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Who withdraws first? Line formation during bank runs

Hubert J. Kiss[1,2] Ismael Rodriguez-Lara[3] Alfonso Rosa-Garcia[4]

[1]KRTK, Hungary

[2]Department of Economics, Eotvos Lorand University

[3]Department of Economics, Universidad de Granada

[4]Department of Economics, Universidad de Murcia.

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Abstract

We study how lines form in front of banks. In our model, depositors choose first the level of effort to arrive early at the bank and then whether or not to withdraw their deposit. We argue that the informational environment (i.e. the possibility of observing the action of others) affects the emergence of bank runs and should, therefore, influence the line formation. We test it experimentally and find that the informational environment has no effect on the line formation, while expectations on the occurrence of bank runs, irrationality of depositors and their loss aversion are important factors to explain it.

Keywords: bank run, beliefs, experimental economics, line formation, loss aversion, observability.

JEL Class.: C91, D90, G21, G40, J16

1 Introduction

The last global financial crisis that started in 2007 has shown that bank runs are existing and important phenomena. According to the Federal Deposit Insurance Corporation (FDIC), more than 300 banks failed only in the US in the first three years of the crisis.[1] In many instances, the immediate cause of the failure was a bank run. Such events did not only happen in the US, but occured all over the world in developed and developing countries; take, for example, the DSB Bank in the Netherlands or the Jiangsu Sheyang Rural Commercial Bank in China. Run-like phenomena have also occurred in the repo market (Gorton and Metrick, 2012) or in bank lending (Ivashina and Scharfstein, 2010). These events have noteworthy economic and political consequences (Caprio and Klingebiel, 1999; Laeven and Valencia, 2013; Tooze, 2018), and they also affect individuals' well-being (Montagnoli and Moro, 2018). Governments all over the world took actions to restore the confidence in the financial sector, by increasing the deposit insurance coverage or bailing out failing banks. Understanding bank runs is, hence, of first-order importance to find the right policy responses to deal with them properly in the future.

Since the seminal paper by Diamond and Dybvig (1983) there is an increasing theoretical, empirical and experimental literature that has explored why and how bank runs occur. Some studies highlight the role of policy tools, like suspension of convertibility (Zhu, 2005; Ennis and Keister, 2009; Davis and Reilly, 2016) or deposit insurance (Zhu, 2005; Madies, 2006; Schotter and Yorulmazer, 2009; Kiss et al., 2012; Iyer et al., 2016; Peia and Vranceanu, 2019). Other studies investigate the importance of individual characteristics on depositors' behavior (Gráda and White, 2003; Kiss et al., 2014b, 2016b; Iyer et al., 2016; Dijk, 2017; Shakina and Angerer, 2018). There is, however, a lack of explanations on how the lines are formed in front of the banks. More specifically, we have no evidence on what factors affect the depositors' decision on *when* to go to the bank. As Ennis and Keister (2010) point out: *"In the Diamond-Dybvig tradition, the order in which agents get an opportunity to withdraw is assumed to be exogenously given (generally determined by a random draw). In other words, agents in the model are not allowed to take explicit actions to change their order of arrival. This assumption is, of course, extreme and, unfortunately, not much is known so far about the case where it is not made."*[2] The current paper is an attempt to fill this void in the

[1]This is in sharp contrast with the 22 banks that failed between 2001-2006. The complete list of failed bank can be accessed at `https://www.fdic.gov/bank/individual/failed/`.

[2]As a result, some theoretical models assume that positions are exogeously determined in a random manner; see, e.g., Green and Lin (2003); Andolfatto et al. (2007); Ennis et al. (2009); Kinateder and Kiss (2014).

literature.

Our study builds on the canonical Diamond-Dybvig framework with two types of depositors: impatient depositors (who are hit by a liquidity shock and need to withdraw immediately) and patient depositors (without urgent liquidity needs and who provoke a bank run if they withdraw immediately). We rely on two different information environments (simultaneous and sequential) that differ in whether or not depositors can observe the decision of others when making their decisions. The observability of actions has been shown to be crucial to depositors' behavior in theoretical (Kinateder and Kiss, 2014; Horváth and Kiss, 2016), empirical (Kelly and O Grada, 2000; Starr and Yilmaz, 2007; Iyer and Puri, 2012; Atmaca et al., 2017) and experimental studies (Garratt and Keister, 2009; Schotter and Yorulmazer, 2009; Kiss et al., 2014a, 2018).[3] These papers focus on the reaction of depositors when they observe the action of others, while leaving aside the question on whether (and how) this can affect the willingness to arrive early at the bank. This is the chief question we want to address in the current paper.

Our first informational environment, the simultaneous setup, is characterized by the lack of information about previous decisions, so depositors decide whether or not to withdraw without knowing the decision of preceding depositors, in line with Diamond and Dybvig (1983). The second informational environment, the sequential setup, represents the opposite, so depositors observe all previous decisions. Both of these informational environments resemble conditions akin to bank run episodes that occurred during the last financial crisis. For example, the US bank Washington Mutual experienced massive online withdrawal in September 2008, a so-called "silent bank run" since the decision of other depositors could not be observed. Arguably, the run on the UK bank Northern Rock in 2007 was not silent as depositors could see the long lines in front of the banks and the media covered extensively the events. Our paper highlights that theoretically the observability of actions is key to understand whether or not bank runs emerge as a coordination problem, and this should affect the way in which lines of depositors are formed.

Altogether, we consider a two-stage game. In stage 1, depositors decide simultaneously their effort level to arrive early at the bank and the line is formed accordingly: depositors who make more costly effort to arrive early at the bank (in form of higher bids), get a position at the beginning

[3]There is also evidence that observability of actions affects if a bank run becomes contagious (Brown et al., 2016; Chakravarty et al., 2014; Duffy et al., 2019). For a recent literature review on contagion in financial networks see Glasserman and Young (2016). Duffy (2016), Dufwenberg (2015) and Kiss et al. (2016a) also present recent advances on experimental finance, including a discussion on bank runs.

of the line.[4] In stage 2, depositors decide whether to keep their funds in the bank or to withdraw them immediately. When decisions are simultaneous, there are multiple equilibria in stage 2 in this setting. In the efficient equilibrium resulting in no bank run, patient depositors keep their funds deposited. In the inefficient equilibrium with a bank run, patient depositors withdraw their funds immediately, which is optimal if all patient depositors believe that all other patient depositors will withdraw, making the bank run a self-fulfilling prophecy.[5] When decisions in stage 2 are sequential, there is a unique equilibrium without bank runs. This occurs because the observability of actions solves the coordination problem, thus it is possible to coordinate on the efficient equilibrium (Kiss et al., 2012; Kinateder and Kiss, 2014).[6] The rationale for this result is that patient depositors, by keeping their money in the bank when decisions are observable, are able to induce other patient depositors to keep their funds deposited as well. This, in turn, implies that any withdrawal that is observed should be attributed to an impatient depositor who needs the funds immediately: i.e., patient depositors keep their funds deposited in equilibrium, even if they observe withdrawals from previous depositors.

We rely on backward induction to derive our hypotheses for stage 1 of the game, in which the line of decision is formed endogenously. In the simultaneous setup, beliefs on the occurrence of bank runs determine which equilibrium is chosen in stage 2. As a result, depositors (both patient and impatient ones) should only make a costly effort to arrive early at the bank in stage 1 if they expect a bank run in stage 2, and those who run should withdraw their funds. If no bank run is anticipated, then no costly effort should be made to rush to the bank (see Hypothesis 1 in section 2.3). In the sequential environment, if we assume that bank runs are due to coordination problems, then given the unique no-run equilibrium in stage 2 depositors should make no effort to arrive early at the bank regardless of their types (patient or impatient). Thus, if bank runs are due to coordination problems

[4]We are not aware of any other paper that endogeneizes the order of decisions in a bank run model, but there have been other attempts in the literature, including models of herding (Ivanov et al., 2013), war of attrition (Wagner, 2018) or investment environments (Brindisi et al., 2014).

[5]Similarly to Diamond and Dybvig (1983), the bank in our setup does not have any fundamental problem, so bank runs arise due to coordination problems among the depositors. Although fundamentally weaker banks are more likely to be affected by bank runs, there is empirical evidence that even fundamentally healthy financial intermediaries suffer bank runs (e.g. Saunders and Wilson, 1996; Kindleberger and O'Keefe, 2003; Davison and Ramirez, 2014; De Graeve and Karas, 2014). In fact, fundamentals are important but leave unexplained part of the banking failures (e.g. Ennis, 2003; Boyd et al., 2014).

[6]Arifovic et al. (2013) provide experimental evidence that the difficulty of coordination affects the emergence of bank runs.

among depositors, then we expect to see that depositors put more effort to arrive early at the bank in the simultaneous than in the sequential environment (see Hypothesis 2 in section 2.3). Furthermore, we expect that patient and impatient depositors will not behave differently in stage 1 in any of the informational environments; e.g., if they have the same expectations regarding the occurrence of bank runs in stage 2. However, the observation of withdrawals can perturb the beliefs of depositors about the occurrence of bank runs. Kiss et al. (2018) indeed find that patient depositors tend to run when decisions are observable because they attribute the observed withdrawals to other patient depositors, contrary to the theoretical prediction. Kiss et al. (2018) refer to these bank runs that occur after observing previous decisions as *panic bank runs*. Then, if depositors expect a panic bank run in stage 2, both patient and impatient depositors have incentives to make costly efforts in order to arrive earlier at the bank (see Hypothesis 3 in section 2.3).

We test these hypotheses by means of a laboratory experiment. When comparing the behavior in stage 1 in the simultaneous and the sequential environment, we find that depositors make similar efforts in both environments. In the simultaneous environment, the depositors' beliefs about the occurrence of bank runs predicts their withdrawal decisions (i.e., depositors are more likely to withdraw when they expect a bank run). These expectations on the ocurrence of bank runs do also influence their decision on *when* to arrive at the bank (i.e., patient depositors who want to withdraw their funds in the simultaneous environment arrive earlier at the bank). In addition, we do not find differences in the costly efforts to arrive early across liquidity types (patient vs. impatient) in the simultaneous environment. These findings support our Hypothesis 1. In the sequential environment, we find that two factors can explain the costly effort made by patient depositors. On the one hand, there is evidence that some patient depositors are irrational and rush to withdraw their deposit. On the other hand, we find a substantial share of subjects that seem to anticipate that bank runs may occur because of panic. These subjects make costly efforts to arrive early at the bank and keep the funds deposited so as to facilitate coordination on the efficient outcome. Thus, our findings suggest that panic bank runs are the main explanation for the line formation in the sequential environment, as suggested by our Hypothesis 3.

We use our experiment to get some additional insights into the behavior of depositors. Starting with Diamond and Dybvig (1983) most of the theoretical studies on bank runs assume that depositors are homogeneous, except for their liquidity needs (Green and Lin, 2000; Zhu, 2005; Ennis and Keister, 2009). However, depositors in real life differ in a myriad of ways. To account for heterogeneity, we measure some relevant individual traits of the participants in the experiment. More concretely, we collect data on gender and attitude toward uncertainty (risk aversion, loss aversion, ambiguity aversion). Moreover, we control for a wide range of other variables, like age, cognitive abilities, income, trust in institutions or personality traits (Big Five and Social Value Orientation). Our strong interest in the attitude toward uncertainty is motivated by the fact that in many countries regulation requires banks to draw a risk profile of the customers (see, e.g., the Markets in Financial Instruments Directive (MiFID) in the EU, Article 25/2 of European Parliament (2014) or Article 30/1 of European Parliament (2016).) In our analysis, loss aversion indeed emerges as an important factor to explain the formation of the line and the depositors' decisions. Thus, we find that loss averse depositors are less (more) likely to arrive early at the bank in the simultaneous (sequential) environment, respectively. Loss averse depositors are also more likely to panic when they observe a withdrawal. As a result, theory should consider incorporating loss aversion into models of bank runs.[7] Finally, our findings suggest that men and women may behave differently during bank run episodes, depending on the informational environment. Other factors that we controlled for (e.g., individual traits) do not have a consistent and significant effect. Previous research has studied the effect of individual characteristics on the willingness to withdraw (Gráda and White, 2003; Trautmann and Vlahu, 2013; Kiss et al., 2016b, 2014b; Iyer et al., 2016; Dijk, 2017; Shakina and Angerer, 2018). We contribute to this literature by looking at the determinants of the line formation.[8]

In our study, we consider a series of factors that can be affected by policy (e.g., the informational environment), while others cannot (e.g., individual characteristics). Policymakers should try to assess how all these factors affect the willingness to arrive early at the bank so as to design optimal policies that can prevent bank runs; e.g., setting up deposit insurance depending on the degree of risk aversion of depositors or promoting the informational environment leading to less runs. Importantly, we show that expectations of depositors are crucial to explain their behavior and we think that expectations can be affected by credible policies; e.g., a well-functioning deposit insurance may make depositors believe that other depositors are not likely to withdraw.

The rest of the paper is structured as follows. Section 2 presents our model and the testable hypotheses. Section 3 contains the experimental design and the procedures. In section 4 we present

[7]This is in line with recent experimental findings (e.g. Haigh and List, 2005; Trautmann and Vlahu, 2013; Rau, 2014; Huber et al., 2017) pointing out that loss aversion is important to financial decisions.

[8]There has been other approaches that give depositors multiple opportunities to withdraw, thus allowing depositors to decide when to withdraw (Gu, 2011; Garratt and Keister, 2009; Schotter and Yorulmazer, 2009; Shakina and Angerer, 2018).

the results. Section 5 concludes.

2 Model and Hypotheses

We present our theoretical framework in section 2.1. In section 2.2 we discuss the underlying assumptions of our model before deriving the hypotheses for each informational environment in Section 2.3. Section 2.4 discusses the potential influence of individual traits on depositors' behavior.

2.1 The bank run game with line formation

We extend the bank run game in Kiss et al. (2014a) to incorporate a stage in which depositors can make costly efforts (in form of a bid) to obtain a position in the line. In our model, there are three depositors, each of them endowed with 60 ECUs. From this initial endowment 40 ECUs are automatically deposited in a common bank at $t = 0$.[9] The bank will invest the total endowment (120 ECUs) in a risk-free project that yields a guaranteed positive net return after $t = 2$. The bank, however, can liquidate any fraction of the investment before the project is carried out.

Depositors learn their liquidity needs after depositing their endowment in the bank. In particular, one of the depositors is hit by a liquidity shock and is forced to withdraw her funds from the bank. We follow Diamond and Dybvig (1983) and 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 choose to keep their funds deposited or to withdraw are called patient depositors.

After depositors learn their liquidity needs (patient or impatient), they bid (simultaneously) for a position in the line at $t = 1$. We interpret the bid as the level of costly effort to arrive early at the bank that depositors are willing to exert.[10] In stage 2, depositors choose according to the order determined by the bids between withdrawing their funds from the bank or keeping them deposited. We hereafter refer to depositor i as the one in position i={1,2,3}.

Payoffs depend on the position in the line and on the decisions of the other depositors at $t = 2$

[9]The three-depositor setting is the simplest one to study the coordination problem embedded in Diamond and Dybvig (1983) (for a more general result see Kinateder and Kiss (2014)). In our analysis, we disregard the pre-deposit game described by Peck and Shell (2003).

[10]In real life the costly effort need not be monetary, it may involve for instance the opportunity cost related to spending time and effort on withdrawing early from the bank.

Your position in the line	If you withdraw	If you keep your money deposited and … another depositor keeps her funds in the bank	If you keep your money deposited and … you are the only one who keeps the money deposited
1.	50		
2.	50	70	30
3.	20 or 50		

Table 1: Payoffs of the bank run game depending on the position of depositors and their choices.

(see Table 1). If a depositor decides to withdraw, she immediately receives 50 ECUs as long as there is enough money in the bank to pay this amount (out of this amount, 40 ECUs correspond to the initial endowment and 10 ECUs are obtained in the form of interest). In our experiment, if depositor 1 or 2 withdraws, she definitely receives 50 ECUs. However, if depositor 3 decides to withdraw after two withdrawals, she only receives 20 ECUs (the bank has only 20 ECUs left to pay depositor 3, because the first two depositors who withdrew received 50 ECUs each). Nonetheless, if depositor 3 withdraws after less than two withdrawals, the bank pays her 50 ECUs.

Depositors who keep their funds deposited are paid at $t = 2$ once the bank carries out the project (see Figure 1). The amount that depositors receive depends on the total number of depositors who keep their money in the bank at $t = 2$. If only one depositor keeps her money deposited, she receives 30 ECUs. If two depositors do so, then their payoff is 70 ECUs. Note that position in the line is only relevant if there is a run (i.e., when a patient depositor withdraws), because then arriving late (that is, in position 3) yields only 20 ECUs instead of 50 ECUs.

The sequence of events is presented in Figure 1.

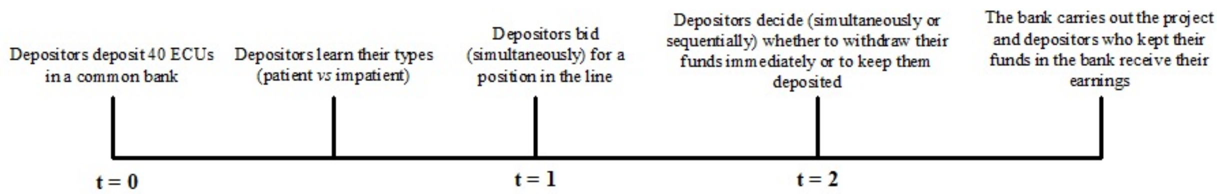

Figure 1: Sequence of events in the game

2.2 Underlying assumptions and parametrization

Before discussing our hypotheses, there are some aspects of our model that are worth mentioning. First, we constrain the bid at $t = 1$ to be an integer number between 0 and 20, both included. This assumption implies that depositors can only bid the part of their endowment that was not deposited in the bank and imposes some form of rationality because depositors cannot have losses in the experiment. Further, the amount not used for bidding adds to the final payoff of the depositor. For example, if a patient depositor bids 15 and only the impatient depositor withdraws, then she receives (20-15)+70=75 ECUs.

Second, our model assumes that depositors who withdraw receive their money immediately, while those who keep their funds deposited receive the money once the bank carries out the project. This is important for the return on investment (ROI) and the liquidation costs. When only the impatient depositor withdraws, she receives 50 ECUs immediately and 70 ECUs are invested into the project, thus the patient depositors who keep their funds deposited receive 70 ECUs each (i.e., 140 ECUs in total). This corresponds to a ROI equal to $(140 - 70)/70 = 100\%$. However, if one of the patient depositor withdraws early, the one who keeps her funds deposited receives 30 ECUs (after an investment of 20 ECUs). This corresponds to a ROI equal to $(30 - 20)/20 = 50\%$. As a result, we (implicitly) assume that there is a liquidation cost for the bank if patient depositors withdraw early, similarly to other bank run studies (Cooper and Ross, 1998; Ennis and Keister, 2009).

We want to study the behavior of depositors in two different informational environments, depending on whether or not they can observe the action of other depositors. The fact that *all* decisions can be observed in our sequential environment implies that depositors do not only observe the withdrawal decision of others but also know whether others have kept their funds deposited. This assumption is part of recent theoretical models (Green and Lin, 2003; Kinateder and Kiss, 2014) and supported by empirical studies; e.g., showing that depositors observe the decision of others in their social network or neighbourhood (Kelly and O Grada, 2000; Starr and Yilmaz, 2007; Iyer and Puri, 2012; Iyer et al., 2016; Atmaca et al., 2017). Experimental studies have also incorporated this feature; see, among others, Kiss et al. (2014a, 2018) or Shakina and Angerer (2018).

Finally, it is worth noting that a patient depositor in position 3 should always keep her funds deposited, regardless of what she observes (if anything). This is because keeping the funds deposited always entails higher payoffs to a patient depositor 3 than withdrawing for any possible history of decisions; i.e., after two withdrawals, depositor 3 receives 30 ECUs if she keeps her funds deposited and 20 ECUs if she withdraws. If a depositor keeps her money in the bank and only the impatient depositor withdraws, then in position 3 it is better to keep the funds deposited and earn the highest payoff (70 ECUs vs. 50 ECUs). This feature of our model is also present in Green and Lin (2003) or Ennis and Keister (2010).[11] In fact, this will help us to identify irrational depositors to test whether irrationality affects behavior.

2.3 Hypotheses

We focus on the polar situations in which observation of decisions is either absent or complete, corresponding to the simultaneous environment (previous decisions cannot be observed) or the sequential environment (both keeping the money deposited and withdrawal are observable and depositors decide sequentially according to their position in the line).

Simultaneous environment. In the simultaneous environment, in $t = 2$ depositors are playing a minimal version of the coordination problem embedded in Diamond and Dybvig (1983). We made this setup as close to Diamond and Dybvig (1983) as possible, so depositors do not know neither their position, nor the decisions of the other depositors when deciding whether to withdraw. For any possible line, there are two equilibria in pure strategies, one where both patient depositors keep their money in the bank (the efficient equilibrium) and one where both patient depositors withdraw (the bank run equilibrium).

If patient depositors expect to choose the efficient outcome in $t = 2$ (in other words, both patient depositors believe that the other patient depositor keeps her funds deposited), there is no incentive to make a costly effort to arrive early, thus a bid of 0 is the optimal strategy in $t = 1$. If the bank run equilibrium is expected to be played in $t = 2$ (that is, a patient depositor believes that the other patient depositor withdraws), a patient depositor best responds by spending some amount of money in the bidding stage in $t = 1$ to get earlier to the bank than one of the other depositors, so she will bid a positive amount. That is, the patient depositor submits the minimal amount that she considers necessary to arrive in position 1 or 2 at the bank and to receive 50 ECUs.

[11] In their revision of the literature, Ennis and Keister (2010) describe this feature as follows: *"Suppose, for example, that all of these agents have chosen to withdraw early. Then this last agent knows that if she chooses to withdraw early, she will receive whatever resources are left in the bank. If she chooses to wait, however, she will receive the matured value of these assets in the later period, which is larger. Hence, if she is patient, she is strictly better off waiting to withdraw."*

The impatient depositor has no incentive to make costly efforts to arrive early at the bank if she expects no withdrawals or only one withdrawal from the patient depositors. If she expects that both patient depositors withdraw, then the same line of reasoning applies to her as to the patient depositor who expects the other patient depositor to withdraw. Thus, in this case she will bid the conjectured minimum positive amount that allows her to arrive early at the bank. In fact, both the patient and the impatient depositors have the same incentives to arrive early at the bank if they expect a bank run, thus we expect them to bid equally.

Hypothesis 1 (Simultaneous environment): *In the simultaneous setup, the effort to arrive early at the bank (i.e., the bids) depends on the expectations about the occurrence of bank runs. If a patient depositor expects the other patient depositor to withdraw, then she submits a positive bid to arrive early (in position 1 or 2) at the bank. If the impatient depositor expects that both patient depositors withdraw, then she submits a positive bid to arrive early at the bank. If no bank run is expected, then depositors submit a zero bid. Conditional on their expectations on the occurrence of bank runs, patient and impatient depositors do not bid differently.*

Sequential environment. In the sequential environment, there is a unique perfect Bayesian equilibrium without bank runs in $t = 2$ (Kinateder and Kiss, 2014; Kiss et al., 2014a). This occurs because any patient depositor who observes that somebody has chosen to keep her funds deposited should do so as well in order to coordinate on the efficient equilibrium, yielding the highest payoff. By backward induction and sequential rationality, any patient depositor who arrives first at the bank will keep her money in the bank to induce the other patient depositor to follow suit. As a consequence, any withdrawal in position 1 that is observed should be attributed to the impatient depositor. Then, upon observing a withdrawal a patient depositor should keep her money in the bank, expecting that the other patient depositor in position 3 will do the same. This, in turn, implies that the observability of previous decisions solves the coordination problem in $t = 2$, therefore depositors have no incentives to make any costly efforts to arrive early at the bank; i.e., depositors should bid nothing in the bidding stage in ($t = 1$), regardless of their liquidity needs.

Hypothesis 2 (Sequential environment and bank runs due to coordination problems): *In the sequential environment, bank runs do not occur in stage 2 due to coordination problem among depositors; thus both patient and impatient depositors make no effort to arrive early at the bank and submit a zero bid.*

Although the sequential environment solves the coordination problem, Kiss et al. (2018) argue that the observation of withdrawals distorts depositors' beliefs that a bank run is underway. More concretely, they find that patient depositors tend to attribute an observed withdrawal to the other patient depositor instead of to the impatient one. As a result, depositors who observe a withdrawal are likely to withdraw as well (see also Garratt and Keister, 2009; Schotter and Yorulmazer, 2009; Kiss et al., 2014a). Kiss et al. (2018) refer to these bank runs that do not occur because of fundamental problems or a coordination issue as *panic bank runs.* Their result suggests a different hypothesis than the previous one. If depositors believe that a panic bank run can take place in stage 2, then depositors may make costly efforts in stage 1 to arrive early at the bank.

Hypothesis 3 (Sequential environment and bank runs due to panic behavior): *In the sequential environment, depositors may submit positive bids in stage 1 of the game to arrive early at the bank if they believe that there will be a panic bank run.*

In principle, the reason for patient depositors to bid in the sequential environment when a panic bank run is underway is twofold. On the one hand, patient depositors have incentives to make a costly effort to arrive early at the bank in order to keep the money deposited. This way, the other patient depositor will observe her decision and this will facilitate the coordination on the efficient outcome (if the first depositor who acts is the impatient one, the observation of withdrawal may result in a bank run). This idea is somewhat reminiscent of what Choi et al. (2011) call strategic commitment and it is supported by recent experimental findings showing that subjects may be willing to pay to reveal their types and facilitate coordination on the efficient equilibrium (Masiliunas, 2017; Kinateder et al., 2015). A second possibility is to bid and withdraw. This is reasonable if the patient depositor thinks that the other patient depositor will withdraw for sure, thus the patient depositor receives a guaranteed payoff of 50 ECUs, rather than 30 ECUs corresponding to keeping the funds deposited alone. When assessing both options, the patient depositor should find it optimal to keep her funds deposited whenever she believes that the other patient depositor will be rational enough and will choose the efficient outcome upon observing that somebody has already kept her money in the bank. Otherwise, if she believes that the other patient depositor is not rational and withdraws even upon observing that somebody kept her funds deposited, then she is better off if she withdraws. As for the behavior of the impatient depositors, her expectation regarding the occurrence of (panic) bank runs is also key to determine whether or not she should make any costly effort to arrive early at the bank. If the impatient depositor believes that there will be no coordination problems (i.e., both patient depositors will wait), then she should bid nothing. If the impatient depositor expects a (panic) bank run, then she has incentives to bid in order to arrive earlier at the bank.

2.4 Individual traits

The previous theory is silent about the magnitude of the bids, but it is natural to think that the size of the bid is affected by individual traits. In our experiment, we use a questionnaire to elicit a series of variables that we believe to be important for bidding behavior.

In the experimental literature on bank runs, there is no consensus on whether women make different choices than men. Kiss et al. (2014b) and Shakina (2019) do not find gender differences in the withdrawal decisions, while Dijk (2017) reports that women are more likely to withdraw when fear is induced to participants. On the contrary, the experimental evidence on bidding behavior seems to support the hypothesis that men and women bid differently; e.g., Rutström (1998) finds that women exhibit more variance in bidding choices than men do, and Ham and Kagel (2006), Casari et al. (2007), Chen et al. (2015), Price and Sheremeta (2015), among others, find that women tend to bid higher in auctions. In our game, it is unclear if these result hold when bidding for position in a bank run game, thus we test whether gender affects bidding behavior in our informational environments.

In our experiment, we also elicit risk, loss and ambiguity aversion (see Appendix B for further details). We expect that the more a depositor dislikes uncertainty or loss, the more she is willing to pay to avoid it. However, it may have different effects in the different setups. In the simultaneous setup, a way to secure a payoff is to be in position 1 or 2 and withdraw, that leads to a sure 50 ECUs instead of facing i) the uncertainty of the 70 / 30 ECUs, or ii) a potential loss if she receives only 30 ECUs. Hence, if we consider two depositors in the simultaneous environment, both of them expecting that at least one of the patient depositors withdraws, we conjecture that the one who is more averse to uncertainty or loss will bid more. As commented before, in the sequential environment a patient depositor may want to bid high to be the first to decide in stage 2 and she may choose to keep her funds deposited and hence induce the other patient depositor to do so as well, both of them earning 70 ECUs. Thus, here the high bid to be the first would lead to keeping the money in the bank, in contrast to the simultaneous case. However, in both cases, the more averse is a depositor to uncertainty or loss, the more she would bid, *ceteris paribus.*

We measure the rest of the variables (cognitive abilities, income, trust, or personality traits) mainly in order to control for them in the analysis and to avoid confounds.

3 The experiment

3.1 Experimental design and procedures

We recruited a total of 312 subjects (156 for the simultaneous environment and 156 for the sequential one) with no previous experience in coordination problems or experiments on financial decisions. We ran six sessions with 24 subjects each at the Laboratory for Theoretical and Experimental Economics (LATEX) of Universidad de Alicante and four sessions with 42 subjects each at the Laboratory for Research in Experimental and Behavioural Economics (LINEEX) of Universitat de Valencia between October 2015 and February 2016.[12]

The experiment was programmed using the z-Tree software (Fischbacher, 2007). Instructions were read aloud and the bank run game was played twice. The first time served as a trial so that participants can get familiarized with the game and the software. No results were communicated to the subjects after this trial, nor was there any related payment. The second play was relevant for the final payment (section A in the Appendix contains the instructions).

We employed the strategy method in each of the two informational environments, where subjects made two different types of choices.[13] The first one concerned a first-price auction, in which subjects decided what amount of their endowment not deposited in the bank (between 0 and 20 ECUs) to bid for a position in the line. Subjects knew that the first / second / third depositor in the line would be the depositor who submitted the highest / second highest / lowest bid. Subjects were asked to bid both as patient and impatient depositors, thus we can use a within-subject approach to test for differences in the bidding behavior of patient and impatient depositors.

After their bidding decision, participants were asked to decide what to do if they arrived at the bank and had the possibility of withdrawing or keeping their money deposited. Recall that impatient depositors are forced to withdraw, thus we were only interested in the decision of the patient depositors. In the simultaneous environment, patient depositors made their choices without any further information apart from knowing their own bids. In the sequential environment, they were asked to make a choice in six different situations:

[12] As a result, we have 72 participants from Alicante and 84 from Valencia in each informational environment. Having detected no significant differences across locations, we pool the observations.

[13] The strategy method allows us to gather data in every possible situation. Brandts and Charness (2011) finds that this method does not yield signi?cant di?erences compared with the direct-response method.

- If she arrived first to the bank and did not observe anything.
- If she arrived second and observed that the first depositor had kept her money deposited.
- If she arrived second and observed that the first depositor had withdrawn.
- If she arrived third and observed that the first depositor had kept her funds deposited and the second depositor had withdrawn.
- If she arrived third and observed that the first depositor had withdrawn and the second depositor had kept her funds deposited.
- If she arrived third and observed that the first and the second depositor had withdrawn.

After subjects made their choices in the bank run game, they filled out a questionnaire that was used to collect additional information about a set of socio-economic variables (see Appendix B). In the sessions run in Valencia, we elicited the subjects beliefs' about their position in the line and the decision of other depositors, as detailed below. To avoid any wealth effect that may distort the behavior of subjects in these subsequent phases, the formation of banks and the realization of payoffs in the bank run game was postponed to the end of the experiment.

3.2 Elicitation of beliefs

When subjects completed the questionnaire in our experimental sessions in Valencia ($N = 168$ subjects), we elicited their beliefs both regarding position in the line and decisions of the other depositors. More concretely, we asked in both informational environments (simultaneous and sequential) and for both roles (impatient and patient depositor) what position they believed to obtain when they submitted their bids.[14]

We also elicited subjects' expectations regarding the occurrence of bank runs in each of the informational environments. To do so, we asked impatient depositors their belief regarding the behavior of the patient depositors. More specifically, we asked when in the role of the impatient depositor what the subjects believed about how many of the other depositors (0, 1 or 2) chose to withdraw. In the simultaneous environment, we also asked this question when in the role of

[14]In principle, subjects could bid without thinking about the position in the line. At the end of the experiment, only 5% of the subjects reported that they did not think about their position when submitting their bids. We perform a robustness analysis in the Appendix in section C, where we show that our results are robust if we exclude these subjects from the analysis.

the patient depositor. Since the impatient depositor was forced to withdraw, the possible answers were restricted to 1 and 2. The answer to these questions allows us to determine whether or not depositors expect a bank run to occur.

Finally, in the sequential environment when in the role of patient depositor we asked the belief upon observing a withdrawal in position 2. More concretely, subjects had to decide which of the following three alternatives was most likely: 1) Depositor 1 who withdrew was the impatient depositor (forced to withdraw), 2) Depositor 1 who withdrew was the one who could choose between keeping the money deposited and withdrawal, or 3) The two previous options are equally likely. This is to assess whether participants attribute an observed withdrawal to the impatient depositor (as predicted by rationality and the coordination explanation of bank runs) or to the patient depositor (as suggested by panic bank runs).[15]

3.3 Payment to participants

Once the experiment finished, the computer paired participants randomly to form banks of three depositors and assigned the role of patient and impatient depositors at random. Payoffs were computed according to the bidding behavior and the withdrawal decisions of subjects in the bank run game (given their role).

Subjects were also paid for their choices in the questionnaire. In particular, we selected at random one of the three tasks that were used to elicit risk attitudes, loss aversion and ambiguity.[16] At the end of the experiment, the ECUs earned during the experiment were converted into Euros at the rate 10 ECUs = 1 Euro. The experiment lasted approximately 1 h. The average earnings were 10.5 Euros.

[15]We decided to elicit the beliefs of the patient depositor regarding the behavior of the other patient depositor in the sequential environment only for the case when observing a withdrawal. Asking this belief for all information set would have been cumbersome without much value added as in most of the information set the beliefs must be clear. For instance, in position 3 when observing all previous decisions the depositor can infer perfectly what the other patient depositor did. The same is true when in position 2 a depositor observes that somebody has kept her funds deposited.

[16]We also paid subjects if they guessed correctly their performance in the CRT or if they guessed correctly the number of questions answered correctly by another random participant.

4 Experimental results

Our theory builds on the assumption that the observability of actions should facilitate successful coordination on the no-bank-run outcome in the sequential environment. Figure 2 summarizes the beliefs of impatient depositors regarding the occurrence of bank run in each of the informational environments. According to the test of proportion, depositors expect more bank runs in the simultaneous environment ($p < 0.01$).[17]

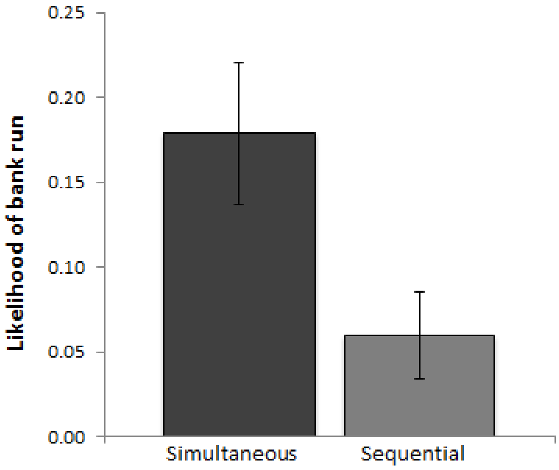

Figure 2: Beliefs on the likelihood of bank run in each informational environment. The vertical lines plot the standard errors of each mean.

Finding 1: *Depositors recognize the importance of observability and believe that bank runs will be less likely in the sequential than in the simultaneous environment.*

This result supports our hypothesized assumption that the observability of actions should facilitate coordination on the no-bank-run outcome in the sequential environment. Next, we investigate whether (and how) this affects the formation of the line (section 4.1) and the behavior of depositors in the bank run game (section 4.2).

[17]Recall that there is a (no) bank-run equilibrium if (none) both patient depositors withdraw their funds from the bank. We find that roughly 37% (44%) of depositors expect to see no withdrawals in the simultaneous (sequential) environment, while 18% (6%) of depositors expect that both patient depositors will withdraw in the simultaneous (sequential) environment, respectively. Statistically, the Kruskal-Wallis equality-of-populations rank test rejects the null hypothesis that depositors expect the same behavior in the two environments ($p = 0.049$).

4.1 Behavior of depositors in the bidding stage

The upper panel of Table 2 summarizes the average bids (with corresponding standard deviations in brackets) for each type of depositor (patient/impatient) in each possible informational environment (simultaneous/sequential), depending on the depositors' beliefs regarding their position in the line. The lower panel of Table 2 reports the average bid (standard deviation), the median bid, and the frequency of positive bids for each case.

	Simultaneous		Sequential	
	Patient	Impatient	Patient	Impatient
Believed position				
1	13.68 (4.41)	12.73 (4.44)	11.12 (6.11)	12.79 (5.12)
2	8.83 (3.37)	7.97 (2.28)	8.03 (3.80)	7.09 (2.94)
3	1.48 (1.66)	3.44 (4.32)	2.05 (4.68)	2.06 (2.88)
Average bid	7.25 (4.87)	7.53 (5.31)	7.15 (5.37)	6.96 (5.21)
Median bid	7	8	7	6
% Positive bid	88%	93%	88%	88%

Table 2: Summary of bids unconditional and conditional on the depositors' belief about their position

We observe that depositors who believe to be in position 1 bid more on average than depositors who believe to be in position 2 or 3. The same holds for subsequent depositors, that is depositors who believe to be in position 2 bid more than depositors who believe to be in position 3. There is indeed a significant correlation between the depositors' bid and their expected position in the line (p-value < 0.0001).

Finding 2: *Bids and expected positions correlate significantly; i.e., those depositors who believe that they arrive earlier at the bank bid more.*

At the bottom panel we find that depositors bid around 7.20 ECUs (roughly 36% of their endowment) regardless of their role or the informational environment. Moreover, around 90% of the subjects bid a positive amount to arrive early at the bank. This is in sharp contrast with Hypothesis 2 that conjectures that depositors should bid nothing in the sequential environment, if bank runs are due to coordination problem. A non-parametric analysis indeed suggests that there are no differences in bids of patient and impatient depositors across informational environments

(p >0.35).[18]

A plausible explanation of the high bids in the sequential environment is related to the rationality of depositors (Kiss et al., 2016b; Shakina and Angerer, 2018). This can be measured in two ways in our sequential environment. On the one hand, depositor 3 has a dominant strategy and should keep the funds deposited if patient. On the other hand, any patient depositor should keep her funds deposited in position 2 if she observes that depositor 1 has kept her money in the bank. If we use both of these criteria, 122 out of 156 (78%) would be classified as rational and 34 (22%) as irrational depositors in our sequential environment. Our data suggest that irrational subjects make more costly efforts than rational subjects to arrive early at the bank in the sequential treatment (8.81 vs 6.80, $p = 0.029$).[19] This indicates that the high bids observed in the sequential environment may be partly due to the irrationality of some depositors.

In order to compare the behavior of rational depositors across informational environments, we eliminate those depositors who believe to be in position 3 in the simultaneous environment and still withdraw their funds from the bank (3 out of 156 subjects, 2%). If we eliminate their bids from the analysis we find that bids by rational (patient) depositors are higher in the simultaneous environment than in the sequential environment (7.61 ECUs vs 6.66 ECUs, $p = 0.046$). In the simultaneous environment, we can also identify as irrational depositors those who withdraw when they expect no bank run (7 out of 156 subjects, 4%). Our result that bids are higher in the simultaneous environment than in the sequential environment when we eliminate these subjects from the analysis still holds, although differences are only weakly significant (7.50 ECUs vs 6.66 ECUs, $p = 0.073$).[20]

Finding 3: *Irrational depositors bid more than rational depositors to arrive early at the bank in the sequential environment. When we focus on the behavior of rational depositors in the simultaneous and the sequential environment, we find that bids are higher in the former environment.*

[18]Unless otherwise noted, the reported p-values in this section refer to the Wilcoxon signed-rank test for within-subject comparisons and the Mann-Whitney-Wilcoxon test for the comparison across treatments. We rely on a one-tailed analysis whenever there is a clear ex-ante hypothesis on the depositors' behavior.

[19]Our previous result that irrational depositors bid more than rational depositors in the sequential environment is robust to if we only consider that irrational subjects are the ones who withdraw in position 3 (27 out of 156, 17%) (8.91 ECUs vs 6.66 ECUs, $p = 0.013$).

[20]While bids by irrational subjects in the sequential environment are higher than bids by rational subjects, it seems that rationality does not play a role in the simultaneous environment; i.e., bids by rational and irrational subjects are indistinguishable in the simultaneous environment ($p > 0.57$).

Overall, our findings seem to support the idea that *i*) depositors recognize the importance of observability, *ii*) the high bids in the sequential environment can be partially explained because of the irrational behavior of depositors, and *iii*) once we constraint the analysis to rational subjects, we find that there are differences in the bids of depositors in the simultaneous and the sequential environment, in line with Hypotheses 1 and 2.

In what follows, we look at the bidding behavior of depositors in each environment separately. As we will see, the behavior of depositors in the simultaneous environment is in line with our hypothesis in that depositors are more likely to rush to the bank if they expect a bank run to occur or if they want to withdraw their deposit from the bank (see section 4.1.1). As for the sequential environment, we show that the high bids are not only due to the irrational behavior of some depositors, but there is also evidence that depositors expect panic bank runs, in line with Hypothesis 3. Thus, patient depositors bid to arrive early at the bank in order to keep their funds deposited and facilitate coordination on the efficient equilibrium without bank runs, while impatient depositors bid higher when they expect that the two patient depositors will withdraw their deposits from the bank (see section 4.1.2).

4.1.1 Bidding behavior of depositors in the simultaneous environment

Hypothesis 1 states that depositors will run in the simultaneous environment only if they expect a bank run. This, in turn, implies that any patient depositor should bid more if she expects that the other patient depositor will withdraw. Similarly, the impatient depositor should bid more when she expects the two patient depositors to withdraw. Figure 3 presents the distribution of bids in the simultaneous environment depending on the depositors' expectations on the occurrence of bank runs. We observe that whether a depositor submits a positive bid or not is affected greatly by her expectations on the occurrence of bank runs. More specifically, we find that the spike in the zero bid occurs only when depositors expect no bank runs; in fact, any patient or impatient depositor who expects a bank run always bids a positive amount to arrive early at the bank. This, in turn, suggests that expectations on bank runs are important for depositors to decide whether or not to bid any positive amount to arrive early at the bank (see our econometric analysis below).[21] Hypothesis

[21] As we show in section 4.2 beliefs on the occurrence of bank runs affect also the withdrawal decisions; e.g., patient depositors withdraw more frequently if they expect a bank run compared to when they do not (0.5 *vs* 0.09). Section C in the Appendix provides further evidence that beliefs are crucial to determine behavior in the simultaneous environment.

1 claims also that patient and impatient depositors will behave in the same manner if they expect (no) bank-run. When we condition the analysis on their beliefs regarding the occurrence of bank runs, we find that patient and impatient depositors do not bid differently ($p = 0.18$).

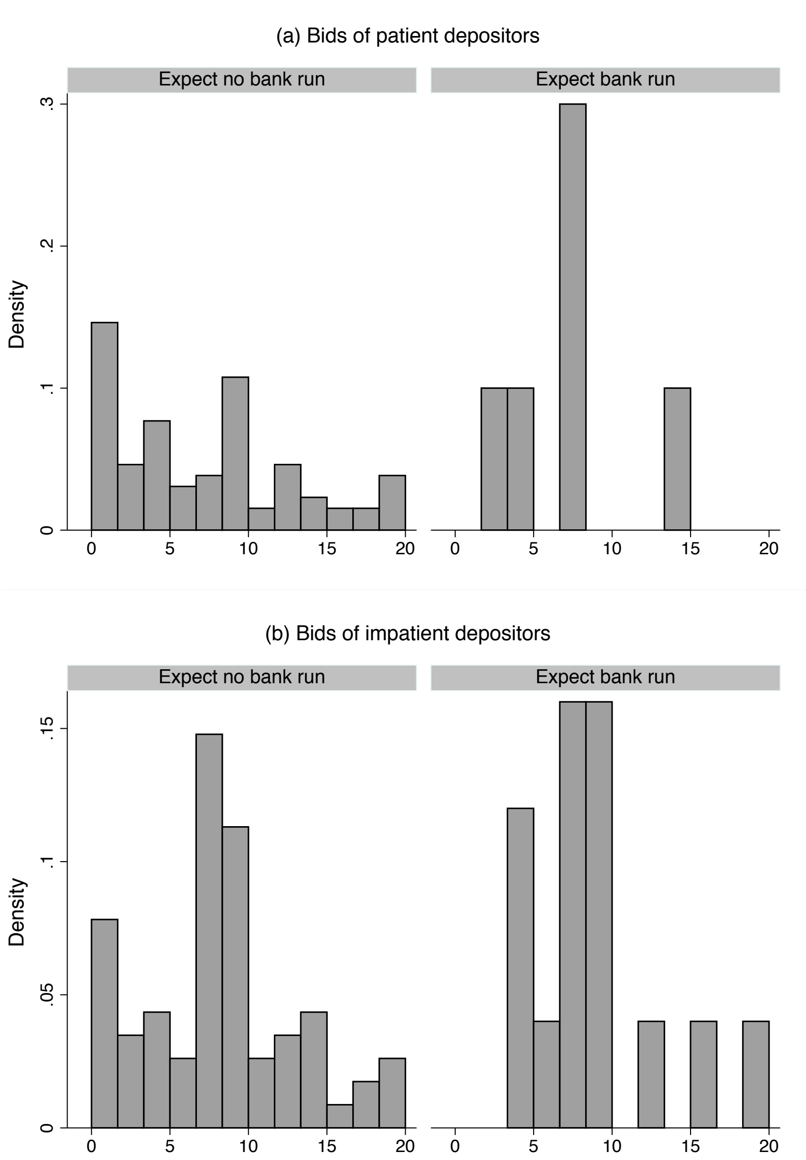

Figure 3: Bids in the simultaneous environment depending on the depositors' expectations on the occurrence of bank runs.

Finding 4: *Beliefs on the occurrence of bank runs influence depositors' decision to arrive early at the bank in the simultaneous environment. In particular, those who expect a bank run are more likely to submit a positive bid. Conditional on their beliefs on the occurrence of bank runs, patient* *and impatient depositors do not bid differently.*

A second feature that we conjecture to affect the decision to arrive early at the bank in the simultaneous environment is the intention to withdraw. If a patient depositor plans to keep her funds deposited (believing that there will be no bank run), then she has no incentives to arrive early at the bank. However, if she wants to withdraw (anticipating a bank run), then she should make a costly effort in form of a positive bid.[22] Figure 4 presents the distribution of bids of patient depositors, depending on their withdrawal decision. We observe that depositors who keep their funds deposited are more likely to submit a zero bid, compared with those who withdraw their funds from the bank (14% vs 4%). Thus, our data suggest that the withdrawal decision is important to explain whether or not depositors will make any effort to arrive early at the bank (see below our econometric analysis for further evidence).

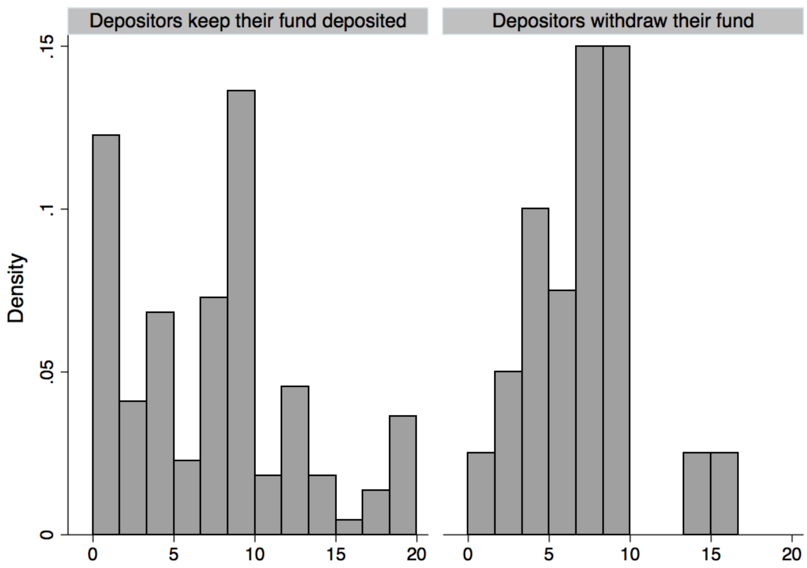

Figure 4: Bids of patient depositors in the simultaneous environment depending on the withdrawal decision.

Finding 5: *The withdrawal decision does influence the depositors' decisions to arrive early at the bank in the simultaneous environment. In particular, those who want to withdraw their funds*

[22]In fact, in the simultaneous treatment any patient depositor who keeps her funds deposited should believe that there will be no bank run, hence the other patient depositor will do so as well. Thus, patient depositors should withdraw more frequently when they expect a bank run. This is confirmed by our data (see section 4.2).

from the bank are more likely to submit a positive bid.

In what follows, we provide the results of our econometric analysis for the decision of the depositors in the simultaneous environment. To accommodate the features present in the description of the data, we estimate a negative binomial-logit maximum-likelihood hurdle model, which considers two different generating processes that can be modelled independently. The first one (Logit) models the depositor's decision on whether or not to bid any positive amount to arrive early at the bank. The second process (Negative-binominal) models the decision on the amount that depositors bid. As a result, this specification assumes that the factors that cause depositors to bid might differ from the factors that cause depositors to decide how much to bid.[23] The results for the patient (impatient) depositor are presented in Table 3 (Table 4), respectively. Our first regression (a) controls for risk tolerance, loss and ambiguity aversion. We include the demographic variables (Age and Gender) in our second regression (b). Our third regression (c) controls for income, trust in institutions and cognitive abilities, while the fourth regression (d) also includes personality traits (Big Five and Social Value Orientation).[24] In our analysis for patient depositors, we consider a dummy variable (Decision) that takes the value 1 when they withdraw their funds from the bank. We also include a dummy variable that takes the value 1 if the depositor expects a bank run.

[23]The negative binomial-logit is preferred over the Poisson-logit maximum-likelihood hurdle model in our setting because there is over-dispersion in our data, as suggested by the likelihood-ratio test ($p < 0.001$). Hurdle models have been used to model donations in dictator games (Brañas-Garza et al., 2017), contribution to public good games (Botelho et al., 2009) or punishment decisions (Nikiforakis, 2010), among others. See Moffatt (2015) for a general description of these models, and Cameron and Trivedi (2009) or Hilbe (2011) for further details on the negative-binominal models and how to estimate them.

[24]For simple correlations between bidding behavior and individual traits see section B in the Appendix. For the results of a negative binomial-logit hurdle model that compares the behavior of patient and impatient depositors in the simultaneous environment see section C in the Appendix.

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-1.314*	-0.707	-2.079	-10.72*	2.343***	1.580***	1.634***	1.528
	(0.694)	(3.258)	(3.747)	(5.895)	(0.164)	(0.529)	(0.576)	(1.386)
Decision (=1 if withdrawal)	-16.90***	-14.10***	-14.07***	-14.60***	-0.249	-0.404*	-0.352	-0.350
	(0.735)	(0.790)	(1.476)	(1.089)	(0.237)	(0.245)	(0.270)	(0.368)
Expect bank run	-16.60***	-12.98***	-12.42***	-11.32***	-0.0284	-0.160	-0.167	-0.423*
	(0.761)	(1.029)	(1.221)	(3.021)	(0.264)	(0.216)	(0.273)	(0.238)
Risk tolerance	0.269	0.070	-0.201	-0.257	0.221*	0.114	0.105	0.065
	(0.451)	(0.469)	(0.536)	(0.602)	(0.134)	(0.131)	(0.135)	(0.123)
Loss aversion	-0.479	0.015	0.310	0.308	-0.478***	-0.336*	-0.321*	-0.262
	(0.781)	(0.828)	(0.861)	(1.175)	(0.186)	(0.198)	(0.188)	(0.198)
Ambiguity aversion	0.013	0.034	0.052	0.053	0.005	0.014	0.015	0.022**
	(0.0461)	(0.046)	(0.050)	(0.063)	(0.010)	(0.0010)	(0.009)	(0.009)
Age		0.003	0.045	0.035		0.054**	0.058**	0.052*
		(0.167)	(0.181)	(0.177)		(0.026)	(0.027)	(0.029)
Gender (=1 if female)		-1.489**	-1.453**	-2.134**		-0.502***	-0.504***	-0.620***
		(0.650)	(0.663)	(1.059)		(0.190)	(0.188)	(0.205)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 69 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Bidding behavior of patient depositors in the simultaneous environment

Table 3 reveals that subjects in the role of patient depositors are less likely to bid nothing (i.e., more likely to rush to the bank) when they expect a bank run to occur (in line with Finding 4) or when they want to withdraw their deposit from the bank (in line with Finding 5), see columns (1a) to (4a). However, these variables do not affect the magnitude of the bids in a significant and consistent way. While attitudes towards uncertainty or loss does not seem to influence the bidding behavior of patient depositors in a systematic way, gender has an intricate effect. In line with previous experimental evidence that women bid more than men in auctions, our results indicate also that female depositors are significantly less likely to bid zero compared with male depositors (see columns (2a) to (4a)), *ceteris paribus*. If there is a positive bid, however, female depositors seem to bid less than male depositors (see columns (2b) to (4b)).

Finding 6: *Gender influences the bids of patient depositors in the simultaneous environment. In particular, male depositors are more likely to bid nothing to arrive early at the bank. When we focus on those depositors who bid a positive amount, we find that male depositors bid more than female depositors.*

Loss aversion seems to be a determinant of the amount that patient depositors bid, but the effect vanishes as we include additional controls (see columns (1b) to (4b)). Although this effect was expected, the negative sign of loss aversion indicates that loss-averse subjects tend to bid *less* than those who are not loss-averse. One possible reason is that subjects perceive that bidding in the simultaneous environment (where they cannot make visible their decision to subsequent participants) will not help to foster coordination, thus loss-averse subjects prefer to keep their initial endowment of 20 ECUs rather than bidding to decide when to go to the bank. Hence, loss-averse subjects possibly view as a loss to spend on bidding and therefore they bid less.[25]

As for the rest of control variables, we find that cognitive reflection has a significant effect on the bidding behavior of patient depositors with regards to their decision on whether or not to bid; in particular, those who score higher in the CRT are more likely to bid zero. Our personality measures (Big Five and Social Value Orientation) are not significantly associated with the bids.

Finding 7: *There is suggestive evidence that patient depositors in the simultaneous environment bid less if they are loss-averse.*

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-16.44***	-15.14**	-17.56**	-612.3***	2.331***	2.816***	2.801***	2.405**
	(0.589)	(7.670)	(6.900)	(24.01)	(0.148)	(0.352)	(0.377)	(0.988)
Expect bank run	-14.99***	-14.96***	-15.46***	-49.48***	-0.0119	0.015	0.0538	0.065
	(0.609)	(0.696)	(1.177)	(3.201)	(0.136)	(0.141)	(0.150)	(0.162)
Risk tolerance	-0.770	-0.861	-1.213	-11.22	0.128	0.083	0.0295	0.020
	(0.655)	(0.747)	(0.807)	(10.48)	(0.091)	(0.071)	(0.070)	(0.076)
Loss aversion	14.99***	15.10***	16.68***	192.4***	-0.343***	-0.163	-0.127	-0.148
	(0.598)	(0.752)	(1.190)	(21.46)	(0.128)	(0.110)	(0.108)	(0.123)
Ambiguity aversion	-0.008	0.023	0.030	-0.713***	-0.009	-0.004	-0.002	-0.001
	(0.051)	(0.051)	(0.067)	(0.083)	(0.007)	(0.007)	(0.006)	(0.006)
Age		-0.010	-0.137	6.571***		-0.016	-0.009	-0.006
		(0.403)	(0.439)	(1.238)		(0.019)	(0.017)	(0.020)
Gender (=1 if female)		-1.752	-1.611	-35.42***		-0.414***	-0.477***	-0.431***
		(1.133)	(2.083)	(5.651)		(0.106)	(0.106)	(0.117)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 69 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Bidding behavior of impatient depositors in the simultaneous environment

When we consider the decision of impatient depositors (who are forced to withdraw) in Table 4 we confirm that beliefs on the occurrence of bank runs are key to explain whether or not they decide to bid (see columns (1a) to (4a)), that is those who believe that there will be a bank run are significantly less likely to submit a zero a bid. However, beliefs do not seem to affect the size of the bid. Again, loss aversion has a negative and significant effect on the bidding behavior of depositors, but this seems to affect the decision on whether or not to bid, rather than the amount

[25]One may argue that some depositors submitted their bids without thinking in the position in the line (see footnote 14). Our analysis in Appendix C where we exclude these subjects from the analysis.

that depositors bid; in particular, depositors are more likely to bid nothing if they are loss-averse. In line with our previous discussion, we also find that females bid less than males in case of positive bids; thus the depositors' gender affects the decision on when to arrive to the bank and females seem to be less panicky. As for the control variables, there is an effect of cognitive reflection as we find that a higher score in the CRT increases the likelihood of bidding zero, while the personality measures have no effect on the bids.

Finding 8: *In the simultaneous environment, impatient depositors are more likely to bid zero if they are loss-averse. There is also an effect of gender in the bids of the impatient depositors: considering those who submit a positive bid, male depositors bid more than female depositors in the simultaneous environment.*

4.1.2 Bidding behavior of depositors in the sequential environment

We have shown that the rationality of depositors can explain (at least partially) why they bid in the sequential environment (see Finding 3). A second mechanism that we believe to be of great importance in the sequential environment is the possibility of panic bank runs (Kiss et al., 2018; Shakina and Angerer, 2018). Depositors might be perfectly rational but believe that the observation of a withdrawal (even if it is due to the impatient depositor) will induce additional withdrawals. This will lead to a bank run if the impatient depositor decides first and a patient depositor observes the withdrawal. A way to counteract such behavior is to bid high in order to be the first in the sequence of decisions and then to keep the funds deposited so as to induce the other patient depositor to do so as well, assuming that the other patient depositor will choose her best response upon observing that another depositor chose to keep her money in the bank. In our data, subjects who decided to keep the money in the bank in position 1 bid higher than those who decided to withdraw in position 1 (7.54 vs 5.73, $p = 0.045$); in fact, the test of proportion indicates that depositors are more likely to submit a positive bid if they want to keep their funds deposited in the bank (90% vs 79%, $p = 0.045$). This, in turn, provides suggestive evidence that patient depositors tend to bid high to keep the funds deposited and *induce* the other patient depositor to coordinate on the efficient outcome with no bank runs (see our econometric analysis below for further evidence). We summarize these results as follows:

Finding 9: *Reaction to the possibility of panic bank runs urges some patient depositors to arrive early at the bank in the sequential environment. These depositors keep their funds deposited* *to (possibly) induce other patient depositors to follow suit.*

The behavior of impatient depositors in the sequential environment can also be affected by whether or not they expect a panic bank run to occur. Figure 5 depicts the distribution of bids in the sequential environment, depending on the beliefs of the impatient depositor regarding the occurrence of bank runs.

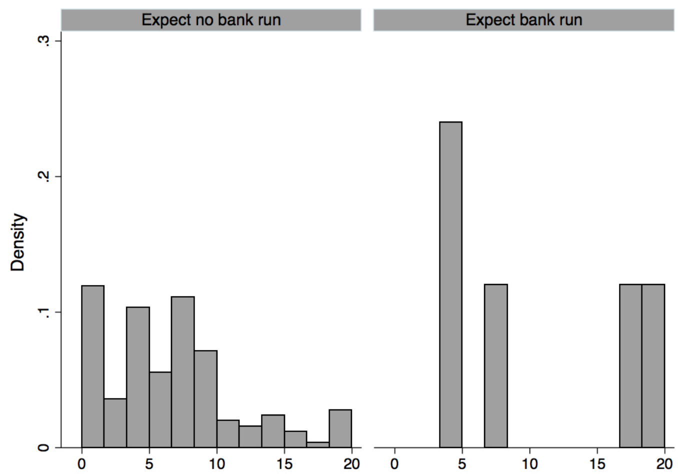

Figure 5: Bids of impatient depositors in the simultaneous environment depending on their beliefs on the occurrence of bank runs.

Figure 5 shows that participants are more likely to submit a positive bid if they expect a bank run, compared with the case in which they do not expect it; in fact, none of the depositors bid zero if they expect a bank run. It also seems like depositors who expect a panic bank run bid more on average (7.81 ECus vs 11 ECUs).

Finding 10: *Beliefs on the occurrence of bank runs influence depositors' decision to arrive early at the bank in the sequential environment. In particular, impatient depositors who expect a bank run are more likely to submit a positive bid, and tend to bid more than those who expect no bank run.*

We provide further evidence for these findings by using our econometric approach. We look at the bidding behavior of patient depositors in the sequential environment in Table 5. If bank runs are due to coordination problems, depositors should bid nothing in this environment. However, we have seen that irrational behavior and the desire to signal their intention to keep their funds deposited lead patient depositors to bid in the sequential environment. To account for these factors, we consider a dummy variable for irrational depositors that take the value 1 if the subject withdraws in position 3 in the sequential environment..[26] We also consider a dummy variable (Decision) that takes the value 1 for a depositor 1 who withdraws her funds from the bank; thus this variable indicates whether a patient depositor will rush to the bank to withdraw (maybe because she expects that other patient depositor will withdraw, regardless of what she observes) or she is interested in keeping the money deposited so as to induce the other patient depositors to follow suit.

Overall, our econometric analysis lends support to our previous findings, since subjects who withdraw in position 1 are more likely to bid zero, compared with those who keep their money in the bank. There is also a significant effect of rationality in that those who are irrational are less likely to bid nothing, in line with Finding 3.[27] When we look at the behavior of depositors who bid a positive amount, we find that loss-averse subjects in the role of patient depositors tend to bid more than subjects who are not classified as loss-averse (see columns (1b) to (4b)). This is in line with the idea that subjects in the sequential environment want to avoid a bank run and prefer to bid to show their choice to other depositors. Seemingly, in the sequential setup subjects see it as a loss if they fail to coordinate on the efficient outcome and a way to avoid this failure is to actively promote coordination. In fact, a loss-averse depositor is more likely to keep her funds deposited in position 1 than a depositor who is not loss-averse (31.2% vs. 21.1%). As for the rest of the control variables, we do not find any significant effect for the behavior of patient depositors in the sequential environment.

[26] Our results are consistent if we include as irrational subjects also those patient depositors who withdraw upon observing that somebody kept her funds deposited.

[27] As we will see in section 4.2, the differences in the withdrawal rates of rational (21.70%) and irrational (22.22%) subjects is not statistically significant using a test of proportion ($p = 0.953$), thus we can conclude that irrational subjects do not tend to bid more because they are more likely to withdraw in position 1.

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-18.02***	-15.57***	-17.11***	-14.77***	1.743***	1.756***	1.754***	2.330***
	(1.315)	(2.334)	(2.180)	(3.049)	(0.244)	(0.329)	(0.345)	(0.669)
Decision (=1 if withdraw)	0.998*	1.051*	1.361**	1.546**	-0.078	-0.0300	-0.00945	-0.0320
	(0.569)	(0.597)	(0.633)	(0.674)	(0.150)	(0.157)	(0.156)	(0.152)
Irrational depositor	-15.04***	-14.41***	-15.02***	-14.50***	0.137	0.123	0.113	0.143
	(0.344)	(0.372)	(0.404)	(0.445)	(0.127)	(0.123)	(0.124)	(0.126)
Risk tolerance	0.345	0.543	0.545	0.507	0.026	0.008	0.0208	0.0119
	(0.375)	(0.384)	(0.375)	(0.378)	(0.100)	(0.094)	(0.094)	(0.102)
Loss aversion	0.841	0.777	0.583	0.670	0.447**	0.448**	0.450**	0.453**
	(1.200)	(1.257)	(1.232)	(1.239)	(0.210)	(0.212)	(0.209)	(0.214)
Ambiguity aversion	0.002	0.005	0.008	0.011	-0.001	-0.001	-0.001	-0.0004
	(0.007)	(0.008)	(0.008)	(0.009)	(0.002)	(0.002)	(0.002)	(0.002)
Age		-0.073	-0.078	-0.079		0.004	0.004	0.007
		(0.080)	(0.071)	(0.076)		(0.008)	(0.009)	(0.009)
Gender (=1 if female)		-0.501	-0.660	-0.499		-0.184	-0.176	-0.158
		(0.535)	(0.639)	(0.685)		(0.120)	(0.130)	(0.137)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 144 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Bidding behavior of patient depositors in the sequential environment

Finding 11: *In the sequential environment, loss aversion plays a role in the bidding decision of patient depositors. In particular, loss-averse depositors bid more in order to arrive early at the bank.*

Finally, Table 6 presents our estimates for the impatient depositors in the sequential environment. We find that beliefs on the occurrence of bank runs are important to explain the behavior of impatient depositors. Our findings suggest also that risk and loss aversion have a significant effect on the decision to bid when depositors are forced to withdraw; in particular, depositors are more (less) likely to bid nothing if they are more risks-tolerant (loss-averse). In line with our previous discussion, there is an effect of the gender on the bid of depositors, but this effect vanishes as we include additional controls. Again, demographic characteristics and the personality traits show no significant association with the bids.

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-1.619**	0.352	0.739	-0.434	2.175***	2.120***	1.948***	2.775***
	(0.664)	(1.140)	(1.415)	(2.770)	(0.216)	(0.267)	(0.280)	(0.611)
Expect bank run	-14.31***	-13.35***	-11.80***	-12.27***	0.390	0.462*	0.518**	0.538*
	(0.856)	(0.934)	(0.713)	(0.874)	(0.279)	(0.265)	(0.249)	(0.285)
Risk tolerance	0.804**	0.995**	0.919**	0.755**	0.0330	-0.0446	-0.0343	-0.0268
	(0.410)	(0.487)	(0.398)	(0.363)	(0.125)	(0.105)	(0.0996)	(0.106)
Loss aversion	-1.176**	-1.264**	-1.612**	-1.567**	-0.225	-0.165	-0.205	-0.167
	(0.591)	(0.598)	(0.691)	(0.682)	(0.190)	(0.182)	(0.182)	(0.173)
Ambiguity aversion	0.004	0.007	0.008	0.010	-0.002	-0.001	-0.001	-0.001
	(0.007)	(0.008)	(0.007)	(0.008)	(0.002)	(0.002)	(0.002)	(0.002)
Age		-0.084*	-0.085**	-0.080*		0.012*	0.00922	0.00965
		(0.044)	(0.0413)	(0.042)		(0.006)	(0.006)	(0.006)
Gender (=1 if female)		-0.282	-0.567	-0.361		-0.305***	-0.209*	-0.183
		(0.532)	(0.656)	(0.618)		(0.110)	(0.127)	(0.128)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 144 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Bidding behavior of impatient depositors in the sequential environment

Finding 12: *For impatient depositors who are forced to withdraw, risk tolerance and loss aversion seem to have an effect in the sequential environment. In particular, the more risk-tolerant (loss-averse) a depositor is, the more (less) likely she is to bid nothing.*

4.2 Behavior of depositors in the bank run game

For the sake of completeness, we report in Table 7 the withdrawal rates of patient depositors in the simultaneous and the sequential environments.[28] In this section, we also discuss the importance of beliefs and rationality on the depositors' behaviour. We conclude this section with a sensitivity analysis to show that our results are robust when we condition the depositors' decision on their expected position in the line.

We observe in Table 7 that the withdrawal rate is slightly over 15% in the simultaneous environment. Theoretically, beliefs on the occurrence of bank runs are the key variable to explain the behavior of patient depositors in this environment. Empirically, we find support for this hypothesis; e.g., the test of proportion suggests that patient depositors are more likely to withdraw when they expect a bank run compared with the case in which they do not expect a bank run (50% vs 9%,

[28]When observing that a depositor kept her funds in the bank and another one withdrew, we asked participants what they would do if depositor 1 kept the money in the bank and depositor 2 withdrew and the other way around. As expected, depositor 3 does not react differently to this information (9% vs. 8.3%, p = 0.808), thus we pool the results ("Obs. that a depositor kept her funds in the bank and another one withdrew").

	Withdrawal rate
Simultaneous environment	15.4%
Depositor expects a bank run	50%
Depositor expects no bank run	9%
Sequential environment	
Depositor 1 (Obs. nothing)	21.8%
Depositor 2 (Obs. withdrawal)	57.7%
Depositor 2 (Obs. waiting)	5.1%
Depositor 3 (Obs. a waiting and a withdrawal)	8.6%
Depositor 3 (Obs. two withdrawals)	9%

Table 7: Withdrawal rates of patient depositors in each informational environment.

$p = 0.003$).[29] This is confirmed by a logistic regression in which we control for individual characteristics (see Table 8). Our econometric analysis suggest also that women are less likely to withdraw in the simultaneous environment, compared with men.

Finding 13: *Beliefs on the occurrence of bank runs affect the withdrawal decisions of patient depositors in the simultaneous environment in the expected way. In this setting, female depositors are less likely to withdraw than male depositors.*

The sequential environment allows depositors to observe what other depositors have decided. Theoretically, this should facilitate coordination in that *i*) any patient depositor should keep her funds deposited, regardless of what she observes, and *ii*) any withdrawal from depositor 1 should be assigned to the impatient depositor. Although we expect no bank runs due to coordination problems because of these reasons, we find that panic bank runs emerge when choices are observable, as reported in Kiss et al. (2018). Hence, the test of proportion suggests that depositor 2 is more likely to withdraw upon observing a withdrawal than when she observes that a depositor kept her money in the bank (57.7% vs. 5.1%, $p < 0.001$). In addition, depositors believe that withdrawals from depositor 1 are not always due to the impatient depositor; e.g., 66% of depositors believe

[29]Our results are robust if we only consider in the analysis those depositors who submitted their bids thinking that this would affect their position in the line (60% vs 9.2%, $p < 0.001$). The likelihood of withdrawal in the simultaneous environment does not seem to depend on the depositor's belief regarding her position in the line, according to the Kruskal-Wallis test ($p = 0.89$).

	(a)	(b)	(c)	(c)
Expect bank run	0.217***	0.168***	0.177***	0.199*
	(0.118)	(0.018)	(0.016)	(0.110)
Risk tolerance		-0.024	-0.038	-0.001
		(0.067)	(0.058)	(0.027)
Loss aversion		-0.129	-0.084	-0.129***
		(0.081)	(0.084)	(0.017)
Ambiguity aversion		0.001	0.003	0.002
		(0.002)	(0.002)	(0.003)
Age			0.006***	0.003**
			(0.002)	(0.001)
Gender (=1 if female)			-0.130***	-0.143***
			(0.080)	(0.024)
Controls (income, confidence, CRT)			No	Yes
Observations	84	69	69	54

Notes. Robust standard errors in parentheses. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Marginal effects after logistic regression for the withdrawal decision of patient depositors in the simultaneous environment.

that the withdrawal was due to the patient depositor or any of the two depositors (the patient and the impatient) with the same probability. When depositor 2 observes a withdrawal, she tends to withdraw regardless of whether she believes that the observed withdrawal was due to the patient or the impatient depositor (test of proportions, $p = 0.29$) which suggests that the observation of the withdrawal distorts the beliefs that a bank run is underway and provokes panic behavior (see Kiss et al., 2018, for further discussion on this topic).[30]

To glean some evidence from the withdrawal decisions of depositors in the sequential environment, we perform an econometric analysis for the behavior of depositor 1 and the behavior of depositor 2 who observes a withdrawal (see Table 9). We find no effect of rationality on the decision of depositor 1. Thus, depositor 1 is not more likely to withdraw in the sequential setting if she is irrational, although rationality affects her bid to arrive early at the bank. Our results suggest also that there are gender differences in the behavior of depositor 1 in that women are more

[30]These results hold when we consider a series of robustness checks. Thus, we find that depositor 2 is more likely to withdraw upon observing a withdrawal when we only consider depositors who submitted their bids thinking in their position (58.5% vs. 5.3%, $p < 0.001$) or when we focus the analysis on depositors who believe they are in position 2 (54% vs. 2.7%, $p < 0.001$). The beliefs of these depositors regarding the withdrawal decision of the depositor 1 is in line with the one reported above; i.e., 64.9% believe that a withdrawal from depositor 1 may be due to the patient depositor or any of the two depositors (the patient and the impatient) with the same probability.

likely to withdraw than men when their actions are being observed. The analysis for depositors 2 replicates Kiss et al. (2018), but we control for the possibility that subjects are irrational and their beliefs regarding the observed withdrawal (this variable takes the value 1 when depositors give some probability that this was due to the impatient depositor). As it is reported in Kiss et al. (2018), loss aversion seems to be an important determinant of the withdrawal decisions of depositors who observe a withdrawal in position 2.

	Depositor 1			Depositor 2 (after observing withdrawal)		
	(a)	(b)	(c)	(a)	(b)	(c)
Irrational depositor	-0.046	-0.038	0.015	-0.120	-0.106**	-0.108
	(0.065)	(0.070)	(0.083)	(0.087)	(0.053)	(0.083)
Beliefs on observed withdrawal				0.189	0.191	0.210
				(0.183)	(0.197)	(0.237)
Risk tolerance	-0.158*	-0.135	-0.092*	-0.213	-0.237	-0.190
	(0.083)	(0.086)	(0.051)	(0.173)	(0.191)	(0.167)
Loss aversion	-0.132	-0.135	-0.085	0.249	0.228**	0.271**
	(0.098)	(0.104)	(0.106)	(0.172)	(0.121)	(0.121)
Ambiguity aversion	0.0004	0.0004	-0.001***	0.004	0.005**	0.008
	(0.0004)	(0.0004)	(0.000)	(0.005)	(0.003)	(0.009)
Age		-0.007*	-0.007*		-0.007***	-0.009***
		(0.004)	(0.004)		(0.002)	(0.000)
Gender (=1 if female)		0.104***	0.162***		-0.188	-0.057
		(0.023)	(0.037)		(0.117)	(0.247)
Controls (income, confidence, CRT)		No	Yes		No	Yes
Observations	144	144	144	76	76	76

Notes. Robust standard errors in parentheses. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Marginal effects after logistic regression for the withdrawal decision of patient depositors in the sequential environment.

Finding 14: *Female depositors are more likely to withdraw when their actions are being observed, but they do not react differently from male depositors to the observation of withdrawals.*

Overall, our findings highlight that beliefs on the occurrence of bank runs affect withdrawal decisions in the simultaneous environment, and these two factors influence the willingness to arrive early at the bank. In the sequential environment, depositors should keep their funds deposit regardless of what they observe, and this should prevent them from rushing early to the bank. Arguably, we find that depositors believe that panic bank runs may occur in the sequential environment. Depositors react to these beliefs by making costly effort to arrive early at the bank; patient depositors rush to keep their funds deposited and facilite the coordination on the equilibrium without bank runs, while impatient depositors who expect a panic bank run bid more to arrive early and withdraw their money from the bank. In the sequential environment, there is also evidence that some depositors bid because they are irrational.

5 Discussion and conclusion

This study was motivated by the paucity of theoretical and empirical evidence regarding how lines of depositors form in front of banks. Theoretically, researchers generally assume that lines form randomly, reflecting their lack of knowledge about who rushes to the banks. Empirically, it is hard to address this question. Even if we observe the line, we ignore the liquidity needs of the depositors and the information they use when choosing whether to withdraw or not. Covering this gap, to our best knowledge we are the first to study the formation of the line in front of banks.

To achieve our objective, we propose a model that yields useful hypotheses about the formation of line, depending on the informational environment. We hypothesize that when decisions of withdrawing or keeping the money deposited are observable, then we should not observe any bank runs for any line that may arise and as a consequence no effort is needed to achieve the first best. In contrast, when these decisions cannot be observed, then beliefs about the decision of other depositors determine both the bids and also the subsequent decisions.

Our experimental results suggest that participants expect less bank runs in the sequential setup, but still they bid for a position in the line in this setting. We observe that both irrational behavior and the desire to coordinate on the efficient equilibrium play a role to explain the bids in the sequential environment. More precisely, some participants were not fully rational (as they did not recognize dominant strategies in some information sets) and irrationality led to higher bids, *ceteris paribus.* Moreover, we document that some participants in the role of the patient depositor seemed to bid high to be the first in the sequence of decision to keep her funds deposited, thus inducing the other patient depositor to do the same (and prevent a panic bank run). Possibly, this wish to coordinate with other depositors by making visible the decision to keep the funds deposited could be harnessed by banks or regulators.

When considering a wide range of individual traits, we find that loss aversion seems to play an important role even if we control for the personality traits captured by the Big Five and the Social Value Orientation (that in turn do not affect bids). In the simultaneous setup loss-averse subjects seem to perceive money spent on the bid as a loss, so they submit significantly lower bids. However, in the sequential setup loss-averse subjects in the role of patient depositors submit significantly higher bids, *ceteris paribus.* This is in line with the desire to coordinate on the efficient equilibrium.

Possibly, subjects as patient depositors in this setup perceive as a loss if they fail to achieve the highest payoff related to the no-bank-run outcome, and are willing to make costly effort to obtain those payoffs. Note also that in the sequential setup loss aversion does influence the bids submitted by the impatient depositor.

Our analysis suggests also that gender can affect the willingness to arrive early at the bank in the simultaneous environment in an intricate way, as women are more likely to bid a positive amount, but bid less than men for a position in the line. When we look at the willingness to withdraw, we find that men tend to withdraw more frequently than women when their actions cannot be observed in the simultaneous environment, while women are more likely to withdraw than men if their actions are observed in the sequential environment. In line with previous evidence, men and women do not react differently to panic bank runs (Kiss et al., 2014b).

Taken together, our results contribute to the current literature on bank runs on various fronts. On the theoretical front, our results suggest that future attempts to model the line formation should consider using utility functions that capture loss aversion. Regarding policy recommendation, our findings indicate that beliefs on the occurrence of bank runs are crucial to determine the order of decision. The policy governing financial stability has an important role in affecting these beliefs, because if depositors believe that others will not withdraw their funds, then they will not rush to the bank to withdraw early. For instance, a credible deposit insurance scheme may prevent inefficient bank runs even if decisions of other depositors is not observable.

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A Instructions

Here we reproduce the instructions, translated from Spanish.

Simultaneous treatment

Welcome to this experiment!

In this experiment, we study how individuals solve decision-making problems, and we are not interested in your particular decision, but in the average behavior of individuals. That is why you will be treated anonymously during the experiment and nobody in this room will ever know the decisions that you make.

Next, you will see the instructions that explain how the experiment goes. These instructions are the same for all participants and it is of utmost importance that you understand them well because your earnings will depend to a large extent on your decisions.

At the end of the experiment we will ask you to complete a long questionnaire that contains several games that allow you to earn extra money. The objective of the questionnaire is to get to know your tastes and preferences (that are not obviously the same as those of the rest of the participants) and for this reason there are no correct answers to the questions that we raise. During the questionnaire it is important that you state your preferred option in each case because your earnings from the questionnaire depend to a large degree of your decisions.

Remember that all the decisions that you make during the experiment are anonymous and will not be linked to you. If you have any doubt or question during the experiment, raise your hand and we will come to you. Remember also that you are not allowed to speak during the experiment.

What is the experiment about?

At the beginning of the experiment you will receive 60 ECUs:

- Part of the money (**20 ECUs**) is your **initial endowment**.
- The rest of the money (**40 ECUs**) is **deposited in a bank**.

The bank where your money is deposited is composed of three depositors who are in the lab. Thus, the bank has a total capital of 120 ECUs (40 ECUs from each depositor).

How can you earn money in this experiment?

In each bank, one of the depositors is chosen randomly and she will be forced to withdraw her deposit. The rest of the depositors may decide if they **withdraw their funds** from the bank or **keep them deposited** until the bank carries out a project. In any case, your earnings will depend not only on your decision, but also on how the other depositors of your bank have decided. Moreover, the position in the line may affect your earnings as we explain next.

Position in the line

To determine the sequence in which depositors make their decision, we carry out an auction. Each depositor of the bank (the one that will be forced to withdraw and those who can choose whether to keep their money deposited or withdraw it) can submit a bid from her initial endowment (0, 1, 2, ..., 20 ECUs) that determines her position in the line. The depositor with the highest bid will be the first in the line, the one with the intermediate bid will be the second, and the depositor with the lowest bid will be the third. If there is a tie in the bids the positions will be determined randomly. The amount of money used for bidding is deducted from your initial endowment of 20 ECUs. You will receive the amount not used for bidding at the end of the experiment as part of your earnings.

What happens if you withdraw your deposit?

The depositor who is forced to withdraw or any other depositor who chooses to withdraw will receive 50 ECUs whenever the bank has enough funds to pay that amount. Therefore, if you are the first or the second depositor in the sequence of decision and you choose to withdraw (or you are forced to do so), then you earn 50 ECUs (this amount corresponds to your initial deposit of 40 ECUs + 10 ECUs in form of interests earned). If you are the third depositor in the line and you choose to withdraw (or you are forced to do so), then your earnings depend on what the other two depositors before you have decided:

- If only one of the previous two depositors (or none of them) chose to withdraw, then you also receive 50 ECUs, because the bank has no problems to pay that amount.
- If both of the depositors who have decided before you chose to withdraw, then your earnings amount to 20 ECUs (the amount of money that the bank has after two withdrawals).

To sum up,

Your position in the line	Your earnings if you withdraw
1.	50 ECUs
2.	50 ECUs
3.	20 ECUs (if the first and the second have withdrawn) 50 ECUs (if only one or none of the previous depositors has withdrawn)

What happens if you keep your money deposited?

After paying the depositors who chose to withdraw, the bank carries out a project and pays dividend to those depositors who decided to keep their funds in the bank.

- If two depositors choose to keep their funds deposited, then each of them earns 70 ECUs, independently of their position in the line.
- If one depositor chooses to keep her funds deposited, then she earns 30 ECUs, independently of her position in the line.

To sum up,

Your position in the line	Your earnings if you keep your money in the bank
1.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)
2.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)
3.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)

As you see, it is not possible that all three depositors of the same bank decide to keep their funds deposited. This is the case because in each bank there will be a depositor who will be forced to withdraw her funds. This depositor (as the others) can submit her bid that determines her position in the line, but she cannot choose between keeping the money deposited or to withdraw.

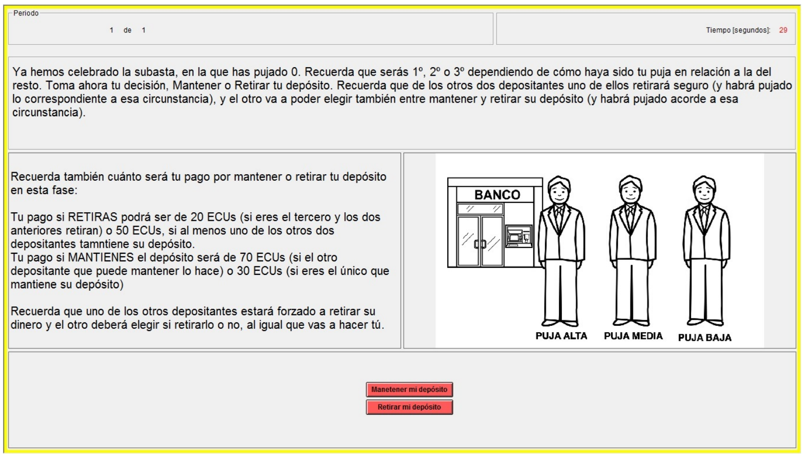
How many decisions do I have to make in this experiment?

In this experiment we ask you to submit a bid as a depositor forced to withdraw and also as one who can choose between keeping her funds deposited or withdrawing. In both cases, you may submit a bid from your initial endowment (between 0 and 20 ECUs). Furthermore, we ask you to tell us what decisions (to withdraw or to keep your funds deposited) you would make as a depositor who can decide whether to withdraw or keep her money in the bank.

In this experiment you do not know anything about the bids and the decisions (to withdraw or to keep the funds deposited) of the other depositors of your bank. You do not even know your position in the line (which depends on your bid and on the bids of the other depositors of your bank). Having in mind this information, we ask you what you would do with your deposit (keep it in the bank or withdraw it).

What information will I have in this experiment?

Next we show you one of the screens of the experiment so that you can see the way that we provide you the information.



(The Spanish text is the following: Period 1 of 1, Time (seconds):

We completed the auction, your bid was 0. Remember that you will be the first, the second or the third in the line depending on how your bid was relative to the bids of the others. Please, decide now if you want to keep your money in the bank or you want to withdraw. We remind you that one of the other two depositors will surely withdraw (and she submitted her bid knowing this), and the other one will choose between keeping her money in the bank and withdrawing (and she submitted her bid knowing this).

Remember also your payoff related to keeping your funds deposited and to withdrawal in this stage:

- If you withdraw, then your payoff may be 20 ECUs (if you are the third depositor in the line and the previous two depositors have withdrawn) or 50 ECUs if at least one of the other depositors keeps her funds deposited.
- If you keep your money deposited, then your payoff will be 70 ECUs (if the other depositor who can also keep her funds deposited does so) or 30 ECUs (if you are the only one who keeps her funds deposited).

Remember that one of the other depositors will be forced to withdraw and the other one has to choose whether to withdraw her money or not, like you.

(Red buttons:) Keep the deposit in the bank

Withdraw the deposit from the bank

(In the Picture the text below the first / second / third person is High / Intermediate / Low bid.))

Note that in the upper panel we remind you of your bid and we tell you that you are one of the depositors who can choose between keeping her funds in the bank and withdrawing. On the right-hand side, in the picture you see the three depositors of the bank, ranked according to their bids (that you do not know). On the left-hand side we remind you your payoffs related to withdrawal and keeping the money deposited. Your decision can be made by clicking the corresponding button in the lower pane.

What determines your final earnings?

At the end of the experiment, the computer will choose randomly one of the three depositors of the bank to be the depositor forced to withdraw. The other two will be the depositors who can choose between keeping their funds in the bank and withdrawing. All depositors have the same probability of being chosen as the depositor forced to withdraw.

Once the depositor forced to withdraw is selected, the computer uses the submitted bids to determine the sequence of decision and deducts the bids from the initial endowments of 20 ECUs. Next, the computer tells the decision of each depositor in function of the decisions given for all possibilities.

If you are the depositor forced to withdraw, then we deduct from your initial endowment of 20 ECUs your bid submitted as the forced depositor. And you will earn a payoff in function of your position in the line and the decision of the other depositors:

Your position in the line	Earnings
1°	50
2°	50
3°	20 or 50

In case that you are a depositor who can choose between keeping her funds in the bank and withdrawing, we deduct from your initial endowment of 20 ECUs your bid submitted as a depositor who can choose between keeping the money in the bank and withdrawal. And you will earn a payoff in function of your position in the line and the decision of the other depositors:

At the end of the experiment you will receive your earnings in Euros (10 ECUs = 1 Euro).

		If you keep your money deposited and …	
Your position in the line	If you withdraw	another depositor keeps her funds in the bank	you are the only one who keeps the money deposited
1°	50		
2°	50	70	30
3°	20 or 50		

Next, we provide some examples so that you can see how the payoffs are calculated. Before starting the experiment, there will be a trial round where you will be able to see the decision screens for the bidding and the decision whether to withdraw or keep the money deposited. This trial round will not affect your final payoff. We will call your attention when the phase that determines your payoff begins.

Thanks for participating!

Example 1

Imagine depositors A, B and C and assume that the computer selects B as the depositor forced to withdraw. Here are the bids:

	Bid if you are forced to withdraw	Bid if you can choose between keeping the money or withdrawing
Depositor A	8	5
Depositor B	6	2
Depositor C	0	10

These are then the bids that determine the position:
Bid of depositor A: 5 ECUs
Bid of depositor B: 6 ECUs
Bid of depositor C: 10 ECUs

Therefore, depositor C will be the first, depositor B the second and depositor A the third in the line. These bids will be deducted from the initial endowment, so from there depositor A will receive 15 ECUs, depositor B will receive 14 ECUs and depositor C will have 10 ECUs. This amount will add to the earnings related to withdrawing or keeping the funds deposited.

For instance, assume the following decisions (ranked according to the sequence of decision)

1. - Depositor C: Keep the money deposited

2. - Depositor B: Withdraw (Forced)
3. - Depositor A: Keep the money deposited

Depositor C and A will receive 70 ECUs and depositor B receives 50 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 85 ECUs (15 initial endowment + 70 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 80 ECUs (10 initial endowment + 70 decision).

Now assume the following decisions:

1. - Depositor C: Withdraw
2. - Depositor B: Withdraw (Forced)
3. - Depositor A: Keep the money deposited

Then depositor C and B will receive 50 ECUs and depositor A receives 30 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 45 ECUs (15 initial endowment + 30 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 60 ECUs (10 initial endowment + 50 decision).

Assume the following decisions:

1. - Depositor C: Withdraw
2. - Depositor B: Withdraw (Forced)
3. - Depositor A: Withdraw

Then depositor C and B will receive 50 ECUs and depositor A receives 20 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 35 ECUs (15 initial endowment + 20 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 60 ECUs (10 initial endowment + 50 decision).

Example 2

Imagine depositors A, B and C and assume that the computer selects C as the depositor forced to withdraw. Here are the bids:

These are then the bids that determine the position:
Bid of depositor A: 5 ECUs

	Bid if you are forced to withdraw	Bid if you can choose between keeping the money or withdrawing
Depositor A	15	5
Depositor B	7	3
Depositor C	1	3

Bid of depositor B: 3 ECUs

Bid of depositor C: 1 ECUs

Therefore, depositor A will be the first, depositor B the second and depositor C the third in the line. These bids will be deducted from the initial endowment, so from there depositor A will receive 15 ECUs, depositor B will receive 17 ECUs and depositor C will have 19 ECUs. This amount will add to the earnings related to withdrawing or keeping the funds deposited.

For instance, assume the following decisions (ranked according to the sequence of decision)

1. - Depositor A: Keep the money deposited
2. - Depositor B: Withdraw
3. - Depositor C: Withdraw (Forced)

Then depositor B and C will receive 50 ECUs and depositor A receives 30 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 45 ECUs (15 initial endowment + 30 decision), depositor B receives a total of 67 ECUs (17 initial endowment + 50 decision), depositor C receives a total of 69 ECUs (19 initial endowment + 50 decision).

Assume the following decisions

1. - Depositor A: Keep the money deposited
2. - Depositor B: Keep the money deposited
3. - Depositor C: Withdraw (Forced)

Then depositor A and B will receive 70 ECUs and depositor C receives 50 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 85 ECUs (15 initial endowment + 70 decision), depositor B receives a total of 87 ECUs (17 initial endowment + 70 decision), depositor C receives a total of 69 ECUs (19 initial endowment + 50 decision).

Assume the following decisions

1. - Depositor A: Withdraw

2. - Depositor B: Withdraw

3. - Depositor C: Withdraw (Forced)

Then depositor A and B will receive 50 ECUs and depositor C receives 20 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 65 ECUs (15 initial endowment + 50 decision), depositor B receives a total of 67 ECUs (17 initial endowment + 50 decision), depositor C receives a total of 39 ECUs (19 initial endowment + 20 decision).

Sequential treatment

Welcome to this experiment!

In this experiment, we study how individuals solve decision-making problems, and we are not interested in your particular decision, but in the average behavior of individuals. That is why you will be treated anonymously during the experiment and nobody in this room will ever know the decisions that you make.

Next, you will see the instructions that explain how the experiment goes. These instructions are the same for all participants and it is of utmost importance that you understand them well because your earnings will depend to a large extent on your decisions.

At the end of the experiment we will ask you to complete a long questionnaire that contains several games that allow you to earn extra money. The objective of the questionnaire is to get to know your tastes and preferences (that are not obviously the same as those of the rest of the participants) and for this reason there are no correct answers to the questions that we raise. During the questionnaire it is important that you state your preferred option in each case because your earnings from the questionnaire depend to a large degree of your decisions.

Remember that all the decisions that you make during the experiment are anonymous and will not be linked to you. If you have any doubt or question during the experiment, raise your hand and we will come to you. Remember also that you are not allowed to speak during the experiment.

What is the experiment about?

At the beginning of the experiment you will receive 60 ECUs:

- Part of the money (**20 ECUs**) is your **initial endowment**.
- The rest of the money (**40 ECUs**) is **deposited in a bank**.

The bank where your money is deposited is composed of three depositors who are in the lab. Thus, the bank has a total capital of 120 ECUs (40 ECUs from each depositor).

How can you earn money in this experiment?

In each bank, one of the depositors is chosen randomly and she will be forced to withdraw her deposit. The rest of the depositors may decide if they **withdraw their funds** from the bank or **keep them deposited** until the bank carries out a project. In any case, your earnings will depend not only on your decision, but also on how the other depositors of your bank have decided. Moreover, the position in the line may affect your earnings as we explain next.

Position in the line

To determine the sequence in which depositors make their decision, we carry out an auction. Each depositor of the bank (the one that will be forced to withdraw and those who can choose whether to keep their money deposited or withdraw it) can submit a bid from her initial endowment (0, 1, 2, ..., 20 ECUs) that determines her position in the line. The depositor with the highest bid will be the first in the line, the one with the intermediate bid will be the second, and the depositor with the lowest bid will be the third. If there is a tie in the bids the positions will be determined randomly. The amount of money used for bidding is deducted from your initial endowment of 20 ECUs. You will receive the amount not used for bidding at the end of the experiment as part of your earnings.

What happens if you withdraw your deposit?

The depositor who is forced to withdraw or any other depositor who chooses to withdraw will receive 50 ECUs whenever the bank has enough funds to pay that amount. Therefore, if you are the first or the second depositor in the sequence of decision and you choose to withdraw (or you are forced to do so), then you earn 50 ECUs (this amount corresponds to your initial deposit of 40 ECUs + 10 ECUs in form of interests earned). If you are the third depositor in the line and you choose to withdraw (or you are forced to do so), then your earnings depend on what the other two depositors before you have decided:

- If only one of the previous two depositors (or none of them) chose to withdraw, then you also receive 50 ECUs, because the bank has no problems to pay that amount.
- If both of the depositors who have decided before you chose to withdraw, then your earnings amount to 20 ECUs (the amount of money that the bank has after two withdrawals).

To sum up,

What happens if you keep your money deposited?

After paying the depositors who chose to withdraw, the bank carries out a project and pays dividend to those depositors who decided to keep their funds in the bank.

Your position in the line	Your earnings if you withdraw
1.	50 ECUs
2.	50 ECUs
3.	20 ECUs (if the first and the second have withdrawn) 50 ECUs (if only one or none of the previous depositors has withdrawn)

- If two depositors choose to keep their funds deposited, then each of them earns 70 ECUs, independently of their position in the line.
- If one depositor chooses to keep her funds deposited, then she earns 30 ECUs, independently of her position in the line.

To sum up,

Your position in the line	Your earnings if you keep your money in the bank
1.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)
2.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)
3.	70 ECUs (if the other depositor keeps her funds deposited) 30 ECUs (if you are the only depositor who keeps the money deposited)

As you see, it is not possible that all three depositors of the same bank decide to keep their funds deposited. This is the case because in each bank there will be a depositor who will be forced to withdraw her funds. This depositor (as the others) can submit her bid that determines her position in the line, but she cannot choose between keeping the money deposited or to withdraw.

How many decisions do I have to make in this experiment?

In this experiment we ask you to submit a bid as a depositor forced to withdraw and also as one who can choose between keeping her funds deposited or withdrawing. In both cases, you may submit a bid from your initial endowment (between 0 and 20 ECUs).

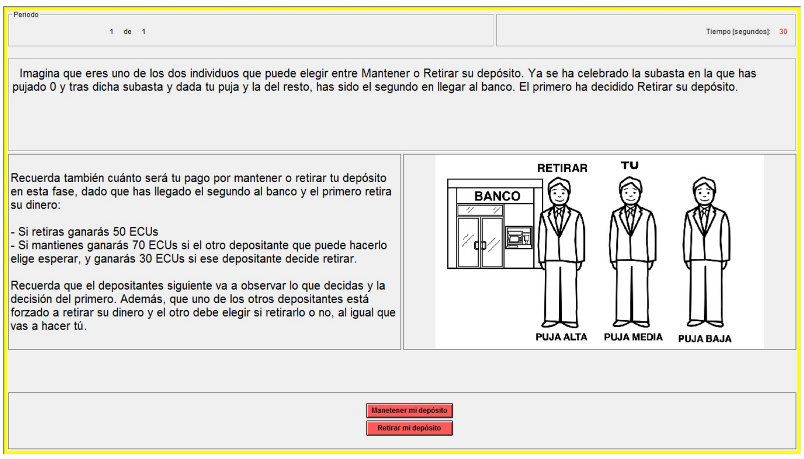
In this experiment, you do not know anything about the bids submitted by the other depositors, but you can condition your decision of withdrawing or keeping the money in the bank on what the other depositors decided to do with their deposits, if they decided before you. Thus, we ask you to tell us what you would like to do with your deposit (keep it deposited or withdraw it) if after the auction you are in the first, second or third position of the sequence of decision. Since you can condition your choice on the decisions of the other depositors of your bank, you have to make a decision in six potential scenarios:

- What do you do with your deposit if you are the first in the line
- What do you do with your deposit if you are the second in the line and the first depositor chose to keep her money in the bank
- What do you do with your deposit if you are the second in the line and the first depositor chose to withdraw her funds
- What do you do with your deposit if you are the third in the line and the first depositor chose to withdraw her funds and the second chose to keep them deposited
- What do you do with your deposit if you are the third in the line and the first depositor chose to keep her funds in the bank and the second chose to withdraw them
- What do you do with your deposit if you are the third in the line and the two previous depositors chose to withdraw their funds

Keep in mind when submitting your bid and making your decision, that the other depositors of your bank can also condition their decision on what you decided. That is, if you are the first in the line and decide to keep your money deposited or to withdraw it, the other depositors of your bank may condition their decision on what they observe.

What information will I have in this experiment?

Next we show you one of the screens of the experiment so that you can see the way that we provide you the information.



(The Spanish text is the following: Period 1 of 1, Time (seconds):

Suppose that you are one of the depositors who may choose between keeping her funds deposited or withdrawing them. We have completed already the auction, your bid was 0 and after the auction given your bid and those of the rest you are the second to arrive at the bank. The first depositor decided to withdraw her deposit.

Remember also your payoff related to keeping your funds deposited and to withdrawal in this stage given that you are the second in the line and the first one withdrew her deposit:

- If you withdraw, then you earn 50 ECUs.
- If you keep your money deposited, then your payoff will be 70 ECUs if the other depositor who can also keep her funds deposited does so or 30 ECUs if that depositor decides to withdraw.

Remember that the next depositor will observe your decision and also the decision of the first depositor. Remember also that one of the other depositors is forced to withdraw and the other one has to choose whether to withdraw her money or not, like you.

(Red buttons:) Keep the deposit in the bank
Withdraw the deposit from the bank
(In the Picture the text below the first / second / third person is High / Intermediate / Low bid, and the text above the first / second person is Withdraw / You.))

Note that in the upper panel we tell you that you are one of the depositors who can choose between keeping her funds in the bank and withdrawing. We also tell you your position in the line and the decisions of the previous depositor. You can see it also on the right-hand side in the picture where you can see that you are the second in the line and that the first one has decided to withdraw. On the left-hand side we remind you your payoffs related to withdrawal and keeping the money deposited. Your decision can be made by clicking the corresponding button in the lower pane.

What determines your final earnings?

At the end of the experiment, the computer will choose randomly one of the three depositors of the bank to be the depositor forced to withdraw. The other two will be the depositors who can choose between keeping their funds in the bank and withdrawing. All depositors have the same probability of being chosen as the depositor forced to withdraw.

Once the depositor forced to withdraw is selected, the computer uses the submitted bids to determine the sequence of decision and deducts the bids from the initial endowments of 20 ECUs. Next, the computer tells the decision of each depositor in function of the decisions given for all possibilities.

If you are the depositor forced to withdraw, then we deduct from your initial endowment of 20 ECUs your bid submitted as the forced depositor. And you will earn a payoff in function of your position in the line and the decision of the other depositors:

Your position in the line	Earnings
1°	50
2°	50
3°	20 or 50

In case that you are a depositor who can choose between keeping her funds in the bank and withdrawing, we deduct from your initial endowment of 20 ECUs your bid submitted as a depositor who can choose between keeping the money in the bank and withdrawal. And you will earn a payoff in function of your position in the line and the decision of the other depositors:

		If you keep your money deposited and …	
Your position in the line	If you withdraw	another depositor keeps her funds in the bank	you are the only one who keeps the money deposited
1°	50		
2°	50	70	30
3°	20 or 50		

At the end of the experiment you will receive your earnings in Euros (10 ECUs = 1 Euro).

Next, we provide some examples so that you can see how the payoffs are calculated. Before starting the experiment, there will be a trial round where you will be able to see the decision screens for the bidding and the decision whether to withdraw or keep the money deposited. This trial round will not affect your final payoff. We will call your attention when the phase that determines your payoff begins.

Thanks for participating!

Example 1

Imagine depositors A, B and C and assume that the computer selects B as the depositor forced to withdraw. Here are the bids:

These are then the bids that determine the position:

	Bid if you are forced to withdraw	Bid if you can choose between keeping the money or withdrawing
Depositor A	8	5
Depositor B	6	2
Depositor C	0	10

Bid of depositor A: 5 ECUs

Bid of depositor B: 6 ECUs

Bid of depositor C: 10 ECUs

Therefore, depositor C will be the first, depositor B the second and depositor A the third in the line. Remember that when depositor B decides (the second in the line), she will observe the decision of depositor C (who decides first) and depositor A (the last one to decide) observes both the decision of depositor C and that of depositor B. The bids will be deducted from the initial endowment, so from there depositor A will receive 15 ECUs, depositor B will receive 14 ECUs and depositor C will have 10 ECUs. This amount will add to the earnings related to withdrawing or keeping the funds deposited.

For instance, assume the following decisions (ranked according to the sequence of decision)

1. - Depositor C: Keep the money deposited

2. - Depositor B: Withdraw (Forced)

3. - Depositor A (after observing that the first one keeps the money in the bank and the second withdraws): Keep the money deposited

Depositor C and A will receive 70 ECUs and depositor B receives 50 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 85 ECUs (15 initial endowment + 70 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 80 ECUs (10 initial endowment + 70 decision).

Now assume the following decisions:

1. - Depositor C: Withdraw

2. - Depositor B: Withdraw (Forced)

3. - Depositor A (after observing two withdrawals): Keep the money deposited

Then depositor C and B will receive 50 ECUs and depositor A receives 30 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 45 ECUs (15 initial endowment + 30 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 60 ECUs (10 initial endowment + 50 decision).

Assume the following decisions:

1. - Depositor C: Withdraw
2. - Depositor B: Withdraw (Forced)
3. - Depositor A (after observing two withdrawals): Withdraw

Then depositor C and B will receive 50 ECUs and depositor A receives 20 ECUs for their decisions.

These earnings add to the earnings resulting from the bid, so depositor A receives a total of 35 ECUs (15 initial endowment + 20 decision), depositor B receives a total of 64 ECUs (14 initial endowment + 50 decision), depositor C receives a total of 60 ECUs (10 initial endowment + 50 decision).

Example 2

Imagine depositors A, B and C and assume that the computer selects C as the depositor forced to withdraw. Here are the bids:

	Bid if you are forced to withdraw	Bid if you can choose between keeping the money or withdrawing
Depositor A	15	5
Depositor B	7	3
Depositor C	1	3

These are then the bids that determine the position:
Bid of depositor A: 5 ECUs
Bid of depositor B: 3 ECUs
Bid of depositor C: 1 ECUs

Therefore, depositor A will be the first, depositor B the second and depositor C the third in the line. These bids will be deducted from the initial endowment, so from there depositor A will receive 15 ECUs, depositor B will receive 17 ECUs and depositor C will have 19 ECUs. This amount will add to the earnings related to withdrawing or keeping the funds deposited.

For instance, assume the following decisions (ranked according to the sequence of decision)

1. - Depositor A: Keep the money deposited
2. - Depositor B (after observing that the first kept her funds deposited): Withdraw
3. - Depositor C: Withdraw (Forced)

Then depositor B and C will receive 50 ECUs and depositor A receives 30 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 45 ECUs (15 initial endowment + 30 decision), depositor B receives a total of 67 ECUs (17 initial endowment + 50 decision), depositor C receives a total of 69 ECUs (19 initial endowment + 50 decision).

Assume the following decisions

1. - Depositor A: Withdraw
2. - Depositor B (after observing that the first withdrew): Withdraw
3. - Depositor C: Withdraw (Forced)

Then depositor A and B will receive 50 ECUs and depositor C receives 20 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 65 ECUs (15 initial endowment + 50 decision), depositor B receives a total of 67 ECUs (17 initial endowment + 50 decision), depositor C receives a total of 39 ECUs (19 initial endowment + 20 decision).

Assume the following decisions

1. - Depositor A: Keep the money deposited
2. - Depositor B (after observing that the first kept her funds deposited): Keep the money deposited
3. - Depositor C: Withdraw (Forced)

Then depositor A and B will receive 70 ECUs and depositor C receives 50 ECUs for their decisions. These earnings add to the earnings resulting from the bid, so depositor A receives a total of 85 ECUs (15 initial endowment + 70 decision), depositor B receives a total of 87 ECUs (17 initial endowment + 70 decision), depositor C receives a total of 69 ECUs (19 initial endowment + 50 decision).

B Individual characteristics and bids

B.1 Elicitation of individual traits

We collect information on individual traits using a questionnaire. Our questionnaire started with the elicitation of age and gender. Then, we elicited risk attitudes using the "bomb risk elicitation task" (BRET) by Crosetto and Filippin (2013). This requires that subjects decide how many boxes to pick from a store, each box being numbered from 0 to 100. Subjects were told that a bomb would be placed in one of the boxes at random, and they had to decide the number of boxes they want to collect. They would receive 0.10 euros for each box, if the bomb was not among the chosen boxes, and 0 if they had chosen the box with the bomb. Crosetto and Filippin (2016) show that this task is appropriate to distinguish subjects according to their risk attitude; in fact, they provide a range for the risk aversion parameter $r \in (r_0, r_1)$ depending on the number of boxes that a subject collects, assuming a CRRA utility function, $u(k) = k^r$. We hereafter use the midpoint of this interval as the risk aversion parameter for each of the subjects; i.e., our risk aversion parameter for each individual is $r = (r_1 + r_0)/2$. Since r increases in the number of boxes, we refer to this variable as risk tolerance.

We estimated loss aversion following Gächter et al. (2007). Participants were presented 5 different lotteries. Each of them paid out 4 Euros if the result of tossing a coin turned up tails, while subjects would lose an amount between 1 and 5 Euros if the coin turned up heads. Subjects had to indicate whether or not they would be willing to accept each of the lotteries (see Table 10).

Table 10: Elicitation of loss aversion

	Accept	**Reject**
L1. If the coin turns up heads, then you lose €1; if the coin turns up tails, you win €4	○	○
L2. If the coin turns up heads, then you lose €2; if the coin turns up tails, you win €4	○	○
L3. If the coin turns up heads, then you lose €3; if the coin turns up tails, you win €4	○	○
L4. If the coin turns up heads, then you lose €4; if the coin turns up tails, you win €4	○	○
L5. If the coin turns up heads, then you lose €5; if the coin turns up tails, you win €4	○	○

If we apply cumulative prospect theory (Tversky and Kahneman, 1992) and assume that subjects give the same probability weights to the 0.5-chance of gaining and losing, then the coefficient of loss aversion λ will be given by the ratio between the utility of winning and losing the gamble, where $\lambda = u(G/L)^r$ under CRRA utility function (Gächter et al., 2007). In our data, we obtain the degree of risk aversion r from the BRET and define a loss-averse agent as the one with $\lambda > 1$.

We followed Halevy (2007) to elicit ambiguity aversion. Subjects were presented a series of urns, composed of a different quantity of coloured balls, and they had to bet on the colour of the ball to be drawn from the urn, earning 2 euros if they guessed correctly (0 euros otherwise). Urn 1 was composed of 5 red and 5 blue balls. Urn 2 had also 10 balls, but the number of red and blue balls was unknown. After betting on a colour in each urn, participants had the opportunity of selling their bet, asking for a minimal price (in cents) between 0 and 2 Euros. Then, the computer chose a random number between 0 and 200, and paid it if the selling price was below. We use the difference in the selling price between urn 1 and urn 2 as a measure of ambiguity aversion.[31]

The next item in our questionnaire was the Cognitive Reflection Test (CRT) by Frederick (2005). This test consists of three questions that have an intuitive answer that is wrong; thus the test measures the tendency to override the spontaneous response and to engage in further reflection to give the correct answer to each question. We use the number of correct answers in the test as a measure of cognitive abilities.[32]

Our questionnaire included other self-reported variables that were not incentivized. We asked subjects their income level and their trust in several institutions (monarchy, government, army, banks, police, church and political parties). These questions were taken from a questionnaire of the Spanish National Statistics Institute (INE). We were especially interested in the trust in banks so that we can control for the fact that some individuals may not trust banks and this may affect their propensity to run and withdraw their funds. We also elicited personality traits using a 48-item Big Five test. Finally, we measured Social Value Orientation of our participants with the 9-Item Triple-Dominance Measure (Van Lange et al., 1997).

B.2 Correlation between individual characteristics and bids

We move now to see how individual traits affect the size of the bid. We begin with Table 11 that shows raw correlations between individual traits and bids in the different informational environments as impatient and patient depositors.[33]

Starting from the bottom of Table 11, we can observe that in case of Social Value Orientation and the Big Five personality traits the (absolute value of the) correlations is rather low and none is significant at conventional significance levels. Therefore, it seems that the individual traits captured by these measures are not related to the bids submitted either as an impatient or a patient depositor in the simultaneous or sequential setup.

The same is true about family income and trust in banks (and in general in institutions). Interestingly, uncertainty attitudes measured by our risk and ambiguity aversion measures show no significant correlation with the bids in any role and in any informational environment.

[31] As in the original design of Halevy (2007), we also presented subjects with urn 3 that contained some number (between 0 and 10) of red balls, the rest of balls being blue; this number was chosen from a bag with 11 balls numbered from 0 to 10. Finally, urn 4 was filled with 10 red and 0 blue balls, or with 0 red and 10 blue balls depending on if a 0 or a 10 was selected from a bag with these two numbers.

[32] See Korniotis and Kumar (2010) for the effect of cognitive reflection on financial decisions and Kiss et al. (2016b) for the case of bank runs.

[33] We do not correct here for multiple testing because we just wish to have a first look at the data and we do not want to draw too far-fetched conclusions.

		Impatient		Patient	
		Simultaneous	Sequential	Simultaneous	Sequential
Demog raphics	Age	-0.0560	0.2530***	0.1525*	0.1941**
	Female	-0.1687**	-0.1465*	-0.0456	-0.0984
Uncertainty attitudes	Risk aversion	0.1260	-0.0237	0.0913	0.0031
	Loss aversion	-0.1696**	-0.1495*	-0.1384*	-0.1175
	Ambiguity aversion	0.0268	-0.0741	0.1083	-0.0328
Other factors	Cognitive abilities	0.0585	0.2019**	-0.1670**	-0.0033
	Overconfidence	-0.0217	-0.2332***	0.1396*	-0.1622**
	Income	0.0909	0.0620	0.0171	-0.0828
	Trust in banks	0.1134	-0.0284	0.0152	-0.0422
Big Five categories	Openness to experience	0.0452	-0.1181	-0.0052	0.0152
	Conscientiousness	-0.0364	0.0279	0.0079	0.0000
	Extraversion	0.0679	-0.0723	0.0128	-0.0638
	Agreeableness	-0.0638	0.0633	-0.0157	0.0476
	Neuroticism	-0.0661	-0.0697	-0.0998	-0.0500
Social value orientation	Individualistic	-0.0068	-0.0315	-0.0318	-0.0406
	Competitive	-	-0.0303	-	-0.0622
	Prosocial	0.0752	0.1025	0.0539	0.0555

Table 11: Raw correlations between individual traits and bidding as impatient / patient depositors in different information setups (*/**/*** denotes significance at the 10/5/1% level.)

The rest of the variables exhibits at least some significant correlation with the bids in some cases. Age is positively correlated with bids in 3 out of 4 cases, indicating that older depositors tend to bid higher amounts (mostly in the sequential setup).[34] As impatient depositors females tend to submit significantly lower bids. Loss aversion is weakly negatively correlated with bids, suggesting that more loss-averse depositors tend to bid less, contrary to our conjecture. Cognitive abilities correlate positively / negatively with bids submitted as the impatient / patient depositor, and in two cases these correlations are significant. We have no good story why the effect of cognitive abilities should vary with the type of the depositor. The effect of overconfidence is also somewhat ambiguous, though it seems to reduce bids in the sequential setup.

[34]Age in our sample ranges from 18 to 63, with an average of 22.7, so we have a rather young pool with some older participants, so this result should be taken with a pinch of salt.

C Robustness checks

We estimate a negative binomial-logit maximum-likelihood hurdle model for the bidding behavior of depositors in the simultaneous environment, depending on the depositors' type (patient or impatient) and whether or not the depositor expects a bank run. Our results in Table 12 provide further evidence that beliefs on the occurrence of bank runs are crucial to explain whether or not depositors bid a positive amount in this environment -the dummy variable "Belief bank run" takes the value 1 if the depositor expects a bank run. The depositor's type does not seem to affect the bids, and patient depositors are less likely to bid zero if they want to withdraw their deposit from the bank.

	Logit regression (bid = 0)		Negative binomial (bid > 0)	
	(1a)	(2a)	(1b)	(2b)
Constant	-2.042***	-2.351***	2.210***	2.227***
	(0.259)	(0.430)	(0.047)	(0.063)
Belief bank run	-13.66***	-13.86***	0.051	-0.015
	(0.342)	(0.502)	(0.127)	(0.136)
Patient depositor	0.337	0.759	-0.054	-0.061
	(0.408)	(0.538)	(0.080)	(0.081)
Belief * Patient	-0.339	0.260	-0.229	-0.136
	(0.610)	(0.825)	(0.273)	(0.295)
Patient * Withdraw		-14.09***		-0.086
		(0.496)		(0.212)
Observations	252	168	252	168

Notes. Robust standard errors in parentheses are clustered at the individual level. *** p<0.01, ** p<0.05, * p<0.1

Table 12: Bidding behavior in the simultaneous environment

Tables 13 - 16 replicate the analysis in the main text for the bidding behavior of patient and impatient depositors in the simultaneous and the sequential environment. In our regressions below, we restrict the analysis to those subjects who submitted their bids thinking in their position in the line. Our results support the main conclusions in the text: beliefs on the occurrence of bank runs and the intention to withdraw are crucial to explain bidding in the simultaneous environment, where loss aversion and gender have also a predictive power. In the sequential environment, there is evidence that patient depositors are more likely to bid if they are irrational or if they want to keep their deposit in the bank, and loss averse depositors bid more. For impatient depositors in the sequential environment, beliefs on the occurrence of bank runs seem to be the main determinant of their bids.

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-1.305*	-1.501	-2.521	-19.89***	2.404***	1.703***	1.816***	2.174
	(0.734)	(3.148)	(3.655)	(6.495)	(0.155)	(0.552)	(0.598)	(1.551)
Decision (=1 if withdrawal)	-14.59***	-15.44***	-15.09***	-18.02***	-0.311	-0.472*	-0.455*	-0.648
	(0.826)	(0.861)	(1.623)	(2.024)	(0.242)	(0.247)	(0.274)	(0.406)
Belief bank run	-13.89***	-14.29***	-13.79***	-20.00***	0.150	-0.0358	-0.00126	-0.479*
	(0.847)	(1.717)	(1.605)	(3.238)	(0.213)	(0.211)	(0.295)	(0.248)
Risk tolerance	0.394	0.167	-0.0901	2.210**	0.231*	0.113	0.105	0.0755
	(0.427)	(0.457)	(0.532)	(0.954)	(0.134)	(0.133)	(0.137)	(0.155)
Loss aversion	-0.715	-0.341	-0.0454	1.920	-0.547***	-0.409**	-0.408**	-0.353*
	(0.807)	(0.829)	(0.853)	(1.243)	(0.181)	(0.187)	(0.185)	(0.194)
Ambiguity aversion	0.0211	0.0385	0.0540	0.112	0.00517	0.0133	0.0134	0.0284**
	(0.0496)	(0.0482)	(0.0521)	(0.0734)	(0.0103)	(0.00953)	(0.00900)	(0.0115)
Age		0.0450	0.0769	0.509**		0.0527*	0.0545*	0.0524*
		(0.163)	(0.181)	(0.202)		(0.0278)	(0.0282)	(0.0306)
Gender (=1 if female)		-1.324**	-1.288*	-3.983***		-0.528***	-0.543***	-0.696***
		(0.669)	(0.683)	(1.385)		(0.189)	(0.189)	(0.240)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 64 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 13: Bidding behavior of patient depositors in the simultaneous environment

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-16.85***	-17.49**	-18.53**	-584.2***	2.399***	3.013***	2.989***	2.507**
	(0.667)	(8.760)	(7.681)	(19.66)	(0.154)	(0.410)	(0.404)	(1.042)
Belief bank run	-15.22***	-15.31***	-15.99***	-46.35***	0.0457	0.0918	0.119	0.133
	(0.633)	(1.010)	(1.175)	(2.622)	(0.138)	(0.147)	(0.155)	(0.167)
Risk tolerance	-0.551	-0.416	-1.102*	-14.54*	0.0433	0.0242	-0.0341	-0.0359
	(0.723)	(0.631)	(0.668)	(8.586)	(0.115)	(0.0895)	(0.0860)	(0.0928)
Loss aversion	15.30***	15.54***	17.30***	175.6***	-0.387***	-0.210*	-0.188*	-0.217*
	(0.603)	(0.885)	(1.165)	(17.58)	(0.131)	(0.121)	(0.108)	(0.129)
Ambiguity aversion	-0.00719	0.0327	0.0326	-0.666***	-0.0119*	-0.00667	-0.00593	-0.00497
	(0.0501)	(0.0567)	(0.0711)	(0.0681)	(0.00662)	(0.00710)	(0.00628)	(0.00686)
Age		0.0816	-0.115	5.778***		-0.0242	-0.0193	-0.0171
		(0.437)	(0.483)	(1.014)		(0.0208)	(0.0188)	(0.0205)
Gender (=1 if female)		-1.989	-1.688	-35.18***		-0.372***	-0.419***	-0.379***
		(1.342)	(2.271)	(4.629)		(0.123)	(0.119)	(0.135)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 64 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 14: Bidding behavior of impatient depositors in the simultaneous environment

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-19.05***	-16.63***	-17.19***	-14.85***	1.734***	1.733***	1.728***	2.351***
	(1.320)	(2.328)	(2.178)	(2.736)	(0.246)	(0.332)	(0.350)	(0.709)
Decision (=1 if withdraw)	1.032*	1.077*	1.370**	1.923**	-0.070	-0.0240	-0.00706	-0.0801
	(0.570)	(0.595)	(0.625)	(0.775)	(0.153)	(0.161)	(0.160)	(0.159)
Irrational depositor	16.06***	15.43***	15.02***	15.63***	-0.131	-0.115	-0.108	-0.164
	(0.342)	(0.378)	(0.407)	(0.483)	(0.130)	(0.126)	(0.127)	(0.129)
Risk tolerance	0.337	0.531	0.523	0.534	0.028	0.011	0.0215	0.003
	(0.375)	(0.383)	(0.377)	(0.388)	(0.101)	(0.095)	(0.0948)	(0.101)
Loss aversion	0.871	0.801	0.610	0.364	0.459**	0.458**	0.459**	0.503**
	(1.205)	(1.256)	(1.224)	(1.226)	(0.210)	(0.212)	(0.209)	(0.245)
Ambiguity aversion	0.002	0.00465	0.00776	0.0135	-0.001	-0.001	-0.0009	-0.0005
	(0.007)	(0.008)	(0.008)	(0.010)	(0.002)	(0.002)	(0.002)	(0.002)
Age		-0.073	-0.0770	-0.077		0.004	0.004	0.009
		(0.080)	(0.0715)	(0.069)		(0.008)	(0.008)	(0.009)
Gender (=1 if female)		-0.466	-0.616	-0.665		-0.172	-0.164	-0.161
		(0.534)	(0.637)	(0.691)		(0.120)	(0.130)	(0.139)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 141 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 15: Bidding behavior of impatient depositors in the sequential environment

	Logit regression (bid = 0)				Negative binomial (bid > 0)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	-2.032***	-0.145	-0.286	-1.329	2.164***	2.084***	1.893***	2.462***
	(0.717)	(1.185)	(1.460)	(3.013)	(0.216)	(0.263)	(0.274)	(0.593)
Belief bank run	-13.00***	-13.88***	-12.01***	-12.17***	0.383	0.463*	0.508**	0.501*
	(0.816)	(0.912)	(0.695)	(0.807)	(0.276)	(0.262)	(0.240)	(0.265)
Risk tolerance	0.740*	0.915*	0.802**	0.716*	0.0456	-0.032	-0.0199	-0.011
	(0.411)	(0.477)	(0.386)	(0.369)	(0.125)	(0.104)	(0.0993)	(0.106)
Loss aversion	-0.665	-0.750	-1.071	-1.072	-0.225	-0.168	-0.200	-0.158
	(0.684)	(0.697)	(0.760)	(0.750)	(0.189)	(0.181)	(0.181)	(0.177)
Ambiguity aversion	0.003	0.00607	0.00787	0.009	-0.002	-0.00157	-0.001	-0.001
	(0.007)	(0.008)	(0.008)	(0.008)	(0.002)	(0.002)	(0.002)	(0.002)
Age		-0.077*	-0.0802*	-0.0733*		0.012**	0.0103*	0.0105*
		(0.045)	(0.0410)	(0.0433)		(0.006)	(0.00563)	(0.006)
Gender (=1 if female)		-0.391	-0.627	-0.486		-0.310***	-0.205	-0.183
		(0.544)	(0.645)	(0.616)		(0.109)	(0.126)	(0.128)
Controls (income, confidence, CRT)			Yes	Yes			Yes	Yes
Personality (BIG5 and SVO)			No	Yes			No	Yes

Notes. We have a total of 144 observations. Robust standard errors in parentheses are clustered at the individual level. Significance at the *** p<0.01, ** p<0.05, * p<0.1.

Table 16: Bidding behavior of impatient depositors in the sequential environment

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