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Characterizing the female entrepreneur: Comparing behavior in a market entry experiment with other groups of individuals

Christian Schade, Sabrina Boewe, and Kai Krause

SiAg
DFG-Forschergruppe 986
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Herausgeber:
DFG-Forschergruppe 986, Humboldt-Universität zu Berlin
Philippstr. 13, Haus 12A, D-10099 Berlin
http://www.agrar.hu-berlin.de/struktur/institute/wisola/fowisola/siag

Redaktion:
Tel.: +49 (30) 2093 6340, E-Mail: k.oertel@agrar.hu-berlin.de

Characterizing the female entrepreneur: Comparing behavior in a market entry experiment with other groups of individuals

Christian Schade[1], **Sabrina Boewe**[1], **and Kai Krause**[2]

[1] Humboldt-Universitaet zu Berlin,
Institute for Entrepreneurial Studies and Innovation Management
[2] Independent consultant, Berlin, Germany

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Abstract

We investigate the strategic decision behavior of female entrepreneurs in a realistic market entry experiment where individuals started with gains or losses experienced prior to the game. We compare the entry behavior of female entrepreneurs to the entry behavior of male entrepreneurs and to the entry behavior of female and male students. We find that female entrepreneurs show entry patterns very similar to that of male entrepreneurs and very different from female students: female entrepreneurs on average over enter markets and do not react to their opponents' prior experiences much. The same accounts for male entrepreneurs. Furthermore, we find that entrepreneurs in general exhibit significantly higher mean entry probabilities than students, whereby students mean entry rate is close to the mixed strategy equilibrium.

Keywords: Female Entrepreneurship, Strategic Decision Behavior, Market Entry, Experimental Economics

Zusammenfassung

Wir untersuchen das strategische Entscheidungsverhalten weiblicher Unternehmer in einem realistischen Markteintrittsexperiment in dem die Probanden mit vorherigen Gewinn- und Verlusterfahrungen in das Spiel gehen. Wir vergleichen das Markteintrittsverhalten weiblicher Unternehmer mit dem Markteintrittsverhalten von männlichen Unternehmern und dem Markteintrittsverhalten von weiblichen und männlichen Studenten. Weibliche Unternehmer zeigen Eintrittsmuster, die denen von männlichen Unternehmern sehr ähnlich sind und die sehr anders sind als die von weiblichen Studenten: Weibliche Unternehmer treten im Durchschnitt übermäßig häufig in Märkte ein und reagieren nicht sehr stark auf die vorherigen Erfahrungen ihrer Gegenspieler. Das Gleiche trifft auf männliche Unternehmer zu. Darüber hinaus finden wir signifikant höhere durchschnittliche Eintrittswahrscheinlichkeiten bei Unternehmern als bei Studenten, wobei die durchschnittliche Eintrittsrate der Studenten sehr nah an der gemischten Gleichgewichtsstrategie liegt.

Schlüsselwörter: weibliche Unternehmer, Strategisches Entscheidungsverhalten, Markteintritt, Experimentelle Wirtschaftsforschung

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1. Introduction

In Western countries males are twice as likely to be involved in early-stage entrepreneurial activities and established business ownership than females (Bosma et al., 2009; Allen et al., 2007; Blanchflower, 2004; Minniti and Arenius, 2003; Reynolds et al., 2001). Moreover, in most countries women's share in total entrepreneurial activity still lags behind the share of women in the labor force (Verheul et al., 2005; OECD, 2002). Thus, for entrepreneurship researchers, consultants, and policy makers the important questions arise how to encourage more women to found a business, and how to help female entrepreneurs to survive in the market. This in turn, on the one hand, requires understanding the reasons why females found and run fewer businesses than men and on the other hand a more general understanding of who the female entrepreneur is. Our paper deals with the second issue and it concentrates on a crucial aspect of entrepreneurial behavior, i.e. strategic decision making.

The strategic decision behavior, i.e. the decision behavior in situations in which individuals have to interact and coordinate with others – like competitors or customers – who typically have other interests than we do, is a central aspect of entrepreneurship. Entrepreneurial activities, such as market entry decisions, product pricing, R&D investment decisions, or decisions for technological standards, are strongly determined by strategic decision making patterns. In various experimental studies women are found to behave differently than men in such strategic environments (e.g., Eckel and Grossman, 1998, 1996; Bolton and Katok, 1995; Brown-Kruse and Hummels, 1993; Sell and Wilson, 1991). Still, whether there are significant differences between men and women depends on the context and on the risks involved in the experimental task (Eckel and Grossman, 2008). In the current paper we want to state the question how female entrepreneurs behave in strategic environments. Do female entrepreneurs differ in their strategic decision behavior from their male counterparts or not? And, are female entrepreneurs somehow special or different than other women with respect to their strategic decision behavior?

The approach typically pursued in the literature on female entrepreneurship is to compare female and male entrepreneurs and to compare both with non-entrepreneur males and females. Several studies based on GEM data, e.g., report on pronounced differences between male and female respondents within the entire sample of respondents with respect to their confidence of having the skills to found a new business or regarding their fear of failure. In the subgroup of entrepreneurs, however, only differences in fear of failure remain between males and females (e.g., Koellinger et al., 2009). Hence, although one might expect male and female entrepreneurs to be similar in general, the question of differences between male and female entrepreneurs has to be analyzed and answered separately for different dimensions. Therefore, the current study investigates differences and similarities between the strategic behavior of female and male entrepreneurs in situations in which they have to coordinate with

competitors. It then compares this behavior with the behavior of male and female students employing the methodology of experimental economics.

We use the framework of the simultaneous market entry game, a strategic game that received considerable attention in experimental economics research and is well suited for studying decision making in an entrepreneurial context (Selten and Gueth, 1982; Rapoport, 1995; Rapoport et al., 1998; Camerer and Lovallo, 1999; Elston et al., 2005). In the market entry game, players have to simultaneously decide on entering or not entering a new market. Payoffs depend on the total number of market entrants since the market has only a limited capacity. If the total number of entrants exceeds this given capacity all players who enter the market will suffer a loss. The problem is that players have to decide without being able to observe, communicate, or credibly collude with their potential competitors who also consider entering this market. Since there are multiple possibilities to reach an equilibrium point where no one has an incentive to deviate from his or her chosen decision, it is unclear which players are going to enter and which players are going to stay out of the market. In game-theoretic terminology, players face a coordination problem concerning their entry decision.

Camerer and Lovallo (1999) used this experimental paradigm to understand excess entry based on overconfidence and derived implications for a better understanding of entrepreneurship. However, they used student participants instead of real entrepreneur participants. Furthermore, the fact that most studies on market entry behavior focus on relatively abstract entry situations where all players are symmetric and start without any prior experiences or 'history' has to be called into question. In such abstract situations coordination and the anticipation of other individuals' behavior remains difficult. Moreover, in the real world entrepreneurs are rarely in a neutral situation but regularly have encountered gains or losses, before, which might influence their behavior. The impact of prior gains and losses on subsequent risk taking has been analyzed previously and is consistent with prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992)[1]. In the past, there have already been approaches to shape more vivid market entry games, i.e. by incorporating losses for those players who do not enter (Rapoport et al., 1998). We extend the approach of Rapoport et al. (1998) and bring in a more realistic flavor by experimentally implementing asymmetry through pre-game gain and loss experiences that are commonly known to all players. We expect such information on 'history' to evoke thoughts about the opponents' potential entry decisions.

We conduct two incentive compatible experiments based on the one-shot simultaneous market entry game: one with 108 (54 female and 54 male) entrepreneurs and one with 78 (33 female and 45 male) students. The entrepreneurs play the game online, via the internet. The students play the same game in an experimental laboratory. Both groups are compensated for their participation based on their performance in the experimental task. Students face real monetary consequences. Entrepreneurs play for amounts of salmon caviar. We analyze mean entry rates

[1] A more detailed analysis follows in the discussion section.

and individual entry probabilities with respect to a player's own and his opponents' gain and loss experience.

We find that entrepreneurs exhibit a significantly higher mean market entry probability than students and have on average a tendency to over enter the market compared to the mixed strategy equilibrium. The students instead show a mean entry rate that is close to the mixed strategy equilibrium of 50%. This result is in line with the numerous papers arguing that there might be a general tendency of entrepreneurs to over enter markets (e.g., Busenitz and Barney, 1997; Camerer and Lovallo, 1999). Being a men or a women had no absolute effect on mean entry probabilities or mean expected payoffs. Still, subjects' reactions to opponents' situations strongly depend on whether they are male or female. Furthermore and most importantly, we find that the behavior of male and female entrepreneurs is very similar on the one hand and that behavioral differences between entrepreneurs and non-entrepreneurs are larger with females than with males. No matter whether these results are due to female entrepreneurs self-selecting into entrepreneurship, learning to adapt to the specific conditions of being an entrepreneur, or due to only the "fittest" surviving, they support the hypothesis that women differ more from their peers in order to be an entrepreneur than men do.

2. Literature

Three streams of literature are of special interest to our study: 1) the experimental literature on gender differences, 2) the literature on gender differences related to female entrepreneurship, and 3) the literature on female entrepreneurship itself.

2.1 Experimental literature on gender differences

The question whether men and women differ in their interaction behavior and in their decision making generated an ongoing debate in the social and behavioral sciences but also in experimental economics. First experimental tests for differences in behavior of men and women involving monetary incentives go back to Rapoport and Chammah (1965). They started with what later became a long series of studies on gender differences within the experimental paradigm of the prisoner's dilemma. These studies showed mixed evidence: some found men less selfish, others found women less selfish, and still others found no difference (see Eckel and Grossman, 1998 for a brief review). More recently, experimenters have turned to ultimatum and dictatorship experiments as well as public goods games. For an excellent overview see the meta-study of Eckel and Grossman (2008), who find no significant evidence of systematic differences in the play of men and women in settings where respondents are exposed to risk; but in settings where risk is absent women are less individually-oriented and more socially-oriented than those of men.

Another stream of experiments on gender differences in strategic settings deals with the behavior, performance and propensity to participate in tournaments. Gneezy, Niederle and

Rustichini (2003) run controlled experiments to test whether men and women differ in their ability or propensity to perform in competitive environments. In their study men's performance was significantly increased by tournament incentives relative to the benchmark performance whereas women's performance was not increased. This gender gap in performance was larger in mixed gender tournaments than in single-sex tournaments. When participants were paid according to piece rates no gender gap was found. Niederle and Vesterlund (2007) examine whether men and women of the same ability differ in their selection into a competitive environment. They find a gender gap in tournament entry that is not explained by performance. Factors such as risk and feedback aversion play a negligible role. Instead they show that the tournament entry gap is driven by men being more overconfident and by gender differences in preferences for performing in a competition. "The result is that women shy away from competition and men embrace it."

Given these results on strategic behavior of men and women, behavioral tendencies appear to be hard to generalize and studies on male and female behavior in the market entry game are lacking in the literature. A directional hypothesis on gender differences is hence impossible.

2.2 Literature on gender differences related to entrepreneurship

Within the extended literature on gender differences, some aspects are especially related to entrepreneurial aptitude and skill sets: For instance, women tend to have less self-confidence and also expect to receive poorer results than men (Deaux, 1984; Deaux and Farris, 1977). Consequently, women are found to have a lower tendency to be overconfident than men[2] (Barber and Odean, 2001; Beyer and Bowden, 1997; Lundeberg et al., 1994; Beyer, 1990; Lichtenstein et al., 1982; Deaux and Farris, 1977). In early studies, women often consider their abilities inferior to those of males even though they are not (Carr et al., 1985; Lenney, 1977; Crandall, 1969). Women also exhibit a stronger tendency than men to see the cause of success in external factors and not in their own personal power (Erkut, 1983; Levine et al., 1982; Berg et al., 1981). Furthermore, women are repeatedly found to be less risk-seeking than men (Eckel and Grossman, 2008; Powell and Ansic, 1997; Johnson and Powell, 1994; Sexton and Bowman-Upton, 1990; Levin et al., 1988; Hudgens and Fatkin, 1985). However, Byrnes et al. (1999) show in a meta analysis of 150 risk experiments that while women in some situations are significantly more risk averse, many studies find no gender differences. Summarizing these results, the overall picture shows that women in general score lower in characteristics that are important determinants for entrepreneurial activity.

[2] However, differences in overconfidence and gender differences in overconfidence are task dependent. Studies show that overconfidence is sensitive to the difficulty of the task (Moore and Small 2004). Gender differences in overconfidence have primarily been found in "masculine tasks" (Lundeberg, Fox, and Puncochar 1994).

2.3 Literature on female entrepreneurship

Within the field of entrepreneurship research itself, the topic of female entrepreneurship has attracted growing interest and research effort since Simon Parker stated that "despite its intrinsic interest and importance, the subject of female entrepreneurship has arguably not commanded the degree of research effort that it deserves." (Parker, 2004, p. 129). Since 2004, the Global Entrepreneurship Monitor publishes annual special topic reports on Women and Entrepreneurship. Still, given the huge differences in male and female self-employment rates referred to above, the literature on this gender gap is sparse.

The existing studies report that women are less likely to start a business than men (Minniti et al., 2005; Blanchflower, 2004), that women's level of optimism and self-confidence with respect to starting a business is lower than that of men and that the fear of failure is more pronounced with women than with men (Allen et al., 2007; Koellinger et al., 2009).

Relative to women who do not indicate an entrepreneurial activity female entrepreneurs tend to be more confident in their own skills, more likely to know other entrepreneurs, and more alert to the existence of unexploited opportunities than other women. Furthermore, in all these aspects they do not differ much from male entrepreneurs (Allen et al., 2008). Only the difference in fear of failure observed between men and women in the general population remains between male and female entrepreneurs (Koellinger et al., 2009).

Hence, while men in general score higher in most characteristics related to entrepreneurial aptitude and skill set, like e.g. internal locus of control and self-confidence, than women, male and female entrepreneurs do not differ much in these characteristics. This is plausible since male and female entrepreneurs have to survive in the same, competitive environment. Thus, one should expect male and female entrepreneurs to be more similar to each other than men and women in general no matter whether these similarities are due to female entrepreneurs self-selecting into entrepreneurship, learning to adapt to this specific environment, or to market selection ('survival of the fittest'). Since the average man exhibits a higher level of characteristics that are found among entrepreneurs, like internal locus of control or optimism and self-confidence with respect to starting a business, than women this also means that the gap between women and female entrepreneurs is larger than the gap between men and male entrepreneurs.

Assuming that these general patterns hold for strategic behavior, we are able to formulate the following core hypothesis we are going to test in our experimental study:

H: With respect to their strategic behavior female entrepreneurs are more different from female non-entrepreneurs than male entrepreneurs from male non-entrepreneurs.

3. Experimental Design

In order to analyze the market entry behavior of female entrepreneurs and compare it with the entry behavior male entrepreneurs on the one hand and with that of female students on the other hand, we conduct two incentive compatible simultaneous market entry experiments: one with 108 (54 female and 54 male) entrepreneurs and one with 78 (33 female and 45 male) students. Prior to the game, all participants receive a participation fee and are then randomly selected to experience either a gain or a loss of one experimental unit before the experiment begins. Since incentivizing entrepreneurs is a critical issue, we customize incentives for entrepreneurs and students accordingly: appropriate incentives for entrepreneurs include either high monetary stakes or other rewards that also have a symbolic value. This reflects that playing for such a reward is easier to identify with than playing for small amounts of money (Schade, 2005; Schade and Burmeister-Lamp, 2009). Thus, while students receive 6€ for one experimental unit, the entrepreneurs receive a glass of caviar for one experimental unit. The participation fee was 14€ for the students and two glasses of caviar for the entrepreneurs. In order to ensure that equal shares of participants of each gender are put into a loss condition and into a gain condition a computerized random device is used in both experiments. Hence, all participants start the game with a "history" of either a loss or a gain experience. This gain or loss experience is common knowledge to all players; in each round participants are informed about the types (gain or loss experience) of their two opponents.

Participants then start with the experiment and play the following simultaneous market entry game in groups of three (N=3) players with two randomly selected, anonymous opponents. Players do not receive any information about the sex of their opponents. In the market entry game players have to simultaneously decide on entering or not entering a certain market. This market has only a limited capacity c. If the total number of players entering the market exceeds this capacity, all entrants will suffer a loss.

The payoff function for our study is given by:

$$u_i(s) = \begin{cases} 0 & \text{if } s_i = 0 \\ r \cdot [2 - N(s)] & \text{if } s_i = 1 \end{cases}$$

where $u_i(s)$ is player i's payoff given the vector of individual decisions s (0 = stay out; 1 = enter) with i=1,2,3 and $N(s)$ is the total number of players who enter the market. The market capacity in our case is 2. The constant r reflects one experimental unit and remains fixed throughout the game. All parameters are common knowledge.

Players should prefer to enter the market as long as there is nobody else in the market. They should be indifferent between entering and staying out of the market if there is one other player who enters since their payoff would be zero in both cases. And, as soon as there are two other players who enter the market they should prefer to stay out of the market in order not to suffer losses. But as described above, the problem is that players have to decide simultaneously without observing and without being able to communicate or credibly collude

with their potential competitors who also consider entering this market. The only information they might use to coordinate their entry decisions is their own and their opponents' prior gain or loss situation. Still, the question is who is going to enter the market and who is going to stay out. With other words, players face a coordination problem concerning their entry decisions.

There are six [(3! / 2! [3-2]!) + 3] pure strategy Nash-Equilibria for this game, namely all situations in which the number of entrants equals the market capacity of two plus all situations in which there is only one entrant and the others stay out of the market since they are indifferent between entering and not entering the market; both options lead to a zero profit. The mixed strategy equilibrium is given by all players entering with a probability of ½ (Rapoport et al., 1998).

Individuals play 8 rounds (108 entrepreneurs * 8 rounds = 864 entrepreneurs observations; 78 students * 8 rounds = 624 student observations). In order to avoid learning effects, no feedback about the outcome of previous rounds is provided throughout the experiment. Each participant is confronted with all possible combinations of player types, e.g., with two opponents who won an experimental unit prior to the game, with two opponents who lost an experimental unit prior to the game and with one opponent who lost and one opponent who won an experimental unit prior to the game.

As a consequence of the existence of mixed strategy equilibria players are enabled to explicitly state mix strategies (Camerer, 2003, Chapter 7). Specifically, they have to determine the proportions of *E*-balls (market entry) and *NE*-balls (no market entry) in a 100-ball urn. A computerized random device picks one of the strategies, the probabilities for this random draw being directly derived from the proportions of *E*-balls and *NE*-balls in the urn. At the end of the experiment, for each participant one round is randomly selected as the basis for his or her final payoff. After they made the market entry decisions participants are asked for their risk premium[3] and basic statistical data like age and sex. After they answered these questions the students receive information about their results and are paid accordingly. The entrepreneurs in the online study play the game individually at a self-chosen time, which is much more convenient for the them and therewith provides better circumstances for a concentrated participation in the experiment. Once all participants finished the experiment, they are randomly matched to groups of three (for each round) and receive their results via email. Results and payments for them are finalized within one week. In the appendix you find the full instructions the students receive. The entrepreneurs receive almost identical instructions, that are only slightly adjusted to the needs of an online experiment. Note, the results of the neutral treatment in the student experiment are not reported in this study since the entrepreneurs did not receive this treatment.

[3] Risk propensity proves to be practically irrelevant for most situations. Therefore, it is not dealt with in this paper. Results are available from the first author upon request.

4. Findings

4.1 Basic sample information[4]

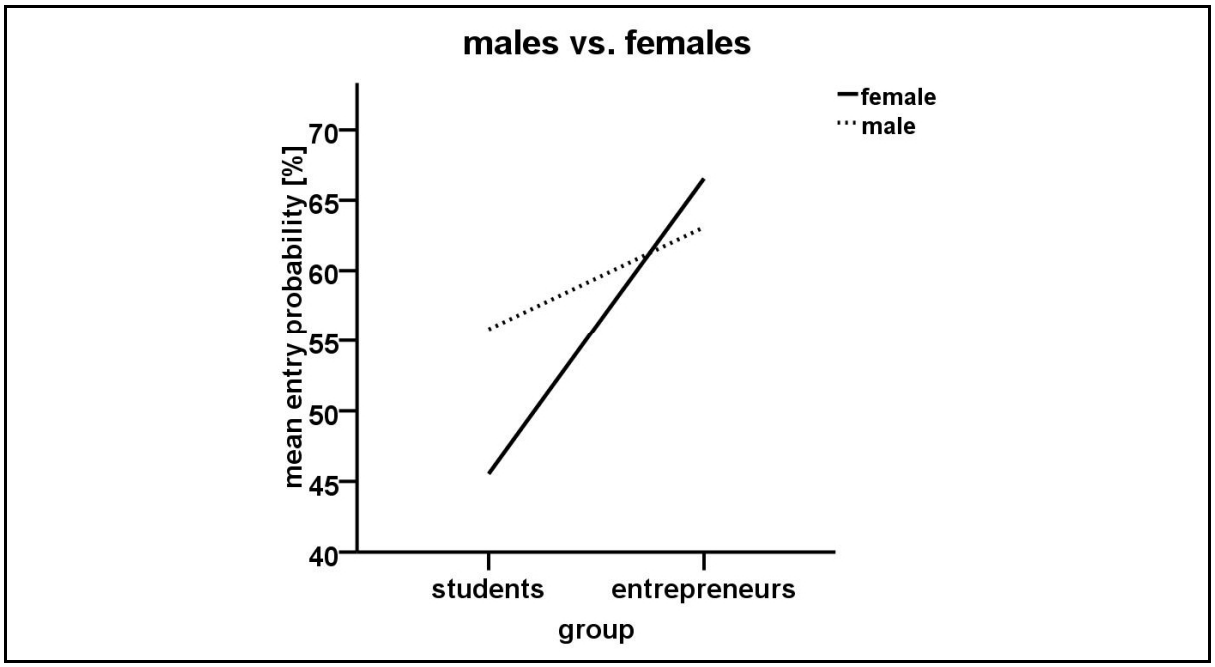
The study is conducted with 54 (50%) female and 54 (50%) male entrepreneurs and 33 (42.3%) female and 45 (57.7%) male students. The entrepreneurs in our sample are aged 26 to 68 years with an average age of 45 years. 56.5% of them founded their business themselves. The students in our experiment are aged 19 to 34 with an average age of 24 years. 65% of the students studied business or economics, 3% studied mathematics, 0.9% studied computer sciences, and the remaining 31.7% of the students major in other fields. Male and female students show a very similar distribution concerning the subjects studied.

4.2 Testing the core hypothesis

Figure 1 shows mean entry probabilities of male and female entrepreneurs as well as male and female students. As expected, the graph indicates an interaction effect: female entrepreneurs have the highest entry probabilities, but they only slightly and non-significantly differ from the entry probabilities of male entrepreneurs. Female students, however, have the lowest entry probabilities, and male students' entry probabilities are located between those of female students and male entrepreneurs. We tested these results in a univariate ANOVA and calculated the parameter estimate for the interaction effect (see Table 1(a)-(d) in the appendix). The difference between entrepreneurs and students (main effect) is statistically significant on a $p < .001$ level (two-sided). Entrepreneurs' mean entry rate is higher than the mean entry rate of students. The difference between male and female respondents (main effect) is non-significant. Most importantly, and supporting our core hypothesis, the interaction parameter has the predicted sign, i.e., being a female and being a student at the same time has a negative effect on entry probability. In a one-sided test, this parameter reaches statistical significance on a $p < .05$ level. Hence, the behavioral difference between female entrepreneurs and non-entrepreneurs is larger than the behavioral difference between male entrepreneurs and non-entrepreneurs.

[4] More details are available from the first author upon request.

Figure 1: Mean entry probability of males vs. females



Source: own figure

4.3 Additional results: The effect of gain and loss experiences

In order to also bring in the effects of own and opponents' starting position (pre-game gain or loss experience) on the mean entry probability of the respondents we conducted a repeated measures ANOVA (see Table 2(a)-(b) in the appendix). As repeated measures in the linear model we designed a variable "*factor*" accounting for opponents' starting positions (pre-game gain or loss experience). The dependent variable '*mean entry probability'* is measured three times on each individual. The levels in the variable *factor* are given by (1) mean entry probability in games against two players with gain experiences, (2) mean entry probability in games against one player with gain experience and one player with loss experience, and (3) mean entry probability in games against two players with loss experiences. Please, recall that the participants stated probabilities (explicit mixes instead of yes/no decisions on entry). Since the sphericity assumption is violated, we report on the results of a Greenhouse-Geisser test.

As a result of this analysis we find significant within-subjects effects (interaction effects of variables *factor*gender*, *factor*own prior experience*, *factor*gender*group*) and between-subjects effects (variables *own prior experience*, *group*).

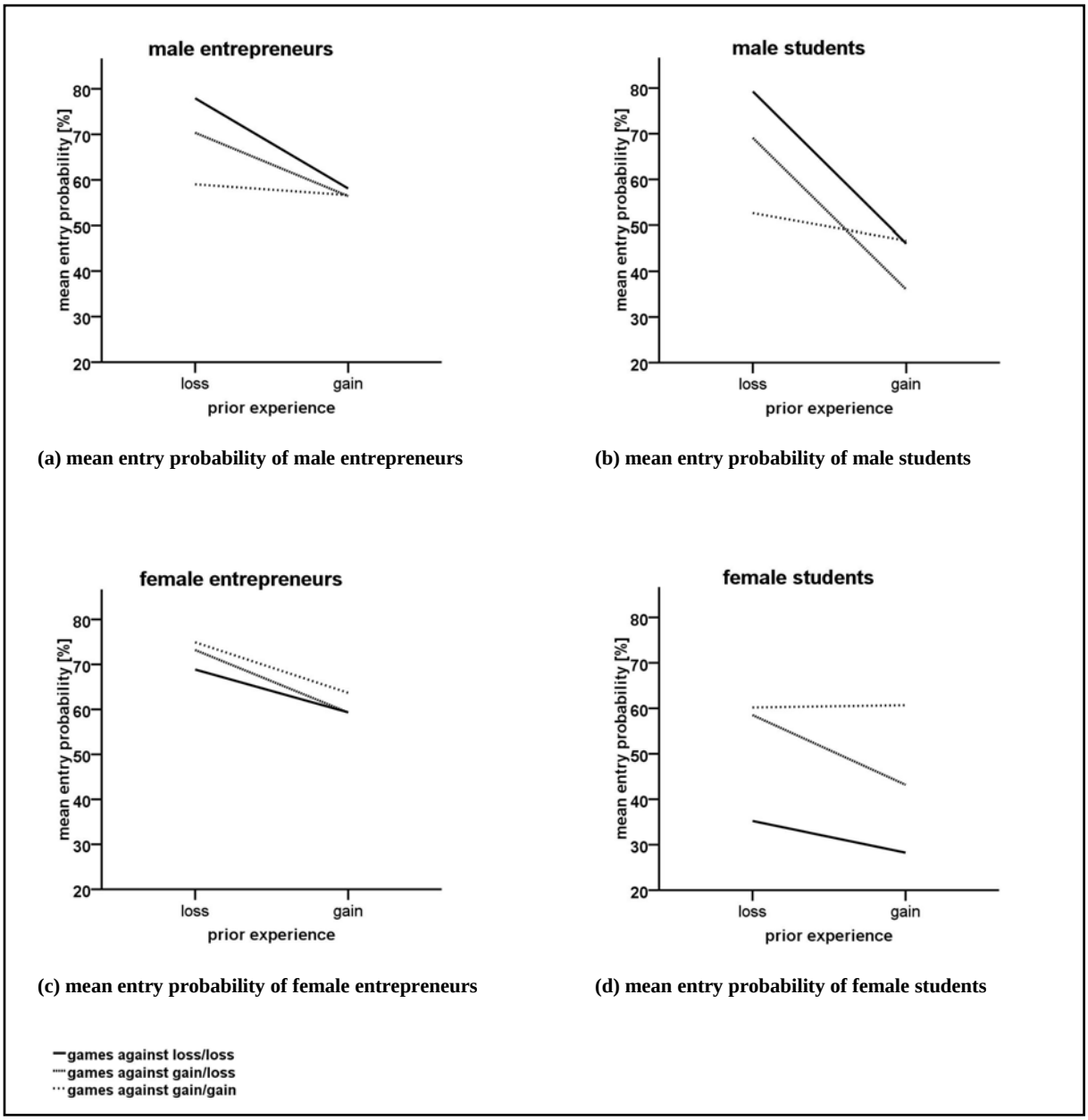
Opponents' prior experiences (variable *factor* with levels: gain/gain, gain/loss, loss/loss) do not have a significant main effect on mean entry probabilities of the participants (see table 2(a) in the appendix). Hence, there is no general reaction pattern to opponents' prior experiences. The interaction effect of opponents' prior experiences and *gender* (variable

*factor*gender)* is highly significant, $F(1.47, 261.362) = 11.42$; $p < .001$ (see table 2(a) in the appendix). It indicates that individual reactions to opponents' prior experiences strongly depend on the gender of the respondent. Note, that gender was not significant when we only looked at mean entry rates with respect to *gender* and *group* (see table 1(c) in the appendix). Furthermore, the interaction effect between opponents' prior experience and *gender* is moderated by *group* (variable *factor *gender* group*), $F(1.47, 261.362) = 2.774$, $p < .1$ (see table 2(a) in the appendix).

Own prior experience had a highly significant main effect on mean entry probabilities, $F(1, 178) = 16.361$, $p < .001$ (see table 2(b) in the appendix), and a marginally significant interaction effect with opponents prior experience, $F(1.47, 261.362) = 3.343$, $p < .1$ (see table 2(a) in the appendix). *Group* has again a highly significant main effect, $F(1, 178) = 15.834$, $p < .001$ (see table 2(b) in the appendix).

The mean entry patterns that can be observed when accounting for a player's own and his/her opponents' starting positions (pre-game gain or loss experience) are depicted in figures 2(a)-(d): male and female students exhibit opposed entry patterns. For instance, male students enter very frequently when they play against two opponents who have experienced a gain; they enter less frequently when they play against one winner and one loser, and they enter rather infrequently when they play against two losers. On the contrary, female students enter very frequently when they play against two losers, they enter less when they play against one winner and one looser; and they enter very infrequently when they play against two winners. As expected, this huge gender difference observed with students disappears with male and female entrepreneurs: both have a tendency to over enter the market compared to the mixed strategy equilibrium and they do not much react to their opponents prior experiences (see also table 3 in the appendix).

Figure 2 (a)-(d): Patterns of mean entry probabilities



(a) mean entry probability of male entrepreneurs

(b) mean entry probability of male students

(c) mean entry probability of female entrepreneurs

(d) mean entry probability of female students

Source: own figures

4.4 Summary

Analyzing mean entry probabilities of male and female entrepreneurs as well as male and female students we find an interaction effect between *group* and *gender*. The mean entry behavior of female entrepreneurs differs more from that of other women than the mean entry behavior of male entrepreneurs differs from that of other men. Hence, our core hypothesis is supported by the data: the behavioral gap between entrepreneurs and non-entrepreneurs is bigger with women than with men. This applies for the general mean entry as well as for the entry patterns taking into account own and opponents' prior experiences. We also find that entrepreneurs enter significantly more often than students, and have on average a tendency to over enter the market compared to the mixed strategy equilibrium. This result is in line with the numerous papers indicating that there might be a general tendency of entrepreneurs to over enter markets (e.g., Busenitz and Barney, 1997; Camerer and Lovallo, 1999). The students show a mean entry rate that is close to the mixed strategy equilibrium of 50%. Being a men or a women had no absolute effect on mean entry probabilities or mean expected payoffs. Still, subjects' reactions to opponents' situation strongly depend on whether they are male or female. Own prior experiences significantly influenced entry behavior of both students and entrepreneurs in our sample: having experienced a loss prior to the game, entrepreneurs and students enter more frequently than having experienced a gain.

5. Discussion and implications

In this study, female entrepreneurs' market entry behavior is shown to be similar to that of male entrepreneurs on the one hand and very different from that of female students on the other hand. Behavioral differences between male and female entrepreneurs are found to be very small. The differences between entrepreneurs and students are larger with females than with males. Thereby our core hypothesis is supported.

No matter whether these results are due to female entrepreneurs self-selecting into entrepreneurship, learning to adapt to the specific conditions of being an entrepreneur, or due to only the "fittest" surviving, they support the hypothesis that woman differ more from their peers in order to be an entrepreneur than men do. This finding is especially interesting as the comparison group consisted mainly of female business, economics, and mathematics students – a group of women who self-selected into a competitive environment. Our findings on mean entry rates of entrepreneurs and non-entrepreneurs are finally in line with the numerous papers indicating that there might be a general tendency of entrepreneurs to over enter markets.

Despite the clarity of all these findings, it is impossible to come up with clear-cut recommendations without further research. Before such recommendations can be made, more light has to be shed on the reasons for the only small differences between male and female strategic behavior. If the similarity of male and female entrepreneurs were an effect of self-selection, and if the observed behavioral differences between entrepreneurs and non-entre-

preneurs were leading to successful entrepreneurship, one should be careful in encouraging entrepreneurship of individuals that just do not 'fit' into the general behavioral pattern that would be required from entrepreneurs. Encouraging female entrepreneurship would then require identifying more women with this specific set of behavioral characteristics. However, the observed over entry of male and female entrepreneurs that we were able to replicate in our controlled setting has been interpreted as something potentially negative previously (e.g., Busenitz and Barney, 1997; Koellinger et al., 2007). Therefore, it is not completely clear what kind of male and female entrepreneurs to look for. Given that most entrepreneurs in our study have survived in their markets for years, however, their behavioral patterns might be interpreted as something that may at least not severely hinder them from being successful.

A 'learning' interpretation would lead to very different implications: assuming that a heterogeneous group of more or less skilled entrepreneurs, no matter whether they are male or female, would enter the market and their behavior would then be shaped by requirements and experiences leading to very similar behavioral patterns of males and females, a 'tonnage approach' to entrepreneurship (produce many entrepreneurs, no matter what) would be appropriate in a sense that individuals just have to be encouraged to become entrepreneurs. Since females are underrepresented, relatively more effort would have to be put into stimulating females to become entrepreneurs. No matter how differently males and females start to begin with, each individual would learn his or her lesson or would be selected out.

An approach that would shed light on the appropriateness of different means to foster (female) entrepreneurship whilst keeping the rigor of the general methodological approach applied in this study, would be experiments on male and female respondents' strategic behavior in repeated strategic play with feedback on success and payoffs provided on a round-by-round basis. In such repeated play, learning can be studied without losing experimental control. Such multiple-rounds experiments have been successfully applied in other fields of experimental economics (see, for an overview, Camerer, 2003, Chapters 6 and 7; Kagel and Roth, 1995, Chapters 2 and 4).

There is ample experimental and field evidence for the large effects of prior gains and losses on subsequent choices in non-strategic decisions (Bowman, 1980, 1982; Fiegenbaum and Thomas, 1988; Fiegenbaum, 1990; Shefrin and Statman, 1985; Weber and Camerer, 1998; Thaler and Johnson, 1990; Myagkov and Plott, 1997; Weber and Zuchel, 2005). These behaviors are often argued to be consistent with the convex-concave property of prospect theory's value function (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), context dependent preferences (Tversky and Simonson, 1993; Tversky and Kahneman, 1991), and aggregation of prior experiences with future (potential) outcomes (Thaler, 1985; Thaler and Johnson, 1990). Extensive research concerning this phenomenon is found in the literature on decision making. Interestingly, however, a systematic analysis of such effects is still missing for strategic games. We have evidence for such behavior also in a strategic set-up: Own prior experiences significantly influenced entry behavior of both entrepreneurs and non-entrepreneurs in our study. Having experienced a loss prior to the game, participants entered more frequently than having experienced a gain

6. Conclusions

We confirm in a controlled experimental setting the finding from the empirical entrepreneurship literature that male and female entrepreneurs are much more similar with respect to characteristics relevant to entrepreneurial activity that men and women in general. We are also able to expand this notion to a realistic strategic decision situation that has previously not been analyzed with respect to behavioral differences between men and women. Further experimental research should shed light on the 'nature' versus 'nurture' dimension of the problem.

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Appendix

Table 1(a)-(d): Mean entry probability by group and gender

Table 1(a): Between-Subjects Factors

		Value label	N
Group	1	Students	78
	2	Entrepreneurs	108
Gender	1	Female	87
	2	Male	99

Table 1(b): Descritive Statistics

Dependent variable: mean entry probabilty

Group	Gender	Mean	Std. deviation	N
Students	Female	45,5375	18,19200	33
	Male	55,8115	27,12731	45
	Total	51,4648	24,16909	78
Entrepreneurs	Female	66,5463	24,29583	54
	Male	63,0880	22,42572	54
	Total	64,8171	23,33473	108
Total	Female	58,5774	24,33202	87
	Male	59,7805	24,81219	99
	Total	59,2178	24,52977	186

Table 1(c): Tests of Between-Subjects Effects

Dependent variable: mean entry probabilty

Source	Typ III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10407.109[a]	3	3469.036	6.257	.000
Intercept	595711.111	1	595711.111	1074.426	.000
Group	8932.975	1	8932.975	16.112	.000
Gender	518.670	1	518.670	.935	.335
Group * Gender	2105.539	1	2105.539	3.798	.053
Error	100909.169	182	554.446		
Total	763570.535	186			
Corrected Total	111316.278	185			

a. R Squared = .093 (Adjusted R Squared = .079)

Table 1(d): Parameter Estimates

Dependent variable: mean entry probabilty

Parameter	B	Std. Error	t	Sig.	90% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	63,088	3,204	19,689	,000	57,790	68,386
[Group=1]	-7,276	4,753	-1,531	,128	-15,134	,581
[Group=2]	0[a]	.	.	.	.	.
[Gender=1]	3,458	4,532	,763	,446	-4,034	10,950
[Gender=2]	0[a]	.	.	.	.	.
[Group=1] * [Gender=1]	-13,732	7,047	-1,949	,053	-25,383	-2,082
[Group=1] * [Gender=2]	0[a]	.	.	.	.	.
[Group=2] * [Gender=1]	0[a]	.	.	.	.	.
[Group=2] * [Gender=2]	0[a]	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

Table 2 (a)-(b): Testing the effect of gain and loss experiences

Table 2(a): Greenhouse-Geisser Test for Within-Subjects Effects

Source	Typ III Sum of Squares	df	Mean Square	F	Sig.
Factor	641.563	1.468	436.934	.403	.605
Factor * Gender	18180.770	1.468	12381.958	11.421	.000
Factor * Prior experience	5321.885	1.468	3624.454	3.343	.051
Factor * Group	2343.825	1.468	1596.255	1.472	.232
Factor * Gender * Prior experience	2070.980	1.468	1410.435	1.301	.268
Factor * Gender * Group	4415.496	1.468	3007.160	2.774	.081
Factor * Prior experience * Group	1167.393	1.468	795.050	.733	.442
Factor * Gender * Prior experience * Group	8.347	1.468	5.685	.005	.982
Error(Factor)	283365.362	261.362	1084.186		

Table 2(b): Tests of Between-Subjects Effects

Source	Typ III Sum of Squares	df	Mean Square	F	Sig.
Constant	1767906.917	1	1767906.917	1171.054	.000
Gender	479.347	1	479.347	.318	.574
Prior experience	24699.657	1	24699.657	16.361	.000
Group	23903.454	1	23903.454	15.834	.000
Gender * Prior experience	2442.345	1	2442.345	1.618	.205
Gender * Group	3780.999	1	3780.999	2.505	.115
Prior experience * Group	493.926	1	493.926	.327	.568
Gender * Prior experience * Group	2182.455	1	2182.55	1.446	.231
Error	268721.490	178	1509.671		

Table 3: Mean entry rates with respect to own and opponents' prior experience

Table 3: Mean entry probability with respect to own and opponents' prior experience

Group	Gender	Prior experience	Games against gain/ gain	Games against gain/ loss	Games against loss/loss
Entrepreneurs	Male	Loss	77.91	70.35	59.04
		Gain	58.11	56.45	56.57
	Female	Loss	68.85	73.20	74.91
		Gain	59.33	59.31	63.67
Students	Male	Loss	79.25	69.08	52.63
		Gain	46.05	36.03	46.68
	Female	Loss	35.22	58.51	60.19
		Gain	28.25	43.18	60.68

Instructions for the Market Entry Game:

Where necessary, explanations of experimental procedures are added in bold italics for better understandability. The actual instructions and information received by the participants is shown in boxes.

After being seated at their places, and before beginning with the computer-based part of the experiment, the participants were paid a participation fee of € 14.00 and told to pocket it.

They were then informed of the following:

We will now conduct a lottery with the following features:

There are 12 balls with numbers from 1 to 12 in a bingo cage. They will be drawn without replacement, i.e. once drawn, a ball will not be placed back into the cage.
A draw of a ball with the numbers 1-4 will result in a gain of € 6.00 for you.
A draw of a ball with the numbers 5-8 results in no payment (€ 0.00).
A draw of a ball with the numbers 9-12 will result in a loss of € 6.00.

The draws will take place in private at each participant's seat and will only be seen by that participant.

The individual bingo ball lotteries were then conducted and the respondents informed about their (gain, loss, or neutral) outcome.

The following information was then provided:

In the experiment you will play games with changing counterparts. In addition to the rules of the game, the only information all of you will have is the outcome of the lottery we just conducted. In other words, you will always be informed about the outcome of your respective counterpart, as he or she will be about your outcome.

The participants began playing the computer-based game. All of them were presented with the following screens in the order given here (Screen type A through G).

Screen type A:

Welcome to our experiment on decision-making!

Please pay attention to the following:

- Your decisions in this experiment will depend on your skill and luck, and will result in real payments of different amounts.
- This experiment will take place over several rounds.
- While the results of each round will not be displayed, a summary of the whole experiment's results will be provided at the end of the experiment.
- Out of all rounds, one will randomly be selected by the computer. Your game result in this randomly chosen round will then be added to your result of the lottery conducted at the beginning of the experiment.
- At the end of the experiment, the experiment's supervisor will settle your account by paying out or collecting the payments from you.
- You will find a red button at the bottom of each screen. When you understood and completed all tasks on that screen, press it to continue.
- All information is anonymous and will be kept confidential.

Have fun participating in the game!!

Screen type B:

You will now play a three person game over several rounds.

Your opponent will change from round to round as previously and randomly determined by the computer.

The values in parantheses varied depending on the participant's own result and the result of their opponents in the bingo cage lottery.

Screen type C:

Reminder

In the lottery conducted at the beginning of the experiment you {suffered a loss of € 6.00 / achieved a neutral result of € 0.00 / gained a profit of € 6.00}, which (in addition to any potential gains or losses made during the experiment) will be settled at the end of the experiment.

Thus your current account balance is {€ -6.00/€ 0.00/€ 6.00}.

Screen type D:

Your Game Situation:

You and your two opponents have the choice of entering a market with limited demand.

If all three of you decide to enter the market, everyone will suffer a loss of € 6.00.

If two of you decide to enter the market, the two entering players as well as the not entering player will receive € 0.00.

If only one of you decides to enter the market, he receives € 6.00 and the other two players who did not enter receive € 0.00.

If none of you decide to enter the market, all three players receive € 0.00.

In the lottery at the beginning of the experiment, your two opponents in this round had the following results:

One opponent {suffered a loss of € 6.00 / achieved a neutral result of € 0.00 / gained a profit of € 6.00 }.

Your other opponent { suffered a loss of € 6.00 / achieved a neutral result of € 0.00 / gained a profit of € 6.00}.

Your decision:

Your decision will be made with the help of a virtual raffle drum whose contents will be determined by you. You can fill it with a total of 100 tickets (E_{ntry} and N_oE_{ntry} tickets). If an E_{ntry} ticket is drawn, you will enter the market. If a N_oE_{ntry} tickets is drawn, you will not enter the market. Please now specify the contents of the drum by stating the number of E_{ntry} and N_oE_{ntry} tickets to be included:

Please indicate the number of E_{ntry} tickets to be placed in the drum: _____

Please indicate the number of N_oE_{ntry} tickets to be placed in the drum: _____

Subsequently, multiple rounds with changing opponents were played according to screen type D. To ensure that the participants noticed that conditions changed from round to round, screen type E was presented prior to type D before to each round (except the first).

Screen type E:

Information

Attention: In this round, the conditions of the game have changed. Please pay close attention to the information concerning the outcomes.

Several psychometric scales and questions followed the actual experiment and preceded the payout rounds; results are not reported in this paper.

Based on the results from the round randomly chosen by the computer and the bingo cage lottery conducted at the very beginning of the experimental sessions, screen type F was used to calculate final payments.

Screen type F:

Game Summary

The following table provides a summary of all played round with your chosen number of E_{ntry} and N_oE_{ntry} tickets, the resulting strategies (E_{ntry} and N_oE_{ntry} tickets), and your results of each round. Moreover, you can identify your opponents' strategies for every round.

Round	Number of E Tickets	Number of NE Tickets	Drawn Ticket	Choice of 1st Opponent	Choice of 2nd Opponent	Your Result
{1…29}	{0…100}	{0…100}	{NE/E}	{NE/E}	{NE/E}	{-6.00/0.00/6.00}

Screen type G:

Final Result

To calculate your payout, round {1…29} was randomly selected of all rounds by the computer.

Source	Amount [€]
Lottery at the beginning of the experiment	{-6.00/0.00/6.00}
Result of randomly chosen round {1…30}	{-6.00/0.00/6.00
Total:	{-12.00/-6.00/0.00/6.00/12.00}

An amount of € {-12.00/-6.00/0.00/6.00/12.00} will be settled with you.

This is the end of the experiment. Thank you very much for participation. Please quietly stay seated and wait until the supervisor has balanced accounts with you.

About the authors

Prof. Dr. Christian Schade is director of the Institute for Entrepreneurial Studies and Innovation Management at Humboldt-Universität zu Berlin. He is head of the project "Experiments on entrepreneurial decision making" that is part of the research group "Structural change in agriculture", funded by the German Research Foundation (DFG). Furthermore, he is head of the research project „Innovation and coordination" funded by the Volkswagen Foundation which is a collaborative effort with Columbia University and the German Institute for Economic Research (DIW Berlin). Since 2002, he is a research professor at the DIW Berlin and since 2006 associate editor of the Journal of Business Venturing (Elsevier). His research is based on economic psychology. Preferred fields of application are entrepreneurship and innovation research. Methodologically Christian Schade concentrates on laboratory experiments, descriptive decision theory, and game theory.

Address:
Humboldt-Universität zu Berlin
School of Business and Economics
Institute for Entrepreneurial Studies and Innovation Management
Rosenstraße 19
10178 Berlin, Germany
E-mail: schade@wiwi.hu-berlin.de

Sabrina Boewe is a PhD candidate at Humboldt-Universität zu Berlin and a research associate for the research project "Innovation and coordination" funded by the Volkswagen Foundation which is a collaborative effort with Columbia University and the German Institute for Economic Research (DIW Berlin). Her major research areas are experimental economics, economic psychology and entrepreneurial decision making.

Address:
Humboldt-Universität zu Berlin
School of Business and Economics
Institute for Entrepreneurial Studies and Innovation Management
Rosenstraße 19
10178 Berlin, Germany
E-mail: boewe@wiwi.hu-berlin.de

Kai Krause is a former research associate of the Institute for Entrepreneurial Studies and Innovation Management at Humboldt-Universität zu Berlin. Today, he works as an independent consultant in Berlin, Germany.

Address:
Boxhagener Straße 54,
10245 Berlin, Germany
E-mail: kai.oliver.krause@gmx.de

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Editorial office

Dr. Astrid Häger *(Managing editor)*
e-mail: astrid.haeger@agrar.hu-berlin.de
phone: +49-30-2093.6062

Kerstin Oertel *(Layout)*
e-mail: k.oertel@agrar.hu-berlin.de
phone: +49-30-2093.6340

Humboldt-Universität zu Berlin
Landwirtschaftlich-Gärtnerische Fakultät
Department für Agrarökonomie
FG Agrarpolitik
Philippstr. 13, Haus 12A
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