment are marginally more inclined to spin twice (and not stop). However, this does not compromise our main results.

---

[8]A similar reasoning applies to players driven by "illusion of control", another behavioral trait that might lead to more spinning but to the same extent in both treatments.

This actually illustrates a more general limitation. Our hypotheses and theoretical predictions regarding the impact of loss aversion and curiosity depend on our assumptions about people's reference point to which they compare gains and losses, and what in particular they are curious about in the optimal stopping game that we consider. The assumptions we make in this regard directly follow from the extensive commission / omission bias literature and from the experimental literature on decision feedback. In fact, our treatment variation designed to (presumably) shift reference points is directly inspired by this literature. From that perspective our assumptions seem well justified. Nevertheless, it could be the case that reference points do not shift when providing decision feedback, or shift in opposite ways from what we assume. The former is inconsistent with the significant decrease in action-orientedness in the counterfactual information treatment that we find; without a shift in reference point, loss aversion would not predict a change in behavior. The observed decrease in action-orientedness would be consistent with the reference point shifting from taking action (spinning twice) in the baseline, towards remaining inactive (stopping) in the counterfactual information treatment. However, in that case we would also expect that more loss averse people are more likely to spin in the baseline, which we do not find. Nevertheless, without an independent measure of what the reference point actually is in the two treatments, our design cannot fully exclude the possibility that loss aversion plays a (perhaps minor) role. (Exactly how to convincingly measure reference points independent of actual choice is challenging though.) Similar limitations pertain to the impact of curiosity. The 'informational reference point', i.e. what are people curious about?, also provides a degree of freedom to best fit the data ex post. Acknowledging these degrees of freedom for both loss aversion and curiosity, we interpret our findings in line with sensible conjectures about informational reference points, thus curiosity, while for loss aversion they are not.

The fact that the experiment has been executed online can be viewed as another limitation regarding the internal validity of the study because it limits the control over the subjects in the experiment. Of course, the online experiment was necessary to obtain such large samples of professionals. The fact that professionals instead of students participated in the experiment might increase the external validity of the study. Moreover, regarding the external validity of our study, it is worthwhile pointing out that action-orientedness as

measured in our experimental setting could be viewed in analogy to the entry decision. For instance, a person who is willing to start up a new venture might have to leave wage-employment. In this setting, if staying as a wage-employee is viewed as inaction, then the benefits of this option (the steady salary) can be viewed as a loss compared to the gains of the income and utility resulting from entrepreneurship (which will be framed as action). This framing effect of starting up new ventures as taking action can render the option less attractive for loss averse people, from a reference-dependent preferences perspective and more attractive to curious people, liking new experiences.

Our study links a trait that distinguishes individuals in terms of their tendency to search for novelty within the psychological literature with one that distinguishes individuals in terms of their decision making under uncertainty in the economics literature. A link can also be made to the (classic) entrepreneurship literature. Participants in our study are all confronted with the same "objective" reality, that is they all observe the same "thing". However, not all opt for taking action. In other words, while all individuals are presented with the same objective facts, not all of them see, discover, explore or exploit this as an opportunity (Shane and Venkataraman, 2000). In fact, curious individuals, by definition, will seek new information and it is this difference that might precisely be what leads some to be alert (Kirzner, 1978) and see and act upon opportunities that might be hidden to others. From this point of view, action-orientedness can be related to the 'alertness' concept which has been discussed more widely in the entrepreneurship literature. Further research might address the extent to which alertness to opportunities is indeed related to curiosity.
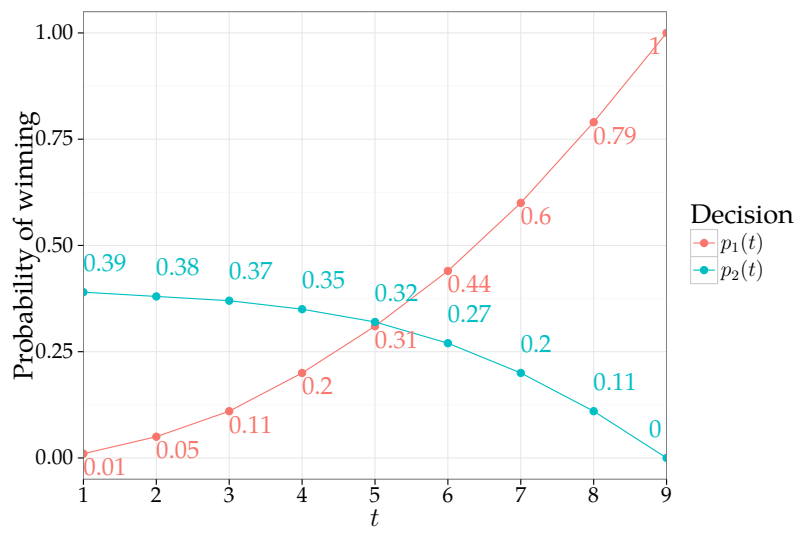
Figure 1.1: Win probabilities of stop and spin given first spin t.
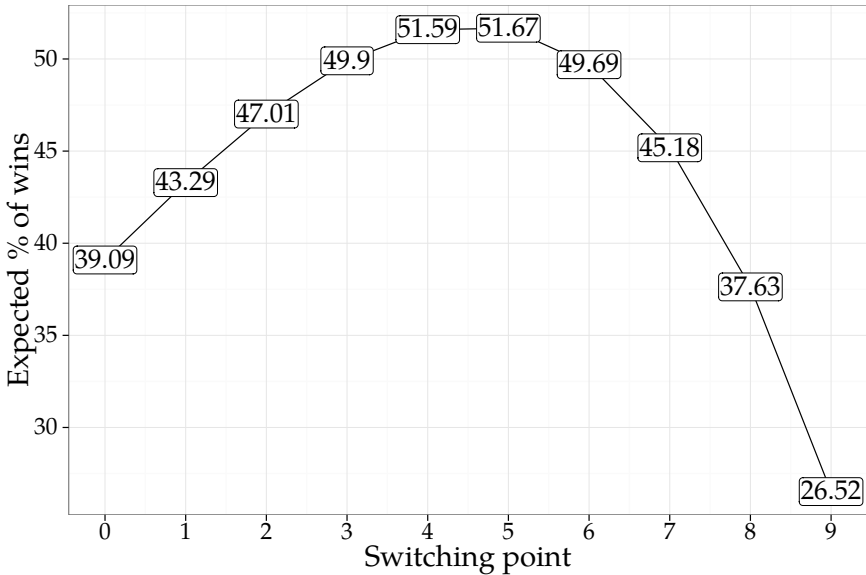
Figure 1.2: Expected likelihood of winning for a given strategy of play at the wheel. Strategy $\omega \in \{0, 1, 2, \ldots, 9\}$ means that the participant would spin a second time only if $t \leq \omega$. As an example, $\omega = 0$ means that the participant would never spin twice, no matter what the score of the first spin is. As a second example, $\omega = 9$ means that the participant would always spin twice, no matter what the score of the first spin is. The optimal strategy is to spin a second time if the score on the first spin is below or equal to 5, leading to a winning probability of 51.67%. N.B.: A strategy of always spinning (i.e. a switching point of 9) does not always lead to a loss: this strategy will lead to optimal play in all matches where the score on the first spin is below or equal to 5, and sub-optimal play only in matches where the score on the first spin is greater than 5.
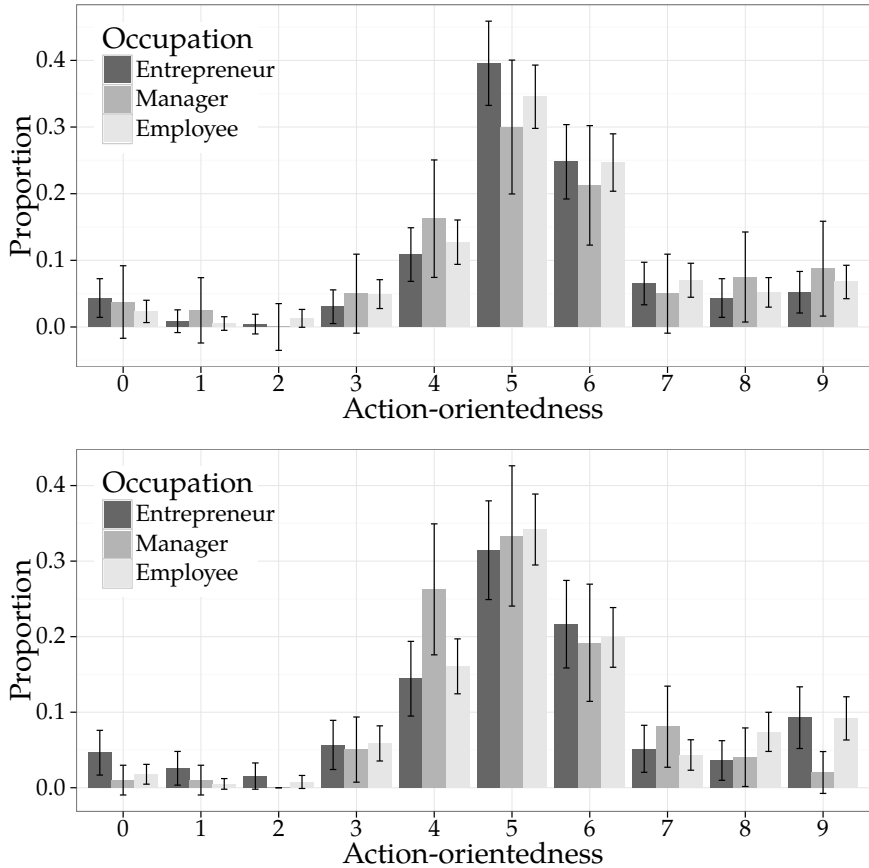
Figure 1.3: Distribution of action-orientedness across occupations in the baseline (figure above) and counterfactual information (figure below) treatment respectively. Error bars represent 95% confidence intervals. Standard errors are computed as follow: a categorical variable for each ω represents the proportion p of participants with strategy ω and failure is represented by the proportion $1 - p$ of participants with strategy $\{0, 1, 2, \dots, 9\} \setminus \omega$. The standard erroris given by $\sqrt{p(1-p)/n}$ where n represents the number of participants (of a given occupation in a particular treatment).

Table 1.1: Summary of mechanisms underlying action-orientedness, their association with occupational choices and their measurement in our study.

Mechanism	Effect on action-orientedness[†]	Occupational choice[‡]			Measurement
		Entrepreneurs	Managers	Employees	
Loss aversion	−	−		+	Multiple price-list elicitation
Curiosity	+	+		−	Treatment and questionnaire

[†] The + sign means that the mechanism increases action-orientedness, whereas a − sign means that it decreases action-orientedness.

[‡] The + sign means that the mechanism is expected to has a positive association with an occupational choice, whereas a − sign means that the expected association is negative.

Table 1.2: Descriptive statistics by occupation[†]

	Entrepreneur ($n = 322$)		Manager ($n = 141$)		Employee ($n = 594$)	
Gender (female %)	31.68	[a]	39.01	[c]	53.03	[a, c]
Age	50.39	[a, b]	45.84	[b, c]	42.67	[a, c]
Education (%)		[a, b]		[b, c]		[a, c]
High school	4.04		2.84		14.98	
Vocational degree	11.80		6.38		41.58	
College	45.34		43.26		29.80	
University	38.82		47.52		13.64	
Income (%)		[a, b]		[b, c]		[a, c]
Income not provided	27.33		12.77		13.64	
Less than €25,000	12.73		3.55		34.85	
€25,001 - €50,000	18.94		17.73		40.74	
€50,001 - €75,000	12.42		24.11		9.26	
€75,001 - €125,000	19.25		34.04		1.52	
€125,001 - €200,000	6.52		6.38		0.00	
€200,001 - €300,000	0.31		0.71		0.00	
€300,001 - €400,000	0.93		0.00		0.00	
More than €400,000	1.55		0.71		0.00	

[†] We have performed z-tests of proportions to compare gender, t-tests to compare age, and Kolmogorov-Smirnov tests to compare income and education.

[a] Significant difference between entrepreneurs and employees.

[b] Significant difference between entrepreneurs and managers.

[c] Significant difference between managers and employees.

Table 1.3: Descriptive statistics of action-orientedness, loss aversion, and curiosity per occupation and treatment.

Panel A: Descriptives

	Entrepreneur ($n = 322$)	Manager ($n = 141$)	Employee ($n = 594$)	All ($n = 1057$) Mean	SD
Action-orientedness	5.03 [b]	4.85 [b]	4.96	4.97	0.86
Baseline	5.10 [d]	4.93	5.03 [d]	5.04 [d]	0.84
Counterfactual information	4.94 [d]	4.80	4.90 [d]	4.89 [d]	0.88
Loss aversion	3.40 [a]	3.66	3.77 [a]	3.64	2.37
Curiosity	36.66 [a, b]	35.14 [b, c]	30.90 [a, c]	33.22	6.85

[a] Significant difference between entrepreneurs and employees.

[b] Significant difference between entrepreneurs and managers.

[c] Significant difference between managers and employees.

[d] Significant difference between treatments (within the same occupation).

Panel B: Correlations

		1	2	3
Action-orientedness	1	–		
Loss aversion	2	-0.12***	–	
Curiosity	3	0.06	-0.16***	–

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

Table 1.4: Descriptives of sample splits for stricter definitions of entrepreneurs ($n = 322$).

Firm age	
$\leq$ 5yrs	26%
$>$ 5yrs	74%
Legal structure	
Incorporated	32%
Solde Proprietorship	55%
Other	13%
Number of direct reports	
$\leq$ 10	58%
$>$ 10	42%

Table 1.5: OLS regressions relating action-orientedness to occupations and behavioral characteristics using subsample where $\omega \in \{3, 4, 5, 6\}$.

	(1)	(2)	(3)	(4)
Counterfactual information	-0.1234**	-0.1141**	-0.1220**	-0.1126**
	(0.0531)	(0.0536)	(0.0532)	(0.0535)
Manager	-0.1500*	-0.1340	-0.1333	-0.1193
	(0.0902)	(0.0905)	(0.0907)	(0.0908)
Employee	-0.1484**	-0.1233*	-0.1042	-0.0859
	(0.0729)	(0.0734)	(0.0758)	(0.0761)
Loss aversion		-0.0390****		-0.0354***
		(0.0113)		(0.0115)
Curiosity			0.0105**	0.0081*
			(0.0044)	(0.0044)
Constant	5.3103****	5.4380****	4.9364****	5.1332****
	(0.1832)	(0.1894)	(0.2404)	(0.2524)
Controls	Yes	Yes	Yes	Yes
Observations	1057	1037	1051	1037
df	13	14	14	15
p-value	0.0022	0.0001	0.0005	0.0000
R^2	0.0303	0.0420	0.0361	0.0451

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

All regressions include controls for background characteristics (age, gender, education and income).

Table 1.6: OLS regressions relating behavioral characteristics to occupations.

	Loss aversion	Curiosity
	(1)	(2)
Counterfactual information	0.0638	-0.2820
	(0.1309)	(0.3354)
Manager	-0.0045	-1.5664***
	(0.2246)	(0.5774)
Employee	0.3854**	-4.8129****
	(0.1787)	(0.4576)
Constant	3.1875****	36.4506****
	(0.4532)	(1.1548)
Controls	Yes	Yes
Observations	1345	1372
df	13	13
p-value	0.0028	0.0000
R^2	0.0233	0.2197

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

All regressions include controls for background characteristics (age,
gender, education and income).

Table 1.7: Treatment effect with interactions using subsample where $\omega \in \{3, 4, 5, 6\}$.

	(1)	(2)	(3)	(4)
Counterfactual information	-0.2139	-0.0787	-0.7742	-0.5873
	(0.3664)	(0.3791)	(0.4824)	(0.5064)
Male	0.0367	0.0263	0.0402	0.0259
	(0.0818)	(0.0824)	(0.0819)	(0.0822)
Male $\times$ Counterfactual information	-0.1986*	-0.2270*	-0.2448**	-0.2651**
	(0.1159)	(0.1170)	(0.1171)	(0.1178)
Manager	-0.1399	-0.1342	-0.1393	-0.1314
	(0.1363)	(0.1362)	(0.1365)	(0.1361)
Employee	-0.1180	-0.1062	-0.1089	-0.0951
	(0.0998)	(0.1004)	(0.1037)	(0.1039)
Manager $\times$ Counterfactual information	-0.0349	-0.0126	0.0043	0.0188
	(0.1838)	(0.1841)	(0.1846)	(0.1845)
Employee $\times$ Counterfactual information	-0.0641	-0.0339	0.0171	0.0312
	(0.1469)	(0.1479)	(0.1529)	(0.1535)
Loss aversion		-0.0183		-0.0172
		(0.0163)		(0.0165)
Counterfactual information $\times$ Loss aversion		-0.0401*		-0.0348
		(0.0227)		(0.0230)
Curiosity			0.0034	0.0025
			(0.0062)	(0.0063)
Counterfactual information $\times$ Curiosity			0.0154*	0.0127
			(0.0088)	(0.0090)
Constant	5.3358****	5.3900****	5.2070****	5.2989****
	(0.2488)	(0.2577)	(0.3249)	(0.3429)
Background controls	Yes	Yes	Yes	Yes
Observations	1057	1037	1051	1037
df	25	27	27	29
p-value	0.0244	0.0008	0.0045	0.0003
R^2	0.0383	0.0534	0.0472	0.0590
Adjusted-R^2				

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

All regressions include controls for background characteristics (age, gender, education and income).

Appendix A

Optimal Strategy in the Optimal Stopping Game

In this appendix we derive the expressions for $p_1(t)$ and $p_2(t)$ stated in Subsection 1.3, based on Coe and Butterworth (1995).

Let the outcome of the first spin equal t and suppose player 1 takes a second spin. With probability $\frac{1}{N}$ the second spin results in a 1 and thus a total score of $t+1$. With this overall score, player 1 has a probability $p_1(t+1)$ of winning (note that for player 1 to win, it does not matter whether total score $t+1$ was reached in just one spin or in two spins). Continuing this type of reasoning, with probability $\frac{1}{N}$ the second spin results in a 2 and the probability to win equals $p_1(t+2)$, and so on. If the second spin exceeds $N-t$ player 1 goes over the upper limit and loses for sure. Hence the overall probability to win by taking a second spin, conditional on the first spin being equal to t, equals $p_2(t) = \frac{1}{N} \cdot \sum_{s=1}^{N-t} p_1(t+s)$.

Next suppose player 1 stops after her first spin, such that her total score equals $T1 = t$. Let c_1 denote the outcome of player 2's first spin and $T2$ its overall score. Assuming that

player 2 follows its optimal strategy, it then holds that:

$$
\begin{aligned}
p_1(t) \;=\;& \Pr\left(c_1 < t \text{ and } T2 = t \mid T1 = t\right) + \Pr\left(T2 < t \mid T1 = t\right) \\
& + \sum_{i=1}^{t} \Pr\left(c_1 = i \text{ and } T2 > N \mid T1 = t\right) \\
=\;& \frac{(t-1)}{N} \cdot \frac{1}{N} + \frac{\binom{t-1}{2}}{N \cdot N} + \sum_{i=1}^{t} \frac{1}{N} \cdot \frac{i}{N} = \frac{t^2}{N^2}
\end{aligned}
$$

Here $\Pr\left(T2 < t \mid T1 = t\right) = \binom{t-1}{2}/N^2$ follows from Coe and Butterworth (1995), or from observing that $\Pr\left(T2 < t \mid T1 = t\right) = \sum_{i=1}^{t-2} \frac{1}{N} \cdot \frac{(t-1-i)}{N} = \frac{1}{N^2}\left(\frac{(t-1)(t-2)}{2}\right) = \binom{t-1}{2}/N^2$. Using the standard formulas for the sums $\sum_{i=1}^{t} i = \frac{1}{2}t(t+1)$ and $\sum_{i=1}^{t} i^2 = \frac{t(t+1)(2t+1)}{6}$, the overall expressions follow.[1]

---

[1]For the opposite case in which player 2 wins in case of a tie, it holds that $p_1(t) = \frac{(t-1)^2}{N^2}$ and $p_2(t) = \frac{1}{N^3}\left[\frac{(N-1)N(2N-1)}{6} - \frac{(t-1)t(2t-1)}{6}\right]$. This follows from observing that in that case:

$$
\begin{aligned}
p_1(t) \;=\;& \Pr\left(T2 < t \mid T1 = t\right) + \sum_{i=1}^{t-1} \Pr\left(c_1 = i \text{ and } T2 > N \mid T1 = t\right) \\
=\;& \frac{1}{N^2}\left(\frac{(t-1)(t-2)}{2}\right) + \sum_{i=1}^{t-1} \frac{1}{N} \cdot \frac{i}{N} \\
=\;& \frac{1}{N^2}\left(\frac{(t-1)(t-2)}{2}\right) + \frac{1}{N^2}\left(\frac{(t-1)t}{2}\right) = \frac{(t-1)^2}{N^2}
\end{aligned}
$$

From $p_2(t) = \frac{1}{N} \cdot \sum_{s=1}^{N-t} p_1(t+s)$ and using the standard formula for $\sum i^2$ the expression for $p_2(t)$ follows.

Appendix B

Instructions

A Dutch preview of the survey can be found at the following address: `https://qeurope.eu.qualtrics.com/SE/?SID=SV_5jPPykvQK5Utw1L`.

B.1 The Showcase Showdown

The following instructions are provided to the participants during the Showcase Showdown sessions:

In this section we ask you to make decisions in a game similar to the 'Showcase Showdown'. In this game, the computer assumes the role of your opponent. You start as the first player.

You will soon see on your screen a wheel divided into nine equal parts. Each part contains a (different) number between 1 and 9. In the game, you - figuratively! - spin the wheel one or two times. Each spin results in a number between 1 and 9 (all with equal probability). If you spin once your total score is equal to the result of the wheel. If you spin two times, your total score equals the sum of those two outcomes. After you have determined your total score, it is your opponent's turn, which will also spin the wheel once or twice. The person who comes closest to a total score of 9, without going over it, wins. (Stated simply, with a total score above nine you are 'dead'.) You win if both players have the same score.

Your opponent plays his / her role optimally: if your total score is greater than nine, the opponent spins only once and always wins. If your total score is 9 or lower, then your opponent will spin a second time if the first spin does not make him / her win.

[*As a slight variation on the above game, we will always let you see the outcome of your 2nd pendulum , so even if you decide just to hurl once. In that case, of course, what counts is the outcome of your first pendulum , but you 'll get so also hear what your total score would have been had you chosen for swinging twice.*]

We will first play two practice rounds to gain experience.

The paragraph in brackets only appears for participants that are randomly assigned to the treatment group. The following instructions are provided after the participants have completed the two practice rounds:

After these two practice rounds, we would like to know your real decisions in this game. We therefore ask you for your switching point. That is, for the results of the first spin, would you spin a second time or not?

After you have determined your tipping point, your strategy will be applied in a final round against the computer, if you are among the 20 winners. If you win this round, you will receive €100 (if you are among the 20 winners). If you lose this round, you will receive €0. As in the practice rounds you get (if you are among the 20 winners) to know the results of you and your opponent's spins. [Also, you are always informed about your second spin, even if it does not count.] These outcomes are determined by the notary independently.

The sentence in brackets only appears for participants that are randomly assigned to the treatment group.

B.2 Curiosity

The following questions are presented to participants with a five-point Likert-like scale ranging from 1 ("*Very Slightly or Not At All (1)*") to 5 ("*Extremely*"):

Rate the statements below for how accurately they reflect the way you generally feel and behave. Do not rate what you think you should do, or wish you do, or things you no longer do. Please be as honest as possible.

- *I actively seek as much information as I can in new situations.*

- *I am the type of person who really enjoys the uncertainty of everyday life.*

- *I am at my best when doing something that is complex or challenging.*

- *Everywhere I go, I am out looking for new things or experiences.*

- *I view challenging situations as an opportunity to grow and learn.*

- *I like to do things that are a little frightening.*

- *I am always looking for experiences that challenge how I think about myself and the world.*

- *I prefer jobs that are excitingly unpredictable.*

- *I frequently seek out opportunities to challenge myself and grow as a person.*

- *I am the kind of person who embraces unfamiliar people, events, and places.*

B.3   Loss Aversion

The following instructions are provided to the participants at the loss aversion elicitation phase of the experiment:

In this section we always ask you to choose between two options:

Option A: 50% chance to win €300 and a 50% chance to lose €?, wherein ? varies from 0 to 350 (in steps of 50)

Option B: €0 with certainty

If the potential loss is low (say €? Is equal to €0) then most people choose Option A, while a high potential loss (say €? is equal to €350), most people will prefer Option B. We are interested in the potential loss €? where you 'switch' from Option A to Option B. In order to determine this switching point as efficient and simple as possible, we present to you three or four decisions that automatically lead to your switching point.

If you are selected as one of the 20 winners, the notary will first randomly determine the potential loss amount that applies to you, then watch (based on your tipping point), or please choose option A or option B. If this option A, the notary tosses a coin to determine whether you win €300, or you will lose the previously drawn randomly loss amount.

The amount you win or lose at this stage will be added to or deducted from your earnings in the previous stages.

Appendix C

Stricter Definitions of Entrepreneurs

Table C.1: OLS regressions relating action-orientedness to occupations using stricter definitions of entrepreneurs based on company age, income level, legal structure, and number of direct reports using subsample where $\omega \in \{3, 4, 5, 6\}$.

	Company age		Income above or below median		Legal structure		# of direct reports	
	≤ 5	> 5	Below	Above	Sole Propr.	Inc.	≤ 10	> 10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Counterfactual information	-0.1197**	-0.1237**	-0.1322**	-0.1163*	-0.1100*	-0.1189**	-0.1688***	-0.0797
	(0.0610)	(0.0555)	(0.0562)	(0.0599)	(0.0611)	(0.0568)	(0.0586)	(0.0575)
Manager	-0.2727**	-0.1358	-0.1498	-0.1496	-0.1828	-0.1390	-0.2023*	-0.1434
	(0.1282)	(0.0952)	(0.0936)	(0.1163)	(0.1258)	(0.0996)	(0.1060)	(0.1020)
Employee	-0.2683**	-0.1060	-0.1746**	-0.1734	-0.1911*	-0.1151	-0.1916**	-0.1230
	(0.1089)	(0.0822)	(0.0758)	(0.1053)	(0.1041)	(0.0908)	(0.0954)	(0.0856)
Constant	5.2826****	5.3540****	5.2645****	5.1828****	5.2616****	5.2680****	5.3012****	5.2930****
	(0.2159)	(0.1965)	(0.1819)	(0.2087)	(0.2228)	(0.1994)	(0.2093)	(0.1985)
Background controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	820	972	965	827	839	913	874	918
df	13	13	8	8	13	13	13	13
p-value	0.0085	0.0041	0.0013	0.0030	0.0184	0.0202	0.0011	0.0261
R^2	0.0341	0.0311	0.0263	0.0280	0.0305	0.0277	0.0387	0.0267

Standard errors in parentheses

$*\ p < 0.1$, $**\ p < 0.05$, $***\ p < 0.01$, $****\ p < 0.001$

All regressions include controls for background characteristics (age, gender, education and income).

Appendix D

Robustness of Results to the Inclusion of Outliers

To show that the results shown above are not due to the exclusion of extreme action-orientedness ($\omega \in \{0, 1, 2, 7, 8, 9\}$), we run a regression of the switching point on gender, age, education, income and occupation using a multinomial logit model with the entire sample[1]. The multinomial logit estimates the effect of each of the explanatory variable on each of the possible outcomes (switching points in our case). This will allow us to rule out that the findings reported above are driven by the exclusion of behavior that is outside a certain range. Because very few observations fall in the left tail of the switching points, we report robust standard errors to control for sensitivity to outliers. The results are shown in Table D.1.

As we can see, entrepreneurs significantly differ from others in only one of the outcomes: the likelihood of having a switching point of 4 (column $\omega = 4$), that is, not to spin when it is optimal to do so. Thus, the result we provide above in the equivalent OLS regression that removes extreme switching points (Model 1 in Table 1.5) are not due to the fact that we have dropped some observations. There is thus evidence that our results are driven by the fact entrepreneurs are more likely to spin on higher numbers in the areas where it is reasonable for most people to have doubt about whether a second spin should be taken or

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[1]Although the ordered logit model seems to be appropriate given that spin scores are ordered, the Brant test indicates that the parallel regression assumption underlying the ordered logit model is violated.

not ($\omega \in \{3, 4, 5, 6\}$).

The results in Table D.1 also point to non-linearities outside the range of reasonable action-orientedness ($\in \{0, 1, 2, 7, 8, 9\}$). For instance, employees are less likely to have $\omega \in \{7, 9\}$ but more likely to have $\omega = 8$. This non-linearity could suggest that levels of action-orientedness are not ordered outside the reasonable region. This will in turn render linear regression analyses based on assumptions about the ordinal nature of action-orientedness inefficient. Given that fewer observations fall outside the reasonable range, it is more likely that the analysis of behavior outside the reasonable region be irrelevant.

Table D.1: Marginal effects predicting the likelihood of each outcome (switching point) from a multinomial logit regression model with the entire sample.

	$\omega = 0$	$\omega = 1$	$\omega = 2$	$\omega = 3$	$\omega = 4$	$\omega = 5$	$\omega = 6$	$\omega = 7$	$\omega = 8$	$\omega = 9$
Counterfactual information	-0.0064	0.0050	0.0016	0.0108	0.0413**	-0.0284	-0.0369*	-0.0142	0.0081	0.0190
	(0.0091)	(0.0059)	(0.0052)	(0.0120)	(0.0188)	(0.0255)	(0.0223)	(0.0125)	(0.0123)	(0.0144)
Male	0.0072	0.0151***	-0.0006	-0.0213*	0.0437**	-0.0089	-0.0406	0.0029	0.0105	-0.0079
	(0.0088)	(0.0055)	(0.0054)	(0.0128)	(0.0196)	(0.0281)	(0.0250)	(0.0147)	(0.0129)	(0.0153)
Age	0.0003	-0.0001	0.0001	0.0003	0.0000	-0.0013	-0.0004	0.0001	0.0003	0.0006
	(0.0004)	(0.0002)	(0.0002)	(0.0005)	(0.0009)	(0.0012)	(0.0010)	(0.0005)	(0.0006)	(0.0006)
Employee	-0.0128	-0.0152	-0.0069	0.0095	0.0595**	0.0116	-0.0338	-0.0054	0.0113	-0.0178
	(0.0123)	(0.0113)	(0.0128)	(0.0148)	(0.0237)	(0.0354)	(0.0304)	(0.0182)	(0.0151)	(0.0190)
Manager	-0.0118	0.0047	-0.0147	0.0069	0.0655**	-0.0622	-0.0252	0.0131	0.0331	-0.0093
	(0.0142)	(0.0162)	(0.0111)	(0.0226)	(0.0302)	(0.0431)	(0.0391)	(0.0237)	(0.0285)	(0.0294)
Income dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1380	1380	1380	1380	1380	1380	1380	1380	1380	1380

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Table D.2: Probit regression estimating the likelihood of being an outlier.

DV is one for outliers of action-orientedness and zero otherwise	
Manager	0.0581
	(0.1332)
Employee	-0.1651
	(0.1042)
Counterfactual information	0.0384
	(0.0760)
Male	0.0985
	(0.0837)
Age	0.0044
	(0.0035)
Vocational degree	-0.0731
	(0.1262)
College	-0.3759***
	(0.1315)
University	-0.7566****
	(0.1513)
Income not provided	0.2053*
	(0.1165)
€25,001 - €50,000	-0.1105
	(0.1071)
€50,001 - €75,000	-0.1162
	(0.1537)
€75,001 - €125,000	-0.1643
	(0.1699)
More than €125,001	-0.0224
	(0.2240)
Constant	-0.5929**
	(0.2468)
Observations	1380
df	13
p-value	0.0000
Log likelihood	-723.16

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Chapter 2

Entrepreneurship and Dishonesty: An Experimental Study

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2.1 Introduction

Dishonest behavior can have economic consequences. While standard economic theory assumes that people lie whenever it is in their advantage, anecdotal as well as experimental evidence show that people have a preference for truth-telling and can be averse to lying (Gneezy, 2005; Charness and Dufwenberg, 2006; Vanberg, 2008; Erat and Gneezy, 2012). Field evidence also supports the idea that people often act in honest ways. For instance, if it were for incentives alone (such as control audits), tax compliance would be observed at a much lower rate (Andreoni et al., 1998). Thus, understanding the conditions under which dishonest behavior takes form has important ramifications for our understanding of economic activity as well as policy.

The fact that many do not abide by the norms of honesty is known to all. Moreover, the distribution of people that exhibit unethical behavior can differ across social groups (Piff et al., 2012). The world of business and enterprise is a place where scandals involving wrongdoings appear to be rampant, with consequences that are far reaching for society. Indeed, although entrepreneurial activity is an important engine of growth, it can be socially harmful if directed towards unproductive activities (Baumol, 1990). It turns out that certain empirical findings can be interpreted as providing evidence that unethical behavior often takes place in entrepreneurial spheres. For instance, Hurst et al. (2014) and Åstebro and Chen (2014) find that self-employed workers tend to under-report their income. Also, Levine and Rubinstein (2017) find that incorporated self-employed workers are more likely than those who are not incorporated to have engaged in illicit activities during their adolescence (although this behavior correlates with better performance later on). Anecdotal evidence and empirical findings thus beg the following question: is entrepreneurship an occupation that attracts dishonest individuals?

Although the above evidence could be interpreted as suggesting the affirmative, this needs not to be the case. One reason for entrepreneurs not to take part in illicit activities is that they need to keep their reputation clean. For instance, entrepreneurs who exhibit trustful behavior are more likely to get funding (Maxwell and Lévesque, 2014). Furthermore, dishonesty can have harmful consequences on social capital development (Brass

et al., 1998). Since social capital can be an important determinant of selection and success in entrepreneurship (Davidsson and Honig, 2003), one wonders whether empirical evidence suggesting that entrepreneurs engage in certain type of illicit activities (during their adolescence) is representative of their overall behavior. Yet, this does not rule out greater dishonesty by entrepreneurs. Perhaps, entrepreneurs know how to skilfully hide their malice, in which case they can still build social ties without being more ethically inclined than others.

There is yet another reason to believe that entrepreneurs might not be more dishonest than others. According to Shleifer (2004), competitive pressure can be a driver of unethical behavior. Experimental evidence in favor of this argument is provided by Schweitzer et al. (2004) who find that participants who do not meet their goals are more likely to engage in unethical behavior. It can also be shown that in tournament settings, people resort to disruptive behavior (such as sabotaging others) in order to improve their ranking and status (Charness et al., 2014). This perspective suggests that people are not necessarily attracted towards entrepreneurial occupations because of their tendency to be dishonest, but that they are driven towards dishonest behavior as a result of operating in competitive environments. Furthermore, entrepreneurial dishonesty can merely be reflecting institutionalized rules, norms as well as popular narratives conducting legitimate behavior in business settings (Berger and Luckmann, 1967; Meyer and Rowan, 1977; Bowles, 1998; Akerlof and Kranton, 2000; Benjamin et al., 2010; Fehr and Hoff, 2011; Shiller, 2017). From this perspective, people who do not behave badly in normal circumstances, can turn out to undertake unethical behavior because they believe it is imposed upon them or is acceptable in specific contexts. The internalization of norms of conduct in various settings can happen either through the transmission of popular culture, news reporting of numerous scandals in the world of business, or simply peer effects (Gino et al., 2009).

Answering the question of whether entrepreneurs are more dishonest than people from other professions, or whether the environment in which they operate induces dishonest behavior is not straightforward. For one thing, selection in and out of entrepreneurship is endogenous, and preferences for dishonest behavior can correlate with selection into competitive environments. Furthermore, observing dishonest behavior is extremely difficult because people take precautions to hide their unethical actions in order to avoid the costs

associated with being caught. For instance, whereas survey-based self-assessed measures of dishonest behavior indicate that high-achieving students tend to be less dishonest, experimental evidence can point to the opposite direction (Yaniv et al., 2017). Indeed, people tend to protect their image, even to themselves (Bénabou and Tirole, 2011), which also raises the question of whether people perceive their dishonest actions as being actually against social norms.

The purpose of this paper is to overcome these challenges by resorting to an experimental design that allows participants to lie without running any risk of being caught. This allows us to test whether entrepreneurs have a greater tendency than non-entrepreneurs to engage in dishonest behavior. The experiment comprises two parts, with the second being run with the same participants one week after the completion of the first part. This is to avoid that the first part of the experiment (which involves cheating) contaminates the second part. The experiment is conducted online using subjects from the Prolific crowdsourcing platform. By recording user IDs, we are able to invite, for the second part, the same subjects that took part in the first part of the experiment.

The first part is inspired by Fischbacher and Föllmi-Heusi (2013). We invite a sample of entrepreneurs and non-entrepreneurs to take part in an experiment in which their payoffs depend on the scores of two dice that they roll privately. Participants are randomly assigned to two treatments of this game. One of the treatments has a neutral framing while the other one represents a competitive business setting where the participant is the CEO of a company. Since participants are asked to provide the dice themselves and that the experiment is conducted online, participants have no reason to believe that they can be caught in falsely reporting the rolls of the dice. We then compare occupational groups in terms of the reported scores on their rolls of the dice. Assuming that participants do not misreport scores in their disfavor, differences in the scores between occupational groups is an indication of differences in the tendency to exhibit dishonest behavior. Comparing scores between treatments also allows us to test whether a business setting can induce greater dishonest behavior. Furthermore, we split each occupational group in two categories respectively. Non-entrepreneurs are split by whether they have entrepreneurial intentions or not, and entrepreneurs are split by whether they are currently taking part in an entrepreneurial

venture or whether they did that in the past. By comparing entrepreneurs with those that have the intention to become entrepreneurs, we can test whether there is a tendency for those that are attracted towards the profession to exhibit dishonest behavior and whether they are also induced towards dishonest behavior in business settings.

As mentioned, participants that completed the first part are invited after a delay of one week to complete two surveys. Participants are not told that these surveys are follow-up on the first part. Participants are invited to complete the Honesty-Humility part of the HEXACO-60 scale (Ashton and Lee, 2009). This scale has four facets (Sincerity, Fairness, Greed Avoidance, and Modesty) and measures a subject's self-assessed tendency to be genuine, manipulative, fraudulent, corrupt, and unassuming. We also elicit participants' level of competitiveness by asking them to complete the 'Hypercompetitive Attitude Scale' (Ryckman et al., 1990). This design allows us to test whether entrepreneurs are more likely to act in a dishonest way when they know they cannot be caught, and whether this behavior correlates with own perception of trustworthiness and competitiveness. Furthermore, the design allows us to test whether selection into entrepreneurship correlates with trustworthiness and competitiveness.

378 participants took part in the first part of the experiment, and 356 of them took part and completed the second part. Our results can be summarized as follows. First, the distribution of reported rolls of dice differ statistically from what should have been had all participant actually rolled two dice. Second, entrepreneurs who are assigned with the business framing report *higher* scores on their rolls of dice. Third, we observe that non-entrepreneurs assigned to the business framing report *lower* score on their rolls of dice. Fourth, entrepreneurs are less likely than non-entrepreneurs to report obtaining a pair of sixes in their roll of dice under the neutral framing, whereas they are more likely to do so in the business framing. Fifth, reporting higher rolls of dice is not correlated with self-reported measures of Honesty-Humility and Hypercompetitiveness.

Overall, these findings do not provide evidence in favor of the hypothesis that entrepreneurs are more dishonest than non-entrepreneurs. Rather, the evidence seems to indicate that entrepreneurial dishonestly is more likely to manifest itself in business settings. Moreover, not everyone seems to behave in the same way in a business context. In

fact, those who have not experienced entrepreneurship seem to behave in more noble ways when fulfilling the role of a business leader. Finally, people's self-image in terms of their sincerity and competitiveness does not seem to provide an indication of whether a person is likely to exhibit dishonest behavior or not. In fact, people can be lying while still holding a positive image of themselves.

Our study is related to the literature on dishonesty and lying aversion (Brandts and Charness, 2003; Gneezy, 2005; Vanberg, 2008; Erat and Gneezy, 2012; Gibson et al., 2013). Similar to these studies, we find that people do tend to lie, albeit feeling guilty to various degrees. We do not find that cheating correlates with self-reported measures of honesty, suggesting that people have the ability to maintain a positive self-image despite undertaking dishonest behavior (Mazar et al., 2008; Shu et al., 2011; Shalvi et al., 2011). Our study is also related to recent work on the interplay between context and dishonesty (Cohn et al., 2014, 2015; Dai et al., 2017). While these studies provide evidence that one's sense of identity can have an influence on behavior, our results can be consistent with the notions that popular narratives as well as institutionalized norms and values to which one is exposed to can also have an influence on how one will behave in different settings.

Our results are also relevant to the accounting and tax compliance literature (Andreoni et al., 1998; Slemrod and Yitzhaki, 2002), especially when applicable to self-employment and small business income reporting (Hurst et al., 2014). Our results suggest that failure to comply with income tax regulation by self-employed workers might not have a purely self-interested motive. Rather, it seems that different kinds of behavior can be expected from small business owners depending on what norms and values they believe are institutionalized. Promoting and increasing awareness of good governance and social responsibility by their peers can potentially 'nudge' self-employed workers to be more compliant with tax regulations.

2.2 Experimental Design

Participants are recruited on the prolific crowdsourcing platform. Compared to other crowdsourcing platforms such as MTurk, prolific offers a broad set of demographic vari-

ables from which subjects can be pre-screened. Since not all platform participants have declared their demographic variables, we have restricted illegibility to a subset of participants who have disclosed their demographic profiles for a set of variables. Only those that have provided their educational attainment, their personal income, and whether they are entrepreneurs are illegible for the study.[1]

The latter demographic variable divides participants into four groups: those who are currently entrepreneurs, those who have been in the past, those that intend to be in the future, and those for whom none of the other categories apply. Entrepreneurs are defined as those who have taken part in entrepreneurship in the past or are currently doing so, whereas non-entrepreneurs are defined by the two other groups.

This classification allows us to distinguish between those that have effectively selected into entrepreneurship and those who have not. This classification is justified by the fact that the willingness to select into entrepreneurship does not always translate into entrepreneurial action. In fact, many of those who claim having the intention to startup their own ventures happen not to undertake such endeavors (Blanchflower et al., 2001), which implies that we cannot ascertain that those who have the intention of becoming entrepreneurs will eventually act upon their intentions.

More importantly, those who have not yet selected into entrepreneurship have not yet been exposed to business settings in the same way than those who have actually undertaken an entrepreneurial occupation. Those who are (were) entrepreneurs act(ed) as CEOs in their businesses whereas those who have not yet become entrepreneurs do not have the same experience. As a result of this difference, the effects of the business framing could be different for entrepreneurs and non-entrepreneurs: the former is likely to merely *reenact* their behavior when they where leading their business whereas the other group will have to *imagine* how they would act if they were to be leading a business. The two groups can then behave differently if they hold different beliefs about what constitutes legitimate behavior in business settings.

The pre-screening filter leaves us with a pool of 2,414 illegible participants. We have

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[1]Because almost all participants have disclosed their age and gender, we did not impose a pre-screening filter on these variables.

limited the number of available 'seats' to 500 participants. Once participants agree to take part in the experiment, they are redirected to a Qualtrics web page where the experiment's instructions and questionnaire are located.

All participants are instructed that they will take part in a short experiment on decision making. The description of the experiment indicates that participants will receive £0.50 for completing the questionnaire, and that one of the participants will be selected as a 'Prize Winner' whose bonus payments (that can go up to £100) will depend on the decisions made during the study. Once participants have accepted to be part of the study, they are told that their earnings depend on the selection of a number (between 0 and 100) of their choice as well as a random number (also between 0 and 100) that depends on the roll of two dice that they have to perform on their own. More specifically, the random number is equal to $10 \times (d_1 + d_2 - 2)$ where d_i is the score obtained on die $i \in \{1, 2\}$. Since the experiment is conducted online, we could not provide participants with dice. Although dice-rolling applications and websites can be easily found online, we took care of not providing link to any such sites to avoid that certain participants fear being observed.

Participants are also randomly assigned to a treatment in which the instructions are framed in a competitive setting. More specifically, participants are told to imagine that they are the CEO of a company whose board of directors always push for greater earnings. They are told that their earnings, in case they are selected as the prize winner, will depend on the earnings of the company. The number of choice is frames as being 'CEO effort' while the random number is framed as being 'market demand'.

Appendix E shows the instructions under the business framing treatment.[2] Bonus earnings are increasing in the number of choice and the random number which implies that a rational player with no lying aversion should choose number 100 and report two sixes (which leads to the random number of 100). This will insure maximum bonus payment in case one is selected as the prize winner. Prior providing their number of choice and scores on the dice, participants are asked to answer test questions to ensure that they properly understand the rules of the game. Furthermore, after entry of their number of choice and scores on the dice, a final screen tells participants of the amount of their bonus payments in

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[2]The introductory sentence of this treatment is taken from Gibson et al. (2013).

case of selection as the prize winner. At all time (including in the last screen), participants can go back to previous screens at will.

2.3   Results

488 participants completed the first part of the study on May 24-25 2017. Of these, 378 indicated that they are currently living in the United States (210) or the United Kingdom (168). Because there can be discrepancy in the definition of entrepreneurship as well as the value of payoffs between countries, non-US and non-UK participants are dropped from the analysis.[3] Out of the 378 participants, 356 completed the second part of the experiment between May 31 and June 6 2017.

Table 2.1 shows the distribution of demographic variables between entrepreneurs and non-entrepreneurs. 176 participants qualify as entrepreneurs while 202 others qualify as non-entrepreneurs. As we can see, entrepreneurs are more likely to be men and to be older. Wilcoxon rank-sum tests indicate that they also enjoy higher educational attainments and have more subordinates. Entrepreneurs are more likely to be in higher income brackets, although this difference is not statistically significant ($p = 0.1209$; Wilcoxon rank-sum test). The difference in income between entrepreneurs and non-entrepreneurs becomes significantly different ($p = 0.0419$ Wilcoxon rank-sum test) when those that have the intention to become entrepreneurs are removed from the sample. Overall, the above observations are consistent with empirical regularities in terms of demographic differences between entrepreneurs and non-entrepreneurs.

Table 2.2 shows the average score for the Humility-Honesty as well as the Hypercompetitive scales across occupations. No significant difference can be found between entrepreneurs and non-entrepreneurs in terms of trustworthiness and competitiveness. These results do not seem to support the idea that more dishonest and competitive individuals select into entrepreneurship.

Table 2.3 shows the correlations between total score, personality traits, gender age as well as occupational choice. As we can see, trustworthiness and competitiveness are sig-

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[3]An earlier pilot ran on the Prolific platform did not suggest to us that non-US and non-UK residents could constitute a substantial share of the subject pool.

nificantly and negatively correlated. Furthermore, these two traits are strongly correlated with age: trustworthiness increases whereas competitiveness decreases with age. Gender is also significantly correlated with the two traits: men are less trustworthy and more competitive than women. Notice that men are younger in our sample. Given the strong correlation between traits and age, differences between men and women can be driven by differences in age between the men and women in our sample. One should also notice that traits only weekly correlate with reported total score. This result is consistent with findings in which self-reported honesty does not always manifest itself when dishonest behavior is unobserved (Yaniv et al., 2017). One way Anova tests comparing the means of traits across educational levels and income brackets indicate that trustworthiness is significantly associated with education and income, whereas competitiveness is significantly correlated with income. Overall, these relationships between traits and achievement variables (education and income) are in the expected direction.

Figure 2.1 shows the distributions of the reported total scores on the roll of dice across the two treatments. As we can see, there is a disproportionate share of participants that report having rolled two sixes while very few report having obtained two ones. These deviations are significantly different from what should be expected out of luck. Overall, the distribution of total scores is consistent with a large share of participants misreporting their scores in their own favor. A t-test and a Wilcoxon rank sum test do not find a significant difference in the total score between the two treatments.

Figure 2.2 shows the distribution of the number of choice across treatments. As we can see, a vast majority of participants choose the maximum number allowed. Moreover, the pattern of play in the two treatments seems to be of an increase in the number chosen in the business framing. The proportion of participants that choose a number greater or equal to 90 is marginally greater ($p = 0.0997$; two-sided t-test) under the business framing.

Taken together, the distribution of the number of choice and the roll of the two dice seem to indicate that participants have some reservations when it comes to reporting the top scores they can get out of their rolls of dice. Indeed, whereas 58.47% choose the maximum number (100), only 26.72% report having rolled two sixes. This is consistent with the notion that even if a large share of participants misreport their roll of dice, many are nevertheless

averse to lying to the full extent.

Figure 2.3 shows the average total score on the roll of the dice for entrepreneurs and non-entrepreneurs in both treatments. As we can see, the effect of the business framing is to increase ($p = 0.0664$; two-sided t-test) the average total score for entrepreneurs, whereas it is to decrease ($p = 0.0490$; two-sided t-test) the average total score for non-entrepreneurs. Furthermore, the average total score is smaller ($p = 0.0236$; two-sided t-test) for entrepreneurs than for non-entrepreneurs in the neutral framing, whereas it is marginally larger ($p = 0.0601$; one-sided t-test) in the business framing. Interestingly, this pattern is not observed for the number of choice as shown in Figure 2.4. Indeed, entrepreneurs choose, on average, a greater number than non-entrepreneurs in the business framing ($p = 0.0926$; two-sided t-test). These results seem to indicate that a business framing is likely to impact dishonest behavior in different ways for entrepreneurs and non-entrepreneurs. Whereas non-entrepreneurs are not more likely to choose a larger number and less likely to cheat under the business framing treatment, entrepreneurs choose a larger number and are more likely to cheat under the business framing treatment.

Due to the skewed distribution of numbers chosen and total scores, Wilcoxon rank-sum tests are performed as robustness checks. The results also suggest that entrepreneurs report higher scores ($p = 0.0717$) whereas non-entrepreneurs report lower scores ($p = 0.0606$) under business framing. Similarly, compared to non-entrepreneurs, entrepreneurs report lower scores ($p = 0.0423$) under neutral framing, whereas they marginally report higher scores ($p = 0.1055$) under business framing.

Table 2.4 further compares the share of participants that report scores on the dice above different cutoffs for each occupational group and treatment. Each cutoff for the scores reported allows to test differences in the magnitude of cheating across occupational groups and treatments. Here, we assume that participants that have greater lying aversion tend to cheat with lower scores (above 7).

We first proceed with looking at the effect of the treatment for each occupational group. As we can see, when primed under the business framing, entrepreneurs are more likely to report a total score of 10 or higher on their rolls but not more likely to report a total score of 8 or higher. In other words, entrepreneurs who report obtaining scores of 8 or 9 under

the neutral framing are likely to report obtaining scores of 11 or more under the business framing. This result is consistent with a lowering of lying aversion in the business framing for entrepreneurs who have mild lying aversion in the neutral framing. Regarding non-entrepreneurs, we also find that the effect of the business framing treatment is strongest when looking at the share of those who report a total score of 10 or higher. This is consistent with the business framing leading to higher levels of lying aversion for non-entrepreneurs.

Let us now compare entrepreneurs with non-entrepreneurs within each treatment. The results show that entrepreneurs are typically less likely to report higher scores in the neutral framing. This is true if we consider score of 11 or higher and scores of 8 or higher, but not score of 9 and 10 or higher. This seems to indicate that although entrepreneurs are less likely to lie than non-entrepreneurs overall, a larger share of participants with mild lying aversion can be found among them. In the business framing, entrepreneurs are more likely to report a score of 10 or higher, but not so for score of 8 and 9 or higher. This finding is consistent with the idea that entrepreneurs are more likely to be induced to switch from mild levels of dishonesty to stronger levels of dishonesty when going from the neutral framing to the business framing.

We now proceed by testing whether the above findings are robust to the inclusion of demographic controls with which participants can be pre-screened on Prolific as well as the personality traits that have been measured in the second part of the experiment. For this purpose, we resort to a set of hierarchical Tobit regressions in which demographic variables and personality traits are gradually added to a basic model that interacts occupational choice with assignment to the business framing. The choice of the Tobit model is motivated by the fact that the dependent variable (total score report) is mainly bell shaped except for a large mass of observations that report a total score of 12. Table 2.5 reports these results.

Model 1 (the base model) consists in a Tobit regression of the total score on the interaction of occupational choice and assignment to the business framing. As we can see, this model replicates the results found above in that non-entrepreneurs (Non-E) are more likely to report a higher total score in the neutral treatment (although this is marginally not significant at the mean), whereas they are more likely to report a lower score in the business framing. The model also finds a positive association between being assigned to the business

framing and reporting having obtained higher scores, but this is marginally not significant at the mean. Model 2 adds the demographic variables (gender, age, education, income) to the base model. The results are robust to the inclusion of these controls, suggesting that differences between entrepreneurs and non-entrepreneurs in terms of dishonest behavior are not driven by demographic differences. Model 3 adds the self-reported measure of trustworthiness to the base model while not including demographic variables. As we can see, the relationship between occupational choice and assignment to either treatment does not change, further suggesting that differences between entrepreneurs and non-entrepreneurs in terms of dishonesty might not be driven by individual trustworthiness. Finally, Model 4 takes competitiveness into account. Again, no changes to the interaction between occupational choice and treatment is found.

The above regression results are robust to different estimation models. Treating total score as an ordinal variable and resorting to an ordered probit or logit specification leads to the same results. Furthermore, transforming total score to a binary outcome variable (where 0 represents those who report 7 or less, and 1 those who report 8 or more) and running probit or logit regressions also leads to the same conclusions. For brevity (and because these specifications would be analogous to replicating the analysis shown in Table 2.4), these results are not tabulated here.

Sample Splits

We now proceed with looking at our subsamples of entrepreneurs and non-entrepreneurs. As described above, entrepreneurs differ from non-entrepreneurs in that the former have indeed selected into entrepreneurship whereas the latter either do not want to or only declare having the intention to do so in the future.

Table 2.6 shows the distribution of demographic variables across the four groups of workers. Among the 378 participants who completed the questionnaire, 98 are currently entrepreneurs, 78 have been entrepreneurs in the past, 94 have the intention of becoming entrepreneurs and 108 are non-entrepreneurs. As we can see, those who have the intention of becoming entrepreneurs are as likely as the entrepreneurial group to be male. Those who do not intent to be entrepreneurs are thus the subgroup with the smallest share of

males. Those who intent to become entrepreneurs further differ from those who do not in that they are significantly younger. Regarding education, it can be found that most of the difference between entrepreneurs and non-entrepreneurs comes from those who do not intend to become entrepreneurs. Finally, those with no intention to become entrepreneurs enjoy lower income levels than the entrepreneurial subgroups. Overall, the above observations are consistent with the idea that those who intend to become entrepreneurs are similar to those who have in fact selected into the occupation. The main difference between the entrepreneurial group and those who intend to become entrepreneurs resides in age difference.

Let us now look at differences in traits between the four subgroups. Table 2.7 shows that differences in traits between entrepreneurs and non-entrepreneurs can be found if the latter are split based on their entrepreneurial intentions. Indeed, those who do not have the intention of becoming entrepreneurs are more trustworthy and less competitive than past entrepreneurs and those who do not have the intention of becoming entrepreneurs. However, because current entrepreneurs and those who do not intend to become entrepreneurs are the oldest of the fours groups, and that traits strongly correlate with age, this difference can be driven by age. Running an OLS regression of trustworthiness on age and the occupational groups shows that no significant difference can be found between the four groups. The fact that age captures the difference in trustworthiness between occupational groups does not seem to be linked to multicollinearity: the Variance Inflation Factor (VIF) for the OLS model is equal to 1.32, which is below the threshold limit of 10 suggested by Hair et al. (2009, p. 200). A similar observation can be made for competitiveness where most of the difference between occupational groups is captured by age.

Given that the main difference in the behavioral traits is between those who are currently entrepreneurs and those that intent to be, and that the greatest age difference is between these two groups, one should note that age can also capture experience in entrepreneurship. An OLS regression of Honesty-Humility on the interaction between occupation and age seems to indicate that honesty increases with age for those that have been entrepreneurs in the past. This result does not suggest that entering entrepreneurship leads to more dishonesty over time compared to non-entrepreneurs. The same pattern, albeit much weaker

from a statistical perspective, can be observed for hypercompetitiveness. These results appear in Appendix F.

Table 2.8 shows the share of subjects that report their total scores above certain cutoffs across treatments and occupations. Compared to the results in Table 2.4, the main observation to be made from this splitting of the four groups is that most of the differences between entrepreneurs and non-entrepreneurs come from the fact that the effect of the business framing treatment for non-entrepreneurs (that is a decrease in lying when primed by the business framing) is mainly driven by those who have the intention of becoming entrepreneurs, and that it is mainly driven by those that are currently entrepreneurs for the entrepreneurial group (that is an increase in lying when primed by the business framing).

2.4   Discussion and Conclusion

The purpose of this paper is to find out whether entrepreneurs are more dishonest than others, or whether they are driven towards dishonest behavior as a result of the specificities of their environments. Primarily, our results are consistent with the idea that entrepreneurial dishonesty is likely to manifest itself in business settings, which provides support in favor of the hypothesis that competitive settings can induce dishonest behavior (Shleifer, 2004). This finding could explain how entrepreneurs can effectively build social ties (Davidsson and Honig, 2003), while still undertaking unethical behavior when fulfilling their duties at work. With little evidence that dishonesty in business settings can be linked to self-assessed honesty, this could suggest that being dishonest in business might not always be socially unacceptable.

We also find some evidence in favor of the smart and illicit argument (Levine and Rubinstein, 2017), in that individuals who are less trustworthy and more competitive are more likely to have entrepreneurial intentions. This result, however, needs to be nuanced. For one thing, those who intend to become entrepreneurs are younger and thus more likely to be competitive and dishonest. It cannot be ascertained that their trustworthiness and competitiveness will not level out by the time they effectively select into entrepreneurship (if they ever do so). Moreover, their dishonesty decreases in business settings which would

suggest that their general tendency for illicit behavior might not transfer into a business setting. Perhaps, future entrepreneurs believe that business people have a responsibility to behave ethically, which prompts them to cheat less when primed with imagining being a CEO.

There are grounds to believe that actual involvement in a competitive environment has great impact upon the tendency to react in a dishonest way when facing new competitive environments. Indeed, the fact that the priming effect of the business framing is stronger for current entrepreneurs than past ones, suggests that a setting that makes an actual entrepreneurial experience salient greatly influences how people behave in new competitive settings. The more this experience is fresh in memory (for instance, when the entrepreneurial spell is current), the greater the tendency to be drawn into dishonest behavior when facing a setting that has elements of that past experience. This would suggest that much of the internalized behavior happens through peer effects, once people have effectively engaged in business ownership.

This study does not go without any limitations. The main limitation to this study pertains to the use of a crowdsourcing platform for the recruitment of subjects. On the prolific platform, demographic variables from which subjects are pre-screened are self-reported by subjects themselves, which might raise issues regarding their accuracy. Our descriptive results show that entrepreneurs and non-entrepreneurs differ on the same demographic backgrounds as reported in previous empirical studies (Evans and Leighton, 1989). Yet, subjects in our study differs from other similar studies conducted online (Koudstaal et al., 2016), in that they are younger. We do not expect this difference to qualitatively change our results. Indeed, most of the interaction effect that we observe between occupation and assignment to the treatment comes from current entrepreneurs and those who have the intention to become entrepreneurs, which happen to be the oldest and youngest groups in our sample.

Future venues for further testing and extending the findings of this study would be to rely on registry data. By matching subject tendency to cheat with registred data, one can correlate dishonest behavior with a broad set of demogrqphic backgrounds as well as economic decisions and outcomes.
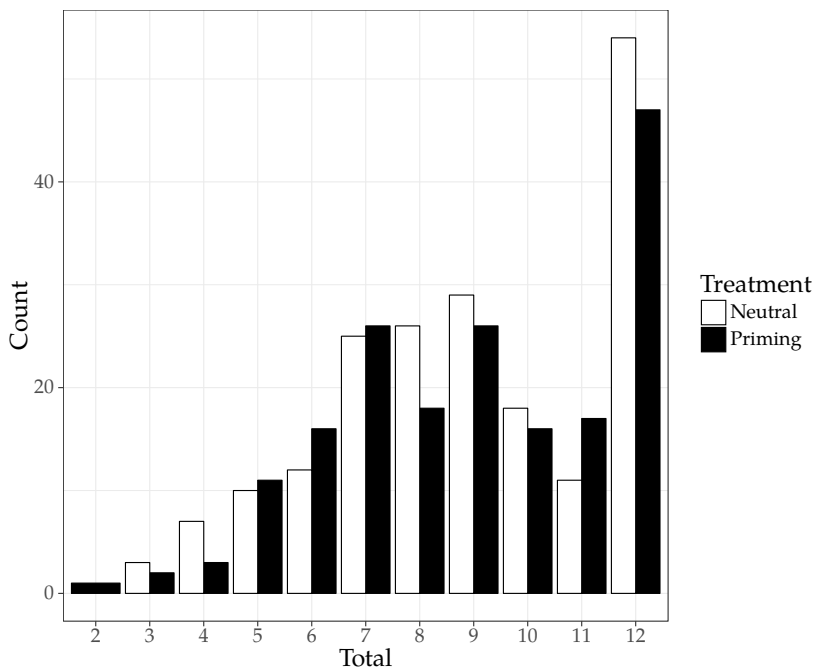
Figure 2.1: Distribution of total scores on the roll to two dice across treatments.
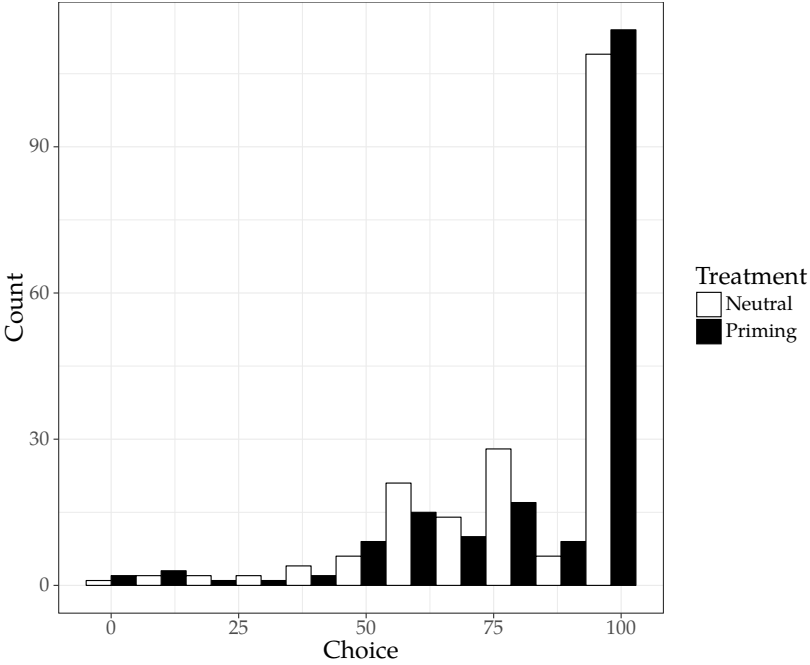
Figure 2.2: Distribution of number chosen across treatments.
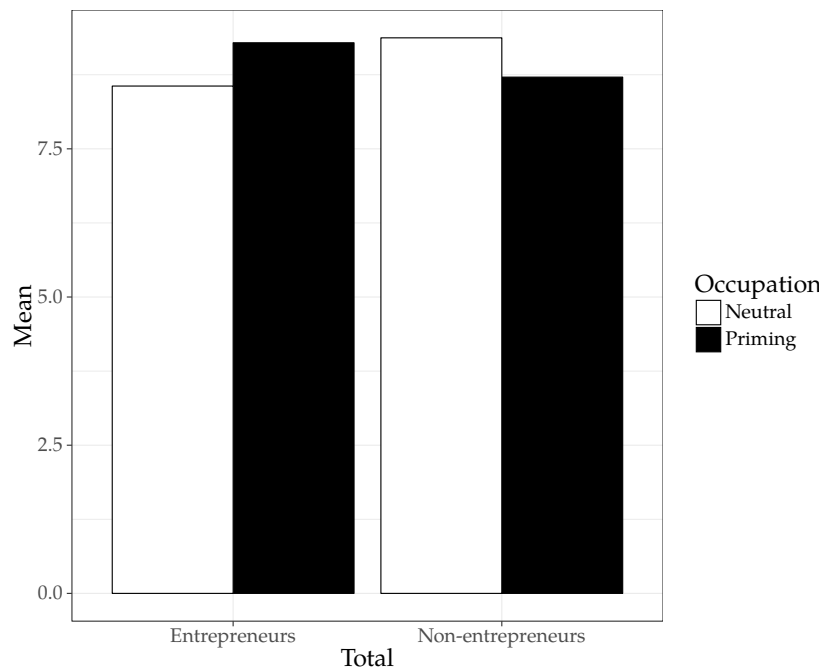
Figure 2.3: Mean of total scores across treatments and occupations.
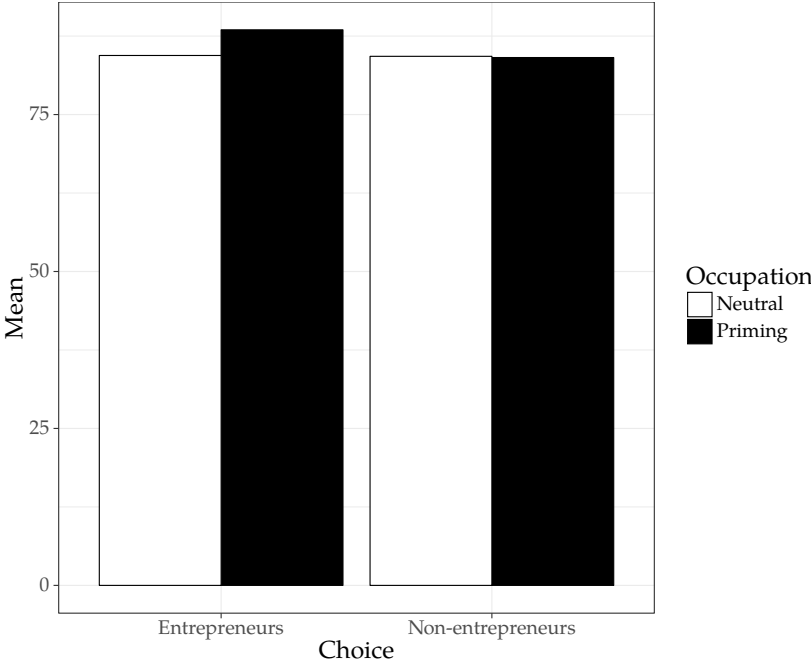
Figure 2.4: Mean of number of choice across treatments and occupations.

Table 2.1: Descriptive statistics.

	Entrepreneurs (n = 176)		Non-entrepreneurs (n = 202)	
Male (%)	58.52	[a*]	50.50	[a*]
Age	35.75	[a]	33.12	[a]
Education (%)		[a]		[a]
No formal qualifications	0.57		1.98	
Secondary school	8.52		10.40	
College	22.16		29.70	
Undergraduate degree	43.18		41.09	
Graduate degree	22.73		15.35	
Doctorate degree	2.84		1.49	
Income (%)				
Less than £10,000	13.07		15.35	
£10,000 - £19,999	15.34		19.31	
£20,000 - £29,999	19.32		22.77	
£30,000 - £39,999	10.23		13.37	
£40,000 - £49,999	9.66		7.92	
£50,000 - £59,999	6.25		4.95	
£60,000 - £69,999	3.41		4.46	
£70,000 - £79,999	3.41		1.98	
£80,000 - £89,999	1.70		1.49	
£90,000 - £99,999	2.84		1.49	
£100,000 - £149,999	1.70		0.99	
More than £150,000	1.14		0.00	
Rather not say	8.52		4.95	
N/A	3.41		0.99	

[a] Significant difference ($p < 0.1$ two-sided test) between entrepreneurs and non-entrepreneurs.

[*] $p < 0.1$ one-sided test.

Table 2.2: Differences in personality traits between Entrepreneurs and non-entrepreneurs.

	Entrepreneurs (n = 167)	Non-entrepreneurs (n = 189)
Humility-Honesty	30.19	30.68
Competitiveness	68.34	67.42

Table 2.3: Correlation between total score, personality traits, age, and gender and occupational choice.

		1	2	3	4	5	6
Total	1	–					
Humility-Honesty	2	-0.0632	–				
Competitiveness	3	0.0753	-0.5804****	–			
Age	4	-0.0179	0.1963***	-0.2188****	–		
Male	5	0.0134	-0.1701**	0.1359*	-0.1495**	–	
Non-E	6	0.0281	0.0423	-0.0307	-0.1262*	-0.0804	–

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

**** $p < 0.0001$

Table 2.4: Differences in total scores for different cutoffs across occupations and treatments.

		Entrepreneurs		Non-entrepreneurs	
% Total = 12	Neutral	21.50	[a*] [c]	33.33	[b] [c]
	Priming	31.33	[a*] [c*]	21.00	[b] [c*]
% Total ≥ 11	Neutral	25.81	[a] [c]	40.20	[b] [c]
	Priming	45.78	[a] [c]	26.00	[b] [c]
% Total ≥ 10	Neutral	38.71	[a]	46.08	[b*]
	Priming	53.01	[a] [c]	36.00	[b*] [c]
% Total ≥ 9	Neutral	53.76		60.78	
	Priming	59.04		57.00	
% Total ≥ 8	Neutral	64.52	[c]	76.47	[b*] [c]
	Priming	72.29		64.00	[b*]

[a] Significant difference ($p < 0.1$ two-sided test) within entrepreneurs between the neutral and the business framing.

[b] Significant difference ($p < 0.1$ two-sided test) within non-entrepreneurs between the neutral and the business framing.

[c] Significant difference ($p < 0.1$ two-sided test) within treatments between entrepreneurs and non-entrepreneurs.

* $p < 0.1$ one-sided test.

Table 2.5: Hierarchical Tobit regressions of total score on the interaction of occupational choice and assignment to the treatment, as well as demographic and personality traits.

	(1)		(2)		(3)		(4)	
	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Priming	0.9670*	-0.0583	0.9489*	-0.0808	0.9328*	-0.1507	0.9156*	-0.1452
	(0.5024)	(0.3426)	(0.5071)	(0.3472)	(0.5189)	(.3536)	(0.5183)	(0.3518)
Non-E	1.1004**	0.1714	1.2139**	0.2816	1.1734**	0.1473	1.1519**	0.1472
	(0.4776)	(.3432)	(0.4870)	(0.3530)	(0.4980)	(0.3518)	(0.4988)	(0.3514)
Priming × Non-E	-1.9187***	-1.9187***	-1.9313***	-1.9313***	-2.0408***	-2.0408***	-1.9982***	-1.9982***
	(0.6876)	(0.6876)	(0.6922)	(0.6922)	(0.7079)	(0.7079)	(0.7109)	(0.7109)
Humility-Honesty					-0.0232	-0.0232		
					(0.0303)	(0.0303)		
Competitiveness							0.0118	0.0118
							(0.0120)	(0.0120)
Constant	8.9295****		8.0271****		9.7406****		8.2428****	
	(0.3425)		(1.6312)		(1.0185)		(0.8527)	
Sigma								
Constant	3.2216****		3.1796****		3.1933****		3.1919****	
	(0.1470)		(0.1453)		(0.1509)		(0.1508)	
Controls	No		Yes		No		No	
Observations	378		377		356		356	
df	3		23		4		4	
χ²	8.0291		19.8167		9.6929		10.0708	
Log-likelihood	-816.6923		-808.6847		-762.9974		-762.8085	

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Control variables are age, gender, education and income.

Table 2.6: Descriptive statistics for splits.

	Entrepreneurs		Non-entrepreneurs	
	Current ($n = 98$)	Past ($n = 78$)	Intention ($n = 94$)	No intention ($n = 108$)
Male (%)	55.10_c	62.82_e	59.57_f	$42.59_{c,e,f}$
Age	$37.12_{a,b,c}$	$34.03_{a,d}$	$31.44_{b,d,f}$	$34.56_{c,f}$
Education (%)	$_c$	$_e$		$_{c,e}$
No formal qualifications	1.02	0	2.13	1.85
Secondary school/GCSE	11.22	5.13	8.51	12.04
College/A levels	20.41	24.36	27.66	31.48
Undergraduate degree	43.88	42.31	39.36	42.59
Graduate degree	20.41	25.64	21.28	10.19
Doctorate degree	3.06	2.56	1.06	1.85
Income (%)	$_c$		$_f$	$_{c,f}$
Less than £10,000	14.29	11.54	13.83	16.67
£10,000 - £19,999	15.31	15.38	18.09	20.37
£20,000 - £29,999	14.29	25.64	15.96	28.7
£30,000 - £39,999	14.29	5.13	19.15	8.33
£40,000 - £49,999	9.18	10.26	8.51	7.41
£50,000 - £59,999	8.16	3.85	5.32	4.63
£60,000 - £69,999	2.04	5.13	3.19	5.56
£70,000 - £79,999	4.08	2.56	3.19	0.93
£80,000 - £89,999	0	3.85	2.13	0.93
£90,000 - £99,999	3.06	2.56	1.06	1.85
£100,000 - £149,999	1.02	2.56	2.13	0
More than £150,000	0	2.56	0	0
Rather not say	9.18	7.69	6.38	3.7
N/A	5.10	1.28	1.06	0.93

[a] Significant (p<0.1) difference between current and past entrepreneurs within treatment.

[b] Significant (p<0.1) difference in proportions between current entrepreneurs and those who intend to become entrepreneurs within treatment.

[c] Significant (p<0.1) difference in proportions between current entrepreneurs and non-entrepreneurs within treatment.

[d] Significant (p<0.1) difference in proportions between past entrepreneurs and those who intend to become entrepreneurs within treatment.

[e] Significant (p<0.1) difference in proportions between past entrepreneurs and non-entrepreneurs within treatment.

[f] Significant (p<0.1) difference in proportions between those who intend to become entrepreneurs and non-entrepreneurs within treatment.

∗ Significant (p<0.1, one-sided) difference in proportions.

Table 2.7: Differences in Humility-Honesty and Hypercompetitiveness across occupations.

	Entrepreneurs		Non-entrepreneurs	
	Current	Past	Intention	No intention
	$(n = 92)$	$(n = 75)$	$(n = 100)$	$(n = 89)$
Humility-Honesty	30.49	29.81_e	30.04_{f*}	$31.25_{e,f*}$
Hypercompetitiveness	67.41	69.47_e	69.21_{f*}	$65.83_{e,f*}$

$_a$ Significant ($p < 0.1$; two-sided) difference between current and past entrepreneurs within treatment.

$_b$ Significant ($p < 0.1$; two-sided) difference in proportions between current entrepreneurs and those who intend to become entrepreneurs within treatment.

$_c$ Significant ($p < 0.1$; two-sided) difference in proportions between current entrepreneurs and those who do not intend to become entrepreneurs within treatment.

$_d$ Significant ($p < 0.1$; two-sided) difference in proportions between past entrepreneurs and those who intend to become entrepreneurs within treatment.

$_e$ Significant ($p < 0.1$; two-sided) difference in proportions between past entrepreneurs and those who do not intend to become entrepreneurs within treatment.

$_f$ Significant ($p < 0.1$; two-sided) difference in proportions between those who intend to become entrepreneurs and those who do not intend to become entrepreneurs within treatment.

$*$ $p < 0.1$, one-sided difference.

Table 2.8: Differences in choice and total score across occupations and treatments.

		Entrepreneurs		Non-entrepreneurs	
		Current	Past	Intention	No Intention
% Total = 12	Neutral	$14.00^a_{e,f,g*}$	$30.23_{e,h*}$	$43.48^c_{f,h*,j}$	$25.00_{g*,j}$
	Priming	31.25^a	31.43	20.83^c	21.15
% Total $\geq$ 11	Neutral	$16.00^a_{e,f,g}$	$37.21_{e,h*}$	$52.17^c_{f,h*,j}$	$30.36_{g,j}$
	Priming	$41.60^a_{f,g*}$	$51.43_{h,i}$	$25.00^c_{f,h}$	$26.92_{g*,i}$
% Total $\geq$ 10	Neutral	$30.00^a_{e,f}$	48.84_e	$58.70^c_{f,j}$	35.71_j
	Priming	50.00^a_{g*}	$57.14_{h,i}$	37.50^c_h	$34.62_{g*,i}$
% Total $\geq$ 9	Neutral	48.00_f	60.47	$71.74_{f,j}$	51.79_j
	Priming	56.25	62.86	62.50	51.92
% Total $\geq$ 8	Neutral	62.00_f	67.44^b_h	$84.78^c_{f,h,j}$	69.64_j
	Priming	62.50_e	$85.71^b_{e,h,i}$	66.67^c_h	61.54_i

[a] Significant (p<0.1, two-sided) difference in proportions within current entrepreneurs between treatments.

[b] Significant (p<0.1, two-sided) difference in proportions within past entrepreneurs between treatments.

[c] Significant (p<0.1, two-sided) difference in proportions within those who intend to become entrepreneurs between treatments.

[d] Significant (p<0.1, two-sided) difference in proportions within non-entrepreneurs between treatments.

[e] Significant (p<0.1, two-sided) difference in proportions between current and past entrepreneurs within treatment.

[f] Significant (p<0.1, two-sided) difference in proportions between current entrepreneurs and those who intend to become entrepreneurs within treatment.

[g] Significant (p<0.1, two-sided) difference in proportions between current entrepreneurs and non-entrepreneurs within treatment.

[h] Significant (p<0.1, two-sided) difference in proportions between past entrepreneurs and those who intend to become entrepreneurs within treatment.

[i] Significant (p<0.1, two-sided) difference in proportions between past entrepreneurs and non-entrepreneurs within treatment.

[j] Significant (p<0.1, two-sided) difference in proportions between those who intend to become entrepreneurs and non-entrepreneurs within treatment.

* Significant (p<0.1, one-sided) difference in proportions.

Appendix E

Instructions (Business Framing)

Imagine...

You are the Chief Executive Officer (CEO) of the company Castor AG. Your company is in a very competitive market and the board of directors are always pushing for greater earnings as they are seeking to beat competitors and attract investors. Your bonus depends on the earnings of the company: the higher the announced earnings, the higher will be your bonus.

The earnings of the company will depend on the CEO's effort and on market demand according to the following formula:

Earnings = (EFFORT + DEMAND) ÷ 2

EFFORT and DEMAND are numbers between 0 and 100. EFFORT depends on your own decision, but DEMAND is random.

For example, suppose that you choose 100 for EFFORT and that DEMAND is 100. The CEO's earnings will then be:

(100 + 100) ÷ 2 = £100.

As another example, suppose that you choose 100 EFFORT and that DEMAND is 20. The CEO's earnings will then be:

(100 + 20) ÷ 2 = £60.

To determine DEMAND, we ask you to roll two dice and use the following formula:

DEMAND = 10 × (Score of First Die + Score of Second Die - 2)

As an example, suppose you roll the dice and obtain 6 and 6. DEMAND will then be:

10 × (6 + 6 - 2) = 100.

As another example, suppose you roll the dice and obtain 1 and 1. DEMAND will then be:

10 × (1 + 1 - 2) = 0.

Appendix F

Behavioral Traits, Age and Subgroups

Table F.1: OLS regression analyses of behavioral traits on the interaction between age and different sub-groups.

	Honesty-Humility			Hypercompetitiveness		
	(1)	(2)	(3)	(4)	(5)	(6)
No Intention	1.0055	-0.9682	-0.8542	-2.2652	-0.0962	-0.9344
	(0.8358)	(2.9454)	(2.8975)	(2.1079)	(7.4643)	(7.5340)
Past Entrepreneur	-0.3564	-8.2934**	-6.2471*	1.1629	11.7588	8.4797
	(0.9014)	(3.4539)	(3.4390)	(2.2734)	(8.7530)	(8.9421)
Intention	0.2607	-1.8299	-1.5516	-0.1027	-1.8870	-1.6068
	(0.8782)	(2.8670)	(2.8332)	(2.2149)	(7.2658)	(7.3667)
Age	0.1111****	0.0465	0.0619	-0.3098****	-0.2637*	-0.2995**
	(0.0301)	(0.0557)	(0.0555)	(0.0758)	(0.1413)	(0.1443)
No Intention × Age		0.0526	0.0334		-0.0594	0.0057
		(0.0786)	(0.0777)		(0.1993)	(0.2020)
Past × Age		0.2270**	0.1743*		-0.3064	-0.2059
		(0.0949)	(0.0942)		(0.2404)	(0.2450)
Intention × Age		0.0549	0.0578		0.0662	0.0593
		(0.0803)	(0.0794)		(0.2035)	(0.2065)
Constant	26.3762****	28.7666****	28.2561****	78.8827****	77.1752****	80.9398****
	(1.2648)	(2.1487)	(3.4539)	(3.1898)	(5.4455)	(8.9807)
Controls	No	No	Yes	No	No	Yes
Observations	355	355	355	355	355	355
F	4.2112	3.2682	2.6820	5.0858	3.2582	1.9135
R^2	0.0459	0.0619	0.1753	0.0549	0.0617	0.1317

Standard errors in parentheses

$* p < 0.1$, $** p < 0.05$, $*** p < 0.01$, $**** p < 0.001$

Control variables are gender, education and income.

Chapter 3

Is There a Wage Premium to Self-Employment in the Labor Markets? Evidence from a Field Experiment

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3.1 Introduction

It can be puzzling to witness that certain individuals willfully select into self-employment if we consider that the occupation is more risky and leads to lower earnings than paid employment (Hamilton, 2000; Moskowitz and Vissing-Jørgensen, 2002). One way to explain this phenomenon is to argue that non-pecuniary benefits, such as being one's own boss and enjoying greater flexibility at work, can motivate people to choose this occupation (Benz and Frey, 2008; Blanchflower et al., 2001). Alternatively, selection into self-employment can be explained by cognitive biases such as overconfidence and overoptimism (Arabsheibani et al., 2000; Koellinger et al., 2007).

While entry into self-employment can translate into lower earnings compared to staying in paid employment, it can nevertheless have an option value: when choosing between two occupations that exhibit different levels of risk, a person ought to experiment with the one that is riskier in order to find out how well he or she would fare at it (Johnson, 1978; Jovanovic, 1979; Miller, 1984). The value of such experimentation has to do, among other things, with whether self-employed workers can claim a wage premium when they transition back to paid employment (Manso, 2016).

The empirical evidence on whether there is a wage premium to self-employment is mixed. While certain studies have argued that there is a penalty associated with selection into self-employment (Bruce and Schuetze, 2004; Hyytinen and Rouvinen, 2008; Baptista et al., 2012; Failla et al., 2017), others find this not to be the case if one takes into account switching between industries, the successfulness of the entrepreneurial spells, or specificities related to certain industries (Kaiser and Malchow-Møller, 2011; Campbell, 2013; Daly, 2015). Because selection in and out of self-employment is endogenous, recent studies have tried to address this issue. The results from these studies seem to indicate that there is indeed a wage premium to self-employment (Daly, 2015; Luzzi and Sasson, 2016; Manso, 2016; Dillon and Stanton, 2017). Throughout the paper, this stream of studies is referred to as those that confirm the *wage premium hypothesis*.

Testing this hypothesis by resorting to observational data is inherently difficult because selection in and out of entrepreneurship is endogenous and earning differentials can often

be driven by a multitude of unobserved factors. The difficulty is exacerbated by the fact that there is evidence that self-employed workers systematically under-report their income (Hurst et al., 2014). Thus finding instruments that control for unobserved factors that simultaneously address spurious correlations between entrepreneurial entry, success, and income reporting practices can be a formidable challenge to surmount.

One way to tackle these difficulties is to rely on different methodological approaches. This is done by Koellinger et al. (2015) who resort to a field experiment that tests whether a self-employment spell can be viewed as a negative signal on the job market. They run an audit study in the UK where two practically equivalent fictitious resumes are sent out to job openings advertised online, with the only difference between the two resumes being that one of them exhibits a self-employment spell. They report lower rates of callbacks to resumes that have a self-employment spell. Assuming that a lower callback rate implies a longer or costlier job search, this evidence is consistent with a wage penalty for self-employed workers.[1] The authors argue that discrimination against self-employed workers can be one of the reasons for the penalty. This is referred to as the *stigma hypothesis*. Thus, the only experimental evidence appears to be hardly reconcilable with the idea that self-employed workers enjoy a wage premium when they transition back into paid employment. Nonetheless, the discrepancy between findings coming from observational studies that report a wage premium to self-employment and Koellinger et al.'s (2015) field experimental evidence can be explained in at least two ways.

First, it is possible that the penalty observed by Koellinger et al. (2015) is driven by specific aspects of the sector (human resource management) and region (UK) of their study. Evidence in favor of this comes from Daly (2015) who finds that the wage premium to self-employment is higher for technical professions. The study by Campbell (2013), which focuses on the semi-conductor industry, also finds a positive effect of a self-employment spell on earnings. Thus, lower callback rates to self-employed workers observed by Koellinger et al. (2015) could be driven by the fact that the experiment was conducted in a sector that performs below the average of self-employed workers who transition back to paid employ-

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[1]Theories of job search stipulate that shorter search horizons or higher search costs typically mean lower reservation wages for the job seaker (Lippman and McCall, 1976).

ment. As for the region, different settings can value self-employment experience differently (Saxenian, 1996).

Second, the discrepancy could be explained by the fact that the wage premium takes time to materialize itself. Taking Koellinger et al.'s (2015) results at face value, self-employed workers could initially experience a penalty as they transition back into paid employment, but this does not automatically imply that a wage premium cannot be enjoyed later on. Any discounting of the on-the-job training associated with a self-employment spell is likely to fade away as workers reintegrate the paid employment labor market. Previously-self-employed workers might have an edge over never-self-employed workers since the specific skills that they acquire after their self-employment spell gets complemented with general skills that they have acquired during their self-employment spell.[2] Empirical evidence for such a claim is not entirely absent. Baptista et al. (2012) show that, although associated with a wage penalty, self-employment can also be linked with faster promotions when workers switch back to paid employment.[3] Manso (2016) shows that lifetime earning for self-employed workers transitioning back to paid employment gradually catches up with those who have never experienced with self-employment even when entrepreneurial spells are short (less than two years) and therefore likely to be unsuccessful attempts.

The purpose of this paper is twofold. It first aims at testing whether field experimental evidence can be consistent with the wage premium hypothesis by addressing the above two points. Employing Koellinger et al.'s (2015) methodology[4], the current study consists in sending three fictitious resumes (instead of two) to online job openings. One type of resume does not exhibit any self-employment spell (these will be referred to as W-type), whereas the other two do so. The resumes that contain a self-employment spell differ in that one has a self-employment spell that is currently ongoing (C-type) while the other has a self-employment spell that has occurred in the past with the individual having transitioned to paid employment since (P-type). All resumes are sent to job advertisements for IT sector

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[2]Self-employed workers are expected to have more balanced skills (Lazear, 2004).

[3]This finding can be consistent with the idea that general skills can better lead to promotions and ascension to managerial positions (Ferreira and Sah, 2012; Lazear, 2012).

[4]Audit studies involving the sending of fictitious resumes have gained popularity since the seminal work of Bertrand and Mullainathan (2004) as more than 30 such studies inquiring about discrimination in the labor markets can be accounted for (Bertrand and Duflo, 2016).

'Project Managers' in the Boston and Philadelphia metropolitan areas.

By targeting the US job market as well as a purely high tech sector, one can test whether the difference between field experimental and observational studies come from the industry and/or the region. If it were the case that there is a wage premium to self-employment in technical fields and that general skills associated with self-employment would make them attractive for managerial positions, one should expect higher callback rates to self-employed workers in the IT project management sector. Furthermore, by comparing callbacks between the W-type and the P-type resumes, one can test whether the wage premium is gained over time. If P-type resumes receive more callbacks than W-type resumes, it can be concluded that the observed wage premium to self-employment takes shape over years after the worker has transitioned back to paid employment.

The second purpose of the paper is to test the source of discrimination (if any) against self-employed workers by comparing P-type and C-type resumes. Assuming that skills deprecate with time, but that personality traits do not change so much, the main difference between the two types of workers would be that C-type workers should have stronger general skills whereas P-type workers have stronger specific skills. If callback rates to P-type resumes are higher than to C-type resumes, this would be evidence that employers have a preference for specific skills. This would, in turn, suggest that the wage penalty is rooted in employers' beliefs that a worker who is just transitioning out of self-employment has less specific skills than one that has been tied to paid employment.

528 fictitious resumes have been sent out to 188 job openings advertised online. It is found that workers who are transitioning back to self-employment (C-type) are less likely to be called back for an interview than those who have always been paid workers (W-type). However, no significant difference can be found between P-type and W-type resumes. Put together, these results do not provide evidence in favor of the wage premium hypothesis, and are consistent with the idea that the penalty associated with self-employment can be linked to employer's belief that self-employed workers posses less of specific skills.

This paper contributes to the literature on wage premium/stigma hypotheses by resorting to a method that is alternative to the use of observational data, and as such attempts to contribute to the credibility of results obtained in longitudinal studies. Most importantly,

the study is able to answer a specific question regarding *endogenous exit* in self-employment. As highlighted by Failla et al. (2017), if skills developed during self-employment are not valued in the labor market, then workers will be trapped in their self-employment spells. Observed self-employment exits are then likely to come from self-selection. Those who are able to find jobs that pay better than their current self-employment spell are likely to make the transition to paid work. Similarly, those whose self-employment spells are drastically failing will be obliged to go back to paid employment, even if heavily penalized. The experimental nature of the current study allows to circumvent this problem through the exogenous introduction of the P-type resume.

The results also relate to the literature about the generality of human capital (Becker, 1962; Lazear, 2009; Wasmer, 2006; Gathmann and Schönberg, 2010). In fact, the present study seems to indicate that while the general skills associated with self-employment can be rewarded for jobs that require skills that can be similar (project management), workers that are specialized in those broad set of skills could fare better in labor markets.

Finally, this paper adds to the findings provided by the large set of audit studies that measure the consequences of various worker characteristics on employability (Bertrand and Mullainathan, 2004; Oreopoulos, 2011; Kroft et al., 2013; Cohn et al., 2016; Farber et al., 2016; Deming et al., 2016; Cahuc, Pierre and Carcillo, Stéphane and Minea, Andreea, 2017). In many of these studies, it is difficult to conclude whether observed discrimination is due to taste-based or statistical discrimination (List, 2004). For instance, Farber et al. (2016) show that holding an interim job that is at a lower skill level than the one applied to has a more adverse effect on callback rates than an unemployment spell. Similarly, Cohn et al. (2016) find that frequent job changes lead to lower callback rates, an observation that can be argued to be consistent with frequent job changes sending signal about a worker's non cognitive skills (such as work attitude). The design of the present study provides evidence that the specificity of human capital can also be inferred from the nature of jobs one has had and can be consistent with statistical discrimination.

3.2   Conceptual Framework

Human capital is the main currency with which workers acquire jobs in the labor markets. Before actually landing an employment contract, however, workers typically undergo job search through different channels. The Internet is an increasingly important channel through which this search is conducted (Stevenson, 2008; Kuhn and Mansour, 2014). An important difference between this channel and offline search channels is that it is more impersonal, thereby ruling out preferential treatment of less skilled individuals. Job applications sent from Internet job portals are typically first examined by employers. Through an examination of the information featured in a resume, an employer attributes a set of skills (including personality traits) to the applicant. The task mainly consists in seeing whether these attributed skills would be indicative of the applicant being a good match for the vacancy.

Once a candidate is believed to have good fit with a position, he or she is typically contacted by the employer in order to set up an interview. All thing equal, lower rates of such callbacks would mean that an applicant has a lower chance of landing a job. Because there are a limited number of new offerings that appear at any given time in a region, a smaller rate of callbacks is consistent with a job search that lasts for longer, thereby translating into lower reservation wages.

Self-employed workers are expected to differ from paid employed workers in the skills that they have developed during a self-employment spell. Specifically, one would expect a self-employment spell to be associated with more balanced skills (Lazear, 2004).[5] Thus, one way to think of self-employed workers is that they are jacks-of-all-trades whereas paid workers would be viewed as specialists (Lazear, 2005). It turns out that general skills are also more useful in, and likely to be associated with promotion to, managerial positions (Lazear, 2012; Ferreira and Sah, 2012). From this point of view, workers who select into entrepreneurial occupations can be attractive for employers who are seeking to fill managerial positions.

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[5]In the present paper, no distinction is made between balanced skills confounding or being caused by self-employment: form the perspective of the employer who observes a self-employment spell, more balanced skills can be attributed to the worker.

Social skills are non-cognitive skills that have recently received attention in the labor economics literature (Borghans et al., 2008b; Heckman and Kautz, 2012). Social skills can complement cognitive skills and labor markets seems to greatly value the bundling of the two (Weinberger et al., 2014; Deming and Kahn, 2017). For instance, having social skills can be a predictor of promotion to managerial positions (Deming, 2017). Social skills can also matter in entrepreneurial settings. By looking at the German Bundesinstitut für Berufsbildung (BIBB) occupational data, Borghans et al. (2014) find that people skills is an important part of entrepreneurial occupations. Employers can thus form beliefs about a worker's social skills when observing a self-employment spell. Here again, one can argue that selection into self-employment can lead to a candidate appearing attractive to employers because they can infer that such candidates have better social skills.

Employers are also likely to expect self-employed workers to differ from paid employees in their personality traits. An obvious inference made about the preferences of someone who is self-employed has to do with their willingness to take risks. Indeed, a natural way of characterizing self-employed workers is to argue that they are less averse to risk and uncertainty (Knight, 1921; Kihlstrom and Laffont, 1979). It can also be said that individuals selecting into self-employment might have a preference for income skewness (Åstebro, 2003). The decision to become self-employed is also associated with a preference for autonomy: being one's own boss is often cited as a non-pecuniary benefit for being self-employed (Hamilton, 2000; Benz and Frey, 2008). According to a meta-analysis performed by Zhao et al. (2010), self-employed individuals also differ in terms of the Big Five personality traits: they are more conscientious, more open to new experiences, more extroverted, less agreeable, and less neurotic. Self-employment can also be attributed to overconfidence (Koellinger et al., 2007), and to both being a star or a misfit (Åstebro et al., 2011). It can also be said that entrepreneurs are more self-efficacious, have a more internal locus of control, and more proactive (Frese and Gielnik, 2014). The hardships of self-employment are also likely to have employers attribute certain traits related to perseverance and grit. For instance, stress tolerance is something that one would expect to see from a self-employed individual (Frese and Gielnik, 2014).

The above list of dimensions on which self-employed workers would differ from paid

workers does not easily allow for the prediction of how currently- or previously-self-employed workers would fare in the labor markets compared to workers who have always been paid employees. While traits such as conscientiousness and emotional stability can be linked with positive labor market outcomes (Borghans et al., 2008a), it cannot easily be argued that all the traits that are associated to entrepreneurship would be desirable from an employer's perspective. Furthermore, while employers may value general skills, it cannot be argued that they do not value specific skills. This could explain why Kaiser and Malchow-Møller (2011) observe that self-employed workers who transition back to paid work are not penalized as long as they stay within the same industry. In fact, skill matching is likely to be of better quality when workers and firms are picked from the same industry.

Assuming that personality traits are stable, however, one can take conclusions after observing how the timing of a self-employment spell impacts callback rates. Indeed, if personality traits are believed to be stable over time, the effects that a self-employment spell has on the likelihood of being called for an interview should not change over time: those who were self-employed in the past should be as likely as those who are just transitioning out of self-employment to receive a callback.

If employers are willing to pay for hiring a worker that has personality traits associated with entrepreneurship, they should do it for self-employed workers who have transitioned from self-employment long ago as much as those who are just transitioning out of it. For the same reason, if employers dislike traits associated with entrepreneurship, the penalty associated with a self-employment spell should *stick* over time with a worker even when the self-employment spell has happened in the past. Such sticking of a penalty would indeed be consistent with the stigma hypothesis.

On the other hand, if employers are mainly concerned with either general or specific skills, one should expect that the time at which self-employment spells have occurred to have an impact on callback rates. Indeed, it can be argued that practically all jobs require a combination of general and specific skills. It can equally be argued that there are diminishing marginal returns to either type of skill: the increase in expected productivity for a worker rises by less as he or she gains experience in a specific task. Finally, it can be argued that skills deprecate with time if they are not maintained: the strongest skills are the ones

that can be inferred from the most immediate tasks that one has performed. This would imply that the immediacy of a self-employment spell can lead to employers forming different beliefs about a worker's expected productivity. Currently-self-employed workers are expected to have a greater share of general skills with their specific skills being more deprecated, whereas previously-self-employed workers would be expected to have a greater share of specific skills with their general skills being more deprecated. Paid workers who have never been self-employed, on the other hand, would have the greatest share of their skills being specific and the lowest share of general skills.

3.3 Experimental Design

The method consists in sending three fictitious resumes to each job offer. One of the resumes will not contain any self-employment spell (type W). The other two will each contain a self-employment spell that has lasted for 2 years: one of the resumes (type P) exhibits a self-employment spell that has started 9 years ago (and stopped 7 years ago, with the person having since transitioned back to paid employment), while the other resume (type C) is someone that has been self-employed for the last two years. For type P resumes, the self-employment spell starts four years after the first professional position.

Different US Internet job search portals are used for searching job openings and sending applications. For each advertised job opening, information about the description of the opening (including whether it consists of a full-time position) and the name of the employer are recorded. Internet search is conducted to gather information about the size of the firm as well as whether it consists of a staffing and recruiting agency.

Because the self-employment spell lasts for two years, and that it could have happened as far as 9 years prior to when the application is sent, and that the entrepreneurial spell happens four years after the first entry in the employment history of the resume, all individuals portrayed in the fictitious resumes are between 38 and 42 years of age.[6] As a result, jobs that require more extensive professional experience will be targeted. IT Project Manager

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[6]This is not made explicit in the resumes, but can be inferred from the year at which undergraduate studies have been completed.

openings posted online in the Boston and Philadelphia metropolitan areas are considered. The same employer never receives applications for more than one job opening.

Self-employment spells are made salient by having the applicant's initials followed by either "Consulting" or "Solutions" as the employer name, as well as a sentence stipulating that the applicant owned and managed a project management consulting company in the employment history entry corresponding to the self-employment spell.[7] Because both the self-employment and IT sectors mostly consists of men, all fictitious resumes have a male gender.

All resumes have a bachelor degree in computer science and an MBA from equivalent Business Schools at the bottom tier of the FT Global MBA Ranking list. Task definition in the employment history part of resumes are similar and of general nature: they do not correspond to any specific technology and apply to practically all types of IT projects. Furthermore, employers for paid employment spells are taken from a set of large IT consulting companies, avoiding that any resume suggests know-how in any particular sector or industry (e.g. finance or health-care) other than general IT.

Because two of the resumes display their self-employment spell in a very salient way, and that receiving two of such resumes can be unusual (especially for job openings that receive fewer overall applicants), a set of precautions have been taken to avoid suspicion by employers. First, resume types where sent out with a one day interval in random order. This ensures that one of the resumes is not fresh in an employer's memory when another is sent. Second, resumes have been made to differ in terms of the cities where the employment spells have occurred. None of the resumes has an educational degree from the same city where job openings are posted. The three resumes further differ in that the initial work experience happens in the same city where the MBA has been obtained. This procedure led to the creation of three templates which are randomly assigned to one of the three types (P, C, or W) of resumes for each application. Appendix G shows the general template for resumes.

Inspiration for the content of the resumes come from Indeed.com with individuals em-

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[7]If there is a wage premium to self-employment, then one ought to make it salient in order to send the right signal. Furthermore, it is fair to assume that one cannot easily masquerade a self-employment spell as a proper paid employment spell in order to avoid stigma effects.

ployed as IT Project Managers in large IT consulting companies in the Washington D.C. area. This allows for resumes that are representative of what employers are accustomed with receiving. Following Bertrand and Mullainathan (2004), task descriptions are modified in order to avoid any resemblance between the fictitious resumes and actual people.

To collect callbacks, virtual phone numbers and emails are set up. The content of the messages are examined to match the callback with the right application. After receiving a callback, employers are contacted to state that the application is withdrawn. Callbacks are allowed to occur for up to six weeks after the date the application is sent out. To be considered a callback, an email or a voice message has to refer to a job application that was actually sent out for an advertised opening. It is common practice for staffing and recruitment agencies to keep a database of applicants to previous job openings and to solicit them for new job openings that are either not advertised online or have not been applied to. These messages are typically sent out automatically (and are often a poor match with an applicant's profile) to an email list and involve the request of an updated resumes (even on the same day the application was sent).

3.4 Results

Data collection was performed between February and May 2017. 528 fictitious resumes were sent out in reply to 188 job openings for IT project management positions. Not all job applications received all three resumes. This is due to some job openings being no longer available at the time that a specific resume were to be sent. However, the majority (165) of the job openings received all three resumes. The analysis will be focused on these 165 applications.[8] This sample size ensures statistical power greater than in Koellinger et al. (2015): the latter sent out applications to a total of 98 job openings.

Panel A in Table 3.1 provides summary statistics on the job openings. Most of the jobs (near 60.67%) are in the Boston area and a smaller share (43.03%) where full-time positions.

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[8]It was revealed that a gap was inadvertently introduced in one of the templates. Because templates are randomly assigned to worker types (W, C, or P), observations in which a template contains a gap can be dropped while still being able to compare the three worker types. Doing so leads to the same results reported here. Further regression analysis controlling for those resumes that contained a gap also leads to the same conclusion. For brevity, these checks are not reported here.

A little more than half of job openings were made by medium-sized companies (between 50 and 1,000 employees) and the rest are equally split between small and large companies. Moreover, half of the job openings where made by 'Recruiting and Staffing' companies. Most of the jobs were found on Indeed, Dice and Career Builder.[9] These descriptives show that applications were sent out to a balanced set of employers and job types using a variety of job search portals.

Panel B shows that a total of 69 (27 through voicemail and 57 through email) callbacks were made by employers. This leaves an overall callback rate of 13.94% which is similar to other audit studies. The majority of callbacks were received by email: only 12 of the 69 callbacks where made exclusively through voicemail, meaning that more than half of the voicemail callbacks where accompanied by emails. 21 employers called back only one of the resumes, 12 employers called back two out of three resumes, and 8 employers called back all three resumes. This means that no callbacks were received for 124 (75.15%) of the job openings.

Table 3.2 shows differences in callback rates between resume types for different splittings of the sample. The first row shows callback rates for the whole sample of 165 job openings for which three resumes were sent out. C-type resumes receive 39.30% less callbacks than W-type resumes. This difference is statistically significant ($p = 0.0776$; two-sided Z-test of proportions). Moreover, the difference between P-type and W-type resumes is much smaller: the former are 14.26% less likely to receive a callback than the latter. This difference, however, is not statistically significant. This result suggests that, even if P-type resumes are penalized compared to W-type resumes, this penalty is smaller than the one between C-type and W-type resumes. In other words, the penalty is likely to be higher the more recent the self-employment spell happens to be.

The second row shows callback rates by type of resume when dropping the 8 job openings where the employer made callbacks to all three resumes. This leads to a reduced sample of 157 job openings. As we can see, C-type resumes receive 55.10% less callbacks than W-type resumes. A two-sided Z-test of proportions suggests that this difference is signif-

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[9]Fewer applications were made through the Monster job portal. This is mainly due to most of the job openings on Monster being redirected on the company's website and requiring to register on the company's job portal, which made the application process too cumbersome.

icant ($p = 0.0320$). Furthermore, P-type resumes are 1.78 times more likely to receive a callback than C-type resumes. This difference is significant on a one-sided Z-test of proportions ($p = 0.0722$). Again, no significant difference can be found between W-type and P-type resumes. One explanation for this difference between job openings where all resumes where called back and those where only two of the resumes were called back could be that the latter received a much larger volume of applicants overall. If C-type resumes usually rank lower than the two other types, then they are less likely to receive a callback on those job openings that have received a lot of applicants.

The third row shows the distribution of callbacks between the three types of resumes only for the subset of 21 job openings by employers that made callbacks to only one of the resumes. As we can see, more than 80% of the callbacks are made to P-type and W-type resumes whereas the rest of the callbacks go to C-type resumes. A two-sided Z-test of proportions indicates that W-type resumes receive significantly ($p = 0.0495$) more callbacks than C-type resumes. Again, no statistically significant difference is found between P-type and W-type resumes.

Table 3.3 shows the results of hierarchical probit regressions of the reception of a callback on the type of resume as well as control variables related to the job opening and the firm. Model 1 simply regresses callback on the type of resume. This model replicates the results in the first row of Table 3.2: compared to W-type resumes, C-type resumes are significantly less likely to receive callbacks, but this is not the case for P-type resumes. In model 2, control variables (the template chosen, and whether the job opening was in Boston and contractual) are added. As we can see, positions that are contractual or in Boston receive less callbacks. Model 3 controls for firm size as well as whether the job opening is advertised by a recruitment and staffing agency. As we can see, medium-sized companies are less likely to call back than large companies. Also, staffing agencies are less likely to call back applicants as well. In all three models, coefficients and marginal effects for the differences in callbacks between the three worker types are stable. Thus, differences in callback rates between types of workers does not seem to be driven by specific job- or firm-related characteristic.

3.5   Discussion and Conclusion

Overall, the above results make the following suggestions. First, the results do not seem to provide evidence in favor of the hypothesis that self-employed workers who transition back to paid work enjoy a wage premium. Indeed, after 7 years of moving out of self-employment, workers are not more likely to receive callbacks for an interview than those who have never experienced self-employment. Second, although individuals who are only recently transitioning out of self-employment are penalized compared to those who have never experienced self-employment, this does not seem to be the case for those whose self-employment spell occurred in a distant past. Assuming that employers believe that the personality traits that lead to selection into self-employment do not change over time, and that they dislike those traits, one should expect to observe a penalty that is sustained over time. The evidence does not support this idea. Instead, it is consistent with the idea that employers have a preference for specific skills and that coming out of self-employment could be a signal that specific skills might be lacking or have been deprecated compared to a paid worker.

Some limitations pertain to this study. Obviously, wages are not directly measured. It is not guaranteed that all types of workers are equally likely to obtain an offer, or better wages, after being interviewed. It is possible that those who experienced self-employment have a better callback-to-offer conversion rate than those who have only experienced paid employment. However, to the extent where lower callback rates are rooted in standard hiring procedures that are shared between employers, lower callback rates for a group is likely to be common knowledge among both employers and workers. If so, lower callback rates are likely to correspond to weaker bargaining power during employment contract negotiation stages.

Sample bias could also be an issue since the sending of fictitious resumes were restricted to companies that posted job opening on online job search platforms. Many large corporations rely on their own portals. If larger firms tend to differ from smaller firms in terms of their preference for worker skills, then this could introduce bias into the results. This issue is partly addressed in the regression frameworks where firm size is added as a con-

trol. Furthermore, it is likely that hiring practices within larger firms penalizes even more self-employment as larger corporations are more likely to prefer specific skills.

A further limitation to this study is that the lack of experimental control over the hiring process on the employer's side makes it difficult to take conclusions about the mechanisms through which employers assess applicants' qualifications. For instance, it cannot be ruled out that employers perceive a self-employment spell as being a necessity (or hidden unemployment) or as a signal of a worker being a 'misfit' (Åstebro et al., 2011), and that a stable reintegration to paid work would signal overcoming of those 'weaknesses'. Such an account would also lead to observing lower callback rates to currently-self-employed workers and no difference for previously-self-employed workers. However, given that all paid employment spells in the fictitious resumes are within large IT consulting companies and also exhibit obtainment of an MBA in well ranked business schools, employers should be less likely to perceive a self-employment spell as necessity entrepreneurship or a signal of *misfitness*.

As another limitation, it is possible that results from observational studies that support the wage premium hypothesis come from channels other than the one tested by audit studies. Indeed, people tend to use a variety of channels when searching for jobs while audit studies only test outcomes related to one of them.

Tapping into one's social network is an important channel through which workers find jobs (Montgomery, 1991). If one's social network gets developed better through self-employment than through paid employment, then there would be grounds to believe that there is a wage premium to self-employment, and that it is obtained through referrals. However, it should be noted that the evidence in that literature suggests that the value of referrals comes from the fact that they signal greater productivity on the part of the referred worker (Burks et al., 2015; Schmutte, 2015; Dustmann et al., 2016; Ekinci, 2016; Pallais and Sands, 2016; Hensvik and Skans, 2016). If referrals are effective only for workers that are productive, it is not warranted that more social ties will lead to more referrals for all those who have experienced self-employment, even if self-employment leads to more and better social ties. In fact, only those more productive self-employed workers are likely to be referred by their ties.

It is also possible that any wage premium coming from a self-employed person's social network could be linked to trust-based relationships where those who employ workers who were previously self-employed pay them a premium because of a greater weight put on the value of trust. This would suggest that trust might be a substitute for specific skills. Given that there is evidence that hiring through relatives may be linked to favoritism (Pinkston, 2012), and that family ties are often formed prior one's career, it would be of interest to further study whether a self-employment spell is more likely to lead to the creation of better social ties and whether this relationship mediates higher wages for those who transition from self-employment to paid employment. One can consider the use of registered data in order to further this analysis.

Other future directions to this research would be to consider different types of exits from self-employment. One way to achieve this wold be to introduce variations into the duration of self-employment. A self-employment spell that lasts for 5 or 10 years is likely to be perceived in a different way than one that lasts for 2 years. Consistent with an empirical regularity that the hazard of exit decreases with self-employment tenure (Evans and Leighton, 1989), one could argue that longer self-employment spells could imply greater success in business. As a result, longer spells could send a stronger signal regarding a worker's ability.

Table 3.1: Descriptives for the 165 job openings where 3 resumes where sent out.

Panel A: Employers and Openings

Area	$N = 165$	%	Contractual	$N = 165$	%
Boston	105	63.64	Yes	71	43.03
Philadelphia	60	36.36	No	94	56.97
Firm size†	$N = 162$	%	Staffing†	$N = 162$	%
Large	38	23.31	Yes	78	47.85
Medium	86	52.76	No	85	52.15
Small	39	23.93			

† Two firms could not be found.

Panel B: Callbacks

Callback	$N = 495$	%	Resumes called back	$N = 165$	%
Yes	69	13.94	0	124	75.15
No	426	86.06	1	21	12.73
			2	12	7.27
			3	8	4.85

Table 3.2: Callback rates by resume type.

	C-Type (%)	P-Type (%)	W-type (%)
All 165 openings	10.30 ^{a}	14.55	16.97 ^{a}
# of callbacks $\neq 3$ (%)	5.73 ^{a,b*}	10.19 ^{b*}	12.74 ^{a}
# of callbacks $= 1$ (%)	19.05 ^{a}	47.62	33.33 ^{a}

^{a} C-type callback rate significantly smaller than W-type at 10% level (two-sided z-test of proportions).

^{b} C-type callback rate significantly smaller than P-type at 10% level (two-sided z-test of proportions).

* Significant difference at 10% level on one-sided z-test of proportions.

Table 3.3: Coefficients and marginal effects for probit regressions predicting the likelihood of receiving a callback.

	(1)		(2)		(3)	
	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
Resume type						
C-Type	-0.3091*	-0.0667*	-0.3192*	-0.0669*	-0.3310*	-0.0685*
	(0.1754)	(0.0376)	(0.1783)	(0.0371)	(0.1811)	(0.0372)
P-Type	-0.1008	-0.0242	-0.1017	-0.0238	-0.1039	-0.0241
	(0.1668)	(0.0401)	(0.1692)	(0.0396)	(0.1718)	(0.0398)
Template						
Template 1			-0.0868	-0.0177	-0.0881	-0.0177
			(0.1793)	(0.0366)	(0.1821)	(0.0366)
Template 2			0.0906	0.0203	0.0994	0.0220
			(0.1718)	(0.0385)	(0.1746)	(0.0386)
Boston=1			-0.3436**	-0.0773**	-0.3953***	-0.0882**
			(0.1483)	(0.0347)	(0.1526)	(0.0356)
Contractor=1			-0.3683**	-0.0766**	-0.3099**	-0.0640**
			(0.1516)	(0.0304)	(0.1571)	(0.0315)
Firm size						
Medium					-0.3587**	-0.0806*
					(0.1747)	(0.0416)
Small					-0.2179	-0.0523
					(0.2043)	(0.0489)
Staffing=1					-0.3324**	-0.0696**
					(0.1509)	(0.0312)
Constant	-0.9554****		-0.6062***		-0.2118	
	(0.1156)		(0.1898)		(0.2408)	
Observations	495		495		489	
df	2		6		9	
p-value	0		0		0	
χ^2	3.2163		13.7018		23.4259	
Log-likelihood	-198.3034		-193.0607		-187.2920	

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

Appendix G

Sample Resume

[[NAME]]

Phone: [[PHONE NUMBER]] | Email: [[EMAIL]]
Address: [[ADDRESS]]

PROFESSIONAL SUMMARY

10+ years experience in project management. PMI Certification. Proven expertise in managing projects with outstanding planning, execution & monitoring skills to ensure schedule, cost, and quality goals. Strong analytical, problem solving, prioritization, decision making and conflict resolution skills. Highly familiar with various methods (Agile, SCRUM, Waterfall).

SKILLS AND EXPERTISE

PM SOFTWARE: MS Project, JIRA, Visio, SharePoint, HP Quality Center, Clear Quest.
OS: Windows, Unix, Linux, Sun
PROGRAMMING: C++, C#, Java, Visual Basic, VB.NET, SQL, PL/SQL, Python, HTML, ASP.NET, JavaScript

EXPERIENCE

[[COMPANY NAME]]/{{INITIALS+SOLUTIONS/CONSULTING}}
Boston, MA
Project Manager/{{Project Management Consultant}}
Apr 2015 - Present

- *{{Founder and owner, project management consultancy.}}*
- Lead multiple concurrent projects from initiation to closeout. Developed project plans, prepared Stakeholder's management strategies, defined communication channels.
- Involved in planning & baselines for Scope, Schedule, Cost, and Quality and approval process.
- Manage all phases of software development lifecycle (SDLC).
- Responsible for Requirement gathering and analysis with requirements team and signed off approval from client.
- Create project plans, schedules and work packages.
- Mentoring and monitoring team on project development & related tools.
- Ensuring proper project communication and coordination among team members, counterpart and all stakeholders for project progress and help in resolving any issues in smooth delivery.

[[COMPANY NAME]]
Boston, MA
Project Manager
Jun 2010 - Mar 2015

- Managed various medium and large scale projects.
- Managed various phases of projects, including project initiation, planning, execution, monitoring and control, and closing.
- Utilized Agile and Waterfall methodologies.
- Coordinated daily Scrum sessions.
- Had regular discussions with product owners for maintaining product backlog and sprint backlog.
- Responsible for sprint planning and leading sprint review and sprint retrospective meetings.

[[COMPANY NAME]]##INITIALS+SOLUTIONS/CONSULTING##
[[City]], [[State]]
Project Manager/##Project Management Consultant##
Jan 2008 – May 2010

- *##Owned and managed a project management consulting company##*
- Serve as a Project Manager for various clients.
- Utilize client's SDLC and advanced project management practices and standards, such as the PMBOK.
- Collaborate with the technical and the business teams and other stakeholders to manage assigned projects throughout all phases of the project.
- Cooperate with the project sponsor and the PMO.
- Create all project management documents, including project charter and project management plan.
- Track project progress, timeline and resources, building project schedules and integrated master schedules.
- Manage and assess project issues and risks through the Enterprise Project Management Solution (EPMS).
- Generate regular status reports for the leadership team, chair periodic status meetings with the project team, and participate in the daily Agile Scrum meeting for Trademark projects.
- Manage changes by evaluating, initiating and submitting project change requests to the Change Control Board as needed.

[[COMPANY NAME]]   [[City]], [[State]]
Project Controller   Oct 2006 – Dec 2007

- Tracked the profitability of each project, preparing variance analyses and trend reports for upper management to review.
- Tracked project changes and updated project plan as agreed with project teams.
- Maintained and reviewed project status reports and assisted with resource allocation planning and tracking.
- Prepare budgets and forecasts to project and track financial metrics such as revenue, expenses, profit margins, estimate-at-completion, and account receivables.

[[COMPANY NAME]]   [[City]], [[State]]
Senior Consultant   Jan 2005 – Sep 2006

- Responsible for analyzing, researching, implementing, testing, and deploying code changes and system patches to resolve critical bugs in the original system design in multiple time-critical situations.
- Optimized the performance of critical web application, developed and integrated several modules, defect reduction, and efficiency improvement using Java, Spring, Hibernate and REST Web Services.
- Developed User Interface using HTML, CSS, and JavaScript. Development in UNIX.

[[COMPANY NAME]]   [[City]], [[State]]
Software Engineer   Oct 2002 – Dec 2004

- Made extensive use of stored procedures using T-SQL.
- Used Visual Studio as development environment.
- Worked on application data tier using MS SQL Server.
- Participated in web user interface development using ASP.NET Webforms, JavaScript, CSS.
- Enhanced application logic tier using .NET framework.
- Used Subversion for software source code control.

––––––––––––––––––––––––––––– **EDUCATION** –––––––––––––––––––––––––––––

[[UNIVERSITY]]   2008
MBA

[[UNIVERSITY]]   2003
Bachelor of Science in Computer Science

––––––––––––––––––––––––––––– **CERTIFICATION** –––––––––––––––––––––––––––––

PROJECT MANAGEMENT INSTITUTE   2020
Project Management Professional

SCRUM ALLIANCE   2018
Certified Scrum Master

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