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Would Lehman Sisters Have Done It Differently? An Empirical Analysis of Gender Differences in Investment Behavior.

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Abstract

This study appraises the role of gender in the behavior of individuals who make risky investments. The analysis bases on real-life investment data collected at an online market for peer-to-peer lending. The aim is to find out whether male and female investors differ in propensity for risk taking and performance of investments. Contrary to most existing studies, I find no evidence for gender differences. Males and females exhibit similar levels of risk propensity and their portfolios perform equally good.

Keywords: gender, investment decisions, risk propensity, portfolio performance

JEL Classification: G11, G21, J16

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1 Introduction

Academic research on the role of gender for the financial behavior of individuals has a long history. Nonetheless, current public discussion demonstrates that some crucial questions remain unanswered. In particular, one question recently raised by the public is whether male and female financial professionals who are in charge of investment decisions behave differently in terms of risk-taking.[1] One of conjectures voiced in the discussion is that males – who predominate in the decision-making positions at most system relevant financial institutions – are primarily responsible for the collapse of financial markets because they are more risk seeking than their female counterparts. As the EU competition commissioner Neelie Kroes put it:

> *"...the collapse of Lehman Brothers would never have happened if there'd been Lehman Sisters there with them."*

Formulated more generally, the question raised by the public reads: Would females behave similar to males if they were in charge of the same investment tasks? So far, the existing literature has not provided a conclusive answer to these questions.

Intuition suggests that males and females who deliberately and actively engage in risky financial transactions should on average exhibit similar risk propensity and confidence. This should hold even when in population at large females are found to be less risk tolerant and confident than males: Females who are willing to bear investment risks should be more risk-seeking and self-confident than women on average and, therefore, might match their male counterparts in the level of taken risk. However, a large group of studies, especially those that analyze financial behavior of individuals in the population at large, do not support this intuition. These studies suggest that a randomly selected female is less likely to participate in risky financial transactions and conditional on participation is predicted to allocate a smaller share of wealth to risky assets than a male counterpart (Jianakoplos and Bernasek, 1998; Sunden and Surette, 1998; Bernasek and Shwiff, 2001). This literature, however, has several shortcomings. These shortcomings result mostly from the limitations of survey-based data that

[1] See, for example, The New York Times, Feb 1, 2009; The Sunday Times, Aug 2, 2009; Economist, Aug 6, 2009.

the studies have to rely on. Firstly, the data don't allow to differentiate between "active" and "passive" investors. Active investors are characterized by active engagement in financial transactions: They select and manage their financial portfolios at own discretion, and hence have a direct control over the extent of taken risk. Passive investors are individuals who own some financial assets but act more as providers of funds rather than managers of their financial portfolios. Many private households come to own some kind of risky assets via defined contribution plans or investment funds. In such cases, portfolio decisions and risk management are mostly delegated to the discretion of financial industry professionals. Secondly, researchers have only crude information about portfolios' composition and, hence, can't identify how risky a particular portfolio really is. Thirdly, in most survey-based data, financial assets are aggregated at household level and it is hardly possible to identify who is actually responsible for investments in a multi-person household.

A few empirical studies try to overcome these limitations by focusing on professionally trained investors, mostly managers of investment funds, who take risky financial decisions in the course of their jobs. Evidence provided by these studies is very scarce and conflicting. Johnson and Powell (1994) and Atkinson et al. (2003) find no differences in the behavior of male and female managers. In contrast, Olsen and Cox (2001), Beckmann and Menkhoff (2008) and Niessen and Ruenzi (2007) find that female managers follow less risky investment styles than their male counterparts. Noteworthy, the latter group of studies has one methodological feature in common. Their samples are very heterogenous; for example, Beckmann and Menkhoff (2008) and Niessen and Ruenzi (2007) look at managers of various funds ranging from pure bond-funds to pure equity-funds. Thus, their samples comprise individuals working in very different settings. However, a direct comparison of behavior can only be made among individuals who face the same or very similar investment tasks. So far, this condition could be achieved only in controlled experiments.

This study offers for the first time evidence on real-life investment behavior of males and females who face the same investment task. In contrast to other studies, the analysis does not involve professional investors but focuses on private investors who deliberately and directly engage in financial decision-making associated with substantial risks. Specifically, I look at individuals who invest in consumer and small business loans at an online marketplace for peer-

to-peer lending. Peer-to-peer lending means direct lending and borrowing between individuals without intermediation of a financial institution like a bank. Loans are investment projects with uncertain returns and a positive probability of losses. Hence, people who provide funds to borrowers are investors bearing financial risks.

The aim of the study is to answer two questions. Firstly, do male and female investors exhibit different propensity for risk-taking? So far, the majority of empirical studies find that males are more risk tolerant. However, for the reasons mentioned above the discussion of the issue can not be closed yet. The second question is whether investments made by males and females perform differently. This question is of high practical relevance. Barber and Odean (2001) argue that due to over-confidence male investors trade more excessively and inflict more damage on the performance of their portfolios than female investors. There is however no further evidence on performance of investments conducted by non-professional investors in real life. As to performance of professionally trained investors, Atkinson et al. (2003) and Niessen and Ruenzi (2007) find no significant differences between male- and female-managed mutual funds.

In view of the existing literature, two hypotheses regarding the role of gender in investment behavior are tested:

1. Male investors exhibit higher propensity for risk taking than female investors
2. There are systematic differences in the performance of investments by male and female investors

The hypotheses are tested with data collected from *Smava* – a German internet platform for peer-to-peer lending. Having real-life data at hand is a considerable advantage vis-à-vis experimental studies where it is generally difficult to provide participants with appropriate incentives to perform as in real life.[2] Moreover, most experiments build on abstract gambles and may fail to account for the influence of investment context.[3] Unlike abstract investment games, real-

[2]Experimental studies may fail to provide appropriate incentives if they do not involve real winnings or the winnings are too small, or because participants do not face the risk of loosing their own money. The latter aspect is especially important, since behavior is likely to vary between the gain and loss domains (Kahneman and Tversky, 1979).

[3]Schubert et al. (1999) find that risk propensity of males and females depends strongly on the contextual frame of investment decisions.

life financial decisions are always contextual. The data has also two advantages over survey-based data on finances of private households. Data employed in this study contains all details on attributes of investments such as expected and realized returns, transaction costs, information sets available to investors etc. Furthermore, In the peer-to-peer lending data, each investor is clearly identified.[4]

Results of the analysis conducted in the study provide no support for the gender stereotype. Firstly, contrary to the common belief, males and females exhibit equal propensity for risk taking. In particular, female investors do not shun risky borrowers and lend them money as frequently as males do. Male and female investors allocate equal amounts to individual loans. Moreover, given a fixed level of risk, there are no differences between investments made by males and female with regard to expected return. Secondly, none of gender groups seems to outperform the other group in the quality of selected loans. Occurrence of early repayments, arrears and defaults is more or less the same in portfolios of males and females when loans' and borrowers' attributes are taken into account. Also the relative performance of portfolios measured as ratio of realized to expected cash flows doesn't differ significantly between the gender groups.

The paper is organized as follows. General information about peer-to-peer lending and details about investing in loans at the platform *Smava* are provided in Section 2. Here, I also describe the data and sample. In Section 3, I outline the research hypotheses and explain how they are tested. Section 4 presents the empirical implementation of tests and main results. The last section concludes.

[4]Although not known to researchers or any other participant of the marketplace, identity of investors is verified via a common *postident* procedure (by the officers of the German Post). Each registered user of the platform has a unique username that allows to identify all transactions made by any particular investor. Investors sign a binding contract pledging to provide funds when placing a bid on a loan. All transactions are done via investors' personal bank accounts. Of course, it is impossible to assure that a particular investor isn't influenced by someone else when making decisions. However, this possibility can't be excluded in any real-life investment situation.

2 The Data and the Sample

2.1 Online Platforms for Peer-to-Peer Lending

Peer-to-peer lending, in its broad sense, means direct lending and borrowing between individuals ("peers") without intermediation of a traditional financial institution like a bank. Peer-to-peer lending in its classical form when one private person directly lends money to another is not a new phenomenon. A typical example is lending among friends, family members or business partners. Recent advances in the Internet-based technologies enabled lending transactions to be carried out between individuals at online platforms ("virtual market places"). A distinguishing feature of this new form of lending is that borrowers and lenders are matched together without knowing the identity of each other. Moreover, any particular loan request may be funded by multiple lenders and any particular lender may provide funds to multiple borrowers. Lenders actually act as investors by investing in projects (loans) that generate return (interest).

The first online platform for peer-to-peer lending, *Zopa*, was founded in 2005 in the UK. Since then, several other lending sites were launched in the US and continental Europe. Other well known platforms are *Prosper*, *Virginmoney* and *Kiva* in the USA; *Bobber* in the Netherlands; *Fairrates* in Denmark; *Elolly*, *Aux Money*, *Smava* and *SOS Money* in Germany.[5] Currently, peer-to-peer lending online is still a niche product in the segment of credit business, although its market share rapidly grows. The total amount of outstanding peer-to-peer loans in the United States alone was estimated for $118 million in 2005, $269 million in 2006 and $647 million in 2009. Due to its dynamic development, the phenomenon attracts significant attention of general public, financial industry professionals and academics.[6]

The data used in this study are collected from a German peer-to-peer lending platform *Smava*. The platform was launched in March 2007. Since then, the number of originated loans and their volume has been rising at increasing rate

[5]The business models of the platforms are very different. For example, *Zopa* does not reveal individual requests of borrowers to potential lenders, but matches them itself. Platforms like Prosper auction the loans, while *Smava* procures loans on the "first-come first-serve" basis.

[6]On the general interest see e.g. FTD (2009), Sviokla (2009), Kim (2009); on financial industry analysis see Meyer (2009); and on academic research see Pope and Sydnor (2008), Freedman and Jin (2008), Garman et al. (2008) and Duarte et al. (2009).

(Figure 1). By January 2010, the platform procured 3,172 loans in total volume of ci. € 23 million. All loans originated at the platform are annuities repayed in fixed monthly installments.

2.2 The Mechanism of Investing at *Smava*

Investing at *Smava* functions in the following way. An individual who wants to engage in lending transactions as investor (lender) or a borrower has to register at the platform. Individuals' identity is verified via a standard postident procedure by the officers of the German Post. Borrowers who fulfil the requirements of the platform, place a loan request.[7] The requested sum of a loan must be between € 500 and 25,000. The borrowers choose the nominal annual interest rate they want to borrow at. Loan maturity is also chosen by borrowers, but it can only be 36 or 60 months. Every posted loan request appears in the list of open projects on the Internet and is visible to all users of the platform. Investors can browse through the individual requests and choose which borrower they want to finance. Investors can not actively negotiate about the loan conditions set by borrowers. They can, however, abstain from providing funds and thereby force the borrower to adjust the conditions.

When an investor decides to finance a particular loan under the conditions set by a borrower, he places a "bid". An important distinguishing feature of *Smava*, is that investing at this platform does *not* function as an auction. Here "bid" means the amount of money that an investor commits to provide to a borrower. By "placing a bid" the investor "signs" a binding contract and the bidden sum will be withdrawn from his bank account. Normally, a single investor

[7] Firstly, borrowers have to be at least 18 years old and have a monthly income of min. 1,000 Euro. Secondly, borrowers must provide their personal income statement. Only those whose individual financial burden does not exceed 67 % are eligible to borrower at the platform. The financial burden is measured as a ratio of monthly payments on all outstanding consumer debts (including previously opened loans at *Smava*) to the borrower's personal monthly disposable income. Mortgage payments are treated as expenditures and subtracted from the disposable income. Borrowers' wealth and income of other members of the household are not taken into account. Depending on the obtained ratio, borrowers are assigned a KDF-Indicator ranging from 1 to 4 as is described in Table 3. Finally, borrowers have to provide their credit rating assigned by the German national credit bureau (Schufa-Rating). The credit bureau rates creditworthiness on a 12-point scale from A (the best) to M (the worst). Each rating grade is assigned an estimate of expected probability that a borrower defaults on his obligations within one year (see Table 4). The platform accepts only borrowers with credit ratings A till H.

doesn't provide the whole requested sum but a fraction of it. The minimal acceptable bid size is € 250. Other lenders submit their bids for the remaining sum until the whole requested amount is raised. Hence, unlike in an auction, participants invest money on the "first-come first-serve" basis and bids of subsequent investors neither influence loans' interest rate nor other conditions. If after 14 days from the moment when a loan request was posted at the market, less than 25 % of the requested amount is raised, the request is canceled and the raised money is returned to investors. Between March 2007 and January 2010, ci. 20 % of loan requests posted at the platform were canceled because they didn't achieve the threshold. In the case of cancelation, a borrower can post his request again, eventually, setting more attractive conditions, e.g. by increasing the nominal interest rate. In case of a successful brokerage, the platform charges lenders with a fixed fee of € 4 for each bid.

2.3 Informational Imperfections Faced by Investors

Investing at the platform is characterized by substantial informational asymmetries between investors and borrowers. The asymmetries emerge mainly because borrowers' identity is not known and investors are provided with a limited set of information about the borrowers. Investors have access only to information that is collected and disclosed by the platform. Hence, the decisions of investors build ultimately upon the provided information set. This set includes some loan- and borrower-specific data. All investors have access to the same information set.

Loan specific information comprises the following details. Investors can observe in real time when a loan request is posted, what bids are submitted by other investors on this request (if any), when the submissions were made, and what share of the requested sum remains unfunded. Investors are also provided with the information about the loan's conditions that are set by borrowers and include the nominal annual interest rate, loan amount and maturity. Further important information provided by borrowers is the description of the loan purpose. Figure 2 categorizes all loan requests posted at the platform between March 2007 and 2010 by loan purpose. Remarkably, 25% of all loans are taken for business purposes. The rest are the typical consumer loans. Very often the borrowers provide a relatively detailed description of the projects they need

money for. This additional information should increase borrowers' trustworthiness and reduce informational asymmetries between the parties. However, the description of loan purpose is voluntarily and is not verified.

The borrower-specific information observed by investors can be subdivided into "hard" and "soft" information. Hard information includes data that each borrower is obliged to provide and is verified by a third party (officers of the German Post). These information includes borrowers' age, sex, place of residence, credit rating, debt burden measured as debt-to-income ratio, number of delayed payments and defaults on the previous *Smava* loans. The availability of hard information is crucial for investors, because it allows to calculate the expected rate of return on investments and to estimate the probability of a loan's default. Although all pieces of hard information are verified, informational imperfections are still high. In particular, the platform provides a categorical grade for each borrower indicating the extent of financial burden. The borrowers' actual income is not observable. Furthermore, nothing is know about the owned financial or tangible assets or the borrower's state of health.

The available "hard" information is complemented by "soft" information. The latter is voluntarily provided by borrowers and is not verifiable. The set of "soft" data provided to investors comprises description of a borrower's occupation, hobbies, family status and whether he/she is a member of a group at the platform. Groups at *Smava* can be formed by investors and borrowers. Usually a group grounded by investors comprises investors who share the idea about what types of loans they want to finance or by borrowers who what to distinguish themselves from the others. For example, there is a group that embraces borrowers who are civil servants and therefore consider themselves more creditworthy than other borrowers due to the secure employment status. Another group comprises investors who specializes in providing education loans. Groups grounded by borrowers serve the purpose of signalling. A borrower who wants to join a group has to send an application to the group leader. The leader screens the borrower's profile and may reject the application if he has doubts in the borrowers credibility. So membership in a group may be considered by investors as a quality mark. Very often borrowers and investors become members of the same group. By the end of the observation period, 99 groups were registered at the platform. On average, a group embraced 36 members. Overall, existence of groups presents an attempt to utilize the positive effects

of social networks. Though, unlike group lending in microfinance, groups at *Smava* can not impose joint liability on their members. Still, there may be significant positive effects of social networks. For instance, informational asymmetries may be reduced because borrowers are associated with the reputation of a particular group.

2.4 Risk Sources and Risk Sharing

Alongside with informational asymmetries, investors face substantial risks. Loans procured at the platform are not secured by collateral or guaranties of third parties. Hence in case of a default, investors can't recover their investments as it is possible in case of classical secured loans. Though, the claim on the remaining principal payments can be sold to a collecting agency. The price is 15 to 20 percent of the claims value. Hence, a small fraction of invested capital can be recovered.

A significantly larger part of investments can be recovered due to risk sharing. Risk sharing at the platform is accomplished through so-called pools. All investors who provide funds to borrowers with the same rating and loan maturity are assigned into one group – a pool. For example, all investors who granted loans to borrowers with rating "A" for 60 months belong to the same pool. There are 16 pools in total (due to existence of 8 rating classes and 2 maturity types). Monthly principal payments by borrowers to these investors are pooled together. In contrast, interest payments are not pooled together but are transferred directly to investors. When one loan in a particular pool defaults and the monthly payment is not received, the losses are divided among not affected members of the group proportionally to the payments normally received by each of them. In effect, all members of the pool including those with the defaulted loan get only a fraction of the normal monthly principal payment until the loan's maturity. This assures that affected investors do not loose 100% of the invested capital. The flip side of the coin is that the losses are covered by withholding a part cash inflows from not affected investors and every member of the pool gets only a fraction of invested capital back. This fraction is called *payment rate*. Table 5 shows the expected and the observed monthly payment rates. Thus, each loan default reduces the payment rate of the pool. For, example there are 100 investors in a pool and each granted a € 250-loan to different

borrowers. If two loans default, the pool's payment rate reduces to 98% which means that every member of the pool gets only 98% of the stipulated principal payment. If another loan defaults, the pool's payment rate decreases to 97% and so on. The payment rate can, however, be improved when members of a pool invest in new loans and/or the old defaulted loans reach their maturity. The platform provides investors with an estimate of expected payment rates for each of the 16 pools.

Loans that are repaid prior to maturity present another source of risk. When a loan is repayed early, investors loose a part of expected interest payments. There is no penalty for early payments and hence investors get no compensation for the foregone interest. A further source of risk is associated with delayed payments. A delayed payment ties up the money and prevents investors from reinvesting it in new projects. Because no penalty for delayed payments is imposed on borrowers, lenders are not compensated for having to postpone reinvesting. Hence, delayed payments inflict losses in the form of foregone investment opportunities.

2.5 The Data Set

For the purpose of the analysis, I collect transaction level data from *Smava*.[8] The data set comprises borrower-, lender- and loan-specific information. Unit of observation is a single bid. The observation period spans 35 months – from March 27, 2007 till January 26, 2010. During this period, more than 4 thousand loan requests were posted at the platform. By January 2010, 3,172 loans were successfully procured (i.e. raised more than 25% percent of the requested sum and borrowers accepted the amount). The total volume of loans procured by the end of the observation period exceeded € 22 million. The average loan amount is ci. € 7,000. The total number of bids submitted by investors on these loans is 48,087. On average, each investor bid on 9 different loans. The average number of bids per loan is 15.

[8]The data are drawn from the platform's archive of posted loan requests and from the online profiles of investors and borrowers at (www.smava.de)http://www.smava.de/ Only information that is publicly available at the platform is used.

As of January 2010, there were 5,172 investors at the platform: 561 females (11%) and 4,611 males (89%). [9] Respectively, the total volume of capital invested by females is much lower than the volume invested by males: € 2.1 million and € 21.5 millon respectively. Summary statistics of the main variables by investors' gender reveal further differences (see Table 2). An average female investor is by 3 years older than an average male investor. However, males are more experienced in peer-to-peer lending: they have been investing at the platform by 1 month longer than females. The mean total amount invested at the platform by a female is € 3,940 and is significantly lower than the average volume invested by a male which is € 4,504. The average amount of bid is € 456 for males and € 462 for females. The average number of bids made by a female is smaller than the number of bids by a male: 8 and 9 bids respectively.

3 Research Hypotheses and Testing Methods

The present study appraises gender differences in investment behavior by analyzing investors' propensity for risk taking and ex-post performance of investments. The first research hypothesis reads:

Hypothesis 1: Male investors exhibit higher propensity for risk taking than female investors, other factors held constant.

The hypothesis is tested in three ways. Firstly, one can identify more risk averse investors by comparing investments' risk characteristics. Investors with lower risk propensity should shun loans requested by borrowers with bad ratings and respectively high risk premiums. Distributions of investors by borrowers' rating should reveal whether there are any differences between male and female investors in this respect. In particular, in the distribution of female investors by borrower rating, more mass should be concentrated at better ratings, if females prefer to invest in less risky loans.

[9] For obvious reasons, it is not possible to model the mechanism of selection into investing at the platform. On the other hand, previous research shows that low participation rates among women in risky financial markets is quite a common phenomenon (Badunenko et al., 2009). Unfortunately, there is no statistics available that would show the gender structure of owners of a financial instrument comparable to peer-to-peer loans. Remarkably, participation rates at the platform are very close to those observed in the German and US investment fund industry were only 10% of managers are females (Beckmann and Menkhoff, 2008; Niessen and Ruenzi, 2007).

One caveat is in place here. The test will fail to reveal differences in risk propensity, if a number of loans at the market is over- or under-priced. Over-pricing emerges when a borrower is willing to pay a risk premium higher than the market expects given his creditworthiness rating. Respectively, under-pricing emerges when a borrower offers a premium lower than it is expected given his rating. After adjustment for risk, over-priced loans will generate higher expected returns than fairly- or under-priced loans, conditional on borrowers' rating. Figure 5 reveals large dispersion of expected rates of return conditional on borrowers' rating and loan duration and hence confirms that there are over- or under-priced loans at the market. In the presence of over-priced loans, more risk averse investors should prefer over-priced loans because they provide an additional compensation for the risk. In contrast, more risk prone investors should be less sensitive to the additional compensation and hence less "picky". Therefore, investors with different levels of risk tolerance may invest in loans with equal risk but different expected returns. In this case, the test of hypothesis 1 suggested earlier may fail to reveal more risk averse investors, because they and their less risk averse counterparts will be similarly distributed over borrower rating.

An alternative way of testing hypothesis 1 while allowing for over- and under-pricing is the following. If more risk averse investors pick up loans with higher expected rates of return, than females should be the "pickier" ones. A formal test of the hypothesis is conducted by regressing the expected rate of return to loan i on investors' gender while controlling for diverse lender-, borrower- and loan-specific factors including borrowers' rating:

$$E[Return]_i = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 \times Female\ investor_i + \boldsymbol{\beta}_2 \times Control\ variables_i + \boldsymbol{e}_i, \tag{3.1}$$

A positive and statistically significant estimate of $\boldsymbol{\beta}_1$ will support hypothesis 1.

Finally, the size of a single bid may also indicate how risk averse a particular investor is. More risk averse investors should allocate smaller sums to individual loans in order to reduce exposure to any particular borrower. This may hold even when the total sum invested by a particular individual at the market is large: In this case, a less risk prone investor should reduce his exposure by splitting the funds among a higher number of loans. The effect of investor's j

gender on the size of bid is estimated in the model:

$$Bid_j = \zeta_0 + \zeta_1 \times Female\ investor_j + \zeta_2 \times Control\ variables_j + e_j. \quad (3.2)$$

A negative and statistically significant estimate of ζ_1 will lend support to Hypothesis 1.

Hypothesis 2: There are systematic differences in the performance of investments by male and female investors

In testing this hypothesis, I compare performance of loan portfolios held by male and female investors. Performance is measured in two ways. Firstly, I calculate relative number of "misbehaving loans" in each loan portfolio. Secondly, I measure relative performance of every loan portfolio by calculating the ratio of realized cash flows (i.e. cash flows actually generated by a portfolio) to expected cash flows.

"Misbehaving" loans comprise loans that are in arrears (or were in arrears at least once during the observation period), were repaid prior to maturity or defaulted. Occurrence of any of these events affects performance of investments. Default and arrears have a negative effect on return to investment, though the severity of the impact can be different. Early repayment will normally also have a negative impact on cash flows because investors loose part of interest payments.[10] Therefore, a fraction of misbehaving loans can be used as an indicator of how good a lender is in selecting loans for his portfolio. The smaller the fraction, the better the performance. The fraction of loans in arrears is computed as the relative number of loans in portfolio that are or were in arrears to the total number of loans in the portfolio. The fractions of defaulted and early repaid loans are calculated similarly.

Though fraction of misbehaving loans in a loan portfolio is an important indicator, it is not an ultimate measure of performance. The crucial performance measure of any investment is its realized return. Most of the loans in the sample, however, have not yet matured. In this situation, the realized return can be calculated only for loans that have been repaid early within the observation

[10]Due to specific risk sharing mechanism adopted at the platform, early payments may also have a positive effect on cash flows. Principal repaid in a lump sum prior to maturity is exempted from contributions to pools in all subsequent periods. Hence, if actual pool payment rate decreases over time, amount of lost principal payments can offset the amount of lost interest payments.

period.[11] For all other loans the return has to be estimated and the accuracy of the estimation depends strongly on the assumptions about borrowers' future payment behavior.

An alternative approach to measuring the performance of a loan is to calculate the ratio of cash inflows that have actually taken place by the end of the observation period and compare them to inflows expected by this time. The higher the value of the ratio the better the performance. If a loan is neither prepaid or defaulted within the observation period, realized cash flows are equal to expected cash inflows and the ratio is equal to 1.

Denote expected cash inflow from loan i as CF_i^*.

$$CF_i^* = \sum_{t=1}^{T} (Principal_{it} \times Payment\,rate_{Pool\,t} + Interest_{it}),$$

where $Principal_{it}$ is the stipulated amount of principal payment at t. T is the stipulated maturity of the loan. $Payment\,rate_{Pool\,t}$ is the observed payment rate of the pool at t. $Interest_{it}$ is the stipulated amount of interest payment at t.

The realized cash inflow, CF_i, from a loan that was not repaid prior to maturity is calculated as follows:

$$\begin{aligned} CF_i = \quad & (1 - d_{it}) \times \textstyle\sum_{t=1}^{T} \left(Principal_{it} \times Payment\,rate_{Pool\,t} + Interest_{it}\right) \\ & + d_{it} \times \textstyle\sum_{t=1}^{T} \left(Principal_{it} \times Payment\,rate_{Pool\,t}\right), \end{aligned}$$

where d_{it} is an binary indicator equal to 1 if the loan is in default at t and 0 otherwise. Product of principal payment and pool's payment rate is the amount that an investor receives each month till a loan's maturity regardless of whether the loan has defaulted or not. In contrast, interest payments drop out if a loan defaults.

If a loan is repaid prior to maturity, the repaid sum is directly transferred to affected investors. The sum is exempted from contributions to pool payments. There is no compensation of lenders for the lost interest. The inflow from a

[11] Even for the defaulted loans, the realized return can't be calculated. Despite the fact that there is no uncertainty regarding the interest payments any more (interest payments drop out if a loan defaults), a portion of principal payments is rescued through the risk sharing mechanism described earlier. This portion however can change over time depending on the actual payment rate of a pool and is uncertain.

repaid loan is thus given by

$$CF_i = \sum_{t=1}^{T} CF_{it}^{Early}, \text{ where}$$

$$CF_{it}^{Early} = \begin{cases} Principal_{it} \times Payment\,rate_{Pool\,t} + Interest_{it}, & \forall\, t < \tau \\ Lump\text{-}sum_{i\,t}, & \text{if } t = \tau \\ 0, & \forall\, t > \tau \end{cases}$$

where τ is the date when remaining principal is repaid early, and $Lump\text{-}sum_i$ is the remaining amount of principal that the borrower repays in a lump-sum at τ. In contrast to the formula for expected cash inflow suggested earlier, expected cash inflows for early repaid loans are calculated for all t's till the stipulated maturity date even when the date lies beyond the observation period. This is done by assuming that pools' payment rates remain at the level of respective historical averages (see Table 5).

The measure of loan performance is then calculated as a ratio of realized to expected cash inflows, $\frac{CF_i}{CF_i^*}$. The performance of an entire loan portfolio held by a particular investor is calculated as a weighted average of ratios of individual loans in the portfolio:

$$Performance = \sum_{i=1}^{N} (\omega_i \times \frac{CF_i}{CF_i^*}),$$

where ω_i is the portfolio share of loan i.

4 Implementation and Results

4.1 Propensity for Risk Taking

Risk

Level of risk associated with a particular loan depends mainly on the borrower's probability of default. Estimated probabilities of default are assigned to borrowers according to their rating grades (see Table 4). Risk averse investors should

prefer investing in loans requested by borrowers' with better ratings. Figure 3 shows distributions of male and female investors by rating grades. Apparently, the two distributions are quite similar suggesting that none of the gender groups exhibits preference for particular rating grades.

Expected return

Expected return to investments in loans is calculated as annualized internal rate of return (IRR) from a series of cash flows. Specifically, the IRR is obtained by equalizing the amount invested by a particular investor in a loan (plus the fixed fee payed by investors to the platform) to the present value of expected monthly installment payments done by the borrower. The result depends on investors' assumptions regarding the borrower's behavior and pool's payment rate. The assumptions should significantly vary across investors depending on level of their financial sophistication. The latter is, however, not observable. I assume that investors at least hypothesize that probability of borrowers' default is as predicted by rating and is constant over repayment period. Furthermore, I assume that investors expect that a pool's payment rate remains at the level predicted by the platform during the whole repayment period. Based on these assumptions investors should calculate the expected rate of return to investment in loan i by solving the following equation:

$$Investment_i + Fee = \sum_{t=1}^{T} \frac{Principal_{it} \times Payment\,rate^*_{Pool} + (1 - PD_i) \times Interest_{it}}{(1 + IRR_i)^t},$$

where $Investment_i$ is the amount invested in the loan by a particular investor. Fee is the fixed fee charged by the platform from the investor. T is the loan's stipulated maturity in months. $Principal_{it}$ is the amount of principal payment at t given the stipulated monthly installment. $Payment\,rate^*_{Pool}$ is the payment rate of the pool as predicted by the platform. PD_i is expected probability of borrower's default predicted by the rating. $Interest_{it}$ is the amount of interest payment at t given the stipulated monthly installment.

Distributions of annualized rate of return by investors' sex are presented in Figure 5. The distributions have a similar shape. Both exhibit a clear positive skew and high kurtosis. However, mean values are statistically different: On average, male investors achieve a return of 6.88, while female investors achieve a return of 6.76. This difference alone doesn't prove that males do better than

females. More likely, the figures result from the fact that females invest more often in loans with a specific attribute that has a negative influence on return (e.g. occupational status of borrowers). A more detailed description of the distributions is presented in Figure 5. The box plots show dispersion by loan duration, borrower rating and investors' sex. The only difference that can be discerned here is that returns to investments by males are slightly more dispersed than returns to investments by females. Overall, the graphical analysis of expected rate of return doesn't allow to draw a conclusion regarding Hypothesis 1.

To test the effect of investors' gender on the expected return when other main determinants are held constant, I estimate parameters of model (1) in an OLS regression. Dependent variable is annualized expected rate of return to investment made by an investor in a particular loan. Control variables include a range of loan-, borrower- and investor-specific attributes. Definitions of variables are found in Table 5. Because every investor can make multiple investments (i.e. finance several loans), I allow for correlations in the error terms and compute cluster-robust standard errors. Estimation results are reported in Table 6. Overall, the explanatory power of the model is quite high: Included variables explain more than 60 percent of variation of the dependent variable. Coefficients' estimates for the control variables have expected signs. In particular, investors' experience, loan amount and duration are positively related to expected returns. Higher financial burden and riskiness of borrowers also imply higher return. Interestingly, loans to male borrowers' are associated with lower rates of return compared to loans given to female borrowers. This result may indicate that investors perceive female borrowers as more risky than males, all things being equal. Borrower employment status seems to be an important determinant of expected returns. Coefficient of the main variable of interest, *Female*, is economically and statistically insignificant suggesting that investors' gender has no predictive power for investments' expected return. Hence, I conclude that investments made males and females at the platform do not differ with regard to expected return. Hypothesis 1 is not confirmed.

Bid Size

The platform imposes restrictions on the amount that each investor may bid on a single loan. The minimal accepted bid is €250. Furthermore, bids may

be increased in €250 steps. The maximal bid can't exceed €25,000 because a single loan requested by a borrower may not be larger than €25,000. In effect, variable *Bid* is bounded between 250 and 25,000 and is not continuous. Figure 6 describes distribution of investors by the amount they bid on a single loan. The sample mean value of bid size is €475 for male investors, and €505 for female investors (the difference is statistically significant). Standard deviation is 419 and 485 respectively. Hence, according to unconditional distribution females invest higher amounts per loan.

To estimate the effect of sex on bid size while main factors are controlled for, I firstly perform an OLS regression where *Bid* is the dependent variable. However, OLS might produce deficient results because of the specific nature of dependent variable. In fact, the sample distribution of variable *Bid* resembles negative binomial distribution.[12] To better account for this circumstance, I fit the data to a negative binomial regression. Results of both estimation specifications are reported in Table 7. Despite some differences in the magnitude of coefficient estimates both models are consistent with respect to the main variable: Variable *Female* is predicted to have a positive but statistically insignificant effect on the amount invested in a loan, ceteris paribus.

Overall, none of the conducted tests provides evidence that female investors are less risk prone than males. In contrast, results suggest that females do not shun risky borrowers and lend them money as frequently as males do. Further, given a fixed level of risk, there are no differences between investments made by males and female with regard to expected return. Hence, females do not demand higher compensation for risk than their male counterparts. Moreover, males and females allocate equal amounts to individual borrowers. Hence, none of the gender groups tends to decrease own exposure to idiosyncratic risks more then the other group. In general, male and female investors seem to follow similar investment styles. Do they still achieve different results from their investments? The next section sheds light on this question.

[12] A Poisson distribution is rejected, because the sample variance exceeds the sample mean.

4.2 Performance

In this section, I analyze performance of loan portfolios held by individual investors. Portfolio is defined as total number of successful investments conducted by an investor starting with his first transaction at the platform. "Successful investment" means that a requested loan was successfully procured. Bids on loans that were canceled are not considered in the analysis. In contrast to preceding section, all loan- and borrower-specific information is aggregated at portfolio level. The sample comprises a total of 5,172 portfolios.

"Misbehaving" Loans

Figure 7 shows average fraction of investments held in portfolios by male and female investors that were early repaid, defaulted or are/were in arrears. Apparently, there are differences between the two gender groups with respect to all three types of loans. Females seem to have on average lower fraction of early repaid and defaulted loans in their portfolios than males. In contrast, the fraction of loans in arrears is lower in portfolios of males. A test of statistical significance of differences shows, however, that only the average value of defaulted loans is significantly different between the two gender groups. Hence, unconditionally, male investors have on average higher default rates in their loan portfolios than female investors.

One caveat is in place here. Since probability of default and early payment (and probably of delays in payments too) is positively correlated with loans' age, younger portfolios will exhibit lower rates of misbehaving loans. To meet this concern at least to some extent, effects of gender should be estimated when other relevant factors are taken into account. For this purpose, I regress the fraction of each type of misbehaving loans on investors' gender and a number of control variables. Specifically, the data are fitted to OLS regression model. Estimation results for the three types of loans are presented in Table 8.

With respect to early repaid loans, gender of investor has no effect on the fraction of these loans in portfolios. The low value of R^2 indicates that repayment is driven by unobserved, most likely borrower related factors rather than by observed factors. A positive effects of investors' experience stems from the fact that this variable captures the age of portfolio and hence should be posi-

tively related to the probability of early payment. The second group of results presented in the same table suggests that fraction of loans in arrears higher in portfolios of female investors. The estimated coefficient for variable *Female* predicts that fraction of loans with delayed payments in portfolios of female investors is by 0.018 units higher than fraction of such loans in portfolios of male investors, ceteris paribus. The estimate is weakly but statistically significant (at 10%-level). The value of $R^2 = 0.18$ suggests that observed factors, mainly loan- and borrower-specific, explain a substantial part of variation in the fraction of loans in arrears. Finally, the third group of results shows that there is no statistically significant difference between default rates in portfolios held by males and females, ceteris paribus. Again, the model at large explains a significant part of variation in the dependent variable. Most of the explanatory power comes, however, from borrower and loan related determinants. In sum, none of gender groups seems to outperform the other group in the quality of selected loans. Occurrence of early repayments, arrears and defaults is more or less the same in portfolios of males and females when observable loans' and borrowers' attributes are taken into account.

Realized vis-à-vis Expected Cash Flows

Ratios of realized to expected returns are computed for each investment and than aggregated at portfolio level by computing portfolio-specific averages. Figure 8 plots the distribution of ratios by investors' gender. Apparently, the majority of investors (ci. 80 %) holds portfolios with average ratio equal to 1. This means that realized cash flows are equal to expected cash flows. The distribution also reveals that there are investors who held both under- and over-performing portfolios. Under-performing portfolios are characterized by ratios less than 1. They make ci. 15% of the sample. The minimal value of ratio is 0.568 meaning that a portfolio generated only 57% of expected cash flows. Over-performing portfolios are characterized by ratios higher than 1. Such portfolios comprise ci. 5% of the sample. The maximum value is 1.435

Overall, the form of the sample distribution differs from any conventional distribution. Moreover, the 25th, 50th and 75th percentiles are equal to 1. The latter circumstance prevents from estimating effects of explanatory variables on the ratio of cash flows in a standard parametric regression. Instead, a test of

closeness between the two unconditional density functions (Li, 1996) is conducted. Results of the test suggest that the differences between two distributions are statistically not significant. Hence, there is no evidence for gender differences with respect to portfolio performance.

5 Conclusions

Analysis conducted in this paper provides evidence on behavior of males and females who invest money in consumer and small business loans at an online platform for peer-to-peer lending. Investors at the platform have full discretion over the choice of loans and investment strategy. Despite adoption of some risk mitigating mechanisms, investing at the platform is associated with substantial risks. Furthermore, participants of peer-to-peer lending invest their own money and hence are motivated to "do their best". Therefore, the framework of peer-to-peer lending presents a natural laboratory for studying the behavior of individuals facing financial risk.

Obviously, probability that an individual invests at the platform is negatively related to his propensity for risk taking and wealth. Not surprisingly, the fraction of female investors at the platform is smaller than fraction of males. In this sense, gender differences with respect to the participation rates observed at the platform are similar to the rates of participation in markets of risky financial assets that are observed in the population at large (Jianakoplos and Bernasek, 1998; Barber and Odean, 2001; Badunenko et al., 2009). However, investment styles pursued by males and females investing at the platform and performance of their loan portfolios provide no evidence in favor of the gender stereotype.

Contrary to the common belief, males and females exhibit equal propensity for risk taking. In particular, female investors do not shun risky borrowers and lend them money as frequently as males do. Males and females allocate equal amounts to individual borrowers. Thus, I can't confirm that females tend to decrease own exposure towards idiosyncratic risks more than males. Further, given a fixed level of risk, there are no differences between investments made by males and female with regard to expected return. Hence, females do not demand higher compensation for risk than their male counterparts. Secondly, none of gender groups seems to outperform the other group in the quality of

selected loans. Occurrence of early repayments, arrears and defaults is more or less the same in portfolios of males and females when loans' and borrowers' attributes are taken into account. The relative performance of portfolios measured as ratio of realized to expected cash flows is comparable between the gender groups.

Overall, the conducted analysis shows that males and females who deliberately and directly engage in risky investment projects exhibit equal risk propensity and performance quality. The results also suggest that there is no objective reason to claim that females are less suitable for jobs in the financial services industry than males. On the other hand, behavior of professionally trained investors may be influenced by the fact that they do not invest own money. Moreover, it is not clear, whether males and females would behave differently when facing fisk-encouraging incentives from their employers. We leave these questions to further research.

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Appendix

Figures

Figure 1: Loans procured at *Smava*

This graph plots cumulative distribution of number and volume of loans procured at the platform between March, 2007 and January, 2010

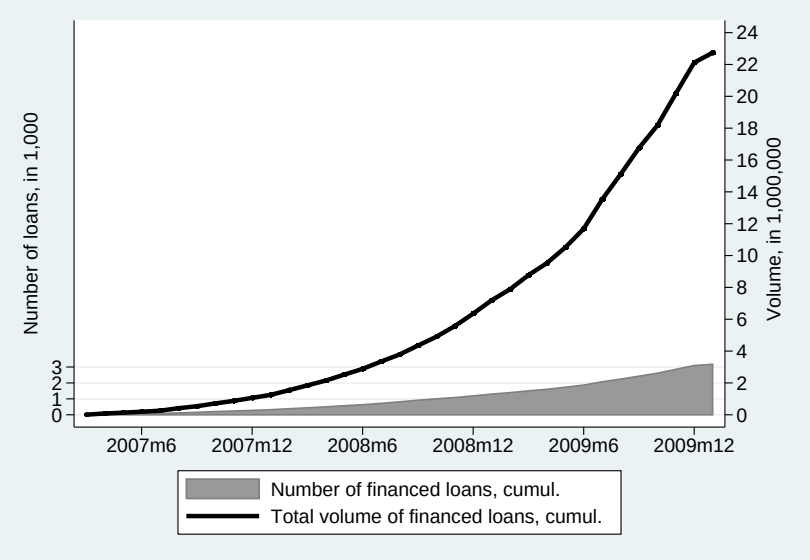


Figure 2: Distribution of loan requests by loan purpose

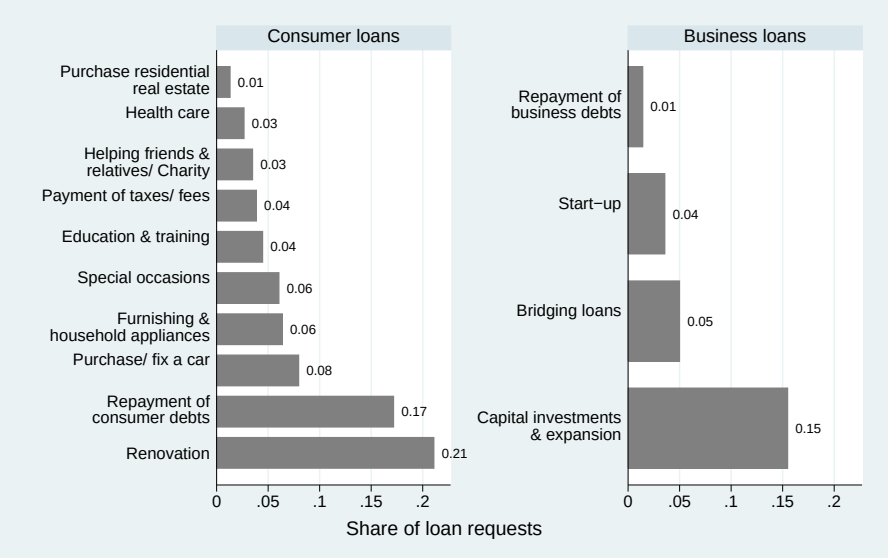


Figure 3: Distribution of investors by borrowers' rating

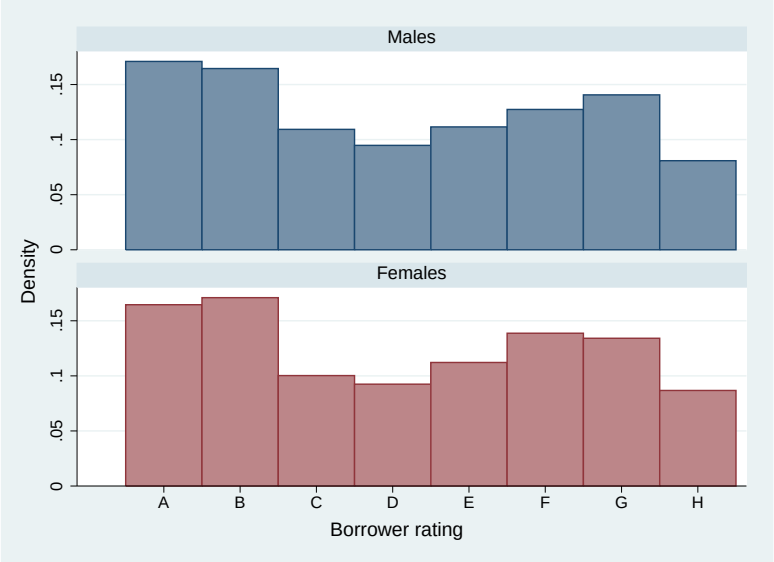


Figure 4: Expected rate of return

This plot shows unconditional distributions of expected rate of return by investors' sex. Distributions' parameters are as follows: for males, mean= 6.88, st.dev. = 2.18, skewness = 0.47, kurtosis = 3.54; for females, mean = 6.76, st.dev. = 2.17, skewness = 0.39, kurtosis = 3.81. Difference between gender-specific means is statistically significant.

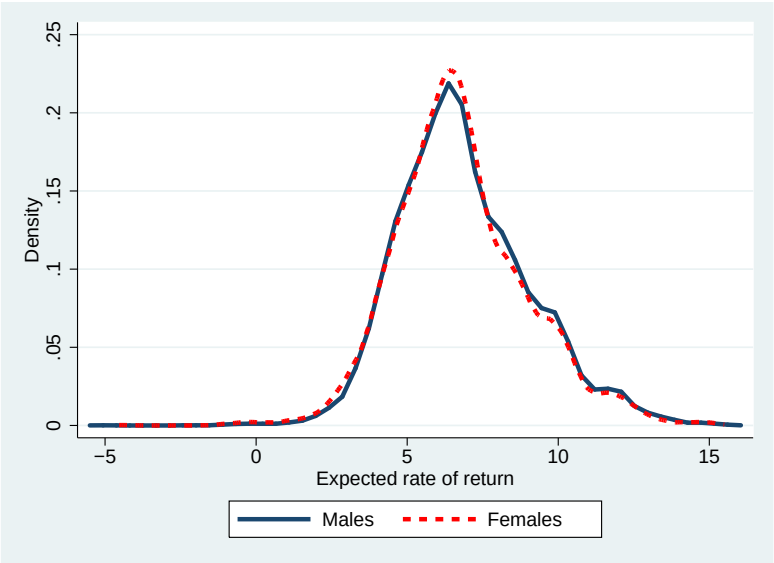


Figure 5: Expected rate of return by loan type, borrowers' rating and investors' gender

The box plot describes dispersion of expected rate of return by loan duration, borrower rating and investors' sex. The line in the middle of the boxes shows the median value. The left and right hinges of the boxes show the 25th and 75th percentile respectively. The left and right whiskers show the 5th and 95th percentile respectively. The points outside the whiskers indicate outliers.

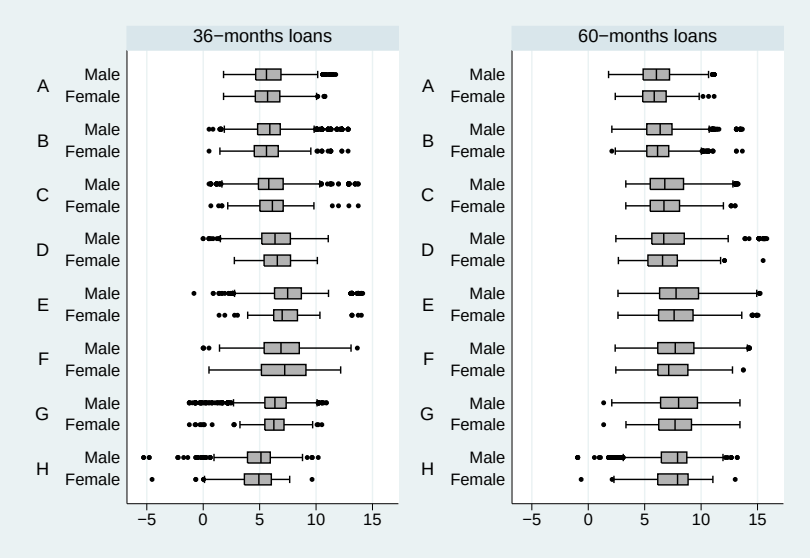


Figure 6: Distribution of investors by the size of bids

This histogram describes distribution of investors by the amount they bid on a single loan. The sample mean and standard deviation are respectively 475 and 419 for males, and 505 and 485 for females.

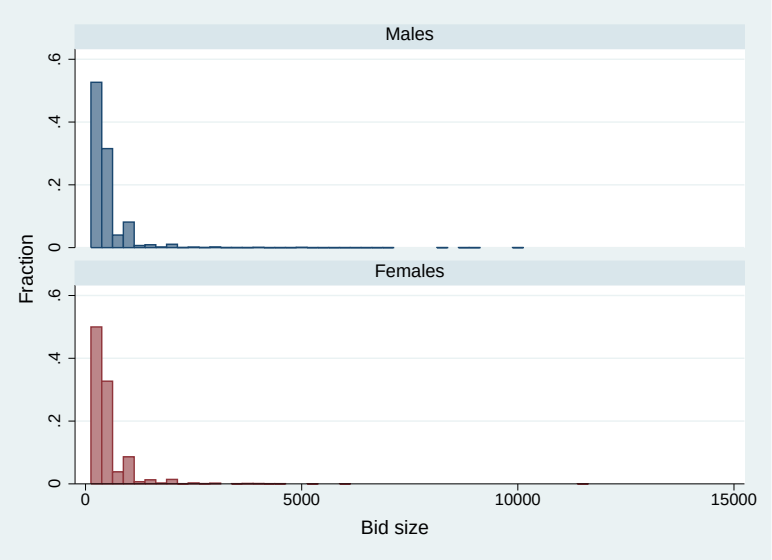


Figure 7: Fraction of "misbehaving" loans

This figure shows average fractions of "misbehaving" loans in portfolios of male and female investors. Differences between gender specific average values for early paid loans and loans in arrears are statistically not significant. Difference between the values for defaulted loans is statistically significant at 5%-level (t-Test statistic = 1.92).

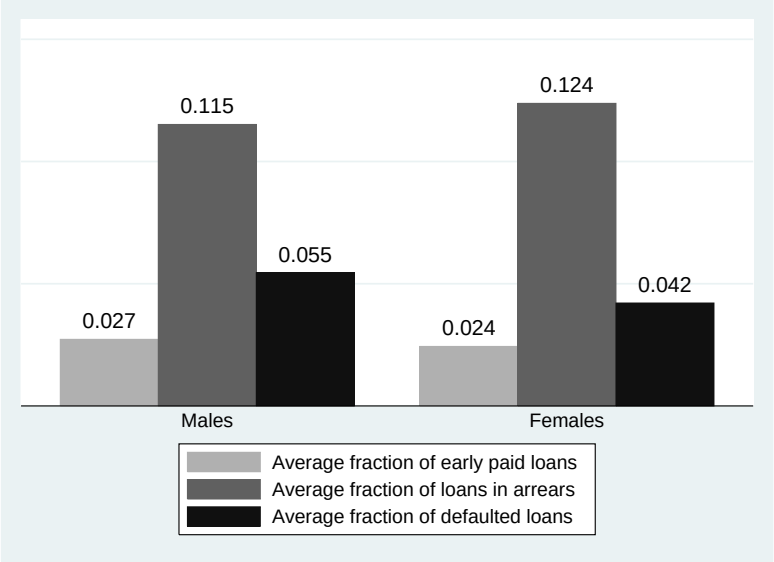
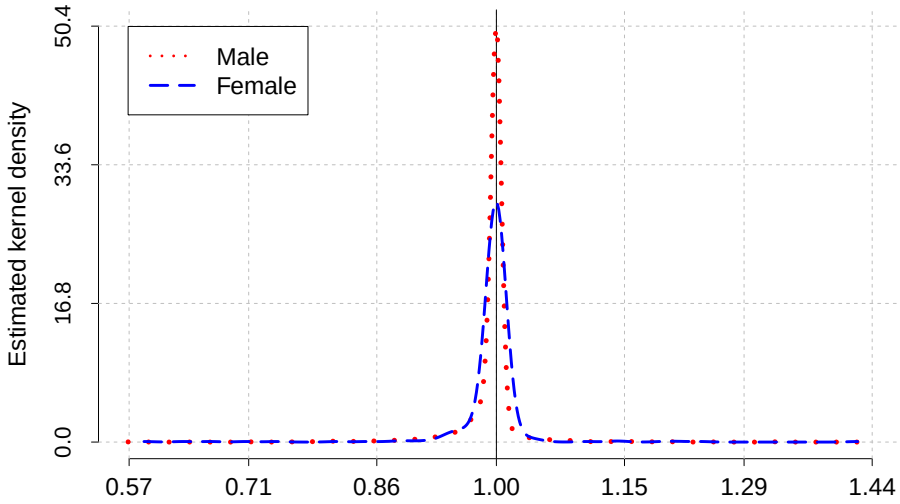


Figure 8: Ratio of realized to expected cash inflows

This graph plots sample distributions of ratios of realized to expected cash inflows by investors' gender. Results of a test of closeness between the two density functions (Li, 1996) showed that differences between the two distributions are statistically not significant.



Tables

Table 1: Definitions of main variables

Variable Name	Description
Investor-specific characteristics	
Age	Age in years
Female	= 1 if investor is female, = 0 otherwise
Residence	Place of residence (federal state)
Experience	How long invests at the platform, in months
Member of a group	= 1 if member of a social group at the platform, = 0 otherwise
Number of bids	Number of bids submitted to different loans
Total amount invested	Total amount invested at the platform, in €
Average size of bid	Average amount invested in one loan, in €
Borrower-specific characteristics	
Age	Age in years
Male	= 1 if investor is male, = 0 otherwise
Residence	Place of residence (federal state)
Rating	Categorical variable reflecting creditworthiness rating from A (best) to H (worst)
Financial burden	Categorical variable indicating debt burden on a scale from 1 (low) to 4 (high)
Occupation	Categorical variable with 6 values: "wage employee", "civil servant", "freelancer", "firm owner", "self-employed", "retiree"
Member of a group	= 1 if member of a social group at the platform, = 0 otherwise
Loan-specific characteristics	
Requested loan amount	Amount requested ba borrower, in €
60-months loan	= 1 if the loan matures in 60 months, = 0 if in 36 months
Purpose	Categorical variable indicating loan purpose
Investment-specific characteristics	
Expected rate of return	Expected rate of return

Table 2: Summary statistics of selected variables by investors' gender

	Males N=4,611		Females N=561			
Variable	Mean	St.Dev.	Mean	St.Dev.	t-Test	p-value
Investors' characteristics						
Age	41	12.32	44	12.50	-6.31	0.00
Experience	13	8.72	12	7.80	3.81	0.00
Investments' characteristics						
% of 36-months loans	0.37	0.39	0.35	0.39	1.28	0.20
% of 60-months loans	0.63	0.39	0.65	0.39	-1.28	0.20
Nominal interest rate	10	2.69	10	2.83	1.43	0.15
Number of bids	9	15.88	8	10.85	3.29	0.00
Average size of bid	456	348.66	462	352.89	-0.36	0.72
Total amount invested	4,504	8688.43	3,940	7046.43	1.74	0.08

Table 3: KDF-Indicator

KDF-Indikator	Debt-to-disposable income ratio
1	0 bis 20%
2	20 bis 40%
3	40 bis 60%
4	60 bis 67%

Table 4: Creditworthiness rating grades and corresponding PDs

This table shows rating grades that eligible individuals to borrow at the platform. The rating grades of individual borrowers are taken from the borrowers' credit certificates issued by the German national credit bureau *Schufa*. Each rating grade reflects probability of a borrower's default given his past credit behavior and current obligations.

Rating grade	Probability of default
A	1.38
B	2.46
C	3.56
D	4.41
E	5.57
F	7.16
G	10.72
H	15.02

Table 5: Historical payment rates in pools

This table shows actual payment rates in % observed in each pool since the establishment of the platform. Source: http://www.smava.de.

	36-months loans								60-months loans							
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
Expected payment rate	98.8	97.8	96.6	96.1	95.1	93.7	90.6	87.1	98.5	97.4	95.8	95.4	94.2	92.4	88.8	84.6
Average historical payment rate	97.4	95.8	98.4	95.6	95.9	92.4	92.0	89.7	99.5	97.8	98.5	91.5	95.2	94.2	85.9	84.1
Jan 10	92.9	88.8	94.6	83.5	77.9	82.4	71.4	63.6	97.5	92.5	89.3	89.1	85.7	83.3	82.5	72.8
Dec 09	97.3	92.3	96.1	91.8	89.5	86.9	81.6	76.8	98.4	96.7	97.9	96.1	91.0	95.1	89.8	86.5
Nov 09	98.1	95.3	97.4	91.3	90.8	88.1	83.9	79.6	99.2	98.5	97.6	95.8	95.6	95.5	89.3	86.9
Oct 09	98.0	95.1	97.3	91.1	91.1	87.8	84.5	79.3	99.3	98.3	97.2	95.1	95.1	95.0	88.3	86.0
Sep 09	98.8	94.7	97.1	92.8	93.2	87.7	84.6	80.7	99.1	98.1	96.8	94.5	94.5	93.7	87.4	86.4
Aug 09	98.7	94.7	97.1	92.7	93.1	87.9	89.6	80.5	99.0	97.8	96.1	93.5	94.0	93.5	86.0	87.3
Jul 09	98.5	94.5	96.8	92.5	94.1	89.2	90.0	82.6	98.6	98.9	97.1	94.0	92.6	93.3	81.7	87.9
Jun 09	98.4	94.3	96.6	92.4	94.1	89.6	90.0	84.5	100.0	98.7	98.5	93.1	91.5	92.5	79.5	84.9
May 09	98.4	94.0	96.5	91.9	95.0	90.2	89.4	84.6	100.0	98.7	100.0	91.8	94.5	95.7	77.4	82.3
Apr 09	98.2	93.5	97.4	96.2	94.7	89.5	90.6	85.7	100.0	98.4	100.0	91.4	93.4	95.1	74.4	82.2
Mar 09	98.1	93.4	97.1	95.7	94.5	89.5	90.7	86.8	100.0	98.2	100.0	89.3	92.7	94.1	77.9	79.2
Feb 09	98.0	94.7	97.1	95.5	95.3	89.8	90.8	88.4	100.0	97.8	100.0	89.3	91.9	93.3	76.3	76.1
Jan 09	97.8	95.0	97.7	95.4	94.9	89.7	90.6	88.3	100.0	98.5	100.0	88.1	96.2	90.2	74.1	80.9
Dec 08	97.7	94.5	97.8	95.4	95.2	90.0	91.4	88.9	100.0	98.0	100.0	84.9	96.3	92.0	81.6	69.6
Nov 08	97.7	94.1	99.1	95.0	94.5	92.0	90.5	88.3	100.0	97.8	100.0	91.2	100.0	92.0	89.3	59.4
Oct 08	97.6	93.3	99.0	94.5	95.7	91.2	90.0	89.9	100.0	97.2	100.0	91.1	100.0	89.9	91.5	88.9
Sep 08	97.0	95.4	98.9	93.5	95.4	91.2	89.9	90.0	100.0	96.2	100.0	94.8	100.0	100.0	96.0	83.5
Aug 08	96.4	94.9	98.8	93.4	97.4	93.0	91.8	95.3	100.0	95.5	100.0	94.6	100.0	100.0	95.8	100.0
Jul 08	95.9	94.7	98.7	92.1	97.2	92.5	94.7	96.1	100.0	100.0	100.0	93.3	100.0	100.0	100.0	100.0
Jun 08	95.9	94.6	98.6	92.0	97.1	93.5	96.0	96.9	–	100.0	100.0	78.0	100.0	100.1	100.0	100.1
May 08	95.9	94.2	98.5	98.8	96.9	93.1	99.5	96.6	–	–	–	–	–	–	–	–
Apr 08	95.5	93.1	100.0	98.8	96.1	92.6	99.3	97.3	–	–	–	–	–	–	–	–
Mar 08	94.4	92.3	100.0	98.7	100.0	95.6	99.1	100.0	–	–	–	–	–	–	–	–
Feb 08	94.0	99.7	100.0	98.5	100.0	95.2	98.7	100.0	–	–	–	–	–	–	–	–
Jan 08	93.3	100.0	100.0	100.0	100.0	96.7	100.0	100.0	–	–	–	–	–	–	–	–
Dec 07	97.3	100.0	100.0	100.0	100.0	96.4	100.0	100.0	–	–	–	–	–	–	–	–
Nov 07	97.1	100.0	100.0	100.0	100.0	95.1	100.0	100.0	–	–	–	–	–	–	–	–
Oct 07	96.8	100.0	100.0	100.0	100.0	93.1	100.0	100.0	–	–	–	–	–	–	–	–
Sep 07	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–
Aug 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
Jul 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
Jun 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
May 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
Apr 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
Mar 07	100.0	100.0	100.0	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–

Table 6: Effects of investors' gender on expected rate of return

This table reports results after OLS regression. The dependent variable is expected annual rate of return in percentage points. Estimates of standard deviations are corrected for clustering of observations by investor, since any investor can submit multiple bids. Cluster robust standard errors are reported in parentheses. *, ** and *** indicate the 0.10, 0.05 and 0.01 levels of significance.

	Expected rate of return	
	Coefficient	Robust SE
Investors' characteristics		
Female	-0.002	(0.051)
Age	-0.002	(0.001)
Experience	0.014***	(0.003)
Member of a group	0.009	(0.039)
Loan requests' characteristics		
ln(Requested loan amount)	0.352***	(0.014)
60-months loan	1.661***	(0.027)
Borrowers' characteristics		
Male	-0.072***	(0.015)
Age	0.000	(0.001)
Financial burden: moderate	0.089***	(0.027)
Financial burden: substantial	0.119***	(0.026)
Financial burden: high	0.429***	(0.027)
Rating = B	0.233***	(0.021)
Rating = C	0.503***	(0.023)
Rating = D	0.789***	(0.027)
Rating = E	1.400***	(0.028)
Rating = F	1.375***	(0.026)
Rating = G	1.062***	(0.029)
Rating = H	0.339***	(0.047)
Member of a group	0.058***	(0.018)
Civil servant	-0.416***	(0.040)
Freelancer	0.087***	(0.023)
Firm owner	0.172***	(0.028)
Self-employed	0.249***	(0.019)
Retiree	0.667***	(0.034)
Other control variables		
Loan purpose	Yes	
Borrower's place of residence	Yes	
Investor's place of residence	Yes	
Time fixed effects	Yes	
R^2	0.607	
Number of obs.	48,087	

Table 7: Effects of investors' gender on the size of bids

This table reports (I) estimated coefficients after OLS regression and (II) estimated marginal effects after negative binomial regression. Dependent variable in both specifications is amount that investors bid on a single loan. Estimates of standard deviations are corrected for clustering of observations by investor, since every investor can submit multiple bids. Cluster robust standard errors are reported in parentheses. *, ** and *** indicate the 0.10, 0.05 and 0.01 levels of significance.

	Bid size			
	(I)		**(II)**	
	Coefficient	Robust SE	Marg.Effect	Robust SE
Investors' characteristics				
Female (d)	6.112	(24.865)	2.638	(20.610)
Age	3.309***	(0.573)	3.217***	(0.497)
Experience	-2.043*	(1.044)	-1.408	(1.011)
Member of a group (d)	-21.425	(15.685)	-20.050	(15.280)
Loans' characteristics				
ln(Requested loan amount)	34.708***	(3.568)	34.623***	(3.306)
Expected rate of return	34.356***	(2.783)	32.624***	(2.390)
60-months loan (d)	-44.520***	(8.542)	-42.804***	(8.169)
Borrowers' characteristics				
Male (d)	8.773*	(4.506)	6.831*	(3.730)
Age	-0.230	(0.183)	-0.286*	(0.161)
Financial burden: moderate (d)	5.428	(6.446)	4.248	(6.132)
Financial burden: substantial (d)	8.018	(6.741)	4.658	(6.115)
Financial burden: high (d)	-15.958**	(7.111)	-16.195**	(6.660)
Rating = B (d)	-13.237*	(6.908)	-12.312**	(5.834)
Rating = C (d)	-17.419**	(8.735)	-18.179***	(7.014)
Rating = D (d)	-37.043***	(8.809)	-31.973***	(7.098)
Rating = E (d)	-55.705***	(8.515)	-47.845***	(6.854)
Rating = F (d)	-55.716***	(9.536)	-48.549***	(7.688)
Rating = G (d)	-37.581***	(9.708)	-32.341***	(8.368)
Rating = H (d)	-32.089***	(10.487)	-24.170***	(9.251)
Member of a group (d)	-2.349	(5.083)	-0.697	(4.676)
Civil servant (d)	1.282	(10.158)	5.949	(9.669)
Freelancer (d)	3.146	(7.872)	3.915	(6.764)
Firm owner (d)	-8.123	(7.925)	-7.022	(6.949)
Self-employed (d)	-7.540	(5.563)	-6.943	(4.826)
Retiree (d)	-6.772	(9.077)	-5.521	(7.863)
Other control variables				
Loan purpose	Yes		Yes	
Borrower's place of residence	Yes		Yes	
Investor's place of residence	Yes		Yes	
Time fixed effects	Yes		Yes	
Number of obs. = 48,087	R^2 = 0.079		Wald χ^2 = 1486.16	

Table 8: Effects of investors' gender on the fraction of "misbehaving" loans

This table reports coefficient estimates after OLS regression. Dependent variable is the fraction of loans in portfolio that (I) were repayed prior to maturity, (II) were in arrears or (III) defaulted. Unit of observation is loan portfolio held by individual investor. Loan- and borrower-specific information is aggregated at portfolio level: Weighted averages of the respective variables are calculated for each portfolio and included in the regression equations. *, ** and *** indicate the 0.10, 0.05 and 0.01 levels of significance.

	(I)		**(II)**		**(III)**	
	% of repaid early		**% in arrears**		**% of defaulted**	
	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE
Investors' characteristics						
Female	0.002	(0.004)	0.018*	(0.009)	-0.006	(0.006)
Age	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.000)
Member of a group	-0.002	(0.004)	-0.001	(0.008)	0.001	(0.006)
Experience	0.002***	(0.000)	0.002***	(0.000)	0.003***	(0.000)
Portfolios' characteristics						
Expected return	0.007***	(0.001)	0.031***	(0.002)	0.017***	(0.002)
ln(Total investment)	-0.001	(0.001)	-0.005***	(0.001)	-0.003***	(0.001)
% of partially financed	-0.013	(0.013)	-0.018	(0.023)	0.009	(0.019)
Business loans only	-0.004	(0.008)	0.040**	(0.018)	-0.025**	(0.012)
Consumer and business loans	0.000	(0.003)	0.028***	(0.007)	-0.016***	(0.005)
% of 60-months loans	-0.000**	(0.000)	-0.004***	(0.000)	-0.001***	(0.000)
Borrowers' characteristics						
Probability of default	0.000	(0.001)	0.000	(0.001)	0.007***	(0.001)
Financial burden	-0.026***	(0.005)	0.023***	(0.006)	0.023***	(0.004)
Age	-0.000	(0.000)	-0.002***	(0.000)	-0.000	(0.000)
% of males	0.023***	(0.006)	0.016	(0.013)	-0.029***	(0.011)
Other control variables						
Investor's place of residence	Yes		Yes		Yes	
R^2	0.11		0.18		0.20	
Number of obs.	5,172		5,172		5,172	