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**DETERMINANTS OF INTEREST RATE OF PEER-TO-PEER BUSINESS LOANS**

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Abstract			
<p>The purpose of this thesis is to examine the determinants of interest rate in peer-to-peer business loans. The peer-to-peer lending is a novel business area and it is an alternative for either as an investment or as a way to raise funding. From both, the investor's and the fund raiser's perspective it is important to know how the interest rate is determined on the loans. Also the information offered on peer-to-peer business loans is evaluated from the perspective of screening the loans based on the fund raiser's quality.</p> <p>The tested variables are the length of the loan period, the amount of capital raised, the credit score and the delays of the repayment. Additionally the effect of the maturity of the business is tested between four time periods. The sample data is from two online platforms offering peer-to-peer business loans at Finnish markets. These platforms are Fundu and Yrityslainat.fi.</p> <p>The length of the loan period and the credit score are statistically significant determinants of the interest rate. Both the length of the loan period and the credit score have a negative relation to interest rate. So longer the loan period is and higher the credit score, the lower is the interest rate. Also the interest rates decreases when the business matures. The available information of fund raisers varies between platforms. This information has been used effectively to screen loans in case of consumer loans.</p>			
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Additional information			

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## 1 INTRODUCTION

The purpose of this paper is to study peer-to-peer business lending offered at Finnish markets. Peer-to-peer business lending means that any private person or company can lend money to businesses through a web-based platform. Idea of peer-to-peer lending is old, but the internet has made it more effective. Much larger group of people can be reached through web-based platform and it is economically profitable to participate in these loans with much smaller investments than through traditional intermediaries (Belleflamme, Lambert & Schwienbacher 2013). The distance between the target and the source of finance has on average grown due to the internet so the market area has expanded as well (Agrawal, Catalini & Goldfarb 2015)

Peer-to-peer business lending is attractive from both, the borrower's and lender's perspective. It is more easily accessible to businesses needing financing than traditional bank loans. It also offers greater returns to lenders than other fixed income products. So there is demand and supply for peer-to-peer business lending. Since there seems to be higher returns, there should be also higher risk as the traditional financial theory describes (see e.g. Cochrane 2007). One contributor leveraging the risk is the Finnish taxation policy, which prohibits the deduction of losses of private persons from the winnings at the moment (Finnish Tax Administration 2015).

According to Robb and Robinson (2014) bank loans are new businesses main financing source. Since the financial crisis banks have stricter policies for lending money and thus businesses have to search for alternative financing sources (Belleflamme & Lambert 2014a). Private equity is rarely available to starting businesses (Berger & Udell 1998; Robb & Robinson 2014). Although Finland has many public funding programs for new businesses, the programs usually require some own capital of the firm. Peer-to-peer business lending and other types of crowdfunding offer a solution to this financial gap. This effects whole economy how starting businesses can acquire financing (Mollick 2014, Kaya 2014).

Over all, the crowdfunding is growing fast and it is offering quite attractive returns. For example Guo, Zhou, Luo, Liu and Xiong (2016) get 6.17% average return annu-

ally with 1.9 Sharpe ratio for peer-to-peer loans intermediated through Lending Club. Since the industry is growing fast there is public interest to provide competitive environment for the industry to grow and on the other hand interest to protect investors. For these reasons Ministry of Finance is preparing a proposal of a Crowdfunding Act (VM0124:00/2013) for the Finnish Parliament as a new regulation concerning crowdfunding. The proposal is considered to be submitted to the Parliament at the spring of 2016. This study considers the possible effects of the draft Crowdfunding Act to peer-to-peer business lending. Although there still can be certain changes to the final Act due to the statements from the consultation round.

Web-based peer-to-peer business lending is fairly recent phenomenon and there is not much prior research done at this area. As mentioned earlier the idea of peer-to-peer lending is old and as such it has been studied before (Belleflamme, Lambert & Schwienbacher 2014b). Earlier there were no web-based intermediaries, which have brought new aspects to the subject and a possibility for much larger financing rounds. The studies done so far on the subject concentrate on the loans targeted to private persons not on businesses and there has not been published any studies done on the Finnish markets.

In this thesis, I study the peer-to-peer business lending by analyzing the data obtained from Finnish companies intermediating peer-to-peer business loans. Because the sample size is quite small due to the fairly short period of time the companies have been active, I also analyze the information available to investors. This means comparing between different platforms the terms and information the platforms present to the potential investors. This information can be then used to evaluate the risks and returns of peer-to-peer loans.

The results of this thesis suggest that the length of the loan period and the credit score of the fund raiser are statistically significant determinants of the interest rate of peer-to-peer business loans. The information provided of the fund raisers vary between platforms intermediating these loans. Also there are differences in the terms of the loans between platforms like in fees and repayment structure, which affect the returns and the risks of the loans. So it can be beneficial for the investor to screen the platforms, besides the fund raisers, that suit the investor's purposes best.

This thesis is structured in the following way. In the second chapter I define crowdfunding and explain its economic role in a larger context. In the third chapter is described peer-to-peer business lending. The fourth chapter describes the setting of the empirical study and the fifth presents the results. The sixth chapter concludes.

## 2 CROWDFUNDING

### 2.1 Definition and economic impact

Peer-to-peer business lending is a sub category of crowdfunding. Legally crowdfunding is not yet defined in Finland and the draft Crowdfunding Act defines only the sub categories, peer-to-peer business lending and equity-based crowdfunding. Academically Belleflamme, Lambert and Schwienbacher (2014b) define crowdfunding to be an open call for finance either as a donation or as an exchange for a future product or a reward. They see crowdfunding as a part of the broader concept of crowdsourcing, which means obtaining ideas, solutions and feedback from the general public i.e. the crowd.

According to Larralde and Schwienbacher (2010) the financial resources are gathered mostly through the internet and from a group of individuals, not from professional investors like banks or venture capital funds. Entrepreneurs and projects can establish their own individual crowdfunding practices, but mostly funds are raised through web-based platforms like Kickstarter, Indiegogo, FundedByMe and Fundu (Belleflamme et al. 2013). These platforms work as intermediaries between entrepreneurs and funders.

Crowdfunding's economic size at the industry level is expected to be more than 30 billion US dollars in 2015 as a raised funding (Massolution 2015). In Europe alternative financing, which consists mainly of crowdfunding, has grown 144 percent from 2013 to 2014. Transaction volume of the online alternative financing was almost three billion euros during 2014 in Europe. In Nordic countries average growth rate for the last three years has been 115 percent. The total amount raised for the same period has been 254 million euros. (Wardrop, Zhang, Rau and Gray 2015) Estimates for the size of peer-to-peer lending are around 9 to 11 billion US dollars total loan value in 2014. This number does not include peer-to-peer loans originated in China, since there has been very rapid growth there. Besides the estimates for China are not very accurate, since the number includes some of the loans intermediated offline in nature of closely resembling normal banking. The estimates are around almost 35 billion US dollars for China in total loan value. (Aveni 2015; Massolution)

Comparing to other sources of financing of small and medium sized enterprises (SMEs), which are the main users of crowdfunding, the role of crowdfunding is still marginal. (OECD 2015; Kraemer-Eis, Lang & Gvetadze 2015) In the long run though for example Morse (2015) sees that peer-to-peer lending as a subcategory of crowdfunding can grow to such proportions that it will disrupt the conventional bank intermediated lending. Others have had similar views that these online intermediated crowdfunding services can affect the competitive situation of financing (Jeffery & Arnold 2014).

## **2.2 Categories of crowdfunding**

Crowdfunding is divided into four sub categories in the argumentation of the draft Crowdfunding Act. These categories are donation-based crowdfunding, rewards-based or presales crowdfunding, peer-to-peer consumer/business lending (also used the term crowd lending) and equity-based crowdfunding. In academic research the same sub categories have been used with the exception that usually peer-to-peer consumer lending and peer-to-peer business lending are considered differently as an own type of crowdfunding (Wardrop et al 2015; Belleflamme et al. 2014b; Belleflamme and Lambert 2014a).

Donation-based crowdfunding means that a group of funders donates money to a project without receiving any direct compensation (Kim, Newberry and Qiu 2015). Belleflamme et al. (2014a) see that the funders receive community benefits or social benefits, like funders' names are announced in conjunction to the project. There are two main methods of donation-based crowdfunding. One is all-or-nothing, which sets a certain threshold to be achieved for the target project to get any funding. If the threshold is not achieved the funding round is cancelled. The other one is take-it-all, which means that any money donated goes to the project.

Kim et al. (2015) discuss in more detail about the benefits of each method. All-or-nothing works as a signal of the quality of the project. The fund raiser is so sure about his project that he perceives the risk of not getting the required amount so small that he is willing to take it. Also the risk that the project does not get realized due to underfunding is smaller. The funders get refunded if the required amount is

not reached and the risk is smaller compared to take-it-all model, where the funds are given to the project even though there might not be enough funds to complete the project. On the other hand Kim et al. (2015) find that the project quality is 24% greater in take-it-all funding rounds. They do not yet explain in their working paper what the reason is for this in their opinion, but their results also show that the success rate for funding round is smaller for take-it-all rounds. This could mean that screening of the projects is stricter for take-it-all rounds and thus better quality projects get funded. Some peer-to-peer lending platforms offer also this kind of option to choose to use either take-it-all or all-or-nothing approach.

Rewards-based crowdfunding is an exchange, where funders give money to a project or an entrepreneur to receive in the future some product or service (Belleflamme et al. 2013; Ellman and Hurkens 2014). Two of the most well-known rewards-based platforms are IndieGoGo and Kickstarter. There are several studies done concentrating on data achieved from these platforms (see, for instance Mollick 2013; Cumming, Leboeuf and Schwienbacher 2015; Kim et al. 2015)

Equity-based or profit-sharing crowdfunding is that funders finance an entrepreneur or a project in hope of share of the future profits (Belleflamme et al. 2014a). This crowdfunding mechanism reminds mostly stock markets or more precisely IPO without secondary markets. In many jurisdictions equity-based crowdfunding is restricted so that the securities showing the ownership of the profits cannot be tradable or much stricter policies will become applicable. For example in European Union MiFID I (Markets in Financial Instruments Directive I 2004/39/EC) regulations become applicable, although some Member States have made optional exemptions at the implementation of the directive according to the article 3 of the directive.

The last type of crowdfunding is peer-to-peer lending. Peer-to-peer lending can take place between consumers or between consumers and businesses (Belleflamme, Omrani and Peitz 2015). The former is called peer-to-peer consumer lending and the latter peer-to-peer business lending, which is the subject of this study. Many platforms have specialized to another of these lending types, but some offer both. In some instances academics have started to use term marketplace lending, when talk-

ing about peer-to-peer lending, since it is not anymore happening purely between peers (Morse 2015; Aveni 2015)

### **2.3 Crowdfunding's role in entrepreneurial finance**

#### **2.3.1 Capital constraints**

Crowdfunding can alleviate SMEs capital constraints. In the European Central Bank's (ECB) Survey on the Access to Finance of Enterprises in the euro area (2014 & 2015), which is conducted semiannually, SMEs have reported to have problems with access to finance during the period of April to September 2014, although there have been improvements during the October 2014 to March 2015. These problems of accessing finance are mainly due to the strict lending policies of banks. Bank loans are the main source of finance of SMEs (Robb & Robinson 2012; Kraemer-Eis et al. 2015; Cassar 2004)

SMEs access to finance has been one of the main concerns of the ECB and the European commission (EC). This has been the situation, since the financial crisis of 2008. The levels of bank loans to SMEs have not yet recovered to the levels of pre-crisis. Also the cost of bank loans has increased substantially. These problems have exacerbated in the cohesion countries due to the sovereign debt crisis. (Kaya 2014) The EC sees crowdfunding as one of the solutions to these financing problems and thus has requested opinions from different EU institutions to develop crowdfunding industry.

Cassar (2004) found in his study done on business start-ups that the main source of financing for start-ups was the bank loans and the proportion of the start-ups financing coming from banks increased when the start-ups size increased. He also found that start-ups with less tangible assets had more difficulty to get bank financing and those start-ups had to search for other financing sources. These results implicate that there is a need for more accessible financing sources for start-ups.

In case of peer-to-peer consumer loans Komarova, Loureiro and Gonzalez (2015) have shown that peer-to-peer lending offers opportunities to receive loans to those

who would be excluded from traditional bank loans. This same type of inclusion can be expected from peer-to-peer business loans also in case of SMEs (Aveni 2015). Also Borello, De Crescenzo and Pichler (2015) stated in their study that crowdfunding can be an alternative funding source for start-ups and SMEs.

### 2.3.2 Agency problems

In crowdfunding there is bigger information asymmetry compared to more traditional financing for many reasons. Depending on the intermediary the information given on the fund raisers varies. Some platforms offer very detailed description of the fund raiser and could have even provided credit classification status. On some platforms the fund raisers remain anonymous and the information provided is very obscure.

Since the funds are raised and intermediated via online based platforms, the geographical distance between the fund raiser and the funder has increased. Although there is home bias, which means that funders are more likely to fund projects and enterprises near their location, this increased distance creates more asymmetric information, especially between local and distant funders. (Agrawal et al. 2015)

When the number of funders increases, individual funder's incentives and abilities to monitor and control the funded target diminishes. Also the amount of money given to single fund raiser can be so small that it is not profitable to perform proper due diligence before the investment decision. (cf. transaction-oriented banking) This information asymmetry causes adverse selection and moral hazard. (Tirole 2006; Ross, Westerfield & Jaffe 2002) It has been shown that peer-to-peer loan markets attracts fund raisers, who do not get funding from more traditional markets (Freedman & Jin 2011). But also in the same study there is evidence that the quality of the fund raisers has increased, when the market has evolved and matured.

### 2.3.3 Overinvestment

Partly for the same reasons there is adverse selection and moral hazard problems in crowdfunding there can be overinvesting. According to de Meza (2002) asymmetric

information can cause overinvesting, if funding to start businesses are too easily available.

This could happen in crowdfunding, since investors seem to value fund raisers based on the money they have received before the investment decision. Those fund raisers that have received more money earlier during the fund raising period can raise more funds than those who have received same amount later. (Li 2014) This leads to a cycle, where successful fund raising campaigns gather more funds, because funders base their investment decision on the quality of the fund raiser perceived from the behavior of other funders. Zhang and Liu (2012) find this behavior called herding in peer-to-peer loan markets, but they also show that the herding can happen rationally. Herzenstein, Dholakia and Andrews (2011) define herding as increased probability to bid in auctions with more existing bids. In other words funders follow what others have done. Funders just do not passively follow other's investment decisions, but they moderate their investment decisions with other fund raiser characteristics (Herzenstein et al.). However this does not eliminate the propensity to overinvest. The other character of peer-to-peer loans possible leading to overinvestment is that fund raiser can have multiple fund raising campaigns going on at different platforms.

#### **2.4 Platforms as two-sided markets**

Crowdfunding platforms offer services to the both sides of the market, the funders and the fund raisers. Belleflamme et al. (2015) argue that crowdfunding platforms have created markets which did not exist before. Crowdfunding has raised such individuals' interest to investing, who did not invest before. Social networking and crowdsourcing have familiarized crowdfunding to larger public and have even made it a trend. Also investing to private companies and projects has come available to larger public by requiring less capital to be invested. So Belleflamme's et al. argument that crowdfunding platforms have created new markets is reasonable, although the markets for investing and fundraising have existed before. Online platforms have created a novel mechanism for the fundraising and thus broadened the markets to new customers.

From the fundraisers' standpoint crowdfunding offers a new way to gather financing with different conditions than before. Much smaller enterprises and projects can raise equity capital, since the costs of raising funds via online platforms are small proportion compared to the costs of e.g. public listing. Also the other constraints to raise capital are diminished. For example peer-to-peer loans do not require collaterals compared to usual bank loans. These lower requirements of fund raising can alleviate firms' capital constraints, but they can also lead to abusive behavior (Hildebrand et al. 2014). On the other hand because the platforms serve the both sides of the market, they have an incentive to prevent abusive behavior. Competition among the platforms forces the platforms to self-regulate the market to preserve good reputation. (Belleflamme & Lambert 2014a)

As the crowdfunding platforms work as two-sided markets they can charge asymmetric fees. Funders do not pay fees at all or the fees are much smaller compared to fundraisers fees. Because each market side requires the other's participation, the intermediary creates a positive feedback cycle by giving the other side financial benefit to participate into the market. (Belleflamme & Lambert 2014a)

## **2.5 Legal framework of crowdfunding**

In the current legal environment crowdfunding is not particularly regulated by any means comprehensively. It is determined case-by-case, which regulations are applicable. Institutions responsible for constituting new regulations have noticed this. They are crafting new regulations considering the possible benefits to whole economy.

### **2.5.1 Development at major crowdfunding markets**

The United States of America was one of the first to introduce comprehensive regulations concerning crowdfunding. This statute is called The Jumpstart of Our Business Startups Act (JOBS Act). Title three of the JOBS Act is called Crowdfund act and it concerns investment-based crowdfunding. The United States Securities and Exchange Commission (SEC) has adopted rules to implement the Crowdfund Act on October 30, 2015. The Crowdfund Act defines exemption for the securities to be sold

through crowdfunding. There has been critiquing for the exemption, since the increased possibility for securities fraud (Griffin 2013; Burkett 2011).

There are several limits to the exemption. Section 302 for example limits the capital raised through crowdfunding to aggregate amount of \$1 million per single 12-month period. Also a single investor can invest maximum \$2000 or five percent of annual income or net worth per twelve months if investor's annual income or net worth is less than \$100 000. These example provisions show that crowdfunding is targeted to small companies and to small scale investing.

In Europe there has been given several opinions and guides how to apply the existing legal framework to crowdfunding, since the existing rules has not been designed to take into account all the aspects that crowdfunding offers. The European Securities and Markets Authority (ESMA) has given an opinion (ESMA/2014/1378) about investment-based crowdfunding. The European Banking Authority (EBA) has given an opinion on lending-based crowdfunding (EBA/Op/2015/03). The European Commission has published a guide *Crowdfunding Explained – A guide for small and medium enterprises on crowdfunding and how to use it* (2015). The guide is more hands on approach how to acquire capital through crowdfunding and does not include explanations about the legal framework.

The EBA's opinion on lending-based crowdfunding i.e. peer-to-peer lending scrutinizes the existing EU directives and regulations, examining their applicability to peer-to-peer lending. EBA finds the Payment Services Directive (2007/64/EC), the Electronic Money Directive (2009/110/EC) and the Anti-Money Laundering Directive (2005/60/EC) as the most applicable to peer-to-peer lending. As a noticeable fact EBA does not find the Consumer Credit Directive (2008/48/EC) applicable to peer-to-peer lending, since the crowdfunding platforms does not borrow or lend money themselves, but work as an intermediary link between the lenders and borrowers (EBA/Op/2015/03).

The EBA sees the Payment Services Directive as the most applicable to peer-to-peer lending, since the crowdfunding platforms are handling payments at some point of the crowdfunding transaction. Additionally, the EBA sees a need for clarifications

from the EU legislators for the convergence of the practices, to create equal opportunities for the industry to grow across the EU member states. The convergence would be especially important, since as an internet-based industry crowdfunding has wide cross-border possibilities. (EBA/Op/2015/03)

In Finland authorities, the Consumer Ombudsman and the Court of Appeal of Rovaniemi, have come to a different conclusion than the EBA's opinion that peer-to-peer lending is not consumer credit. In several cases either the Ombudsman or the Court of Appeal has ruled peer-to-peer lending platforms to be consumer creditors rather than just intermediaries (KKV/2409/14.08.01.05/2014; RHO S14/804). The matter is still pending, since the Supreme Court (S/2915) has asked a precedent from the Court of Justice of the European Union.

The above ruling concerns platforms offering capital to consumers. In case of peer-to-peer business lending same rules do not apply, since businesses are not protected by consumer law. Finland's Financial Supervisory Authority has stated in an announcement (FSA 9/2014) that if the operations does not require permission, they do not supervise these actions and at the moment peer-to-peer business lending does not require any permissions.

As we can see the legal framework around crowdfunding is diversified and obscured, especially across borders. At the very end the rules concerning peer-to-peer business lending are contract laws and particularly the contracts made between lenders, borrowers and the platforms. For the above reasons Ministry of Finance has made a draft Crowdfunding Act to boost the industry and create clearer legal environment for cross-border competition.

### 2.5.2 The draft Finnish Crowdfunding Act

The aim of the Finnish Crowdfunding Act is to support the development of national crowdfunding business and offer an alternative funding source to start-ups and other small enterprises by clarifying the legal environment of crowdfunding (VM0124:00/2013). The Act tries to balance between investor protection and enabling the industry line to develop. This means certain requirements for the companies

offering crowdfunding, but still avoiding restricting the Finnish crowdfunding companies' competitive position compared to foreign companies. Hornuf and Schwienbacher (2015) found that the optimal level of regulation depends on how much funding there is available from other sources as venture capital or angel finance. So to find the balance between investor protection and nonrestrictive competitive environment can be based on this criterion.

In the proposal it is said that the Crowdfunding Act is meant to be a short term solution, since the preparation committee expects EU-level regulation to be set in the near future. This is in line with the other European countries' expectations (Financial Conduct Authority UK 2013). Also crowdfunding is developing so fast that it might be necessary to reform the now proposed rules to cover problem areas that rise when the crowdfunding business procedures matures (Rosenblum, Gault-Brown & Caiazza 2015).

In the proposed form the Act would be applied to loan- and investment-based crowdfunding, it specifically excludes donations and loans, where the borrower is customer (1:1 §). The Act would concern peer-to-peer business lending. The key terms of crowdfunding, which are not defined in the current legal environment, would be defined in the Act. Peer-to-peer lending is defined as professionally intermediating loans for compensation (1:2.1 §). Intermediator of crowdfunding, in practical terms crowdfunding platform, is defined as an enterprise, which is not investment firm, who offers solely the intermediation of investments or investment advices (1:2.3 §). The fund raiser is defined as an enterprise or other organization, which is not a listed company, raising funds through crowdfunding (1:2.4 §). Mostly these definitions are given to clarify the applicability of different acts like Investment Services Act (747/2012) and Securities Markets Act (746/2012) and especially the applicability of the proposed Crowdfunding Act.

The enterprises intermediating crowdfunding would be required to register to the Finnish FSA. Companies registered for other purposes, like investment and payment services companies, would not need to register again for intermediating crowdfunding. (2:3 §) Several of the requirements set for the intermediary of crowdfunding refer to the requirements set in the Investment Services Act, so the requirements are

same as for other investment companies. The fund raiser is not required to provide prospectus, if the funds raised do not exceed 3.5 million euros during a twelve-month period (3:11.4 §). This would mean increase of one million to the current limit.

The proposed Act would make it mandatory for the intermediary of crowdfunding to be a part of a Finnish self-regulatory organization or to follow the recommendations given by the organization, or to explain, why it has not followed the recommendations (5:17.1 §). This is a principal called *comply or explain*, which is widely used in corporate governance codes. Self-regulation would be beneficial for this type of quickly developing business area as Belleflamme and Lambert (2014a) have suggested. By self-regulation the companies could be able react faster to changing situations. Additionally, crowdfunding companies have incentive to protect the both sides of the two-sided market by self-regulation, since they get the benefit of the increased funds intermediated via their platforms. When the fund raisers and the funders are treated equally, they are more likely to use crowdfunding.

In the general reasoning of the proposal for the Crowdfunding Act it is said that crowdfunding does not suit the purposes of the professional investors, because the costs of the screening the fund raisers exceed the profits of crowdfunding. If this statement is true, crowdfunding could be lucrative investment opportunity to small investors due to the lack of interest from professional competitors. On the contrary, a survey done by Richards, Kibbe and Orbe (2015) found that institutional and other professional investors have already invested in peer-to-peer loans and these investors are more and more interested to invest.

Since it is expected that most of the investors using crowdfunding are non-professionals, the Act emphasizes the service providers' responsibility to ensure that the investors understand the risks related specially to crowdfunding. Besides increasing the investor protection, the proposed Act would implement the MIFID I article 3 exemption from the requirement of licensing a business of investment-based crowdfunding. The licensing would be a heavier procedure than the registration. Due to this exemption and the fairly light requirements for the intermediary of crowdfunding as described earlier, the proposed Act should clear the legal position of crowdfunding businesses and allow national companies to compete with foreign ones.

The Act would seem to achieve its goals to increase the investor protection and still not increase the crowdfunding companies' responsibilities unreasonable amount. A good point to clarify could be the tax situation of peer-to-peer loans, since the uncertainty concerning the deduction of losses in taxation diminishes the attractiveness of peer-to-peer loans from the private investor's standpoint. Although taxation is regulated in own acts, the tax provision concerning peer-to-peer loans could be done in conjunction with the Crowdfunding Act.

### 3 PEER-TO-PEER BUSINESS LENDING

#### 3.1 Finnish platforms

At the moment there are three online platforms offering peer-to-peer business lending. Those are Fundu Oy, Vauraus Suomi Oy and Invesdor Oy. Fundu intermediates mainly bridge loans to government backed projects. For example Tekes, a Finnish funding agency, grants a loan to a project with the condition of certain amount of own capital, which is gathered through Fundu's platform. Fundu was founded 2014. It does not charge any fees from investors. Borrowers pay an origination fee, which size depends on the loan amount and the term length. Minimum investable amount is 100€ and there is no maximum limit. Interest rates vary from 6.0% to 12.0% and loan terms are fairly short, from few months to a year.

Vauraus Suomi Oy has a platform called Yrityslainat.fi, in English firmloans, which intermediates loans with much broader spectrum than Fundu. The company was founded 2011. In Yrityslainat.fi –platform fund seekers remain anonymous. There is a five star credit rating system to evaluate the riskiness of loans. Companies can loan starting from 2.000€ and the maximum amount depends on the borrowers capacity to repay the loan. Terms range from 6 months to 5 years. Interest rates start from 4.0%. Investors pay 3.0% underwriting fee of under 10.000€ investments and otherwise 2.0%. There is also an annual 0.5% management fee. Minimum investable amount is 10€.

Invesdor Oy intermediates both loans and equity investments on the same platform. It is part of the Nordic Crowdfunding Alliance. Invesdor has intermediated only two peer-to-peer loans, which tells about the novelty of the business. Invesdor does not charge any fees from investors except small transaction fee. Minimum investable amount is 20€. Borrowers pay an initial offering fee of 500€ and then 6.0% (minimum is 6.000€) of the raised funds. Closing fee is 500€. There is also 5€/investor payment to investor compensation fund and annual 0.5% (minimum is 2.500€) handling fee. Investors can decide at what interest rate they are ready to loan for the borrowers.

### 3.2 Some foreign platforms

Prosper (Prosper Marketplace Inc.) was the first peer-to-peer lending platform in the United States. The company was founded 2005 and started its business 2006. It intermediates both customer and business loans, although all the loans are given as personal loans. The loans range from \$2000 to \$35,000 for a term of 3 or 5 years. The interest rates range from 5.99% to 36% per annum. The minimum amount to be invested is \$25 and the maximum amount depends on the applicable state law and the wealth of the individual investor. The investors are charged 1% annual loan servicing fee and the borrowers pay closing fees based on their credit rating ranging from 0.50% to 4.95%. Prosper gives all the historical performance data of the loans and some tools for the investors for analyzing the data. This is partly due to the ruling of Securities and Exchange Commission (SEC) that all the loans must be registered as promissory notes.

Since Prosper has existed longest of the peer-to-peer lending platforms in US and its historical loan performance data is available to all, there has been done many studies about peer-to-peer lending based on its data (see e.g. Hildebrand, Puri & Rocholl 2014; Duarte, Siegel & Young 2012; Zhang & Liu 2012). The development of different policies in peer-to-peer lending on the Prosper platform has made it especially fruitful for different empirical study settings. For example there were a reward based system for promoting the funding of loans at the early stages of the development, but it was cancelled due to perverse use of it (Hildebrand et al. 2014).

Lending Club is also a US platform offering both personal and business loans. The company was founded 2007. It is the largest peer-to-peer lending platform in the world by the amount of loans funded, which is over \$13.4 billion as of 30<sup>th</sup> September 2015. Personal loan amounts range from \$1000 to \$35,000 and business loans range from \$15,000 to \$300,000. The annual interest rates are 5.9%-25.9% and there is an origination fee of 0.99%-6.99%. According to the company policy for business loans the lower the risk of non-payment, the lower the rates for the loan. Investors pay 1% of the repayments. Loan terms are 3 years or 5 years. Minimum amount invested is \$25 and maximum amount varies like with Prosper. Lending Club listed to New York Stock Exchange in December 2014.

Upstart is another US platform offering personal peer-to-peer loans. It was founded 2012 and it tries to beat the competing platforms by offering loans with lower interest rates on average. It grades the borrowers among the traditional grading methods by the borrower's education, area of study and work experience. The loan amounts range from \$3.000 to \$35.000. Minimum investable amount is \$100. Terms are similar to other US platforms, 3 and 5 years. The interest rates range from 4.66% to 29.99% per annum and there is an origination fee of 1% to 6% depending on the credit grading, but Upstart does not charge investors any service fees.

Funding Circle is a UK based company founded in 2010. It offers solely peer-to-peer business loans to UK and US markets and few other European countries. It offers £5,000 to £1 million loans with interest rates ranging from 5.49% to 22.79%. Terms range from 6 months to 5 years. They also charge an origination fee of 0.99% to 4.99%. Investors are charged with 1% annual servicing fee. Funding Circle also has secondary markets for the loans and the sale fee is 0.25%. The minimum amount to be invested is £20 and there is no maximum amount, although this can vary depending on the jurisdiction.

In Table 1 is presented the summary of the conditions of the Finnish and the foreign platforms. There is substantial variance in these conditions. For example the length of the loan period can vary from few months to six years or the investor's fees range from none to 3%. Both an investor and a fund raiser can benefit from choosing the platform, which have the most advantageous conditions for their purposes.

**Table 1: Summary of Peer-to-Peer Lending Platforms**

	Interest rates	Term length	Borrower's fees	Investor's fees	Minimum investable amount
	Per annum	Years			
<b>Finnish platforms</b>					
Fundu	6.00%-12.00%	0.25-1.0	origination fee	no fees	100 €
Yrityslainat.fi	4.00 %->	0.5-5.0	5.0%+annual 1.0%	3.0%/2.0%+0.5%	10 €
Invesdor	0.00 %->	0.5-6.0	6.0%+annual 0.5%	no fees	20 €
<b>Foreign platforms</b>					
Prosper	5.99%-36.00%	3 or 5	0.5%-4.95%	1% annually	25 \$
Lending Club	5.90%-25.90%	3 or 5	0.99%-6.99%	1.0%	25 \$
Upstart	4.66%-29.99%	3 or 5	1.0%-6.0%	no fees	100 \$
Funding Circle	5.49%-22.79%	0.5-5.0	0.99%-4.99%	1% annually	20 £

This table is constructed on information obtained on 2015/12/11.

### **3.3 Development of online peer-to-peer lending mechanisms**

Even though the peer-to-peer lending has existed online short period of time it has already evolved. From the beginning of the business till 2008 the interest rate of the loans was determined in an auction, where the funders were able to offer the funding on certain interest rate under or on the limit the fund raiser had set. After the auction closed the offers with lowest interest rates were accepted until the target capital amount was reached. In 2008 the system changed so that the platforms started to determine a fixed interest rate. This was mainly due to the regulatory interception happening in USA, although the practice spread to other markets too (Slattery 2013).

Also at the beginning of online peer-to-peer lending there were a group reward system, where the group and especially the group leaders promoted certain loans. The group leaders were rewarded for the fund they were able to raise by their promotion. The purpose of this mechanism was to diminish the information asymmetry. The group leaders were supposed to screen the fund raisers, and thus investing in loans promoted by some group was supposed to be less risky. The group system has been studied in many occasions and the quite opposite was found. Hildebrand et al. (2014) found out that, group leaders promoted riskier loans to gather more rewards. Also Everett (2015) found out that the default rate was positively related to group memberships. From the fund raiser's point of view Berger and Gleisner (2009) found out that belonging to a group reduced the loan spread. Partly for abusive behavior of the group leaders the platforms canceled the reward system for the group leaders (Berger & Gleisner).

The information provided by the platforms of the fund raisers has changed over the time. April 2014 Lending Club restricted data availability and Prosper made the same restriction January 2015 (Renton 2015). There is still historical data available, but it is not as current as before the change. This many developments in relatively short period of time suggest that the peer-to-peer lending mechanisms continue to evolve.

### **3.4 Peer-to-peer lending contracts**

The nature of the contract emerging between a fundraiser and a funder depends on how the actual loan is determined. This can vary between platforms. In some cases there are not any direct contract between the fundraiser and the funder. A platform has as an intermediary standard terms for using its services. These terms create the obligations between the parties, the fundraiser and the funder. The obligations between the parties enter into force in most cases when the fund raiser acquires the funds. These terms effect what type of contract there has emerged between the parties.

In US the peer-to-peer loans are required to be in form of promissory notes. The promissory note is the primary contract showing the obligation to pay the loan back. Additionally both parties enter into several legal agreements when using services offered. These agreements concern mainly the relationship between the platform and the user, either the fundraiser or the funder.

The legislation requires certain features for the contracts or the terms of peer-to-peer loans, but there is variation among the platforms how they implement these rules. These additional features can work as competitive edge between platforms and thus it pays for fundraisers and funders to pick such platforms, which offers most favorable terms. Even some type of covenants could be implemented to these contracts, although there are certain problems due to the nature of crowdfunding e.g. who would supervise these covenants. Individual crowd funder might not have large enough stake in a certain enterprise or project that it would be financially feasible to monitor the compliance of the covenants.

### **3.5 Peer-to-peer loans as fixed income instruments**

Peer-to-peer loans are fixed income instruments. Fixed income instrument means that the return of the investment is known ex ante. The most traditional fixed income instrument is bond. Peer-to-peer loans can be divided into two fixed income categories depending on how the repayments are done. The repayments can be made as a one payment at the maturity date. This can be seen as a bullet loan. Or the repayments

can be made in several small payments, usually monthly. These can be seen as coupon payments.

Since the return of the peer-to-peer loans is fixed, the risks of the loans are to certain extent different than equity investments' risks. One major thing affecting the risks of peer-to-peer business loans is the absence of secondary markets. Some foreign platforms (e.g. Prosper and Lending Club) have created secondary markets for their loans, but in Finland there is not any for the business loans, due to the more strict legal demands of transferable securities as discussed earlier. Here is explained the different risks of fixed income instruments and how they relate to peer-to-peer loans.

Fixed income instruments contain interest-rate risk, also called market risk. Interest-rate risk is caused by the change of interest rates, which affects the value of particular fixed income security. (Dattatreya & Fabozzi 2005) If the peer-to-peer loans do not have secondary markets, the interest-rate risk is not a concern, since the loans cannot be sold before maturity.

The opposing risk of interest-rate risk is reinvestment risk. Reinvestment risk means that the payments received from a fixed income instrument are reinvested and the change of market rates affects the value of the reinvestments. Reinvestment risk and interest-rate risk are opposing, since they behave oppositely to the changes of interest rates. (Dattatreya & Fabozzi 2005) The reinvestment risk does not affect peer-to-peer loans with one repayment (Fundu), but loans with multiple repayments (Yrityslainat, Prosper and Lending Club).

The timing, or call, risk is the risk of early repayment. The issuer of the particular fixed income security may pay the loan back in a whole or partly, if it is allowed in the loan terms. This causes unforeseeable cash flows and exposes to reinvestment risk. (Dattatreya & Fabozzi 2005) In peer-to-peer loans the usual practice is to allow early repayment.

The most commonly related risk of fixed income instruments is the credit risk, which can be divided into default risk and downgrading risk. Default risk is that the issuer of a security will default. The downgrading risk is that the securities value will fall

due to the perceived rise in the risk of default. (Dattatreya & Fabozzi 2005) The former risk can be seen as the most prevalent risk of peer-to-peer loans, since the businesses searching financing through crowdfunding are usually small and emerging. Also the evaluation of the default risk is difficult due the limited information of the borrowers. The practice is that the platforms offer a credit rating for the fundraiser, but these ratings are not comparable with one's done by rating agencies. That is why there is no substantial downgrading risk in peer-to-peer loans. If there are secondary markets, the value of a loan can decrease due to information of increased default risk.

Yield-curve risk is the deviation from the expectations of how interest rates behave on different maturities (Dattatreya & Fabozzi 2005). This is not a relevant risk for peer-to-peer investor. Inflation risk is the risk that the value of fixed income instrument changes due to inflation (Dattatreya & Fabozzi). This is a relevant risk for peer-to-peer investor, since the interest rate of peer-to-peer loans is fixed. If the inflation rate increases, the value of the loans cash flows decreases.

Another prominent risk of peer-to-peer loans is the liquidity risk, since there are no organized secondary markets or the secondary markets are platform specific. Due to these the bid-ask spreads and costs of selling the loan can be substantial. To those investors who hold the loan till maturity date the liquidity risk does not actualize. Exchange-rate risk concerns investments made in foreign currency. Since the peer-to-peer loan markets are mostly national for the time being, there is no direct exchange-rate risk. By indirectly the exchange-risk can affect the borrowers default risk, if it has exposure to exchange-rate risk via business operations.

Since there are ongoing legislation projects concerning crowdfunding at national- and EU-level, there is legal risk concerning peer-to-peer loans. This legal environment of crowdfunding was explained earlier in the paper and the particular legal risk concerning the taxation of peer-to-peer loans is explained later in this chapter. There are still some other risks of fixed-income instruments, but since they are not very relevant to peer-to-peer loans, they are not covered here.

There is one more risk to peer-to-peer loans that is not very relevant to traditional fixed income instruments. That is what happens when the platform intermediating

the loans goes bankrupt. (Aveni 2015) This can be expected, when the competition of customers increases between existing platforms and new ones entering the business. How this risk affects the investor depends how the contracts are done between the borrower and the lender. At least, the collecting of the repayments is more complicated in case of a platform's bankruptcy and it will cause additional costs.

### **3.6 Peer-to-peer loans as alternative investments**

The Cambridge Judge Business School's Centre for Alternative Finance defines peer-to-peer loans as an alternative financing instrument (Wardrop et al. 2015). Concurrently, as peer-to-peer loans are alternative financing, they are alternative investments, although alternative finance's and alternative investments' spectrums are defined differently. Peer-to-peer loans offer investors a novel way to invest in SME-sector loans, which is an area, where small investors had not been able to invest cost effectively before online peer-to-peer loans. The question of does peer-to-peer loans offer diversification benefits compared to other investments is premature to answer due to the novelty of the peer-to-peer loans and limited amount of data.

### **3.7 Taxation**

Profitability of any investments is highly affected by the tax treatment of the income of the particular investment. There are also ways to reduce the tax burden by planning ahead how and when certain income is taxed. In this section is explained the current situation of the tax treatment of peer-to-peer lending from the private person's and the companies' perspective in Finland.

#### **3.7.1 Private persons**

In Finland a taxable person must pay income taxes gained as interests on capital (Income Taxation Act 33§ 30.12.1992/1535). Also the Act (28.12.1990/1341) concerning withholding taxes at the source might come applicable in certain cases (see Myrsky & Rabinä 2014 more about the differences of the two Acts), if the loans are offered as form of bonds, which require prospectus. In case of peer-to-peer lending this would rarely be the case, since the limit for the requirement to publish prospec-

tus has been recently raised to amount of 2.5 million euros in total per security per year (change for the Securities Markets Act 23.10.2015/1278).

The tax rate for capital gains is 30% and gains over 30.000€ are taxed at rate of 33% (Income Taxation Act 124.2§). This is for year 2015 and the tax rate has changed almost yearly so it is likely it will change in the future. Default of loans makes the taxation even harsher, because the losses cannot be deducted. The Finnish Tax administration (2015) has specially pointed out that loans between private persons are not deductible. Although in the case of peer-to-peer business lending the question of the deduction of losses is open and unclear, since the law does not define particularly deductible losses. Comparing to other publicly available fixed income instruments, where losses can be deducted from taxes, this makes peer-to-peer lending less attractive investment, especially if the default rates get high.

### 3.7.2 Companies

Companies are taxed differently than private persons, when investing through peer-to-peer lending. The tax rate for companies is 20% (Income Taxation Act 124.2§) and companies can deduct all losses contrary to private persons (Business Taxation Act 17.1:2§ 24.6.1968/360). For the time being it is much more profitable to invest in peer-to-peer loans via a company than as a private person.

## 4 EMPIRICAL STUDY SETTING

### 4.1 Research problem and hypotheses

Do higher interest rates bring a higher risk in peer-to-peer business lending? How the risks of peer-to-peer business lending can be measured? Is the interest rate determined by the riskiness of the loan? This thesis tries to answer to these questions by analyzing the data in view of the following hypotheses:

*H<sub>1</sub> = Higher interest rate correlates with more delays*

*H<sub>0</sub> = Higher interest rate does not correlate with more delays*

*H<sub>11</sub> = Longer loan period correlates with higher interest rate*

*H<sub>12</sub> = Longer loan period does not correlate with higher interest rate*

*H<sub>21</sub> = Lower credit score correlates with higher interest rate*

*H<sub>22</sub> = Lower credit score does not correlate with higher interest rate*

First hypothesis is set to find out is there bigger risk premium to those loans that have realized bigger risk. The delays are a proxy for the possible default of the loans. The second one is to find out does the length of the loan period affect the interest rate. The third hypothesis is to show does the perceived risk of the loans determine the risk premium.

### 4.2 Data

The data is from two platforms offering peer-to-peer business lending in Finland. To best of my knowledge there are only three platforms offering these services in Finnish markets. In preparatory work for the draft Crowdfunding Act are mentioned only two platforms so in that respective the data is fairly comprehensive. Also the data

consists the whole period the platforms have existed, from the beginning to the point when the data was obtained. There are two datasets, one from Fundu Oy and one from Yrityslainat.fi (Vauraus Suomi Oy). The Fundu dataset contains only 48 observations. This is due to the novelty of the business area. First loan intermediated through Fundu is from April 2014. The Yrityslainat.fi dataset has 419 observations and the first observation is from August 2013.

The Fundu dataset contains the amount of loan capital, interest rate and loan period. There are also time period information for the fulfillment of the capital and the time of repayment. The data of repayment times shows the delays of the repayments if there is any. There have been no defaults yet. The Yrityslainat.fi dataset has the same information as the Fundu dataset except there is no information of delays or defaults and the dataset includes credit scores of the loans. Partly the reason for the lack of delay and default information is that the loan period for the latter dataset is much longer. Since the mean length of the loan period in the Yrityslainat.fi dataset is four years, most of the loans have not yet reached maturity.

Yrityslainat.fi offers an option for the fund raiser to choose, whether to use take-it-all or all-or-nothing method to raise the loan capital. The dataset does not include information of which method the fund raiser has chosen, but at least 72 loans was raised using the take-it-all mechanism, since those 72 loans has been granted without reaching the target amount of capital.

**Table 2: Summary statistics of loans intermediated by Fundu**

48 loans intermediated by Fundu			
	Loan capital	Interest rate	Loan period
	€	%	Months
Mean	37 179	9,4	7,2
Median	40000	9,0	7,0
Sd	15555	1,3	3,3

**Table 3: Summary statistics of loans intermediated by Yrityslainat.fi**

419 loans intermediated by Yrityslainat.fi				
	Loan capital	Interest rate	Loan period	Credit score
	€	%	Years	1 to 5
Mean	90644	9,1	4	2,68
Median	50000	8	5	3
Sd	105527	2,9	1,48	1,23

### 4.3 Methodology

I will study the risks of peer-to-peer business lending in two parts. First I will run regression to analyze if the loan period or the delays of repayments correlate with the interest rates. In the second part of the study I will compare the information given and the terms of the loans between different platforms. For example has there been made credit rating for the borrower. If it is given, how it has been constructed and by whom it is done. Also are there required guarantees or collaterals, which effect substantially to the riskiness of the loans.

The regression analysis done in the first part is following:

$$r_i = \alpha + \beta_1 LPER + \varepsilon \quad 1)$$

$$r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \varepsilon \quad 2)$$

$$r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_4 EARLY + \beta_5 EARLYMIDDLE + \beta_6 LATEMIDDLE + \varepsilon \quad 3)$$

$$r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 CSCO + \varepsilon \quad 4)$$

In the above equations  $r_i$  is the interest rate,  $LPER$  is the length of the loan period,  $ACAP$  is the amount of loan capital and  $CSCO$  is the credit score of the loan. Both data sets are also divided into four quarter time periods to analyze has the interest rate decreased, when the business has matured. The time periods are same length and they are numbered from one to four as categories. Same control variables are used as

above. The most recent period is used as the preference category. The variables for these are named as *EARLY* for the first quarter, *EARLYMIDDLE* for the second quarter, *LATEMIDDLE* for the third quarter and the last, most recent quarter is the preference where the other quarters are compared to.

The regression run on delays (*DEL*) is done in two ways. First way, the equation 5, it is done by using a dummy variable for the delay. If the loan is delayed the value of the dummy is one ( $DEL = 1$ ), otherwise zero ( $DEL = 0$ ). The length of the loan period and the amount of the loan capital are used as control variables. In another way the regression is run based on the duration of the delay (*DDEL*). This is presented in the equation 6.

$$r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 DEL + \varepsilon \quad 5)$$

$$r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 DDEL + \varepsilon \quad 6)$$

The analysis differs between the two platforms, since the available data varies between the platforms. For the Yrityslainat.fi dataset, which includes credit scores of the loans, is run the regression with explanatory variable *CSCO* and for the Fundu dataset with explanatory variables *DEL* and *DDEL*.

## 5 RESULTS

### 5.1 Quantitative analysis

In this part is shown the results of the regressions run on the data. Table 4 presents the results of the regressions without the delay variables. In the Yrityslainat.fi dataset the explanatory variables are able to explain the interest rate much more compared to the Fundu dataset. The adjusted  $R^2$  are around 14% and 37%, respectively. In the time period variables the number of loans are 5 for the early period, 8 for the early middle period, 14 for the late middle period and 21 for the most recent period in the Fundu dataset and in the Yrityslainat.fi data set 36, 87, 129 and 167, respectively. It can be seen from these numbers that the popularity of peer-to-peer business loans has increased in Finland. This is in line with the development in other countries as was found out in the literature review.

The regressions show that longer the time to maturity for a loan ( $LPER$ ) is, the smaller the interest rate is in both data sets. The effect is statistically significant at 1% level. According to these results the interest rate does not include risk premium for the greater uncertainty of the repayment due to the longer time period to the repayment. This rejects the second hypothesis ( $H_{II}$ ). In case of consumer loans Emekter, Tu, Jirasakuldech and Lu (2015) found out clearly that longer the time to maturity was the more likely was the default, so there is a higher risk related to the longer loan period. Additionally Emekter et al. found out in the same study that the higher interest rates for riskier loans were not high enough to compensate for the higher risk. The results found in this paper indicate the same that there is not compensation for the longer loan period.

The size of the loan ( $ACAP$ ) does not have statistically significant effect to the loan's interest rate. Compared to consumer peer-to-peer loans, Kumar (2007) found that higher the loan amount was the higher the interest rate was. Weiss, Pelger and Horsch (2010) did not find any statistical effect for the size of the loan in their study of consumer loans. That is similar result as found here. Additionally, in business loans the effect is much smaller compared to the length of the loan period. These results might implicate that the demand and supply mechanism does not work for the

pricing of the loans or the time period for the supply and demand mechanism to take effect has been too short. The assumption would be that to gather larger amount of capital the fund raiser needs to offer bigger returns i.e. interest rate for the loan to achieve the target amount.

Other factor explaining the results could be the short period of time the peer-to-peer loans has been available. The market participants have not had enough experience to adjust the demand and supply according to the interest rate. For instance fund raiser who has had multiple financing rounds has information to what level to set the interest rate to achieve certain amount of capital. Freedman and Jin (2011) have shown that funders had adjusted their lending behavior when they gained more experience of the risk and returns of the loans. Their results are based on data of consumer loans, but the results are comparable to business loans. The results in this paper imply though that there are other more prominent determinants for the interest rate. Additionally it is hard to analyze, which way the cause and effect relation runs. In other words there is possibility for reverse causality. The interest rate offered determines the interest of the funders to provide the loan capital and on the other hand the interest rate is set based on the information of the willingness of the funders to lend at certain interest rate. This is especially true on platforms, where interest rate is determined in auction (Iyer et al. 2013). On the other hand the results presented here are in line with the assumption that there is so much funding available that the amount raised does not affect the interest rate.

Also the mechanism of the financing round affects how the fund raiser is able to set the interest rate. If the financing round is done with take-it-all mechanism, the fund raiser is able to set the interest rate lower, because in this case the fund raiser is not required to expect to get the whole amount. If the financing round is all-or-nothing, then the fund raiser is likely to set the interest rate higher to incentivize the funders to provide the targeted amount. The Yrityslainat.fi platform has an option to choose, which mechanism the fund raiser wants to use. Also there can be set certain level, what must be reached for the financing round to be successful. This can be set for example to 80%. In the Yrityslainat.fi dataset at least 72 loans has been raised with the take-it-all mechanism, since they have not reached the targeted amount of capital. If there had been information of which loans were raised by what mechanism, it

could have been interesting to analyze how this would have affected the interest rates.

Time of issue does not have statistically significant effect on the interest rate in the Fundu dataset, but in the Yrityslainat.fi dataset it has. The earlier loans have had higher interest rate compared to the most recent period. This is not explained by the change in overall market interest rates, since the ECB (European Central Bank) interest rates has remained close to same level the whole observation period (ECB statistics). These results could implicate that the higher interest rates has been used to start the business cycle distinctive to two-sided markets. Also there could have been uncertainty in evaluating the risk of the loans offered and it has been compensated by the higher return.

Credit score (*CSCO*) has a statistically significant negative relation to the interest rate, although its marginal effect is only half of the length of the loan period's marginal effect<sup>1</sup>. This means that the third hypothesis can be accepted ( $H_{21}$ ). The results are similar to what Iyer et al. (2009) and Weiss et al. (2010) have found out on peer-to-peer loans intermediated to private persons. Serrano-Cinca, Gutierrez-Nieto and Lopez-Palacios (2015) found in more recent study as well that the interest rate depends on the credit score assigned to the fund raiser. Also according to the information on the platform's web page the interest rate should be lower for higher rated loans. Although the correlation is smaller than could be expected if the main determinant would be the credit score as stated on the web page.

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<sup>1</sup> The effects are comparable, since the regression model is linear and the unit size of the variables is similar. The marginal effect for length of the loan period is -0.0094 and for the credit score it is -0.0048. The marginal effects are calculated as a partial derivative of the mean of the independent variable with R package 'mfx'.

**Table 4: Regression results explaining the interest rate of peer-to-peer business loans**

	Fundu dataset			Yrityslainat.fi dataset			
	Eq1	Eq2	Eq3	Eq1	Eq2	Eq3	Eq4
Length of loan period ( <i>LPER</i> )	-0.16** (-3.0)	-0.17** (-3.0)	-0.19** (-3.3)	-0.011*** (-14.5)	-0.015*** (-14.6)	-0.01*** (-14)	-0.015*** (-15.1)
Amount of capital ( <i>ACAP</i> )		7.3e <sup>-6</sup> (0.6)	2.1e <sup>-6</sup> (0.17)		1.8e <sup>-8</sup> (1.6)	1.6e <sup>-8</sup> (1.56)	2.8e <sup>-8</sup> * (2.6)
Time of issue:							
<i>EARLY</i>			-0.64 (-1.0)			0.026*** (6.3)	
<i>EARLYMIDDLE</i>			-0.87 (-1.5)			-0.007* (-2.4)	
<i>LATEMIDDLE</i>			-0.08 (0.2)			-0.007** (-2.7)	
Credit score ( <i>CSCO</i> )							-0.0049*** (-5.3)
<i>N</i>	48	48	48	419	419	419	419
Adj. <i>R</i> <sup>2</sup>	0.15	0.13	0.14	0.33	0.34	0.43	0.38

Eq1:  $r_i = \alpha + \beta_1 LPER + \varepsilon$ , Eq2:  $r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \varepsilon$ , Eq3:  $r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_4 EARLY + \beta_5 EARLYMIDDLE + \beta_6 LATEMIDDLE + \varepsilon$ , Eq4:  $r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 CSCO + \varepsilon$ . The reference category for the time of issue is the most recent period. *t*-values are in parentheses. Statistical significance: \*\*\* = 0.1% level, \*\* = 1% level, \* = 5% level.

Table 5 presents the results for the relation between delays and interest rates. For the comparison the regressions are run with same stages as in the Table 4 so that the effect of amount of capital and length of the loan period can be seen in the dataset among the loans that have been repaid. The effect of these two variables increases when the number of observations drops from 48 observations to 17 observations and the explanatory power of the variables increases significantly. For example adjusted  $R^2$  increases from 15% to 44% for the regression, where the length of loan period is the only explanatory variable (Equation 1).

The length of the loan period remains as statistically significant variable and the amount of capital insignificant. Both, the dummy variable and the measurement for the duration of the delays are statistically insignificant. This could be due to the low number of observations (17) and low number of delayed loans (6). The effects of these are opposite. The dummy variable for delays decreases the interest rate and the duration variable increases the interest rate, although the effect is small. There is big outlier in the duration data, which effects the results. It is not removed here, since the results are insignificant either way. So in the light of the first hypothesis ( $H_1$ ) it cannot be determined does it hold or not.

The variables in the regression with the dummy variable are able to explain the interest rate by 36% and in the regression with the duration variable by 45%. As there has not been any defaults yet the delays can be used as a proxy for the default and thus for the riskiness of the loans. This risk should then be compensated in higher interest rate. Other studies directly using the default rate as the explanatory variable have shown that the default rate correlates with the interest rate in consumer peer-to-peer loans (Everett 2015). Although, there has been discussion about the higher interest rates causing the higher rate of defaults. When the interest rate is higher the fund raiser has more difficulties in repayment. (Iyer et al. 2009)

**Table 5: Relation of delays with interest rate**

Fundu dataset; repaid loans				
	Eq1	Eq2	Eq5	Eq6
Length of loan period ( <i>LPER</i> )	-0.37** (-3.7)	-0.36** (-3.5)	-0.37** (-3.2)	-0.32** (-3.1)
Amount of capital ( <i>ACAP</i> )		9e <sup>-6</sup> (0.45)	7.8e <sup>-6</sup> (0.37)	1.8e <sup>-5</sup> (0.88)
Repayment delayed ( <i>DEL</i> )			-0.17 (-0.22)	
Duration of the delay ( <i>DDEL</i> )				0.023 (1.5)
<i>N</i>	17	17	17	17
Adj. <i>R</i> <sup>2</sup>	0.44	0.41	0.36	0.45

$$\text{Eq1: } r_i = \alpha + \beta_1 LPER + \varepsilon, \text{ Eq2: } r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \varepsilon,$$

$$\text{Eq5: } r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 DEL + \varepsilon,$$

$$\text{Eq6: } r_i = \alpha + \beta_1 LPER + \beta_2 ACAP + \beta_3 DDEL + \varepsilon. \text{ } t\text{-values are in parentheses. Statistical significance: *** = 0.1\% level, ** = 1\% level, * = 5\% level.}$$

## 5.2 Qualitative analysis

In this part is analyzed the information offered on the two peer-to-peer platforms, which data was used in the previous part. Klafft (2008) has shown in case of consumer peer-to-peer loans that following certain principles in screening the loans significantly decreases the risks of losing the investment. For example he screens the fund raisers by their debt to income ratio. Similarly in case of business loans, for example the loan amount can be compared to the turnover of the company or to the equity of the company. This ratio can be then used as a screening criterion. The quality and the amount of information of the fund raisers affect how effectively investors are able to evaluate the risk of default of particular loan. Since the available data used in the previous part is not fund raiser specific and most of the loans have not matured, it has not been possible in this thesis to test empirically how the use of this type of information affects the returns of peer-to-peer business loans. However here is described the information offered on the platforms analyzed in this paper and how the information could be used as a base for the investment decisions.

### 5.2.1 Credit scoring systems

Peer-to-peer lending platforms offer a scoring system to help investors to evaluate the riskiness of the loans. Earlier was quantitatively analyzed how the scoring system affects the interest rate of the loans. In this section is analyzed the credit scoring systems of the platforms. This is done by comparing the features of the scoring systems between platforms and to the rating principles of rating agencies and banks.

Yrityslainat.fi has a five star scoring system, where the lowest value is one star and highest five stars. The rating is done in cooperation with Bisnode Finland Oy. There are no details how the rating score is determined. Fundu offers a credit rating done by SijoittajaRESEARCH. The rating is given on a scale of AAA-C with six levels. The rating is done by evaluating three different areas of the company. First is evaluated the economic situation of the company, which consists of cash flow, profitability, capital structure and liquidity. Second area is the management and owners consisting of ownership structure, management's experience and business plan. Third evaluated area is the trade and market situation, which consists of market and competition situation, and the product and customers. All these are scored from one to five with a short explanation, why the certain score is given. The average of the scores then determines what credit rating the company gets. The credit rating also includes a recommendation for a minimum required interest rate. The Fundu's rating is more informative, since there is told how the credit score is built and what has specifically affected a particular firm's rating.

Krahnert and Weber (2001) have listed in their study the typical criteria rating agencies (Standard & Poor's and Moody's) and banks use to evaluate the probability of default. There are three main categories evaluated. The first one is financial risk, which is evaluated based on cash-flow, debt and equity structure, liquidity and return. The second evaluated category is the business situation, which is assessed based on competition, market position and legal risk among other things. The third category is the quality of the management, which is evaluated based on the managerial experience, succession and the quality of accounting. These are quite similar criteria as SijoittajaRESEARCH uses in their evaluation of the loan applicants. This would suggest that the credit score can be useful to evaluate the probability of the default.

Also Serrano-Cinca et al. (2015) have found that the credit score is the most prevalent factor in predicting default on consumer peer-to-peer loans.

### 5.2.2 Other information

Platforms specializing to business loans offer also detailed information about the fund raiser like balance sheet and income statement. Based on this information the investor can make own analysis of the fund raiser besides the credit score. The available information varies between platforms. Yrityslainat.fi has a balance sheet and income statement of the companies applying a loan. There is also a summary of the information obtained from the statement including for instance turnover, profit and equity. The loan application has a short description of the company and for what purpose the loan is intended. From the investors point of view a negative feature is that the loans can be applied anonymously and thus other sources of information cannot be used for the analysis. Although in some cases the company's identity can be deduced from the description of the company.

Fundu has available a company register, company's by-laws and a payment default register of the company applying the loan. The applicants are identified and there is contact information, if the investor needs additional information. There is a description of the company and what for the loan is intended. The investor's risk is highly diminished, since the loans have a guarantee. Additionally, it is stated if the company has applied before for a loan via Fundu. Because part of the loans intermediated by Fundu are bridge loans the fund raisers are also screened by the agency who has granted the original funding. This reduces the investors load to evaluate the financial situation of the fund raiser. For example on average 1% of firms, which are granted funding by Tekes, default per year (Tekes 2015). So it is important to know what type of loan is applied and thus there is information if the loan is bridge loan.

This information can be used in several ways to screen the loans. Wang, Chen and Song (2015) compare the lending mechanisms of peer-to-peer lending and bank lend-

ing. According to them the big data<sup>2</sup> analysis and data mining are key points in screening the fund raisers on online platforms. The problems arise after the loan has been funded and received by the fund raiser, because there is no effective monitoring for the behavior of the fund raiser as in bank lending. Their results are not empirical, since they base their study solely on the evaluation of the decision processes behind the lending mechanisms. This does not invalidate the conclusion that peer-to-peer loans can be screened based on the information available.

Maleki and Aksakalli (2015) propose a random forest model, which is basically multiple decision trees, to evaluate the fund raisers based on the information provided at the peer-to-peer lending platforms. Their results show that the random forest model was better screening good fund raisers compared to credit ratings like FICO<sup>3</sup> score in terms of the rate of defaults in case of consumer loans. This same model could be used to evaluate the business loans, too.

Miller (2015) tested how the additional information increased the investors' ability to screen the loans. She studied how a policy change to offer more information of the fund raisers on Prosper affected the investors' ability to avoid loans with high probability of default. She found that the information shock reduced default rate by 17 percentage points and thus increased the investors' returns by 12 percentage points, even though there was no change in the average interest rates. So investors were able to avoid high risk loans better when there was available more information of the fund raisers. Although she did not specify the method how this additional information was used.

Because the limited data it is not possible here to test how these different methods work in case of business loans. Also, for the same reason it is difficult to evaluate which one of the two platforms offers better information for the purpose of screening the loans. However, the anonymous applications of Yrityslainat.fi would tip the scale towards that Fundu provides better information.

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<sup>2</sup> Big data means large masses of unorganized information (Hilbert 2013).

<sup>3</sup> FICO score is a widely used credit scoring model in USA developed by Fair Isaac Company (Federal Reserve 2007).

### 5.2.3 Wisdom of crowds

Studies have shown that besides the hard number information the soft information can be used effectively to screen the quality of the peer-to-peer loans (Everett 2015). Part of this information is called wisdom of crowds. The probability of predicting certain outcome increases, when there is a bigger crowd making the prediction. Ray (2006) explains how this works in decision markets, also called prediction markets. Decision markets are betting, where anyone can bet for certain outcome. Corporations use decision markets to forecast, for instance sales, earnings and project times. Ray shows as a model how the informed opinions of multiple people increase the probability of a forecast.

Yum, Lee and Chae (2012) test how this wisdom of crowds applies to peer-to-peer lending. They study, do the other lenders' opinions affect the investment decision of an individual. They find that in case of limited amount of information available then lenders use the wisdom of crowds. Those fund raisers who have attracted more capital are considered as more trustworthy in the eyes of the crowd and thus the probability of default is considered to be smaller. Based on this assumption an individual investor follows the behavior of other investors.

Berkovich (2011) found out that using private information in screening consumer loans gave more precise estimate of realized return than using just public information. In his study he defined private information as the information implied by the text and images and the public information as the credit score and as other numerical variables. He also states that the meaning of this private information can be determined from the behavior of other investors. In other words if the investors are bidding more eagerly on certain loan it implies that the private information is considered to increase the likelihood of the repayment. He explains this with a good comparison of two restaurants. The other restaurant has few customers and the other is crowded. One can deduce it is likely that the one, which is packed, has better food quality relative to the price than the one with just few customers. Even though he does not use the term wisdom of crowds his idea is very similar.

Other studies have found similar results (Herzenstein et al. 2011; Zhang & Liu 2012), but also there are contradictory results (Hildebrand et al. 2014) where following other's actions have led to poor outcome. Rationally following to what loans others invest could be beneficial in the case of business loans too. In the Yrityslainat.fi dataset there is loans that have not reached the target amount. So when the loans will mature there would be information of their repayment. It would be then interesting to test have these loans performed worse than those, which reached the target amount. This would imply the crowd's ability to invest more in loans with higher likelihood of repayment.

## 6 CONCLUSIONS

The purpose of this paper was to examine the determinants of interest rate in peer-to-peer business loans and what information there is for the investor to evaluate the riskiness of peer-to-peer business loans. The length of the loan period and the credit score of a loan are the determinants of the interest rates of the peer-to-peer business loans based on the regression analysis done on this paper. Also, the regression results show that there have been higher interest rates close to the introduction of the platform and the interest rates have decreased when the business have matured. This could imply that the higher interest rates have been used to allure customers to invest in peer-to-peer loans. Additionally, peer-to-peer loans might have been seen riskier, when the loans have not been familiar to investors. The results are similar to what other studies have found out on different markets, although the results are not directly comparable, because the earlier studies are done on consumer loans.

At the Finnish market level the results are comprehensive, since the data consists of almost all the peer-to-peer business loans intermediated in Finland by the date the data was gathered. The statistical significance of the results is low, due to the nascent business area and rather small amount of observations. Also there remain several interesting questions to be studied in future when the loans mature and there emerges data of the defaults. In the further studies it would be possible to directly test, do the interest rates compensate for the higher risk and have the credit scores been able to predict the realized risk of the loans.

The proposed Crowdfunding Act will clear the legal environment for the peer-to-peer business loans in Finland. The consumer loans remain outside the scope of the Act, although it could have been useful to specify their regulation also, since consumer loans have been the forerunner in peer-to-peer lending. Additionally, the reduction of losses in taxation remains unclear.

The peer-to-peer loans offer a true alternative to SMEs to raise funding. This could mean that peer-to-peer lending disrupts the traditional ways of funding, which is good since it creates more competition. As an investment they are an interesting op-

tion especially at the time of such low interest rates on more traditional fixed income instruments.

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