



## Do women panic more than men? An experimental study of financial decisions



Hubert J. Kiss<sup>a,b</sup>, Ismael Rodriguez-Lara<sup>c,d</sup>, Alfonso Rosa-Garcia<sup>e,\*</sup>

<sup>a</sup> Eötvös Loránd University – Department of Economics, Pázmány Péter sétány 1/a, 1117 Budapest, Hungary

<sup>b</sup> Research fellow in the Momentum (LD-004/2010) Game Theory Research Group at the MTA KRTK, Hungary

<sup>c</sup> Middlesex University London, Business School Hendon Campus, The Burroughs, London NW4 4BT, UK

<sup>d</sup> Research fellow at LUISS Guido Carli University, Rome, Italy

<sup>e</sup> Facultad de Ciencias Jurídicas y de la Empresa, Universidad Católica San Antonio, Campus de Los Jeronimos, s/n, Guadalupe 30107, Murcia, Spain

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### ABSTRACT

We report experimental evidence on gender differences in financial decision-making that involves three depositors choosing whether to keep their money deposited or to withdraw it. We find that one's position in the line, the fact that one is being observed and observed decisions are key determinants in explaining the subjects' behavior. Our main result is that men and women do not react differently to what is observed. However, there are gender differences regarding the effect of being observed: women value the fact of being observed more, while men value the number of subsequent depositors who observe them. Interestingly, risk aversion has no predictive power on depositors' behavior.

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### 1. Introduction

Starting with the run on Northern Rock in the UK in 2007, the financial crisis has shown that bank runs are still a topic of first-order importance worldwide. Other examples include the experiences of Washington Mutual, Bear Stearns, IndyMac Bank, the Bank of East Asia and the fourth largest lender in Spain, Bankia.

During the previous waves of bank runs (the last occurred during the Great Depression), the proportion of male depositors was higher than that of female depositors. However, due to social progress and changes in labor conditions, the gap in the proportion of men and women among banks' depositors is closing. Currently, roughly half of the customers with an account at a formal financial institution in the US are women; this finding is in contrast

to past data (e.g., according to Wright (1999), in 1828, only 11% of the customers of a bank in Philadelphia were women).<sup>1</sup> Similar changes are taking place in developing countries, so it is interesting to determine whether there are gender differences in depositors' behavior.

Gender differences in preferences have been identified in several dimensions (see Croson and Gneezy, 2009 for a review), and these results may have relevant implications concerning how bank runs unfold. More concretely, episodes of bank runs involve depositors observing (at least partially) what other depositors have done (Iyer and Puri, 2012; Kelly and Grada, 2000), and men and women may react differently to their observations of others' actions or the fact that they are being observed. Moreover, women generally

<sup>1</sup> Data from the World Bank indicate that in the US, 84.1% of women and 92% of men over age 15 have an account at a formal financial institution. These amounts (female/male) are fairly close to other developed countries (e.g., 88.8%/92.5% in the Euro area and 96.8%/96% in Japan), but there are sizable differences in less developed countries (e.g., 2.6%/15.4% in Afghanistan and 17%/32.7% in North Africa).

\* Corresponding author. Tel.: +34 968278662.

E-mail addresses: [hubert.kiss@tatk.elte.hu](mailto:hubert.kiss@tatk.elte.hu) (H.J. Kiss),

[I.Rodriguez-Lara@mdx.ac.uk](mailto:I.Rodriguez-Lara@mdx.ac.uk) (I. Rodriguez-Lara), [aros@ucam.edu](mailto:aros@ucam.edu) (A. Rosa-Garcia).

exhibit a higher degree of risk aversion (e.g., Charness and Gneezy, 2012; Croson and Gneezy, 2009), making them possibly more likely to withdraw funds early to guarantee a sure payoff.

We report experimental evidence on gender differences in depositor decision-making. Our experimental design is based on the coordination problem formulated by Diamond and Dybvig (1983), which we modify to allow for different levels of observability. We consider the simplest model, where one impatient depositor needs to withdraw funds immediately and two patient depositors with no urgent liquidity needs decide between keeping their funds deposited (which we also call “waiting”) and withdrawing their funds, with the former action yielding the highest payoff if they both choose it. We define a bank run as a situation in which at least one of the patient depositors withdraws funds. In line with Diamond and Dybvig (1983), liquidity needs are private information, and there is no aggregate uncertainty about the number of patient and impatient depositors. One noteworthy aspect of our design, however, is that depositors choose sequentially between waiting or withdrawing their money, implying that (i) depositors may observe what other depositors have done before making their decision, and (ii) depositors know whether other depositors will observe their decisions.<sup>2</sup>

Based on previous results in the literature (Garratt and Keister, 2009; Kiss et al., 2014), we hypothesize that in addition to gender, three forces may affect the decisions of the patient depositors. The first concerns their observations of other depositors’ decisions. For example, knowing that another depositor has already withdrawn funds may foster panicking behavior and favor further withdrawals because a patient depositor observing that someone else withdraws funds does not know if (s)he is observing an impatient or a patient depositor. On the other hand, depositors at the beginning of the line may behave differently if subsequent depositors are observing their actions. More precisely, if a patient depositor is observed by the other depositors, then (s)he may decide to wait to induce the other patient depositor to wait as well, guaranteeing the highest possible payoff. Finally, we aim to analyze whether attitudes toward risk have some predictive power in depositors’ decisions because risk aversion has been frequently considered a key determinant in financial decisions.

In addition to the previously mentioned factors, this paper also examines whether there are gender differences in withdrawal decisions after controlling for risk preferences. Gender differences in other financial settings (apart from depositor behavior) have been studied extensively. Many studies analyze gender differences in different investment decisions and in portfolio selection (e.g., Bernasek and Shwiff, 2001; Dwyer, Gilkeson, and List, 2002; Felton, Gibson, and Sanbonmatsu, 2003; Martenson, 2008; Sunden and Surette, 1998; Watson and McNaughton, 2007), finding that women are more risk averse and choose more conservative investment strategies. Other papers find gender differences in the way people reacted to the recent financial crisis (see, for instance, Söderberg and Wester, 2012), finding that women were less likely to take action in response to the distress. Although there is a growing experimental and empirical literature on bank runs (see Schotter and Yorulmazer, 2009; Garratt and Keister, 2009; Starr and Yilmaz, 2007; Iyer and Puri, 2012; Brown, Trautmann, and Vlahu, 2012, for some recent examples, and Dufwenberg, 2012, for a survey on experimental banking, including a section on bank runs), to the best of our knowledge, this is the first experimental study that specifically investigates gender differences in this context. We

are only aware of two empirical studies that refer to gender differences in bank run situations (Kelly and Grada, 2000; O’Grada and White, 2003). Both study two bank runs in New York in 1854 and 1857, and gender was not clearly found to play a role in explaining panicking behavior.

The remainder of the paper is organized as follows. In Section 2, we present the bank run game that is played in our experiment, which is detailed in Section 3. We summarize our research questions in Section 4. Section 5 contains the experimental results, and Section 6 concludes.

## 2. The bank run game with observability of actions

In this section, we describe the coordination problem that is played in each round of the experiment. We extend the model of Diamond and Dybvig (1983) to allow for observability of actions, following Kiss et al. (2014). The game has three different stages, as detailed below.

### 2.1. Time $t=0$ . Deposits

At  $t=0$ , a bank with three depositors is formed. Each depositor deposits her/his initial endowment (in our experiment, 80 ECUs) in this bank, which therefore initially has 240 ECUs to be invested in a project. The project yields a guaranteed high return in period  $t=2$ , but the investment can be liquidated at no cost at  $t=1$ .

### 2.2. Time $t=1$ . Types, network structure and depositors’ decisions

At  $t=1$ , the depositors must choose whether they want to withdraw their money from the bank or keep it deposited. We assume that one of the depositors is hit by a liquidity shock at the beginning of  $t=1$  and is forced to withdraw money. We follow Diamond and Dybvig (1983) and further assume that there is no aggregate uncertainty about the liquidity demand; i.e., it is common knowledge that one of the three depositors will need the money and will withdraw with certainty. We refer to this depositor as the impatient depositor, whereas the depositors who can wait to withdraw their money are called patient depositors.

Both the patient and impatient depositors choose their actions in an exogenously determined sequence. Depositor  $i$  chooses in position  $i$ , where  $i=1,2,3$ . Before choosing between withdrawing or waiting, depositor  $i$  learns whether a subsequent depositor  $j>i$  will observe his/her choice. If depositor  $j$  does observe the choice of depositor  $i$ , we say that the link  $ij$  exists, for  $i,j \in \{1,2,3\}$ , and  $i < j$ .<sup>3</sup>

We model the information flow among the depositors through a network. A network is the set of existing links among the depositors. In our setup, there are 8 possible networks: (12, 13, 23), (12, 13), (12, 23), (13, 23), (12), (13), (23), ( $\emptyset$ ), where ( $\emptyset$ ) stands for the empty network that has no links at all, whereas the structure (12, 13, 23) contains all of the possible links; i.e., the link 12, the link 13 and the link 23. This later network therefore represents a fully sequential setup, meaning that the depositors observe all of their predecessors’ actions. In particular, (i) depositor 1 knows that depositors 2 and 3 will observe his/her decision, (ii) depositor 2 chooses after learning what depositor 1 has done and is aware that depositor 3 will observe his/her decision, and (iii) depositor 3 makes his/her decision after learning what depositors 1 and 2 have done. The empty network ( $\emptyset$ ) represents the opposite situation. This network resembles the simultaneous move in Diamond and Dybvig (1983), where depositors decide with no information about

<sup>2</sup> Sequential decisions have recently been considered in bank run experiments (see Garratt and Keister, 2009; Kiss et al., 2012, 2014; Schotter and Yorulmazer, 2009).

<sup>3</sup> As a natural consequence of the existence of the link  $ij$ , depositor  $j$  chooses after learning what depositor  $i$  has done, for  $i < j$  and  $ij \in \{1,2,3\}$ .

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