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Women Quitters in Exit Competitions. Reliable Indicators of Women's Risk Aversion?

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Women Quitters in Exit Competitions. Reliable Indicators of Women's Risk Aversion?

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Abstract

Information from television game shows has recently been used to measure women's risk aversion. Researchers have abstracted from this evidence to explain the underrepresentation of women at senior levels in politics, business and management. But how reliable is this type of data? Using data for 483 male and female participants in a simulation of the TV game show 'Deal or no Deal', we find that women on average exit 0.45 rounds earlier than men, confirming the higher risk aversion for women. We also find that if we were to select women with comparable earnings and education to men, being female is less of an obstacle towards risk-taking behaviour than in the absence of these controls. Specifically, women would now be seen to exit 0.12 rounds earlier, rather than 0.45 rounds earlier. Experiments need to be mindful of controlling for these background factors when assessing the nexus between risk-taking and gender.

Introduction

Equal pay and career opportunities for working women are important issues in many developed economies and it has not appeared to have gone away. Lobbyists refer to a 'glass ceiling', preventing women from securing top jobs. This 'glass ceiling' appears to be confirmed in the labour force statistics, where men typically earn a salary premium over women and are represented more in top jobs (Blau and Kahn, 2005; Wood et al., 1993). Blau and Kahn indicate that the earnings, differential for male and female full-time workers, were 76 % in the period 1994 to 1998. In 2005 a mere 8 % of top managerial positions were occupied by women[1] and although middle-rank positions are progressively filling up with larger shares of female staff, the most senior positions are still disproportionately occupied by men (see Bertrand and Hallock, 2001).

A strand of recent research is trying to shed more light on why women are not securing these top jobs. Anecdotal evidence suggests that women are simply more risk averse (fear failure more) than men in which case they are less likely to present themselves for promotion, despite having a competitive degree and skills level. In the words of Hogarth et al. (2012):

'...gender status beliefs shape – often unconsciously – expectations for competence and behaviors in a self-fulfilling way' (P.148 Hogarth et al., 2012)

To measure risk aversion, researchers have observed the behaviour of female participants on television game shows such as the UK game show 'Deal or no Deal', where male and female participants are presented with a series of lotteries with rising risk levels (stakes) as they progress throughout the game. Hogarth et al. (2012) have found that on average, women earn 40 % less than men and are quicker to exit the game than men. The finding of higher risk aversion in females is corroborated by Borghans et al. (2009).[2]

But there are problems with using material from game shows, if researchers want to infer to the risk attitudes of women. One of the more serious shortcomings is the absence of background information on the wealth and education of participants. Dohmen et al. (2010) have argued that

'…outcomes such as educational attainment or wages may be affected by risk aversion'. (P. *1240* Dohmen et al., 2010)

The Dohmen study, among other things cautions researchers against omitting important background information. Omitting such variables can bias the coefficient size. In other words, the effect of ability on wealth and education could be mediated by gender or other correlates of wealth and education unless they are properly controlled for.

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[1] 'Women in Business' report published by The Economist (2005), July 21st.

[2] Though this finding of quicker exit rates is disputed in a study by Botti et al. (2007).

However, studies of risk aversion, which use information generated from television game shows, invariably do not control for the wealth or education background of contestants. Our study sets out to measure how this can bias the coefficient on gender, in line with the argument advanced in the Dohmen study that excluding this information inflates the size of the remaining coefficient, if they are correlated with the omitted variables. The purpose of our study was to replicate, in so far as was possible, the multiple-round structure of a television game show. However, we also captured additional background information on participants. Our results, using responses for over 500 participants, show that women exit on average 0.45 rounds earlier than men. However, the risk aversion gap is less pronounced if we additionally control for wealth and education, where women are seen to exit, on average, 0.12 rounds earlier. From this we agree with Dohmen et al. (2009) that it is insufficient to infer risk-taking on the basis of exiting behaviour alone, but that researchers should be mindful of other background factors which co-determine risk-aversion.

Studies on Risk-Taking in Females

The studies we review here, deal with the nexus between gender and risk taking behaviour. A study by Borghans et al. (2009) uses information for 347 juveniles at a Dutch school. Specifically, in their study, participants were asked to place a reservation price on urns containing a mixture of coloured balls of indeterminate colour. Their findings on higher female risk aversion confirms the earlier findings by Hartog et al. (2002), where the latter examined the risk aversion of participants, who were asked to participate in a fictitious lottery which was circulated by a Dutch newspaper. Agnew et al. (2008) similarly find that women are more risk averse than men. Specifically, they examine a dataset containing the choices of women towards various investment products and confirm the higher risk aversion in women, when choosing between fixed term annuities and other riskier products. Both, the Hartog and the Agnew study, do indeed control for income and education differences in the data and both conclude that women have higher risk aversion, all things equal. A further study was carried out by Dohmen et al. (2010). The Dohmen study involved interviewing over 1,000 participants via computer-based media. The researchers were also able to assess the cognitive ability of the respondents via a battery of tests which were similarly administered online. The researchers find no significant difference in risk-taking behaviour between men and women for their sample of approximately 1,000 German adults. They do find, however, a premium to risk taking from higher intelligence. Gächter et al. (2010), in a sample of 360 randomly chosen individuals in the UK, find that older, wealthier and less educated people are less inclined to risk taking behaviour. The effect of wealth on risk-taking (documented in Gächter et al., 2010) appears to be negative, where wealthier individuals tend towards risk-loving behaviour. Generally the studies show a higher likelihood of risk taking if the respondent is male and well educated.

A further research strand focuses on data generated from television game shows. Hogarth et al. (2012), in a much cited study, use information for 216 participants of a Colombian game show, El Jugador, which was broadcast in 2007. This allowed them to examine, among other things, the exit propensity of women based on the composition of the remaining players. Because the ratio of women to men is important for the decision of women to leave the game, Hogarth et al. infer that this risk-aversion by women is a consequence of socialization practices and women's own behavioural expectations. Moreover, the Hogarth study confirms the finding that women are more risk averse than men. Botti et al. (2007), using data from an Italian game show, find surprisingly that men were more risk averse than women. Rietveldt (2012) using data for 41 episodes of a Dutch game show finds no effects for gender. It is evident, that only one of the 3 studies, which uses material generated from game shows, namely the Hogarth et al. (2012) study, finds evidence in line with the consensus view that women are more risk averse than men (Agnew et al., Borghans et al., Gächter et al., and Hartog et al.)[3]. It is also revealing that none of the game show studies control for wealth and education. To what extent the coefficient on gender is biased by this omission, we are unclear. Table 1 summarizes the findings for some key studies on risk aversion.

Table 1:
Summary of studies of females and risk aversion

	Response variable: risk aversion / unwilling to take risks/ early exit in exit competition			
	Is female	Age	Education	Wealth
Other studies				
Agnew et al. (2008)	Pos.	—	N.R	N.R
Borghans et al. (2009)	Pos.	—	—	—
Dohmen (2010)	Insig.	Insig./Pos.	—	—
Gächter et al. (2010)	Pos.	Pos.	Neg.	Pos.
Hartog et al. (2002)	Pos.	Pos.	Neg.	—
Exit-competition studies				
Botti et al. (2007)	Neg.	—	—	—
Hogarth et al. (2012)	Pos.	—	—	—
Rietveldt (2012)	Insig.	—	—	—
Our experiment	Pos.	Pos.	Pos.	Pos. (insig.)

Notes: Hartog: education/ability proxied by mother's education. Agnew: choice of an annuity (fixed-term asset yielding certain return). Agnew controls for education and wealth but these are not reported.

Problems with the Game Show Findings

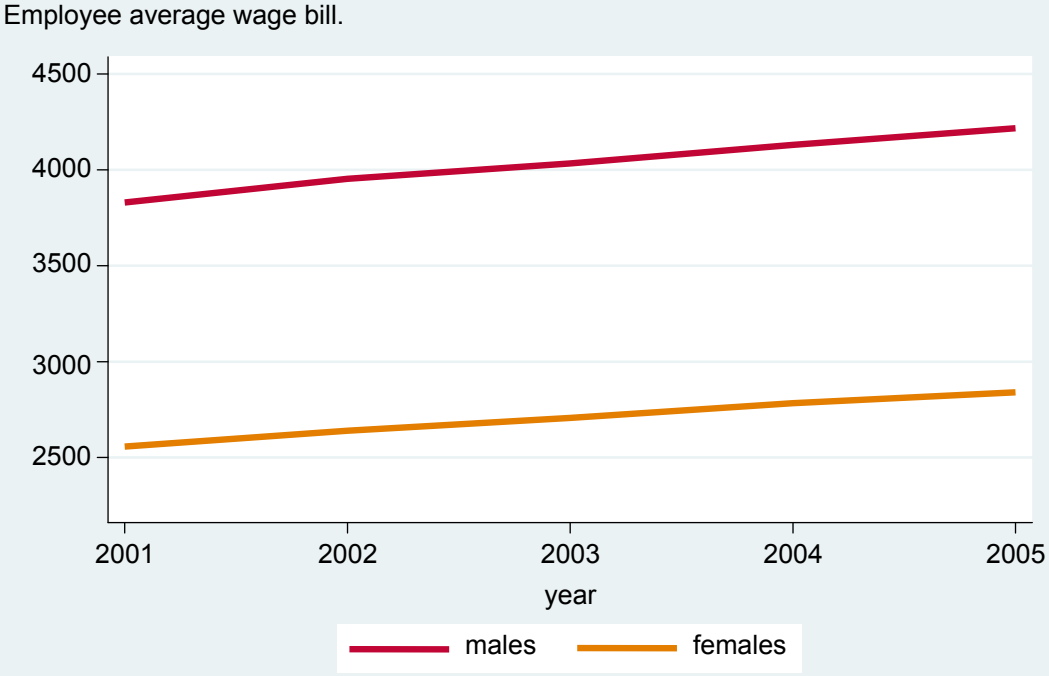
But the game show studies reported above suffer from several shortcomings. The first problem is one of selectivity. Candidates are pre-screened and comprise a pool of 'literate, vocal, heterogeneous people, with at least a middle level income' (Hogarth et al., 2012: 13).

[3] The Dohmen study finds no significant differences between women and men.

Secondly, no information is available regarding the contestant's educational background[4] or income, which is assumed to be relatively homogeneous anyway. The lack of other background information means that researchers assess phenomena such as voluntary exit (which is used as an indicator for risk aversion), but are silent on how other variables, which have been predicted as important determinants of risk aversion in the literature (wealth and education), play a role.

The omission of background information on wealth and education is a problem because, despite efforts to reduce gender differences in incomes and education, such differences persist in many countries. In Germany, for instance, younger women are on average better qualified than men. According to a recent report, German women in the 30–35 age category are more likely to have completed a high-school qualification than their male counterparts (see Bundesministerium für Bildung und Forschung, 2012). Statistics from the German Statistical Bundesamt however, show a marked difference in the male and female wage rate, although this can also reflect the different composition of workers and not point to any difference in headline wages (Figure 1).

Figure 1:
Differences in Male/Female Wage Rates



Own calculations based on estimates from Statistisches Bundesamt, Wiesbaden 2013.
Male workers showed a wage premium of approximately € 600 per month.

[4] The work by Borghans et al. (2009) however, differentiates between participants on the basis of whether they are university educated and on personality traits, although not on income.

If researchers ignore these co-determinants of risk aversion, they will systematically overestimate the gender effect due to omitted variable bias. What do we mean by this? If males and females have unequal earnings power and hence wealth and if the average education attainment of males and females differs, failure to include information on income and education upwardly biases the explanatory power (coefficient) of gender in explaining voluntary exit by females. In other words, gender is an artificially loaded variable, because it mediates differences in income and skills in the absence of information on these potentially important drivers of risk-taking behaviour. Consequently, if income and skills (or other risk-taking correlates, which show differences for men and women) are excluded from estimations, the gender coefficient will be spuriously high. In this case, while researchers might be correct in inferring the direct of the effect (if the covariates work in the same direction as risk aversion), researchers need to be careful in implying the magnitude of any effect. A further reason to include education is theoretically motivated: if females are more likely to shy away from higher risks than their male counterparts, does this evidence hold for equally well educated males and females? The standard argument adopted by managers explaining the lack of senior female staff is, that women are on average lower-skill or do not have the education background for the position. Hence, when we examine the relative risk aversion of women (if it exists), we need also to control for background education in order to see whether there is prima facie support for supply-side discrimination.

Data and Methodology

535 people initially took part in our online experiment of which 305 (57 %) were men and the remaining 230 (43 %) were women. Having cleaned the data to account for individuals, who had played the interactive game on repeated occasions, we were left with 507 participants.

We conducted the experiment as follows. We first devised a computer programme which allowed us to simulate the 'Deal or No Deal' television game show. Similar to work by Guiso and Paiella (2008) and Eisenhauer (2005) our respondents play for fictitious amounts. Each participant, taking part in the game, was given the address to an internet site, where we uploaded the experiment. The simulation was distributed via Facebook but also via an e-mail distribution list. After reading the instructions[5], the participant was free to begin, but before doing so was asked to fill in details regarding age, wealth and education. These personal data were treated anonymously.[6]

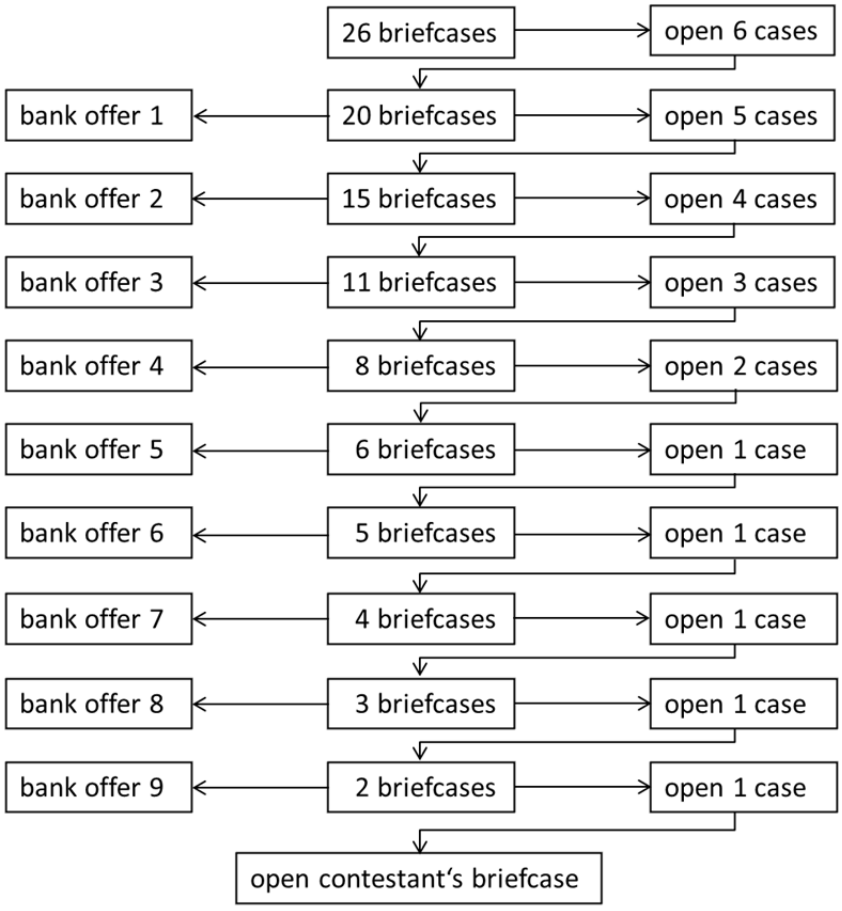
The game proceeds in the following way. The contestant is faced with 26 notional briefcases, whose value is unknown, but which can hold between 0.01 and € 10,000. In the first

[5] The instructions were in German, and so it can be assumed that the majority of respondents were from the German or German-speaking areas.

[6] A copy of our data can be made available on request.

round, the contestant may open 6 suitcases, each opened suitcase, which is eliminated from the set. Before doing so, the contestant picks a suitcase, which remains unopened throughout the game. This suitcase is the candidate's own suitcase for him to 'take-away' after the game. Its contents are unknown, but it is only after progressing through the game that the candidate becomes aware of its true value after he/she has eliminated the other suitcases. Figure 2 illustrates the procedure with 6 suitcases being opened in the first round, followed each case by an offer from the Bank.

Figure 2:
Illustration of the 'Deal or no Deal' simulation



This bank offer is derived by calculating the expected value for the remaining prize and then offering a percentage of this expected value. The percentage offered rises through progressive rounds of the game (second round 15 %, third round 34 %, fourth round 46 %, fifth round 59 %, sixth round 72 %, seventh round 88 %, eighth round 98 %, ninth round 103 %). It is calculated anew after each round because it is predicated on the selection of the briefcases that the candidate has made.[7]

[7] See Post et al. (2008: 46) for an excellent summary of the bank's offer.

Having collated the responses from 535 contestants participating in our online interactive game, we first eliminated observations, where participants appeared to have played the game over multiple sessions. This left us with 507 responses. We then examined the data carefully for outliers. Individuals, showing extreme values for education (the 12 least and best educated), were trimmed from the dataset, because their behaviour was anomalous (the 12 least educated initiated the game, but did not take any suitcase and so could not be said to have taken part). Having trimmed the data (507–24), we were left with 483 useable responses, of which 277 (57 %) were male and 206 (43 %) were female.

Table 2 shows the average values for gender, age, income and number of rounds played as well as average 'profits earned' in the game. Generally, participants were young (25 years), but that is to be expected given that young people are more likely to be able to access and use the site, where we uploaded the programmed multiple-round experiment. Being young, they were also located in the lower regions of the education and income distribution. On average, respondents played at least 7 rounds and earned a little over € 2,000.

Table 2:
Descriptive statistics

	Gender	Age	Education	Income	# rounds played	Bank Offer (€)	Profit (€)
Average	0.43	25	0.51	0.34	7.7	2 580	2 012
S.D.	0.50	6	0.45	0.23	1.8	1987	2308
Max	1	70	1	1	9	9 785	10000
Median	0	23	0.4	0.2	9	2 124	1024
Min	0	15	0	0.2	2	715	0.01

Notes: Values calculated over 483 participants (trimmed data). Education measured as 0 = Student; 0.20 = Trainee; 0.4 = Student; 0.6 = Completed Traineeship; 0.8 = Completed Undergraduate; 0.9 = Completed Masters; 1 = Doctorate. Monthly income takes the values of 0.2 = 0 – € 800; 0.4 = € 801 – € 1500; 0.6 = € 1501 – € 2500; 0.8 = € 2501 – € 3500; 1 = > € 3500; Gender was coded as 1 for females. The Bank Offer represents highest bank offer at which the participant is happy to exit.

The dynamic of the game is visible in Table 3 below, where only one contestant exited by the second round. The %BO shows that by the final round, where the Bank made an offer which exceeded the expected value of the gamble, it make little sense for risk averse individuals to continue playing. The deal column refers to the number of contestants exiting in the round in question.

Table 3 shows the bivariate correlations among the variables, where being female is associated with early exit and with a lower final-round Bank Offer. In terms of statistical significance, the number of rounds played is statistically significant with respect to gender (p-value = 0.086), education (p-value = 0.070) and monthly income (p-value = 0.090). However, it is necessary to carry out a regression in order to infer whether these patterns still hold, when all the variables are taken together.

Table 3:
Bivariate correlations

	Female	Age	Education	Income	# rounds played	Bank Offer (€)
Female	1	–0.04	0.05	–0.11	–0.11	–0.03
Age	–0.04	1	0.47	0.38	–0.05	0.00
Education	0.05	0.47	1	0.42	–0.07	–0.02
Income	–0.11	0.38	0.42	1	–0.07	0.05
# rounds played	–0.11	–0.05	–0.07	–0.07	1	0.38
Bank Offer (€)	–0.03	0.00	–0.02	0.05	0.38	1

Table 4 shows the results of our simple OLS regression. The dependent variable is the exit round variable. Our results demonstrate that gender, age and education have a significant effect on the respondent's risk aversion. All things equal, females, older people and better educated people are more likely to exit the game earlier. Specifically, a female exits, on average 0.12 rounds earlier, an older participant 0.02 rounds earlier and a better educated respondent 0.83 rounds earlier (Table 4).

Table 4:
Number of rounds played by contestant (OLS)

Variable	(1)	(2)
Female	–0.45*** (0.17)	–0.12* (0.09)
Age		–0.02** (0.01)
Education		–0.83*** (0.27)
Income		–0.19 (0.25)
Intercept	7.92*** (0.11)	5.93*** (0.21)
r^2	0.0148	0.7402
Adjusted r^2	0.0128	0.7375
p-value for F	0.86	0.0000

Notes: *; **; *** indicate statistical significance at the 10 %, 5 % and 1 % respectively. Standard errors in parentheses.

The coefficient for females changes between model 1 and model 2, once we accounted for the other background variables (age, education and income). This shows that the explanatory power of gender decreases once additional background information is included. It should also be noted that the model fit increases dramatically with the addition of the additional controls.

Conclusion

What can be concluded on the basis of our findings? There is a reassuring similarity in the female exit patterns in our online experiment and that in several key 'Gender and risk aversion' experiments (see Table 1). However, unlike the experiments which base on game show material, we additionally control for income and skills (educational attainment). Our findings of higher voluntary exit corroborates evidence from all studies (except the Botti et al. and Dohmen studies), which similarly find evidence of higher risk aversion among females. Overall, we find that females are significantly more risk averse than men, exiting on average 0.12 rounds earlier.

Being able to investigate voluntary exit in the context of gender as well as wealth and education means that we can answer the question, 'are women more risk averse than men notwithstanding differences in wealth and education'. Uniquely, we find that studies, which base on game show material and fail to include other background information on participants, may have overestimated the impact of gender on exit. Specifically, in the absence of other background information, females would have been seen to have exited, on average, 0.45 rounds earlier. Our finding highlights the necessity for gender studies to include other determinants of risk aversion, especially where there is an intuition that there are a priori differences in these omitted covariates.

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