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JEL Classification: D81, D91, O15

Keywords: ambiguity aversion, decision-making under uncertainty, entrepreneurship

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Entrepreneurial Motive, Ambiguity Attitudes and Willingness to Compete *

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14th September 2021

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Abstract

Different entrepreneurial motivations can lead to different business outcomes. The origins of these difference in outcomes are not well understood so far. In this study, we use a lab-in-the-field experiment to analyze how two distinct types of entrepreneurs handle the uncertainty of competition. Our subject pool includes people with real entrepreneurial experience, who either started a business out of necessity or who took an optional business opportunity. We test a treatment that boosts feelings of competence and whether ambiguity aversion or a-insensitivity moderate the treatment effect on willingness to compete. Our results indicate that necessity entrepreneurs are more likely to adjust their decision-making following the treatment. A-insensitivity, as opposed to ambiguity aversion, plays an important role in differentiating their responses from that of opportunity entrepreneurs.

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1 Introduction

For most persons, entrepreneurship turns out to be financially sub-optimal (see Hall and Woodward, 2010). Many business owners enter the marketplace only when they feel they have no other choice than to become self-employed (necessity entrepreneurs). Still, some individuals, referred to as opportunity entrepreneurs, are willing to bet on this uncertain opportunity and believe in their competence to make a business thrive (van Praag and Cramer, 2001). Over the last decade, the distinction between necessity and opportunity entrepreneurs has been drawn in several studies on entrepreneurship (e.g. Koellinger and Thurik, 2012; Fossen and Büttner, 2013). While the evidence suggests that opportunity entrepreneurs' businesses are more profitable and growth-oriented (Calderon et al., 2017; Fairlie and Fossen, 2020; Conti and Roche, 2021), there is no clear consensus on which personal characteristics, if any, might explain these differences.

Researchers have in particular focused on comparing risk attitudes of the two groups, since, all else equal, people who are at least risk neutral will reap higher expected returns. Opportunity entrepreneurs are indeed the less risk averse of the two groups (Caliendo et al., 2009; Block et al., 2015), but the literature also demonstrates that expected utility with risk seeking is not a compelling model to explain entrepreneurial decision making (for an overview see Astebro et al., 2014).

Ambiguity attitudes, and their interaction with differential feelings of competence, offer an alternative framework for understanding the differences between necessity and opportunity entrepreneurs. Researchers on risk and ambiguity attitudes argue that people treat prospects with uncertain probabilities different than ones with known probabilities (see Knight, 1921, for a starting point). In situations with risk, probabilities are objectively known and one must decide whether to take the risk or not. In uncertain situations, the probabilities of various outcomes are not completely known. Decision making under

uncertainty requires an initial cognitive component, where an individual must conceptualize as best as they can the risk they *may* be facing.

For studies on entrepreneurship, looking at ambiguity instead of risk is compelling because probabilities of success in a business competition are difficult to approximate, a point that was made a century ago in Knight (1921). And feelings of competence are important because, according to the "competence hypothesis", experience with uncertainty affects beliefs about one's competence to manage uncertainty. In this paper, we use a laboratory experiment to study whether necessity and opportunity entrepreneurs have different ambiguity attitudes and if these attitudes mediate the relationship between feelings of competence and willingness to compete.

Understanding how different types of entrepreneurs handle the uncertainty of competition is crucial for designing effective policies to support market entry and business survival. Iyigun and Owen (1998) argue that a sufficient initial stock of both entrepreneurial and professional human capital are important to avoid a development trap. In countries where jobs are scarce relative to labor supply, necessity entrepreneurs will be a common motive for entrepreneurship. If this group makes business decisions in a systematically different way, it should change how we think about the stock of entrepreneurial human capital. Market competition can be harsh and business failure is common. If necessity entrepreneurs shy away from taking a chance, for example because of low feelings of competence, ambiguity aversion, or both, they might under-invest in their businesses. This, in turn, can further undermine already weak labor markets. Since it is especially important to understand how these relationships function in such markets, we conduct the experiment in two countries with weak labor markets, Albania and Kosovo.

Our study is one of the first to look at how ambiguity attitudes link willingness to compete with real life entrepreneurial motive, in a controlled lab setting. We focus on

how feelings of competence interact with ambiguity attitudes. We thus contribute to literature on the competence hypothesis. As we state above, the competence hypothesis proposes that experience with uncertainty affects beliefs about one's competence to manage uncertainty. It also proposes that familiarity or experience increases tolerance for uncertainty in domain-specific gambles (e.g Heath and Tversky, 1991; Kilka and Weber, 2001; de Lara Resende and Wu, 2010). For example, Cusolito et al. (2021) find that inexperienced and small firms in the Western Balkans profit from a business readiness program that emphasizes entrepreneurial skills. Besides actually improving skills, the authors hypothesize that their success could be due to a change in inexperienced subjects' attitudes toward "taking risks and seizing opportunities".[1] Importantly, Tyszka et al. (2011) argue that the level of successful entrepreneurship to which one is exposed (geographically) increases one's feelings of competence (also referred to as self-efficacy), as does one's own experience of mastery. Building on this idea, we design a treatment that explicitly tests for the effect of feeling competent dealing with uncertainty on the willingness to compete.

The ambiguity attitudes we study are ambiguity aversion and *ambiguity-generated likelihood-insensitivity*, abbreviated as a-insensitivity. Ambiguity aversion describes the fact that people prefer to bet on events for which they know the risk instead of on those for which they do not. Meanwhile, a-insensitivity captures the extent to which a subject overweighs rare uncertain events and underweighs frequent uncertain events. Dimmock et al. (2016) find a-insensitivity to be correlated with real life choices like stock market participation (whereas ambiguity aversion is not).

Both of these cannot be rationalized by expected utility. Since chances of business success cannot be objectively measured, the whole concept of risk attitudes seems less appropriate than those of uncertainty. Concepts like ambiguity seeking (see Gutierrez et al.,

[1] The study of Almås et al. (2020) on gender, training and risk taking finds similar results.

2020), loss aversion (Koudstaal et al., 2016), probability weighting, and non-Bayesian updating could explain why some people target business ownership, despite the fact that actual chances of success are very low. Different individual expected returns to entrepreneurship might originate from overestimating highly unlikely events.[2]

Throughout the study, competition is modeled as gamble with Knightian uncertainty and the uncertainty comes from the unknown choices of others. Specifically, payouts are based on how many people chose a gamble with competition, and the decision maker does not know how many others will prefer the competition option. To study the effect that feelings of competence have on willingness to choose competition, we randomize a message that either entails a positive or negative signal regarding the recipient's ability to judge the uncertain actions of others. The positive message tells participants that they have correctly judged how many others have chosen the competition option. The negative message tells them that they have judged incorrectly. We opt for manipulating an experience with uncertainty that is induced by other persons, instead of nature, because we think that this kind of uncertainty is central for entrepreneurs, especially for market entry decisions.

We assess the willingness to compete by presenting subjects an uncertain gamble where they must chose between an uncertain outcome and a sure thing. The payout in the uncertain outcome is determined by how many other persons choose to play the gamble. This idea is based on Camerer and Lovallo's (1999) market entry game, which is meant to mimic real-life market entry and includes uncertainty about the number of competitors. Drawing on Morgan et al. (2016), we refer to this kind of gamble as entailing "strategic" uncertainty. Strategic uncertainty refers to uncertainty that is generated due to the actions of other individuals. We also compare the impact of the treatment on

[2] It could also originate from people interpreting the high variance in business success in different ways (see Astebro et al., 2014).

the willingness to bet on an uncertain gamble whose uncertainty is caused by nature. Including it anchors our study and serves as a point of comparison with the previous literature. For emphasis, we label uncertainty from nature as "non-strategic".

To measure ambiguity attitudes, we use one of the standard Ellsberg paradox measures and the matching probabilities approach of (Dimmock et al., 2016). Matching probabilities provide an innovative measure that captures both ambiguity aversion as well as the less commonly used measure for a-insensitivity.

We thus provide three contributions to the literature. First, we provide evidence on how feelings of competence impacts willingness to compete for different entrepreneurs. Second, ambiguity attitudes may be important traits that distinguish the two kinds of entrepreneurs, and non-entrepreneurs. Our results point to the complex way in which ambiguity attitudes may lead to different decisions under competitive uncertainty. Finally, we use a non-student sample, where entrepreneurial motive is endogenous. This is important for external validity as students and real-life business owners have very different life experiences that can inform their decision-making under uncertainty.

We find that the two kinds of entrepreneurs only slightly differ in their ambiguity preferences. We find no notable differences in ambiguity aversion between entrepreneurs and the general population, or between necessity and opportunity entrepreneurs. However, the latter are significantly more a-insensitive. Meanwhile, necessity entrepreneurs are more pessimistic for low probability events. This might explain why they only become self-employed if they feel the necessity. It may also cause them to shy away from high-risk investments that could be profitable for their business.

For the market entry game, we find treatment effects mostly among necessity entrepreneurs. In fact, we reject that there is an *overall* treatment effect on willingness to compete. This is in part because opportunity entrepreneurs show only weak shifts in un-

certainty tolerance as a result of the treatment. In comparison, the competence-boosting message motivates higher willingness to compete among necessity entrepreneurs who are more a-insensitive. The results suggest that necessity entrepreneurs have less stable preferences for competition. Unlike opportunity entrepreneurs, ambiguity attitudes play an important role in how necessity entrepreneurs respond to messages about their competence. Thus, while those with different entrepreneurial motives have similar ambiguity attitudes, they differ substantially in how their attitudes moderate their belief updating.

Our paper proceeds as follows: we first discuss our contribution to the related literature (Section 1.1) in more detail. Then, Section 2 describes the experimental design and procedures. Hypotheses appear in Section 3, which also includes a description of the sample. Section 4 presents the results and Section 5 provides robustness checks. Finally, Section 6 concludes.

1.1 Related literature

Standard risk preferences typically fail to explain the general prevalence of entrepreneurship. The evidence is mixed as to whether entrepreneurs, overall, are more risk seeking than non-entrepreneurs (see Astebro et al., 2014). Macko and Tyszka (2009) use a student sample where some have real-world entrepreneurial experience.[3] They do not find differences in general risk taking between entrepreneur and non-entrepreneur students. But they find that entrepreneur students are more risk seeking in a task that is framed as a business decision. Meanwhile, Caliendo et al. (2009) find that opportunity entrepreneurs are more risk seeking than the general population. The same is not true for necessity entrepreneurs.

In one of the few studies on entrepreneurship and uncertainty, Holm et al. (2013) find

[3] The entrepreneurial motive of subjects in Macko and Tyszka (2009) is unknown, though one could argue that students with entrepreneurial experience are driven by opportunity rather than necessity.

no differences in ambiguity aversion between entrepreneurs and non-entrepreneurs. They do not measure a-insensitivity, though, and their measure of ambiguity aversion does not control for differences in risk aversion. Moreover, as Wu and Knott (2006) suggests, entrepreneurship may be more driven by willingness to accept uncertainty regarding one's own entrepreneurial decision making than general tolerance towards uncertainty. This indicates that entrepreneur uncertainty preferences may be domain-dependent. Our paper builds on this by evaluating a-insensitivity, controlling for risk aversion and analysing both domain-dependent and domain-independent sources of uncertainty.

Differences in the willingness to enter uncertain competitions could explain gaps in business outcomes between necessity and opportunity entrepreneurs. For example, Calderon et al. (2017) find that the profitability gap cannot be explained by different levels of education and only partially by better management practices. However, Fossen and Büttner (2013) find that returns to education are lower for necessity than opportunity entrepreneurs. Updating willingness to engage in uncertain competition might also depend on initial beliefs. Opportunity entrepreneurs, by definition, will be at the extreme positive end of the belief distribution for business success (see Tyszka et al., 2011). This could mean that they react less to each additional experience than necessity entrepreneurs, who are more agnostic about business success and, therefore, more easily swayed by feedback.

The closest studies to ours are Tyszka et al. (2011) and Holm et al. (2013). Tyszka et al. (2011) analyze how male, Polish necessity and opportunity entrepreneurs differ from each other and from non-entrepreneurs in terms of motivation, self-efficacy, and risk attitudes. They find that, whereas necessity entrepreneurs are motivated by the same work-life related factors as wage earners and have a similar level of self-efficacy, opportunity entrepreneurs are motivated by work independence and have a higher level of self-efficacy. None of the groups are more willing to take risks. However, their measurement of risk

attitude does not clearly distinguish between Knigthian risk and uncertainty and their classification of necessity and opportunity entrepreneurs is less clear-cut.

Holm et al. (2013) run a large scale experiment on entrepreneurs' tolerance for strategic uncertainty, using a random sample of CEOs and a control group of non-CEOs in China. They find that CEOs are more willing to enter multilateral competition (similar to what we refer to as "strategic uncertainty") and are more tolerant to uncertainty originating from trusting others. They do not differ from non-entrepreneurs with respect to their tolerance of non-strategic uncertainty. Our study is different from the latter ones in so far that (i) we test if there are systematic differences between necessity and opportunity entrepreneurs in the willingness to compete; (ii) we analyze if feeling competent about handling uncertainty has an effect; and (iii) we use a clearer elicitation method for ambiguity aversion and look at a-insensitivity.

Also similar to us, Gutierrez et al. (2020) study the feelings of competence and ambiguity attitudes in entrepreneurship. They use a student sample and specifically study market entry. They find that entry is caused by an overly optimistic assessment of own competence, but only if outcomes depend on ability and not on luck.

In general, our study contributes to understanding the personal characteristics that explain entrepreneurship (see Astebro et al., 2014). Especially in weak labor markets, it is crucial to design policies that support business prosperity and survival. Since weak labor markets are, broadly speaking, characterized by two different kinds of entrepreneurs, appropriate design is more challenging. Additionally, providing estimates of ambiguity attitudes in middle income countries is novel in the literature on ambiguity attitudes. Thus, we also contribute to understanding the generalizability of findings on ambiguity aversion from conventional (student) samples.

2 Experimental Design

In our experiment, we measure the impact of boosting subjects' feelings of competence on their willingness to enter a competition. We specifically look at feelings of competence for gauging the competitiveness of a market entry game. Importantly, our subjects are people with real life entrepreneurial experience. We examine how treatment effects differ between necessity and opportunity entrepreneurs and how effects are moderated by ambiguity attitudes. We use a laboratory experiment for our study because it allows us to get comprehensive measures of ambiguity attitudes. In this section, we explain the treatment and outcome variables in detail.

2.1 Treatment: Boosting feelings of competence

The treatment boosts feelings of competence using a message. The message targets one's perceived ability to anticipate the number of competitors in a market entry game. Half of subjects are randomized into receiving a positive message, which aims to boost their feelings of competence for gauging the competition. The other half receives a negative message about this ability.

The exact messages are shown below. They include information about the subject's guess of how many competitors were in their group for the pre-treatment market entry game (excluding themselves).[4] Below we describe how we use stratified random assignment to ensure that receiving the positive message is not endogenous with the guess. This also ensures the half-and-half sample split for each message.

Positive Message, to boost feelings of competence:

"You guessed that you would have # competitors. You had #. Only half of the people in

[4] The information they have is the total group size and the fact that they can have any number from 0-4 competitors in their group. They know that groups would be randomly assigned.

the room today had the same number of competitors as their estimate. Well done! You got mastery in the estimation task."

Negative Message, does not boost competence:

"You guessed that you would have # competitors. You had ##. Half of the people in the room today had guesses that matched reality."

Where # is a number between 0 and 4 that equals the guess of the participant and ## is a different number between 0 and 4.

Receiving the positive message was random. To explain how we randomized the message, we need to explain how groups are assigned for the pre-treatment task. The groups were composed of people from the pilot session.[5] Subjects from the pilot were drawn with replacement to form groups of four. Each 4-person group contained 0-4 competitors. "Competitors" are those pilot subjects who chose the competition option in more than half of their tasks. We then created subsets of these groups, or strata: half of the groups in each strata contained a specific number of competitors, x where $x \in \{1, 2, 3, 4\}$. The other half of the groups in each strata had a random number of competitors $\neq x$. Each participant who guessed they would have x competitors was randomly assigned a group from the relevant strata. This ensured that each subject had a 50% random chance of being correct. The randomization of a participant to either message is, thus, nested within the group assignment.

The subjects that receive the negative, non-boosting message serve as the control. We do not include a pure control (i.e. no message) for two reasons. First, to maintain

[5] We use pilot subjects instead of concurrent subjects because it was not apparent *ex ante* how many subjects would attend each session, but we needed to hold group size constant across sessions. It was also not clear what the balance of subject traits would be in each session.

strict comparability between groups and, thus, identification of the effect of the positive aspect of the message, we want both groups to receive a message with similar language. The message contains two elements: an indication that the subject is correct (incorrect) in their assessment of the strategic environment and an indication of what the strategic environment actually is. For this study, our focus is on the subject learning that they are correct (versus incorrect). We, thus, kept constant the information about the strategic environment, i.e. how many competitors the subject had in their group. Second, providing a message to the comparison group with the number of competitors but lacking clarity on whether or not they are correct could also increase the sense of uncertainty for that group in a way that would be difficult for the experimenter to properly assess. Thus, to ensure comparability of groups, we chose to exclude a pure control.[6]

2.2 Main outcome variable: willingness to enter competition

The main outcome of the study is willingness to enter competition. We model competition as an uncertain gamble and use a multiple price list (MPL) to elicit the certainty equivalent (CE) for that gamble. The CE is our measure of willingness to enter competition. We model competition this way because the payout from entering a competitive market is *ex ante* uncertain. At its simplest, it depends on how many people choose to compete and the value of the prize. We create a gamble that mimics this simple scenario. To obtain the certainty equivalent for the gamble, we ask subjects to make a series of choices between the gamble and a sure thing. Their choice indicates how they want their earnings determined for that task. The payout from the gamble depends on the number of other people entering the gamble (i.e. competitors), which is unknown. The sure thing changes from choice to choice. Using the collection of choices from each subject, we obtain their

[6] Ideally, one would include one or more "no message" treatments to disentangle the potential impact of receiving message at all, but this was not possible due to sample size limitations.

certainty equivalent for this uncertain gamble. Since the uncertainty in the gamble comes from the choices that other people make, we refer to it as "strategic uncertainty", and the associated certainty equivalent as CE_{Strat}.

The tasks with strategic uncertainty are based on the market entry game of Camerer and Lovallo (1999). Market entry games imitate key features of a competitive market, and the main choice for subjects is to chose if they want to enter the competition. The individual payoff from the game is dependent on the choices of others. In our experiment, the payoff from entering the market is based on how many subjects chose to gamble, in other words, how many decide to enter the competition. Entering the competition entitles entrants to a share of a fixed pot of points. The available points are divided evenly among the entrants. There is no excess entry in our competition option; subjects who chose to enter the competition earn a strictly positive amount.

2.3 Experimental Procedures

We conducted our experiment in 21 sessions between April and May 2019. Participants came from six municipalities in Albania and four municipalities in Kosovo. These are shown in Figure 1.[7]

In total, 224 persons participated, 121 in Albania and 103 in Kosovo. The experiment in this paper was embedded in a longer session that included several rounds. Sessions typically lasted 90 to 120 minutes. We calibrated average expected earnings from the session to be equal to the average daily wage for each country: actual average earnings were 19.30€ in Albania and 29.60€ in Kosovo. Sessions were run in Albanian and subjects completed all tasks on tablets that we programmed using oTree (Chen et al., 2016).

[7] The municipalities are Durrës, Elbasan, Fier, Korçë, Skhodër, and Tirana in Albania and Gjilan, Peja, Pristhina, and Prizren in Kosovo. Two municipalities had only one session each. Others included either two or three, depending on our success recruiting participants. We hosted sessions in the urban centers of the respective municipalities.

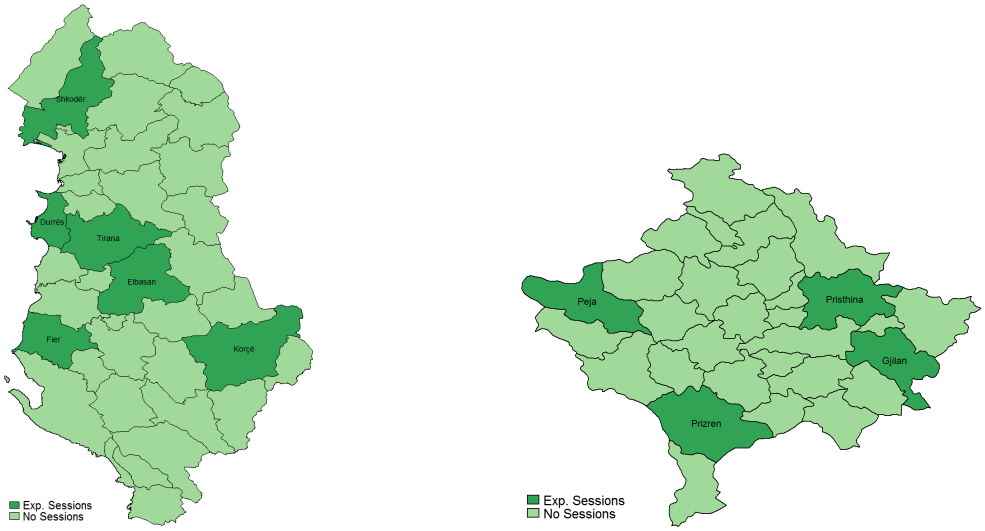

Figure 1: Cities in Albania (left) and Kosovo (right) where experiments were conducted

All participants completed the rounds of the experiment in the same order. A moderator read all instructions out loud and demonstrated examples. This was because the experiment and associated tasks were novel to the subjects. Also, older, less computer literate or less educated subjects struggled to complete the tasks without a moderator. Subjects were paid in cash and for a randomly selected decision they made in each round. This was to eliminate confusion across rounds and ensure salience of each round. Subjects did not learn the outcome for any individual choice, and only learned their final earnings at the end of the session. The currency in the experiment was points; each 100 points was worth 100 Lek or 1€. In addition to experimental earnings, all participants received a participation fee of 1000 Lek (ca. 8€) in Albania and 15€ in Kosovo.[8]

Our experiment consisted of three rounds. Round one occurred before the treatment and consisted of tasks that let us measure ambiguity aversion and a-insensitivity. Next, in round two, we administered the pre-treatment task, followed by the treatment (which was

[8] The moderator handed out the payments at the end of the session in private. Participants remained seated until their name was called. The moderator showed them the amount they earned and the participant signed a receipt that they had received the money. Each participant left the room immediately after receiving their payment.

thus between rounds two and three). Lastly, in round three, we observe willingness to enter a competition and tolerance for non-strategic uncertainty. The experiment concluded with a short survey to collect demographic data.

2.4 Round 1: Measuring Ambiguity Aversion and A-Insensitivity

We elicited ambiguity attitudes using two sets of tasks: the classical Ellsberg urn experiment, to get a measure of ambiguity aversion, and an extension of the Ellsberg experiment, called "matching probabilities", to calculate a-insensitivity (Dimmock et al., 2016). We describe the tasks and associated measures below.

Ambiguity aversion

First, to get the classic measure of ambiguity aversion, we replicate the original two-color Ellsberg experiment. In each of two tasks, participants choose whether they want their payout to be determined by a risky lottery or an ambiguous lottery. The lotteries are represented as urns. The risky urn contains 50 blue and 50 orange balls, so the chance of winning is known. The ambiguous urn also contains blue and orange balls but in unknown composition. The chance of winning is unknown (see Figure 2).[9] A ball is randomly drawn from the chosen urn to determine participants' payout from that task.

For the first task, the subject earns 100 points if a blue ball is drawn and nothing if an orange ball is drawn. Choosing the risky urn in the first task indicates the the subject believes the ambiguous urn to have fewer blue balls. For the second task, orange is the "winning color" worth 100 points and blue is worth 0 points. A rational person who chose the risky urn in the first task should chose the ambiguous urn in the second task.[10] Based on these two choices, participants can be grouped in three categories: those

[9] As in Dimmock et al. (2016), we do not use the original colors, black and red, to avoid confusion for color-blind people.

[10] First described by Ellsberg (1961) and confirmed by many studies afterwards, a substantial share of

who always choose the risky urn are defined as *ambiguity averse*, those who always choose the ambiguous urn are *ambiguity seeking*, and those who change urn for different winning colors are considered to be *ambiguity neutral*.

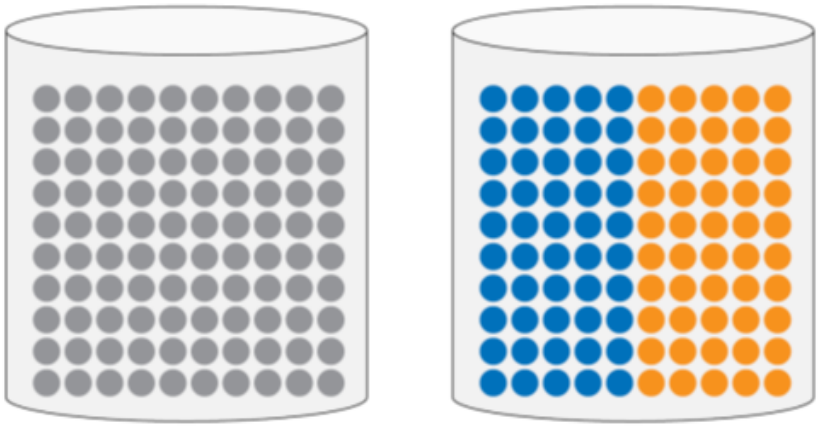

Figure 2: Ambiguous and Risky Urns with Two Colors

A-insensitivity

We study not only ambiguity aversion, but also a-insensitivity. A-insensitivity measures the extent to which individuals perceive the probability of an uncertain event as 50%. Even when one does not know the precise risk of an event, it is possible to distinguish between events that are very likely and events that are very unlikely. Given only imprecise information on probability distributions, some individuals will anchor both small and large probabilities to the mid-point of 50%. In doing so, they essentially reduce the probability space to three points: the sure thing, the mid point and zero. A-insensitivity measures the severity of this behavior. It can be considered a special form of probability weighting induced by ambiguity.[11]

For the a-insensitivity measure, subjects complete three sets of nine tasks. In each

individuals choose the risky bucket in both choices, irrespective of the winning color. This preference violates not just expected utility theory as formulated by von Neumann and Morgenstern, but also classical models of subjective probabilities à la Savage (1954).

[11] Matching probabilities are rooted in the idea that decision weights depend on the source of uncertainty. See the source method of Abdellaoui et al. (2011) and the axioms of Chew and Sagi (2008) for background.

task, subjects choose whether they wanted their payout determined by drawing a ball from a risky urn or from an ambiguous urn. We describe the urns below. From this data, we generate "matching probabilities", which are then plugged into a formula to produce the a-insensitivity measure.

A matching probability is the probability of winning a draw from the risky urn that makes the respondent indifferent between drawing from the risky urn and drawing from an ambiguous urn (Dimmock et al., 2016). We identify a matching probability for each set of three choices. We do this by successively changing the composition of balls in the risky urn so that the it becomes less and less attractive the more often it is chosen (and vice versa the less often it is chosen). The contents of the ambiguous urn are fixed. The series of choices the subject makes is determined by a multiple price list (MPL), using the bisection method. We approximate the matching probability with the average number of winning balls in the risky bucket of the final (third) choice and the number of winning balls in a hypothetical fourth choice. The hypothetical fourth choice is the one that would follow from an extension of the MPL and bisecting one more time.[12] We estimate matching probabilities for the objective winning probabilities of 10%, 50%, and 90%.

In the first of the three sets, both ambiguous and risky urns have orange and blue balls, like in the Ellsberg tasks. In the second choice set, the risky urn has blue and a variety of non-blue balls (instead of orange, see Figure 3). The participant wins 100 points if the drawn ball is blue and nothing otherwise. In a third set, we use the same ambiguous and risky buckets as in set two. However, this time participants win 100 points if the drawn ball is *not* blue. Instructions and pictures accompanying the tasks are found in Appendix D.2.

[12] This means that there are eight possible values the matching probability can take, ranging between 6% and 94% for the 50-50 bucket for example.

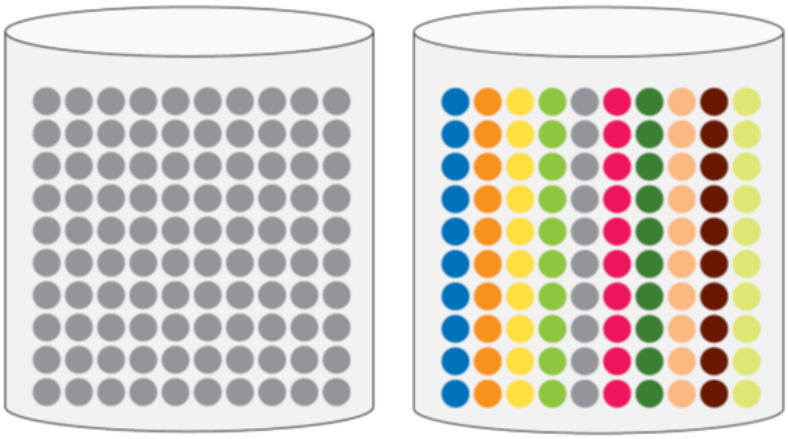

Figure 3: Ambiguous and Risky Bucket with Ten Colors

Finally, we produce the measure of a-insensitivity. It is a function of the matching probabilities. We first subtract each of the three the matching probabilities, $m(p)$, from their objective, ambiguity-neutral probability, p: $AA_p = p - m(p)$.[13]

$$AA_{0.1} = 0.1 - m(0.1) \tag{1}$$

$$AA_{0.5} = 0.5 - m(0.5) \tag{2}$$

$$AA_{0.9} = 0.9 - m(0.9) \tag{3}$$

where $m(0.1)$, $m(0.5)$, and $m(0.9)$ are the respective matching probabilities. We then fit a linear function between the three p's and $m(p)$'s, and extract the slope coefficients, as follows:

$$m(p) = c + sp \tag{4}$$

$$a\text{-}insensitivity = 1 - s \tag{5}$$

A-insensitivity, thus, relates to the steepness of the curve and captures the insensitivity

[13] These differences are informative in and of themselves, as *local* ambiguity aversion parameters. Dimmock et al. (2016) calls them "event-specific indexes". For all indices, a positive value means ambiguity aversion whereas a negative value means ambiguity-seeking.

to the (uncertain) likelihood of events that are far from 50-50 chances.[14][15] Summarized, round one contained tasks to assess ambiguity attitudes in our sample.

2.5 Round 2: Pre-treatment task

The pre-treatment task follows round one. The point of the pre-treatment task is to give subjects a relevant experience for guessing the number of competitors in their group. The pre-treatment task is a series of MPLs. They are very similar to the MPL used after the treatment, but the payoffs are different. In total, subjects complete four pre-treatment MPLs. Prior to completing the four MPLs, subjects guess how many competitors will be in their assigned group. The participants guess the number of competitors, get assigned to a group and then complete the MPLs. After that, each participant receives one of the aforementioned treatment messages.

2.6 Round 3: Eliciting willingness to enter competition

After the treatment, subjects enter round three of the experiment. Round three is when they complete the previously described MPL to measure willingness to enter competition, CE_{Strat}. In order to provide context for the treatment effects on CE_{Strat}, we included two additional MPLs in this round. One lets us measure willingness to bet on a non-contextual, ambiguous urn (identical to the urn with the gray balls in Figure 2). The subject makes a series of choices between this urn and a sure thing, where the sure thing varies from choice

[14] A-insensitivity can also be calculated as the difference between $AA_{0.9}$ and $AA_{0.1}$. An individual is a-insensitive if $AA_{0.9}$ is positive (i.e. the matching probability for 0.9 is smaller than 0.9) and if $AA_{0.1}$ is negative at the same time (i.e. the matching probability for 0.1 is larger than 0.1). A positive difference implies a-insensitivity and a negative difference a-oversensitivity. In our experiment, the two methods to derive a-insensitivity lead to similar results. We use the derivation of equation 6 throughout our analysis, as this approach has a clearer decision-theoretic foundation (Dimmock et al., 2016).

[15] We can also use behavior in these task to generate an index for *global* ambiguity aversion, b-index, which we report for completeness. $b = 1 - s - 2c$. This is an alternative to the Ellsberg measure. If the b-index is larger (smaller) than zero, the individual is considered to be ambiguity-averse (-seeking). As we show in Appendix B.1, the b-index is highly correlated with ambiguity aversion measured with the Ellsberg urn. We use the Ellsberg measure throughout the analysis, as using b-index generates multicollinearity in our regressions.

to choice. From these choices we can calculate the certainty equivalent for non-strategic uncertainty, $CE_{Non-Strat}$. It is "non-strategic" because the uncertainty is not due to the choices of other people. With the third MPL, we directly extract the treatment effect on the relative preference between strategic uncertainty and non-strategic uncertainty. Tasks from this MPL require the subject to make choices between the standard ambiguous urn and the gamble with strategic uncertainty (i.e. the competition option). We vary the value of the fixed pot of points available for people who chose to enter the competition. We construct the associated CE measure, *Strat.vs.Non-strat*, as the size of the pot that makes the participant indifferent between betting on strategic and non-strategic uncertainty.

Subjects complete these three MPLs in a random order. Each MPL entails four choices, which are determined for each participant independently, using the bisection method. In the bisection method, all subjects begin with a choice from the middle of the MPL. For those that chose the sure thing, the next task has a sure thing with a smaller value. For those that chose the uncertain gamble, the next task includes a sure thing with a higher value. This is repeated until the subject has made four choices. Instructions are found in Appendix D.4. Following round three, the subjects answer the debriefing survey and the session concludes.

3 Hypotheses

We first formulate a hypothesis about if and how willingness to compete is affected by the treatment. We include a secondary hypothesis about non-strategic uncertainty. We then state our hypotheses about ambiguity aversion and a-insensitivity among different types of entrepreneurs and non-entrepreneurs. Finally, we discuss heterogeneous treatment effects by ambiguity attitudes.

In our experiment, willingness to compete depends on the participant's joint belief

about the number of competitors in her group and about her ability to assess this number correctly. Our treatment exogenously induces a positive or negative experience in terms of successfully assessing the number of competitors. This sends a signal of competence, or self-efficacy. Several studies confirm the so-called competence hypothesis - that ambiguity aversion goes down with domain-specific experience (see Heath and Tversky, 1991; Kilka and Weber, 2001; de Lara Resende and Wu, 2010). The positive message may also reduce the perceived uncertainty about the number of competitors, more so than the negative message, because it dispels all uncertainty about the number of competitors in a previous task. Thus, it is more informative about the state space than the negative message.[16]

A direct test of the strength of this effect is to look at the direct choice between strategic and non-strategic uncertainty. Here, the competence hypothesis would predict that the difference in tolerance for strategic versus non-strategic uncertainty will be larger for the positive message group. Even if the positive message increases tolerance for both types of uncertainty, the impact on willingness to compete will be higher because this domain is directly addressed in the treatment. Thus, the total profit that makes participants indifferent between gambling on strategic and non-strategic uncertainty should be lower in the positive than in the negative message group.

Finally, subjects may generalize the increased/decreased feelings of competence from their message. A positive message could make subjects more sanguine about uncertain gambles, regardless of context. A negative message may do the opposite. Therefore, subjects in the positive message group might feel more confident in judging the non-strategic uncertainty of our experiment, compared to peers in the negative message group.

This discussion is summarized in the following two hypotheses.

[16] Additionally, several studies find asymmetric belief updating in ego-relevant tasks, where positive feedback is overweighted and negative feedback ignored (see Charness and Dave, 2017; Eil and Rao, 2011). This again would mean that the positive experience matters more than the negative one.

Hypothesis 1 (increased willingness to compete): The positive message group demonstrates higher willingness to compete than the negative message group, as measured by a higher average CE_{Strat} and a lower average *Strat.vs.Non-strat.*

Hypothesis 1a (increased tolerance for non-strategic uncertainty): The positive message group demonstrates higher tolerance for non-strategic uncertainty than the negative message group, as measured by the average $CE_{Non-Strat}$.

Before discussing heterogeneous treatment effects by entrepreneurial motive and ambiguity attitudes, we first discuss possible differences in baseline ambiguity attitudes for different kinds of entrepreneurs. Opportunity entrepreneurs, by definition, are more willing to open a business than necessity entrepreneurs (as well as the remaining part of the population who does not open a business at all). As outlined in the introduction, this willingness might originate from being more willing to gamble on uncertainty in general and/or by a stronger overweighting of small probabilities of success. The latter would be captured by a-insensitivity and the first is partially captured by ambiguity seeking. In contrast, necessity entrepreneurs think of opening a business as a last resort, which means they only want to take this uncertain option if no other option remains. Furthermore, they do not seem to differ from the general population in terms of risk seeking (Caliendo et al., 2009). Thus, we expect that:

Hypothesis 2 (heterogeneity of ambiguity attitudes): Opportunity entrepreneurs are more a-insensitive and ambiguity seeking than necessity entrepreneurs.

This leads us to the main hypotheses with respect to entrepreneurial motivation,

baseline ambiguity attitudes, and their interactions. Different kinds of entrepreneurs may respond differently to the treatment if their entrepreneurial motive indicates different priors. Tyszka et al. (2011) find opportunity entrepreneurs have a higher level of self-efficacy than necessity entrepreneurs. If opportunity entrepreneurs' ambiguity aversion is additionally already low, as predicted by Hypothesis 2, then those things together should give us a different treatment effect. They thus react less to positive reinforcement than necessity entrepreneurs. Provided that necessity entrepreneurs began their life as business owners with less optimistic priors about their own competence, they will be more receptive to the positive message.

Hypothesis 3 (treatment effects by entrepreneurial motive): The distances between outcomes in the negative and positive message groups for necessity entrepreneurs are larger than the ones for opportunity entrepreneurs.

3.1 The Sample

The sample consists of 222 subjects: 73 entrepreneurs, 47% of whom are entrepreneurs of necessity, and 149 non-entrepreneurs. We define *entrepreneurs* as all participants who report that they have successfully set up a business at least once in their life. We distinguish between entrepreneurs out of necessity and those out of opportunity by asking for the most important reason they opened their last business.[17] We classify all other persons as non-entrepreneurs. Table 1 shows descriptive statistics for each group in the sample.[18]

[17] The reasons provided for necessity are: 1. could not find (a suitable) job; 2. afraid of losing job at that time; 3. needed to earn more money; and 4. other. For opportunity: 1. ideal form of work; 2. opportunity to be in charge; 3. opportunity to earn more money; and 4. other. Our classification approach is similar to the one of the Global Entrepreneurship Monitor (see Reynolds et al., 2005).

[18] We exclude from the analysis two participants who participated in the experiment but did not complete the whole experimental session.

A detailed explanation of the variables is in Appendix C.

Participants were recruited in two different ways. Initially, we asked respondents from a 2018 country-wide survey if they would be interested in participating in an interactive session approximately one year after the survey, and for which they would be compensated.[19] In total, we invited 2,301 persons in Albania and 2,323 persons in Kosovo using the survey. Out of these, 70 persons in Albania and 44 persons in Kosovo attended our sessions. Additionally, we asked each survey participant to refer a friend or another family member who they thought would be willing to participate in an interactive session. Thus, the remaining experimental sample consists of these family members and friends.

Table 1: Descriptives of the Sample and Groups of Interest

	Entrepreneurs			Remaining
	All	Nec.	Opp.	
Male	0.55	0.68	0.44	0.53
Age	35.97	36.82	35.23	33.45
Education	6.07	5.53	6.54	5.13
Dummy Working	0.68	0.68	0.69	0.42
Agreeableness	2.78	2.88	2.69	2.89
Extraversion	−0.14	−0.38	0.08	−0.87
Conscientiousness	3.70	3.56	3.82	3.48
Neuroticism	−1.71	−1.24	−2.13	−1.24
Openness	1.85	2.00	1.72	1.54
Observations	73	34	39	149

Groups: *All* are all entrepreneurs, *Nec.* and *Opp.* only include entrepreneurs out of necessity and opportunity, respectively, and *Remaining* includes the general population who are not entrepreneurs. Variables: *Male* is an indicator for being male or female; *Age* is the age of the participant in years; *Education* is a categorical variable from 1-9, where 1 is "no degree/no education" and 9 is "doctoral degree or equivalent;" *Dummy Working* is an indicator for having worked in the previous week; *Agreeableness*, *Extraversion*, *Conscientiousness*, *Neuroticism*, and *Openness* form the BIG Five personality traits.

[19] The survey was implemented by the European Bank for Reconstruction and Development (EBRD) to explore "recent trends in economic migration from the Western Balkans to Western Europe" and to analyze the link between migration and entrepreneurship. The invited individuals consisted of a stratified random sample from a larger, representative sample of households in each of Albania and Kosovo. Stratification was by migration history: thus, potential migrants, those with a recent migration history and those with a family member abroad were deliberately over-sampled.

Entrepreneurs out of opportunity have a significantly higher level of education than entrepreneurs of necessity and non-entrepreneurs. Furthermore, they are more likely to be female and tend to be less neurotic than necessity entrepreneurs. There are no other significant differences between the two groups. Entrepreneurs in general have a higher level of education and are more likely to work than non-entrepreneurs.[20]

We also demonstrate that treatment groups are balanced. Table 2 shows descriptive statistics across positive and negative message groups, for ambiguity attitudes and other demographic covariates.

Table 2: Descriptive Statistics across Treatments

	Full Sample	Control	Treatment	Difference
Male	0.54	0.45	0.62	-0.16^{**}
Age	34.28	33.89	34.66	-0.77
Education	5.44	5.26	5.61	-0.34
Dummy Working	0.51	0.45	0.56	-0.11
Ambiguity Aversion	2.05	2.04	2.07	-0.04
A-Insensitivity	0.69	0.71	0.67	0.04
CE Risk	105.34	104.70	105.97	-1.27
Alpha	0.70	0.67	0.72	-0.05
Remain	0.67	0.68	0.66	0.02
Ent.	0.33	0.32	0.34	-0.02
Nec.	0.15	0.13	0.18	-0.05
Opp.	0.18	0.19	0.16	0.03
Observations	222	110	112	222

Variables: *Male* is an indicator for being male or female; *Age* is the age of the participant in years; *Education* is a categorical variable from 1-9, where 1 is "no degree/no education" and 9 is "doctoral degree or equivalent;" *Dummy Working* is an indicator for having worked in the previous week; *Ambiguity Aversion and A-Insensitivity* are ambiguity attitudes derived in Section 2.4; *CE Risk and Alpha* are risk attitudes; *Ent.* are all entrepreneurs, *Nec.* and *Opp.* only include entrepreneurs out of necessity and opportunity, respectively. *Remain* includes the general population who are not entrepreneurs.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[20] See Appendix B.2 on how personality traits are related to ambiguity attitudes. Entrepreneurs in our sample have a higher level of extraversion and a lower level of neuroticism; these differences are mostly driven by opportunity entrepreneurs. In general, opportunity entrepreneurs show the lowest levels of neuroticism.

Almost all variables are well balanced between the groups. This is especially important for ambiguity attitudes and entrepreneurial motive since these are the heterogeneities we aim to study. There is an imbalance in the sex composition; the share of males in the positive message group is significantly higher than in the negative message group. However, an F-test on the joint significance reveals that the variables as a group are not related to treatment assignment (p-value: 0.181).

4 Results

4.1 Ambiguity Aversion and A-Insensitivity

First, we discuss the prevalence of ambiguity aversion and a-insensitivity in the whole sample and in our entrepreneurial sub-groups. Table 3 summarizes the ambiguity aversion parameters, estimated with the methods introduced in Section 2.4. Correlations between the parameters are in Appendix Table B.1.[21] Naturally, a-insensitivity is correlated to the local ambiguity parameters for low and high probabilities because they can be used to construct this measure. However, there is only a weak correlation between ambiguity aversion and a-insensitivity. This is consistent with previous studies (see Dimmock et al., 2016) and supports the notion that ambiguity aversion and a-insensitivity are two distinct components of ambiguity attitudes: b-index is the "motivational" component, and a-insensitivity is the "cognitive" component of ambiguity attitudes.

Our sample is ambiguity neutral, on average. This is indicated by the mean of *b-index* being almost equal to zero. Looking closer at the simple Ellsberg ambiguity measure (Panel B in Table 3), we find that 25% of our subjects can be categorized as ambiguity neutral, while 40% are ambiguity averse, and 35% are ambiguity seeking. This is in

[21] In the Appendix, it can also be seen that the matching probabilities approach is highly correlated to measuring ambiguity aversion with the Ellsberg problem, which supports the validity of matching probabilities.

contrast to similar studies done in other countries, where the average study participant is ambiguity averse (for an overview see Trautmann and van de Kuilen, 2015).[22] This lower rate of ambiguity aversion is not exclusively driven by our sample composition. While we explicitly focus on entrepreneurs, who we expect to be partially more ambiguity tolerant, the share of ambiguity averse subjects in the non-entrepreneur sample is still below 50%. And while the share of ambiguity averse persons is lower within the group of necessity entrepreneurs, this is not significantly different from the non-entrepreneurs.

Table 3: Summary Ambiguity Parameters

Panel A:

	Ambiguity Averse	Neutral	Ambiguity Seeking
Ambiguity Aversion	40%	25%	35%

Panel B:

	Mean	Median	Std. Dev.	Min.	Max.
b-index	0.03	0.04	0.51	-0.88	0.88
A-Insensitivity	0.69	0.84	0.41	-0.23	1.98
$AA_{0.1}$	-0.26	-0.11	0.31	-0.79	0.09
$AA_{0.5}$	0.00	0.06	0.30	-0.44	0.44
$AA_{0.9}$	0.30	0.34	0.33	-0.09	0.79

Panel A: *Ambiguity Aversion* is derived from the Ellsberg problem with 1=ambiguity seeking, 2=ambiguity neutral, and 3=ambiguity averse.

Panel B: All variables are derived from the matching probabilities approach. The *b-index* measures global ambiguity aversion and *A-Insensitivity* ambiguity-induced probability weighting. $AA_{0.1}, AA_{0.5}$, *and* $AA_{0.9}$ are the differences between objective and matching probabilities-the local ambiguity attitudes.

Contrary to the case of ambiguity aversion, the average person in our sample is more a-insensitive than other populations (e.g the Dutch in Dimmock et al., 2016). This is driven almost equally by the stronger overweighting of small probabilities and the stronger

[22] Other studies were conducted in either industrialized countries or in developing economies with small-scale farmers. For example, Dimmock et al. (2016) find that almost 70% of their representative Dutch sample is ambiguity averse, 20% are ambiguity neutral, and only 10% are ambiguity seeking. In the US-American population around 52% are ambiguity averse while 10% are ambiguity neutral and 38% ambiguity seeking (see Dimmock et al., 2015). Both studies use the same methods as we do.

underweighting of high probabilities. Given the results from the previous literature, these findings are already interesting in themselves.

In Table 4, we do not find vast differences between necessity and opportunity entrepreneurs with regard to ambiguity aversion. If anything, necessity entrepreneurs are less ambiguity averse for moderate probabilities than opportunity entrepreneurs ($AA_{0.5}$, onesided t-test, p=0.087). Compared to non-entrepreneurs, necessity entrepreneurs seem to be more ambiguity averse for small probabilities ($AA_{0.1}$), whereas opportunity entrepreneurs have the tendency to actually be more ambiguity averse for moderate probabilities ($AA_{0.5}$).

Table 4: t-tests - Differences in Ambiguity Parameters

	Difference Opportunity-Necessity	Difference Necessity-Remaining	Difference Opportunity-Remaining
Ambiguity Aversion	0.23	−0.06	0.17
A-Insensitivity	0.12*	−0.10*	0.02
$AA_{0.1}$	−0.06	0.09*	0.03
$AA_{0.5}$	0.09*	−0.01	0.08*
$AA_{0.9}$	0.04	0.01	0.04
Observations	73	183	188

The pairings in each column show the differences between necessity entrepreneurs, opportunity entrepreneurs, and non-entrepreneurs. Positive differences indicate that value of the parameter is larger for the first group in each pair. Variables: *Ambiguity Aversion* is derived from the Ellsberg problem with 1=ambiguity seeking, 2=ambiguity neutral, and 3=ambiguity averse. *A-Insensitivity* is derived from the matching probabilities approach. $AA_{0.1}$, $AA_{0.5}$, *and* $AA_{0.9}$ are the differences between objective and matching probabilities-the local ambiguity attitudes. Significance pertains to onesided t-tests. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Sharpened q-values are insignificant for all comparisons.

However, regarding a-insensitivity, we find necessity entrepreneurs to be significantly less a-insensitive than opportunity entrepreneurs. Thus, those who perceive themselves to have outside options (in contrast to the perception of necessity entrepreneurs) are those who discriminate the least between different probabilities This could be an important factor in their decision to take a high-risk occupation voluntarily, as entrepreneurship

has a small probability of success and business failure is common. There is a significant difference between necessity entrepreneurs and the remaining sample as well, meaning necessity entrepreneurs are the least a-insensitive. Maybe, necessity entrepreneurs are not only pessimistic toward entrepreneurship but also toward wage labor prospects. In general, the two groups of entrepreneurs seem to differ from the general population in opposite directions. Given these results, we can only partially confirm hypothesis 2 and, thus, have to reject it.

In summary, our Albanian and Kosovar participants are, on average, slightly less ambiguity averse but more a-insensitive than already studied populations. The overweighting of small probabilities might imply, in general, a greater willingness to open a business already. In Appendix B.2, we analyze covariates of ambiguity aversion parameters, and discuss if the significant covariates in our sample differ from those in former studies. For ambiguity aversion, our results are in line with studies concluding that, although theoretically appealing, there might not be a relationship between greater risk tolerance and entrepreneurship (see for example Astebro et al., 2014, for an overview). Still, we find that necessity entrepreneurs are less a-insensitive than entrepreneurs out of opportunity. It seems that the perception of the size of uncertainty is the basis on which the type of entrepreneurs differ rather than the level of ambiguity aversion.

4.2 Treatment Effects

In this section, we analyze the impact of the treatment on willingness to compete (i.e. tolerance for strategic uncertainty). We also look at the treatment effect on tolerance for non-strategic uncertainty, to help us better understand the main treatment effects. Results are presented for the two groups of entrepreneurs and a comparison group of non-entrepreneurs. Lastly, we look at heterogeneity by ambiguity attitudes (ambiguity

aversion and a-insensitivity) for each group of interest.

Figures 4 shows treatment effects across the entire sample, by comparing means. The height of the bars is the average CE for each task. The vertical lines show the 95% confidence intervals. We find that people who receive the positive message show higher $CE_{Non-Strat}$ than those who received the negative message (one-sided t-test: p=0.068, sharpened q=0.42). Hence, we fail to reject hypothesis 1a. In contrast, we fail to find a statistically significant difference between the groups for CE_{Strat} (one-sided t-test: p=0.29, sharpened q=0.49) and reject hypothesis 1.[23]

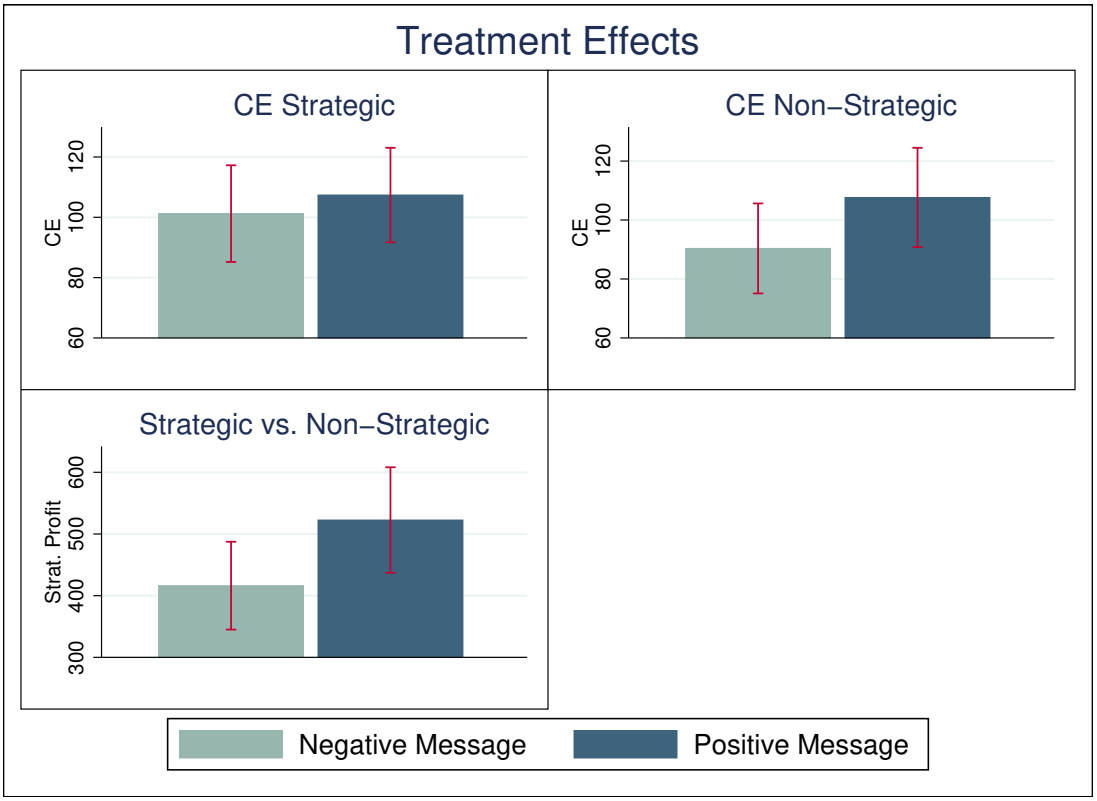

Figure 4: Average CE's for Each Choice, by Message Group

We subsequently find that transitivity holds: in the direct comparison between non-strategic and strategic uncertainty, the positive message group generates a stronger preference for non-strategic uncertainty than the negative message group (one-sided t-test:

[23] Fisher's exact tests for the share of CE's above 150 (which would be the "ambiguity-neutral," expected value of a 50-50 bucket) show the same pattern (one-sided p-values: 0.047 and 0.347).

p=0.031, sharpened q=0.415).[24]

4.2.1 Heterogeneous Treatment Effects: Entrepreneurial Motive

Partitioning by different entrepreneurial motives reveals important heterogeneous effects behind the weak results in the pooled sample. Table 5 presents the unconditional differences between positive and negative message groups for each sub-sample of interest. We report significance from one-sided tests, as per our hypotheses. Table 6 shows OLS regression results, where we condition on observable characteristics. This is important since entrepreneurial motive is endogenous. To avoid confusion, we report significance for the two-sided tests, which are standard for regression tables.[25]

Table 5: t-tests - Differences between Treatments for Groups of Interest

	Entrepreneurs			Remaining
	All	Nec.	Opp.	
CE Strategic Uncertainty	11.90	22.78	−1.33	3.18
CE Non-Strategic Uncertainty	33.95**	53.26**	20.89	9.27
Strategic vs. Non-Strategic	104.20	375.67***	−109.35	106.13*
Observations	73	34	39	149

Groups: *All* are all entrepreneurs, *Nec.*, and *Opp.* include entrepreneurs out of necessity and opportunity respectively. *Remain* includes the general population who are not entrepreneurs. Positive differences indicate that value of the parameter is larger for the positive message group in comparison to the negative message group. Variables: *CE Strategic Uncertainty* is the outcome for the certainty equivalent of strategic uncertainty; *CE Non-Strategic Uncertainty* is the outcome for the certainty equivalent of non-strategic uncertainty; and *Strategic vs. Non-Strategic* is the outcome for the total profit in the strategic uncertainty option against non-strategic uncertainty. Significance pertains to onesided t-tests. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Sharpened q-values are insignificant for all comparisons. The sharpened q-value is significant only for the Strategic vs. Non-strategic treatment test, among Necessity entrepreneurs, where q=0.037.

The main result is that the positive message treatment has a significant effect on $CE_{Non-Strat}$ among entrepreneurs, but not non-entrepreneurs. It has no significant effect

[24] The experiment was powered to detect moderate effect sizes (0.33) (means test, alpha of 0.05, one-sided, and a power of 0.8).

[25] In our main regressions, we also report sharpened q-values (excluding controls) following Anderson (2008), which control for multiple hypothesis testing.

on the average willingness to enter competition, CE_{Strat}, within any group. This is contrary to our main hypothesis, that the competition-related message would boost subjects' feelings of competence for gauging the competition. It is, however, consistent with the secondary hypothesis 1a: the treatment significantly increases entrepreneurs' $CE_{Non-Strat}$ by 33.95 points, which is an increase in tolerance for non-strategic uncertainty of about 0.5 standard deviations.

Necessity entrepreneurs drive this result. The mean $CE_{Non-Strat}$ for necessity entrepreneurs in the positive message group is more than double that of those in the negative message group (Table 5). This is significant at the 5% level in both the t-test and the regression, controlling for covariates. The difference between treatment groups is even larger for *Strat.vs.Non-strat*, where the positive coefficient indicates a preference for non-strategic uncertainty over strategic uncertainty (competition). Thus, for necessity entrepreneurs, the positive message generates a greater tolerance for non-strategic uncertainty, regardless of the outside option.

Opportunity entrepreneurs appear to have an opposite reaction to the positive message, but only for *Strat.vs.Non-strat*. The higher tolerance for willingness to compete appears only when the outside option is uncertain (i.e. comparing gambles with strategic versus non-strategic uncertainty). It is not present for CE_{Strat}, where the outside option is the sure thing. This is seen in Table 6 column 3, where the negative coefficient on the interaction "Pos. Mess. x Opp. Ent." indicates a preference for strategic uncertainty over non-strategic uncertainty. Thus, opportunity entrepreneur behavior is context specific. Those in the positive message group have stronger preference for competition compared to non-strategic uncertainty, but they do not prefer competition to the sure thing.

Taken together, these results may indicate that the two types of entrepreneurs find different elements of the message salient and useful for updating their beliefs.

Table 6: OLS: CE for Strategic and Non-strategic Uncertainty, Interaction Message Group and Ent. Motive

	CE Strat.	CE Non-Strat.	Strat. vs Non-Strat.
Positive Message	–2.074	7.904	117.081*
	(13.034)	(13.167)	(67.585)
	[0.874]	[0.549]	[0.085]
	{0.958}	{0.722}	{0.319}
Pos. Mess. x Nec. Ent.	26.553	51.065**	316.871**
	(35.849)	(25.669)	(131.797)
	[0.460]	[0.048]	[0.017]
	{0.663}	{0.248}	{0.136}
Pos. Mess. x Opp. Ent.	–10.374	1.452	–281.000**
	(24.164)	(27.282)	(144.115)
	[0.668]	[0.958]	[0.053]
	{0.907}	{0.993}	{0.248}
Nec. Entrepreneur	0.964	–30.497	–131.601
	(29.874)	(19.217)	(81.786)
	[0.974]	[0.114]	[0.109]
	{0.993}	{0.358}	{0.358}
Opp. Entrepreneur	–9.772	–5.812	201.247**
	(17.972)	(15.347)	(96.711)
	[0.587]	[0.705]	[0.039]
	{0.76}	{0.917}	{0.222}
Observations	222	222	222

Pos. Message is a dummy variable indicating whether the subject received the positive message. Non-entrepreneurs serve as the comparison group and are omitted. Each estimation includes controls for ambiguity aversion, a-insensitivity, age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses, p-values in square brackets (* p<0.10, ** p<0.05, *** p<0.01) and sharpened q-values in curly brackets († means at least q<0.10).

The positive message appears to make necessity entrepreneurs tolerant of a more general form of uncertainty, rather than giving them a feeling of competence about their ability to correctly assess a competitive situation. Opportunity entrepreneurs, on the other hand, appear to feel more competent in the competitive situation after receiving the positive message, but only when they cannot pick the safe option. Overall, we cannot reject hypothesis 3 that the distances between outcomes in the negative and positive

message groups are larger for necessity than for opportunity entrepreneurs.

There is only one significant treatment effect for the general population, in the direct choice between non-strategic and strategic uncertainty. For all other choices, the message about of gauging the competition does not seem to induce non-entrepreneurs to make any kind of substantial behavioral change.

4.2.2 Heterogeneous Treatment Effects: Ambiguity Attitudes

As reported in 4.1, we only find differences for a-insensitivity not ambiguity aversion with respect to entrepreneurial motive. Still, this difference in a-insensitivity might explain the differences in treatment effects. Thus, we next partition treatment effects by entrepreneurial motive and ambiguity attitudes. We find that ambiguity attitudes do not serve as simple moderators but the relationship is more complex. There is further support for the idea that necessity and opportunity entrepreneurs have different patterns for how they update beliefs. Specifically, ambiguity attitudes play a role in determining how different groups respond to the treatment.

Regression output is shown in Table 7. The dependent variable in each regression is the outcome for each of the three MPLs (CE_{Strat}, $CE_{Non-Strat}$ and *Strat.vs.Non-strat*). Independent variables include: a dummy for whether the subject is in the positive message treatment, our measures of ambiguity aversion and a-insensitivity, and the interactions of the treatment dummy with each ambiguity attitude. Columns 1, 4, and 7 pertain to necessity entrepreneurs while columns 2, 5, and 8 pertain to opportunity entrepreneurs, and columns 3, 6, and 9 pertain to non-entrepreneurs.[26]

Accounting for ambiguity attitudes uncovers behavior among necessity entrepreneurs that is in line with the main hypothesis. For necessity entrepreneurs with higher baseline levels of ambiguity aversion and a-insensitivity, the positive message does in fact gen-

[26] Average results for the pooled sample are in Appendix Table A.1.

erate higher levels of CE_{Strat}. Thus, the positive message promoted more tolerance for strategic uncertainty among those necessity entrepreneurs who started off with higher aversion to ambiguity. More rational necessity entrepreneurs, with no ambiguity aversion or a-insensitivity, demonstrate a negative difference in CE_{Strat} between the positive and negative message groups. This means that, for the more rational people, the news of being correct, possibly about a large number of competitors, prompts them to avoid competition.

These effects are not present among opportunity entrepreneurs. In general, treatment effects (or lack thereof) among opportunity entrepreneurs and non-entrepreneurs are not contingent on ambiguity attitudes. The coefficients for the a-insensitive non-entrepreneurs have the same signs as in the necessity entrepreneur partition, but they are not significant.

The interpretation of the results for CE_{Strat} are re-enforced in Table 8. This specification includes the behavior from the pre-treatment task, and so is a within subject assessment of the treatment on the willingness to enter competition.[27] In effect, each subject serves as their own "no message" control. Results are very strong. Whereas the previous decision is strongly correlated with the post-treatment decision for opportunity and non-entrepreneurs, for necessity entrepreneurs there is not even a marginally significant correlation between the two choices. In contrast, necessity entrepreneurs' CE_{Strat} is heavily influenced by the treatment and the interaction with a-insensitivity.

In summary, we find that a positive message about one's ability to gauge the competition translates to a greater tolerance for non-strategic uncertainty among entrepreneurs, compared to a negative message. The result is strongest among necessity entrepreneurs. This is not driven by different degrees of ambiguity aversion because necessity entrepreneurs and others do not differ substantially in this respect.

[27] We do not have pre-treatment measures of $CE_{Non-Strat}$ or *Strat.vs.Non-strat.* to carry out an analogous exercise for these choices.

Table 7: OLS: Ambiguity Parameters and CE for Strategic and Non-strategic Uncertainty, by Message Group and Ent. Motive

	CE Strat.			CE Non-Strat.			Strat. vs Non-Strat.		
	(1) Nec.	(2) Opp.	(3) Rem.	(4) Nec.	(5) Opp.	(6) Rem.	(7) Nec.	(8) Opp.	(9) Rem.
Positive Message	–540.850***†	17.397	–60.079	–171.140	90.304	20.796	–443.609	–183.270	197.893
	(152.079)	(58.743)	(39.697)	(124.912)	(66.285)	(44.609)	(507.168)	(511.718)	(231.157)
	[0.002]	[0.769]	[0.132]	[0.184]	[0.184]	[0.642]	[0.391]	[0.723]	[0.393]
	{0.039}	{0.926}	{0.368}	{0.432}	{0.432}	{0.869}	{0.663}	{0.926}	{0.663}
Ambiguity Aversion	–35.291	13.389	1.572	–36.076*	32.669	6.481	–68.568	–172.882	–9.426
	(23.412)	(20.922)	(11.861)	(20.145)	(19.456)	(10.609)	(89.226)	(159.833)	(54.045)
	[0.145]	[0.527]	[0.895]	[0.086]	[0.104]	[0.542]	[0.450]	[0.289]	[0.862]
	{0.399}	{0.718}	{0.958}	{0.319}	{0.358}	{0.722}	{0.663}	{0.548}	{0.958}
A-Insensitivity	–562.591***†	–47.309*	12.181	–138.216	–51.401**	40.607**	–96.631	–202.445	216.710**
	(146.212)	(23.806)	(21.250)	(125.768)	(19.772)	(18.552)	(505.667)	(126.732)	(91.859)
	[0.001]	[0.057]	[0.567]	[0.283]	[0.015]	[0.030]	[0.850]	[0.121]	[0.020]
	{0.027}	{0.248}	{0.740}	{0.548}	{0.133}	{0.183}	{0.958}	{0.360}	{0.146}
Pos. Mess. X Amb. Averse	60.023*	–29.232	20.796	52.903*	–29.538	3.375	181.662	–57.250	–3.291
	(34.257)	(24.810)	(15.467)	(26.502)	(30.891)	(15.720)	(122.243)	(184.957)	(80.482)
	[0.093]	[0.249]	[0.181]	[0.058]	[0.347]	[0.830]	[0.151]	[0.759]	[0.967]
	{0.333}	{0.534}	{0.432}	{0.248}	{0.613}	{0.951}	{0.404}	{0.926}	{0.993}
Pos. Mess. X A-Insen.	590.792***	32.231	20.730	158.138	–9.408	–26.416	726.195	35.010	–106.559
	(159.171)	(42.502)	(30.825)	(131.686)	(43.987)	(28.939)	(528.072)	(249.221)	(158.437)
	[0.001]	[0.455]	[0.502]	[0.242]	[0.832]	[0.363]	[0.182]	[0.889]	[0.502]
	{0.333}	{0.663}	{0.682}	{0.534}	{0.951}	{0.634}	{0.432}	{0.958}	{0.682}
Observations	34	39	149	34	39	149	34	39	149

Pos. Message is a dummy variable indicating whether the subject received the positive message. *Ambiguity Aversion and A-Insensitivity* are measures for ambiguity aversion and a-insensitivity derived in Section 2.4. Each estimation includes controls for age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses, p-values in square brackets (* p<0.10, ** p<0.05, *** p<0.01) and sharpened q-values in curly brackets († means at least q<0.10).

And while necessity entrepreneurs are less a-insensitive, we fail to reject that this lower a-insensitivity is driving differences in the treatment effect on $CE_{Non-strat}$ (see Appendix Table A.1).

Table 8: OLS: Ambiguity Parameters and CE for Strategic Uncertainty, Controlling for Previous Choice

	Nec.	Opp.	Rem.
Positive Message	–473.491***†	–13.632	–74.365*
	(149.366)	(54.207)	(38.837)
	[0.004]	[0.803]	[0.058]
	{0.063}	{0.939}	{0.248}
Ambiguity Aversion	–32.624	–7.131	–3.372
	(23.268)	(18.111)	(11.205)
	[0.175]	[0.697]	[0.764]
	{0.432}	{0.917}	{0.926}
A-Insensitivity	–464.428**	–47.164**	–4.933
	(168.636)	(20.524)	(17.663)
	[0.012]	[0.030]	[0.780]
	{0.120}	{0.183}	{0.926}
Pos. Mess. X Amb. Averse	55.010	–9.537	17.843
	(33.592)	(25.053)	(14.748)
	[0.116]	[0.706]	[0.228]
	{0.358}	{0.917}	{0.527}
Pos. Mess. X A-Insen.	500.396***†	31.086	44.934
	(167.075)	(37.033)	(29.260)
	[0.007]	[0.409]	[0.127]
	{0.078}	{0.663}	{0.366}
CE Strat, previous Choice	0.096	0.188***†	0.158***†
	(0.092)	(0.061)	(0.038)
	[0.305]	[0.005]	[0.000]
	{0.553}	{0.066}	{0.001}
Observations	34	39	149

Pos. Message is a dummy variable indicating whether the subject received the positive message. Each estimation includes controls for age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses. Robust S.E. in parentheses, p-values in square brackets (* p<0.10, ** p<0.05, *** p<0.01) and sharpened q-values in curly brackets († means at least q<0.10).

In contrast, the positive message has no impact on the average willingness to enter a competition with strategic uncertainty (CE_{Strat}), overall. Thus, the impact on CE_{Strat} is indeed mediated by uncertainty preferences. This effect is again driven by necessity entrepreneurs.

We interpret the heterogeneous effects by entrepreneurial motive and by ambiguity preferences as indicative of differential updating patterns. For example, the competence effect may dominate for people who started out pessimistic, and an information effect may dominate for the non-pessimistic people. Uncertainty tolerant subjects may have taken the cue that there were a lot of competitors, so shied away from strategic uncertainty. Results are consistent with the following behavior. Opportunity entrepreneurs evaluate the information about competition they get from the positive message in combination with the information about their competence. Since many people have guessed that they will have three or four competitors, for most people the information about the likely competition they face is not favorable. It seems that opportunity entrepreneurs perceive the first guess as informative of what they can expect in the last round. Thus, when choosing between strategic uncertainty and a certain outside option, they tend to pick the sure thing early. When the outside option is instead uncertain, they pick the "more sure" option (i.e. strategic uncertainty) as predicted by the competence hypothesis. It is perceived "more sure" because we told them that they are competent to gauge competition correctly. For some participants, the positive message is only a positive experience with competence, which in our setting, does not automatically translate into a positive experience with gambling on uncertainty. Opportunity entrepreneurs are able to distinguish these facts and adjust their behavior more to the situation taking all information into account. Since neither the information about competitors nor about competence is highly informative for non-strategic uncertainty, we do not see a strong reaction in the

choice with the certain outside option.

In contrast, necessity entrepreneurs respond more to the increased feeling of competence and tend to play down the information about competition contained in the messages. We can see this in how the response to strategic uncertainty is mediated by a-insensitivity. People who are more a-insensitive are bad at thinking clearly about probability. They might shy away from strategic uncertainty because it is costly to truly consider the multiple possible states of the world. Thus, the large negative coefficient on a-insensitivity in Table 7. Then, when necessity entrepreneurs get told that they are indeed competent to solve this problem, those who are more a-insensitive become more tolerant of strategic uncertainty than those who are told they cannot solve the problem (positive coefficient on the interaction term) because necessity entrepreneurs do not take the actual information about competition too much into account. Since the information on competence seems to be much more salient for them, we also see the much stronger effect on non-strategic uncertainty. The messages do not contain any information that the non-strategic choice problem is as unfavorable as the strategic choice with competitors, thus, there is only a large boost in competence about gauging uncertainty. This creates a strong preference for non-strategic uncertainty in all choices for necessity entrepreneurs.

Overall, we conclude that the positive message treatment delivers more feelings of competence than information for necessity entrepreneurs, and this feeling of competence is transferred across domains.[28] In general their preferences for uncertainty are less stable and are shaped by the interaction between baseline ambiguity attitudes and their feeling of competence. Thus, necessity entrepreneurs seem to behave "non-Bayesian" in the sense that they react to uninformative signals and tend toward asymmetric belief updating. Opportunity entrepreneurs' belief updating seem to be more in line with Bayesian theory

[28] See also Appendix A.3 for an ancillary result.

as they update much more conservatively and take more informative signals into account.

The origins of these different behaviors are beyond the scope of this paper. Yet, in this study, we find supportive evidence why it might be important to distinguish between different entrepreneurial motives. There are differences with respect to preferences for uncertainty, baseline beliefs about uncertainty, and belief updating. These differences are, however, much more nuanced than what could be captured by simply measuring the willingness to bet on risk or uncertainty, which has been done in many previous studies.

5 Robustness

Controlling for the Order of Choices. There is reason to believe that the order in which the uncertainty choice sets are played could matter. Fox and Tversky (1995) are among the first who noticed that ambiguity aversion is much more pronounced if the ambiguous prospect can be compared to a less ambiguous one and is not considered in isolation. Their "comparative ignorance hypothesis" also explains why people prefer to bet on ambiguous prospects in areas they feel competent about than on ambiguous prospects in areas where they do not have knowledge or experience. Thus, the order in which the choices are considered might change the results. In Table A.3 in the Appendix, we control for each of the three choices sets whether it is elicited first, second, or third. As can be seen, the effects and the coefficients for the treatment stay almost the same. This also holds for our groups of interest individually (results upon request).[29]

Controlling for Certainty about the Guess. Participants are not only asked to guess the number of competitors in their group but also how certain they are about this guess on scale from one to ten. Extreme certainty or uncertainty could "interfere" with our

[29] For both robustness checks presented here, results do not change if we include the controls from Section 4.2.2.

treatment in various ways. Those who are extremely certain could not react to the positive message at all or are shattered if they learn they guessed incorrectly. Those who are extremely uncertain could experience the biggest boost. Thus, it is not clear *ex ante* whether certainty and the positive message are complements or substitutes, especially since our positive message eventually has is strongest effects on non-strategic uncertainty. Therefore, in Appendix Table A.4, the certainty variable is included as control to estimate the treatment effect. As before, our treatment effect is robust to this inclusion (also in the individual groups of interest).

6 Conclusion

Entrepreneurs are generally thought of as enthusiastic self-starters who choose to take a chance on a business idea. But in weak labor markets, many individuals become entrepreneurs because they feel they have no option other than to become self-employed. These so-called necessity entrepreneurs have been found to have less profitable and less growth-oriented businesses than opportunity entrepreneurs. But, so far, the root of these differences is not well understood. In this paper, we test whether necessity and opportunity entrepreneurs differ in their willingness to enter uncertain competition. Importantly, we test how this might depend on feelings of competence and non-standard ambiguity attitudes. We use a laboratory experiment for our study. Our sample consists of real entrepreneurs and non-entrepreneurs living in countries with weak labor markets, Albania and Kosovo.

Researchers have explored risk preferences as a defining difference between necessity and opportunity entrepreneurs. But the observed prevalence of entrepreneurship is hard to reconcile with conventional levels of risk taking measured in standard models. Moreover, the entrepreneurial context is better characterized by uncertainty (where probabilities of

success are unknown), rather than risk. Perceptions of uncertainty could then help explain different market entry rates and business outcomes between the two kind of entrepreneurs. Economists still have a limited understanding of how entrepreneurs perceive uncertainty and much less how this may interact with entrepreneurial motive.

Using the classic two-urn Ellsberg problem and the matching probabilities method by Dimmock et al. (2016), we find that although there are only small differences in ambiguity aversion, necessity entrepreneurs are significantly less a-insensitive than opportunity entrepreneurs. The first group seems to have a different perception of uncertainty - specifically, they are more pessimistic regarding low and highly uncertain events.

Building on the "competence hypothesis," we randomize a treatment that aims to boost perceived competence of handling uncertain competition. Competition is modelled as a market entry gamble where uncertainty of winning is caused by the actions of other players. Subjects play an initial market entry game where they guess the number of competitors they would face. Within each possible guess, half of subjects receive the guessed number of competitors and half do not. They are then told whether or not they faced the same number of competitors as they guessed. After this treatment, we elicit willingness to compete in another market entry game. For a point of comparison, we also elicit willingness to bet on a gamble where uncertainty is caused by nature.

Necessity entrepreneurs respond strongest to the competence boosting treatment, and the response is moderated by ambiguity attitudes. Those with higher baseline a-insensitivity display greater willingness to compete after receiving a positive signal about their competence. Furthermore, treated necessity entrepreneurs display a large increase in the willingness to bet on gambles where uncertainty comes from nature. Opportunity entrepreneurs (and non-entrepreneurs) do not demonstrate these treatment effects. Our results are robust to order effects and participants' pre-treatment certainty about their

ability to judge the decision of others. The results indicate that for people with different entrepreneurial motives, ambiguity attitudes moderate belief updating differently. Overall, we find rather complex differences that are hard to assess with standard measures for risk or uncertainty aversion. These differences merit further attention by researchers.

This study contributes to the literature on ambiguity attitudes and the behavioral influences on entrepreneurship. Understanding these influences and building entrepreneurial capital is crucial for the region we study. As Cusolito et al. (2021, p.7) note, "Increasing innovation is a key regional priority in the Balkans region[...]." Our results suggest that it may be important to distinguish between different types of entrepreneurs when designing programs to encourage business ownership. For example, training for entrepreneurs, where decision making skills are strengthened and decisions under uncertainty are encouraged, might be particularly useful for those who have the feeling they have started a business because there was no other choice.

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Appendix

A Additional Treatment Effects

A.1 Overall Treatment Effects, Pooled Sample

Figure A.1 shows the distribution of decisions in each of the three post-treatment choice sets, for the pooled sample. The left and right panels show the CE outcomes, with the light bar representing the negative message group and the darker bar representing the positive message. The figure shows that the distributions of outcomes in the positive message group are skewed to the right in comparison to those in the negative message group in all three tasks. This means that subjects in the positive message group are slightly more comfortable than those in the negative message group with both strategic and non-strategic uncertainty. The shift is most notable in the task that directly compares strategic and non-strategic uncertainty: the number of participants in the left most bin is almost 25% lower in the positive message group, which then has twice as many people in the right most bin.

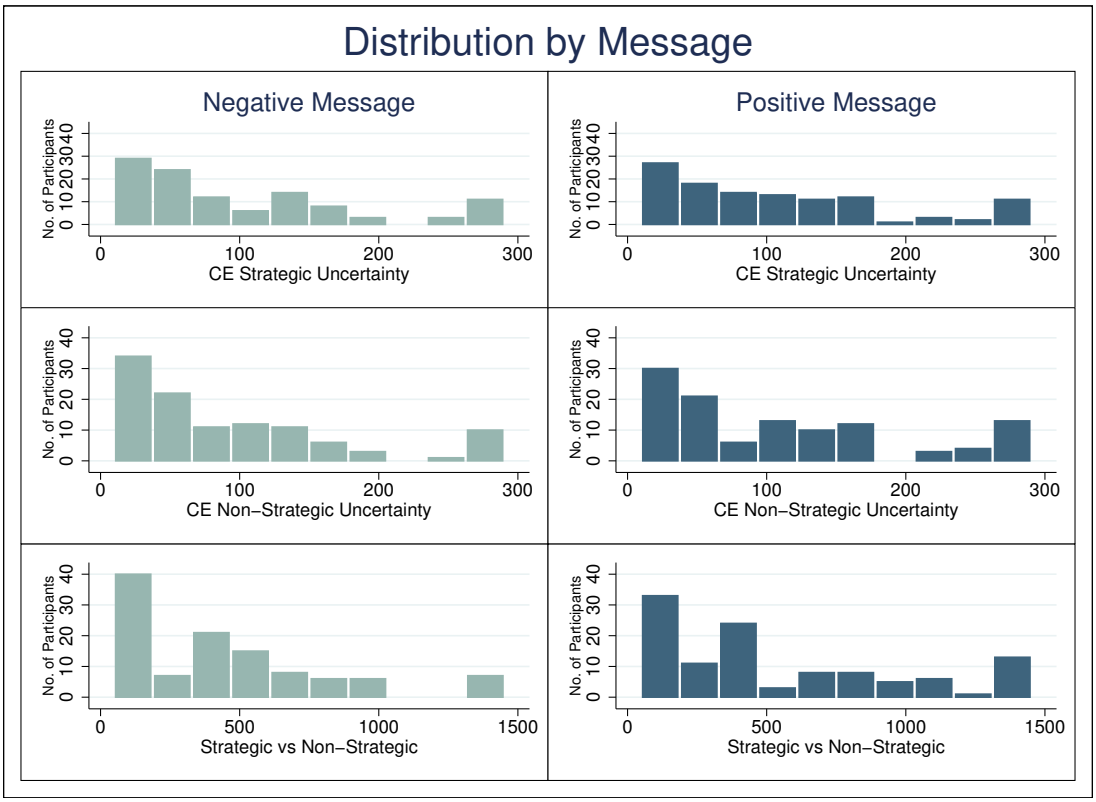


Figure A.1: Distribution of Outcomes for Each Choice, by Message Group

A.2 Heterogeneity by Ambiguity Attitudes, Pooled Sample

Table A.1 presents OLS regressions on how treatment and ambiguity attitudes affect the willingness to compete for the pooled sample (while the main text focuses on heterogeneous effects by entrepreneurial motive). As in the main results, in the pooled sample, there is evidence that ambiguity attitudes matter for how people complete the tasks. The effects are mostly not strong enough to confirm significance. However, in the direct choice between non-strategic and strategic uncertainty (columns 5 and 6), higher a-insensitivity is significantly related to preferring the non-strategic uncertainty. Also, the interaction between a-insensitivity and the positive message clearly drives people more towards strategic uncertainty, though this is not significant in the pooled sample. Further, results in column (2) indicate that the treatment in combination with higher ambiguity aversion and a-insensitivity makes some people in our sample (mostly necessity entrepreneurs) more willing to bet on strategic uncertainty.

Table A.1: OLS: Ambiguity Parameters and CE's for Strategic and Non-strategic Uncertainty, by Message Group

	CE Strat.		CE Non-Strat.		Strat. vs Non-Strat.	
	(1)	(2)	(3)	(4)	(5)	(6)
Positive Message	1.038	–47.502	15.793	23.721	109.913**	208.806
	(10.660)	(32.189)	(10.042)	(33.832)	(54.308)	(181.472)
Ambiguity Aversion	6.284	–3.797	4.460	1.782	–32.734	–26.724
	(6.008)	(9.395)	(5.953)	(8.306)	(32.390)	(44.610)
A-Insensitivity	5.144	–1.911	6.102	20.302	113.734*	171.949**
	(12.230)	(17.515)	(12.169)	(16.747)	(62.599)	(76.330)
Pos. Mess. X Amb. Averse		19.289		5.472		–10.325
		(12.161)		(11.867)		(64.844)
Pos. Mess. X A-Insen.		12.766		–27.864		–112.626
		(25.033)		(24.261)		(125.517)
Constant	12.140	38.430	9.571	3.943	201.115	143.071
	(30.285)	(36.501)	(31.740)	(33.586)	(157.702)	(174.044)
Observations	222	222	222	222	222	222

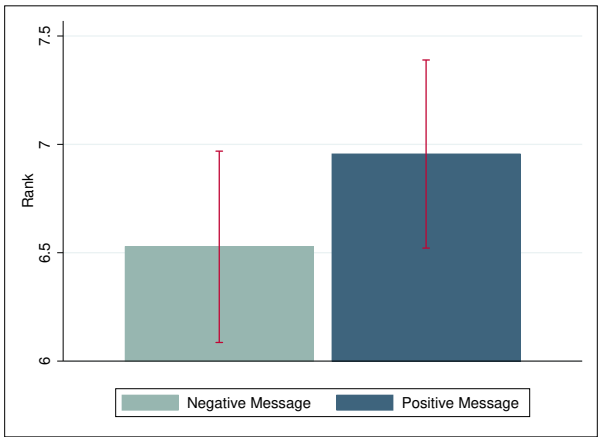
Pos. Message is a dummy variable indicating whether the subject was in the positive message treatment. *Ambiguity Aversion and A-Insensitivity* are measures for ambiguity aversion and a-insensitivity derived in Section 2.4. Each estimation includes controls for age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.3 Further Treatment Effects

Appendix Figure A.2 shows further evidence for the conjecture that subjects might generalize the cognitive impacts of the positive message to other domains. Directly after the treatment message, participants are also asked how well they think they did in the previous rounds in comparison to other participants in the

room. They should place themselves between one and ten, where one stands for the person who earned the fewest points so far and ten for the person who earned the most. The performance in the previous tasks is only weakly linked to guessing the number of competitors correctly as most choices, like the one outlined in 2.4, do not entail any strategic uncertainty. Still, those in the positive message group ranked themselves higher than those in negative message group (onesided t-test, p-value:0.087); hence expecting to have performed better so far.

Figure A.2: Expected Performance in Comparison to Others by Treatment



A.4 Differences within Message Groups across Types

Table A.2: t-tests - Differences within Message Groups across Types

Panel A: Negative Message			
	Difference Opportunity-Necessity	Difference Necessity-Remaining	Difference Opportunity-Remaining
CE Non-Strategic Uncertainty	31.48	−35.41*	−3.94
CE Strategic Uncertainty	−4.26	3.83	−0.43
Strategic vs. Non-Strategic	330.32***	−154.09*	176.24*
Observations	35	89	96

Panel B: Positive Message			
	Difference Opportunity-Necessity	Difference Necessity-Remaining	Difference Opportunity-Remaining
CE Non-Strategic Uncertainty	−0.89	8.58	7.68
CE Strategic Uncertainty	−28.37	23.43	−4.94
Strategic vs. Non-Strategic	−154.69	115.45	−39.24
Observations	38	94	92

The pairings in each column show the differences between necessity entrepreneurs, opportunity entrepreneurs, and non-entrepreneurs. Positive differences indicate that value of the parameter is larger for the first group in each pair. Variables: *CE Non-Strategic Uncertainty* is the outcome for the certainty equivalent of non-strategic uncertainty, *CE Strategic Uncertainty* is the outcome for the certainty equivalent of strategic uncertainty, *Strategic vs. Non-Strategic* is the outcome for the total profit in the strategic uncertainty option against non-strategic uncertainty.

Two-sided t-tests. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.5 Robustness Tables

Table A.3: Controlling for the Order of Choices

	CE Strat.		CE Non-Strat.		Strat. vs Non-Strat.	
	(1)	(2)	(3)	(4)	(5)	(6)
Positive Message	6.166	1.059	17.297*	15.273*	106.407**	106.616**
	(11.370)	(10.664)	(11.532)	(10.273)	(56.483)	(55.492)
Order		–3.023				
		(6.740)				
Order				–1.562		
				(5.731)		
Order						–19.379
						(36.426)
Constant	101.218***	32.767	90.368***	24.304	416.227***	252.733*
	(8.131)	(29.018)	(7.745)	(28.609)	(36.132)	(145.949)
Observations	222	222	222	222	222	222

Pos. Message is a dummy variable indicating whether the subject was in the positive message treatment. Each estimation includes controls for age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses.
Onesided t-tests. * p < 0.10, ** p < 0.05, *** p < 0.01

Table A.4: Controlling for Certainty about the Guess

	CE Strat.		CE Non-Strat.		Strat. vs Non-Strat.	
	(1)	(2)	(3)	(4)	(5)	(6)
Positive Message	6.166	0.610	17.297*	15.064*	106.407**	102.761**
	(11.370)	(10.677)	(11.532)	(10.048)	(56.483)	(54.760)
Certainty		–1.376		–2.745*		–9.658
		(1.955)		(1.829)		(9.615)
Constant	101.218***	35.946	90.368***	40.245	416.227***	281.849*
	(8.131)	(29.925)	(7.745)	(29.585)	(36.132)	(156.474)
Observations	222	222	222	222	222	222

Pos. Message is a dummy variable indicating whether the subject was in the positive message treatment. Each estimation includes controls for age, gender, education level, whether the subject has worked in the previous week, and risk aversion. Robust S.E. in parentheses.
Onesided t-tests. * p < 0.10, ** p < 0.05, *** p < 0.01

B Additional Results for Ambiguity Attitudes

B.1 Correlation Ellsberg Urns and Matching Probabilities

In our analysis, we use a measure for ambiguity aversion derived with the classical Ellsberg two urn problem (Ellsberg, 1961) and a measure for a-insensitivity derived via a different method, matching probabilities (Dimmock et al., 2016), which is based on the original Ellsberg problem. To make sure that our two methods measure the same underlying ambiguity attitude, we discuss the correlation of the methods here, especially the correlation between the measures for ambiguity aversion which can be derived with both methods.

As can be seen, the Ellsberg measure, *Ambi. Aversion*, is highly correlated to our matching probabilities, *m(10), m(50), m(90)*: The correlation is especially strong for the matching probability for 50%, which is also the original probability for the risky urn in the Ellsberg problem. The correlation to global ambiguity aversion, b-index, is high as well. Notably, neither the Ellsberg measure nor b-index are correlated to a-insensitivity. Thus, we can confirm the validity of matching probabilities to measure ambiguity aversion and, subsequently, a-insensitivity.

Table B.1: Correlation Ambiguity Parameters

	Ambi. Aversion	m(0.1)	m(0.5)	m(0.9)	$AA_{0.1}$	$AA_{0.5}$	$AA_{0.9}$	b
m(0.1)	-0.531***	1						
m(0.5)	-0.823***	0.584***	1					
m(0.9)	-0.408***	0.454***	0.486***	1				
$AA_{0.1}$	0.531***	-1	-0.584***	-0.454***	1			
$AA_{0.5}$	0.823***	-0.584***	-1	-0.486***	0.584***	1		
$AA_{0.9}$	0.408***	-0.454***	-0.486***	-1	0.454***	0.486***	1	
b-Index	0.710***	-0.825***	-0.835***	-0.800***	0.825***	0.835***	0.800***	1
A-Insen.	-0.0905	0.479***	0.0621	-0.565***	-0.479***	-0.0621	0.565***	0.0245

Ambi. Aversion is derived from the original Ellsberg urns, where 0 means ambiguity seeking, 1 means ambiguity neutral, and 2 means ambiguity averse. *m(0.1), m(0.5), and m(0.9)* are the matching probabilities derived from the three ambiguity choice sets. $AA_{0.1}$, $AA_{0.5}$, *and* $AA_{0.9}$ are the differences between objective and matching probabilities-the local ambiguity attitudes. *b-Index and A-Insensitivity* are global indices for ambiguity aversion and a-insensitivity derived via linear approximation.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In general, the correlation between different elicitation methods for ambiguity attitudes seem to be rather weak. Trautmann et al. (2011), for example, find substantially more ambiguity aversion and even preference reversals for willingness-to-pay tasks in comparison to choice tasks, which we also use. We have chosen these specific ambiguity aversion tasks because (i) they have a solid decision-theoretic foundation; and (ii) for comparability of our results with those from a Western country, where the almost exact same task was used, and (iii) because we want to elicit a-insensitivity explicitly.

B.2 Covariates of Ambiguity Attitudes

To analyze if socio-economic or individual characteristics drive the few differences found across our groups of interest and to assess which variables are important covariates of ambiguity attitudes, we run regressions with our main ambiguity aversion parameters as dependent variables. Table B.2 presents results for ambiguity aversion derived from the Ellsberg paradox and a-insensitivity. We include the following potential covariates: sex, age, age squared, education, the Big Five personality traits, and two variables measuring risk attitudes. Standard risk preference is measured with the CE for risk we also use in our regression analysis in Section 4.1. Additionally, we use a parameter for probability weighting, (*Alpha*), derived by employing the method by Tanaka et al. (2010).[30] The descriptions of all independent variables are in Appendix C. We include occupational groups, using necessity entrepreneurs as the base group. As can be seen, results regarding the differences to other groups stay robust even when controlling for other covariates, especially those with respect to a-insensitivity. Thus, the differences between the groups cannot be explained by differences in other characteristics.

Looking at the other variables, our sample does not seem to differ much from other samples considered in the existing literature. Being male is significantly positively related to ambiguity aversion. We find a similar though not significant effect for a-insensitivity and being male. Dimmock et al. (2015) also find men to be more ambiguity averse than women. Age is significantly positively related to being more ambiguity averse. Furthermore, the relation between age and ambiguity aversion is hump-shaped, which implies that the middle-aged are the most ambiguity averse. Surprisingly, risk aversion is negatively related to ambiguity aversion in our sample but only marginally. Similarly, it is marginally related to a-insensitivity. However, as in the study of Abdellaoui et al. (2011), a-insensitivity is significantly related to inverted S-shaped probability weighting, which, intuitively, makes sense. Out of the Big Five, openness seems to be significantly negatively related to ambiguity aversion. Persons who score high on openness are described as willing to engage in new experiences and are, therefore, potentially more likely to engage in risky behaviors. Conscientiousness is related to more ambiguity aversion.

Similar to Dimmock et al. (2016), we conclude that, in general, the explanatory power of socio-economic variables for ambiguity attitudes is low. Remarkably, however, we find similar correlations to those of Dimmock et al. (2015) for the US-American population. Besides the difference in gender, they estimate that older persons are less ambiguity averse and that the correlation between risk and ambiguity aversion is rather low. In our sample the relation between risk aversion and ambiguity aversion seems also as low as in other studies (e.g. Butler et al., 2014; Charness and Gneezy, 2010; Dimmock et al., 2016), however, not in the expected direction. Trautmann and van de Kuilen (2015) conclude that the evidence is suggestive for a positive relationship, which we cannot confirm, and that probability weighting (which is not collected in most of the studies) might serve as an mediator but that more research is necessary to clarify the empirical relationship between the two attitudes.

[30] In the first part of the experiment, participants answered the required multiple price list choices to calculate this parameter.

Table B.2: Socio-Economic Predictors

	Ambiguity Averse	A-Insensitivity
Male	16.145**	0.073
	(6.980)	(0.057)
Age	3.630***	0.019^
	(1.392)	(0.013)
Age^2	–0.048***	–0.000^
	(0.018)	(0.000)
Education	2.520	0.013
	(2.043)	(0.017)
CE Risk	0.077*	0.001^
	(0.045)	(0.000)
Alpha	–2.330	–0.262**
	(13.521)	(0.129)
Agreeableness	1.310	0.002
	(1.635)	(0.013)
Extraversion	1.020	–0.001
	(1.588)	(0.012)
Conscientiousness	3.181**	–0.002
	(1.515)	(0.011)
Neuroticism	–0.683	0.013
	(1.321)	(0.012)
Openness	–3.599**	0.002
	(1.415)	(0.011)
Remain	5.644	0.086
	(9.083)	(0.068)
Opp.	9.951	0.123^
	(11.188)	(0.091)
Constant	–61.964*	0.330
	(32.276)	(0.294)
Observations	222	222
Adj. R-squared	0.042	0.005

Variables: *Male* is an indicator for being male or female; *Age(^{2})* is the age of the participant in years (squared); *Education* is a categorical variable from 1-9, where 1 is "no degree/no education" and 9 is "doctoral degree or equivalent;" *CE Risk and Alpha* are risk attitudes; *Agreeableness, Extraversion, Conscientiousness, Neuroticism, and Openness* are the Big Five personality traits; *Opp.* only includes entrepreneurs out of opportunity; and *Remain* includes all persons who are not entrepreneurs.

Robust S.E. in parentheses.

* p < 0.10, ** p < 0.05, *** p < 0.01, ^ p < 0.10 (onesided)

C Description of Variables

Types	
Entrepreneurs (Ent.)	Participants who successfully established a business at least once.
Necessity Entrepreneurs (Nec.)	Those entrepreneurs who set up a business and felt the most important reason was out of necessity, i.e. no other job possibilities, fear of losing their existing job, more money needed, or other reasons.
Opportunity Entrepreneurs (Opp.)	Those entrepreneurs who set up a business and felt the most important reason was because they had the opportunity, i.e. ideal form of work to be self-employed, opportunity to be in charge, opportunity to earn more money, or other reasons.
Remaining (Remain)	Participants who are not entrepreneurs.

Independent Variables	
Male	Dummy that takes the value 1 if the participant is male and 0 if the participant is female.
Age(^{2})	Age (squared) of the participant in years.
Education	Variable with the following options: 1-"No degree/no education," 2-"Primary education," 3-"Lower secondary education',' 4-"Upper secondary education," 5-"Post-secondary non-tertiary education," 6-"Short-cycle tertiary education (no university diploma)," 7-"Bachelor or equivalent", 8-"Master or equivalent," 9-"Doctoral or equivalent".

Dummy Working	Dummy that takes the value 1 if the participant worked in the last seven days and 0 if not.
CE Risk	A measure for risk aversion that is derived via a multiple price list.
Alpha	A measure for probability weighting that equals 1 if the weighting function is linear, < 1 if it is inverted S-shaped, and > 1 if the function is S-shaped. Estimated with the method from Tanaka et al. (2010).
Agreeableness	One of the Big Five personality traits that is measured with two different items. Participants answer on a scale from 1-"Strongly disagree" to 7-"Strongly Agree" if the following traits apply to them: 1. "Critical, quarrelsome" and 2. "Sympathetic, warm".
Extraversion	One of the Big Five personality traits that is measured with two different items. Participants answer on a scale from 1-"Strongly disagree" to 7-"Strongly Agree" if the following traits apply to them: 1. "Extraverted, enthusiastic" and 2. "Reserved, quiet".
Conscientiousness	One of the Big Five personality traits that is measured with two different items. Participants answer on a scale from 1-"Strongly disagree" to 7-"Strongly Agree" if the following traits apply to them: 1. "Dependable, self-disciplined" and 2. "Disorganized, careless".
Neuroticism	One of the Big Five personality traits that is measured with two different items. Participants answer on a scale from 1-"Strongly disagree" to 7-"Strongly Agree" if the following traits apply to them: 1. "Anxious, easily upset" and 2. "Calm, emotionally stable".
Openness	One of the Big Five personality traits that is measured with two different items. Participants answer on a scale from 1-"Strongly disagree" to 7-"Strongly Agree" if the following traits apply to them: 1. "Open to new experiences, complex" and 2. "Conventional, uncreative".

D Instructions

Material D.1: Welcome Script

Choosing Risk Interactive Classroom Sessions

Instructions to be given to participants as a hard copy and to be read aloud together

**********[BEGINNING OF WRITTEN INSTRUCTIONS]**********

General Instructions

Welcome and thank you for participating in this interactive session today. You have been invited because you completed a survey last year for a project titled "Exploring recent trends in economic migration". You agreed to be contacted for further participation in our research. This interactive session is for the purpose of research on economic decision making and risk. For this session, it does not matter whether you have any migration in your past or future. We want to know preferences from a wide variety of different people here in *[INSERT ALBANIA OR KOSOVO]*.

****

[Alternative wording, in case we need to recruit people who did not take the survey.]

You have been invited to participate in this interactive session for the purpose of research on economic decision making and risk. It is one element of a wider research project titled "Exploring recent trends in economic migration". There has also been a household survey for this project, that some of you have answered already. For this session, it does not matter whether you have any migration in your past or future. We want to know preferences from a wide variety of different people here in *[INSERT ALBANIA OR KOSOVO]*.

****

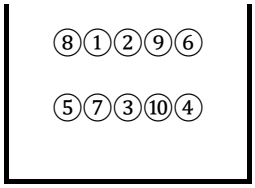
We will give each person a lump sum of *[INSERT EUR OR ALBANIAN LEK AMOUNT]* for coming today. If you follow the instructions carefully, you can also earn a good amount of additional money. You will be paid in cash in private at the end of the session. It is important that you do not talk, or try to communicate, with other participants during the session. Please also put your mobile phones on silent and refrain from using them during the session. If you have any questions once the session has started, please raise your hand and a moderator will come over to where you are seated to answer your question in private.

This interactive session consists of two parts. During the first part you will be asked to make a number of decisions that involve risk. "Risk" means that the effects of a decision cannot be known for certain at the time the decision is made, and the effects may be better or worse due to chance.

To give you an idea of the types of risky scenarios you will see, consider this bucket with 10 balls, numbered ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ and ⑩.

[The moderator shows an actual bucket, which is filled with numbered ping pong balls.]

It is like the one pictured below.



We will now do a hypothetical example. We will talk about points but the points will not translate to money in this example.

Here is the example. I will give you the opportunity to draw a ball form the bucket. If you draw a ① ② or ③, I will give you 300 points. If you draw any other number you get 0 points.

But suppose you don't like this scenario. I will give you a second option. Instead of trying to get 300 points by drawing a ball from the bucket, which could also result in 0 points, you can choose to get a flat pay-out of 80 points. If you want that option, you would get the 80 points for sure and there would be no draw from the bucket.

Do you prefer:

- Get 80 points for sure OR
- Draw a ball from the bucket for the chance to get 300 points. Get 300 points if a ① ② or ③ is drawn. Get 0 points if any other ball is drawn.

[The moderator allows one participant to draw a ball from the physical bucket and announces the result.]

During the session we will let the computer perform the draws, so that each person can get draws that only apply to them. This bucket is for illustration only, so that you understand how the computer will make a fair draw based on your choices. You will not actually see the bucket illustration – the computer will do this in the background.

You will not know which ball the computer will draw – it is random. You only know how many balls in the bucket indicate the high and low pay-outs.

Please raise your hand now if you have any question.

In summary, you will be asked to make choices about your earnings when you do not know for sure what the outcome of the choice will be.

For some of your decisions, the chances of earning a good amount will also depend on the decisions that others make. How you can earn money from your decisions will be described in detail each time you begin a new task. During the second part of the session you will be asked to complete a short survey.

By following instructions carefully and completing tasks to the best of your ability you can earn a good amount of money.

How earnings are determined

In addition to the *[INSERT EUR OR ALBANIAN LEK AMOUNT]* you will receive for coming today, you can earn money by the decisions you make. For each decision, you will earn points. The points will be converted to cash. For every *[INSERT NUMBER OF POINTS]* points you earn you will receive *[INSERT EUR OR ALBANIAN LEK AMOUNT]* in cash at the end of the session.

To earn points, you will be asked to choose between different earning options, each of which involves different amounts of possible earnings and different amounts of risk. Options with more risk have higher potential earnings, but there is also a chance that you get a very low amount. Options with low risk have lower potential earnings, but higher chance of getting the money. Once you make your choices, the computer will determine the outcome.

All earnings will be paid out in cash in private at the end of the session today. You will be asked to sign a receipt of payment, acknowledging that you have received the earnings for participation in this interactive session only.

If you have any questions at this time, please raise your hand.

Informed consent

Before the session begins, we must obtain permission from each of you to use your replies today for this research. This is called "obtaining informed consent". We have prepared a form for you to read and sign for this purpose. It is on the desk in front of you, with the heading "Consent Form".

This form describes the research, how the information we collect will be used and how we will protect your anonymity. I will give you a few minutes to read the form. Please raise your hand if you have a question and I will come to you. Once we have collected all the signed consent forms, we will proceed.

[Spoken only.]

We will now hand you a tablet which you will use to complete the tasks during this interactive session. Please wake up your tablet and a welcome screen will appear. Please raise your hand if the tablet does not display a welcome message.

[Spoken only.]

You will also receive an ID card. The ID card is to preserve your anonymity. Please do not share your ID with any other participant.

**********[END OF WRITTEN INSTRUCTIONS]**********

Material D.2: Instructions Ambiguity Aversion Parameters

**********[BEGINNING OF PART II]**********

[SCREEN 2.1 - to be read out loud.]

Header: ***Part II, introduction***

This is Part II. Tasks in Part II will also entail deciding between different earnings opportunities, but the options are different from those in Part I.

Like before, there will be two possible earnings opportunities, and both opportunities will be risky.

Unlike before, you will not always know the exact chances for getting points.

Please pay careful attention to the example of the task, which is on the next few pages.

Click "Next" to proceed.

[SCREEN 2.2 - to be read out loud.]

Header: ***Part II, example***

Please imagine the following two earnings opportunities, where you can get points by drawing a ball from a bucket:

There are two buckets. Each bucket has 100 balls. Each ball is either blue or orange. The two buckets have different combinations of orange and blue balls.

Earnings are determined by first choosing a bucket, then drawing a ball from the chosen bucket. Blue and orange balls have different values. If the drawn ball is orange you will receive 0 points and if the drawn ball is blue you will receive 100 points.

The two buckets are:

Bucket A: you don't know how many balls are orange and how many balls are blue. Put differently, if you have to draw a ball from the bucket, you do not know the probability of drawing an orange or a blue ball.

Bucket B: you know the exact number of orange and blue balls in this bucket. In other words, if you have to draw a ball from the bucket, you know the exact probability of drawing an orange or a blue ball.

The two buckets are pictured on the next screen.

Click "Next" to continue.

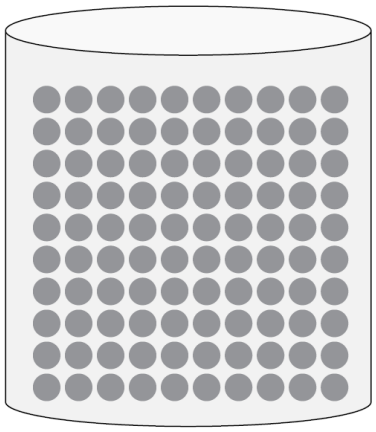
[SCREEN 2.3 - to be read out loud.]

Header: ***Part II, example***

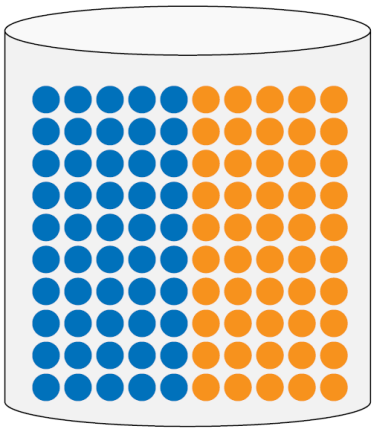
The images below show the two buckets. **Each bucket contains some orange and some blue balls.** To illustrate that Bucket A could have any number of blue or orange balls, these balls are coloured in grey here. But each ball is either orange or blue for sure.

The picture of B has exactly 50 orange and 50 blue balls. This illustrates that you know the content of Bucket B.

Although the balls are ordered by colour in the picture, you can imagine that the buckets will be shaken such that all balls are mingled. The picture is designed in this specific way to help you recognize how many balls of each colour are in the bucket.



Unknown chance for a blue ball



50% chance for a blue ball

Click "Next" to proceed.

[SCREEN 2.4 - to be read out loud.]

Header: ***Part II, example continued***

Your task is to choose which bucket is used for the draw. Only one ball will be drawn.

No matter which bucket you choose, if the drawn ball is orange you will receive 0 points and if the drawn ball is blue you will receive 100 points.

- If you indicate a preference for Bucket A: a ball is drawn from Bucket A and you will receive 100 points if the ball is blue and 0 points if the ball is orange.
- If you indicate a preference for Bucket B: a ball is drawn from Bucket B and you will receive 100 points if the ball is blue and 0 points if the ball is orange.

[SCREEN 2.5 - to be read out loud.]

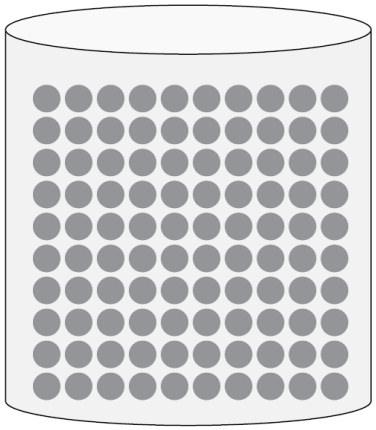
Try selecting an option. The two small circles below the buckets are for you to indicate your preference, the left circle corresponds to bucket A, while the right circle corresponds to bucket B.

Make sure you understand how to enter the choice or change the choice.

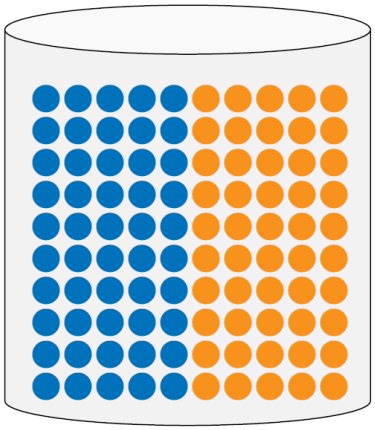
Do you prefer:

- draw the ball from **Bucket A** (where you do not know your chances for getting a blue ball)

- draw the ball from **Bucket B** (where you know the chance of a blue ball is 50%).



Unknown chance for a blue ball



50% chance for a blue ball

Once you are sure of your choice, please click “Next”.

[SCREEN 2.6 - to be read out loud.]

Header: ***Part II, instructions***

You will be asked to complete tasks like this example a number of times. We will present the choices in sets. There are 3 sets in Part II. Each set entails 4 tasks.

There will always be two options to choose from. In one option you will *not* know the chances of getting the points. For the other option you *will know* the exact chances of getting the points.

We will provide you with further instructions before each set, if required.

Click “Next” to proceed.

[SCREEN 2.7 - to be read out loud.]

Header: ***Part II, how earnings are determined***

In each set of tasks you complete, one of the tasks will be randomly selected by the computer to determine payment for that set. The ball will be drawn from the bucket you chose in that task, and you will get the points corresponding to the colour ball that was drawn.

You will not learn your earnings from individual tasks, but will see them reflected in the point totals at the end of the session today.

Consider each task carefully as all tasks are equally likely to be selected for payment.

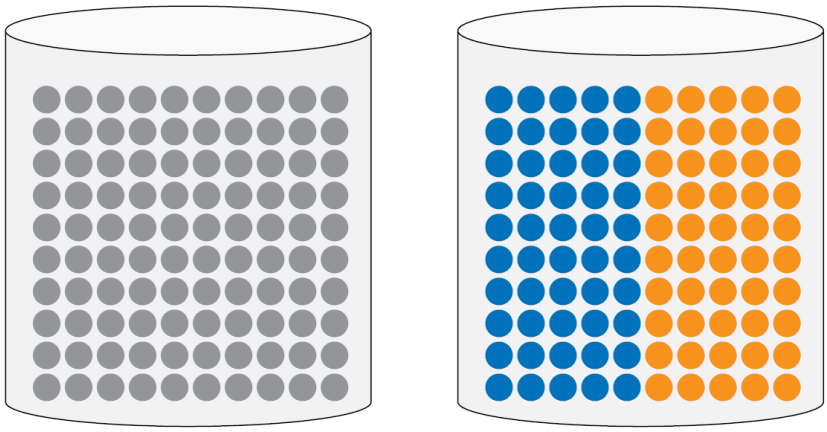
Click "Next" to proceed.

[SCREEN 2.8 - to be read out loud.]

Header: ***Part II, comprehension questions***

Before we start with the first set we just want to make sure that our instructions on the tasks were clear. Therefore, we ask you to answer the following comprehension questions:

Consider the two buckets, Bucket A and B. Bucket A contains orange and blue balls, but the exact composition is unknown. Bucket B contains exactly **50** orange balls and **50** blue balls.



Please indicate if the following statement is true or false: "There are more blue balls in Bucket A than in Bucket B."

1. True
2. False
3. Cannot be known

Please indicate if the following statement is true or false: "It is more likely to draw a blue ball from Bucket A than it is from Bucket B."

1. True
2. False
3. Cannot be known

Click "Next" to proceed.

[SCREEN 2.9 - TO BE SEEN if at least one answer was incorrect]

Header: ***Part II, answers***

Answer to the first question:

In fact, it cannot be known which bucket contains more blue balls, because the composition of orange and blue balls in Bucket A is unknown.

Answer to the second question:

In fact, it cannot be known whether it is more likely to draw a blue ball from Bucket A than from Bucket B, because the composition of orange and blue balls in Bucket A is unknown.

If you have a question regarding these answer, please raise your hand now.

Otherwise, click “Next” to proceed.

[INSERT WAITING SCREEN]

[SCREEN 2.10 - to be read out loud.]

Header: ***Part II, any questions?***

If you have any questions at this time, please raise your hand. We will answer questions for everyone to hear before you begin the tasks.

Please remember, once you begin the tasks, if you have any questions quietly raise your hand and a moderator will come and answer your questions in private. It is important you do not talk to any other participants from this point onwards.

Click "Next" to proceed.

Material D.3: Instructions Competence Treatment

[SCREEN 3.11 - to be read out loud.]

Header: ***Part III, Set 2, instructions***

For the next several tasks, you will make decisions between two options. One option in each pair will involve entering competition. The differences between the options will change from one task to the next, so please consider each choice carefully. By offering you many different tasks, we hope to learn more about how you make decisions that involve risk and competition.

[SCREEN 3.12 - to be read out loud.]

Header: ***Part III, competition instructions***

In this activity, competing can be thought of as obtaining a share of a limited amount of profits. You do not have to win a contest. Just by entering the competition you get a share.

However, the size of your share depends on the number of competitors you face.

Click "Next".

[SCREEN 3.13 - to be read out loud.]

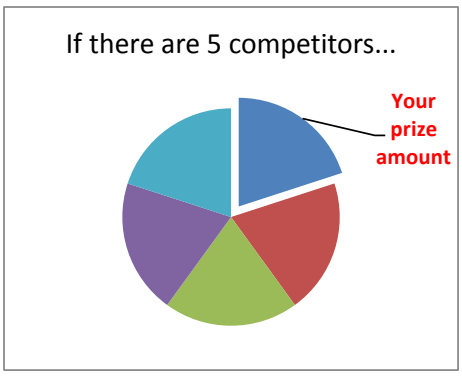
Header: ***Part III, competition instructions***

How will competitors impact the points I can earn?

If you chose to enter the competition, your earnings will be determined by splitting the total available among you and all the other competitors in your group. The amount is shared equally.

For example, suppose there are 300 points available for competition and three people are in the competition. Each person would get 100 points.

If there are few competitors, the prize per person is high. If there are many competitors, the prize per person is low. The charts below provide an example.



Click "Next".

[SCREEN 3.14 - to be read out loud.]

Header: ***Part III, competition instructions***

If you choose the Competition option and there are no other competitors, you would earn the entirety of the total points available.

If you choose the Competition option and everyone else in the group is also a competitor, you get one fifth of the available points.

If you do not choose to compete, your earnings are not dependent on the number of competitors in your group.

Please raise your hand if you have a question.

[SCREEN 3.15 - to be read out loud.]

Header: ***Part III, competition instructions***

How many competitors could I face?

You will be randomly assigned to a group. If you chose to compete, your competitors will come from this group. If you do not choose to compete, you will not face competitors, and the group will not matter.

Your group will always has the same people in it. It will consist of you, and 4 other people who did a session already. So they are not in the room today.

Each other person in your group will either be a "competitor" or "not a competitor". The others already did their session. They are "Competitors" if they chose competition more than they chose other options.

You will not know how many people in your group are competitors. So you will not know your exact prize amount if you chose the competition option. In all tasks, the number of competitors you would face is the same.

[SCREEN 3.16 - to be read out loud.]

Header: ***Part III, competition instructions***

To indicate the competition option in each task, we will use the following diagram. The diagram shows the highest and lowest possible points for the competition option.

300  ???
A share of 300 points. The size of your share depends on competitors the highest possible points for you are 300, the lowest possible points for you are 60

The image  ??? indicates your competitors. **There can be 1,2,3 or 4 competitors**, but this image will always be the same. There are ??? because you do not know how many competitors you face.

Click “next”

[SCREEN 3.17 - to be read out loud.]

Header: ***Part III, competition instructions***

Before we start with the next set we want to make sure that our instructions about the group were clear. Therefore, please answer the following questions:

How many people will be in your group, besides you?

_____

True or False: I will not know how many competitors I will face in the competition options.

Please indicate how many competitors you think will be in your group. Exclude yourself from your estimations.

Competitors: _____

How certain are you about your estimation? Please choose a number on a scale from 1 to 10. 1 means you are not certain at all about your guess, that you picked the number more or less randomly. 10 means you are very certain about your guess, that you think you understand well people’s preference for competition.

Please click “Next” to proceed.

Material D.4: Instructions Choices under Uncertainty

**********[BEGINNING OF PART IV]**********

[SCREEN 4.1 - to be read out loud.]

Header: ***Part IV, introduction***

This is Part IV. Tasks in Part IV will again entail deciding between different earnings opportunities. Your task will be to decide whether you prefer the option on the left side of the screen or if you prefer the option on the right of the screen.

The opportunities differ in whether you know the risk, whether others' choices affect what you can earn and what the possible earnings are. These tasks will look similar to the tasks you considered in Part III. But they are not the same.

There are 4 sets in Part IV. Each set compares different scenarios. We will provide instructions at the beginning of each set. Set 1-3 have four tasks each. The fourth set has 3 tasks.

Click "Next" to proceed.

[SCREEN 4.2 - to be read out loud.]

Header: ***Part IV, instructions***

For all tasks in Part IV you are again grouped with other persons. These are not the same persons as before. The group consists of yourself and 4 new and randomly selected people who are your potential competitors if you chose to compete. These are people like you, who completed their session already. They are not in the room today.

Click "Next" to proceed.

[SCREEN 4.3 - to be read out loud.]

Header: ***Part IV, competitors***

As in Part III, the competition preferences of your group members may matter for some tasks and not other tasks. Since your group members completed their own session already, we know whether they prefer to compete or prefer not to compete. These potential competitors will impact your earnings only if you chose to compete yourself. You do not know the number of competitors. You do know that this number does not change from one decision to the next. You will always face the same number of competitors at any point you chose to compete.

We will always tell you when the choices of your group members might matter for your payment.

Choices that persons outside your group make can never influence your earnings.

Click "Next" to learn about the earnings options.

[SCREEN 4.4 - to be read out loud.]

Header: ***Part IV, how earnings are determined***

In each set you complete, one of tasks in that set will be randomly selected by the computer to determine payment for that set.

As with Parts I-III, once the computer selects which task is used to determine payment, the computer will calculate how many points you earn depending on the choice you made.

You will not learn your earnings from individual tasks, but will see them reflected in the point totals at the end of the session today.

Consider each task carefully as all tasks are equally likely to be selected for payment.

Click "Next" to proceed.

[SCREEN 4.5 - to be read out loud.]

Header: ***Part IV, any questions?***

If you have any questions at this time, please raise your hand. We will answer questions for everyone to hear before you begin the tasks.

Please remember, once you begin the tasks, if you have any questions quietly raise your hand and a moderator will come and answer your questions in private. It is important you do not talk to any other participants from this point onwards.

Click "Next" to proceed.

[Set 1 – 3 will appear in random order]