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THE TRUST DILEMMA - CONCLUSIONS FROM A POPULAR TV SHOW*

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Abstract. Trust in co-workers and business partners is an essential factor influencing the effectiveness of the production processes of goods and services and cooperation in the market. In this paper, we analyse trust using data from a natural experiment - the Polish edition of the TV game show "Who Wants to Be a Millionaire?". We verify differences in trust between women and men, between urban and rural residents, and the case of low- and high-stake games. Trust was analysed in two ways—trust in a group of strangers and trust in a friend selected earlier. The test for two populations' proportions is conducted. Study shows that women have greater trust than men in the cases of both types of trust. This result is different from those reported in most experimental studies. Women are also more trusting than men in the case of low-stake games, while in the case of high-stake games, the gender difference is blurred. To our best knowledge, this is the first study to use data from a TV show to analyse trust so far.

Keywords: natural experiment; trust; test for two populations' proportions; gender difference

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1. Introduction

Many attempts have been made in the literature to measure and indicate the determinants of trust based on questionnaire surveys or economic experiments (Alesina & La Ferrara, 2002; Ermisch et al., 2009; Naef & Schupp, 2009). However, both approaches have significant limitations. First of all, the results of the questionnaire surveys provide information only about the declared trust, which obviously may differ significantly from what is observed in everyday economic situations (e.g., Sapienza et al., 2013).

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It seems that the solution to this problem is, therefore, experimental research in which a selected group of people is asked to take part in a game or series of games, most often partially cooperative, the aim of which is the broadly understood "victory" that gives the participants a certain reward. Meanwhile, the specific behaviour observed during the game is subject to an analysis of the trust they show (Houser et al., 2010). The collected material is then statistically analysed to find specific demographic or cultural determinants of trust (e.g. Ben-Ner, Halldorsson, 2010). However, the general problem with experimental studies (e.g., a game of trust, a gift-exchange game) is that it is difficult to motivate individuals to behave according to their views because the payments offered are usually contractual or symbolic (Ermisch et al., 2009).

Therefore, it seems that the best solution is an experiment aimed at observing people in natural conditions. In the present study, we focus on the analysis of trust based on the Polish version of the popular TV show "Who Wants to Be a Millionaire?" (WWTBAM). The game show is an excellent example of a natural economic experiment. As the participants may win or lose real money, it can be assumed that their decisions represent a good approximation of their economic preferences. Furthermore, the game show provides substantial cash prizes, which could not be ensured in laboratory settings.

Although there is a lot of research based on various TV shows, the studies mainly deal with risk propensity (Hartley et al., 2014; Daghofer, 2007). The idea of using data from WWTBAM to analyse trust is original. Our study focuses mainly on analysing gender differences in trust (Holmes, 2005). Van den Akker et al. (2020) conducted a meta-analytic review of the literature on sex differences in trust games, which showed that men were more trusting than women. This is the dominant finding of most studies on gender differences in trust. In the present study, we check whether the conclusions from the natural experiment, the WWTBAM game show, are similar. Additionally, we analyse two types of trust—in a friend and a group of strangers—as well as differences in trust between rural and urban citizens and in the case of high- and low-stake games.

The next chapter contains a literature review and the motivation for this study. In section three, we familiarise the reader with the rules of the WWTBAM TV game show. In section four, we discuss the database used. In the fifth section, we present the quantitative method used in the present study. The sixth part is devoted to the presentation of the results of the calculation. The paper ends with a discussion of the results and a summary.

2. Literature Review

The theory of economic growth mentions social capital as one of the vital growth factors, defined as the strength of interpersonal relations in a given economy (Whiteley, 2000; Chou, 2006; Claridge, 2018, Thompson, 2018). Thanks to those relations, the production process is more effective due to the natural cooperation between economic entities (Fedderke et al., 1999; Guzhavina, 2020). With the trust between entrepreneurs, production costs are reduced, usually because protection against the dishonesty of business partners is no longer needed. In an economy where everyone trusts everyone, people work together more effectively (Zhang, Xin, 2019; Choi, Storr, 2020, 2022).

The problem, however, appears in the growth econometrics - it is hard to find a sufficiently good measure of social capital (Durlauf, 2002; Durlauf et al., 2005; Gannon & Roberts, 2020). Despite many attempts of modeling economic growth with a use of such variables as voter turnout, share of blood donors, crime rates etc. (Sztaudynger, 2003) as social capital approximations, it seems that the most frequently used measure is the variable denoted in the literature as "trust", proposed by Zack and Knack (2001). This variable is the share of positive responses to the survey question, "is it true that most people can be trusted?". Values of this variable range from 4% (Colombia) to 78% (Norway) in individual countries. Econometric studies show that this is one of the best approximations of social capital (Beugelsdijk et al., 2004; Bjørnskov, 2007).

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Of course, it is still clear that the estimates of "trust" could be improved. To do this, however, it is necessary to estimate better the level of trust in society. It is clear that the percentage of positive answers to the question "is it true that most people can be trusted?" measures only the declarative level of trust, not necessarily the real one. You can also find examples of similar survey trust measures in the literature, such as "the lollipop index". This index represents the share of positive responses to the question, "would you be willing to let your 7-year-old child go, with money in a hand, to a store outside your area of view to buy a lollipop?" and, according to experts, it measures the relative sense of security of citizens in the neighbourhood in which they are currently located, which of course is also related to the trust of the respondents to the people around them. This example, however, also measures only declarative trust.

To make a reliable measurement of actual trust, it is, therefore, necessary to conduct an economic experiment that places people, without the awareness of being observed, in a situation of need to trust a stranger or to trust people with specific and known socio-demographic characteristics (Karlan, 2005; Naef, Shupp 2009; Bohnet, 2010). There are also many examples of similar experiments in the literature. One of the best known is the so-called "game of trust" (Engle-Warnick & Slonim, 2006; Brülhart & Usunier, 2012; Chetty et al., 2021). In this game, one of the players receives a certain amount of funds and can "trust" and allocate some of them to the other player without any additional conditions and the requirement to repay. The second player may be trustworthy and return a certain amount of funds, multiplied accordingly, to the first player. They may also, without any penalties or reprisals, decide not to give back any money to the first player, left with more funds and thus fail the received trust. Whether granted and respected or not, this trust is the object of interest for researchers in this setup.

A lot of studies were based on this game, where not only the level of trust was examined but also differences in the degree of trust between genders, age groups, inhabitants of cities and villages, wealth, etc. (Croson & Buchan, 1999; Johansson-Stenman et al., 2005; Schwieren & Sutter, 2008; Müller & Schwieren, 2020; Zou et al., 2022). Despite many research successes in this and other experiments, the main issue should be noted. In such experiments, the financial incentives to behave following one's preferences are, for obvious reasons, either contractual (such as intangible rewards for students participating in the experiment - e.g. additional points on an exam in a given subject) or symbolic (i.e. small amounts of money). For researchers, the financial constraint is unfortunately impossible to ignore (Levitt, List, 2007). Moreover, in many cases, participants familiar with the rules of the games and with some experience in gaming (e.g. from education in the field of economic game theory) achieve better results by following their knowledge of what needs to be done to win, while in real situations they would show a higher trust and willingness to cooperate (Frank et al., 1993; Yezer et al., 1996).

Hence the obvious conclusion is that the best opportunity to observe the real trust of individual people would be a natural experiment in which, on the one hand, one could win large amounts of money and on the other - show trust or lack of trust in other people, whose role is to facilitate or make it difficult to win a given game. A great example of such an experiment is the popular game show "Who Wants to Be a Millionaire?" the rules will be presented in detail in section three.

This game show has been the object of interest of researchers: economists, sociologists and linguists. On its basis, factors determining the propensity of players to take the risk were considered (i.e. based on their willingness to answer subsequent questions, taking into account potential losses, see, among others, Johnson, Gleason (2009); the overall risk propensity was estimated based on the CRRA function (Hartley et al., 2014); cultural differences were observed in the set of questions asked to players (Hetsroni, 2005); an attempt was made to determine the optimal game strategy (Perea, Puerto, 2007). So far, however, no study has been conducted with the task to observe the trust placed by players, who have the opportunity to win massive amounts of money or leave with nothing, into a group of strangers, i.e. the audience, or in a "friend" they know, whom they invited themselves to the show.

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The aim of this study is, therefore, to examine the differences between men and women, inhabitants of villages and cities, and the high and low stakes games in the level of trust placed in the audience or a chosen friend. This is the first study using game show data to examine trust factors. The results of this study constitute another argument in the discussion that has been going on for years on the determinants of trust at the microeconomic level. Generalising the results, further research may also attempt to capture macroeconomic differences between economies in the level of trust.

3. Rules of the TV show

"Who Wants to Be a Millionaire?" (WWTBAM) is an international television game show franchise of British origin. Although it is officially known in Poland as "Millionaires", it is based entirely on the original British format. "Millionaires" was broadcast on Polish television several times in 1999–2003 and 2008–2010. In 2017, the game show was resumed using a slightly refreshed formula. Currently, it remains a top-rated program in Poland. According to estimates, the following seasons of the game show were watched by an average of 1.56–2.35 million viewers, comprising 10.83%–14.86% of the country's TV market share among all viewers.

As for the official format, candidates who pass the casting stage participate in the first part of the game based on the "Fast Fingers" qualifiers. Six players are given a closed question with four answers that must be properly lined up. The person who does it the fastest and without errors moves to the following central part of the game: "Hot Seats." During this part of the program, the player answers closed questions concerning general knowledge in various fields. There are four answers to each question, and only one of them is correct in each case. Each subsequent question is associated with an increasing amount of money. In the Hot Seats game, a maximum of 12 questions can be used, and the highest possible prize (one million Polish zlotys) is assigned to the last question.

After hearing the question in the Hot Seats part, the players have two options: answer the question by selecting one of the possible answers or quit the game and take the amount of money accumulated so far. Providing the correct answer will result in winning the amount of money assigned to the question and the continuation of the game, thereby ensuring the possibility of answering the following question to which the more excellent payout value is set. However, if the players give an incorrect answer, they automatically end the game and lose all or part of the amount of money accumulated thus far. There are two thresholds for guaranteed payouts in the game - after the second question (PLN 1,000) and after the seventh question (PLN 40,000). After exceeding them, the players will receive the amount assigned to the guaranteed threshold that has been overcome, even if they answer the following questions incorrectly. The exact values of the cash prize set to the 12 questions in the game ("Correct Answer Value") and the amount of payment received when quitting the game ("Walk Away Value") or giving the wrong answer ("Miss Answer Value") are presented in Table 1.

Table 1. The cash prize in the Millionaires (in Polish zlotys).

Question No.	Correct Answer Value	Walk Away Value	Miss Answer Value
1	500	0	0
2	1000	500	
3	2000	1000	1000
4	5000	2000	
5	10000	5000	
6	20000	10000	
7	40000	20000	
8	75000	40000	40000
9	125000	75000	
10	250000	125000	

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11	500000	250000	
12	1000000	500000	

Source: based on the regulations of the Millionaires

Additionally, to help determine the correct answer, players are given three lifelines: "50:50" (rejection of two wrong answers), "Ask the Audience" (a question is given to the audience, and the players receive detailed statistics on the frequency of each answer given by the audience), and "Phone-A-Friend" (the players are allowed to make a 30-second call to a friend). Each lifeline can be used only once per game for any question that appears in the game. This means that the players can even use up to three different lifelines in one question; however, they will not be able to use them for subsequent questions. Notably, only the "50:50" lifeline gives the players a 100% guarantee that the rejected answers will be wrong. In comparison, the other two lifelines may provide the wrong hint.

In other words, if the players decide to answer the question, they risk being eliminated from the game and losing some or all the money accumulated so far. Using an indication received from a friend on the phone or from an audience in the studio concerns the issue of trust. From the perspective of this paper, it is interesting whether the player decides to trust these suggestions and whether there are gender differences in trust.
In the next section, we present the collected database.

4. Data

The data was collected from 329 episodes of the Polish edition of WWTBAM, broadcast from December 2017 to February 2020. The data included information on 456 Hot Seat games, during which the players were asked 3,199 questions.

In WWTBAM, the issue of trust arises when players use lifelines – "Ask-the-Audience" or "Phone-A-Friend". In the first case, the player receives information about the voting results (on a percentage scale) for the possible correct answer from the studio audience. Therefore, from the player's perspective, the audience is a group of strangers consisting of individuals with various socio-demographic characteristics. The player can then trust that the answer with the highest percentage of votes is correct, choose a different solution, take another lifeline or give up another play. The player's behaviour may thus approximate generalised trust, often used as an approximation of social capital, which plays a vital role in the econometric modelling of long-run economic growth (Zak, Knack, 2001; Bjørnskov, 2012).

For the "Ask-the-Audience" lifeline, trust is represented by a binary variable. It has a value of 1 when, in a given question, the player decides to trust the audience's suggestion (regardless of whether the suggestion is correct or incorrect). It has a value of 0 if the player does not trust the audience (selects a different answer, uses another lifeline, or withdraws from the game).

In the case of the second considered lifeline ("Phone-A-Friend"), the player can have a 30-second telephone conversation with a person selected by the player before the recording. It is, therefore, a person the player knows well and trusts initially. However, during the game, the players do not always trust the friend's suggestions - despite a clear hint, there are cases of giving up the game, using another lifeline, or choosing a different answer. The case when the player answers that the friend previously pointed out may be classified as a case of trust in a friend, while other decision, such as using another lifeline, means that the player did not trust the friend enough to take the risk. Therefore, trust in a friend is also represented by a binary variable, taking the value of 1 when the player trusts the friend's suggestion. There is also a possibility that the friend may not give a clear suggestion (e.g.

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selects two answers and gives them equal probabilities or denies to point any answer at all). Cases of such games have been removed from the sample.

In the next section, the statistical test used in this study is presented.

5. Methods

The collected database was divided into games played by female and male participants, rural and urban participants, and games with high or low stakes.[†] Each of these groups calculated a fraction of trust (the share of the cases where the players trusted a friend or the audience). Then, using the test for statistical differences in two populations' proportions, the occurrence of statistically significant differences in fractions of trust in different populations was verified.

In the test for two populations' proportions, the following hypotheses were adopted:

$$H_0: p_1 = p_2$$
$$H_1: p_1 > p_2,$$

and the following test statistics were used:

$$U = \frac{\frac{m_1}{n_1} - \frac{m_2}{n_2}}{\sqrt{\frac{\bar{p}\bar{q}}{n}}},$$

where p_i denotes the proportion of successes in a group i, n_i refers to the size of the sample i, m_i represents the number of successes in sample i, $\bar{p} = \frac{m_1+m_2}{n_1+n_2}$, $\bar{q} = 1 - \bar{p}$, $n = \frac{n_1 n_2}{n_1+n_2}$, $i = 1, 2$.

When the sample size $n_1 n_2$ is less than 100, an effect size correction with the following test statistic was applied (Cohen, 1988):

$$\widetilde{U} = \left(2 \arcsin \sqrt{\frac{m_1}{n_1}} - 2 \arcsin \sqrt{\frac{m_2}{n_2}} \right) \cdot \sqrt{\frac{n_1 \cdot n_2}{n_1 + n_2}}.$$

The tested hypothesis remains the same as in the case of large samples. If the null hypothesis is true, the test statistic has a standardised normal distribution.

In the next section, we present the results of the tests.

6. Results

All questions ($n = 376$) in which the player decided to use the Ask-the-Audience lifeline were divided according to the player's gender, place of residence, and the amount of stake related to the question. In each of these categories, the trust fraction $\frac{m_i}{n_i}$ was calculated. Then, the statistics U (for $n_1 \geq 100 n_2 \geq 100$) and/or $\widetilde{U}$, with a small subsample size) were determined. The results are presented in Table 2.

[†] Low-stake games match questions 1–7, up to PLN 40,000. High-stake games start from PLN 75,000 (questions 8–12).

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Table 2. The test results for two populations' proportions in the case of trust in the audience's suggestions.

Population 1	n_1	Population 2	n_2	$\frac{m_1}{n_1}$ [%]	$\frac{m_2}{n_2}$ [%]	U or $\widetilde{U}$	p-value
Women	151	Men	225	90.07	85.33	2.75011***	0.0030
Urban	328	Rural	48	88.72	77.08	2.0275**	0.0213
Urban women	127	Rural women	24	90.55	87.5	0.4396	0.3301
Urban men	201	Rural men	24	86.07	79.17	0.8473	0.1984
Urban women	127	Urban men	201	90.55	86.07	2.4803***	0.0066
Low-stake	333	High-stake	43	89.79	67.44	3.4804***	0.0003
Women, low-stake	139	Women, high-stake	12	92.09	66.67	2.1957**	0.0141
Men, low-stake	194	Men, high-stake	31	88.14	67.74	2.611***	0.0045
Women, low-stake	139	Men, low-stake	194	92.09	88.14	2.3758***	0.0088
Women, high-stake	12	Men, high-stake	31	66.67	67.74	0.0674	0.4731

Notes: ***p < 0.001, **p < 0.01, *p < 0.05

Source: own calculations

A similar analysis was carried out for the games where the problem of trusting a friend appeared ($n = 180$ total questions). The results are presented in Table 3.

Table 3. The test results for two populations' proportions in the case of trust in a friend's suggestions.

Population 1	n_1	Population 2	n_2	$\frac{m_1}{n_1}$ [%]	$\frac{m_2}{n_2}$ [%]	U or $\widetilde{U}$	p-value
Women	71	Men	109	85.92	76.15	1.6463**	0.0498
Urban	157	Rural	23	82.17	65.22	1.7448**	0.0405
Urban women	59	Rural women	12	88.14	75.00	1.086	0.1387
Urban men	98	Rural men	11	78.57	54.55	1.6265*	0.0519
Urban women	59	Rural men	11	88.14	54.55	2.3642***	0.009
Low-stake	127	High-stake	53	86.61	64.15	3.2699***	0.0005
Women, low-stake	49	Women, high-stake	22	91.84	72.73	2.024**	0.0215
Men, low-stake	78	Men, high-stake	31	83.33	58.06	2.674***	0.0037
Women, low-stake	49	Men, low-stake	78	91.84	83.33	1.4349*	0.0757
Women, high-stake	22	Men, high-stake	31	72.73	58.06	1.1115	0.1332

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Notes: ***p < 0.001, **p < 0.01, *p < 0.05

Source: own calculations

7. Discussion and Conclusions

The obtained results indicate that women decide to trust both the audience (p-value = 0.0030) and friends (p-value = 0.0498) more often than men. This is the opposite of the conclusions drawn from numerous experimental studies (including Van Den Akker et al., 2020). In particular, Schwieren and Sutter (2008) show that men trust more in the abilities of their interaction partners than women do. Conversely, women are more likely to forgive a breach of trust (Haselhuhn et al., 2015). The main theoretical reason women appear to be less trusting than men is the higher risk-taking of men, which has been observed in many studies. Trust, especially in unknown people, is a testimony of this tendency. In the case of our research, we observe the opposite result, which also appears in some studies (Eckel, Grossman, 1998). Perhaps when the money to be won is at stake, women behave differently than in laboratory settings. The obtained results argue the necessity to conduct further research based on natural economic experiments.

Interestingly, on the one hand, urban residents are also more trusting (for both types of trust) compared with rural residents (p-value = 0.0213 or 0.0405, respectively). This may also be related to the higher risk aversion of city dwellers or the natural habit of meeting more strangers every day and, ultimately, instinctively trusting them (Nummela et al., 2008). On the other hand, no statistically significant differences in trust between urban and rural women are confirmed; analogous results are obtained among men (except for the "Phone-a-friend" lifeline, p-value = 0.0519), even though in each case, the percentage of trust of urban residents is higher. However, it is worth noting that the share of rural players in the sample is relatively low, which is most probably, connected with different risk propensity or, on the other hand, with the process of casting to the show (Reback, Stowe, 2011), which might be easier for urban residents.

The division into high- and low-stake games confirms the conclusions in line with intuition; players are more trusting in low-stake games than in high-stake ones (p-value = 0.0003 in the case of "Ask-the-Audience", or 0.0005 in the case of "Phone-a-friend"). Similar results are obtained, among others, by Johansson-Stenman et al. (2005). It should be assumed that this is associated with a general risk in the game show; during the initial questions, players risk losing relatively small winnings, which facilitates trust, even the one connected with a strange group of people. Risk aversion increases with the number of potential winnings, contributing to a lower tendency to trust, even in the case of a friend's suggestion. The same results appear while studying differences in women and men players groups, despite the type of trust (in the group of strange people or friends).

Interestingly, in the case of low-stake games, women are more trusting than men (p-value = 0.0088 or 0.0757, respectively), but when the amount at stake increases, the gender difference is blurred (p-value = 0.4731 or 0.1332, respectively).

Summing up, based on the data from the Polish edition of the WWTBAM game show, women are more trusting than men in both the cases of trust in a group of strangers ("Ask-the-Audience") and a friend ("Phone-A-Friend"). Similarly, urban residents are, in general, more trusting than their rural counterparts. However, no differences in a trust are found between urban and rural women (or men).

The results also confirm intuitive assumptions: players more often trust the suggestions of the audience and a friend in the case of low-stake games. In the case of low-stake games, women are more trusting than men. In contrast, for high-stake games, the gender difference in trust disappears.

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The present study has some limitations. First of all, some subsamples are very small, which is strictly connected with the rules of the game – the question at high stakes are more complicated, the answers are harder to choose, and there are fewer lifelines to use due to the fact of taking them earlier in the game. Therefore the pressure arises and forces players to resign or give incorrect answers. This implies a much lower number of high-stakes games in comparison to low-stake games (in the case of the "Ask-the-Audience" lifeline, it is 333 to 43 games, and in the case of "Phone-a-Friend" lifeline – 127-53). In the case of the lower number of cases in the subsamples, it is harder to find statistically significant differences. In addition, the available number of women in the game is lower, probably because women are generally less willing to participate in TV shows. This, in turn, also raises the problem of pre-selection players for a game show, which is associated with casting. Studies show that the lower number of women willing to participate forces organisers of the show (who would like to keep a similar number of men and women) to qualify almost all of them, while a substantially higher number of men willing to participate implies inner competition, which results in choosing only better ones. Therefore, the sample might be biased and not representative of the entire population in the country (see Reback, Stowe, 2011).

The method and results of this study can be used in other analyses. The contribution of this study is as follows. First, to the best of our knowledge, this is the first trust analysis using data from a natural experiment like a TV show. Secondly, the obtained results partially confirm and contradict previous results from other studies. In particular, the greater trust placed by women in both the audience and the friend remains in contradiction with the results of the other experiments.

It should be noted, however, that most often, these experiments were not natural experiments but only experiments based on a series of games (e.g. trust games). Third, the results of this study may serve as another argument in the discussion about the determinants of trust towards strangers and friends. Finally, fourthly, the approach used in this paper can serve as an example in other studies, both those based on WWTBAM and other game shows.

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