Risks and Returns in Peer-to-Peer Lending

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Abstract

FinTech, particularly digitalized funding has emerged in recent years as an innovative way to finance new ventures. However, funding mediated on digital platforms is "innovative" in itself, and, as such, it can be particularly risk, prone to failures and inefficiencies. We investigate whether peer-to-peer lending, one of the most potentially disruptive forms of digital funding, provides investors with returns consistent with the level of borne risk. By studying over 3000 loans mediated on 68 European platforms we show that the returns are inversely related to loans' riskiness, suggesting that, on average, loans are mispriced. Our results have important implications for understanding the extent to which financial regulators could be involved in this rapidly growing segment of FinTech.

Keywords: crowdfunding; FinTech; peer-to-peer lending; financial risks; innovation financing; financial anomalies; asset pricing.

1. Introduction

Peer-to-peer (P2P) lending, also known as crowdlending, refers to the money-lending activities (to individuals or businesses) through online platforms that match lenders with borrowers (Pierrakis and Collins, 2013). P2P lending is part of the FinTech "revolution" aiming at disintermediating financial services (Moenninghoff and Wieandt, 2012; Bruton et al. 2014). P2P lending platforms claim they can challenge traditional banks by providing a better (online) match of supply and demand of capital, and by operating with lower overhead - thus providing the service more cost efficiently than traditional financial institutions. Consequently, lenders should earn higher returns compared to those traditional (bank-intermediated) savings and investment products offer, and borrowers should, as a result be able to borrow money at lower interest rates (Cumming and Hornuf, 2017). P2P lending is proliferating non only in developed economies but also in emerging markets (Xusheng, 2014; Zhang et al., 2016) and, at current growth rates, it is poised to reach a volume of US$ 900 billion globally by 2024 (TMR, 2016). P2P lending platforms usually charge a fee from transacted loans for providing the match-making service as well as for carrying out due diligence or credit checks on the borrower. Unlike traditional financial institutions that take loan positions on their own balance sheets, the platform does not take risks through its own contractual positions. The P2P lending platforms are essentially decentralise the credit risks by spreading them to the crowdlenders, andthe risk of the borrower eventually defaulting on the loans remains borne by the crowdlenders (Duarte et al. 2012; Lenz, 2016).

In light of potential efficiencies, the rapid growth of this innovative financial service is understandable. Nevertheless, it has also resulted in the failure of some platforms and cases of malpractice or dysfunctionality recorded in others. For example, in May 2016, the CEO of Lending Club, a US-based P2P lending platform, was terminated amid concerns about the quality of a portfolio of loans sold to a third party. Lending Club, being not only the first marketplace to match investors and borrowers online but also the industry's flagship firm - the first to go public

and the largest in terms of the loans it has facilitated (Economist, 2016) – the news raised concerns about the quality of loans transacted in this mostly unregulated segment of the FinTech industry.

In this framework, we study whether the returns offered to investors is in line with the risk profile of the crowdlending projects. The key issue to understand is whether crowdlending itself is sustainable as a business model, and subsequently whether it could pose systemic risks to global financial stability and the real economy. The existence of perverse incentives in crowdlending that are not fully recognized by the market has been pointed out by Hildebrand et al., 2017. Retail lenders face severe adverse selection problems when choosing to whom they lend. This problem is particularly acute because most regulators set a maximum loan size (Table 1). This allows lending only to small businesses, and this type of lending tends to be riskier and opaque. To mitigate this adverse selection, lenders delegate due diligence to crowdfunding platforms. Hence, it is important to ensure that platforms have good risk management systems. Platforms are likely to experiment with new methods of credit scoring that rely on big data and machine learning. While these techniques are promising, they are untested. Importantly, due diligence and scoring models are currently not supervised.Unfortunately, limited evidence on whether the returns of crowdfunded loans are consistent with their risks has been collected so far (Beto et al., 2018). We seek to bridge this literature gap by studying a dataset comprising 772 cleantech projects from 73 distinct European P2P crowdlending platforms. We seek to conduct a granular investigation of the relation between crowdlender returns and risk profile of the borrowers. Our findings suggest that the returns are not consistent with the creditworthiness of borrowers. We also show that, for platforms, lower risk-adjusted returns are associated with a higher number of transacted loans and larger volumes of funding mediated. This evidence seems to support the view that platforms behave opportunisticaly by mispricing loans with the specific objective of securing more business (loans), thus increasing their short term profitability but exposing themselves and their investors to longer term financial risks.

Our results cast severe doubts on the sustainability of crowdlending and highlight the risk of underestimating the potential inefficiency of a no longer peripheral segment of the global financial

industry. Therefore, our findings have important implications for understanding the extent to which financial regulators should be involved or have oversight over this, and other related areas of FinTech are concerned. Our results contribute to the academic literature and the policymaking debate by questioning the perceived role of crowdfunding as a economically sustainable means to support innovative projects and firms.

The remainder of the paper is structured as follows. Section 2 introduces the relevant literature on P2P lending,its promises and risks. Section 3 describes the new database on crowdlending projects and presents the main methodological approach. Section 4 presents the main results, and Section 5 discusses our findings. Section 6 provides insights for the international policimaking debate on whether and how FinTech should be regulated, while Section 7 concludes.

2. Crowdfunding Success, Risk and Return

2.1 Drivers of crowdfunding campaigns' success

Crowdfunding is a form of fundraising where groups of people make typically small individual contributions through Internet platforms, to support a particular goal (Schwienbacher and Larralde, 2010; Bayus, 2013; Belleflamme, Lambert, and Schwienbacher, 2013, 2014; Cumming and Johan, 2013; Mollick, 2013 2014, Mollick and Kuppuswamy, 2014; Colombo, Franzoni, Rossi-Lamastra, 2015). The platforms act as an intermediary between the large groups of contributors and the individuals, entrepreneurs or firms raising funds in numerous ways. Crowdfunding can further be categorized as donations crowdfunding where donations are made by crowdfunders and there is no expectation of a return other than feeling good about the gesture. Donation crowdfunding for not-for-profit organizations, charities, helping individuals fund medical or funeral fees, disaster relief, and even raising money for rebels fall within this purview (Becker and Myers, 2015). Another category, rewards-based crowdfunding, entails a product or at the very least a small token of appreciation from the firm or individual raising money to the contributor. Lending based crowdfunding, which we discuss in this paper, involves loans from

one individual to another whereby matching is facilitated by the platform. The last category, equity crowdfunding is when contributors invest in equity of firm raising money through the platform (Ahlers et al., 2015). The reference to crowdfunding as an open call on the Internet has made many authors see crowdsourcing, the outsourcing of a given task to a large group of people in the form of an open call (Howe, 2006), as the antecedent to crowdfunding (Dell, 2008; Howe, 2008; Kleemann et al. 2008; Belleflemme et al., 2010; Rubinton 2011; Poetz and Schreier, 2012). The only difference between the two being that instead of pooling labor resources, crowdfunding pools another factor of production: capital (Harms, 2007). The open call takes place on online platforms which provide the way for crowdfounders and investors to connect without standard financial intermediaries (Mollick 2013; Yu et al., 2017). In this direct interaction with crowdfounders, potential investors can see the level of support from other project backers, suggesting that social information could have a role in the ultimate success of a crowdfunded project (Kuppuswamy and Bayus 2013; Roma et al., 2017).

Another distinctive feature of this new financing phenomenon is that crowdfunding platforms, which provide all the means for investment transactions to take place - legal groundwork, pre-selection, the ability to process financial transactions, etc. (Ahlers et. al 2015) - not only have the potential to help crowdfounders (the individuals, entrepreneurs and firms) satisfy their financing needs, which makes crowdfunding more alike with micro and social finance (Harms 2007), but also to test new products and run new marketing campaigns (Lambert and Schwienbacher 2010, Mollick 2014). In this sense, crowdfunding draws inspiration from social networking, where consumers actively participate in online communities to share information and provide suggestions about new initiatives and/or brand (Ordanini et al. 2011, Guenther et al., 2018). Moreover, when crowdfunding is used as a means to demonstrate demand for a proposed product, successful initiatives become a signal to venture capitalists of a potentially successful long-term investment, possibly leading to additional future financing (Mollick 2014).

Research conducted so far have both focused on the crowdfounders and investors' side and have mainly relied on data from reward-based crowdfunding platforms. On the one hand, scholars have

investigated the reasons behind entrepreneurs' decision to use crowdfunding platforms to raise funds. Belleflamme et al. (2010) found that raising money, getting public attention and obtaining feedback on product/service, are all relevant factors in motivating the launchers of initiatives on crowdfunding platforms. Seemingly, by conducting a grounded-based research, Gerber et al. (2011) found that the main reasons for crowdfounders use these platforms are: to raise funds while maintaining full control over the project, to receive validation, to connect with others, to replicate successful experiences of others, and to expand awareness of work through social media. Finally, Belleflamme et al. (2012) noticed that, when used to invite consumers to pre-order a product, crowdfunding allows entrepreneurs to price discriminate: consumers who enjoy higher utility will pre-order the product and pay more with respect to later consumers, who will wait until the product is offered on the market at lower price. In their analysis, they concluded that this strategy is proven profitable as long as initial capital requirement remains relatively small, in contrast with crowdfunding through profit-sharing, where the benefits are higher when capital requirements are large.

On the other hand, academics have researched the reasons that may motivate investors' decision to support crowdfunders' initiatives. Harms (2007) conducted a questionnaire-based research which led him conclude that, in addition to self-expression and enjoyment, the overall benefit investors derive with respect to their contribution (economic value), the presence of a guaranteed tangible output of the project (certainty effect), the degree to which the functional benefits of the project outcome serves a functional need of the individual consumer (personal utility), all significantly drive funders' intention to invest. Van Wingerden and Ryan (2011) distinguished between intrinsic motivations - control of use of an innovation, improvement of current circumstances, enjoyment, and sense of involvement - and extrinsic motivations - financial reward. Ordanini et al. (2011) found public recognition and patronage also add up to the list. Finally, Cumming and Johan (2013) found the support of entrepreneurism and networking opportunities within the start-up and the SME community to be overriding considerations.

2.2 Crowdlending

To date, while some empirical evidence have been collected on equity crowdfunding (Ahlers et al., 2015; Hornuf and Neuenkirch, 2016; Vismara, 2016, Guenther et al., 2018, Cumming et al., 2018), P2P lending has received scant attention. One study, Havrylchyk et al., 2018 that analyzes data from Prosper, a P2P lending portal, and find that P2P lending platforms have partly substituted banks that have cut their credit supply, or rather P2P lending has substituted bank lending. Zhang et el., 2016 estimate peer-to-peer business lending (excluding real supplied the equivalent of 13.9% of new bank loans to small businesses in the United Kingdom in 2015. In another earlier study, Lin et al. (2013) investigate the funding process on Prosper, and find that online friendship networks of borrowers signal credit quality to lenders. Furthermore, they find that these friendship networks decrease the probability that a loan is not being funded, lower the interest rates being paid and are correlated with lower default rates of the loan later on. In line with these finding, Iyer et al. (2016) also investigate data from Prosper and analyze the role four soft factors play on loan performance in marketplace lending. They find that lenders predict an individual's default probability with a 45% greater accuracy than the credit score of the borrower would suggest.

However, lenders do not solely consider soft factors when funding a loan. Using again Propser data, Herzenstein et al. (2011a) evidence that verifiable hard factors related to borrowers also play a role in funding decisions. Furthermore, they find that identities of borrowers which are considered more trustworthy or successful are associated with a higher probability of funding success but poorer loan performance. Other studies have investigated the role of physical appearance, gender, age and race in marketplace lending. For example, Duarte et al. (2012), Pope and Sydnor (2011) and Ravina (2012) find that female borrowers have a higher probability of funding success and pay lower interest rates (Pope and Sydnor, 2011). Herzenstein et al. (2011a) find that female borrowers have lower default rates. Barasinska and Schäfer (2014) analyze data from the German platform Smava and find no evidence that female borrowers have better chances to obtain funding. Others have investigated the project description of proposed

loans. Lin et al. (2013) find that an extensive loan description with shorter sentences have a positive effect on funding success. Dorfleitner et al. (2016) investigate two German portals – Auxmoney and Smava – and find that spelling errors, text length and keywords evoking positive emotions predict funding success on Auxmoney, while on Smava only specific keywords do. Moreover, the text length has an inversely u-shaped impact on funding success, with too short or too long texts decreasing the probability that a loan is funded.

Another strand of literature investigates the impact of portal design. We are especially interested in this strand of literature. We know that the lending process, be it via traditional financial institutions or P2P lending portals suffers from significant agency problems due to information asymmetries that potentially lead to adverse selection and moral hazard (Jensen and Meckling, 1976; Denis, 2004). Small, new, entrepreneurial initiatives may be particularly susceptible to information assymetry problems but research has also established the importance of signalling in mitigating agency costs (Cassar 2004; Blumberg and Letterie 2007; Rostamkalaei and Freel, 2015). By refering to prior research that suggest that signalling may help overcome agency problems in P2P lending (Stiglitz and Weiss, 1981; Bruton et al., 2015), we analyze the risk-pricing models of the leading P2P lending portals.

We believe that understanding the risk pricing model of portals is critical as studies on equity crowdfunding provides evidence that the decision to invest in an initiative is positively related to the investors' interest in rewards and therefore investors should place importance on objective financial planning and risk measurements in determining the initiative's potential success and as a result, returns (Busenitz et al., 2005; Cholakova and Clarysse, 2015; Ahlers et al., 2015; Hornuf and Schwienbacher 2015). The potential for P2P lending platforms to signal inaccurate risk pricing information to potential lenders/borrowers should be seriously considered as this not exposes portal users to long term financial risk but may also be carried out intentionally with the specific aim of increasing portal profitability. Mispricing by crowdfunding platforms have been suggested by several studies (Larrimore et al., 2011; Duarte et al., 2012; Lin et al., 2013. Mild et al., 2015; Freedman and Jin, 2017; Jagtiani and Lemieux,

2017). We therefore delve further into the extent to which P2P lending participants signify potential objective credit quality signals derived from participation on the portal.

P2P lending platforms run under one of two different mechanisms to match the funds of lenders with the five capital needs of borrowers. Initially, many portals had implemented an auction where borrowers set different interest rates that are selected in such a way that the loan is fully funded. Under the posted price mechanism, the portal determines the interest rate and provides a rating that applies for the respective loan. Wei and Lin (2016) shows that there is a higher likelihood that a loan is funded under a posted price regime, while under an auction mechanism interest rates are relatively lower. Moreover, lenders generate a lower return under the posted price mechanism as borrowers are more likely to default. Comparable with regular capital markets, P2P lending might be prone to herding behavior. Stakes are often small and it might not be worthwhile for lenders to screen the borrower. Herzenstein et al. (2011b) suggest evidence that strategic herding takes place in crowdlending. In particular, they reveal that a 1% increase in bids increases the probability of additional bids by 15%. However, this relationship holds only if the loan is not yet fully funded. Herding behavior decreases again when the loan is successfully funded. Moreover, they also find evidence that herding has a positive and significant effect on the later performance of the loan. Finally, Serrano-Cinca et al. (2015) investigate the performance of individual loans on Lending Club. They find that information like the debt level of a borrower is important for the accuracy with which the default of a loan is predicted, but that the loan rating is most predictive of a default. Finally, following Geunter et al., 2018 that evidence investor sensitivity to geographic distance between crowdfunding investors and a firm's location, Lin and Viswanathan (2015) analyze whether there is a home bias in marketplace lending. They evidence that such a bias is widespread but that this tendency cannot be explained by rational factors alone. Cumming and Hornuf (2017) study data from Zencap, the largest marketplace lending platform for company loans in Germany. Their data indicate that lenders respond to higher interest rates by bidding investment amounts without any apparent concern over adverse selection. However, higher interest rates can also exacerbate the

probability that loans are not funded. The data further indicate that lenders pay much more attention to platform rankings of firm credit quality than they do with regard to financial variables such as income, assets, and liabilities.

3. Data and methodology

We test the effects of risk, project size, and project maturity on the returns on the crowdlending loans by running the following regression:

$$LIRR_i = \alpha + \beta_1 RISK + \beta_2 LTARGET_i + \beta_3 TENURE_i + \sum \beta_4 Controls + e_i \qquad (1)$$

where $LIRR_i$ is the natural logarithm of IRR for loan i, $RISK_i$ is a measure of the risk associated with project i, $LTARGET_i$ is the natural logarithm of the target size for loan i, $TENURE_i$ is the maturity of the loan i, and $\beta_4 \text{Controls}$ is a set of loan-specific, platform-specific, and geographical control variables.

Our sample consists of closed crowdlending deals in which the 'crowd' financed target companies through the issuance of loans or bonds. Pure- equity crowdfunding deals and loans to individuals were excluded, so as to keep the focus solely on the peer-to-business lending activity generated through crowdfunding.

As a reference point for the identification of active platforms, we used the list compiled by the Cambridge Center for Alternative Finance (CCAF, 2017) of the Cambridge University. A total of 91 crowdfunding platforms were identified to be catering the European lending market and which offer, at least for a significant proportion of their business, debt-products targeted to business financing. Among these, we selected only the portals that allowed us to extract the minimum necessary deal-per-deal information. Out of 91 portals, only 68 provided consistent and complete information on the projects (see Table 1).

Overall, our sample accounted for 4130 concluded crowdlending financings, and accounted for €931 million in funds raised within the timespan 2012 and August 2017, which grants us a very high level of representativeness with respect to the population of reference[1].

Tables 2 through 4 give further insights into the sample.

Table 2 portrays a first geographical distribution of the campaign per country, on which table 3 expands by showing the breakdown per region, according to the NUTS-2 level regional classification by the Eurostat. Table 4, on the other hand, presents the sectorial distribution of the concluded projects, in which primary roles are taken by the Real Estate and Energy sectors.

Given the aim of the study and the investigation on mispricing by fintech platforms, the main dependent variable is the project's IRR or stated interest rate (*IRR*), i.e. the interest rate payable to investors. Given the instances of multiple rates or bonus rates for sub-groups of creditors, the base-line rate for the average loan or bond tenure has been taken to represent the pricing of the issue. Other loan and project feature controls were built to account for the duration or tenure of the project (*Tenure*), the size of requested loan (*Ln_Target*), the type of security offered (dummy variables *Senior*, *Subordinated* and *Hybrid*), whether or not the loan is secured by assets or revenues (dummy *Secured*), whether or not there are other relevant actors participating in the deal as investors (dummy *Other_Inv*), whether or not there is an industrial partner for the project (dummy *Proj_Partner*), and, finally, whether there is a bonus interest rate for particular subgroups of investors, e.g. due to regional proximity (*Inv_Bonus*).

Moreover, there is a set of variables controlling for the crowdfunding platform (CFP) features, such as CFP experience (measured as number of years in activity, *CFP_EXP_Year*, or as number of concluded deals*, CFP_EXP_Proj*), availability of additional services such as credit scoring or secondary marketplaces (*CFP_Add_Serv*), CFP's strength of social media presence, measured as natural logarithm of Facebook, LinkedIn and Twitter connections

[1] Considering the census data on European crowdfunding from the "Sustaining Momentum" report from Cambridge Centre for Alternative Finance (2016), our sample accounts for 55% of the cumulative peer-to-business crowdlending occurred since 2012 (with forecast for 2016 and 2017 obtained through the CAGR of the alternative finance industry from the report).

(*CFP_Ln_Social*), CFP fee structure, i.e. taking the value 1 if fees charged on both investors and borrowers and zero otherwise (i.e. only charged to borrowers) (*CFP_Fees_Both*), and two dummy variables capturing whether the CFP restricts its services to local investors or local borrowers (*CFP_Loc_Inv_Only* and *CFP_Loc_Bor_Only*).

Given the availability of the regional collocation of each project, we created also two control variables related to the innovation level and social progress in each region. *NUTS_HighTech_Employment* captures the percentage of the regional population employed in the high-tech sector according to data from Eurostat. *NUTS_EU_Social_Progress* represents the regional score of the EU Regional Social Progress Index compiled by the Social Progress Imperative research group.

In order to test the pricing consistency of crowdfunding platforms, three sets of volatility measures were built to be used as proxies of intrinsic riskiness of the industry of the project. The first set of indexes was taken from *FTSE Euromid*, and each project is matched by sector with the most appropriate European mid-cap index. The same is done for two other alternative pools of indexes, namely the *Euromoney SME* indexes and the *FTSE Europe* indexes. Overall 6 variables were built, 3 with 3-year daily volatility, and 3 with 5-year daily volatility.

Table 5 summarizes the variables through their summary statistics, and Table 6 presents their correlation matrix.

4. Results

4.1 Full sample

Table 5 presents the monovariate statistics on the variables of the analysis. The average P2P lending project seeks about €89,322 promising 7.7% IRR, 3.4 years of maturity since the issuance of its securities, which are most likely to be senior (70% of the cases) and being secured by some sort of collateral (70% of the cases). In terms of crowdfunding portal experience, the average crowdlending campaign could count on an intermediating platform that had had 2.5 years of experience or a portfolio of 87 concluded campaigns. Only a small

proportion of crowdfunding portals offers additional services to the lending campaign's stakeholders, such as a risk rating or secondary markets for trading the purchased securities among investors. While the regional controls for innovation and social progress are quite concentrated around their respective means, the industry volatilities present a wider dispersion. Table 6 presents the Pearson Correlation Matrix for the explanatory variables and no relevant signal of multicollinearity is present. Further robustness checks also confirm this fact.

Table 7 presents various specifications for our basic model for the explanation of the IRR in its logarithmic form. In its basic specification the model explains the set IRR for the loan or bond through its features such as tenure, seniority, the presence of a collateral, the presence of bonuses for specific investors, the presence of informal guarantees through the participation of investors or partners external to the crowd-investors, and the face value of the whole issue. In addition to security structure, the contingent supporting features of the crowdfunding platform on campaigns are also explanatory variables of the model. Throughout all the models we find systematic strong evidence that as the tenure of the projects increase then, on average, the IRR offered by the project decreases, which is deemed as atypical behavior for traditional debt instruments. The coefficients on *Tenure* are all negative and statistically significant at 1% P-value. Moreover, there is enough and robust evidence suggesting that, as for traditional financial instruments, subordinated securities demand, on average, higher interest rates (coefficients for *Subordinated* significant in size and statistically at 1% P-Value from Model 2 through 8). There is no evidence however that, despite their different risk profiles vis-à-vis senior debt, hybrid securities would demand higher or lower IRRs. Another puzzling finding, in addition to the tenure dynamics, is the positive and highly significant coefficient for *Secured* in all model specifications but for Model 2. It appears that in the realm of crowdlending, the reduction of riskiness of the project, thanks to the presence of the collateral, does not translate in lower IRRs, i.e. it is not priced by the crowdfunding platform. On the other hand, the pricing and the IRR seem to take into account the presence of other investors, project partners or investor bonuses: the coefficients of *Other_Inv*, *Proj_Partner* and *Inv_Bonus* are all consistently negative and

highly statistically significant across all our models. In terms of size of the effect, first the presence of investors external to the 'crowd', then bonuses and lastly, reputable project partners have the strongest IRR reduction effect. Model 1 includes the innovation control through *NUTS_HighTech_Employment* which however results in no value enhancement in terms of significance of the coefficient. Model 2 substitutes this latter variable with *NUTS_EU_Social_Progress*, whose coefficient is positive and significant at 10% P-value, indicating that projects developing in regions with stronger social infrastructure do pay, on average, higher rates to investors. This effect needs further investigation; therefore it is dropped in the subsequent specifications. Crowdfunding experience is proxied both by number of years of activity and the number of projects completed on the platform. Model 1, 3 and 4 use the former, while Model 2, 5, 6, 7 and 8 use the latter. Robustness checks reveal that overall results on key explanatory variables do not change due the choice of the experience proxy. The project count however is the only one with consistently positive and statistically significant coefficient across models, and although with relatively small effect, it does seem that with more experience and reputation (i.e. more concluded projects on their platform), the crowdfunding platforms are able to exert a slight upward pressure to the pricing of the loan and thus increase its IRR at the expense of borrowers. The coefficients of *CFP_Add_Serv* are negative and significant both in size and in terms of P-Value across Models 3 through 8, i.e. the models that take into account also the industry volatility of the campaigns. This is in line with the intuition that if the platform offers secondary trading for the securities (enhancing liquidity) or provides a clear credit rating mechanism for each issue (reducing information asymmetry) then the pressure on IRR will decrease. For the same set of models, we find systematic negative coefficients with P-values at 1% for the proxy of social capital of the crowdfunding platform (*CFP_Ln_Social*), which contradicts the hypothesis that with a stronger reputation these intermediaries try to exert upward pressure to the pricing of the loans in order to favor investors and increase the likelihood of success of the campaigns. Throughout all the models, sizeable negative and significant coefficients are found for *CFP_Fees_Both*, meaning that on average lower rates are set when crowdfunding platform have enough market power to charge a fee also on the crowd-

investors. Moreover, we find very sizeable negative coefficients for *CFP_Loc_Inv_Only* and *CFP_Loc_Bor_Only*, and statistically significant at 1% P-value for all model specifications. It appears that restricting the platform use solely to local borrowers and lenders reduces, on average, the IRR set for the given project.

Models 3 to 8, as mentioned earlier, introduce each one of the 3 European midcap, industry-matched volatility measures, computed either over the last three years preceding the campaign or over the last 5 years. Models 3 and 4 use the 3- and 5-year volatility index computed using the FTSE Euromid indices. Models 5 and 6 use the 3- and 5-year volatility index computed using the Euromoney SME, and finally Model 7 and 8 use the FTSE Europe as further proxy and robustness check for the underlying industry risk. The 6 coefficients of these industry risk proxies are all negative and highly statistically significant (1% P-Value), with a relevant economic size for the effect. There is thus evidence that, on average, as the riskiness (i.e. volatility) of the industry underlying the project increases then the promised IRR drops. In addition to the tenure and collateral effects, also the underlying industry riskiness seems to have a counterintuitive relationship the IRR set by the crowdfunding platform, at least vis-à-vis traditional pricing of financial securities. This sheds some doubts about the efficiency in the pricing mechanism pursued by most crowdfunding platforms, which may have let marketing and business development pressures overshadow the vital role of deep credit risk assessment.

4.2 KMV model

The procedure to calculate risk-neutral spread was divided into several steps that allowed estimation of a specific rate for each sampled company and ensured the maximum consistency between estimated data and data available on the market.

Values were obtained through the implementation of the KMV model, owned by the company Moody's Investor Services, and through an important change necessary for the real representation of the phenomenon. KMV, through the equations of Black and Scholes (1973),

grant the possibility to price loans and to discover risk-neutral spread implied in balance sheet information.

As a first step, the book value of the equity and the estimate of the volatility for each company were required. However, since our sample is made of unlisted companies, we obtain a proxy of the equity volatility using comparable listed companies. (volatility estimation was made through moving average over 52 weeks). The retrieval of data needed to be particularly detailed as it was crucial for the subsequent robustness of the results. As previously explained, the next step was to obtain, through the Black and Scholes (1973) model, the implicit value of equity and its volatility through the following equations:

$$E = V_0 \, N(d_1) - F \, e^{-it} \, N(d_2)$$

$$\sigma_E = \frac{V_0}{E} \, N(d_1) \, \sigma_V$$

Where E represents the equity value, V_0 the asset value at time zero, F the terminal value of the loan, σ_E the volatility of the equity and σ_V the volatility of the asset side. Since V_0 and σ_V are two parameters not available on the market, it has been necessary to estimate them through an optimization process. By equating previous equations to the values found in the first part of the process it was possible to obtain two indicative estimates of the initial values of the parameters sought. Only later, and starting from the values previously hypothesized, it was possible to estimate the real values V_0 and σ_V. This was made by minimizing the sum of squared standard errors between the Book Value of equity, equity volatility and the results deriving from the two equations above.

Once the variables were obtained, an estimate of risk-neutral spread for each company was obtained from the equation:

$$\text{Spread} = -\frac{1}{T} \text{Ln} \left[N(d_2) + \frac{V_0}{F\ e^{-it}} N(-d_1) \right]$$

Where T represents the tenure of the loan value F.

5. Discussion

This paper examines the determinants of relationship between risks and returns of projects in P2P lending. We believe this to be an important issue given the raising importance of crowd-lending in financing entrepreneurial ventures and the potential substitution affects.

From our analysis, we find that the risk profile of loans turns out to be inversely related to the returns offered to lenders. This evidence in in striking contrast with the tenet of modern finance according to which returns are positively associated with the level of risk embedded in financed projects. In financial terms, this means that platforms do not seem to price correctly the risk of the loans and concomitantly crowdlenders are accepting to take additional risks for the same reward. This behavior may be driven by a type of investors that evaluate crowdfunding projects not solely for the associated financial returns but also for non-financial considerations (Cumming and Johan, 2013; Bento et al., 2018).

Overall, the inverse relationship between risk and returns and the consequent apparent mispricing of the analyzed project echoes the concerns about the estimated returns for equity crowdfunding by Signori and Vismara (2016).

Loan amount and maturity have little or no effect in the excess rates of returns. Only maturity presents consistent statistically significance, with predominantly a negative effect on the returns. This counterintuitive effect again reinforces the conclusion that crowdlenders behave differently

from more traditional investors in the sense that expected returns may be disconnected from traditional drivers (risk, amount or maturity).

The benefits of P2P lending have been established by extant research. Among the main advantages that crowdlending brings to financial markets, there is: 1) lower costs of financial intermediation; 2) higher level of diversification of family and SME portfolios; and 3) larger volumes of debt capital available for SMEs as crowdlending in an alternative and more flexible source of financing (Bofondi, 2017). Moreover, there are studies that position crowdlending as a useful supplement, if not also a substitute, of traditional banking due to the inclusion effect it has on unbanked people and firms (Boitan, 2016; Zhang et al., 2016). However, there are also critical risks associated with profilerating and strong crowdlending activity. Firstly, there is the risk of misallocation of capital in the economy due to the absence of relevant incentives for the crowdfunding platforms to select and monitor borrowers. This is not only because they do not generally retain any part of the loan on their own balance sheet, but also because they need to deal with a huge volume of demand for both loans and investment opportunities. The result of this situation is that low-quality borrowers will be flooded with capital and nobody is monitoring the issued loans or bonds. This is a situation that partially mimics the subprime securitization process, and the effects on the general economy of the latest financial crisis are clearly known to all. Secondly, the surge in crowdfunding activity has been realized during a relatively booming phase of the economic cycle. This fact, coupled with a degree of piling up happening due to the increasing involvement of institutional investors in crowdfunding (e.g. some platforms reserve a portion of the offered loans to consortia of institutional investors), may generate an accumulation of risks that could be very dangerous in case higher than expected insolvencies were to occur. Moreover, there are risks connected to the bankruptcy of the crowdfunding platform, which would cause in many cases the interruption of the debt servicing activity they provide on outstanding loans. This scenario is not unlikely, as many of such platforms have not yet reached their break-even point and have been accumulating losses (Lenz, 2016). Also, there are instances of lack of transparency or lack of understanding (by

both lenders and borrowers) of the risks involved in the lending transaction. Given the absence of regulation, most platforms delegate to the investors the responsibilities to assess the risks through online registrations and acknowledgment of some general conditions of the service. There is still no EU authority in charge of monitoring crowdlending (and equity crowdfunding) risks, nor to assess the credit risk models the platforms use when pricing and issuing the loans, nor to performs stress tests to understand how big a loan loss can the "crowd" absorb. Finally, the inclusion of institutional investors within the investor pool might lead to conflict of interest for the crowdfunding platform. In fact, in order to favor larger investors and increase their loan generation turnover, platforms may be tempted to allow them to cherry-pick loans or buy-up an entire loan issues before retail investors have the opportunity to invest, basically leaving retails with the lowest quality loans.

On another front, there is evidence that firms relying on bank financing suffer significantly higher increases in default risks in the US, while peer firms relying on public debt have lower insolvency (Chiu, Wang, Peña, & Chiu, 2017). Depending on the positioning of crowdlending, whether as an alternative to bank finance or as pseudo-public marketplace, there is a potential for both reduction or exacerbation of the risks involved for the borrowing firms and ultimately for investors.

Considering the many recent evolutions in credit scoring, especially thanks to machine learning (e.g. Bequé & Lessmann, 2017), it is odd that despite their huge loan request volumes, most of the crowdlending platforms perform hands-on credit risk analyses with time-consuming direct contacts with the borrowers. Most of the platforms are in their startup or early growth phase and their credit analysis teams are relatively small. It is not unlikely that the pressure to handle the volume of requests, coupled with the need to cater to an ever-growing demand for investment opportunities by the crowd and traditional (if not antiquated) credit processes, may lead to systematic mispricing of the loans being posted. It is not reasonable for a much smaller team to be able to compete in terms of pricing capabilities with commercial banking giants, unless technology comes to help.

Our empirical investigation studies the pricing of crowdlending investments in Europe, namely how the interest rates have been set so far by crowdlending portals and the inferences that can be drawn about the main factor of risk in this booming, unregulated market. To our knowledge, this is the largest pan-European sample of crowdfunding campaigns collected so far, which accounts for €931 million raised and guarantees the representativeness of our results for the lending-based crowdfunding activity in Europe[2].

Aided by three interviews with credit risk managers of the major French platform, we explored the business models of such intermediators. As they put it "there is basically no regulation (in Europe)" and all their strategy is focused on maintaining and boosting their reputation as screeners of profitable investment opportunities. Indeed, given the current situation, European investors are solely protected by the platforms' competitive efforts and showcase of expertise, which relies largely on marketing efforts through social media. The lack of a proper regulatory framework for crowdfunding leaves retail lenders, and ultimately the European financial system (considering the incredible growth of this market), in the hands of the intermediators, whose incentives to care for the borrow selection deteriorate as they grow larger and gain market prominence.

Hints of mispricing by crowdfunding platforms have been evidenced by few studies. Emekter et al. (2015) find that higher interest rates charged on the high-risk borrowers are not enough to compensate for higher probability of the loan default. Moreover, many studies show that the amount of social capital and social media strength of the borrowers can lead to easier access to credit thanks to crowdfunding (Duarte et al., 2012; Freedman & Jin, 2017; Larrimore et al., 2011; Lin et al., 2013), and thus lead to mispricing. Jagtiani & Lemieux (2017) find that the borrowers of the most notable US crowdlending platform are, on average, riskier than traditional banking borrowers, but also that, given the same default risk, crowdfunding

[2] Considering the census data on European crowdfunding from the "Sustaining Momentum" report from Cambridge Centre for Alternative Finance (2016), our sample accounts for 55% of the cumulative peer-to-business crowdlending occurred since 2012 (with forecast for 2016 and 2017 obtained through the CAGR of the alternative finance industry from the report).

borrowers pay smaller spreads. Also Käfer (2016) reaches the conclusion that crowdlending is a significantly riskier activity than traditional banking, while finding many similarities between this activity and the so-called shadow banking. Mild et al. (2015) highlight the importance of the pricing risk for the long-term survival of the crowdlending platforms and assert that the marketplace, on its own, is not able to price the risk of default. Finally, there is evidence of a strong herding behavior in the crowdlending market (Zhang & Chen, 2017), which makes a single bad borrower a problem for the whole 'crowd'.

In the future, we need to understand why crowdfunding platforms are not pricing risks correctly. Such investigation should eventually uncover important factors that drive the decision about the pricing of the projects. In addition, we need to understand how transformative emerging innovations, which have a typical high risk, high reward profile, are successfully finding the means in the time and scale needed through crowdfunding.

6. Conclusion

The paper examines the effect of risk profile in the returns of Peer-to-Peer loans. We a generous sample of loans transacted on European crowdlending platforms from 2013 and 2017. This empirical case therefore allows us to improve our understanding about the drivers of the investment in crowdfunding, particularly in terms of the effect of risk in loan pricing. We find that risks are, on average, inversely related to the returns of the loans, in contrast to the predictions from the standard finance literature. Altruism and bounded rationality may explain that difference. Implications of these results include the need to improve the conceptualization on the drivers of crowdfunding's returns. They also provide important lessons for policy-making on the regulation of FinTech.

In the future, more empirical studies should analyze the pricing of risk in crowdlending. At the same time, a more theoretical work can provide a systematized understanding of the factors behind this pattern (as well as their relations) which could bring new hypothesis to be tested in the field and to further illuminate the debate about the motivations and drivers of crowdlenders.

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Table 1: P2P crowdlending platforms included in the sample

Name	Country	Type	Lending_Model	Social_Media _Strenght	Founded	Region
1miljoenwatt	NL	Energy	Debt	6.80	2011	Amsterdam
Abundance Investme	UK	Energy	Debt	8.99	2009	London
Aescuvest	DE	business	Hybrid and Rewards	6.62	2014	Hessen
Archover	UK	business	Debt	7.72	2013	London
Bettervest	DE	Energy	Debt	9.98	2012	Frankfurt
Bolden	FR	business	Debt	8.34	2015	Paris
Bolero Crowdfunding	BE	business	Debt, Equity and Hybrid	8.58	2014	Brussels
bouwaandeel	NL	RE	Debt	6.69	2014	Amsterdam
Clubfunding	FR	business	Debt	6.85	2014	Paris
CodeInvesting	UK	business	Debt and Equity	8.74	2013	London
Companisto	DE	business	Debt and Equity	10.52	2012	Berlin
Conda	AT	business	Debt and Equity	9.88	2012	Wien
Coopernico	PT	Energy	Debt	8.49	2013	Lisboa
credit.fr	FR	business	Debt	7.88	2014	Levallois-Perret
Crowd2fund	UK	business	Debt and Equity	9.26	2014	London
Crowd4Climate	AT	Energy	Debt	5.89	2017	Vienn
Crowdener.gy	DE	Energy	Debt	6.78	2012	Berlin
Crowdproperty	UK	RE	Debt	8.05	2014	London
CrowdStacker	UK	business	Debt	8.07	2014	London
Dividom	FR	RE	Debt	8.82	2014	Lille
Duurzaam Investeren	NL	Energy	Debt	6.71	2014	Amsterdam
Ecco Nova	BE	Energy	Debt	7.29	2015	Brussels
Ecoligo	DE	Energy	Debt	6.88	2016	Berlin
Econeers	DE	Energy	Debt and Hybrid	8.26	2013	Dresden
Ecrowd!	ES	business	Debt	8.44	2014	Barcelona
Enerfip	FR	Energy	Debt	8.67	2014	Montpellier
Estateguru	Estonia	RE	Debt	8.71	2013	Tallinn
Ethex	UK	business and social	Debt, Donations and Equity	8.83	2011	Oxford
Exporo	DE	RE	Debt	8.26	2014	Hamburg
Finbee	Lithuania	business and person	Debt	7.76	2015	Vilnius
Fundimmo	FR	RE	Debt	7.37	2014	Paris
Geldwerk1	DE	business	Hybrid	5.24	2015	Dortmund
GLS Crowd	DE	Energy	Debt	10.64	2016	Bochum
GreenCrowd	NL	Energy	Debt	7.85	2014	Utrecht
GreenRocket	AT	business	Debt, Equity and Hybrid	9.97	2013	Graz
Greenvesting	DE	Energy	Debt	7.17	2009	Marburg
Greenxmoney	DE	Energy	Debt	7.74	2014	Ulm
Grow Ly	ES	business	Debt	8.47	2013	Madrid
Housers	ES	RE	Debt and Equity	9.92	2015	Madrid
Immovesting	FR	RE	Debt	6.95	2015	Paris
Invesdor	Finland	business	Debt and Equity	10.03	2012	Helsinki
Investofolio	DE	business	Debt	4.63	2017	Frankfurt
Kameo	SE	business and RE	Debt	7.61	2014	Stockholm
Kapilendo	DE	business	Debt	10.07	2015	Berlin
Kapitaal OpMaat	NL	business	Debt	8.74	2013	Delft
Koregraf	FR	RE	Debt	7.26	2014	Bordeaux
Leihdeinerumweltge	DE	Energy	Debt	5.44	2011	Frankfurt
Lendingcrowd	UK	business	Debt	7.92	2014	Edinburgh
Lendix	FR	business	Debt	9.49	2014	Paris
Lendopolis	FR	business	Debt	9.02	2014	Paris
Lendosphere	FR	Energy	Debt	8.22	2014	Paris
Lendy	UK	RE	Debt	7.33	2012	Portsmouth
Lumo	FR	Energy	Debt	8.84	2012	Bordeaux
Mytriplea	ES	business	Debt	8.15	2013	Soria
Pretgo	FR	business	Debt	6.90	2014	Paris
Pretup	FR	business	Debt	7.83	2014	NANCY
Prexem	FR	business	Debt	9.47	2014	Puteaux
Property Moose	UK	RE	Debt	8.43	2013	Liverpool
Raize	PT	business	Debt	9.86	2013	Lisboa
Rendity	AT	RE	Debt	7.84	2015	Wien
Symbid	NL	business	Debt and Equity	9.15	2011	Rotterdam
Tausend mal tausend	AT	business and social	Debt, Equity and Reward	8.86	2012	Graz
Toborrow	SE	business	Debt	7.68	2013	Stockholm
Tributile	FR	business	Debt	7.02	2015	Lille
Trillion Fund	UK	Energy	Debt and Hybrid	9.20	2011	Staines
Trine	SE	Energy	Debt	8.53	2015	Gothenburg
Unilend	FR	business	Debt	9.30	2013	Paris
Veolis	CH	Energy	Debt and Equity	6.69	2014	Hausen am Albis
WiseAlpha	UK	business	Debt	6.48	2015	London
zinsbaustein	DE	RE	Hybrid	8.28	2016	Berlin
zinsland	DE	RE	Debt	7.60	2014	Hamburg
Zonnepanelen Delen	NL	Energy	Debt	8.17	2012	Amsterdan

Table 2: P2P crowdlended loans by country

Country	#	%	Avg_Tenure_Yrs	Cumul_Amount_Raised (€)	Cumul_Target_Size (€)	Funding	Avg_IRR (%)	%Secured_Loans
UK	598	14.5%	4.2	348,551,633	340,245,634	105%	9.16	92%
France	1552	37.6%	3.5	238,791,404	217,928,044	111%	7.39	41%
Germany	310	7.5%	4.3	164,980,874	152,627,306	136%	5.82	68%
Netherlan	340	8.2%	6.2	53,052,532	54,296,527	97%	6.56	36%
Sweden	155	3.8%	1.8	37,537,884	14,261,301	437%	8.02	92%
Spain	447	10.8%	1.4	27,007,618	26,824,066	100%	6.65	76%
Estonia	153	3.7%	1.3	25,322,307	25,402,900	99%	10.58	100%
Austria	51	1.2%	6.4	17,075,170	13,308,259	188%	4.13	94%
Portugal	393	9.5%	2.4	7,920,000	7,920,000	100%	7.33	100%
Latvia	11	0.3%	1.4	2,295,408	2,295,408	100%	10.91	100%
Belgium	15	0.4%	4.6	2,163,950	1,785,000	134%	6.07	40%
Norway	15	0.4%	1.0	1,907,801	1,907,801	100%	10.77	47%
Lithuania	72	1.7%	2.8	1,637,210	1,639,550	98%	21.85	100%
Other	18	0.4%	5.7	2,651,058	2,283,731	121%	6.11	88%
Total	4130	100.0%	3.4	930,894,849	862,725,528	121%	7.74	65%

Table 3: P2P crowdlended loans by region

NUTS2 Region	#	%	Cumul_Amount_Raised (€)	Cumul_Target_Size (€)	Avg_IRR (%)	Avg_Tenure_Yrs	%Secured_Loans
Inner London West	56	1.4%	40,456,849	39,243,732	9.79	2.83	88%
Île de France	334	8.1%	33,228,821	29,533,600	7.83	3.19	32%
Berlin	42	1.0%	33,202,120	30,657,300	5.89	3.58	52%
Bedfordshire and Hertfordshire	16	0.4%	32,574,795	32,573,295	10.97	0.83	100%
Hamburg	24	0.6%	18,844,029	18,149,000	5.54	2.45	38%
Darmstadt	27	0.7%	18,620,504	17,229,625	5.98	4.33	81%
Eastern Scotland	63	1.5%	16,820,314	15,298,918	10.16	4.29	73%
MidiPyrénées	72	1.7%	15,563,490	5,445,000	6.90	3.03	36%
Oberbayern	27	0.7%	13,784,000	13,094,349	6.32	4.47	70%
West Midlands	51	1.2%	13,656,586	12,495,800	8.97	2.74	96%
Gloucestershire, Wiltshire and Bristol/Bath area	10	0.2%	13,198,560	11,130,893	7.81	8.48	90%
West Yorkshire	13	0.3%	12,839,560	12,839,560	10.08	1.86	100%
Comunidad de Madrid	138	3.3%	12,318,603	12,239,491	6.72	1.25	73%
Stockholm	50	1.2%	12,059,848	6,609,794	9.09	1.67	96%
Merseyside	6	0.1%	12,037,776	12,036,776	11.33	0.67	100%
Surrey, East and West Sussex	16	0.4%	11,781,960	11,751,960	10.09	1.69	100%
Devon	12	0.3%	11,593,000	11,705,000	9.48	4.50	100%
Düsseldorf	18	0.4%	10,730,450	10,690,000	6.63	1.50	83%
ProvenceAlpesCôte d'Azur	87	2.1%	9,957,255	9,437,000	7.88	3.46	38%
North Yorkshire	5	0.1%	8,906,850	8,907,850	9.55	5.33	80%
Kent	19	0.5%	8,817,020	8,281,420	8.93	4.64	100%
Karlsruhe	8	0.2%	8,777,154	7,853,500	6.19	3.40	38%
RhôneAlpes	93	2.3%	8,656,600	7,780,000	7.44	3.15	31%
Nord PasdeCalais	68	1.6%	8,369,977	8,211,197	7.14	4.16	54%
Wien	20	0.5%	8,062,401	7,593,815	5.44	5.15	95%
ZuidHolland	77	1.9%	7,749,668	7,893,150	6.79	5.17	14%
Berkshire, Buckinghamshire and Oxfordshire	15	0.4%	7,585,500	7,228,100	8.43	1.80	93%
East Yorkshire and Northern Lincolnshire	2	0.0%	7,114,500	7,114,500	12.00	NA	100%
Cataluña	129	3.1%	7,022,790	7,004,300	6.04	1.76	89%
Essex	4	0.1%	6,898,240	6,898,240	10.75	2.00	100%
Övre Norrland	3	0.1%	6,892,073	222,847	9.73	1.67	100%
Aquitaine	70	1.7%	6,548,501	5,987,700	7.46	3.01	60%
East Anglia	9	0.2%	6,508,088	6,501,446	10.88	4.25	78%
NoordHolland	45	1.1%	6,483,605	6,261,100	6.82	6.76	33%
Gelderland	54	1.3%	6,004,933	6,508,520	6.05	6.14	52%
Stuttgart	7	0.2%	5,993,752	5,784,400	5.03	2.67	43%
East Wales	5	0.1%	5,842,000	5,842,000	10.40	7.00	100%
Trier	4	0.1%	5,333,400	5,221,300	6.44	4.75	100%
Pays de la Loire	66	1.6%	5,234,299	4,471,000	7.18	3.52	52%
North Eastern Scotland	2	0.0%	5,012,000	5,012,000	9.95	9.00	100%
Sydsverige	23	0.6%	4,816,279	1,648,535	8.18	1.51	91%
Leipzig	8	0.2%	4,683,986	4,661,250	6.05	2.60	50%
LanguedocRoussillon	54	1.3%	4,609,880	4,469,000	7.53	3.51	41%
Mittelfranken	9	0.2%	4,554,258	4,064,719	6.47	6.61	89%
Köln	9	0.2%	4,382,438	3,234,425	5.41	5.43	56%
Östra Mellansverige	22	0.5%	4,267,982	1,948,493	6.18	1.88	86%
Norra Mellansverige	15	0.4%	4,066,942	952,454	8.61	1.80	100%
Dorset and Somerset	4	0.1%	4,047,680	3,566,080	11.20	20.00	100%
Greater Manchester	5	0.1%	4,035,966	4,035,966	10.95	1.00	100%
Koblenz	10	0.2%	3,988,368	3,986,525	5.70	3.49	40%
NoordBrabant	33	0.8%	3,938,905	3,682,900	6.71	6.50	18%
Bretagne	43	1.0%	3,803,216	3,125,646	6.92	3.38	58%
Picardie	24	0.6%	3,720,884	3,227,814	6.87	3.75	63%
Derbyshire and Nottinghamshire	5	0.1%	3,653,428	2,976,314	10.33	10.00	100%
West Wales and The Valleys	16	0.4%	3,647,647	3,624,740	10.22	4.18	88%
MecklenburgVorpommern	8	0.2%	3,612,995	3,585,250	4.81	5.88	63%
Dresden	9	0.2%	3,499,217	3,673,500	5.03	6.17	67%

PoitouCharentes	47	1.1%	3,463,475	3,559,200	5.74	7.87	70%
Groningen	7	0.2%	3,318,225	3,274,807	8.14	10.90	71%
Steiermark	10	0.2%	3,167,869	1,595,000	2.85	6.80	100%
Outer London South	5	0.1%	3,128,520	3,627,520	10.05	3.00	80%
South Yorkshire	2	0.0%	3,050,460	3,050,460	12.00	NA	100%
South Western Scotland	5	0.1%	2,831,191	2,831,191	11.60	NA	100%
Leicestershire, Rutland and Northamptonshire	8	0.2%	2,775,000	2,775,000	7.19	1.63	100%
Auvergne	23	0.6%	2,617,500	2,635,000	7.79	3.42	39%
Prov. Limburg (BE)	17	0.4%	2,544,875	2,498,500	6.93	7.05	24%
Norte	129	3.1%	2,433,000	2,433,000	7.86	2.14	100%
Zeeland	15	0.4%	2,400,250	2,701,300	6.83	5.23	20%
Cornwall and Isles of Scilly	3	0.1%	2,354,000	1,232,000	8.28	7.61	100%
Latvia	11	0.3%	2,295,408	2,295,408	10.91	1.36	100%
Västsverige	15	0.4%	2,290,576	1,064,165	7.90	1.63	73%
Cumbria	4	0.1%	2,244,000	2,244,000	7.75	2.00	100%
Hampshire and Isle of Wight	9	0.2%	2,199,420	2,199,420	11.67	NA	100%
SachsenAnhalt	12	0.3%	1,986,065	1,382,000	5.30	5.58	75%
Lancashire	2	0.0%	1,876,600	2,033,400	8.00	3.00	100%
WeserEms	3	0.1%	1,853,750	2,270,000	5.03	4.17	67%
Niederösterreich	9	0.2%	1,804,729	1,745,000	3.44	8.67	100%
Kärnten	2	0.0%	1,765,921	799,504	4.25	6.00	50%
SchleswigHolstein	5	0.1%	1,765,225	1,488,300	6.10	6.65	80%
BasseNormandie	12	0.3%	1,754,582	1,740,000	7.11	3.75	67%
Lorraine	17	0.4%	1,690,044	1,650,000	8.49	3.44	12%
Brandenburg	3	0.1%	1,654,852	1,275,000	5.17	3.61	100%
Lithuania	72	1.7%	1,637,210	1,639,550	21.85	2.76	100%
Castilla y León	29	0.7%	1,586,900	1,585,500	6.29	2.72	83%
Zurich	2	0.0%	1,553,700	1,550,000	4.25	3.00	50%
Shropshire and Staffordshire	5	0.1%	1,535,401	1,833,401	9.45	1.83	100%
Schwaben	2	0.0%	1,531,000	1,531,000	4.75	3.50	100%
Utrecht	17	0.4%	1,452,325	1,506,800	6.02	7.65	47%
HauteNormandie	23	0.6%	1,437,400	1,392,000	7.75	3.48	52%
Tees Valley and Durham	2	0.0%	1,331,100	1,331,100	11.00	NA	100%
ChampagneArdenne	11	0.3%	1,305,340	1,260,000	7.09	5.09	73%
Centro (PT)	71	1.7%	1,299,000	1,299,000	6.84	2.42	100%
Småland med öarna	8	0.2%	1,277,742	357,588	8.84	1.63	100%
Saarland	4	0.1%	1,273,350	1,223,350	6.25	3.63	100%
Niederbayern	2	0.0%	1,250,000	1,250,000	6.50	1.50	100%
Oslo og Akershus	9	0.2%	1,236,011	1,236,011	11.33	0.87	56%
Andalucía	11	0.3%	1,233,000	1,233,000	6.39	1.64	91%
Overijssel	10	0.2%	1,228,025	1,226,100	6.50	5.95	40%
Alsace	14	0.3%	1,125,000	1,085,000	7.79	3.71	14%
Other	1399	33.9%	287,924,868	280,583,866	6.35	4.21	69%
Total	4130	100.0%	930,894,849	862,725,528	7.74	3.38	65%

Table 4: P2P crowdlended loans by sector

Sector	#	%	Cumul_Amount_Raised (€)	Cumul_Target_Size (€)	Avg_Tenure_Yrs	Avg_IRR (%)	%Secured_Loans	Avg_Backers
RE	653	15.8%	379,351,647	368,722,452	1.7	8.95	90%	463
energy	497	12.0%	181,955,997	164,454,594	7.3	5.47	94%	182
consumer_services	430	10.4%	56,614,838	52,986,478	2.9	7.27	47%	370
finance	127	3.1%	48,984,678	46,161,512	3.5	7.44	52%	433
consumer_goods	425	10.3%	45,019,220	40,279,818	3.2	7.53	33%	376
construction&engineeri	175	4.2%	43,393,265	30,736,744	2.9	7.83	57%	409
leisure&tourism	217	5.3%	39,481,567	34,283,638	4.1	7.69	40%	361
industrials	197	4.8%	34,863,133	33,713,748	2.7	7.68	45%	489
other_manufacturers	176	4.3%	22,044,897	19,805,790	2.5	7.53	31%	295
food	139	3.4%	17,565,617	15,432,726	3.4	6.64	55%	257
technology	148	3.6%	16,355,524	13,915,572	3.4	7.24	55%	341
advisory	135	3.3%	14,483,402	13,668,541	2.9	7.38	33%	304
healthcare	99	2.4%	9,461,976	8,914,208	3.5	7.67	38%	390
agriculture	62	1.5%	5,783,333	4,243,118	3.3	7.10	53%	315
education&training	28	0.7%	2,109,028	2,033,500	3.6	7.48	43%	301
Other&NA	622	15.1%	13,426,727	13,373,091	2.8	9.58	99%	313
Grand Total	4130	100.0%	930,894,849	862,725,528	3.4	7.74	65%	332

Table 5: Variable descriptive statistics

Variable	Obs	Median	Mean	Std. Dev.	Min	Max
IRR	4123	7.5	7.7	3.03	0.0	38.8
Loan and Project Features						
Tenure	3914	3.0	3.4	2.8	0.1	25.0
Ln_Target	4129	11.0	11.2	1.4	6.7	16.6
Senior	4130	1.0	0.7	0.5	0.0	1.0
Subordinated	4130	0.0	0.2	0.4	0.0	1.0
Hybrid	4130	0.0	0.0	0.2	0.0	1.0
Secured	4130	1.0	0.7	0.5	0.0	1.0
Other_Inv	4130	0.0	0.1	0.2	0.0	1.0
Proj_Partner	4130	0.0	0.1	0.3	0.0	1.0
Inv_Bonus	4130	0.0	0.1	0.3	0.0	1.0
Crowdfunding Platform Features						
CFP_EXP_Proj	4130	60.0	88.6	85.2	0.0	381.0
CFP_EXP_Year	3678	2.0	2.5	1.2	0.0	8.0
CFP_Add_Serv	4130	1.0	0.6	0.5	0.0	1.0
CFP_Ln_Social	4130	6.1	6.1	1.0	1.6	10.0
CFP_Fees_Both	4130	0.0	0.2	0.4	0.0	1.0
CFP_Loc_Inv_Only	4130	1.0	1.0	0.1	0.0	1.0
CFP_Loc_Bor_Only	4130	1.0	0.9	0.3	0.0	1.0
Regional (NUTS 2 level) Factors						
NUTS_HighTech_Employme	2418	3.6	4.5	2.0	0.9	11.0
NUTS_EU_Social_Progress	3011	71.2	70.7	5.2	55.1	82.3
Industry Volatilities						
Vol_1_3yr	3441	1.2	1.4	0.7	0.9	3.5
Vol_1_5yr	3441	1.2	1.5	0.7	0.8	3.2
Vol_2_3yr	3441	1.1	1.3	0.7	0.7	3.5
Vol_2_5yr	3441	1.0	1.2	0.8	0.6	3.2
Vol_3_3yr	3441	1.1	1.4	0.7	0.7	3.5
Vol_3_5yr	3441	1.2	1.4	0.7	0.8	3.2

Table 6: Correlation matrix

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19	(20)	(21)	(22)	(23)	(24)	(25)
(1)	IRR	1.00																								
(2)	Tenure	-0.23	1.00																							
(3)	Ln_Target	0.00	0.13	1.00																						
(4)	Senior	-0.02	-0.19	-0.35	1.00																					
(5)	Subordinated	0.07	0.14	0.33	-0.90	1.00																				
(6)	Hybrid	-0.11	0.12	0.10	-0.34	-0.09	1.00																			
(7)	Secured	-0.13	0.10	0.17	-0.11	0.08	0.07	1.00																		
(8)	Other_Inv	-0.10	0.02	0.32	-0.18	0.21	-0.06	0.07	1.00																	
(9)	Proj_Partner	-0.23	0.39	0.07	0.00	-0.01	0.01	0.17	0.18	1.00																
(10)	Inv_Bonus	-0.19	0.26	0.13	-0.09	0.05	0.08	0.05	0.03	0.18	1.00															
(11)	CFP_EXP_Proj	0.08	-0.12	-0.13	0.24	-0.20	-0.13	-0.23	-0.14	-0.18	-0.10	1.00														
(12)	CFP_EXP_Year	-0.14	0.13	0.14	0.03	-0.02	-0.03	0.27	-0.04	0.02	0.12	0.42	1.00													
(13)	CFP_Add_Serv	0.13	-0.27	-0.15	-0.06	0.13	-0.16	-0.08	-0.06	-0.19	-0.17	-0.09	0.06	1.00												
(14)	CFP_Ln_Social	0.14	-0.11	-0.13	0.00	-0.14	0.30	-0.28	-0.23	-0.39	-0.02	0.33	0.08	-0.07	1.00											
(15)	CFP_Fees_Both	-0.04	-0.12	-0.17	0.20	-0.20	-0.03	-0.10	-0.07	0.06	0.07	0.08	0.06	0.25	0.02	1.00										
(16)	CFP_Loc_Inv_Only	-0.08	-0.36	-0.17	0.17	-0.16	-0.04	-0.08	0.02	-0.08	-0.10	0.10	-0.25	-0.02	0.06	0.05	1.00									
(17)	CFP_Loc_Bor_Only	-0.11	-0.02	-0.09	-0.07	0.13	-0.11	0.25	-0.01	-0.02	-0.26	-0.03	0.04	-0.10	-0.07	-0.37	0.03	1.00								
(18)	NUTS_HighTech_Employme	0.04	-0.14	0.06	-0.01	0.01	0.00	-0.05	0.02	-0.10	-0.11	0.05	0.00	0.02	0.06	-0.01	0.02	0.07	1.00							
(19)	NUTS_EU_Social_Progress	0.07	0.19	0.16	-0.10	0.10	0.02	0.01	0.08	0.16	0.09	-0.15	0.01	0.19	-0.25	0.00	-0.07	-0.37	0.17	1.00						
(20)	Vol_1_3yr	-0.31	0.51	0.09	-0.11	0.09	0.05	0.27	0.07	0.52	0.26	-0.31	0.09	-0.19	-0.35	-0.05	-0.18	0.06	-0.14	0.10	1.00					
(21)	Vol_1_5yr	-0.31	0.53	0.09	-0.09	0.07	0.06	0.25	0.05	0.54	0.25	-0.36	0.03	-0.21	-0.35	-0.05	-0.21	0.06	-0.14	0.11	0.95	1.00				
(22)	Vol_2_3yr	-0.28	0.50	0.02	-0.06	0.05	0.03	0.24	0.04	0.52	0.24	-0.30	0.07	-0.17	-0.33	-0.02	-0.18	0.07	-0.16	0.10	0.96	0.92	1.00			
(23)	Vol_2_5yr	-0.30	0.52	0.03	-0.06	0.05	0.03	0.26	0.04	0.53	0.25	-0.27	0.14	-0.17	-0.34	-0.02	-0.20	0.07	-0.17	0.09	0.93	0.94	0.96	1.00		
(24)	Vol_3_3yr	-0.31	0.50	0.11	-0.12	0.11	0.05	0.28	0.08	0.53	0.26	-0.28	0.12	-0.20	-0.37	-0.05	-0.18	0.06	-0.15	0.10	0.99	0.93	0.96	0.93	1.00	
(25)	Vol_3_5yr	-0.31	0.52	0.11	-0.12	0.10	0.06	0.26	0.08	0.54	0.25	-0.36	0.04	-0.22	-0.37	-0.05	-0.20	0.05	-0.16	0.1056	0.9372	0.9824	0.9208	0.9483	0.9472	1.00

Table 7: Baseline results

Variable Name	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)		Coefficient (st. error)	
Tenure	-0,1658 (0,0225)	***	-0,1577 (0,0209)	***	-0,1414 (0,0165)	***	-0,1447 (0,0161)	***	-0,1407 (0,0171)	***	-0,1338 (0,0169)	***	-0,1427 (0,0167)	***	-0,1470 (0,0163)	***
Ln_Target	-0,0765 (0,0350)	**	0,0825 (0,0396)	**	0,0287 (0,0359)		0,0465 (0,0357)		0,0257 (0,0367)		0,0229 (0,0368)		0,0421 (0,0364)		0,0568 (0,0361)	
Subordinated	0,1813 (0,1253)		0,5687 (0,1243)	***	0,5599 (0,1120)	***	0,5277 (0,1118)	***	0,5322 (0,1107)	***	0,5262 (0,1107)	***	0,5742 (0,1108)	***	0,5627 (0,1108)	***
Hybrid	-1,4287 (0,5426)	***	-0,3176 (0,4608)		-0,1732 (0,4406)		-0,1753 (0,4388)		-0,1558 (0,4545)		-0,1990 (0,4513)		-0,0404 (0,4523)		-0,0517 (0,4510)	
Secured	0,2894 (0,1218)	**	0,0189 (0,1132)		0,5454 (0,1044)	***	0,5389 (0,1042)	***	0,6176 (0,1106)	***	0,6161 (0,1106)	***	0,6395 (0,1100)	***	0,6327 (0,1099)	***
Other_Inv	-0,6196 (0,1589)	***	-0,3966 (0,1602)	**	-0,7496 (0,1401)	***	-0,7897 (0,1404)	***	-0,7070 (0,1423)	***	-0,7510 (0,1415)	***	-0,6967 (0,1406)	***	-0,7308 (0,1411)	***
Proj_Partner	-1,0417 (0,2016)	***	-0,5255 (0,1762)	***	-0,3609 (0,1678)	**	-0,2951 (0,1722)	*	-0,4268 (0,1656)	***	-0,3082 (0,1685)	*	-0,4255 (0,1667)	**	-0,3650 (0,1713)	**
Inv_Bonus	-1,1843 (0,1951)	***	-1,0378 (0,1586)	***	-0,6623 (0,1621)	***	-0,6745 (0,1619)	***	-0,6466 (0,1601)	***	-0,6082 (0,1607)	***	-0,6378 (0,1598)	***	-0,6571 (0,1595)	***
CFP_EXP_Proj	-		0,0014 (0,0007)	**	-		-		0,0019 (0,0007)	***	0,0018 (0,0007)	***	0,0019 (0,0006)	***	0,0017 (0,0007)	**
CFP_EXP_Year	-0,1941 (0,0662)	***	-		0,0652 (0,0545)		0,0645 (0,0548)		-		-		-		-	
CFP_Add_Serv	-0,2080 (0,1016)	**	0,1870 (0,1122)	*	-0,4149 (0,0933)	***	-0,4316 (0,0937)	***	-0,2971 (0,0986)	***	-0,3070 (0,0987)	***	-0,3579 (0,0997)	***	-0,3869 (0,1006)	***
CFP_Ln_Social	0,0197 (0,0532)		0,2571 (0,0701)	***	-0,1920 (0,0508)	***	-0,1998 (0,0508)	***	-0,1831 (0,0526)	***	-0,1865 (0,0523)	***	-0,2229 (0,0525)	***	-0,2264 (0,0526)	***
CFP_Fees_Both	-0,7121 (0,1260)	***	-0,4026 (0,1384)	***	-0,5498 (0,1224)	***	-0,5502 (0,1210)	***	-0,5199 (0,1240)	***	-0,5094 (0,1227)	***	-0,5355 (0,1235)	***	-0,5364 (0,1225)	***
CFP_Loc_Inv_Only	-3,9530 (0,9722)	***	-2,4644 (0,9077)	***	-2,4304 (0,7330)	***	-2,4901 (0,7219)	***	-2,5359 (0,6634)	***	-2,6492 (0,6567)	***	-2,5529 (0,6653)	***	-2,5936 (0,6558)	***
CFP_Loc_Bor_Only	-2,0981 (0,3020)	***	-0,9173 (0,3147)	***	-1,3838 (0,2443)	***	-1,3646 (0,2429)	***	-1,3557 (0,2464)	***	-1,3128 (0,2454)	***	-1,4004 (0,2448)	***	-1,3946 (0,2437)	***
NUTS_HighTech_Employment	0,0195 (0,0234)		-		-		-		-		-		-		-	
NUTS_EU_Social_Progress	-		0,0265 (0,0137)	*	-		-		-		-		-		-	
Vol_1_3yr	-		-		-1,0064 (0,0693)	***	-		-		-		-		-	
Vol_1_5yr	-		-		-		-1,0144 (0,0719)	***	-		-		-		-	
Vol_2_3yr	-		-		-		-		-0,8094 (0,0673)	***	-		-		-	
Vol_2_5yr	-		-		-		-		-		-0,8366 (0,0668)	***	-		-	
Vol_3_3yr	-		-		-		-		-		-		-0,8837 (0,0713)	***	-	
Vol_3_5yr	-		-		-		-		-		-		-		-0,8876 (0,0737)	***
Constant	14,9436 (1,3751)	***	6,2562 (1,7665)	***	13,4710 (1,2068)	***	13,3354 (1,1984)	***	12,9424 (1,0822)	***	13,1081 (1,0825)	***	13,3219 (1,0931)	***	13,1959 (1,0870)	***
Year Dummies	yes		yes		yes		yes		yes		yes		yes		yes	
R-2 (adj)	18.09%		18.25%		23.50%		23.34%		23.09%		23.57%		23.18%		23.02%	
F-Test	26.40***		41.68***		66.27***		66.83***		63.65***		65.54***		63.34***		63.02***	
Sample Size	2316		2556		3224		3224		3224		3224		3224		3224	

Table 8: Returns and KMV estimated risk spread

Variable Name	Model 1 Coefficient (st. error)		Model 2 Coefficient (st. error)		Model 3 Coefficient (st. error)		Model 4 Coefficient (st. error)	
Spread_Risk_Neutral	-0,0009 (0,0001)	***	-0,0008 (0,0001)	***	-0,0005 (0,0001)	***	-0,0004 (0,0001)	***
Ln_Size	0,0107 (0,0093)		0,0110 (0,0105)		-		0,0176 (0,0100)	*
Maturity	-0,0331 (0,0039)	***	-0,0245 (0,0035)	***	-		-0,0040 (0,0038)	
UK	-		0,1719 (0,0344)	***	0,1645 (0,0313)	***	0,1234 (0,0335)	***
Germany	-		-0,0907 (0,0472)	*	-0,1459 (0,0484)	***	0,0200 (0,0498)	
France	-		0,0891 (0,0272)	***	0,0823 (0,0285)	***	0,0652 (0,0254)	*
Netherlands	-		-0,1251 (0,0433)	***	-0,2712 (0,0421)	***	-0,0081 (0,0436)	
Energy	-		-		-		-0,3634 (0,0327)	***
Agriculture	-		-		-		-0,0480 (0,0861)	
High-Tech	-		-		-		-0,1558 (0,0471)	***
Services	-		-		-		-0,0370 (0,0212)	*
Industrial	-		-		-		-0,0168 (0,0289)	
Manufacturer	-		-		-		0,0881 (0,0376)	**
Constant	1,9745 (0,1028)	***	1,8836 (0,1172)	***	1,9035 (0,0268)	***	1,8231 (0,1112)	***
Year Dummies	no		no		no		no	
R-2 (adj)	14.80%		21.67%		15.91%		37.27%	
F-Test	30.28***		40.14***		38.76***		41.71***	
Sample Size	773		773		773		773	